

Software Manual Rapid Advanced Version V1.2



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NOTE:This is a software manual written in traditional Chinese. Certain discrepancies exist compared to version written in simplified Chinese.

Chapter 1 Introduction of PM Designer

1. Introduction of software functions

Thank you for purchasing the FV Series Human Machine Interface (HMI) by FAKTEK Automation Corp. All of FATEK's FV Series HMI products work with the editing software PM Designer. In addition to the functions commonly used in the HMI editing software, PM Designer includes many other special functions that are designed for the user's convenience. It is a design software with multiple functions that fully realize the user's imagination.

◆ Superior features

- One project is capable of managing several different FV HMIs.
- Supports 90 degree vertical FV HMI planning.
- Provides the controls of approve/forbid and show/hide for all device operations.
- Supports multiple types of encryption protection schemes.
- Provides arbitrary setting of control/status areas.
- Supports software version of multiple languages with free switching between versions.
- User can freely change the arrangements of software operation interface and display the effects of texts.

◆ Language/Text management

- Supports all WINDOWS fonts.
- Minimum font size 6x8.
- Employs most recent Unicode system and supports free switching between different systems.
- Allows online switching of up to 10 languages/texts.
- Allows specification of individual font in multiple language settings.

◆ Picture/screen management

- Supports picture library and can directly load BMP/JPG/GIF pictures.
- Supports 16 color gray scale/256 color/65535 color.
- Allows display test when object settings are made.

◆ Data/file management

- Management of connection nodes for multiple areas and groups/data alarm (up to 16 areas).
- Management of recipes for multiple areas and groups (up to 16 areas).
- Sampling of historic data and record for multiple areas and groups (up to 16 areas).
- Supports single protection of projects and macros.
- Supports upload/download and restoration of the original data.

◆ Communication

- Supports simultaneous communications of multiple controllers with FV HMI.
- Automatically detects download communication ports by hardware and supports intelligent download.
- Support offline/online simulation and allows direct link to PLC by PC.
- Supports direct download/upload of PLC programs or PLC monitoring via FV HMI.

2. Installation of PM Designer

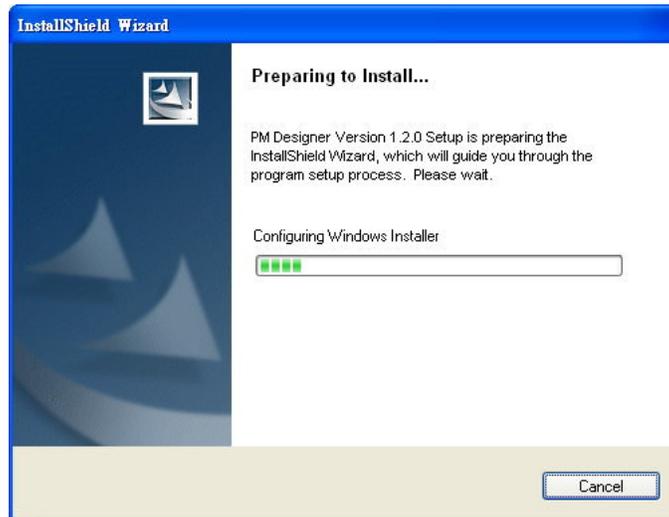
▲ Hardware requirements

- Before installing PM Designer, please verify that your computer meets the following hardware requirements:
- Pentium CPU III
- At least 100MB hard disk drive space.
- At least 64MB system memory.
- RS232 port or network interface (to be used for the communication with FV HMI or program download).
- Installation CD of PM Designer or setup file download from FTP server.
- Operating system: Windows 2000/XP.

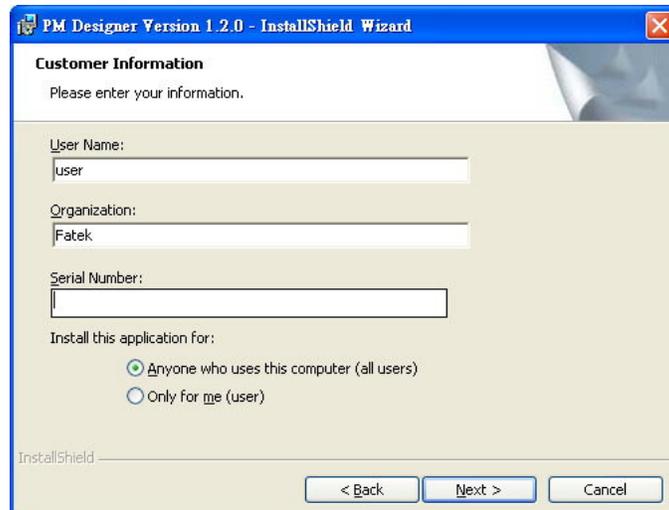
▲ Installation

Note: Please close all running programs. If old versions of PM Designer are installed in the computer, please remove them and proceed with installing the new version.

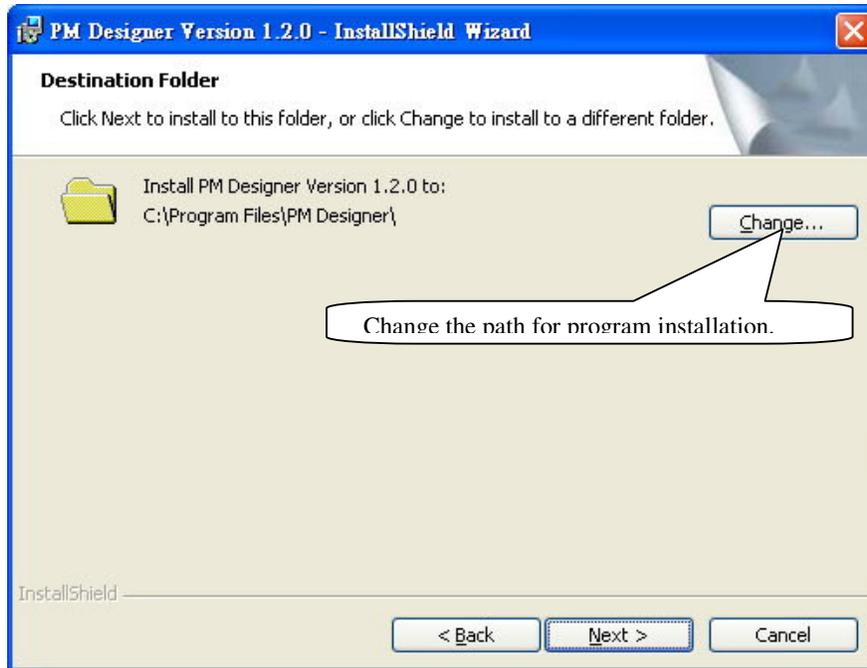
- Click on [SETUP.EXE] in the Setup folder in the installation CD to automatically execute the program, as shown in the figure below:



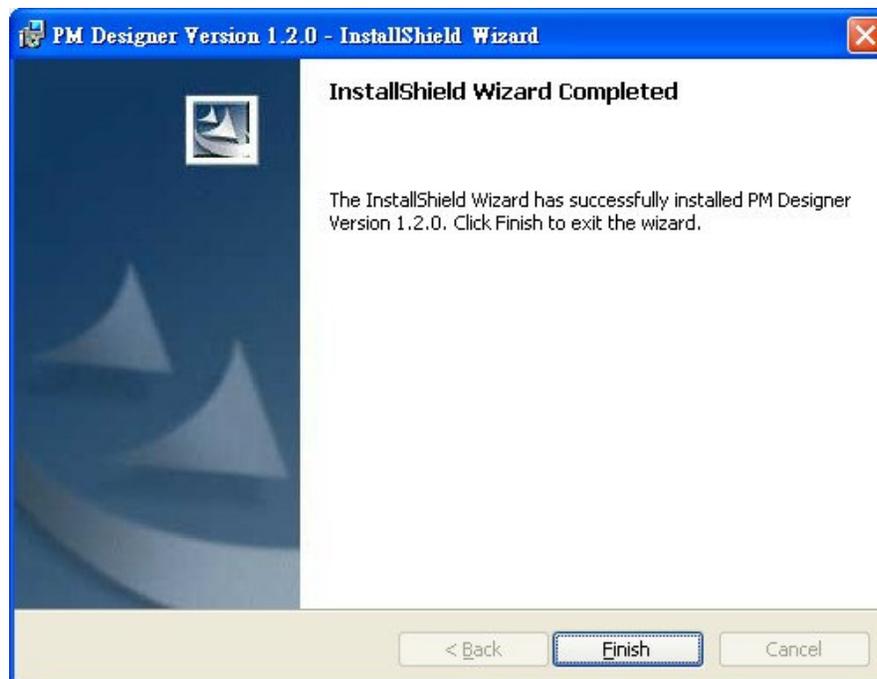
- Follow the instructions during installation and the program will guide you throughout the program setup process, as shown by the following figure:



- Click [Next>] after entering the serial number.



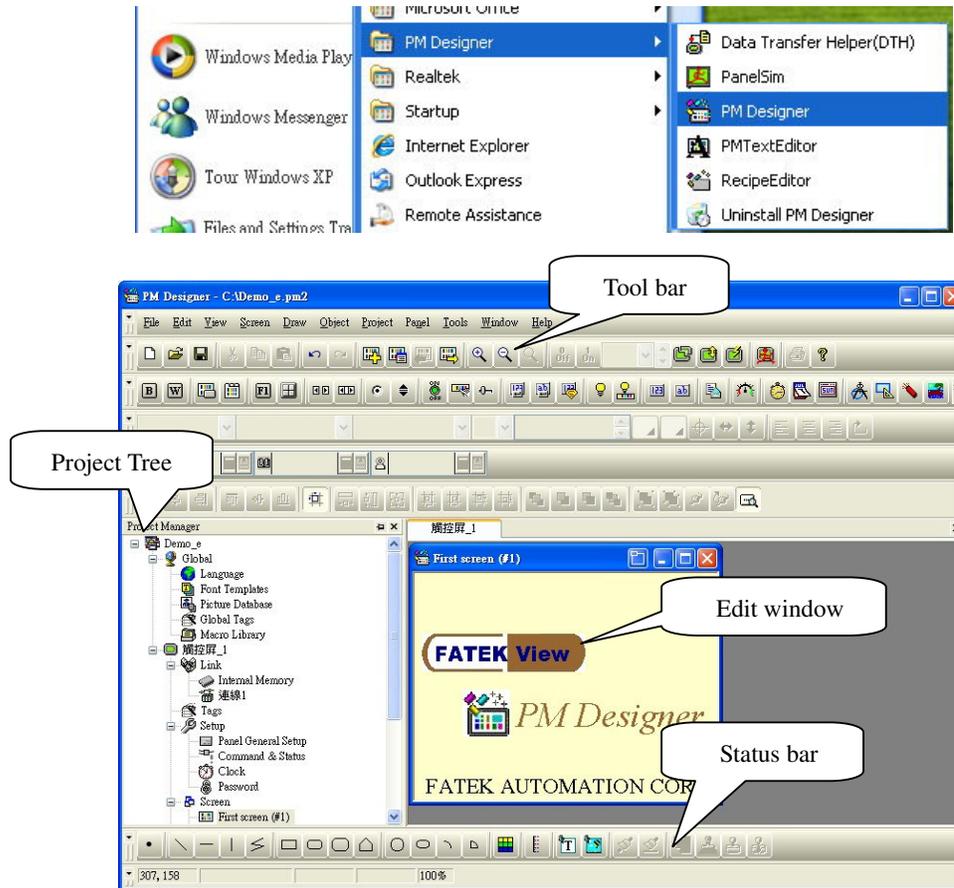
- Follow the instructions to click [Next>] until the installation is complete, as shown in the following figure:



3. Selection of software interface and language

● Program execution

Use the mouse to click [Start] ⇒ [Programs] ⇒ [PM Designer] ⇒ click [PM Designer] as shown in the following figure



▲ Selection of software language

Note: When PM Designer is opened for the first time, the default selection of language is automatic. Now one can select [Tool] ⇒ [Language Selection] ⇒ use the mouse to select the language to use.



- Auto——Select the software language by system default.
- English——Select English as software language.
- Chinese(Simplified) ——Select Simplified Chinese as the software language.
- Chinese(Traditional) ——Select Traditional Chinese as the software language.

4. Creating new projects

▲ Open new file (example: FV035ST-C10-----FATEK FBs/FBe).

- Method 1: Select [File] in tool list ⇒ click [Open].



- Method 2: Directly click the function icon in the toolbar and the following screen will appear upon opening

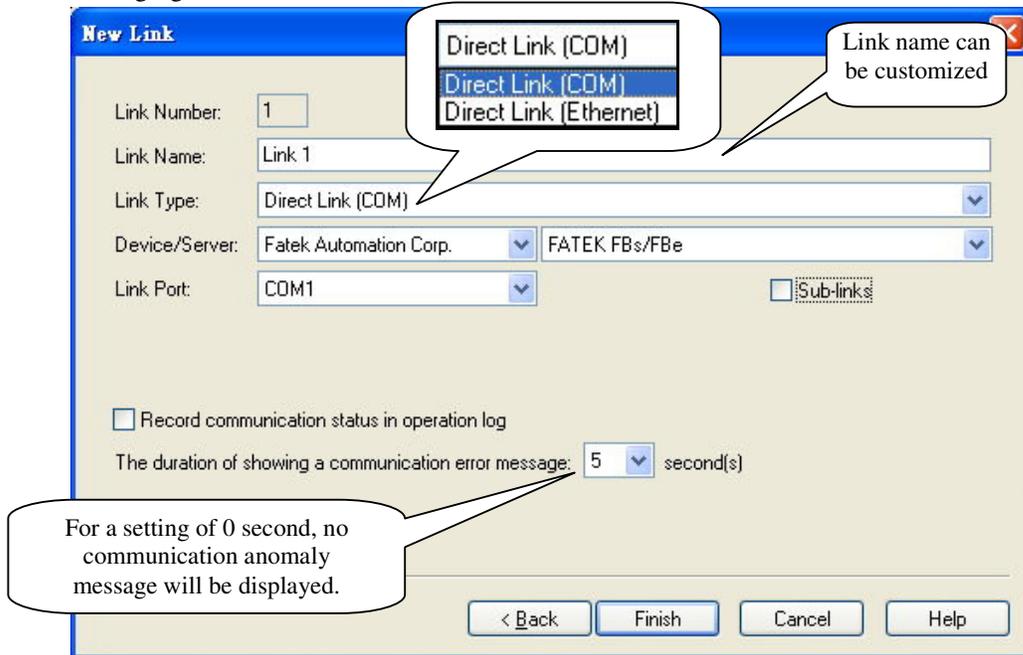
The 'New Project' dialog box features a blue title bar with a close button. It contains two text input fields: 'Project Name' with the text 'DEMO' and 'Location' with the path 'C:\Program Files\PM Designer\'. A 'Browse...' button is positioned to the right of the location field. At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

- ◆ Project Name: name for the current project.
- ◆ Location: Location (path) where the project is stored.

- Click [Next] and enter the **New Panel Dialog Box**. First select the model of FV HMI, as shown in the following figure:

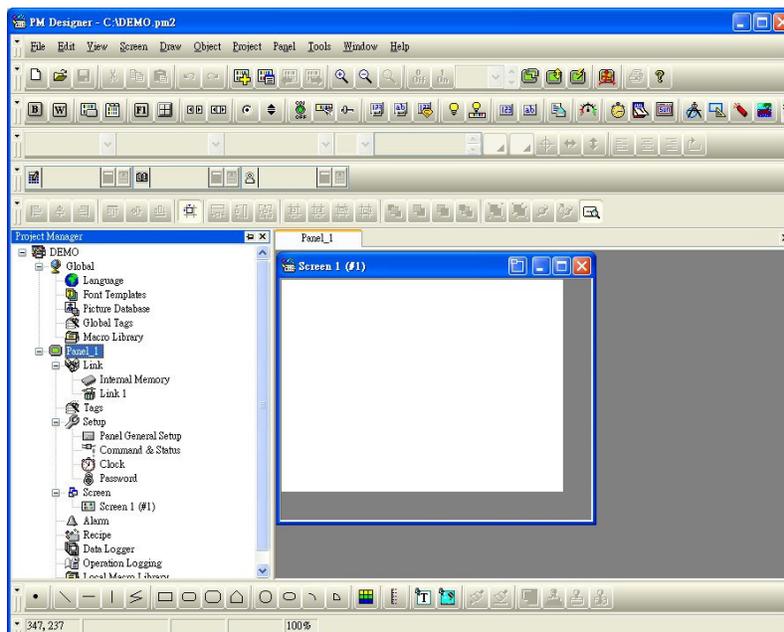
The 'New Panel' dialog box has a blue title bar and a close button. It features a 'Panel Type' dropdown menu set to 'FV035ST-C10' and a 'Panel Name' list box. The list box contains the following items: FV043NT-T21, FV057ST-L11, FV057NT-L11, FV057ST-C11, FV057NT-C11, FV058ST-T11, FV058NT-T11, FV070NT-T41, FV080NT-T31, FV084NT-T51, FV104NT-T31, FV121NT-T51, FV035ST-C10 (highlighted), FV035ST-T10, FV037SK-L00, FV037ST-L00, FV057ST-L10, and FV057ST-T10. At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

- Click [Next] to enter **New Link Dialog Box**. Set the parameters for the control unit to be linked, as shown in the following figure:

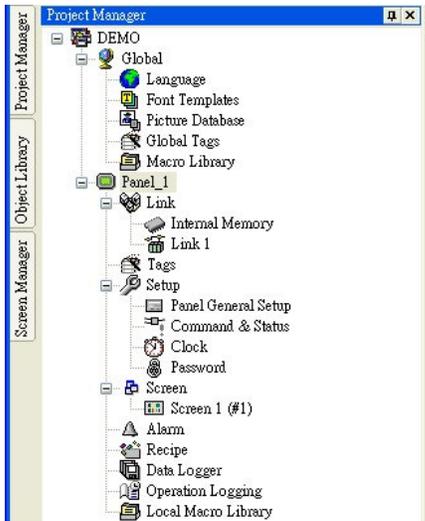


- ◆ Link Name: default name is connection 1, which can be customized.
- ◆ Link type: includes direct connection with PLC or controller, or communication service between two or more FV HMIs.
- ◆ Device/Server: Select the type of PLC or controller connecting to FV HMI.
- ◆ Link Port: Select the communication port to PLC or Ethernet.
- ◆ **Duration of showing a communication error message:** Select the time to perform inspection on the communication between FV HMI and PLC. For a setting of 0 seconds, no message of communication error will be displayed.

- Click [Finish] to enter the software editing environment, as shown in the following figure:

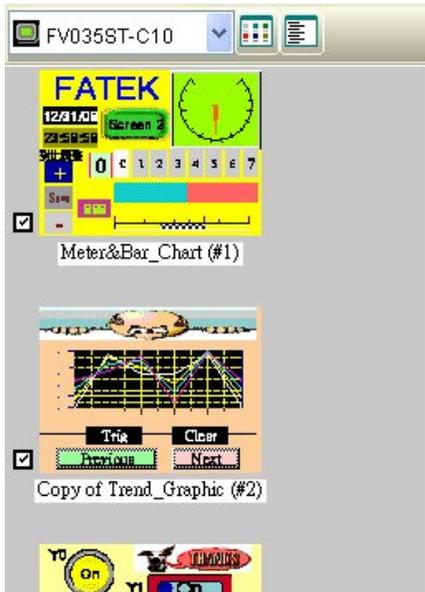


- **Project Manager; Screen Manager; Object Library.**



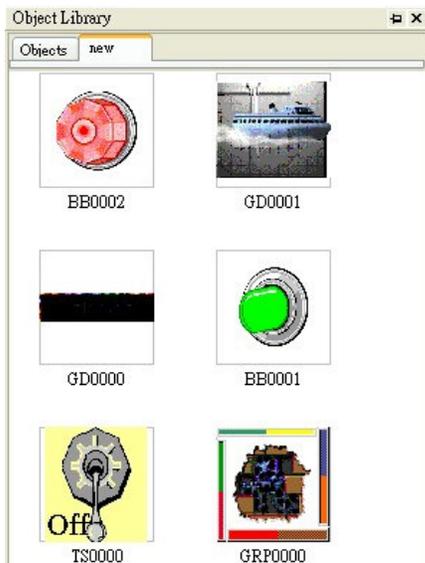
Project Manager:

PM Designer is capable of managing the planning of one or more FV HMIs, which saves the time for future search.



Screen Manager:

PM Designer can scale the screen collectively to make future modifications easier.



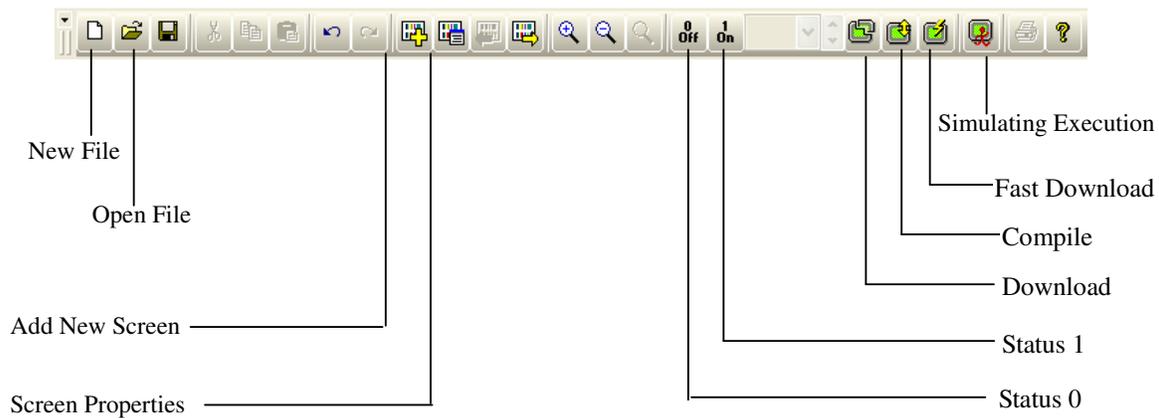
Object Library:

It allows storage and management of the devices such as instruments, keypads, pictures, and switch assemblies designed by the user, enabling them to be located and used by other projects in future planning (see Supplement 3 for details).

5. Introduction of menu and toolbar

- File: Create, open, close, and save a project.
- Edit: Operations of document editing.
- View: Open and close the commonly used toolbar.
- Screen: Create a new screen, open and close an old screen, copy and paste screens.
- Draw: Edit basic picture/text.
- Object: Edit commonly used objects.
- Project: Operation of project files.
- Panel: Upload/download of program files and internal operation of FV HMI.
- Tool: Language selection, simulating execution, and operation of penetrative communication.
- Window: Window operation.
- About: Inquiry of software version and system description.

● Basic Toolbar



● Device Toolbar



- ◆ Move the mouse over the inquired fast key for two seconds and the device description will appear automatically.



- ◆ Fast Key can also display the function descriptions and the associated icons will display at the same time as shown above.

In the following, through creating a simple program, we will explore the design process of an FV HMI and the operation of PM Designer in detail.

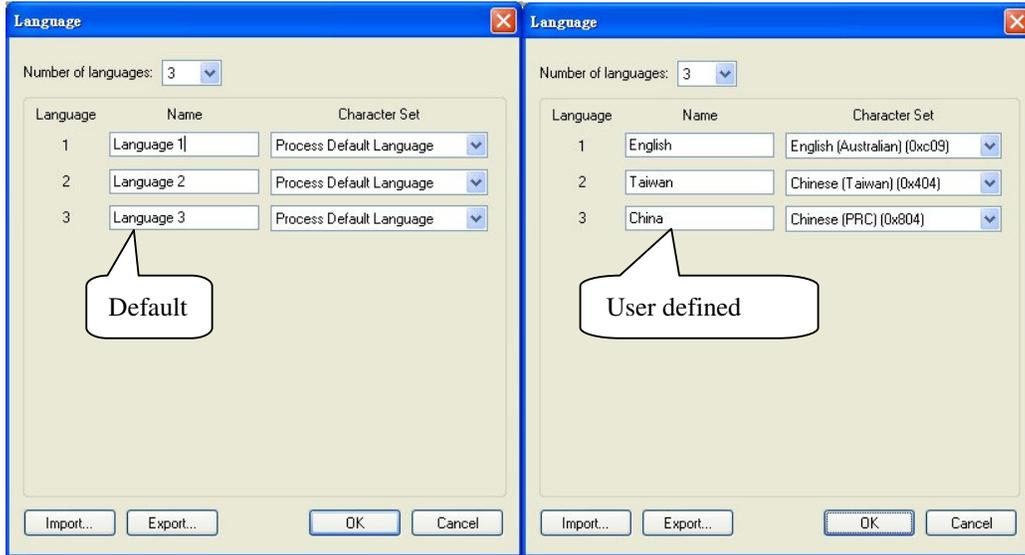
Please refer to the example, where the operation devices include: static text, static picture, display of time and date, GIF display, switch and light, numerical input, numerical display, instrument, column graph, pie graph, slide switch, text button, alarm display, historic trend graph, history data display, scroll button, curves plot, screen change button, function button and setting of multiple languages.

6. Language Setting and Font Templates

- **Language Setting**

Step 1: Add new language

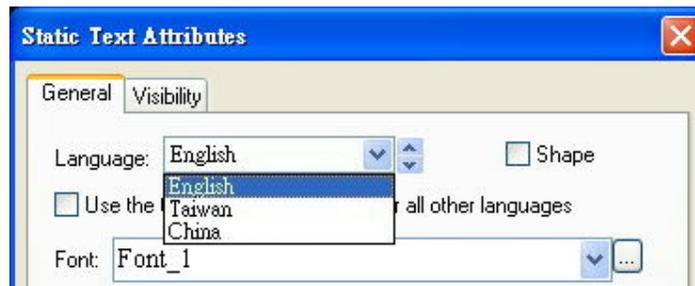
Select [Project] in tool list ⇒ click [Language] or double click the mouse on the [Language] menu in the full page screen of Project Manager, one can open the language setting dialog box, as shown in the figure below:



- ◆ **Number of Languages:** Set the total number of languages to be used in the program by selecting from the pull-down list. A maximum of ten languages can be selected.
- ◆ **Name:** Notation for the selected languages. If the user provides no customized name, the default names will be Language 1~10.
- ◆ **Character Set:** By selecting the types of Unicode language, one can view the languages supported by the system. The default is Process Default Language, which refers to the language used by the computer.

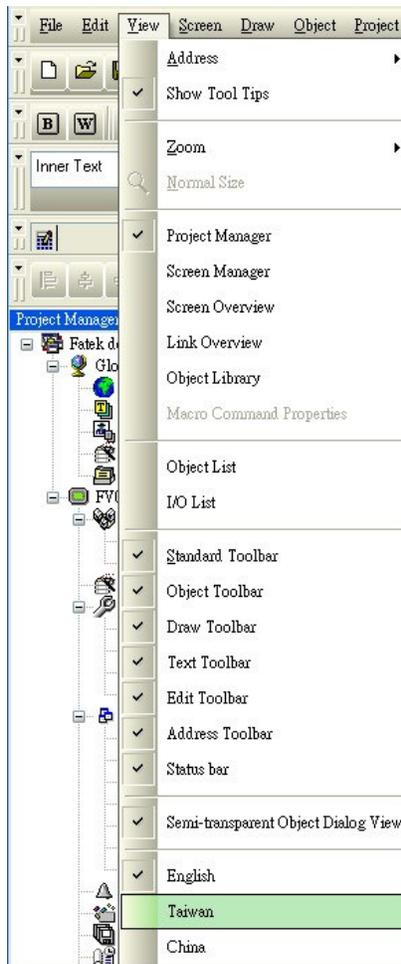
Step 2: Program writing using multiple languages

When the number of languages exceeds one in the language setting, one can set the texts to be displayed by the selected languages. In the case of the above language setting, in defining the properties of the static texts, the pull-down list shows **Taiwan, China, and English** for selection, as shown in the figure below:



This way one can select **Taiwan, China, or English** individually to edit the texts and fonts to be displayed (**Supplement 1**).

The language switch of the entire screen can be done by going to the bottom of the [View] menu in Toolbar, as shown in the figure below.



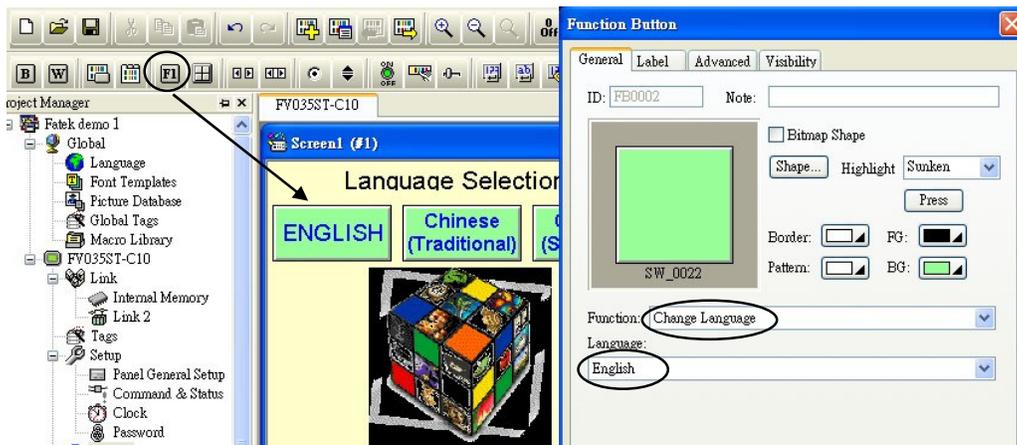
Step 3: Add a function button device for language switch

Select [Object] in Toolbar ⇒ select [Function Button]:

◆ Function Button

Move the mouse to the screen edit area to place the device. Double click the device to open the Function Button properties Dialog Box. Select the function to be executed by this button through the pull-down list.

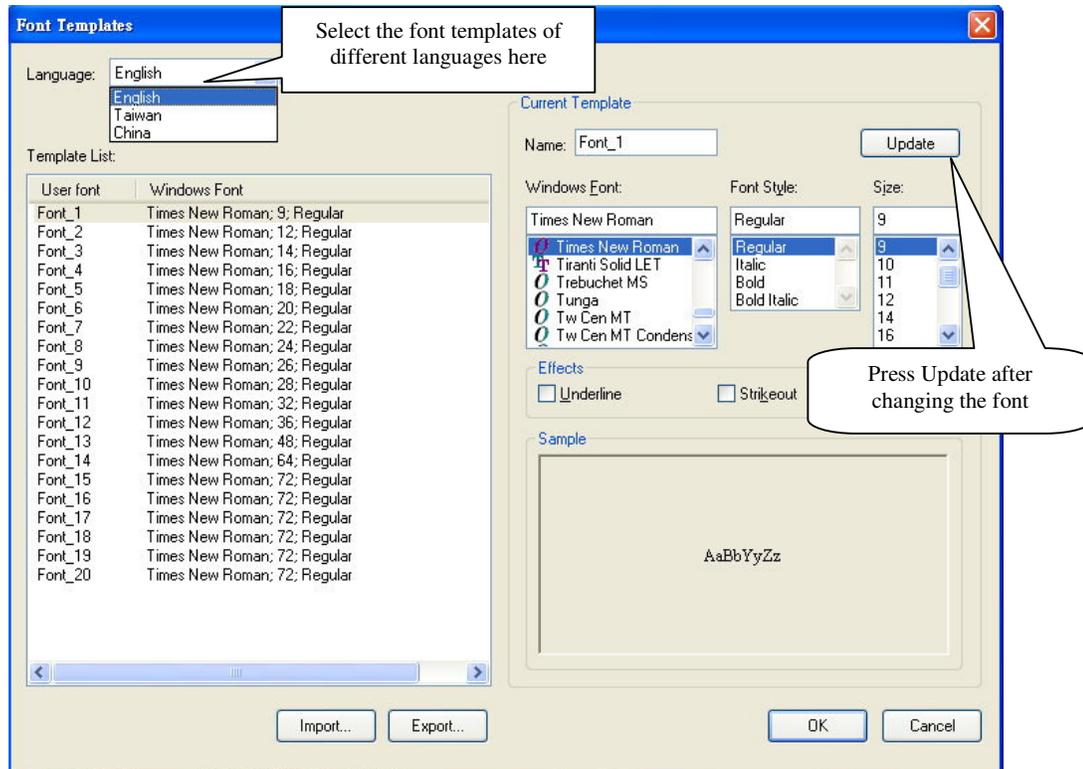
Here we choose the function to change the language and we will see that the language selection menu appears in the space below the function line, as shown in the figure below:



★ Here we can select which language to switch to using this function button.

◆ **Set the corresponding font template of each language.**

Select [Project] in Toolbar ⇒ click [Font template] or double click the Font template menu on the list of Project Manager, one can open the Language Setting Dialog Box, as shown in the following figure:



This way one can directly set the font, type, and size of each language on the list and choose the preset font template of the associated language using the pull-down in the Language Menu.

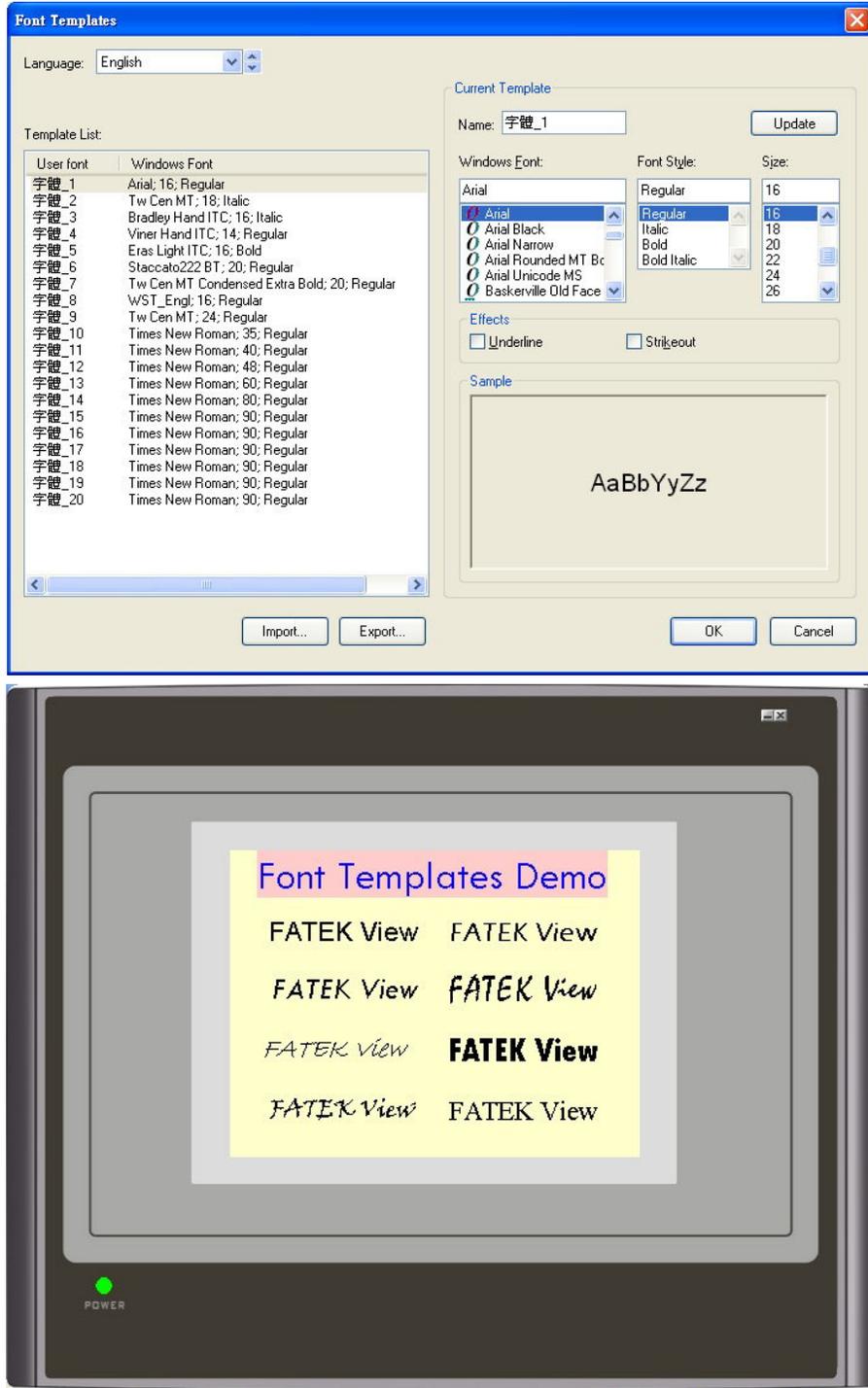
[Example]

1. Set the number of languages to be 2 in the Language Setting Dialog Box, with their names defined as Taiwan and China.
2. Create two new function buttons in screen 1, with the function of changing language. Set the languages of these two buttons to be China and Taiwan, with their labels in Simplified and Traditional Chinese fonts, respectively.
3. Open the Font Template Setting Dialog Box. For Traditional Chinese, set Font_1 to be MingLiU, size 12, Italic; Font_2 to be Kai, size 12, Normal.
4. After the changes are made, click [Update] to complete the changes.

Upon completion of the changes, click [Yes] to exit and complete the design and operation of language switching.

[Special note]

All other pre-installed WINDOWS fonts can be used in the screen design, as shown in the following figure:

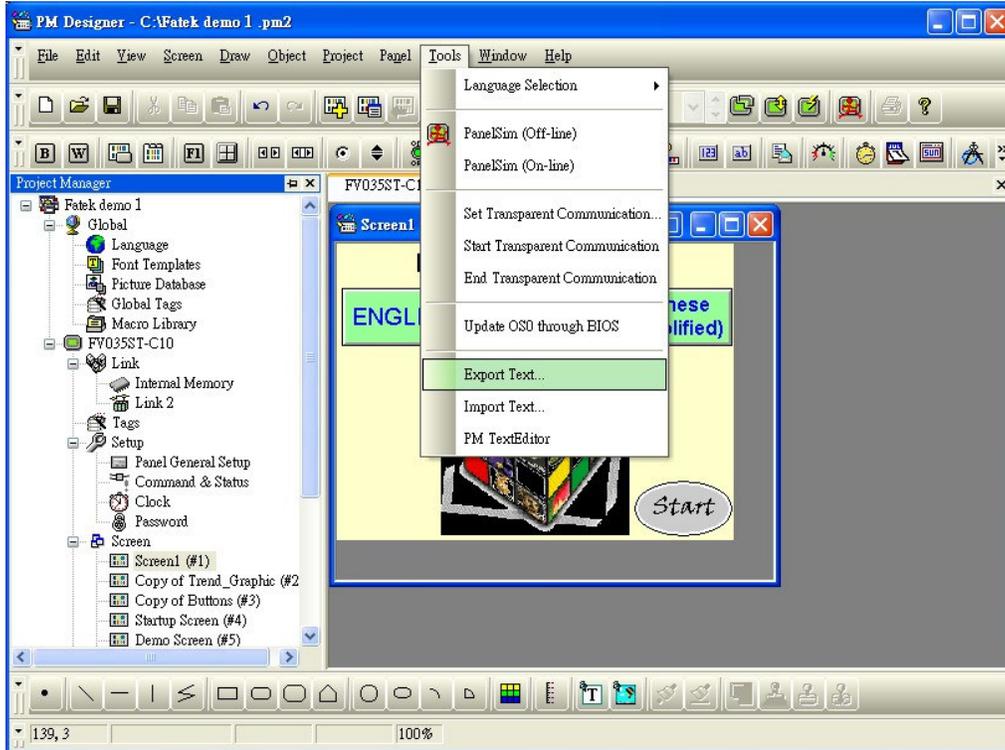


Note that in addition to the fonts provided by WINDOWS, PM Design does not provide any other special fonts. Purchase these special fonts from the software companies that create them.

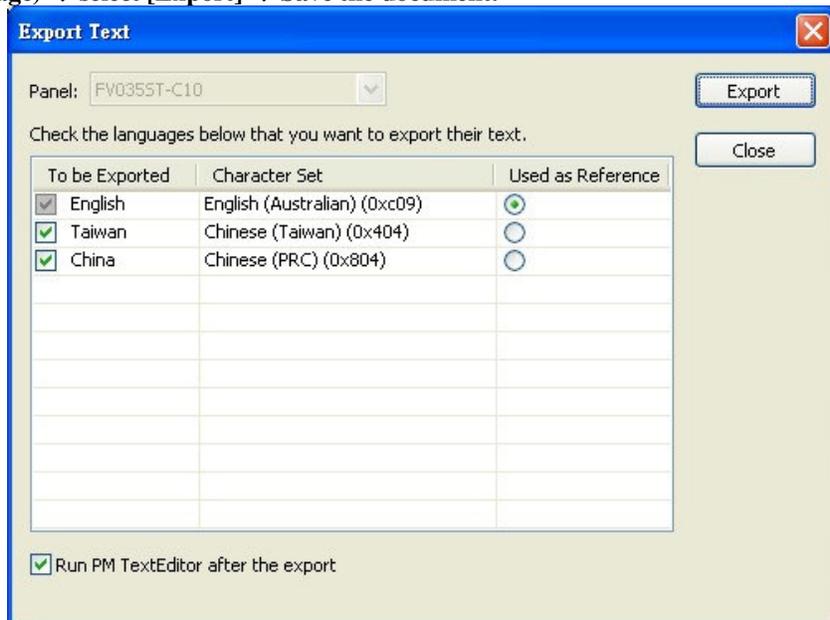
Supplement 1: Export and Import Text

Conventionally the texts of multiple languages must be edited in the same device. As the number of screens and devices increases, chances are more mistakes in editing happen more often. In addition, it makes proofreading very hard and time consuming. PM Designer provides the capability to export and import the screen texts. As long as the user compiles the first language and its texts, this function enables rapid text compiling in other languages.

⊙Step 1: Select [Tools] in Toolbar ⇨ select [Export Text]



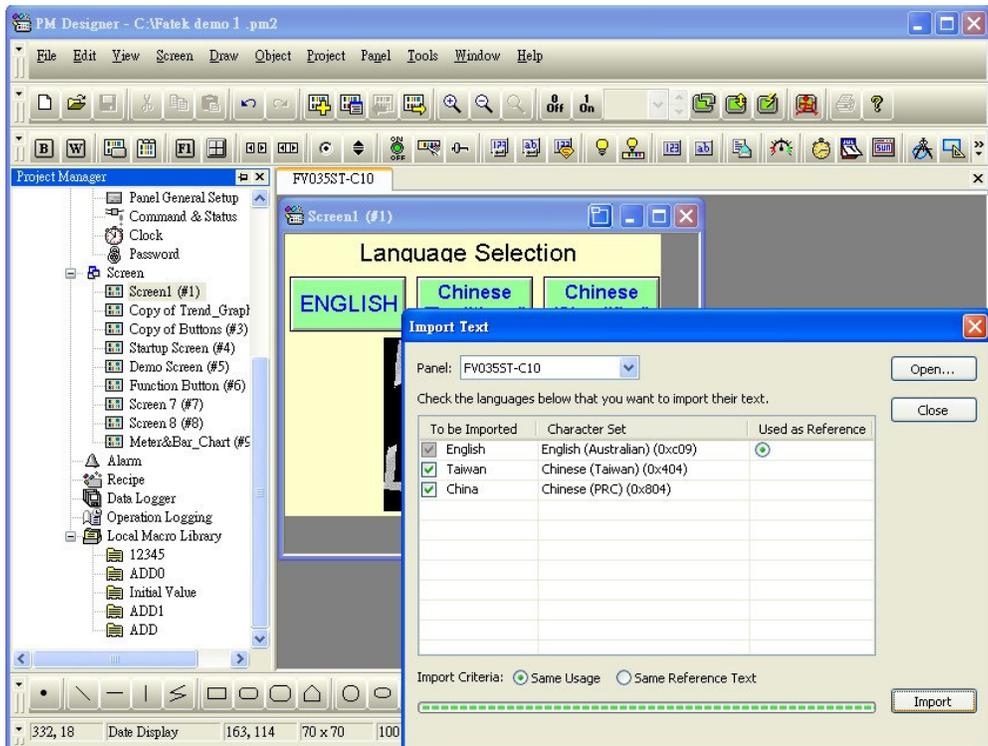
⊙Step 2: Select one language as the reference (of course the user has to finish the text compiling of the reference language) ⇨ select [Export] ⇨ Save the document.



◎Step 3: Open the saved document to edit the texts in other languages ⇒ Import Text.

English(Referenced)	Chinese-Simplified	Chinese-Traditional	Comment
+1000	+1000	+1000	S : panel_1 (1) : WB0000 : S #0
-1000	-1000	-1000	S : panel_1 (1) : WB0001 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0000 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0002 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0003 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0004 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0005 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0006 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0007 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0008 : S #0
Alarm	警報	警報	S : panel_2 (2) : BB0009 : S #0
Alarm panel	警報面板	警報面板	S : panel_2 (2) : BB0000 : S #0
Auto Exec	自動執行	自動執行	S : panel_2 (2) : T0000 : S #0
Bar Graph	柱狀圖	柱狀圖	DL : Data Logger : (1(0)) : D #1
Bar Graph	柱狀圖	柱狀圖	S : panel_1 (1) : T0001 : S #0
Demo : True Color 65535 colors	顯示畫面 : 全彩 65535 色	顯示畫面 : 全彩 65535 色 ors	S : panel_3 (3) : T0000 : S #0
Emergency	警報操作	警報操作	S : panel_2 (2) : BB0001 : S #0
English	English	English	S : panel_1 (1) : FB0002 : S #0
English	English	English	S : panel_2 (2) : FB0000 : S #0
English	English	English	S : panel_3 (3) : FB0000 : S #0
FATEK	FATEK	FATEK	S : panel_1 (1) : T0006 : S #0
Graph	代表柱狀圖	代表柱狀圖	S : panel_2 (2) : MD0001 : S #0
Voltage	電壓	電壓	S : panel_2 (2) : BB0000 : S #1
Processing	處理中	處理中	S : panel_2 (2) : BB0001 : S #1
Operator	人員	人員	S : panel_2 (2) : BB0002 : S #1
Error	錯誤	錯誤	S : panel_2 (2) : BB0003 : S #1
Action	動作	動作	S : panel_2 (2) : BB0004 : S #1
Machine	機械	機械	S : panel_2 (2) : BB0005 : S #1
Program	程式	程式	S : panel_2 (2) : BB0006 : S #1
Stop	停止	停止	S : panel_2 (2) : BB0007 : S #1
Temp	溫度	溫度	S : panel_2 (2) : BB0008 : S #1
Executing	執行中	執行中	S : panel_2 (2) : BB0009 : S #1
Stop	停止	停止	S : panel_2 (2) : TS0000 : S #1
Meter	儀表	儀表	DL : Data Logger : (1(0)) : D #0
Meter	儀表	儀表	S : panel_1 (1) : T0000 : S #0
+1000	+1000	+1000	S : panel_1 (1) : WB0000 : S #0

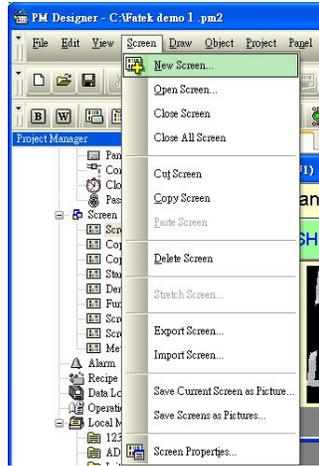
To import text, please select [Tools] in Toolbar ⇒ select [Import Text] ⇒ select [Open].



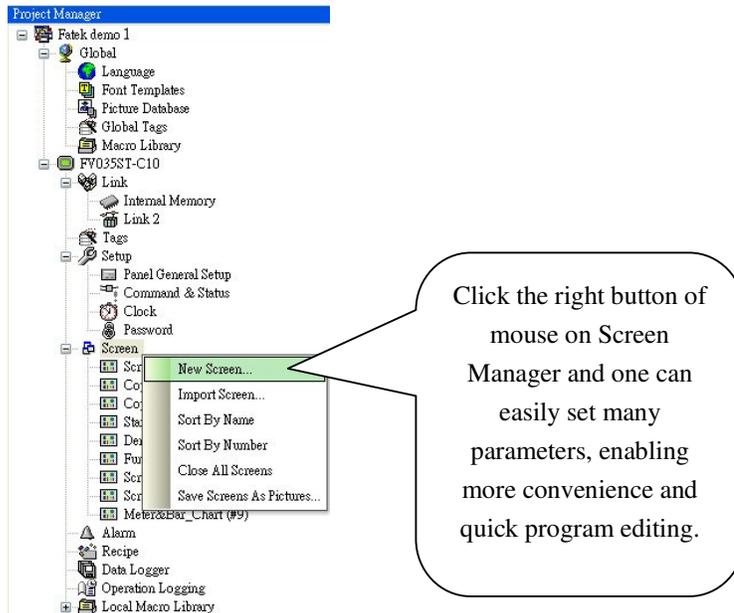
7. Add new screen and set screen properties

● Add new screen

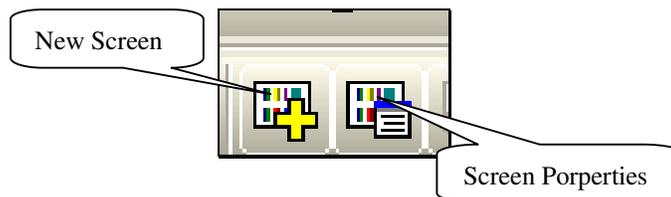
⊙ Method 1 Select [Screen] in Toolbar ⇒ select [New Screen], as shown in the following figure:



⊙ Method 2: In Project Manager ⇒ click the right button of mouse on [Screen] ⇒ select [New Screen].



⊙ Method 3: Click directly the corresponding icon on Toolbar



Using either one of the above methods, the New Screen Dialog Box will appear as shown in the following figure:

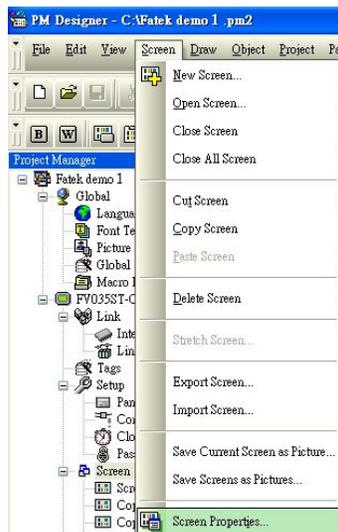


- ◆ **Name:** Name of the new screen.
- ◆ **Number:** Number of the new screen. The “change screen” button switches to the designated screen by matching this number.
- ◆ **Panel:** Effective in the case of simultaneous compiling by multiple FV HMIs, which assigns the new screen to the selected FV HMI.

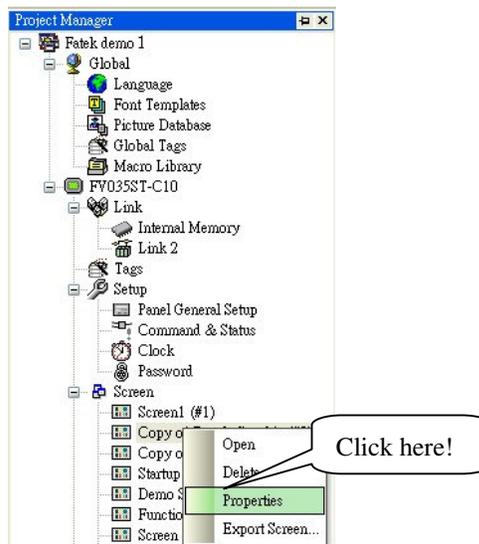
Upon completion of setting, click [OK] to enter the new screen.

● Set screen properties

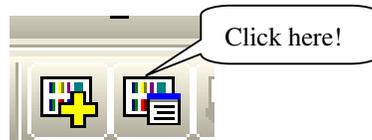
◎Method 1: Click [Screen] in Toolbar ⇒ select [Screen Properties].



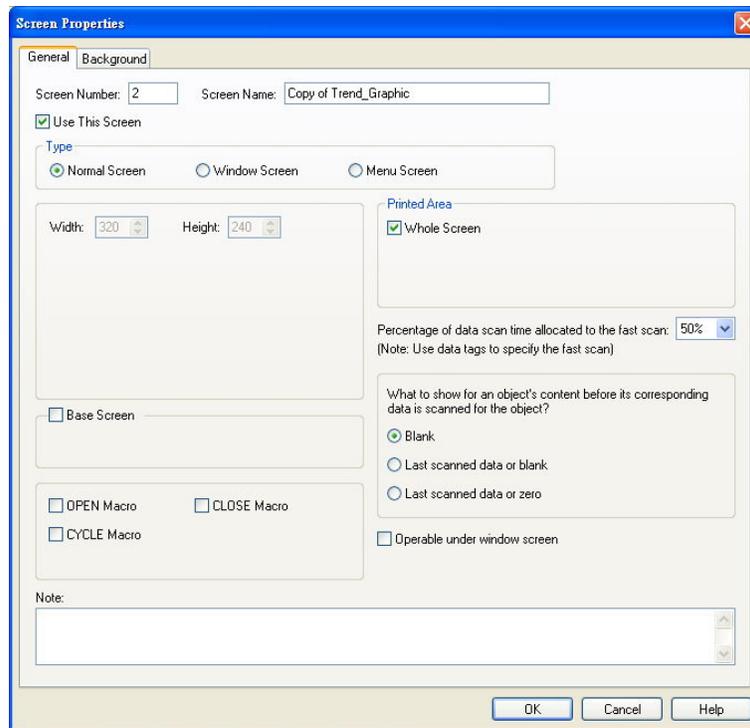
◎Method 2: In Project Manager ⇒ click the right button of mouse on the current screen ⇒ [Properties].



©Method 3: Click directly the icon in Toolbar



Using either one of the above methods, the Screen Properties Dialog Box will appear as shown in the following figure:

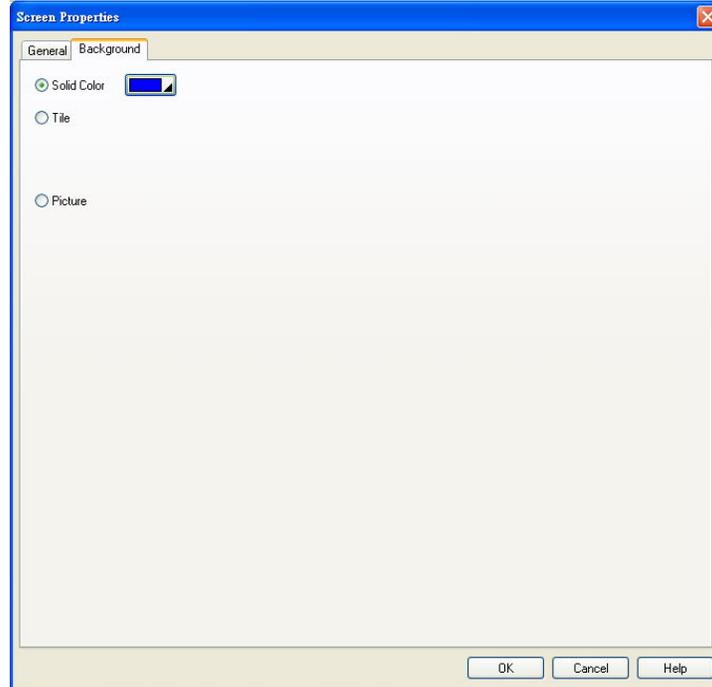


1. [General] Tab

- ◆ **Screen Number:** The number of the current screen can be set as the screen is created.
- ◆ **Screen Name:** The name of the current screen can be specified as the screen is created.
- Use this screen:** Specify whether to use the current screen in the program. It is usually used in program adjustment and test. If unchecked, the current screen will not be processed tentatively.
- **Normal Screen:** Refers to the standard screen corresponding to the selected model of FV HMI.
- **Window Screen:** A pop-up small screen, which allows setting the screen size and display location.
- **Menu Screen:** A display screen with drag and pop-up menu, which allows setting the screen size.
- Base Screen:** Select which screen is to be the background.
- OPEN Macro:** The corresponding macro command every time the current screen is opened.
- CLOSE Macro:** The corresponding macro command will show every time the current screen is closed.
- CYCLE Macro:** As the FV HMI displays the current screen, the corresponding macro command will be executed by the specified time cycle.

2. [Background] Tab

Click the Background tab and the Background Setting Dialog Box will appear as shown in the following figure:



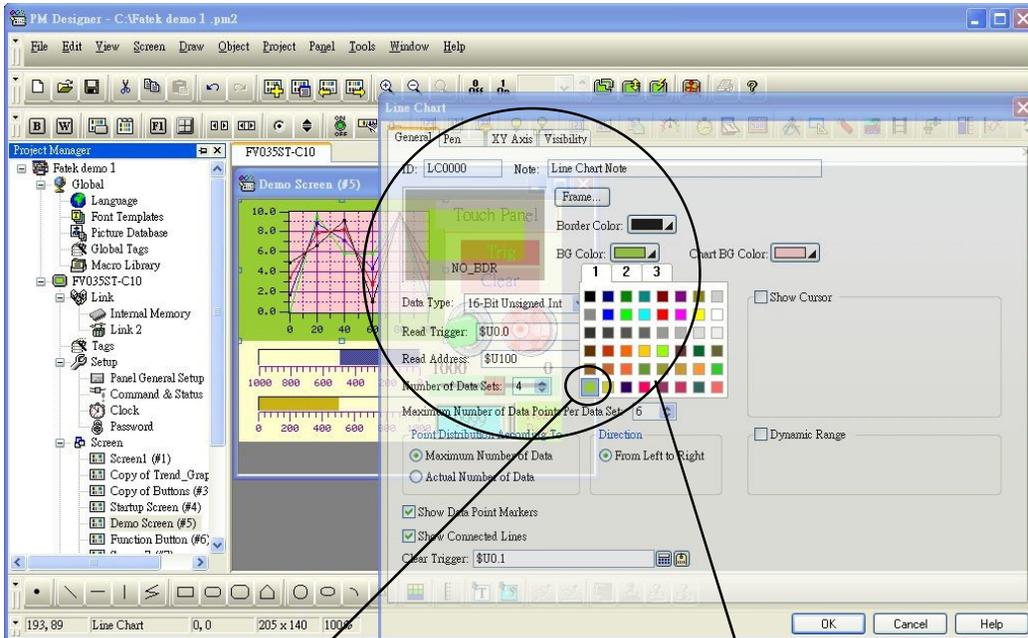
- Ⓐ **Solid Color:** Use single color as the screen background.
- Ⓑ **Tile:** Use the selected pattern as the screen background.
- Ⓒ **Picture:** Use the selected picture (in BMP, JPG or GIF format) as the screen background

[Example]

1. Following the above method, create 8 new screens in a program. Name these screens, numbered from 1 to 8, as Startup Screen, Main Function List, Switch and Light, Numerical Instruments, Alarm Display, Historic Display, Line Chart, and Contact.
2. Set the background color of Switch and Light, Numerical Instruments, Alarm Display, and Historic Display to be orange, blue, red, and green, respectively.
3. Set the screen type of the Main Function List as the Menu Screen, with screen size of 180x360.

View as You Write and Translucent Window Configuration

PM Designer uses the configuration of View as You Write and translucent display, which saves the time of repetitive verification.



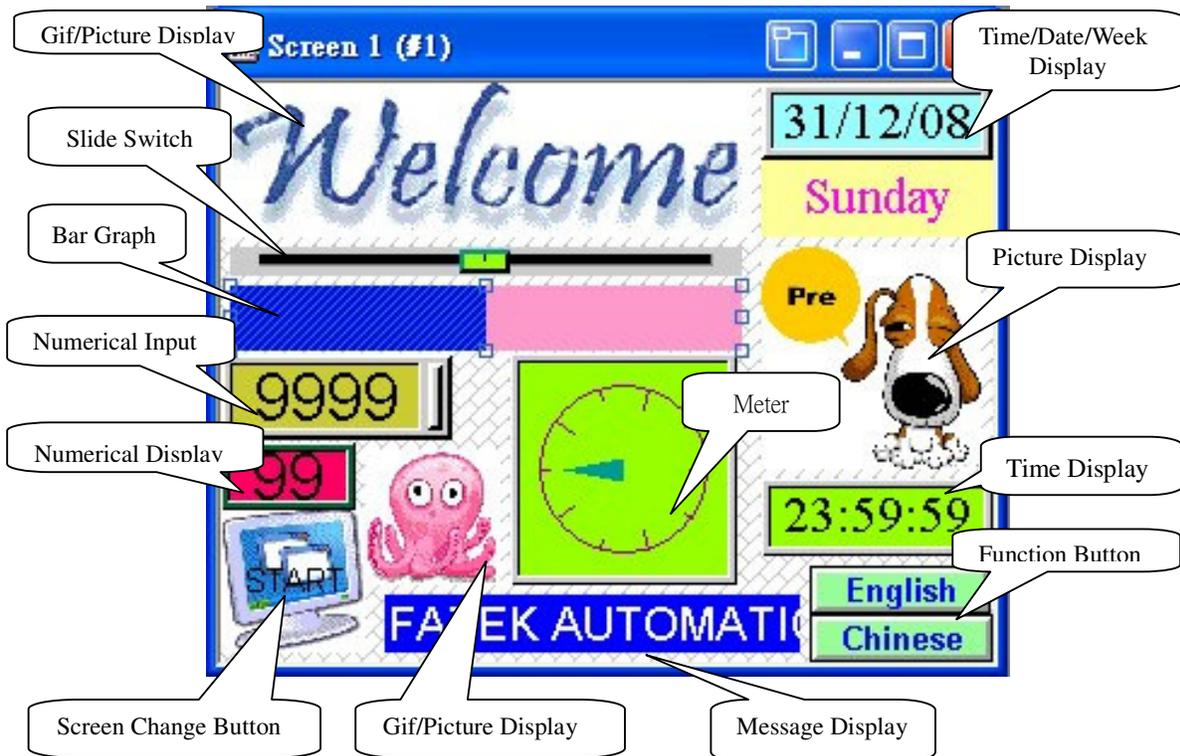
After selecting the color by mouse, the color of the device in selection will change. Once the color is finalized, click OK to finish.

When the Properties Setting Window blocks the device being edited, one can utilize the translucent display mode to see the result. Click OK to finish. To exit this mode, cancel this function in the View menu.

Chapter 2 Creating the Startup Screen and Main Menu

The screen upon completion of editing is displayed as the following figure, showing the devices used in the screen:

- Function Button ●Time/Date/Week Display ●Message Display
- Gif/Picture Display ●Screen Change Button ● Numerical Input ●Slide Switch ●Bar Graph



In the following it will be introduced how to create these devices.

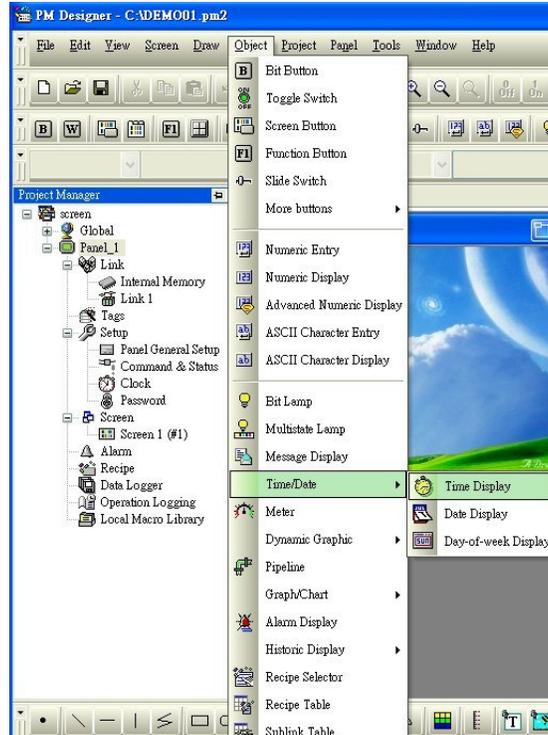
1. Create the Device for Time/Date/Week Display

[Description of Time/Date display: capable of showing the current time, date, week, etc, with the numbers provided by the Real Time Clock (RTC) of FV HMI. It can also send the data to the internal register of PLC to be utilized by PLC.]

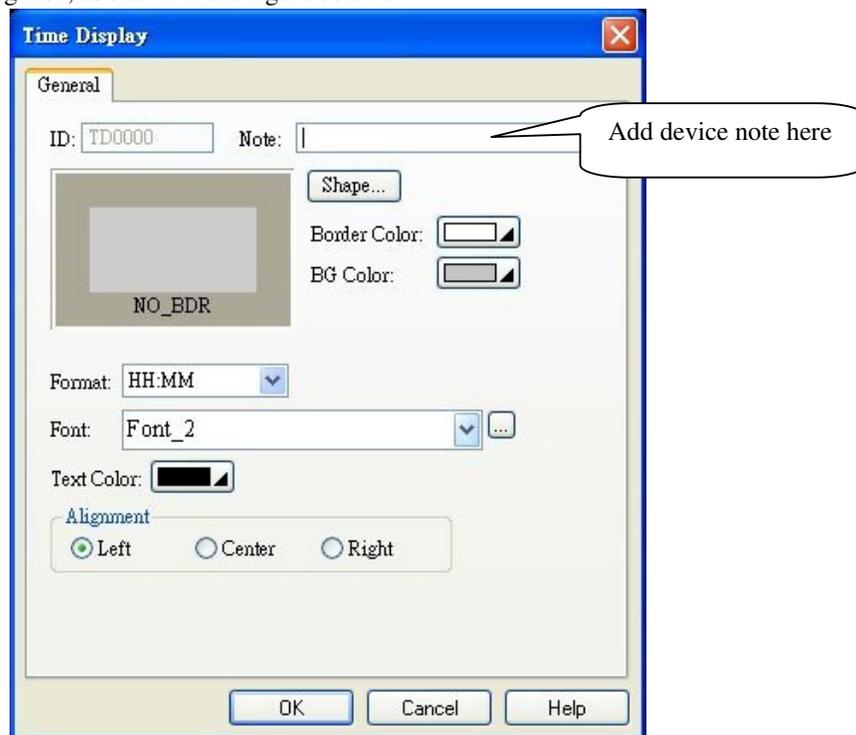
- Click the [Time Display] in Toolbar, as shown in the figure below:



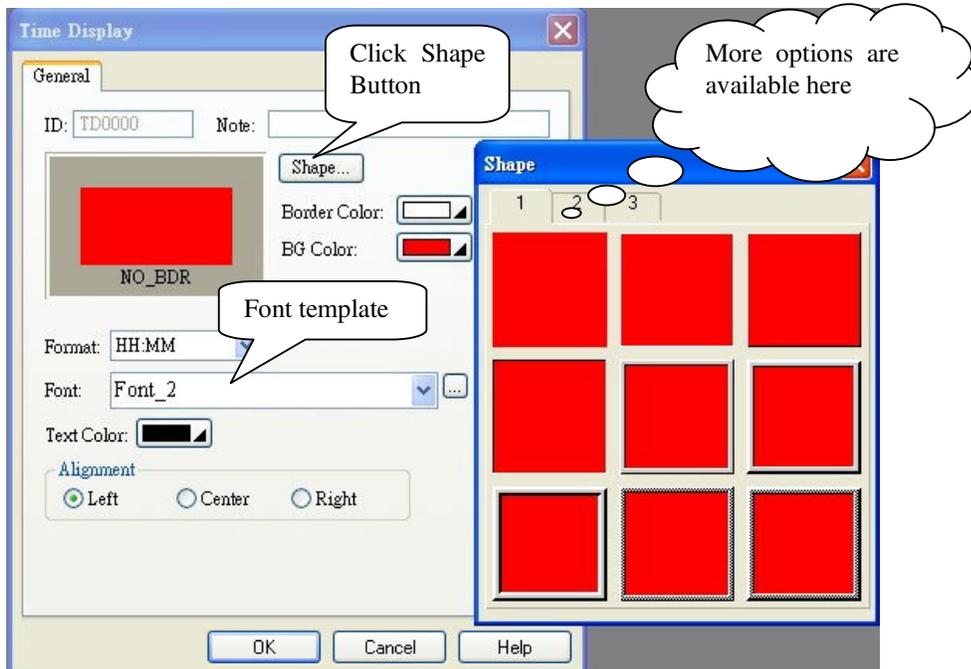
It can also be done by selecting [Object] in Toolbar ⇒ direct to [Time/Date] ⇒ click [Time Display] as shown in the figure below:



- Move the mouse to the Screen Edit area and click the left button of mouse to place the time display to the desired location in the screen edit area. Double click the left button of mouse to open the Device Properties Dialog Box, as shown in the figure below:

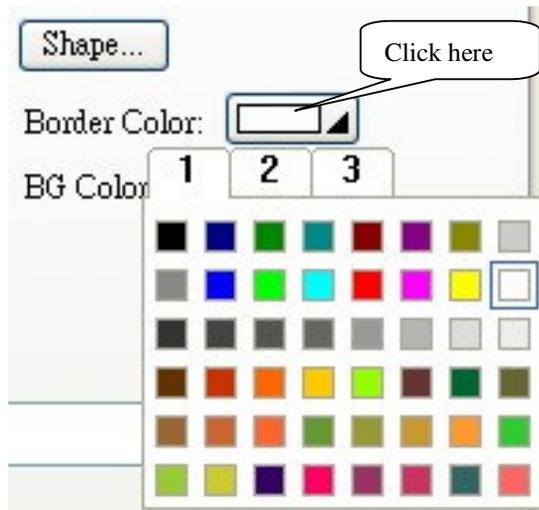


- Click the Shape Button to select the shape for the time display device, as shown in the following figure:



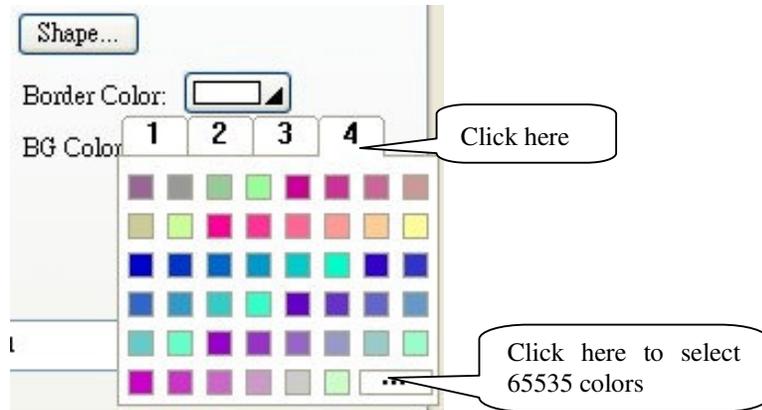
- ◆ Select the desired border and click the left button of mouse to confirm and exit.
- ◆ Border Color: Set the border color for the time display device.
- ◆ Background color: Set the background color for the time display device.

Select the  in the end to show the pop-up Color Selection Dialog Box:

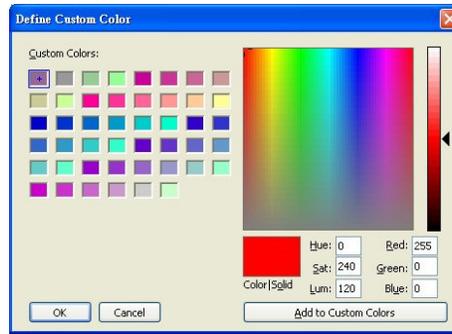


- The High-Performance model of FV HMI supports 65535 full-color TFT. If no desired color can be found in the Color Dialog Box, one can define his own color by doing the following:

Click the Tab 4 in the Color Selection Dialog Box, as shown in the figure below:



- Click the left button of mouse on and the Define Custom Color dialog box will pop up, as shown in the figure below:

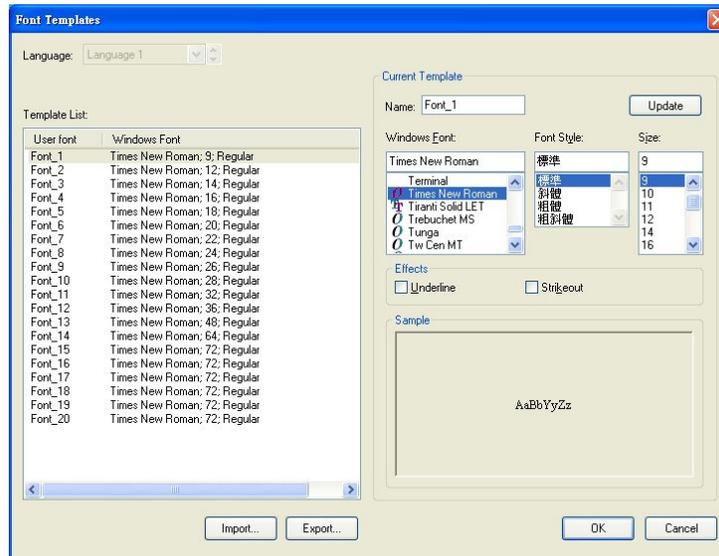


In this dialog box, one can select the desired color.

- ◆ Format: Set the format of the time display. Available options are HH:MM:SS and HH:MM.
- ◆ Font: Set the font of the time display through the font template settings.

Font Settings

Click once on the  icon behind the font to show the Font Template dialog box, as shown in the following figure:



(Note: One can preset the font template in Project Manager, which will be ready for selection in the future.)

◆ Text Color: Select the text color for the time display device.

◆ Alignment: Set the location of text display, with alignment options of Left, Center, and Right.

Upon completion of setting, click OK to exit the Time Display properties dialog box. The displays for date and week can be defined in the same way as the time display.

[Example]

1. Follow the above method to add one time display, one date display, and one-week display in the program.
2. Set the shape of Time Display as GF_0041, with background color of 6, format of HH:MM:SS, font type 10 (Times New Roman, size 28, normal), and center alignment. Resize it and place it at the lower right corner of the screen.
3. Set the shape of Date Display as GF_0051, with background color of 6, format of mm/dd/yy, font type 12 (Times New Roman, size 36, normal), and center alignment. Resize it and place it at the upper left corner of the screen.
2. Use no border for the Week Display and set the texts to be Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday; with font color of 11, font type 2 (Kai, size 20, normal). Resize it and place it below the Date Display.

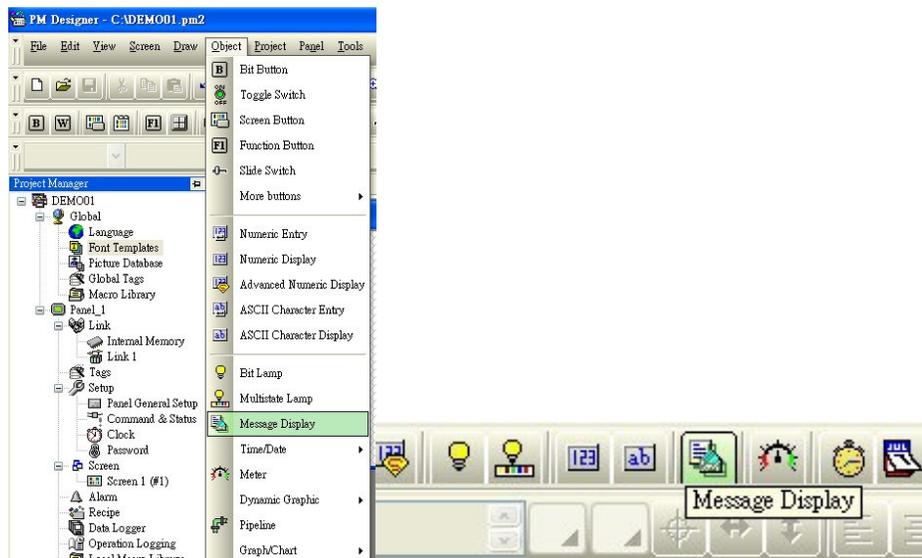
After these settings, the screen is as shown in the figure below:



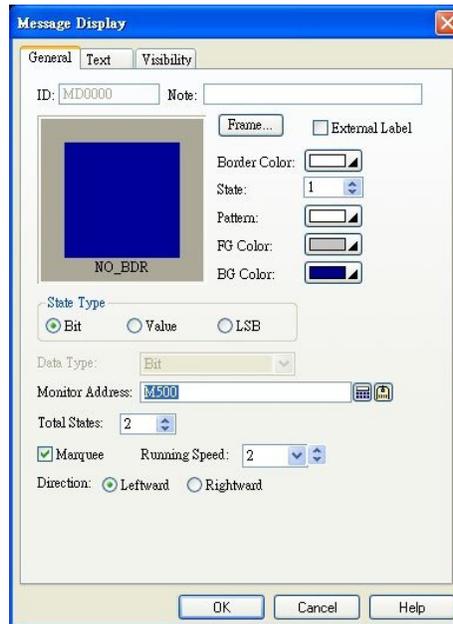
2. Create the Message Display

[Description of Message Display]: Message Display enables accessing the internal address of PLC or FV HMI or the state of the word address, which will be displayed on FV HMI by the preset corresponding mode.

- Select [Object] in Toolbar ⇒ click [Message Display] as shown in the following figure:



- Move the mouse to the Screen Edit Area and click the left button of the mouse to place the Message Display to the desired position in the area. Double click the left button of the mouse to open the properties Dialog Box as shown in the figure below:



1. [General] Tab

In the General Tab, one can set parameters of the Message Display such as border, border color, pattern/FG color, BG color, state type, monitor address, total states, and whether the marquee is needed.

◆ State Type

- Bit: Corresponds to the internal BIT address of HMI or PLC, with only ON/OFF.
- Value: Corresponds to the word address of HMI or PLC, with 256 types of state.
- LSB: Corresponds to the word address of HMI or PLC, converting the numerical word address to binary codes and displaying the lowest bit where it is ON.

◆ Data Type: Specify the format when the state is set as data and when the lowest bit is effective.

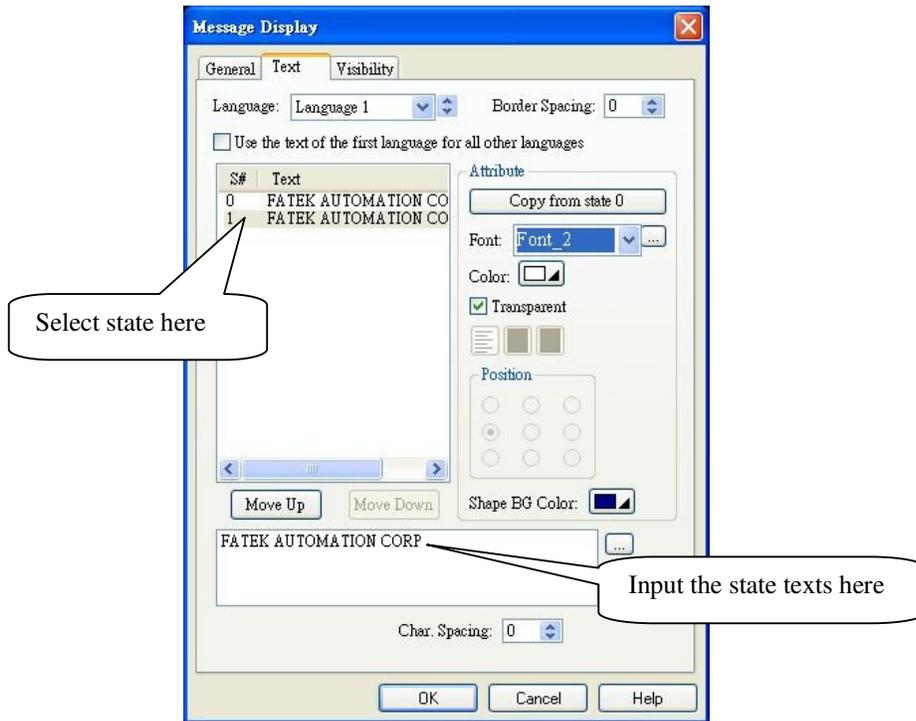
◆ Monitor Address: Set the address monitored by the message display, with the actual state of text changing according to this address.

◆ Total States: Set the overall state of the message display; different types of states have different numbers of available selections.

◆ Marquee: Choose the message display to be shown by a marquee.

2. [Text] Tab

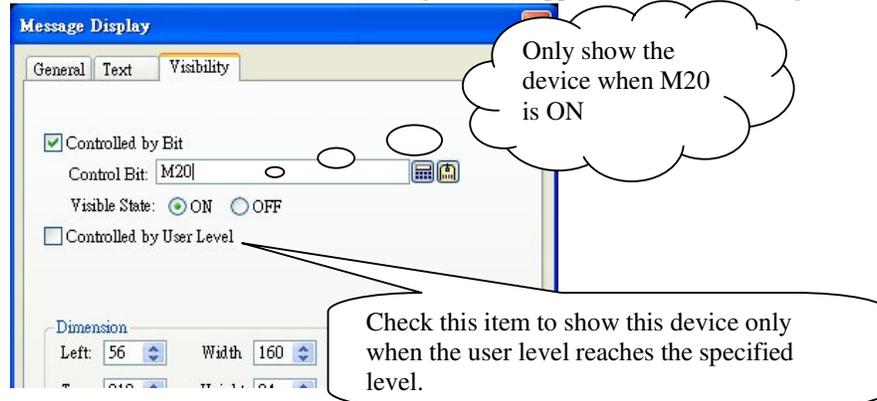
In the Text Tab, one can define the settings of text display for the Message Display in various types of state, as shown in the figure below:



◆ **Attribute:** Set parameters of the Message Display such as font, color, and background color.

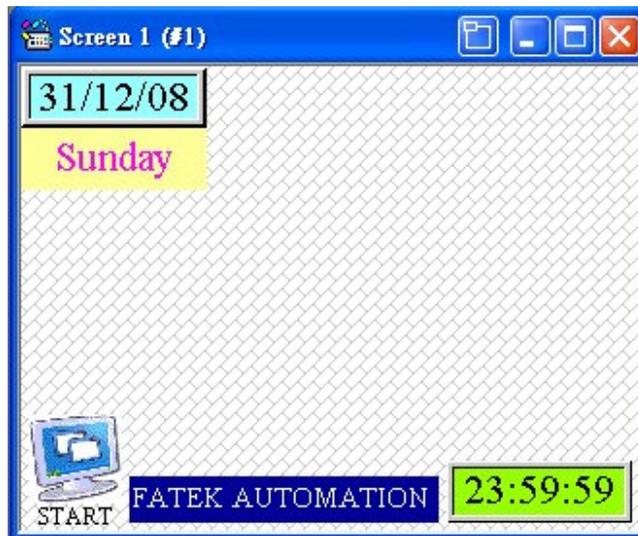
3. [Visibility] Tab

In the Visibility Tab, one can control whether to show a device by setting levels such as the Bit point or password. Check the associated items and the dialog box will appear as in the following:



[Example]

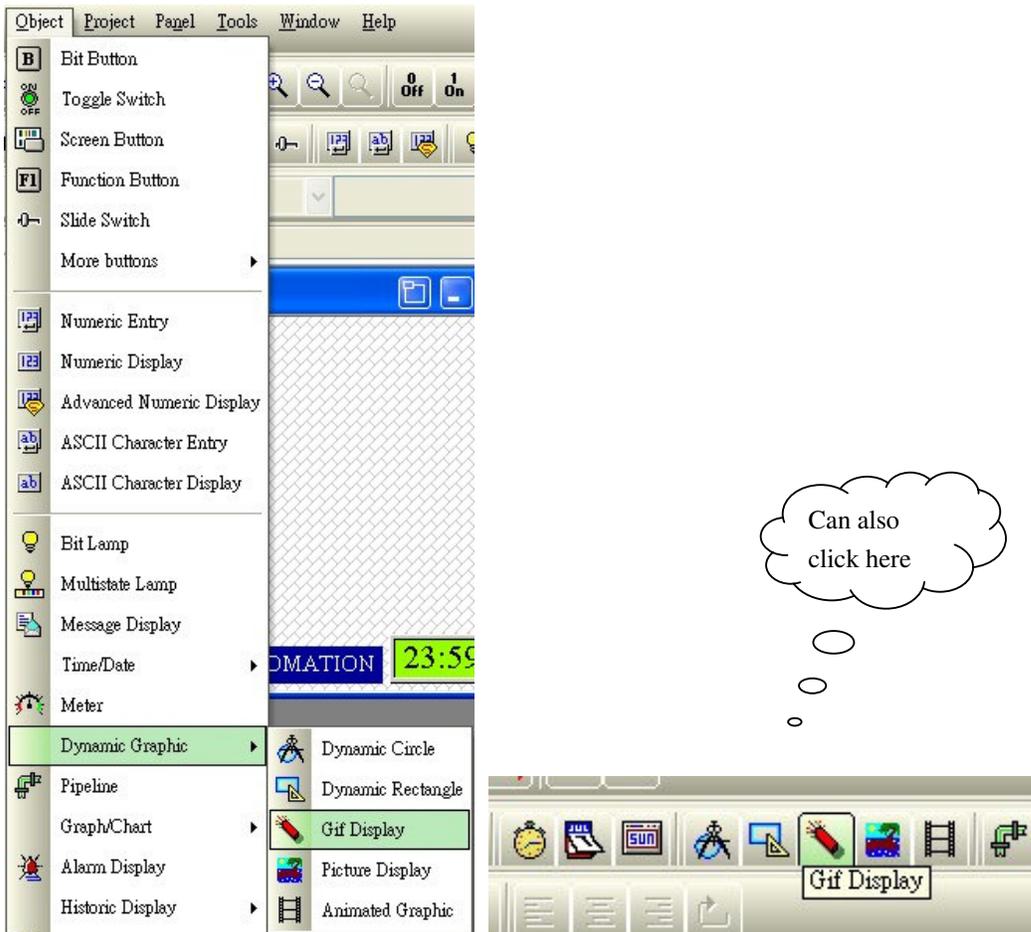
1. Follow the above method to add a Message Display in the program. Resize it and place it in the lower left corner of the screen.
2. Set the background color to be 1, with state type of Bit, monitor address of M500 in PLC, and Total States of 2.
3. Check the box of Marquee and select a speed of 2.
4. In the Text Tab, set the texts to display for state both 0 and 1 to be FATEK Automation Corp and add appropriate space for the best effect of the marquee. After all these settings, the screen should look like the following:



3. Create Gif Display

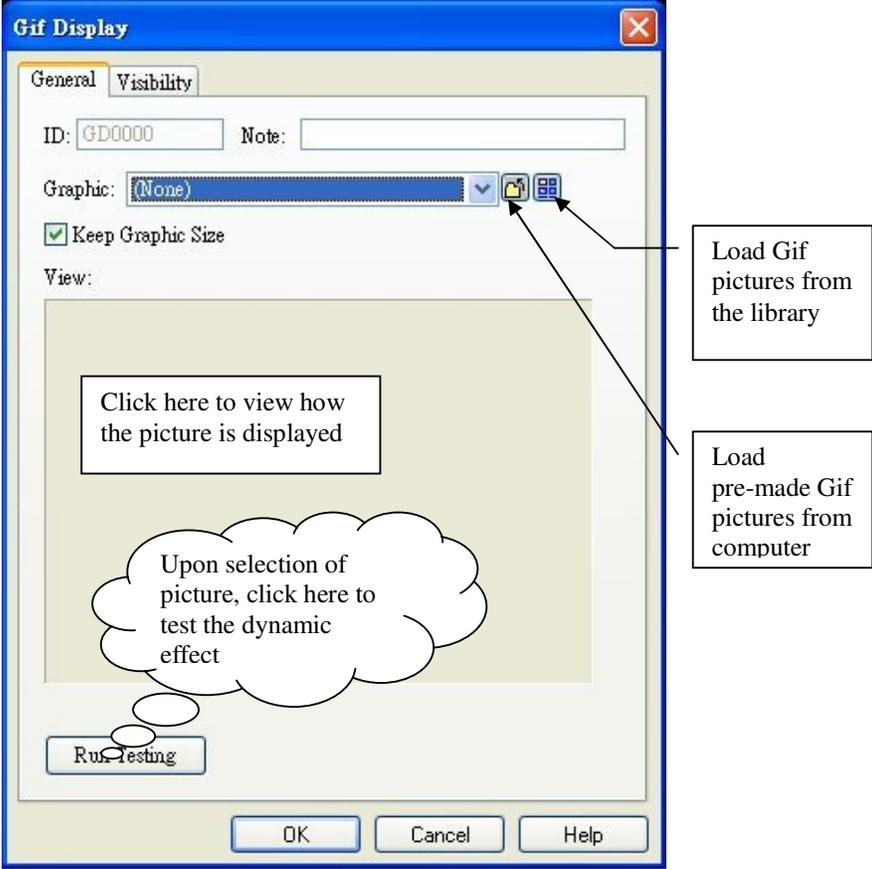
[Description of Gif Display: Gif Display can place the pre-made dynamic graphics in the computer into the screen to enable dynamic screens.]

- Select [Object] in Toolbar ⇒ [Dynamic Graphic] ⇒ select [Gif Display] or directly click the icon in the toolbar, as shown in the figure below”



- Move the mouse to the Screen Edit Area and click the left button of the mouse once to place the Gif

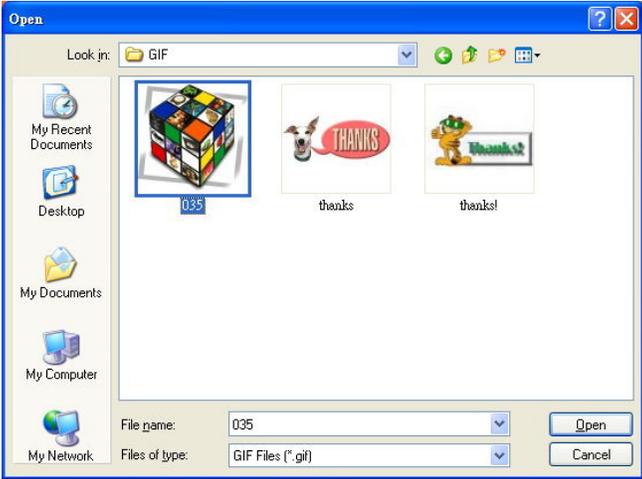
Display to the desired position in the area. Double click the left button of mouse to open the Device Properties Dialog Box, as shown in the following figure:



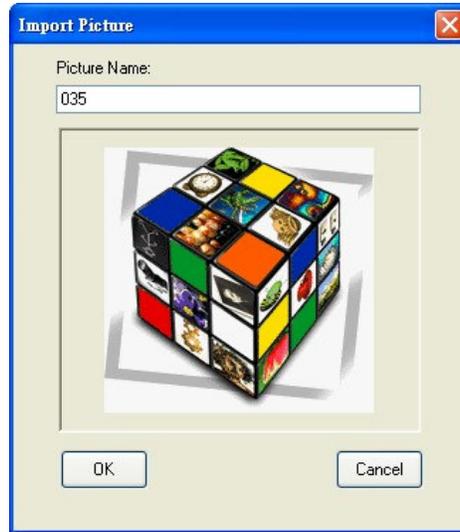
1. [General] Tab

- **Graphic:** Select the Gif picture to be displayed by the Gif display, which can directly load the Gif pictures stored in the computer or can load such stored Gif pictures into the library first for later use.

- ◆ Click the icon  following the picture to load the graphic file from the library, as shown in the figure below:



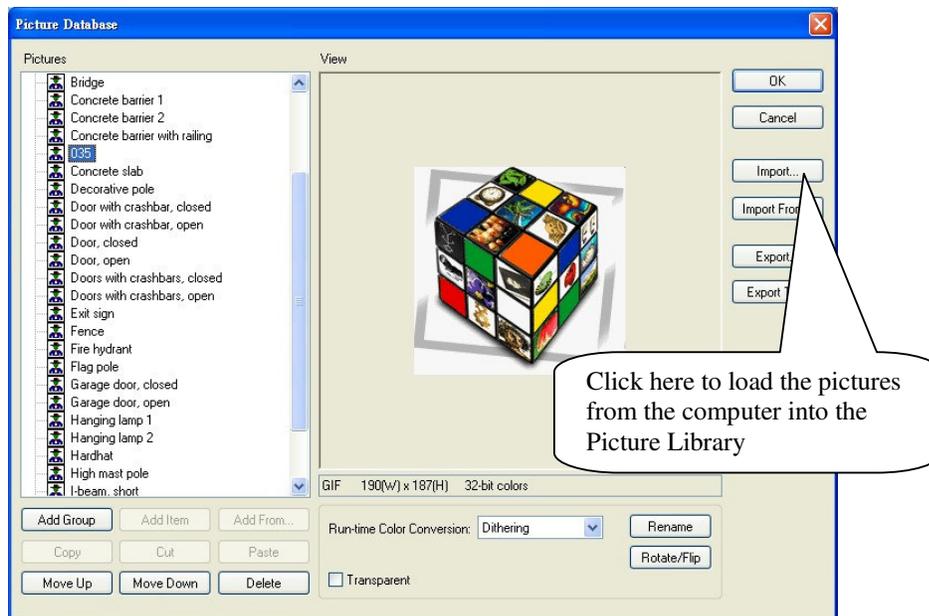
Select the desired Gif picture and click **Open** to show the pop-up Import Picture dialog box, as shown in the following figure:



Name the picture and click OK. It will display the selected picture in the box under View.

Note: (One can load the picture to be used from the Picture Library in Project Manager beforehand and select it from the library later. The FV Human-Machine Interface (HMI) can load BMP, JPG and GIF format graphic files on the computer directly. For other formats, please convert to a supported format using graphics editing software first before loading.)

Double click the **Picture Database subdirectory** in Project Manager and the Picture data library properties dialog box will pop up, as shown in the following figure:



2. [Visibility] Tab

The settings of the Visibility Tab are the same as described in the Message Display properties previously. All devices in FV HMI can be determined whether they are displayed in the current screen through controlling the BIT state and password level. There will be no separate introduction of how to define these settings.

[Example]

1. Follow the above descriptions to add two Gif displays in the program. Resize them and place them at the upper right corner of the screen.
2. Set the pictures to be displayed in these two Gif displays to be Welcome 1 and Welcome 2 (please load these pictures first).

The screen looks like the following in the above settings:



4. Create Screen Button

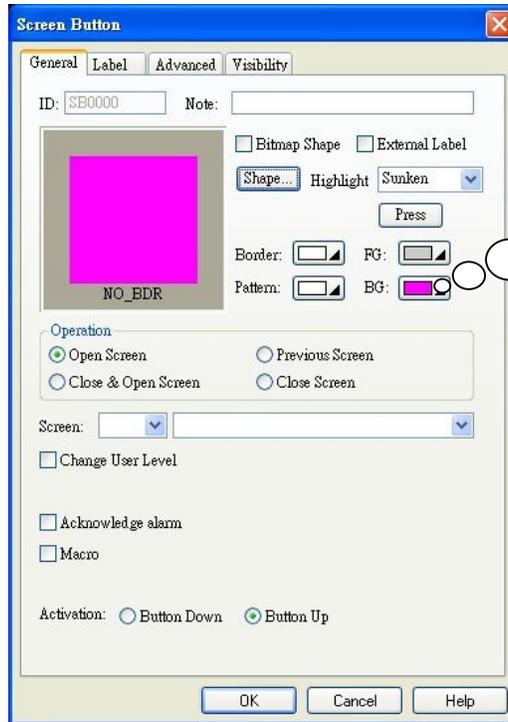
[Description of Screen Button: Screen Button facilitates the switching between each individual screens.]

- Select [Object] in Toolbar ⇒ click [Screen Button] or directly click the associated icon in toolbar, as shown in the following:



Move the mouse to the Screen Edit Area and click the left button once to place the Screen Button at the desired position in the area. Double click the left button to open the Device Properties Dialog box, as shown by the figure

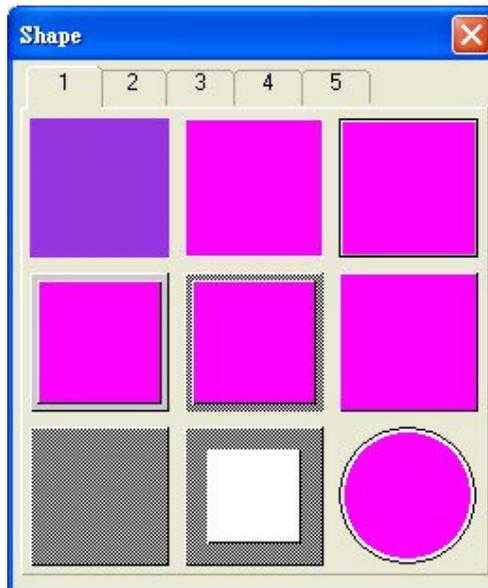
below:



1. [General] Tab

In the General Tab, one can set parameters of the Message Display such as border, border color, pattern/FG color, BG color, operation, screen, change user level, and acknowledge alarm.

- ◆ **Shape:** Set the shape of the device. Click on the button and the Shape selection dialog box will appear, as shown in the figure below.

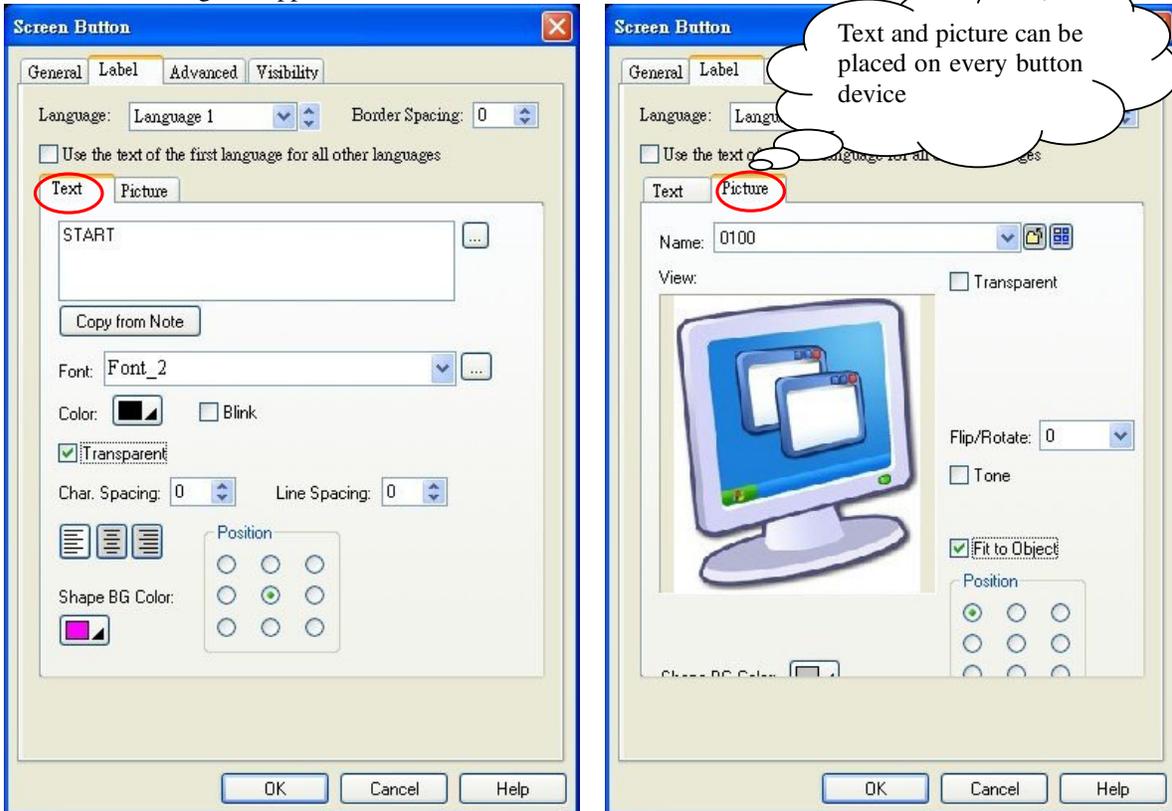


- ◆ **Operation:** Assign the function of the Screen Button, with four options:
 - Open Screen: Click to open the designated screen.

- Previous Screen: Click to return to the previous screen.
- Close & Open Screen: Operation only effective for WINDOW screens.
- Close Screen: Close the screen.
- ◆ **Screen:** Open or close the designated screen.
 - ☑ **Change User Level:** Change the user level following the change of screen.
 - ☑ **Acknowledge Alarm:** Acknowledge the alarm as the screen is changed.
 - ☑ **External Label:** Add description to the border of the device.

2. [Label] Tab

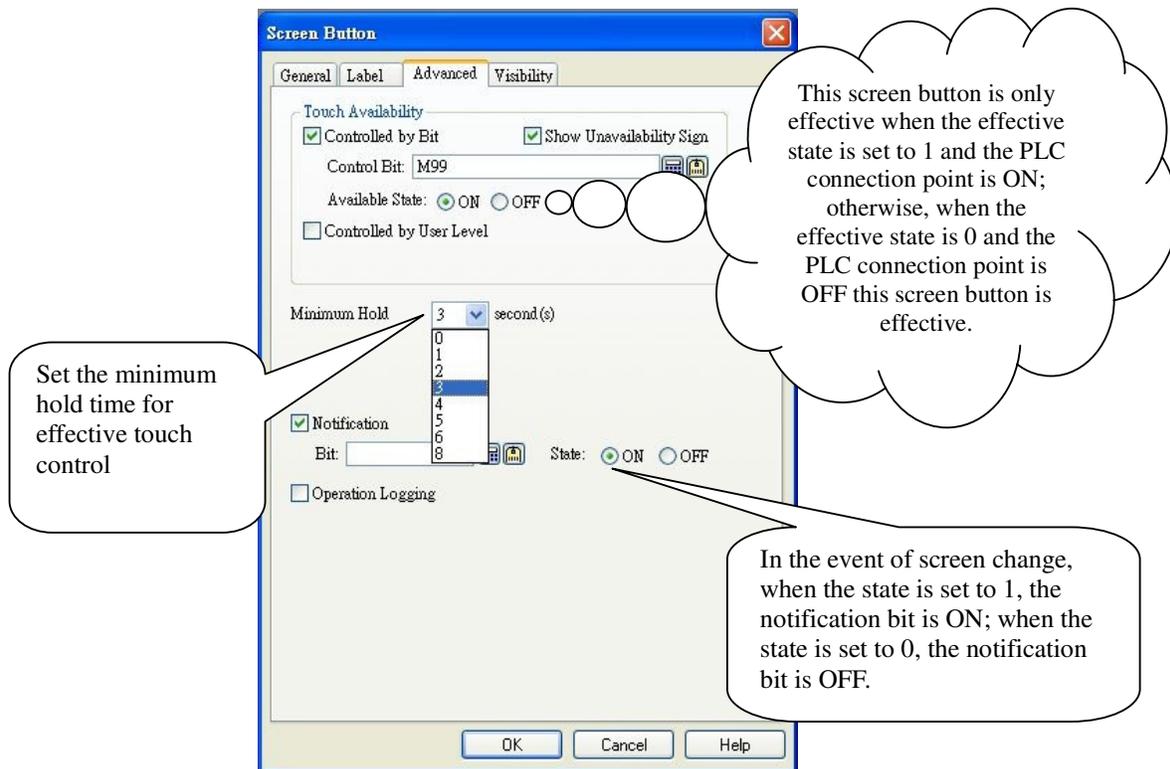
In the Label Tab, one can define the texts and pictures displayed on the Screen Button. Click on the Label tab and the following will appear:



- ◆ **Text/Picture:** Set the text and color to be displayed on the button, as shown by the figure above.
- ◆ **Font/Color:** Set the font and color of text.
- ◆ **Character/Line Spacing:** Set the character spacing and line spacing.
- ◆ **Position:** Adjust the position where the text/picture is displayed.
 - ☑ **Blink:** Define whether the button uses the blinking effect.
- ◆ **BG Color:** Set the background color of the button.
 - ☑ **Fit to Object:** Resize the picture automatically to fit the same size of the device.

3. [Advanced] Tab

Click the Advanced Tab, as shown by the figure below:



- Touch Availability: Define how the touch is available: controlled by bit state or by user level.
 - Controlled by Bit: If this box is checked, the touch button is available only when the state of the touch point matches the preset conditions.
 - Controlled by User level: If this box is checked, entry of password is required when pressing the button and the touch is available only when the password is correct.
- Minimum Hold: Define the minimum time required to hold for the Panel to be effective. The longest length is 8 seconds.
 - Notification: Define that in the event of screen change, set a certain connection point or bit to be 1 (ON) or 0 (OFF).
 - Operation Logging: When such button is pressed, a record is made and stored to the document.

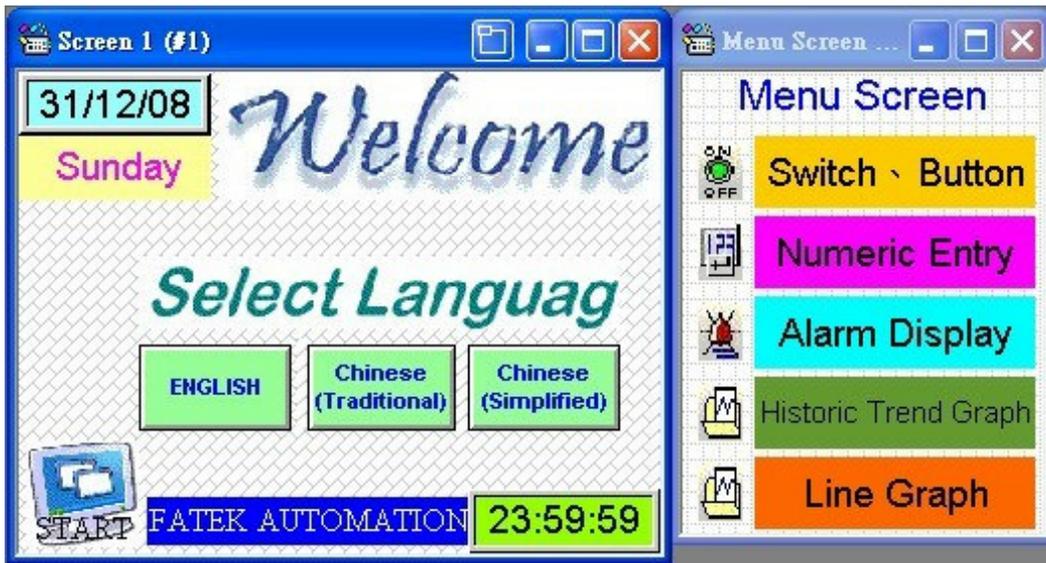
4. [Visibility] Tab

It allows the Control Bit or User Level to control the display of the device. Refer to the previous descriptions for details.

[Example]

1. Follow the above descriptions and add a Screen Button in the Startup Screen. Select Startup Screen to be its operation, with screen selection of 2-Main Menu. Set the Menu Screen using the left button, with the picture set as Start.
2. Add 6 Screen Buttons in the Main Menu Screen, with their operation selections to be Startup Screen and screen selection to be the corresponding screen. The text labels are Switch and Light, Numerical Entry and Display, Alarm Display, Historic Trend Graph, Line Graph, and Contact.
3. Add 5 Picture Displays in the Main Menu Screen (select in the Draw-Picture menu in the Main Menu, refer the Gif Display operation for instructions about settings), including the associated pictures, and place them at the corresponding positions.

After the settings, the creation of the Startup Screen and the Main Menu Screen is complete, as shown in the figure below:



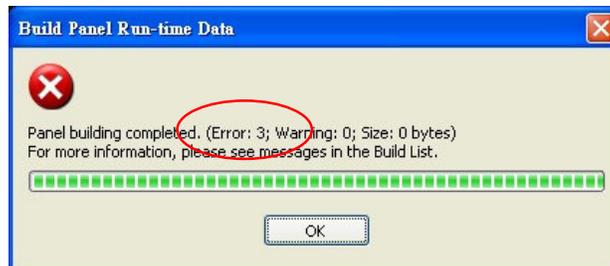
Chapter 3 Simulating Execution and Download

- After creating the Startup Screen and Main Menu, do you want to check how the screen looks? PM Designer provides the function of simulating display, which enables you to directly simulate the display effect in the computer without downloading the program to FV HMI.

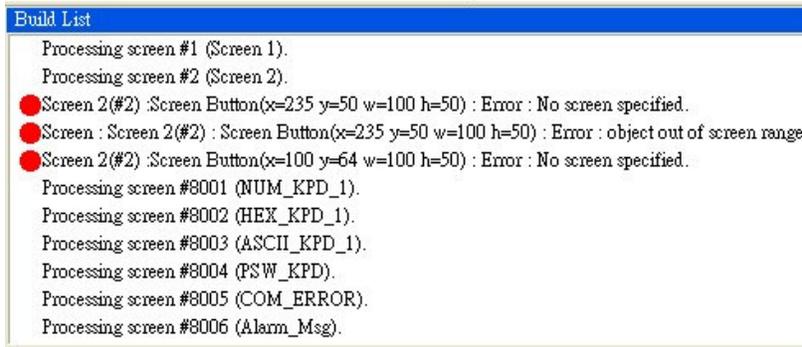
1. Compile

(Note: Simulation and download are only available after the edited program completes compiling successfully.)

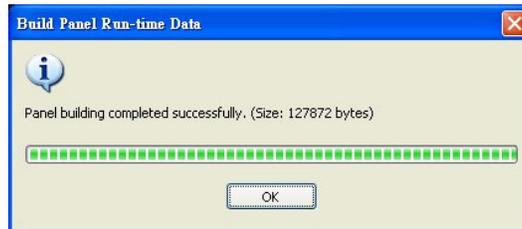
- Select [Panel] in toolbar ⇒ click [Compile] or directly click the corresponding icon in toolbar , program compiling will begin immediately. In case of error, the following message will appear after compiling is completed:



Click OK to view the build list, where the error reminder is listed, as shown in the figure below:



Double click the left button on an error message to close the build list. Now one can see that PM Designer automatically locates the device with error. Once the correction is made, repeat the compiling process. When there are no more errors, it looks like the following figure:



And the compiling is finished.

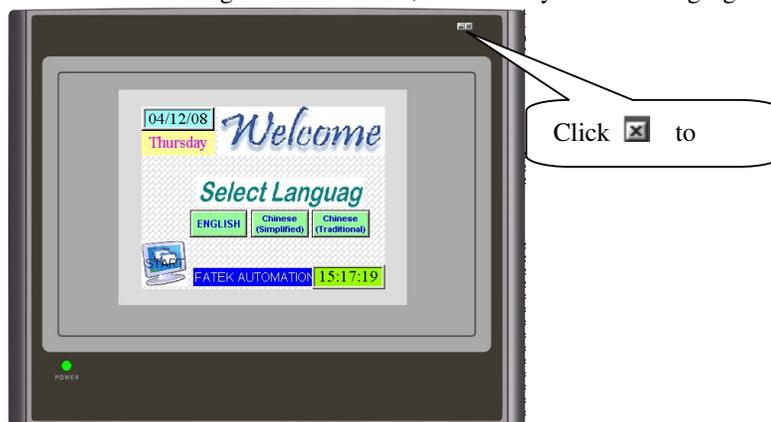
2. Simulating Execution

PM Designer can support both offline and online simulations.

- ◆ Offline Simulation: Treat the computer as an FV HMI, which is not connected to PLC, and simulate the actual display effect.
- ◆ Online Simulation: Treat the computer as an FV HMI, which is connected to PLC, and verify the operation functions.

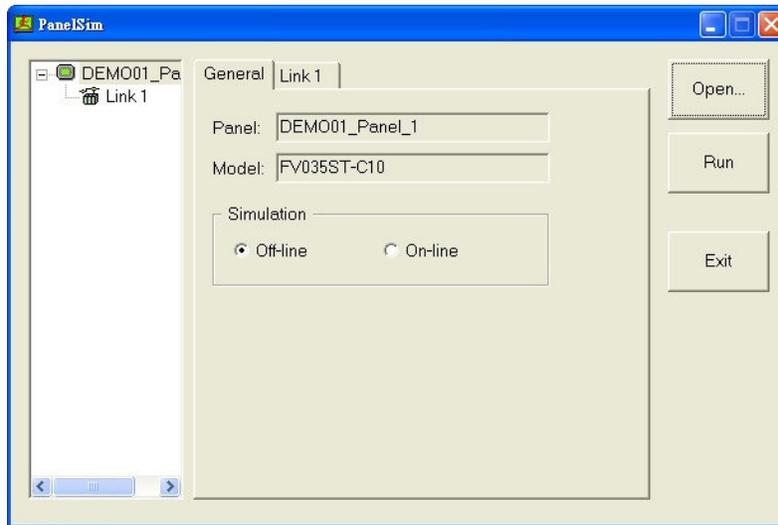
● Start Offline Simulation

- Click Toolbar ⇒ [Tool] ⇒ [Simulating Execution (Offline)] or directly click the corresponding icon in toolbar. PM Designer will enter the Simulating Execution mode, as shown by the following figure:



To end the simulation, click the left button of mouse on the  button at the upper right corner of screen. The

following dialog box will appear:



Click Exit to leave the Offline Simulation.

★ **Functions of Online Simulation will be described in the subsequent chapters.**

3. Program Download

Upon completion of program editing, we must download the screen data to FV HMI in order to establish communications with PLC for further control. Prior to download, one should have the download cable should be ready and turn on the power of FV HMI and connect it to the computer.

- **Cable Connection of Computer Download.**

HMI COM	PC RS232C
9-pin male	9-pin female
RXD 2	3 TXD
TXD 3	2 RXD
GND 5	GND 5
RTS 7	CTS 8
CTS 8	RTS 7

- **Cable connection of Ethernet Download.**

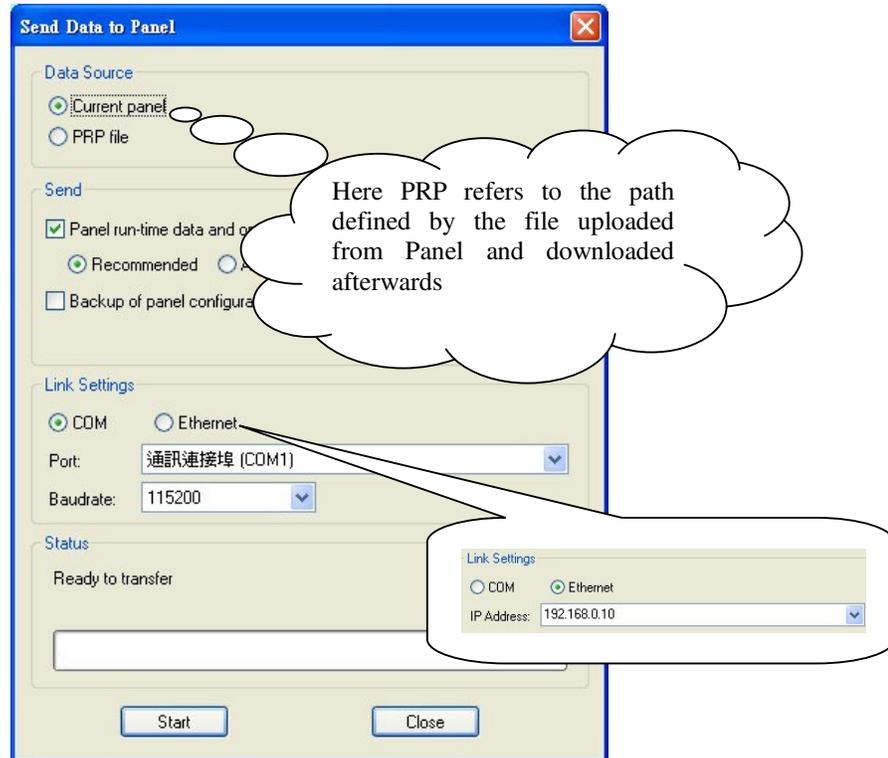
The cable used for the connection between the computer and FV HMI can use the RJ45 jumper network cable; for HUB or Router, one can use the common RJ45 network cable.

(Note: Jumper cable, instead of the one-to-one network cable, is needed for the connection between computer and FV HMI.)

- **Program Download**

- Select **Toolbar** ⇒ follow [Panel] ⇒ click [Send Data to Panel] or directly click on the corresponding icon in

toolbar . A Function Setting window will pop up, as shown in the following figure:



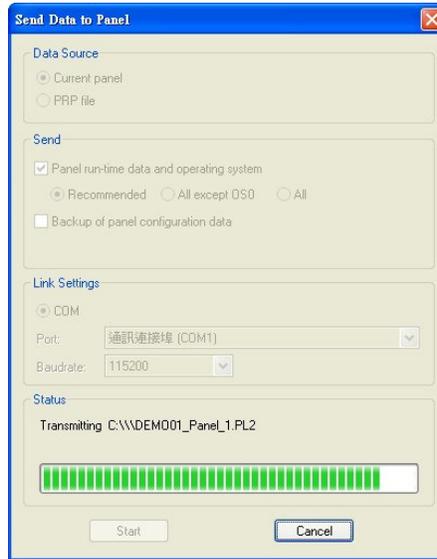
- ◆ **Data Source:** Select the data source to be downloaded to FV HMI.
 - Current Panel: Data in the current program.
 - PRP File: Execution data file of FV HMI, which is the upload execution file (**this file cannot open or edit screens**).

- ◆ **Send:** Set the parameters for the data to be downloaded
 - Panel run-time data and operating system of FV HMI.
 - Recommended: Default download, which sends all data in the first download and only the data that have been updated in subsequent downloads (recommended).
 - All except OSO: Download all data except the OSO files.
 - All: Download all data.
 - Backup of panel configuration data: Select whether to download the original data. Selection of this function allows restoration of the screen data.
 - Menu Data: Select to download the menu data to FV HMI.

- ◆ **Link Setting:** Define the communication port and rate for the link to computer.
- ◆ **Status:** Display download status.

In general the default setting is: Data Source: [Current Panel]; Send option is selected only for Panel run-time data and operating system, with recommended selection. Communication port is set to be COM1, with rate of 115200.

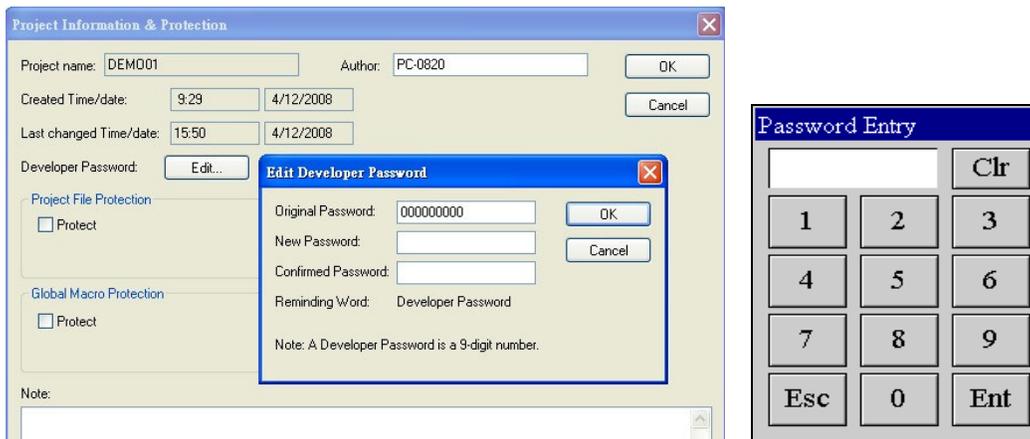
Upon completion of setting, click Start. FV HMI will automatically detect the communication port and start data download, as shown in the following figure:



After the download is complete, the program will automatically return to the Program Edit Screen. We can view the outcome of editing through FV HMI.



- In program editing, one can download the program anytime by using the Download Now icon .
- If a developer password is configured in program editing, the Password Entry dialog box will pop up in program download, as shown in the figure below:



And the correct password is required to complete the download. If the password is changed, any future download will require entry of the new password. If it's the same password, there is no need to enter the password again.

- **Introduction of Developer Password**

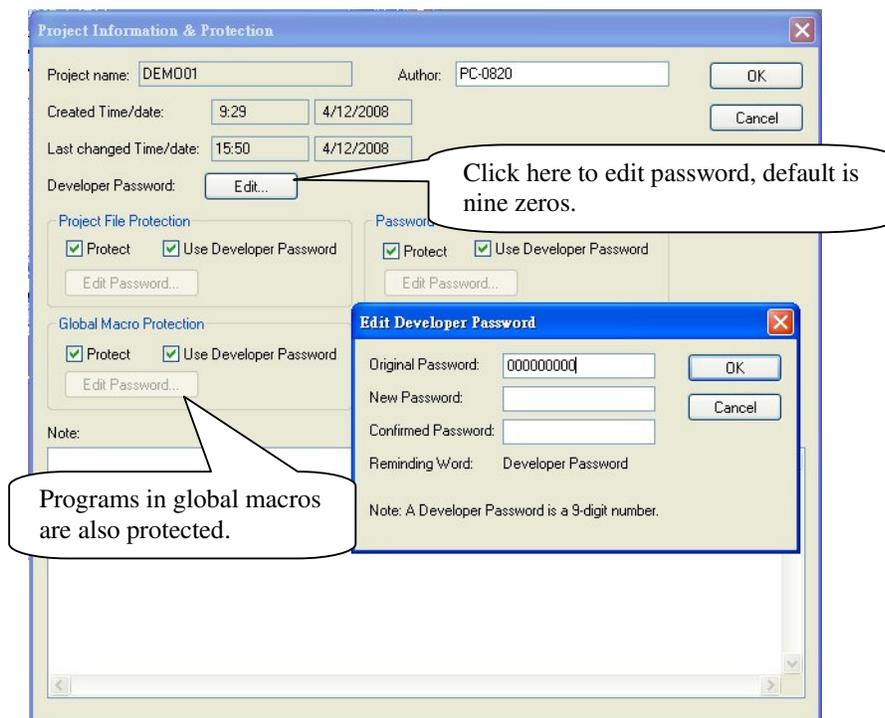
Developer Password is a special feature provided by PM Designer to enable the developer to protect his program. It provides robust protection, which is capable of guarding the project program files, code tables, and global macros.

- **Developer Password must be 9 digits.**

- **Developer Password always has the highest authorization level over all programs by the developer.**

- **If a Developer Password is set or edited, its entry is required to download and upload programs to FV HMI.**

- Click [Project] in toolbar ⇒ [Project Information & Protection], the Project Information & Protection dialog box will pop up as shown in the following figure:

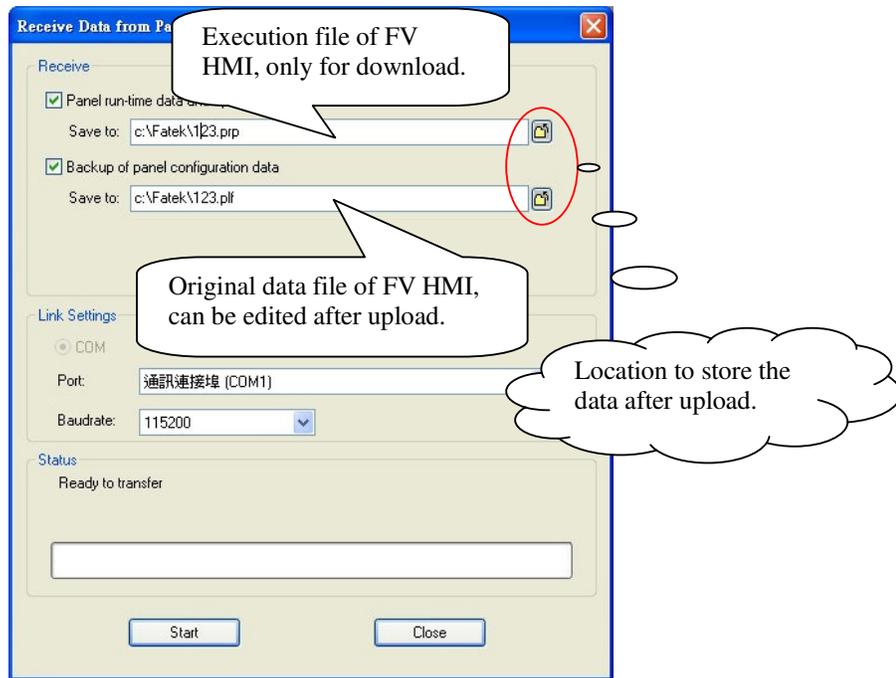


4. Upload Program

FV HMI supports the function of editing the original data once it's uploaded, which allows the user to conduct operations to perform on-site adjustments and tests or to restore the data for modification afterwards if the original data is lost (in the case of password protection, entry of password is required). In the following, we will describe the operation of program upload.

Note: If restoration of original data is needed, one needs to check the box : Panel data Backup in program download.

- Select [Panel] in toolbar ⇒ click [Receive Data from Panel] and a dialog box will pop up as shown in the following figure:



Click [Start] and a Enter Password dialog box will pop up with default password of nine zeros. If there is Developer Password, please enter your Developer Password and click OK to start program upload.

After upload is complete, .Prp and .Plf files will be created in the selected folder.

xxx.Prp: Execution file xxx.Plf: Original file.

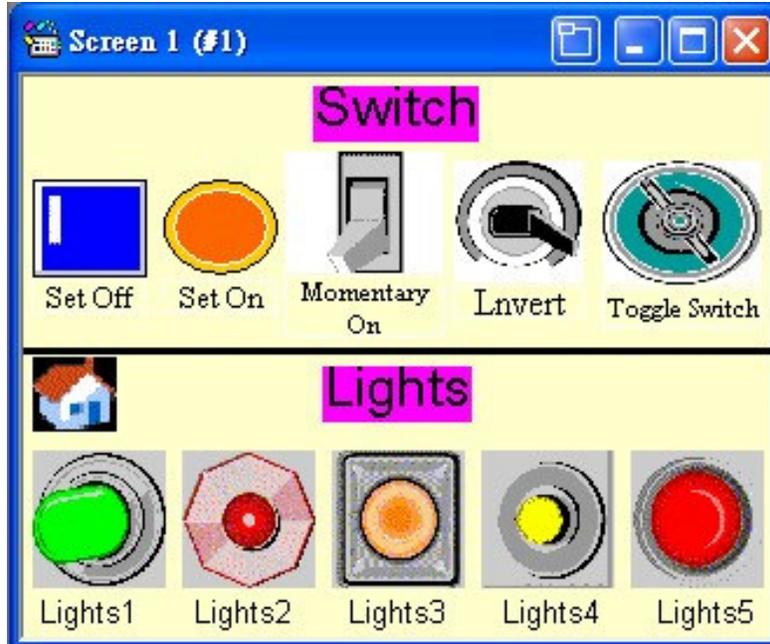
- To edit the uploaded original file, one can select [Project] ⇒ click [Import Panel] to open the edit screen.



Chapter 4 Creating Switches and Lights

The screen after the editing looks like the figure shown below, where the devices that are used include:

- Bit Button
- Switches
- Bit Light
- Static Text
- Screen Change Button
- Rectangle



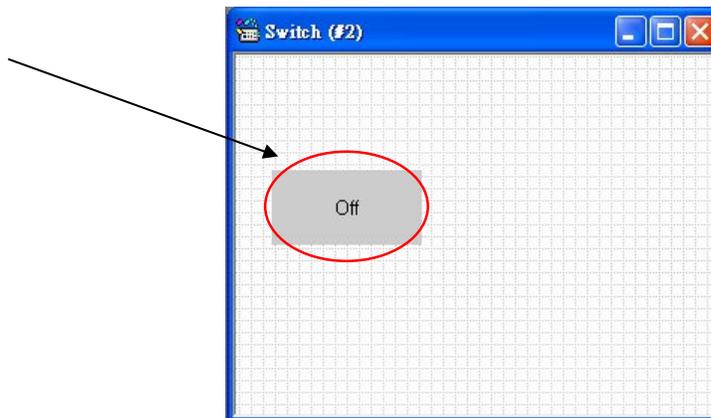
In the following we will introduce how to create these devices (devices that are previously described will not be covered here).

- In the Edit Screen please first place the corresponding picture files into the Picture Library.

1. Create Bit Button

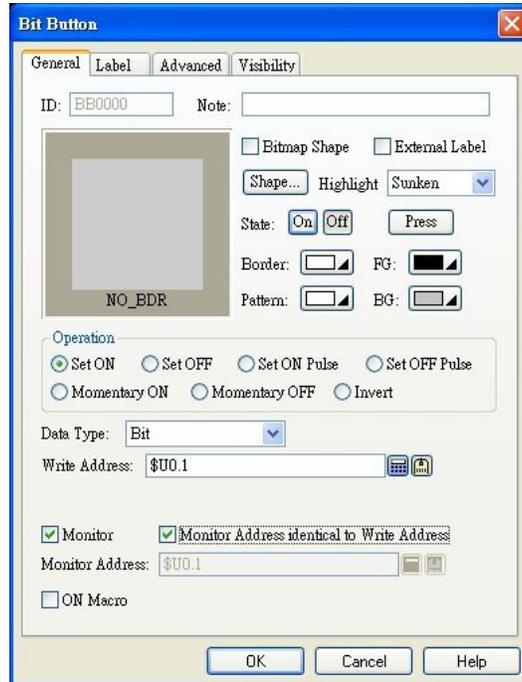
[Description of Bit Button: In general it is used to control the ON/OFF of the corresponding connection point in PLC.]

- Select [Object] in tool list ⇒ click [Bit Button] or directly click the corresponding icon  in toolbar, move the mouse to the Screen Edit Area and click the left button of mouse once, as shown by the figure below:



Double click the left button of mouse on the object or click the right button of mouse once to select the object

properties. The button properties setting will pop up:

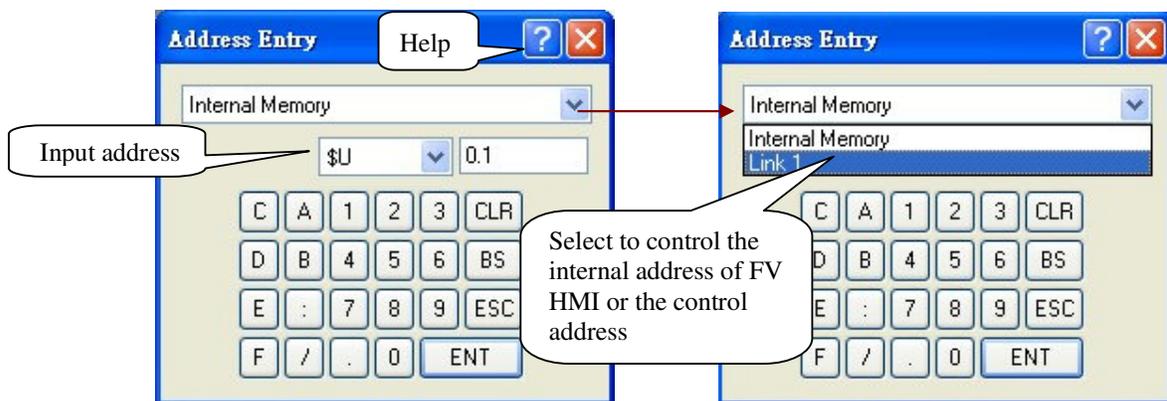


1. [General] Tab

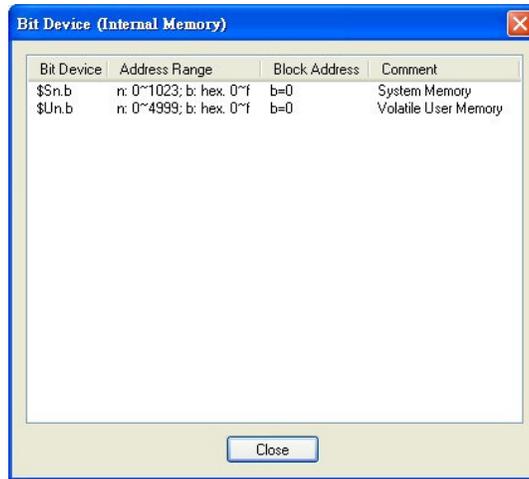
In the General Tab, one can set parameters of the Bit Button such as frame, border color, pattern/pattern color, background color, operation, write/monitor address and macro.

- ◆ **Operation:** Define the operation of the Bit Button, with 5 options:
 - Set ON: Press once for ON, release or press again still remains ON.
 - Set OFF: Press once to be OFF, release or press again to remain OFF.
 - Set ON Pulse: Press and hold the button to be ON, and release to be OFF.
 - Set OFF Pulse: Press and hold the button to be OFF, and release to be ON.
 - Invert: Press once to be ON, release to remain ON, and press again to be OFF.
- ◆ **Address Entry:** Set the connection point address, write the corresponding address into the controller or the internal register.

Click the  button following the box and the Address Entry dialog box will appear, as shown in the figure below:



- ◆ Click  to show the window that displays all Bit devices, as shown by the following figure:

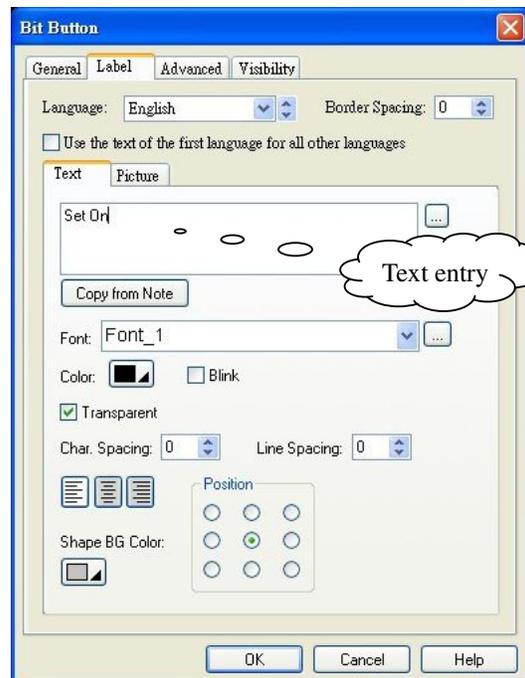


- Monitor: If one chooses to monitor the selected items, the display of the device will change according to the monitor address.
- Monitor Address Identical to Write Address: Monitor and Write Address share the same address (default setting).
- ON Macro: Macro command to be executed when the device is ON.

2. [Label] Tab

- In the Label Tab, one can define the texts and pictures to be displayed for the different status of the Bit Button (0 or 1).

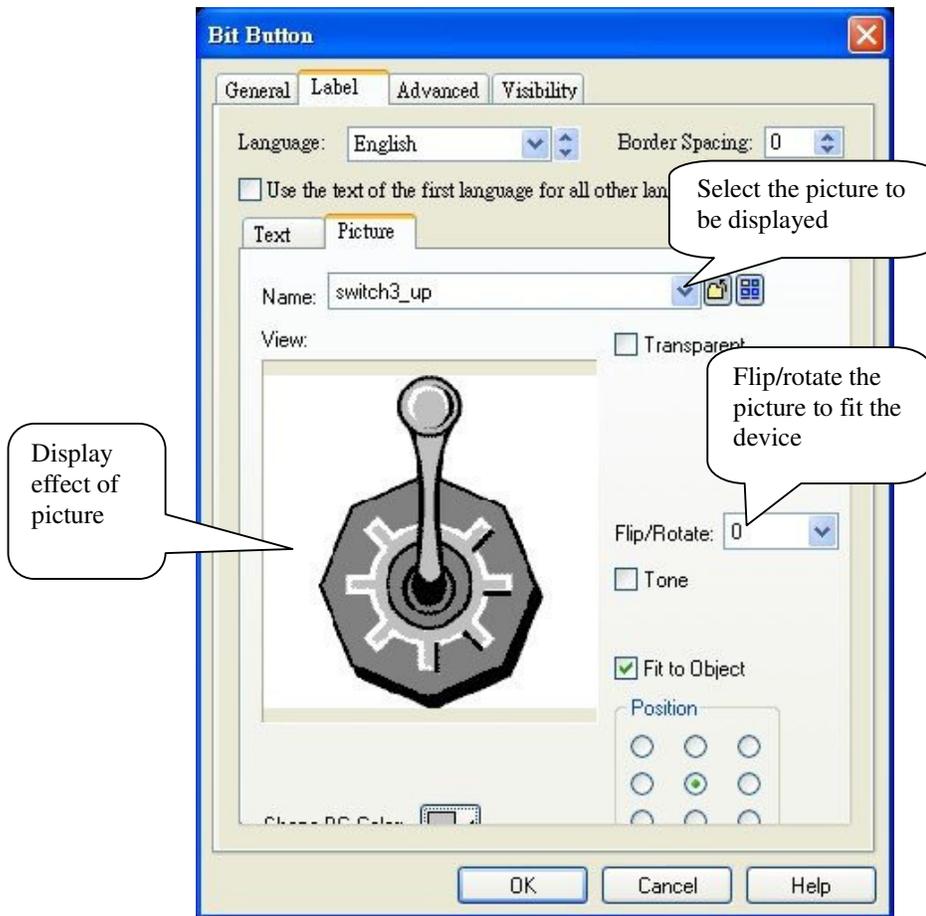
Click the Mark Tab and the display will be as shown by the figure below:



- ◆ Text/Picture for status 0: Set the text or picture to be displayed when the device status is OFF.
- ◆ Text/Picture for status 1: Set the text or picture to be displayed when the device status is ON.

Other remaining settings have already been described in the parts for Screen Buttons. Please refer to the previous chapter for details. The settings in the current example are as follows:

Click the submenu status 0 picture, as shown in the figure below:



- Function settings for **Advanced** and **Visibility** tabs are the same as those for the Screen Buttons.

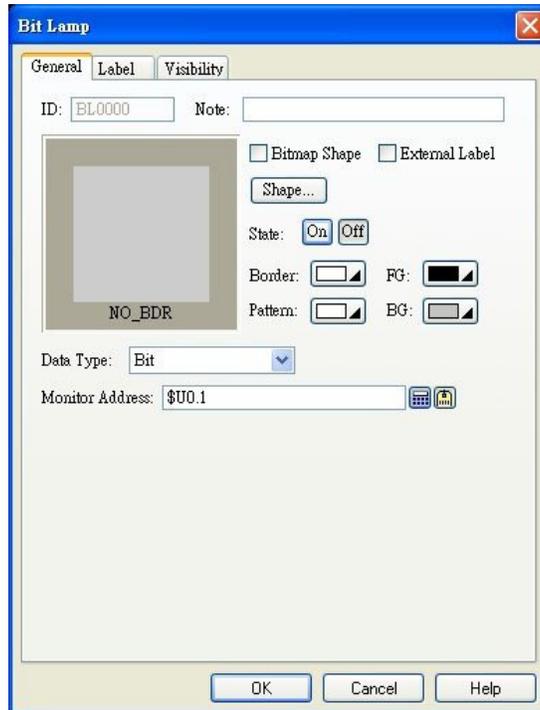
2. Create Switches

- Select the object in tool list ⇒ Switch or directly click on the corresponding icon in toolbar  to add the Switch Device to the screen. The properties settings are the same as the Bit Button. The difference between the Switch and Invert Button needs to be explained. In operation, the Switch will first read the status of the control address. If the status is OFF, the pressing Switch once will change the status to ON; otherwise, it'll be OFF.

3. Create Light

[Description of Light: It practically reads the ON/OFF status of the corresponding connection point of FV HMI or PLC and display the reading by the preset text and picture.]

- Select [Object] in tool list ⇒ click [Light] or directly click the corresponding icon  in toolbar to add Switch to the screen. Double click the left button of the mouse on the object or click the right button of mouse to select the object properties. The Light properties settings dialog box will pop up as shown by the figure below:



- ◆ **Monitor Address:** Specify the address monitored by the bit Light. The actual change of the Light status will be determined by the monitor address.

Settings of other properties of the Bit Light are similar to the Bit Button and will be not described again here. Please refer to how to create Bit Button for details.

[Example]

1. Follow the above descriptions and add 5 Bit Buttons in the Switch and Light Screen, with their operations set to be Set OFF, Set ON, Set OFF Pulse, Set ON Pulse, and Invert. Then add one switch. Set all the read address to be \$U0.1 in the internal memory. Resize them and place them at the desired positions of the screen.
2. In the Label Tabs for the Properties Settings of the 6 new buttons, delete the status texts and add the pictures that correspond to status 0/1. Resize them and place them at the desired positions of the screen.
3. Add 6 Bit Lights in the Switch and Light Screen, with their read address all set to be \$U0.1 in the internal memory. Add the corresponding status pictures to the Label Properties. Resize them and place them at the desired positions of the screen.
4. Select Main Menu⇒Draw⇒Rectangle and add 2 rectangles in the screen. Double click on them to configure their frame color. Resize them and place them at the desired positions of the screen.
5. Add three Static Texts in the screen, with the text displays set to be Switch and Light, Switch area, and Light Area. Resize them and place them at the desired positions of the screen.

After completion of these settings, the Startup Screen and Main Screen are finished.

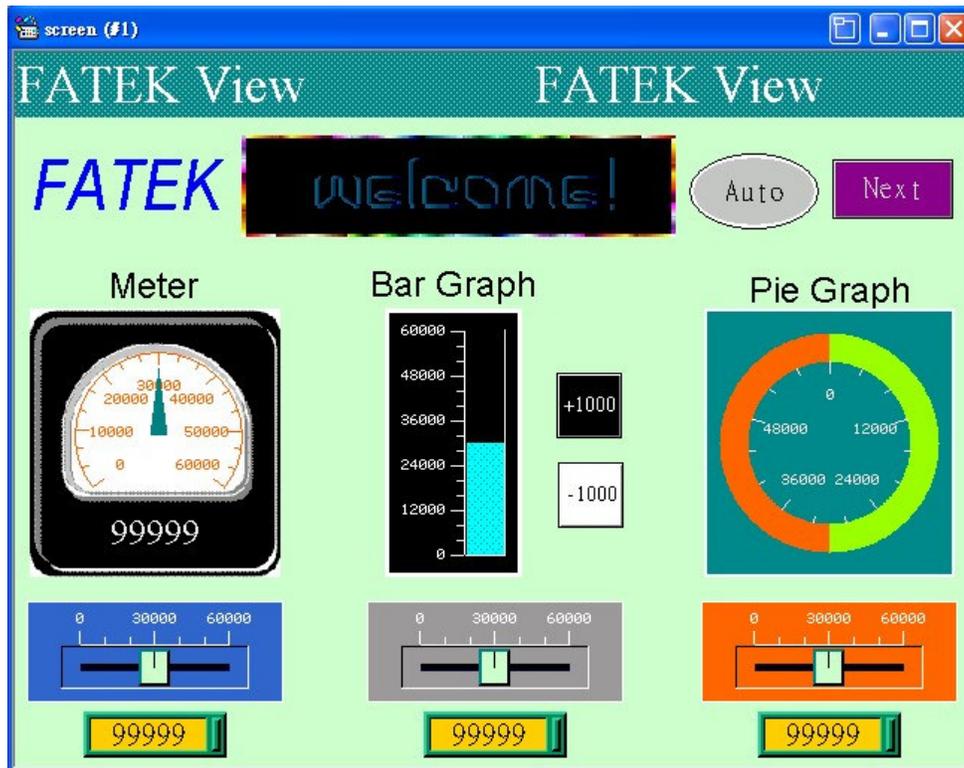
Once the screen creation is finished, we can follow the methods described in the previous chapter to compile the files and perform offline simulation. This way we are able to tell how different the status of each Bit Button will be, as shown in the figure below:



Chapter 5 Creating Numeric Entry and Meters

The completed screen is shown in the figure below and the devices used in the screen include:

● Static Text ● GIF Picture ● Numeric Entry/Display ● Meters ● Bar Graph ● Pie Graph ● Sliding Switch ● Word Button

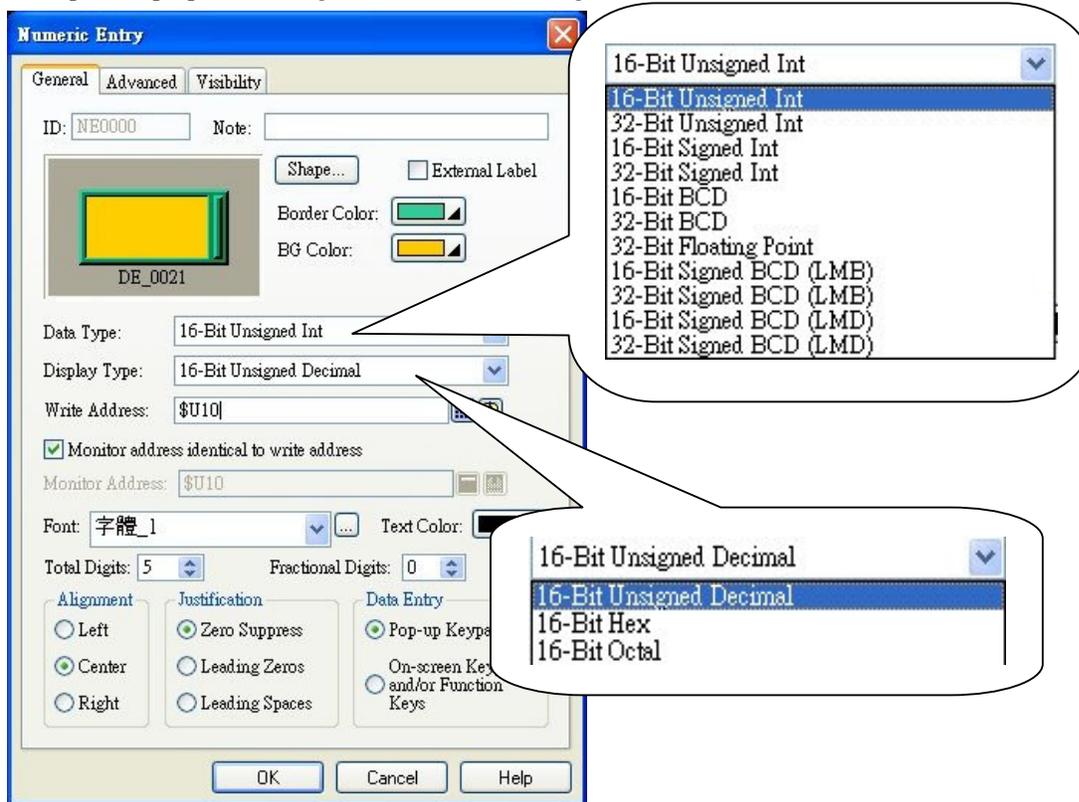


Details on how to create such a screen will be described in the following (devices described previously will be not covered here).

1. Create Numeric Entry

[Description of Numeric Entry: One can directly set the numerical values in FV HMI and transmit them to the corresponding address in PLC.]

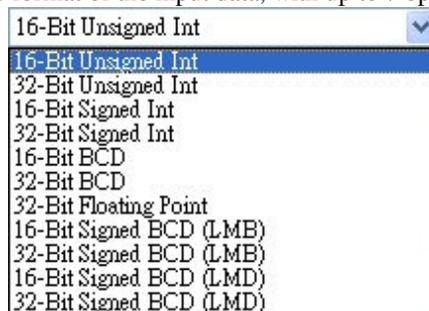
- Select [Object] in tool list ⇒ click [Numeric Entry] or directly click the corresponding icon  in the toolbar. Move the mouse to the Screen Edit Area and click the left button to place the device. Double click to open the properties dialog box, as shown in the figure below:



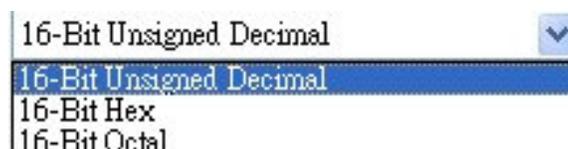
1. [General] Tab

In the General Tab, one can set parameters such as shape, border color, background color, Data Type, Display Type, write/monitor address, total digits, fractional digits, font, text color, alignment, and justification.

- ◆ **Data Type:** Configure the format of the input data, with up to 7 options, as shown below:

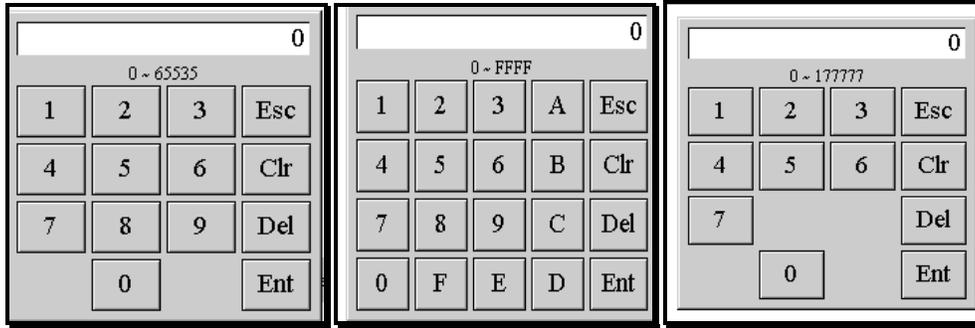


- ◆ **Display Type:** Set the format of data display; this option is only effective when the Data Type is set as a positive integer.



Note: Different keypads will pop up depending on the display categories (see supplement 2 and 3) as shown

below



(16 digits hexadecimal positive integer)

(16 digits hexadecimal number)

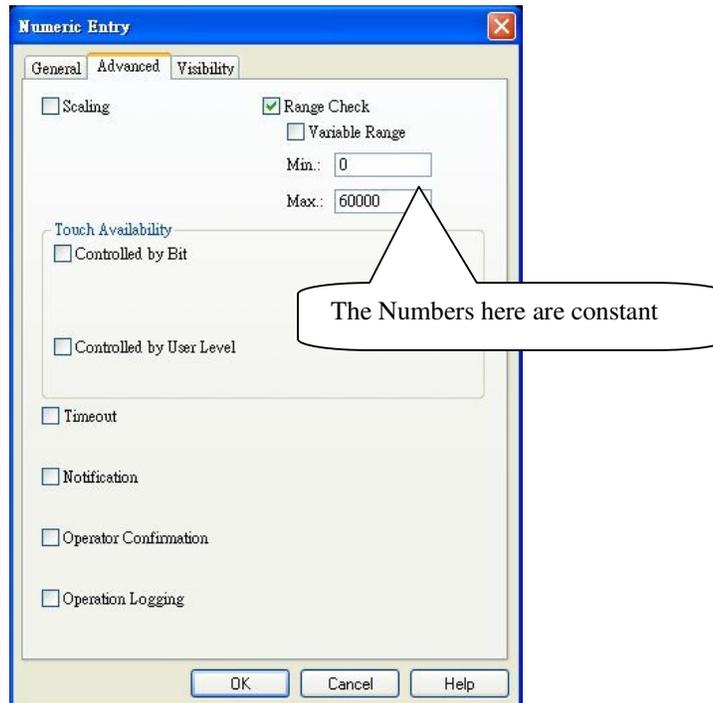
(16 digits octal number)

- ◆ **Write Address:** Set the write address of the Numeric Entry device.
 - Monitor address identical to Write address:** Monitor and Write share the same address (default option).
(Note: If the write address and monitor address are different, the data displayed in the Numeric Entry is determined by the monitor address.)
- ◆ **Font/Text Color:** Set the font and color for texts displayed in the Numeric Entry device.
- ◆ **Total Digits:** Define the total number of digits allowed to be entered in the Numeric Entry device.
- ◆ **Fractional Digits:** Define whether the entry will use decimal input.
- ◆ **Alignment/Justification:** Define where and how the data is displayed.

2. [Advanced] Tab

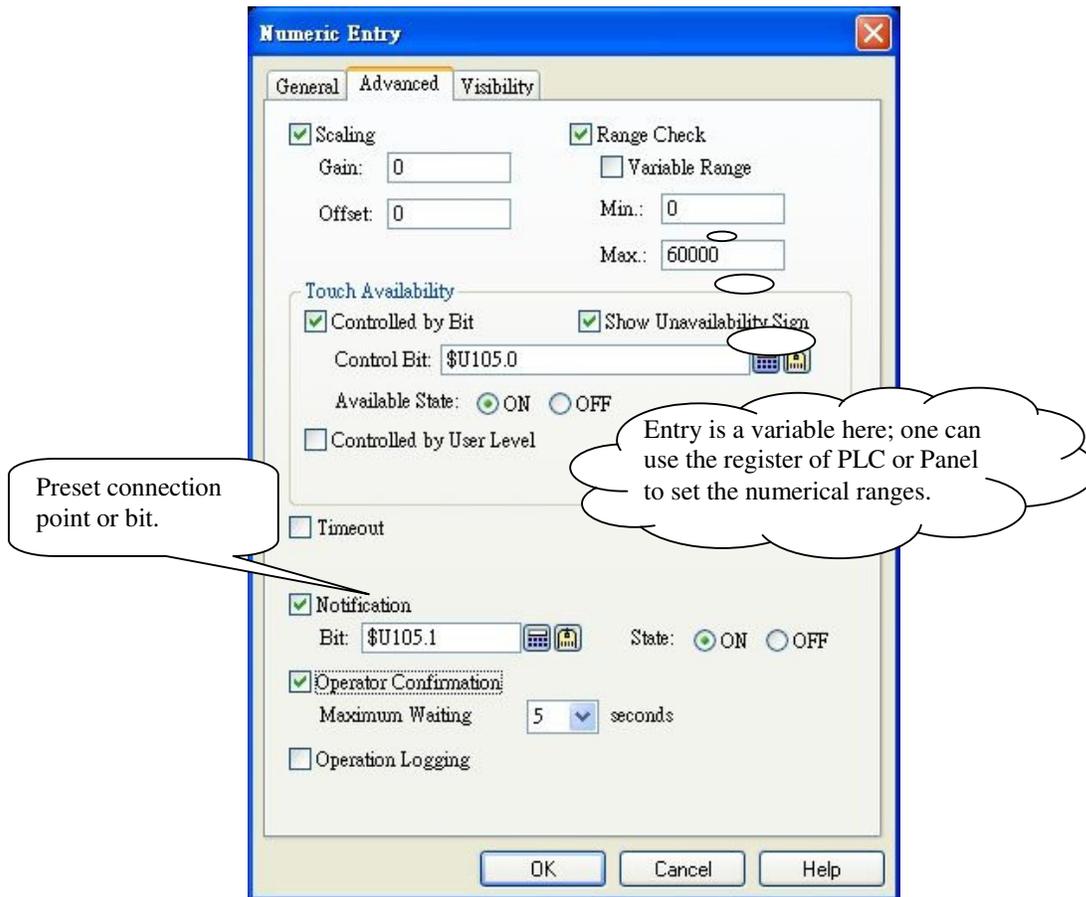
Click the Advanced Tab in the properties dialog box of Numeric Entry and the Advanced settings dialog box will pop up.

- Scaling:** Define **whether** the input data will be scaled.
- Range Check:** Set the upper and lower limits of the data entry. Check this box to define the range of the data.

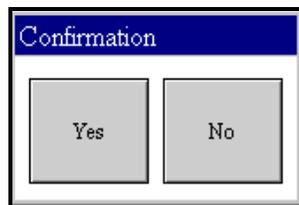


- Variable Change:** Set the register for upper and lower limits and the range can be changed as desired.

- ◆ **Min:** Set the lower limit of the range for data input; entry of number below the lower limit is not allowed.
- ◆ **Max:** Set the upper limit of the range for data input; entry of number above the upper limit is not allowed.



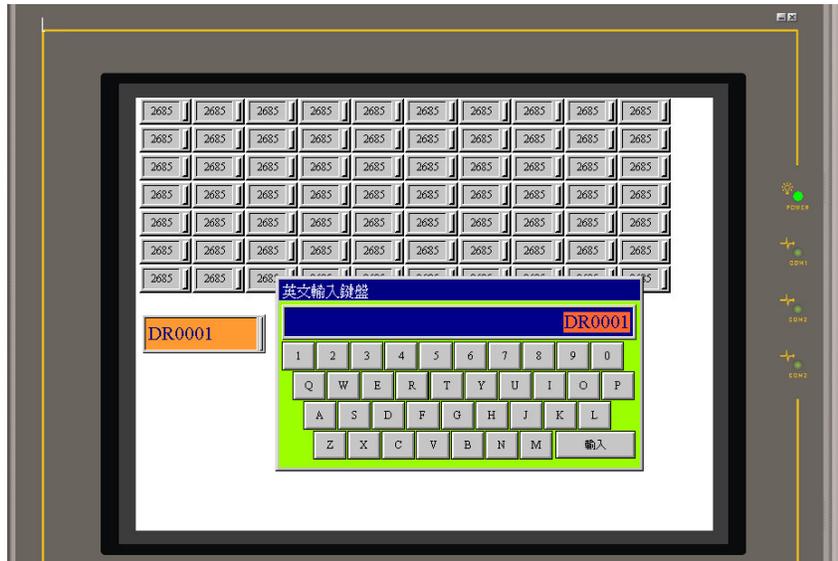
- ◆ **Touch Availability:** Define whether Touch Availability is controlled by the connection point and user level.
- **Notification:** Upon entry of numerical data, the connection point of bit in the current setting will be ON(1) or OFF(0) as configured.
- **Operator Confirmation:** The entered data requires the operator confirmation to be effective. If this option is checked, after the data is entered, a dialog box will pop up as shown below. Click YES to verify the entry.



- **Operation Logging:** Select whether to record the operation.

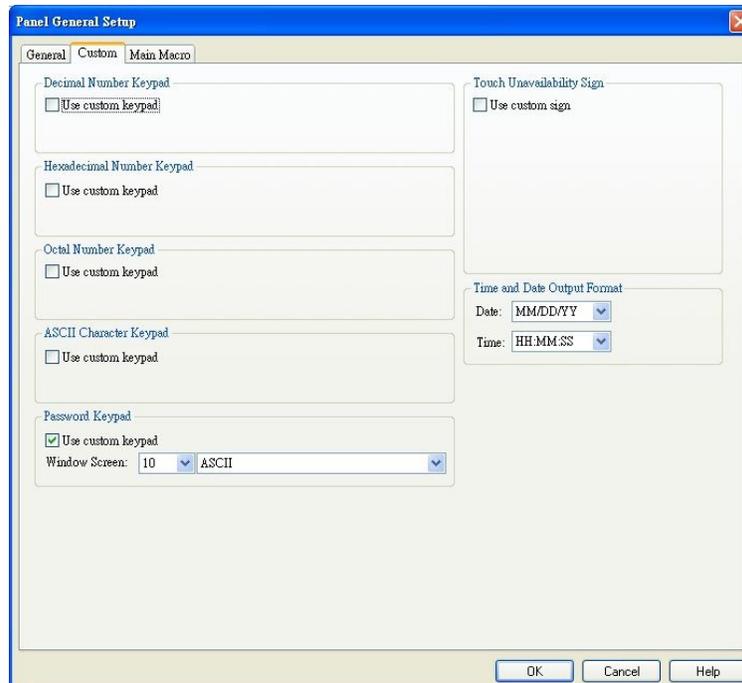
Supplement 2: Create Customized Keyboard

Built-in keyboards are available for the Numeric Entry or ASCII text/number entry in PM Designer, which requires no further setup by the user. In case the user wants to make his own keyboard with customized features, or to enter the corresponding English name for the menus, he can configure his own keyboard, as shown in the figure below:



Configuration of Flow:

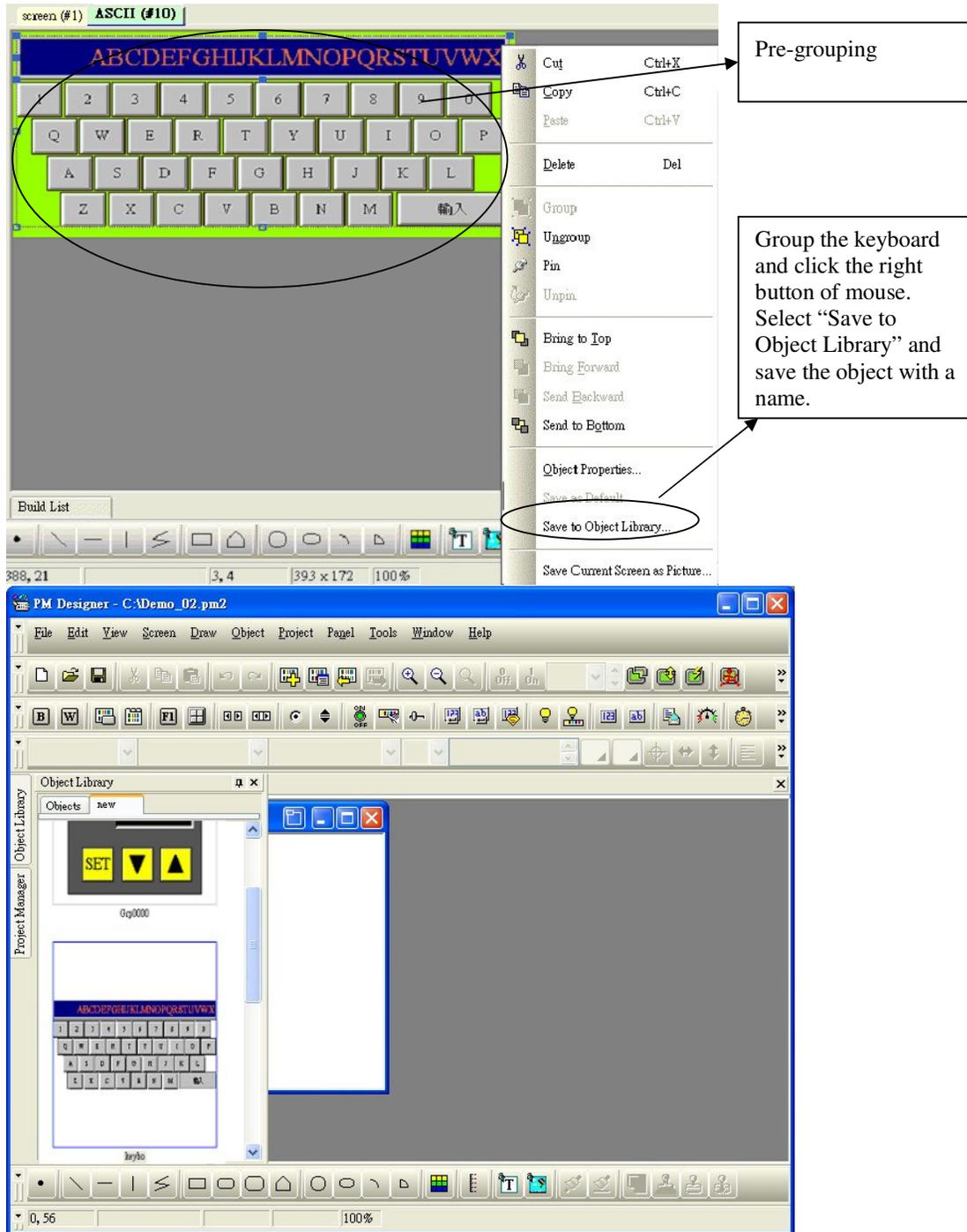
1. Use the Object_Keyboard button  ⇒ Set ASCII text ⇒ enter the corresponding texts.
2. Select the Object_ASCII display  ⇒ check the box (for entry display).
3. Group all the objects.
4. Set the screen in design to be Windows Screen.
5. In the ASCII Character Keypad option in the Custom Tab of [Panel General Setup], select the keyboard window to be used to finish the configuration.



Supplement 3: Create Object Library

In the Object Library of PM Designer, you can collect the designed keyboards, meters, and pictures to make them your own personal objects, which allows you to locate and use them easily in different projects.

For example, if you want to place a customized keyboard into the Object Library

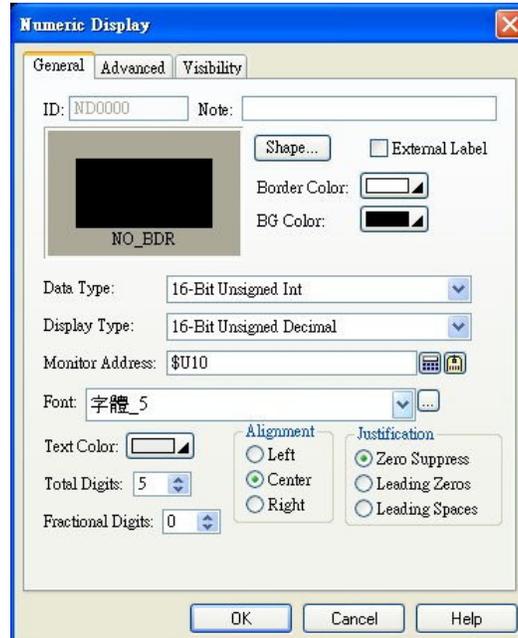


In the end, you should be able to see the saved keyboard in the Object Library. In the future, whenever you are using PM Designer in your computer, you can select this object.

2. Creating Numeric Display

[Descriptions of Numeric Display: Read the internal register of PLC at any time and display the content on the screen]

- Select [Object] in tool list ⇒ click [Numeric Display] or click the corresponding icon in toolbar . Move the mouse to the Screen Edit Area and click the left button to place the device. Double click to open the Numeric Display properties dialog box, as shown by the figure below:

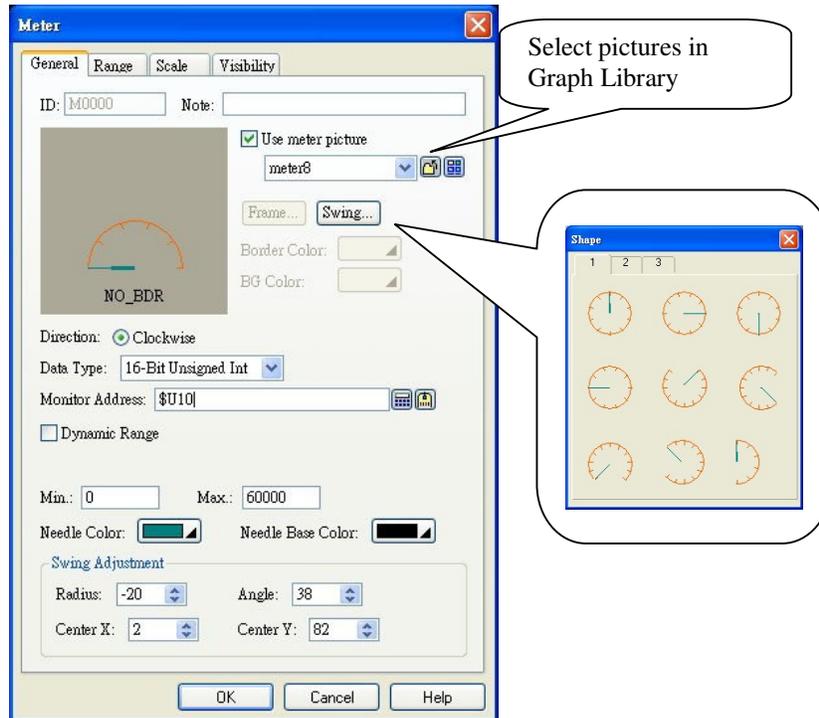


Configuring the setting of the Numeric Display is essentially the same as that for the Numeric Entry. Please refer to the previous descriptions for details.

3. Create Meters

[Descriptions of Meters: Read the numerical data in the internal register of PLC at any time and convert it to meter mode and display on the screen.]

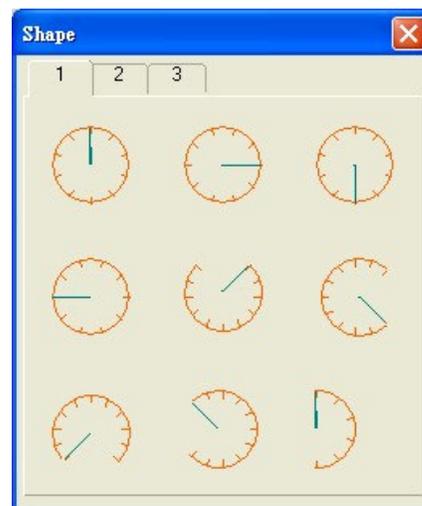
- Select [Object] in tool list ⇒ click [Meters] or directly click the corresponding icon in toolbar . Mover the mouse to the Screen Edit Area and click the left button to place the device. Double click to open the Meters properties dialog box, as shown in the figure below:



1. [General] Tab

In the [General] Tab, one can add new appearance to a meter. One can configure parameters such as frame, swing, style, border color, background color, direction, data type, monitor address, minimum, maximum, colors of needle/needle base color, and panel size.

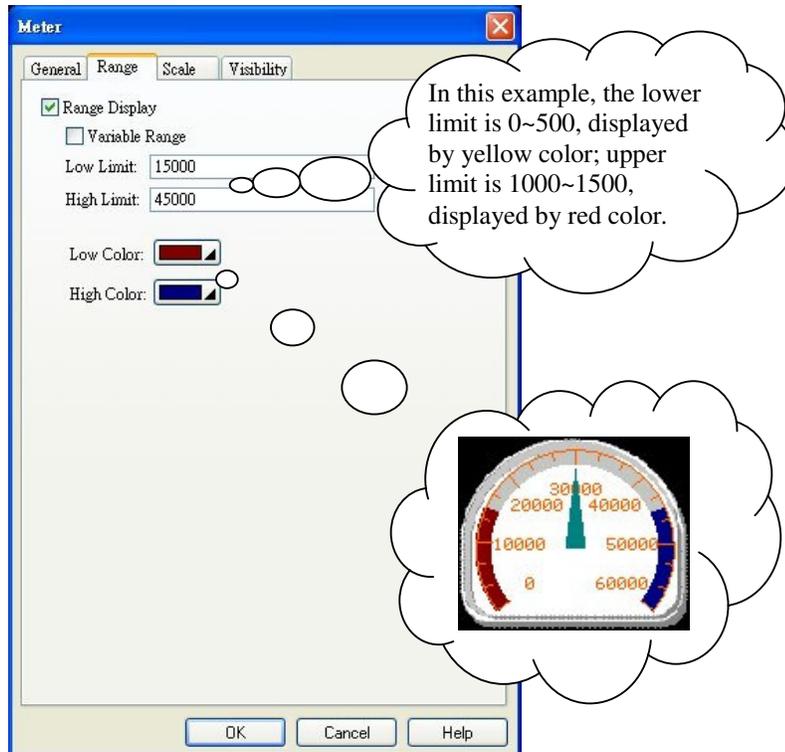
- Use Meter Picture:** Select the picture from the computer or the picture library to be used for the appearance of the meter.
- ◆ **Frame:** Define the appearance of the meter. This option is not available once the Use Meter Picture is selected.
- ◆ **Swing:** Define the style of the meter.



- ◆ **Data Type:** Set the category of the data read by the meter.
- ◆ **Monitor Address:** Set the address read by the meter.
- ◆ **Min/Max:** Define the maximum and minimum of the meter readings. The meter will not be able to display if the readings exceed these values.
- ◆ **Needle/Needle Base Color:** Define the colors of the needle and needle base in the meter.
- ◆ **Swing Adjustment:** Adjust the radius and position of the meter panel.

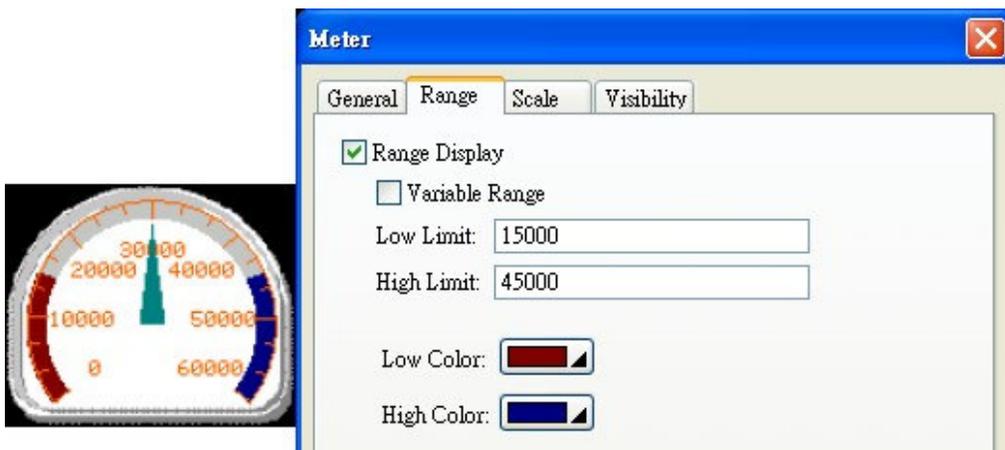
2. [Range] Tab

Click the [Range] Tab in the Meter properties dialog box and the Range Settings dialog box will pop up.



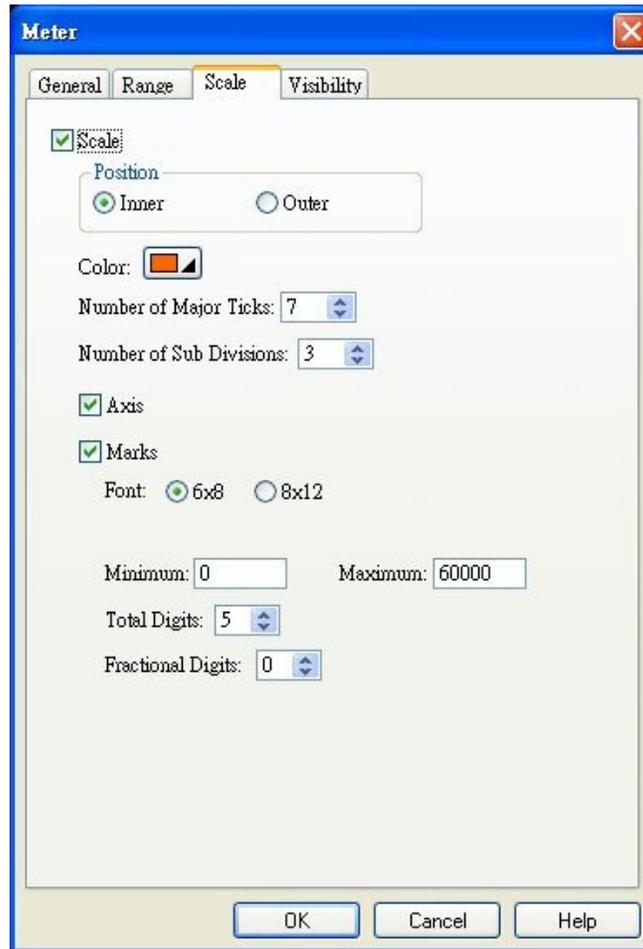
- Range Display:** Check this option to set the colors of the upper and lower limits, used to define the display ranges of the meter.
- Variable Range:** Set the upper and lower values to be the register.
- Low/High Color:** Define the colors for the high/low levels.

After these settings are configured, the meter looks like the following:



3. [Scale] Tab

Click the [Scale] Tab in the Meter properties dialog box and the Scale settings dialog box will pop up. Certain parameters of the meter scale can be configured in the Scale properties, as shown by the figure below:



Scale: Check this option to configure the parameters of the meter Scale.

◆ **Position:** Define whether the Scale is on the inner or outer side of the meter.

◆ **Color:** Set the color of the Scale.

◆ **Number of Major Scale:** Define the number of major Scale on meter.

◆ **Number of Sub Divisions:** Define the number of sub divisions on meter.

Axis: Check this option to show the scale axis.

Marks: Check this option to show numerical symbols as scale marks.

Font: Define the size of the texts used for tick labels, with options of 6*8 and 8*12.

Maximum/Minimum: Define the maximum and minimum values for the numbers displayed on the meter.

Total Digits/Fractional Digits: Define the digits and decimal place for the displayed numbers on the meter.

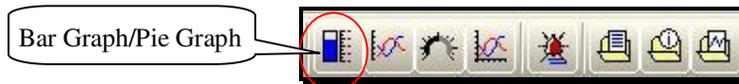
★ **Settings for the Display Tab have been described previously. Please refer to the configurations introduced earlier for details.**

4. Create Bar Graph/Pie Graph

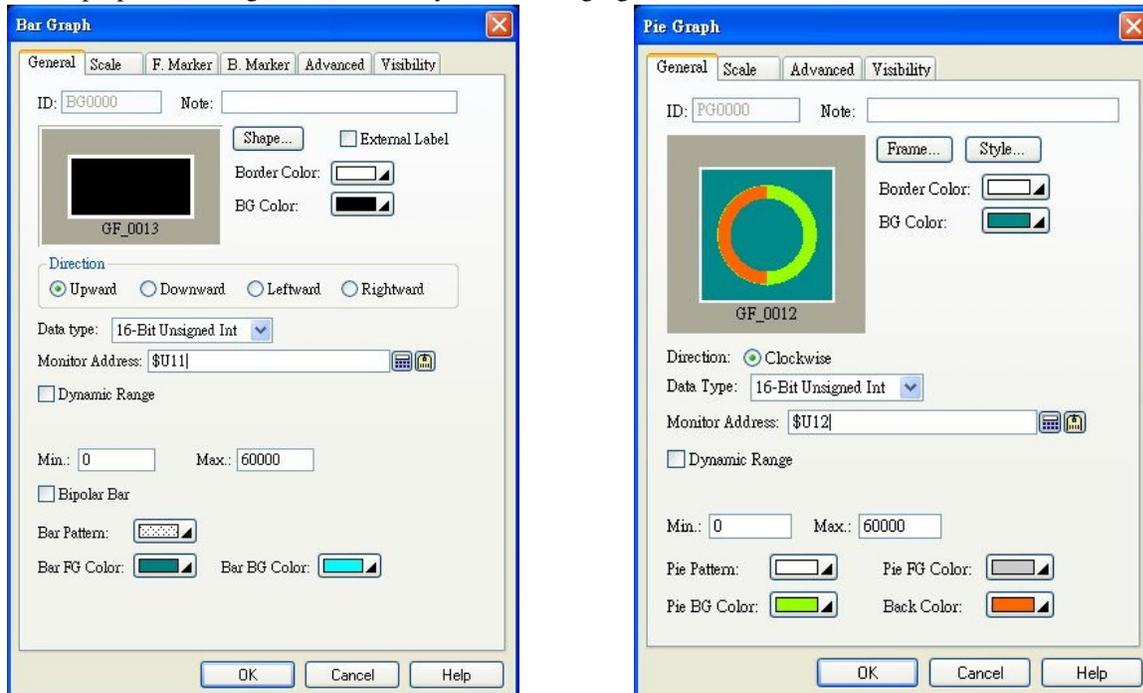
[Descriptions of Bar Graph/Pie Graph: Read the numbers in the internal register of PLC and convert them to Bar Graph or Pie Graph and display on the screen.]

★ Since the configurations for these two devices are basically the same, and many of the tabs have already been described in details, only the General Tab will be addressed here.

- Select [Object] in the tool list ⇒ find [Graph] ⇒ click [Bar Graph/Pie Graph] or directly select from the toolbar, as shown in the figure below:



Move the mouse to the Screen Edit Area and click the left button to place the device. Double click to open the device properties dialog box, as shown by the following figure:



1. [General] Tab

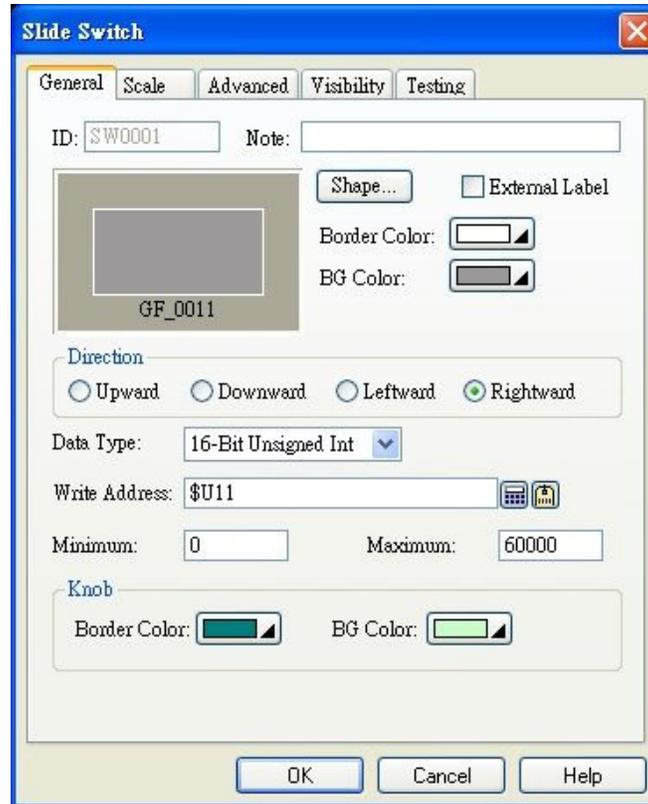
In the General Tab, one can set parameters of the device such as shape, border color, background color, direction, Data Type, monitor address, minimum/maximum, bar pattern, and color.

- ◆ **Direction:** Set the direction along which how the pattern display changes from large to small.
- ◆ **Data Type:** Configure the category of data read by the device.
- ◆ **Monitor Address:** Set the address read by the device.
- ◆ **Min/Max:** Define numbers for the minimum and maximum of the device.
- ◆ **Bar/Pie Pattern:** Select the pattern to be displayed for the device.
- ◆ **Bar/Pie Pattern Color:** Define the color of the pattern.
- ◆ **Bar/Pie Background Color:** Set the background color of the device.

5. Creating Slide Switch

[Descriptions of Slide Switch: Write numbers to the corresponding address of the control unit in the mode of Slide Switch.]

- Select [Object] in tool list ⇒ click [Slide Switch] or click on the corresponding icon in toolbar  to add a new Slide Switch. Move the mouse to the Screen Edit Area and click left button to place the device. Double click to open the Numeric Entry properties dialog box, as shown by the following figure:



1. [General] Tab

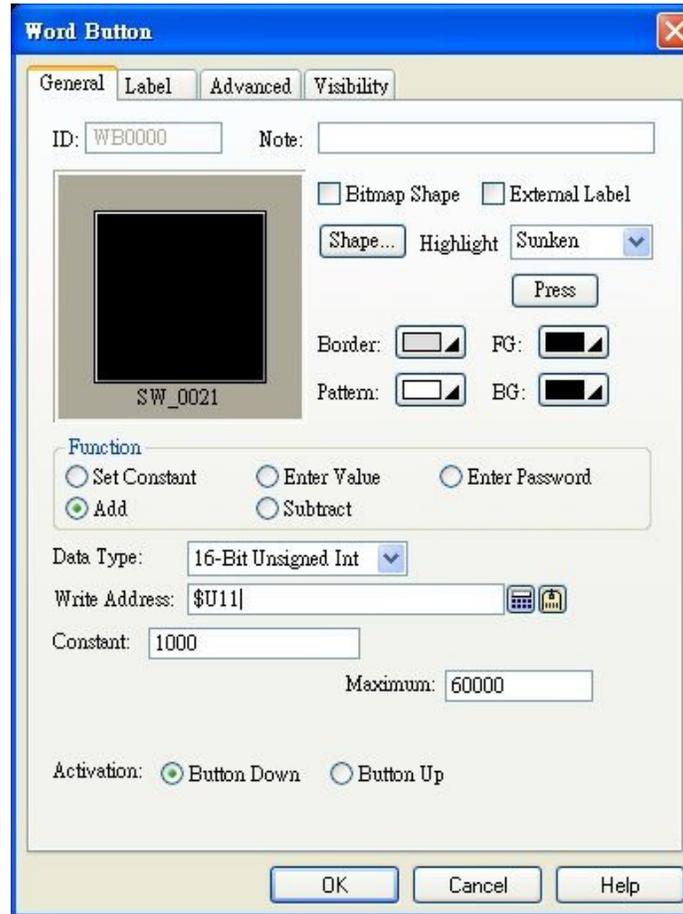
In the [General] Tab, one can configure parameters of Slide Switch such as shape, border color, background color, direction, Data Type, write address, minimum/maximum value, and knob.

- ◆ **Shape:** Define the shape of the Sliding Switch.
- ◆ **Border/BG Color:** Define the border/background color of the Slide Switch.
- ◆ **Direction:** Define the direction along which the number increases as the Sliding Switch moves.
- ◆ **Data Type:** Define the category of the data input from the Sliding Switch to the controller.
- ◆ **Write Address:** Set the address for the Sliding Switch to write to the controller.
- ◆ **Minimum/Maximum Value:** Set the input numbers for minimum and maximum positions of Sliding Switch.

6. Create Word Button

[Descriptions of Word Button: Enter one word into the corresponding address of the control unit at the click of the button.]

- Select [Object] in tool list ⇒ find [More Buttons] ⇒ click [Word Button] or directly click the corresponding icon in toolbar . Move the mouse to the Screen Edit Area and click left button to place the device. Double click to open the Word Button properties dialog box, as shown in the figure below:



1 [General] Tab

In General Tab, one can set parameters of the Word Button such as shape, border color, pattern, pattern color, background color, function, Data Type, write address, constant, and maximum.

- ◆ **Shape:** Define the shape of the Word Button.
- ◆ **Border/BG Color:** Set the border/background color of the Word Button.
- ◆ **Pattern/FG Color:** Set the pattern and pattern color of the Word Button.
- ◆ **Function:** Select the function of the Word Button, with the following 5 options:
 - ⊙ **Set Constant:** Click the button to send one constant to the memory of the control unit.
 - ⊙ **Enter Value:** Click the button to pop up the numerical keypad, allowing number entry to the memory of the control unit.
 - ⊙ **Enter Password:** Click the button to pop up the numerical keypad, allowing number entry to the control unit, except the number is expressed by *.
 - ⊙ **Add:** Click the button to add a predefined value to the internal register of the control unit.
 - ⊙ **Subtract:** Click the button to subtract a predefined value from the internal register of the control unit.

[Example] Use FATEK FBs-24MC PLC

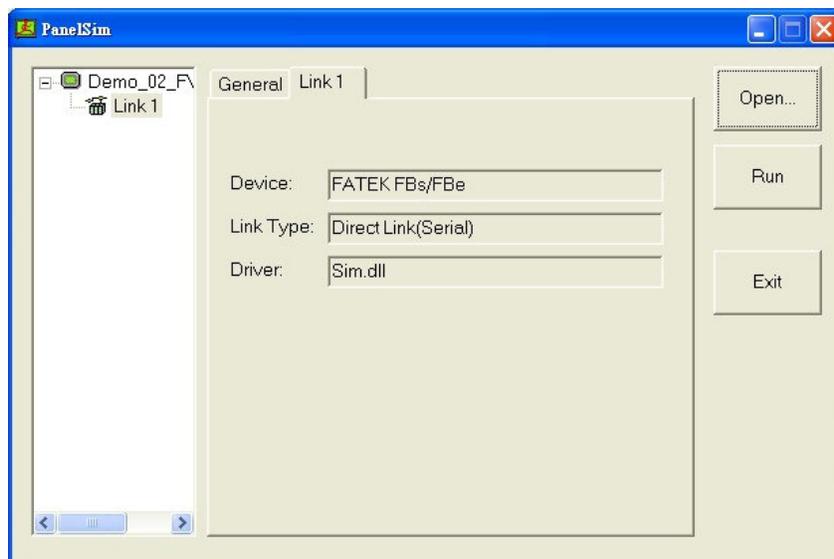
1. Follow the above descriptions to add a Numeric Entry Button on the Meters screen, with the Data Type selected to be 16-digit positive integer and Display Type to be 16-digit decimal positive integer. The Write Address is configured to be R100 of PLC, with 5 digits and center alignment. In Advanced Tab, check the option of Range Check, with the maximum set to be 60000. Upon completion of setting, click OK to finish.
2. Follow the above descriptions to add a new Meter in the Meters screen. Check the option of Use Meter Picture and select the picture of meter 4. Define the Data Type to be 16-digit positive integer, Monitor Address to be R100 of PLC, and the maximum value to be 60000. Set the color of the pointer to be 5 and place the meter with swing adjustment appropriately on the picture. In the Scale Tab, check it to show scale, with an inner scale position, and color 9. Set the number of Major Ticks to be 7, with 3 sub divisions. Check the options of Axis and Scale Mark. Select the font size of 6*8, maximum value of 60000, and 5 digits. Upon completion of setting, click OK to finish.
3. Follow the above descriptions to add a new Bar Graph, with the appearance of GF_0013, border color of 15, BG color of 0, and direction of upward. Set the Data Type to be 16-digit positive integer, with monitor address to be R100 of PLC. The maximum value is set to be 60000. In Scale Tab, check the option to show scale and position to be Left. Set the color to be 15, with 6 major ticks and 3 sub divisions. Check the option of Scale Mark, with font of 6*8, maximum of 60000, and total digits of 5. Upon completion of setting, click OK to finish
4. Follow the above descriptions to add a new Pie Graph to the Meter screen, with the shape of GF_0012, border color of 15, and BG of 5. Define the direction to be clockwise starting from top. Select the Data Type of 16-digit positive integer and monitor address to be R100 of PLC. In the Scale Tab, check the option to show scale. Define the scale position to be inner, the color to be 15, with 6 major ticks and 3 sub divisions. Check the options of scale mark, with font of 6*8, maximum of 60000, and total digits of 5. Upon completion of setting, click OK to finish
5. Follow the above descriptions to add 3 Numeric Displays to the Meter screen, with the frame of GF_0031, border color of 15 and BG of 13. Set the Data Type to be 16-digit positive integer. Define the Display Type to be 16-digit decimal positive integer. The write addresses of two of them are defined to be R101 and one of them to be R102 of PLC. Total number of digits is 5, with center alignment. Upon completion of setting, click OK to finish. Place the displays with write address R101 on the two sides at the bottom of the screen and the one with R102 in center at the bottom of the screen.
6. Follow the above descriptions to add 3 Slide Switches to the Meter screen, placing them on a row at the bottom of the screen. Define the frame to be GF_0011, border color to be 15, BG colors from left to right to be 168, 145, and 48. Define the directions from left to right to be Right, Right, and Left. Define the Data Type to be 16-digit positive integer. The write addresses for the two buttons on the two ends are set to be R101 of PLC and the one in the middle to be R102 of PLC.
7. Add a new word in screen and define the font to be font 2 (Li Shu style, size 20, normal). Text dialog box is defined to be Numeric Entry with color 166. Upon completion of setting, click OK to finish. Resize the word frame and place it at the upper left corner of the screen.
8. Add a new GIF picture to the screen. Select the picture of Welcome2. Click OK to exit. Resize the GIF frame appropriately and place it in the middle at the upper part of the screen.
9. Add a new change screen button, define as open screen 1, set input as Return, font 2 and exits upon clicking OK. Adjust the change button screen size and place in the upper right corner of the screen.

7. Online Simulation

- Online Simulation can treat the computer as an FV HMI and connect it to PLC to test the results of program editing.
- First download the edited PLC program to PLC and do not remove the connection cable between the computer and PLC, only make PLC stay at offline status. Open the edited FV HMI program and compile it to verify there is no error. Confirm again that the PLC COM Port configured in Connection Properties is the actual communication port of PLC with the computer.
- Select [Tool] in tool list → click [Simulating Execution (Online)] and the PM Designer will enter the Online Simulation mode, as shown in the following figure:



At this moment, one can directly click the device on the screen to exchange data with PLC, the effect of which is the same as that in the case of actually connecting to FV HMI. To exit online simulation, click the  at the upper right corner to exit and view the parameters of online simulation, as shown by the figure below:

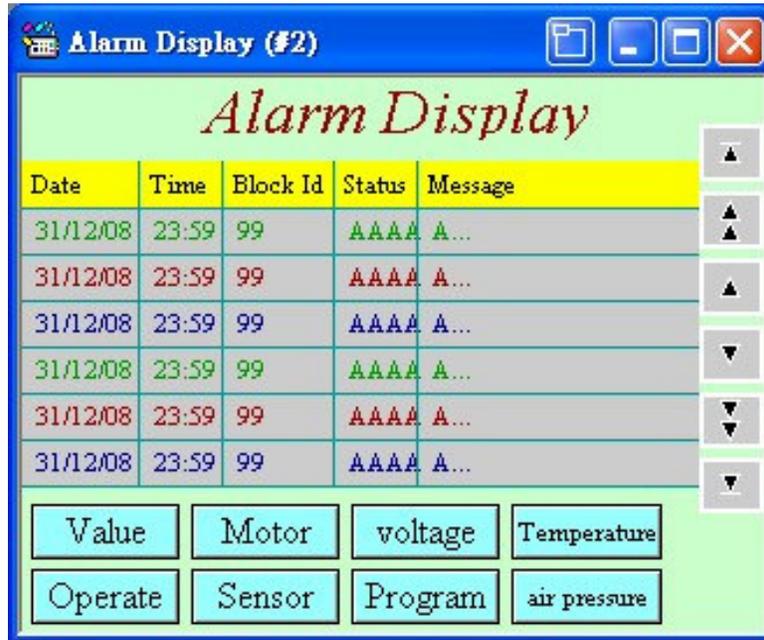


Chapter 6 Creating Alarm Screen

[Description of Alarm Display: Alarm Display is one of the most fundamental functions of FV HMI, which can readily show certain alarms as reminders for the user to discover the problems encountered in equipment operation and take necessary measures to resolve the situation.]

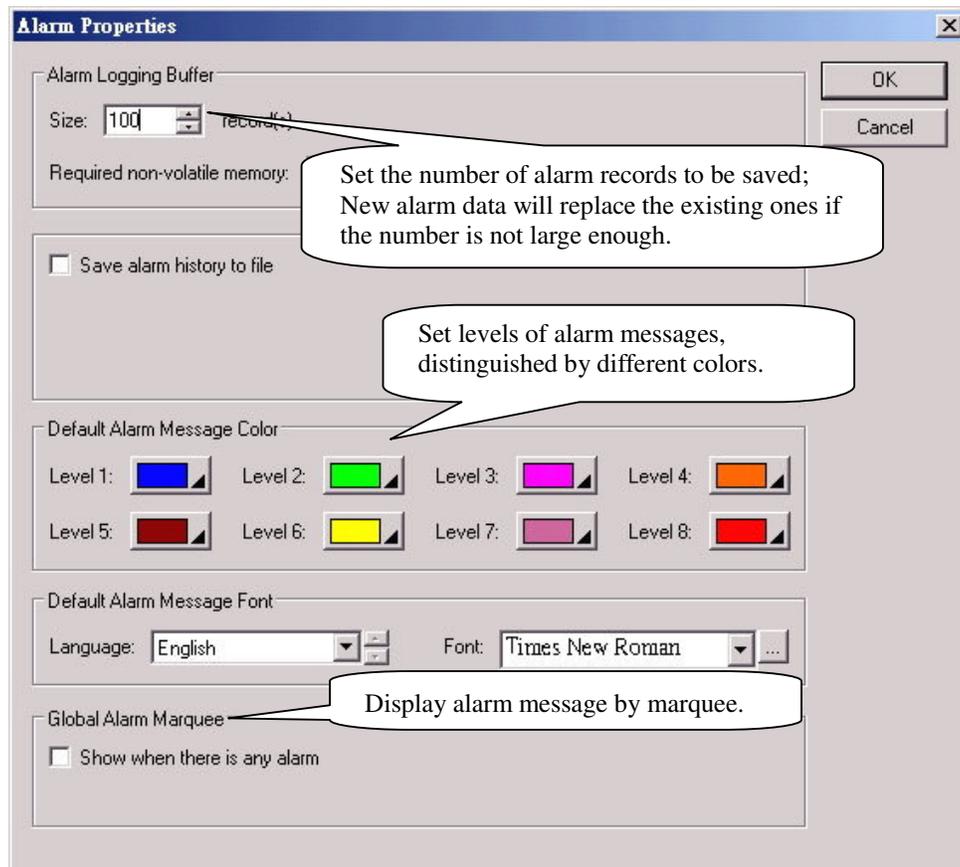
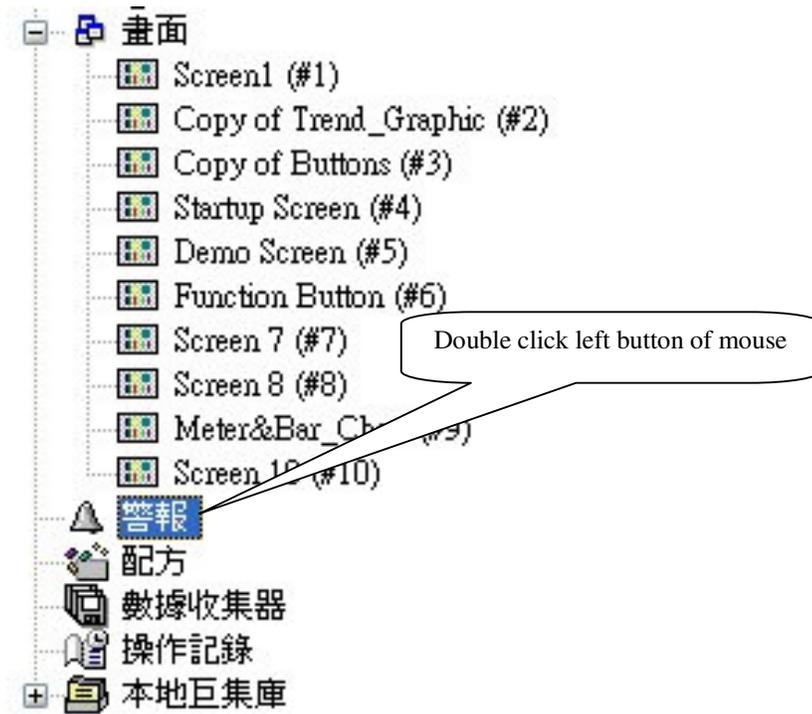
The completed screen is shown as the figure below and the devices used in the screen include:

- Alarm Display
- Scroll Button
- Static Text
- Screen Change Button
- Bit Button

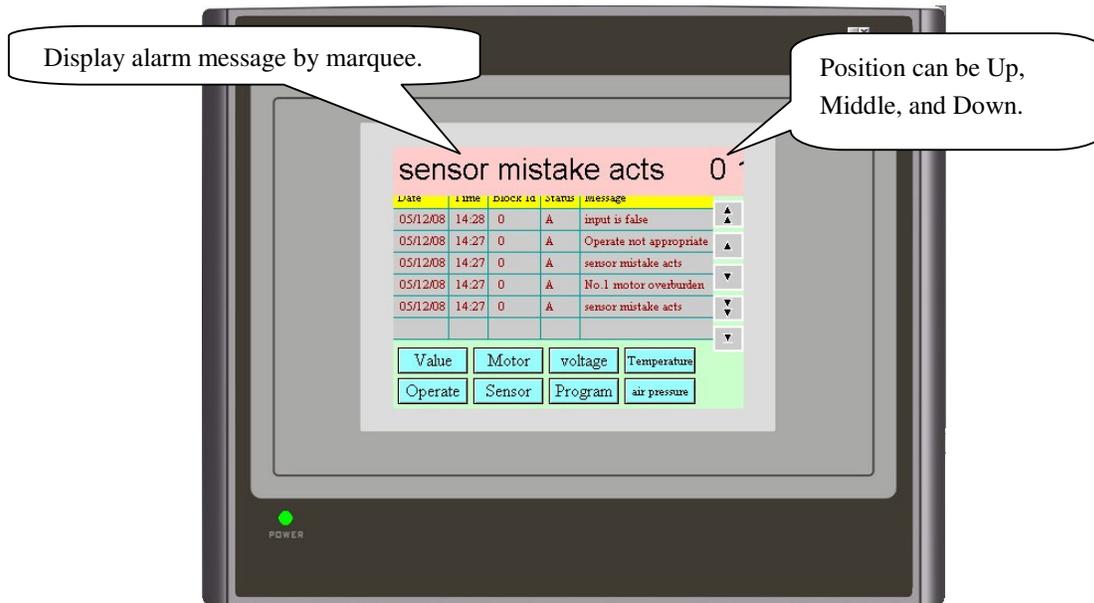


1. Alarm Properties Dialog Box

- Double click the left button of mouse on [Alarm] Project Manager to open the Alarm Properties dialog box, as shown in the figure below:

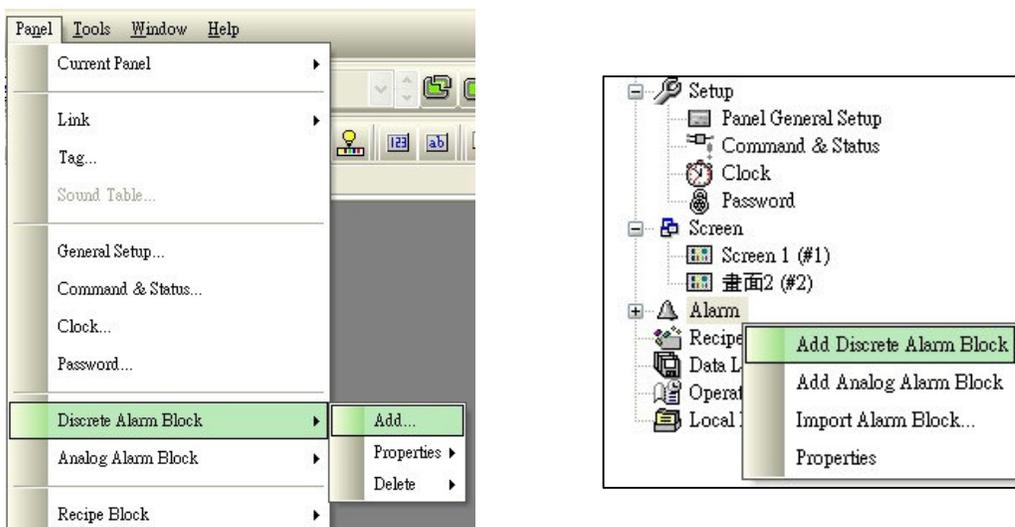


- ◆ **Alarm Logging Buffer:** Set the size of the Alarm Logging Buffer. If there are already 100 records, the 101th record will replace the 1st record, similar for the subsequent records. 100 records are used in this example.
- Save Alarm History to File:** Check this option to save the alarm record to another file.
- ◆ **Default Alarm Message Color:** Set the colors for each alarm level, with up to 8 levels.
- ◆ **Default Alarm Message Font:** Set the default fonts for the alarm message in various languages.
- Global Alarm Marquee:** When there is an alarm, the alarm message will appear as marquee in the current screen of operation.

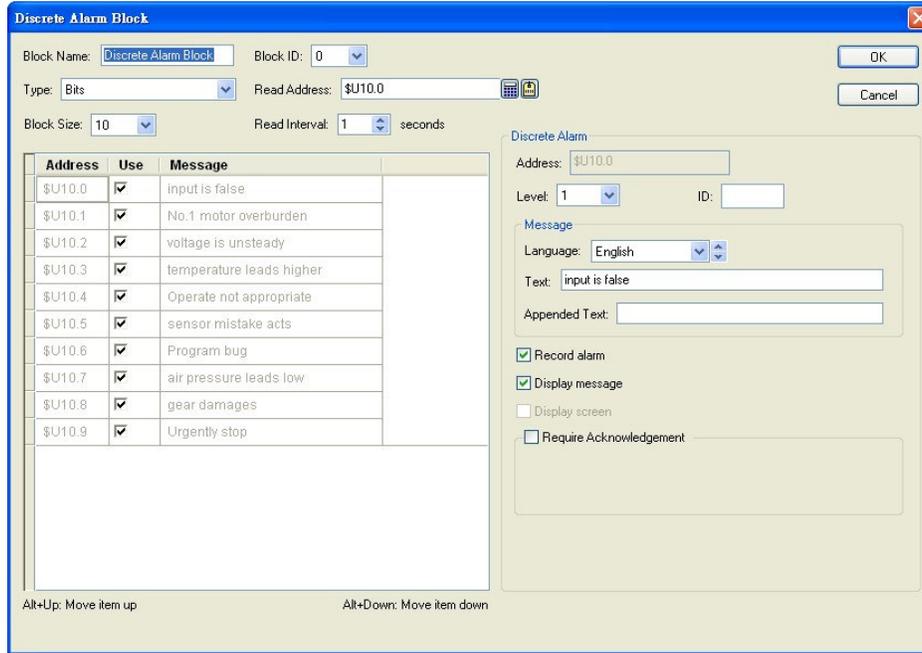


2. Add Discrete Alarm Block and Set Properties

- Select [Panel] in tool list ⇒ find [Discrete Alarm Block] ⇒ click [Add] or click the right button of mouse on Alarm in Project manager to add the Discrete Alarm Block. Either way it can be used to add a new alarm block, as shown in the following figure:



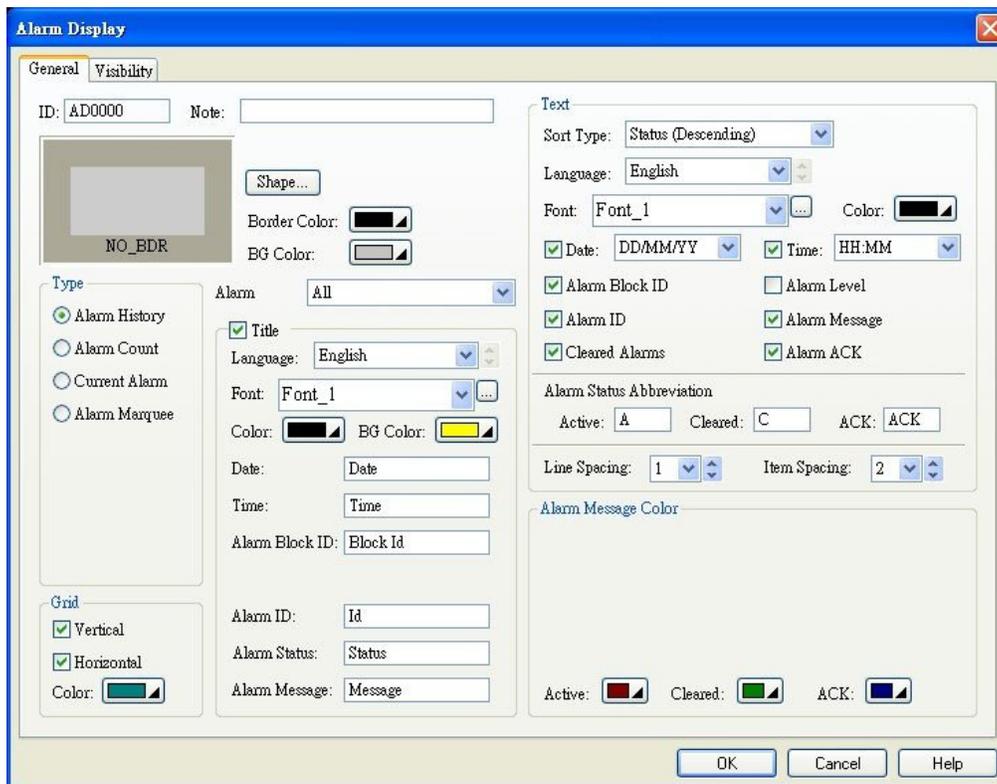
It can be seen that in the Alarm column of Project Manager, a new item  is available. Double click the left button of mouse to open the Discrete Alarm properties dialog box, as shown in the figure below:



- ◆ **Block Name:** Set the name of the alarm block.
 - ◆ **Block ID:** Set the ID number of the alarm block; up to 16 alarm blocks can be numbered.
 - ◆ **Read Address:** Set the initial bit read address of the alarm block. This address requires the device number to be set as multiples of 8, otherwise errors occur.
 - ◆ **Block Size:** Set the quantity of alarms. The alarm address is the continuous address section starting with the read address. If the read address is set to be \$U10.0 with size 10, then when \$U10.0 is ON, Alarm 1 will be activated; if \$U10.1 is ON, Alarm 2 will be activated. Activation of other alarms works in a similar manner.
 - ◆ **Read Interval:** Configure how often the alarm block is to be read.
 - ◆ **Discrete Alarm:** Set the parameters of each alarm. Click the alarm frame on the left to select individually.
 - * Address: Address of the current Digital Alarm.
 - * Level: Set the alarm level of the current alarm address, with up to 8 levels.
 - * ID: Set the ID number of each current alarm, optional.
 - * Message: Configure the texts to be displayed when each alarm is activated. Multiple language setting is available for the text configuration for each language.
 - Record Alarm:** Select whether to record the alarm. Only when this box is checked will the sounded alarm be displayed in Alarm Display.
 - Display Message:** Select this option and when there is an alarm, the alarm message will pop up automatically.
 - Display Screen:** Select this option and when there is an alarm, the designated window will pop up automatically.
- (Note: Display Message and Display Screen can not be selected at the same time.)

3. Add an Alarm Display in Screen

- Select [Object] in tool list ⇒ click [Alarm Display], move the mouse to the Screen Edit Area and click to place the device; resize the device properly. Double click the mouse over the device to open the Alarm Display properties dialog box, as shown in the figure below:



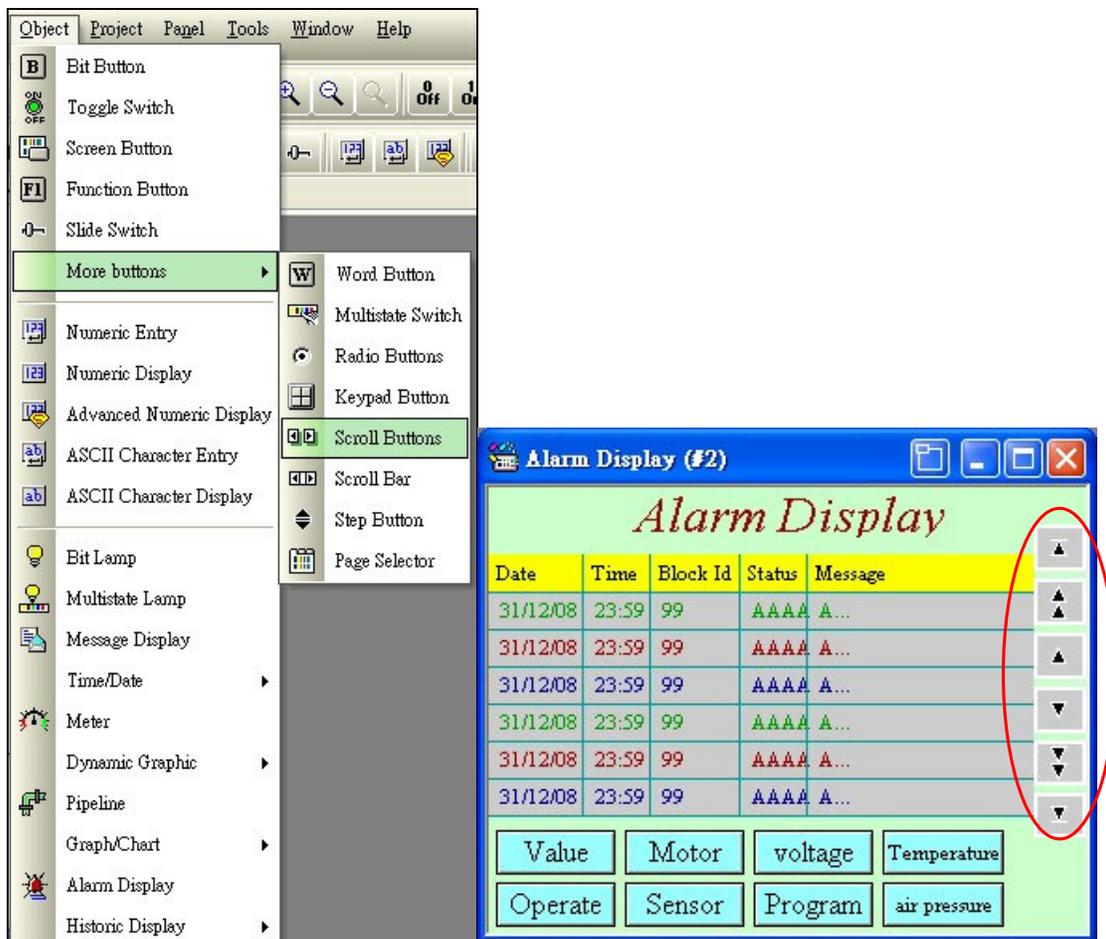
- ◆ **Type:** Select the types of alarm to be displayed.
 - ⊙ **Alarm History:** Once selected, the Alarm Display will show the alarm history record.
 - ⊙ **Alarm Count:** Counting of number of time of alarm.
 - ⊙ **Current Alarm:** Display the current alarm message.
 - ⊙ **Alarm Marquee:** Display the current alarm by marquee.
- **Title:** Set whether the Alarm Display shows the title and content; text message of the title can be shown by the Alarm Display.
- ◆ **Text:** Select the content to be displayed by Alarm Display; choose whether it's necessary to display number, level, time, message, etc.
- ◆ **Alarm Message Color:** Configure the colors of various levels of alarm.

[Example]

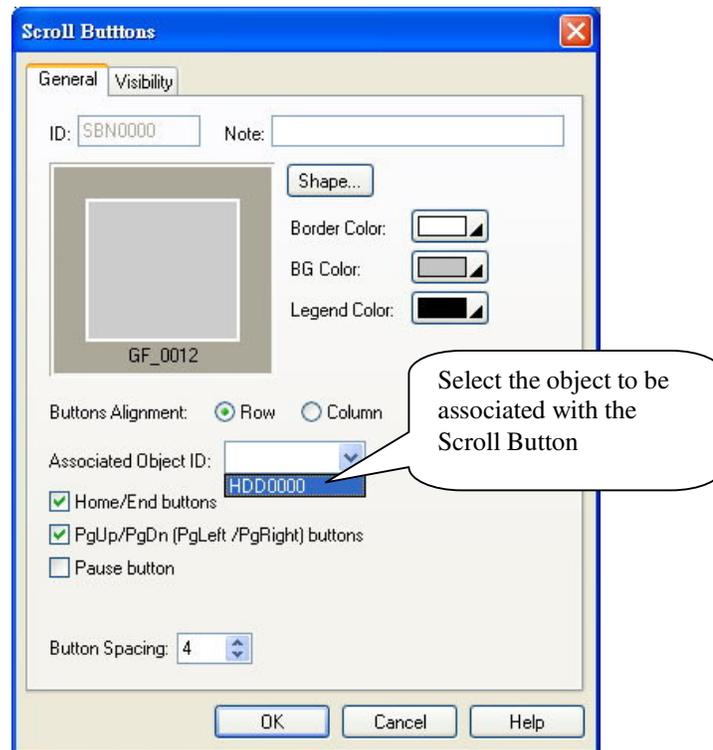
1. Follow the above descriptions and open the Alarm properties dialog box to set the size of Alarm Logging Buffer to be able to hold up to 100 records. Set the default Alarm Message color from levels 1 to 8 to be 0, 1, 2, 3, 4, 5, 6, and 8. Click OK to exit.
2. Follow the above descriptions and add one Discrete Alarm Block and set the Read Address of Discrete Alarm to be \$U10.0, with a size of 10 digits and a read interval of 1 second.
3. In the entry columns \$U10.0-\$U10.9 of Alarm Message, enter alarm messages of \$U10.0 (Numerical Entry Error), \$U10.1 (Motor No.1 exceeds rating), \$U10.2 (Voltage unstable), \$U10.3 (Overheated), \$U10.4 (Inappropriate operation), \$U10.5 (Sensor malfunction), \$U10.6 (Program run-time error), \$U10.7 (Pressure too low), \$U10.8 (Gear damaged), and \$U10.9 (Emergency stop activated). Check all records and click OK to exit.
4. Follow the above description to add an Alarm Display on the Alarm Display Screen.

4. Create Scroll Buttons

- Select [Object] in tool list ⇒ find [More Buttons] ⇒ click [Scroll Buttons] and move the mouse to the Screen Edit Area and click the left button to add a Scroll Button on the screen, as shown in the figure below:



- Double click the left button of mouse on the Scroll Button to open the properties dialog box, as shown by the following figure:



- ◆ **Buttons Alignment:** Select the orientation to align the buttons.
 - ◆ **Associated Object ID:** Select the object to be associated with the Scroll Button. Click the pull-down list to view the numbers of devices available for selection in the screen. Choose the device to be associated by its number.
 - Home/End buttons:** Configure the Scroll Button to display the Home/End button.
 - PgUp/PgDown (PgLeft/PgRight):** Configure the Scroll Button to display the PageUp/PageDown button.
 - Pause button:** Configure the Scroll Button to display the Pause button.
- There is no Clear button for the Scroll Button. To clear the history data, once can use the Clear button provided in the Function Button.

- ◆ **Button Spacing:** Set the spacing between each button.

[Example]

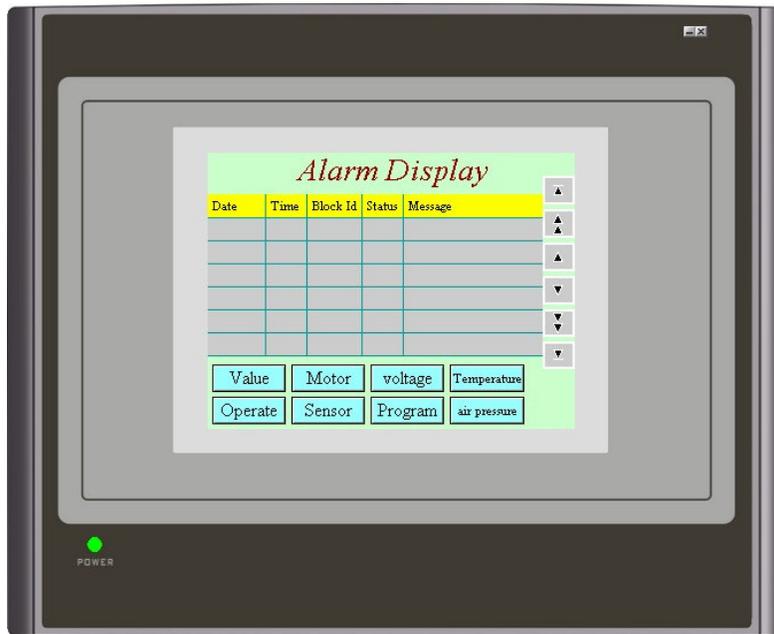
1. In the properties settings of Scroll Buttons, select the Buttons Alignment to be vertical, Associated Object ID to be AD0000, which is the number of the Alarm Display in the screen. Check the columns of Home/End, PgUp/PgDown (PgLeft/PgRight). Set the Button Spacing to be 10. Click OK to exit.
2. In the screen, adjust the size of the Scroll Button and place it on the right side of the Alarm Display.
3. Follow the example to add 10 Set ON Pulse Bit Buttons in the Alarm Display screen. Set the Write Address to be M0-M10. Configure the texts for State 0 to be Numerical, Motor, Voltage, Temperature, Operation, Sensor, Program, Pressure, Gear, and Emergency Stop. Make BG color 10 (green). Set all texts for State 1 to be Alarm, with a BG color 9 (red).

5. Test Alarm Display by Offline Simulation

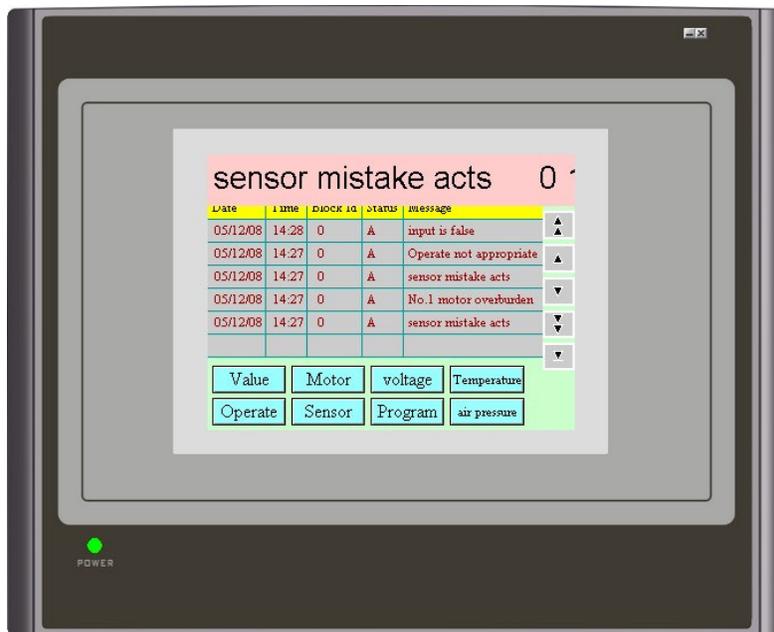
Step 1: Select [Panel] in tool list ⇒ click [Generate Panel Execution File (RPR)] to compile the screen program created previously.

Step 2: Select [Tool] in too list ⇒ click [Simulating Execution (Offline)] to start program execution by offline simulation.

As shown in the figure below:



Click the Bit Button on the screen to test how the alarm is displayed, as shown in the figure below:

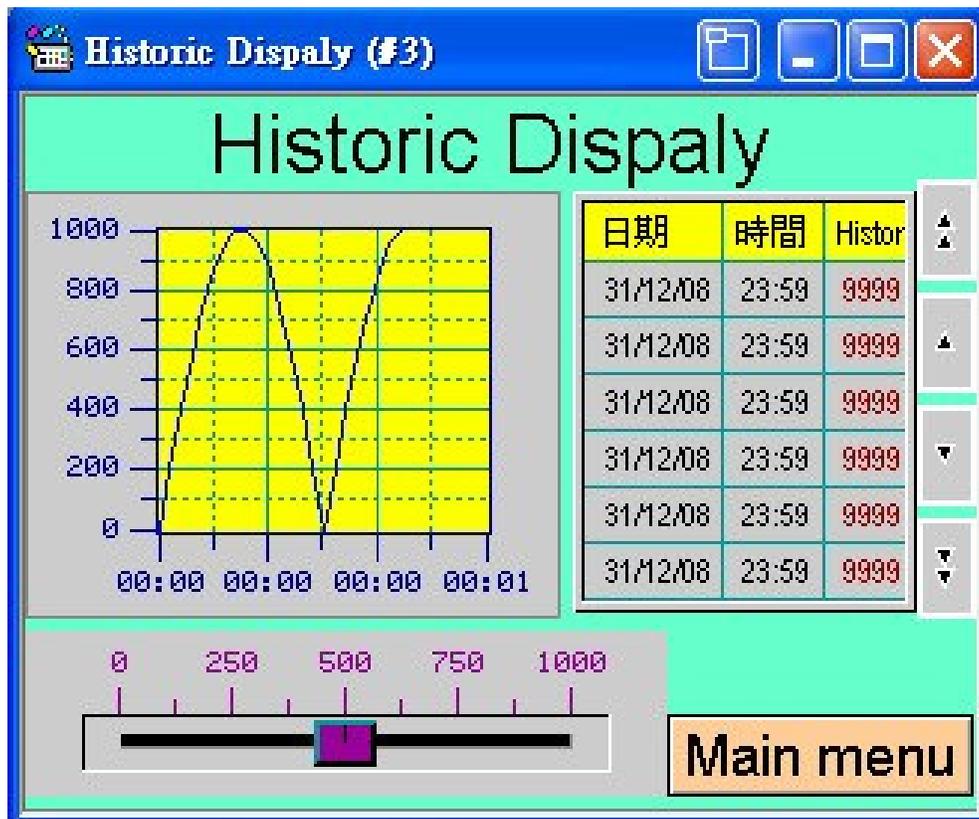


Chapter 7 Creating Historic Display Screen

[Description of Historic Display: Historic Display shows the historic data in the data register of the control unit by plotting the data on the graph and displaying it on FV HMI.]

The completed screen is shown as the figure below and the devices used on the screen include:

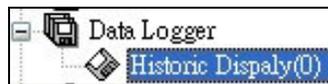
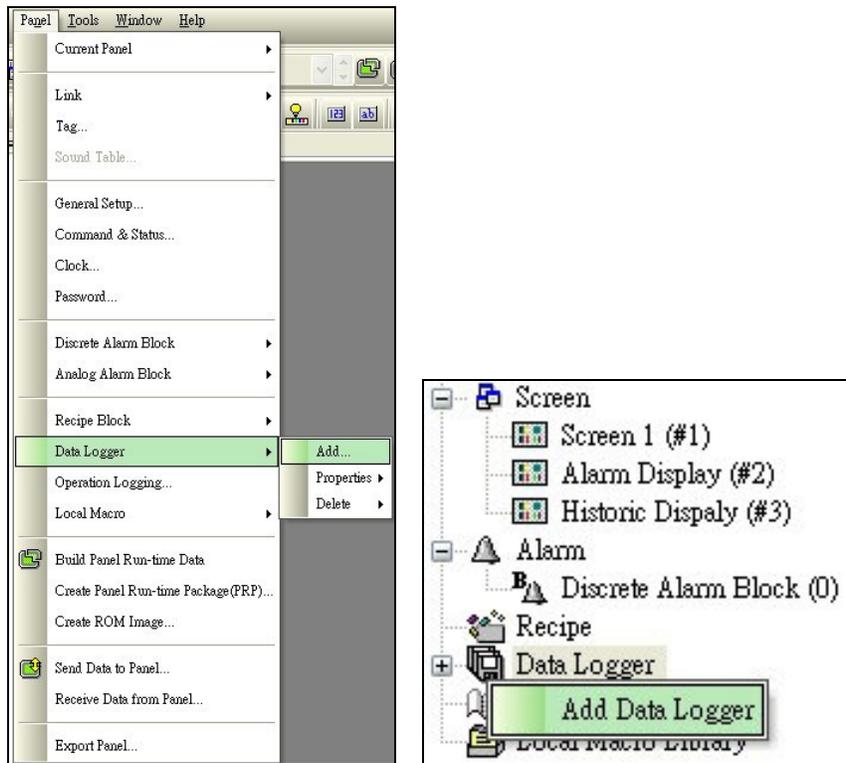
- Historic Display
- Historic Data Display
- Slide Switch
- Change Screen Button
- Scroll Button



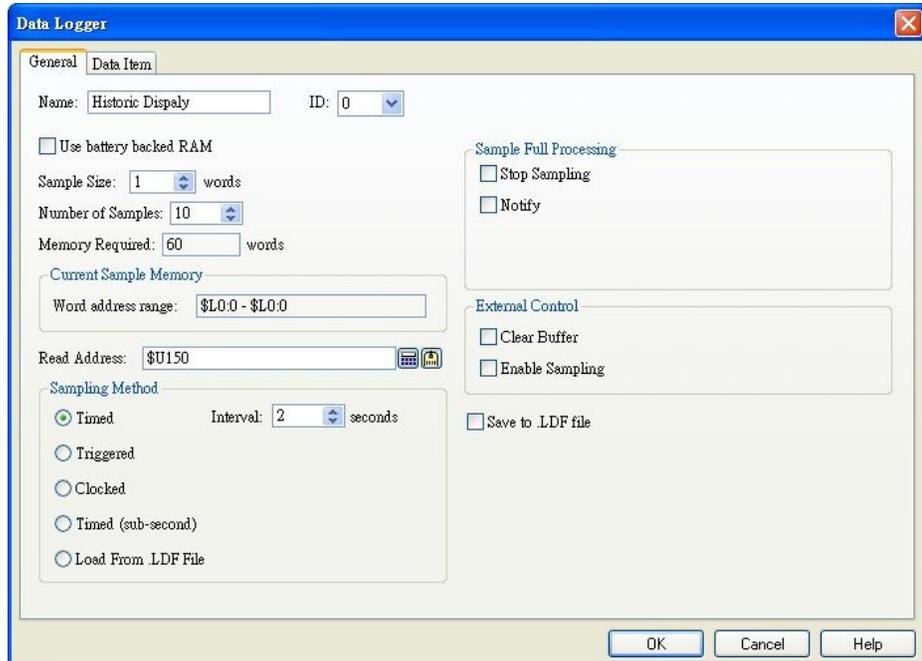
1. Add Data Logger

Prior to creating the Historic Display device, one must add the Data Logger in order to specify the read/write record buffer area of the control unit corresponding to the signal and establish the connection. Data Logger saves the collected data in the internal memory of FV HMI.

- Select [Panel] in tool list ⇒ find [Data Logger] ⇒ click [Add] or click the right button of mouse on Data Logger in Project Manager to select New Data Logger to add a new logger, as shown by the figure below:



- It can be seen that a new item **Historic Display(0)** is available under the Data Logger in Project Manager. Double click the left button of mouse to open the Data Logger Properties dialog box, as shown in the following figure:



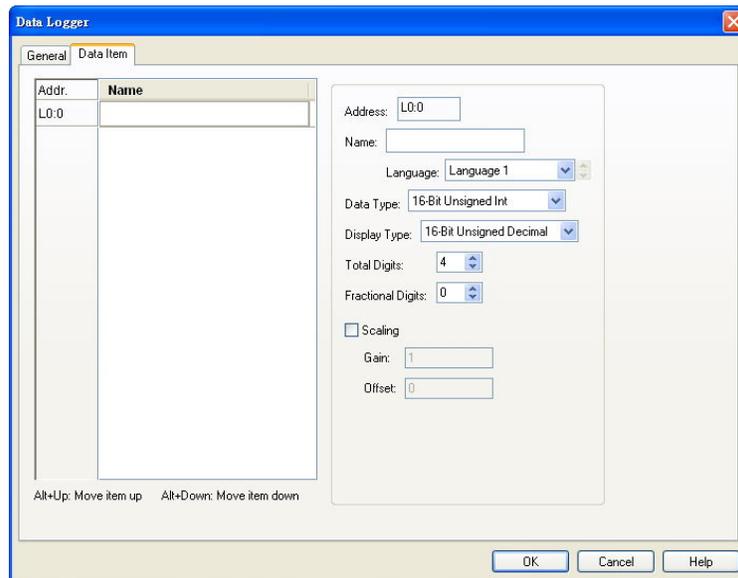
1. [General] Tab

- ◆ **[Name]:** Set the name of the Data Logger.
- ◆ **[ID]:** Set the ID number of up to 16 Data Loggers.
- ◆ **[Sample Size]:** Set the sample size of Data Logger, which defines how many blocks are samples every time, with a maximum length of 32.

- ◆ **[Number of Samples]:** Total number of samples. In the case of 100 samples being taken, when the 101st sample is logged, it will replace the 1st sample. Similar order applies to the samples collected subsequently.
- ◆ **[Memory Required]:** Determine how much internal memory is required by calculating the size and number samples.
 - Use battery backed RAM:** Check this option and the register will choose to use the battery to backup the memory, which keeps the stored data if FV HMI loses the power.
- ◆ **[Read Address]:** Configure the controller address read by Data Logger.
- ※**Sampling Method:** Set the sampling method.
 - ⊙ **Timed:** Configure the Data Logger to take the samples by a regular time interval, with setting of 1 second~65535 seconds.
 - ⊙ **Triggered:** Set to take the samples by the triggered method.
 - ⊙ **Clocked:** Set to take the samples by clocked method, with options of 1~60 minutes with an increment of 5 minutes.
 - ⊙ **Timed (sub-second):** Configure the Data Logger to take the samples by a regular time interval, with setting of 0.1 second~0.9 second.
- ※**Sample Full Processing:** Determine the subsequent action once the sample is full.
 - Stop Sampling:** Stop sampling when the preset number of samples is reached.
 - Notify:** Send notification to a certain trigger point for further action once the preset number of samples is reached.

2. [Data Item] Tab

Click the Data Item Tab in tool list to enter its settings, as shown in the figure below:



- ◆ **[Data Item Properties]:** Set properties of Data Logger such as name, data type, display type, total digits, and fractional point. Please refer to the descriptions provided for the Data Input device for details.

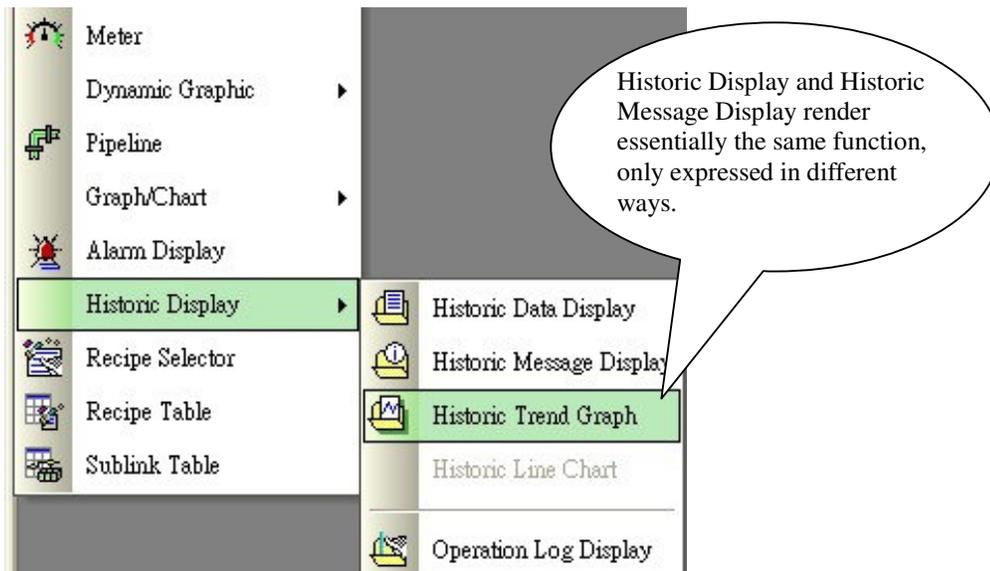
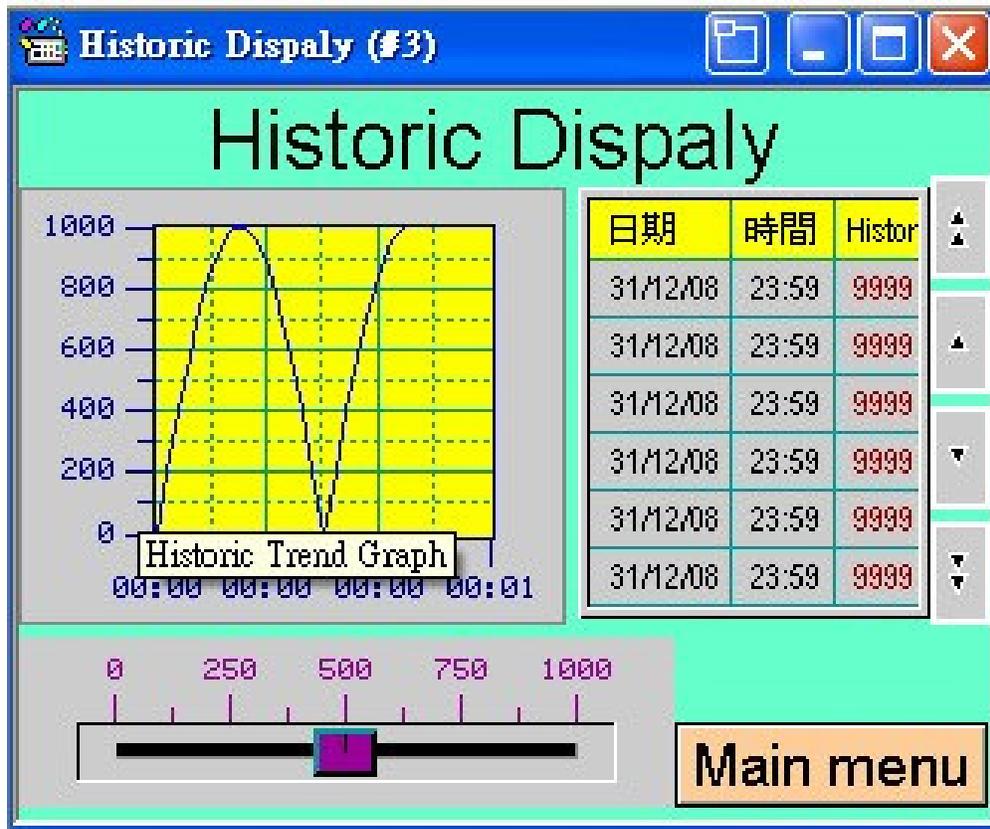
[Example]

1. Set the name of Data Logger to be Temperature and the ID number to be 0.
2. Set the Sample Size to be 1 word and the Number of Samples to be 100.
3. Configure the Read Address to be the internal register \$U150 and the Sample Method to be 1 second.

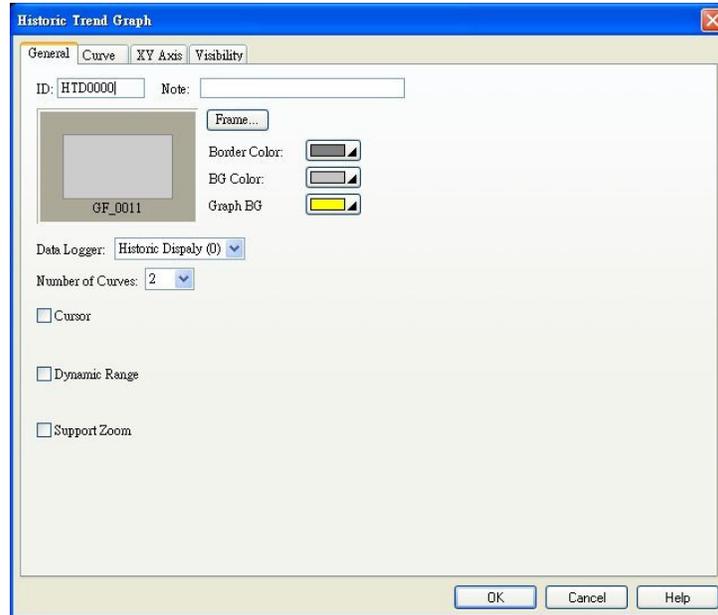
Keep the remaining default settings. After the settings are done, click OK to finish configuring the properties of Data Logger

2. Add Historic Display

- Select [Object] in tool list ⇒ find [History Display] ⇒ click [Historic Trend Graph] to add a new Historic Display, as shown by the following figure:



- Move the mouse to the Screen Edit Area and click the left button to place the device. Double click the mouse again to open the device properties dialog box, as shown in the figure below:



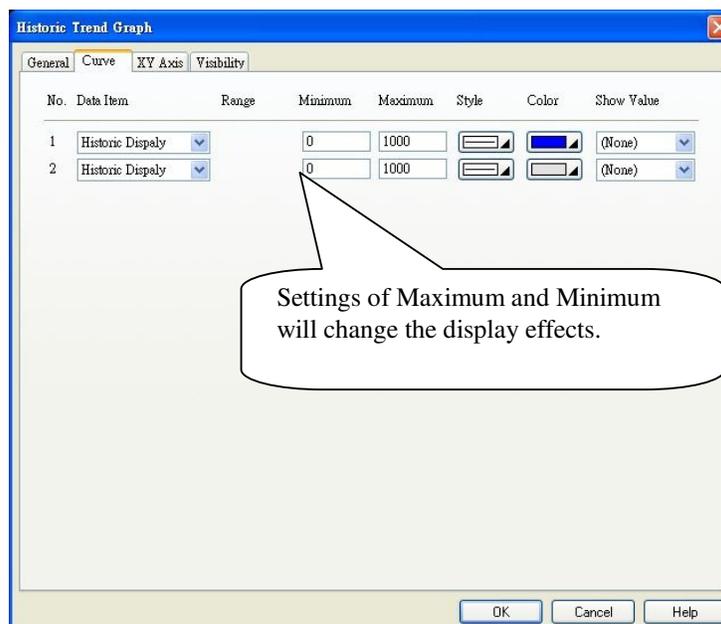
1. [General] Tab

In [General] Tab, one can configure parameters such as frame, border, BG color, data logger, number of curves, and graph BG.

- ◆ **[ID]:** Device number, which needs to be specified whether to be associated with the Scroll Button.
- ◆ **[Data Logger]:** Set the Data Logger associated with the current Historic Trend Graph.
- ◆ **[Number of Curves]:** Define the number of curves to be displayed in the current Historic Trend Graph, with up to 8 curves.
- ◆ **[Graph BG]:** Define the base color of the current Historic Display.

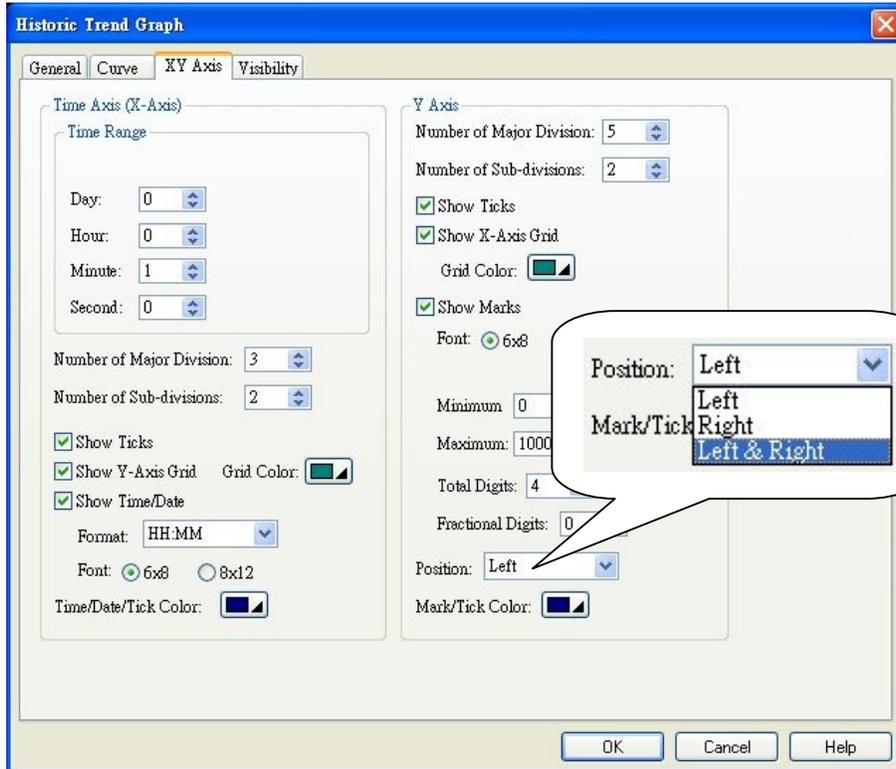
2. [Curve] Tab

Click [Curve] list in tool list to configure the properties of the Historic Trend Graph, as shown by the following figure:



- ◆ [Data Item]: Automatically select the data item by the designated Data Logger.
- ◆ [Minimum]: Set the maximum value of Data Display.
- ◆ [Maximum]: Set the minimum value of Data Display.
- ◆ [Style]: Set the style for the curves in Historic Display. Select from the pull-down list.
- ◆ [Color]: Define the color of the curves in Historic Display.

3. [XY Axis] Tab



- Select [XY Axis List] in tool list to set the properties of the XY axes in Historic Trend Graph, as shown by the figure above:

In the properties dialog box, one can set certain parameters to be displayed for XY axes. The user can adjust the parameters and check how the display effects are changed. Special attention is needed for the selection of Time Range, which may affect how the curves are displayed and need to be configured according to the actual situations.

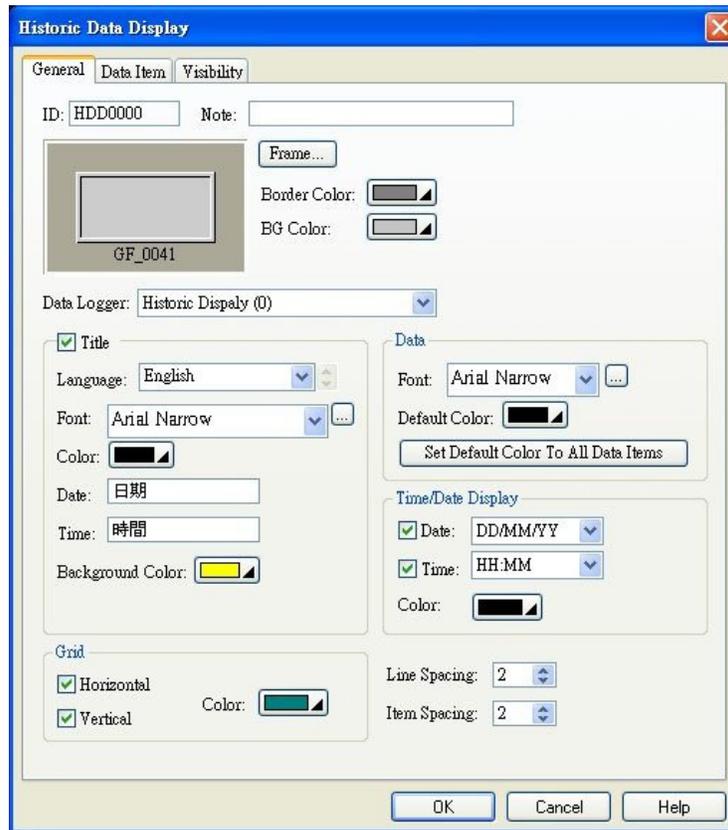
[Example]

1. Set the Temperature of Data Logger to be (\$L0), number of curves to be 1, and graph background to be 14.
2. Set the color of curves to be 65.
3. Set the sampling interval to be 5 minutes, total digits to be 4, and fractional digit to be 0.

Other settings remain default. After the settings are done, click OK to finish configuring the properties of Historic Trend Graph.

3. Add Historic Data Display

- Select [Object] in tool list ⇒ find [Historic Display] to add a new Historic Data Display. Move the mouse to the Screen Edit Area and click the left button of mouse once to place the device. Double click to open the device properties dialog box, as shown by the figure below:



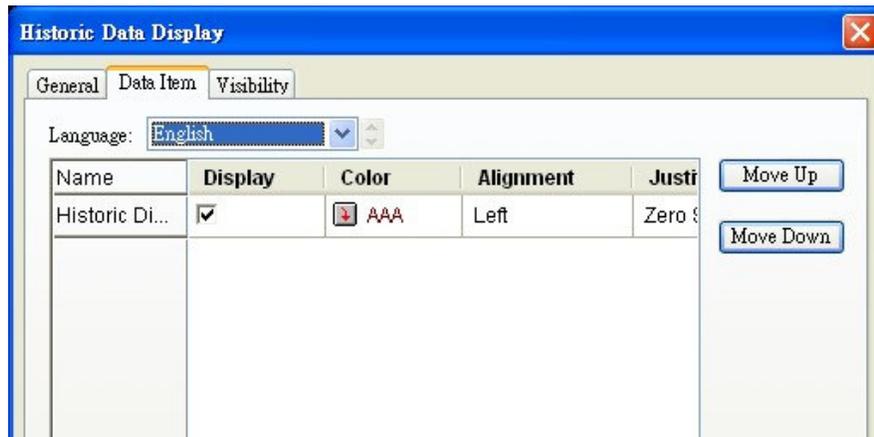
1. [General] Tab

In [General] Tab, one can configure parameters of Historic Data Display such as frame, border, background color, data item, title, grid, font and data color.

- ◆ **[Frame]:** Set the shape and color of the frame and background color for the History Data Display.
- ◆ **[Data Logger]:** Set the Data Logger associated with the current Historic Data Display.
- **Title:** Configure the parameters for the title of Historic Data Display, including language, font, color, and background color.
- ◆ **Grid:** Define whether to show the horizontal and vertical grids on Historic Data Display and set the grid color.
- ◆ **Data:** Set the font and color of data in Data Logger.
- ◆ **Time/Date Display:** Configure whether to show time and date and their format and color in History data Display.
- ◆ **Line Spacing/Item Spacing:** Set the line spacing and item spacing in Historic Data Display.

2. [Data Item] Tab

Click [Data Item] list in tool list to configure the parameters of the data item in Historic Data Display, as shown by the following figure:



It can be seen in the Data Item Tab that some parameter settings have already been imported from Data Logger. There is no need for further configurations.

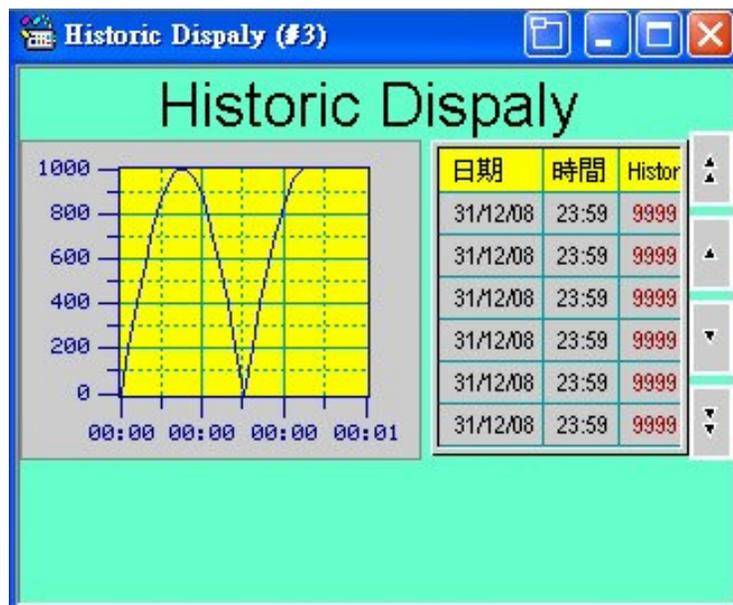
[Example]

1. Set the temperature (\$L0) of Data Logger to be 2 and line color to be 65.
2. Check to select title and set the title color to be 14.

Use default settings for other parameters. After the settings are done, click OK to finish configuring the properties of Historic Data Display.

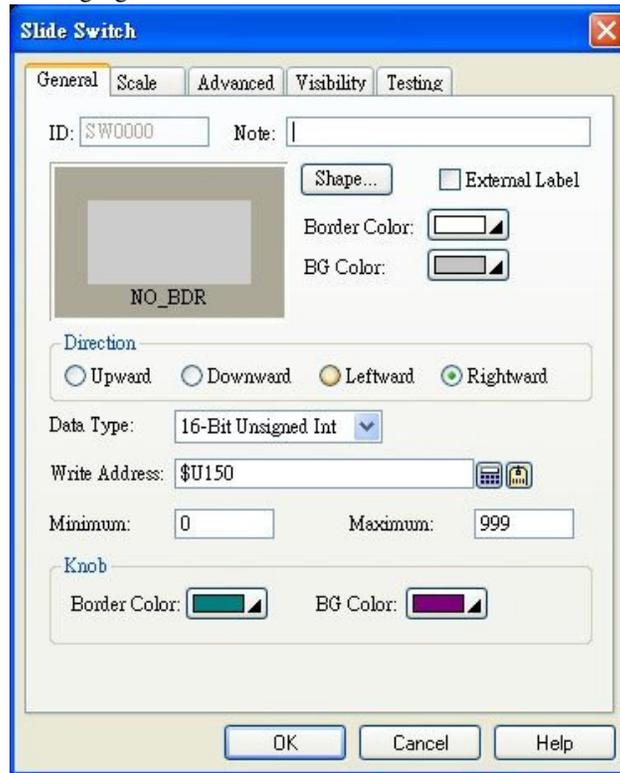
4. Add Scroll Buttons to both Historic Trend Graph and Historic Data Display

The descriptions on how to create the Scroll Button are available in previous chapters and will be skipped here. The created screen looks like the figure shown below:



5. Add Slide Switch in Screen for Test

- Select [Object] in tool list ⇒ click [Slide Switch] to add a new Slide Switch. Move the mouse to the Screen Edit Area and click left button of mouse to place the device. Double click to open the device properties dialog box, as shown in the following figure:



1. [General] Tab

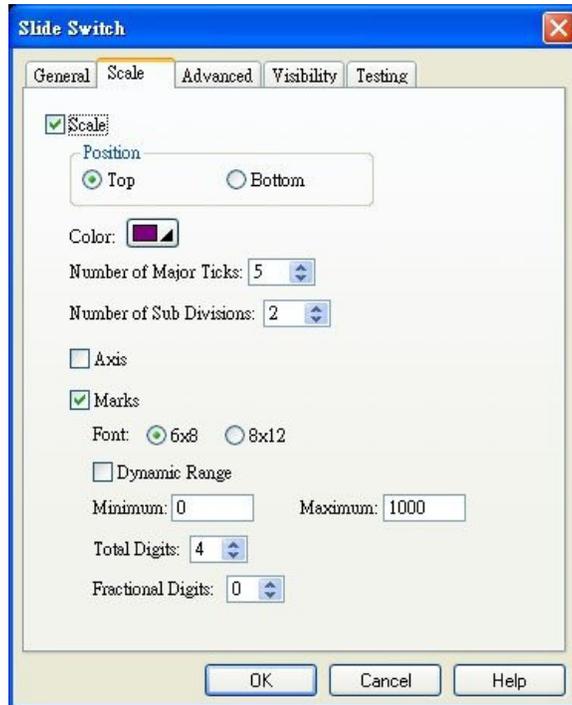
In [General] Tab, one can configure parameters of Slide Switch such as shape, border color, BG color, data type, write address, minimum, maximum, and title.

- External Label:** Check this box to add external label to the device. A selection item for external label will appear in the tool list.
- ◆ **Direction:** Set the direction along which how the device entry increases.
- ◆ **Data Type:** Set the data type of device entry.
- ◆ **Write Address:** Set the address for device write-in.
- ◆ **Minimum/Maximum:** Set the values when the device is at the minimum and maximum positions.
- ◆ **Knob:** Set the border color and BG color for the knob.

2. [Scale] Tab

Click [Scale] tab in tool list and set the parameters for the scale of the Slide Switch, as shown by the figure below:

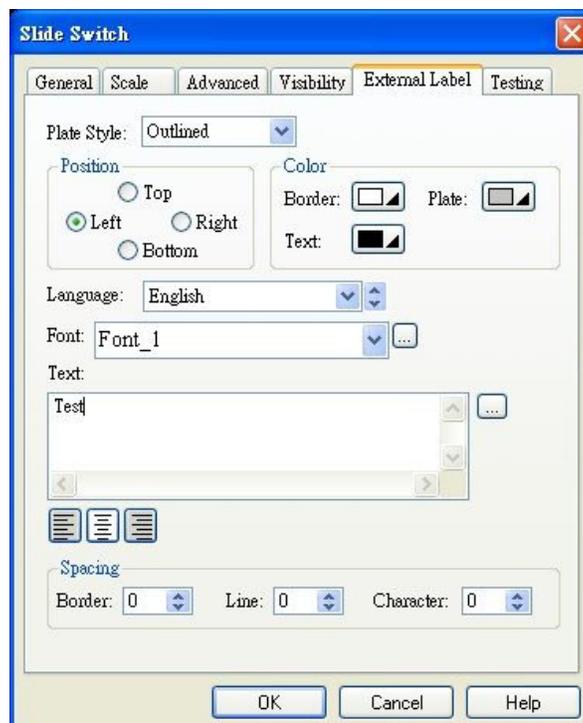
- Scale:** Check this box to show scales on the Slide Switch.
- ◆ **Position:** Define whether the scales are displayed above or below the switch.
- ◆ **Color:** Set the scale color.
- ◆ **Major Ticks:** Define the number of major ticks.
- ◆ **Sub Divisions:** Define the number of sub divisions.
- Axis:** Check this box to show the axis.



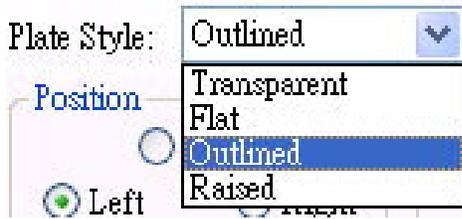
- Marks:** Check this box to show the scale marks.
- ◆ **Font:** Configure the font for the scale marks, with options of 6*8 and 8*12.
- ◆ **Minimum/Maximum:** Set the maximum and minimum values of the scale marks.
- ◆ **Total Digits/Fractional Digits:** Set the total digits and fractional digits for the scale marks.

3. [External Label] Tab

Click [External Label] tab in tool list to set the parameters for [External Label] in Slide Switch, as shown by the figure below:



- ◆ **Plate Style:** Plate Style: Set the style of the external label; click the pull-down list to choose

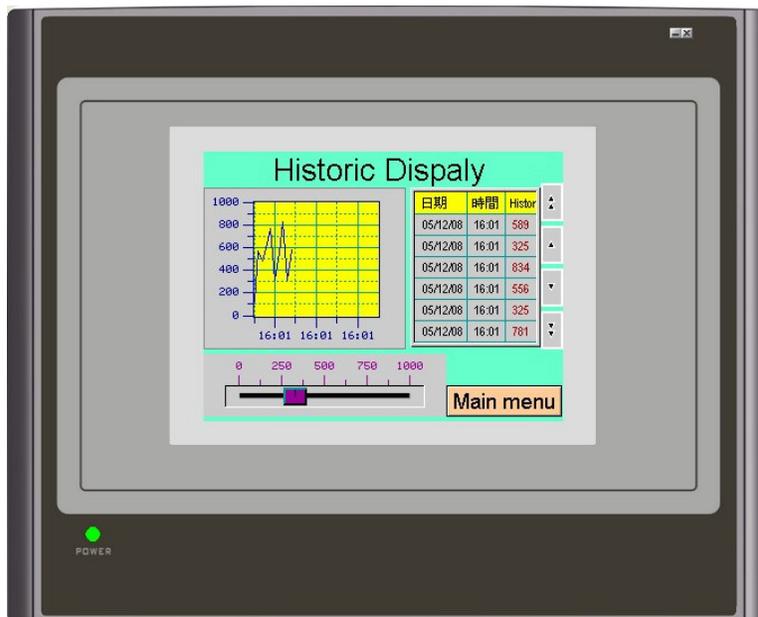


- ◆ **Position:** Define the position where the external label is placed in the device.
- ◆ **Color:** Set the color of edge/base board/text.
- ◆ **Language:** Select the texts in the pull-down list for various languages; effective in the application of multiple languages.
- ◆ **Font:** Select the font of texts.
- ◆ **Text:** Enter the mark texts to be displayed on the white board.

[Example]

1. In the General Tab, select External Label with the direction for increasing order to be rightward. Define the data type to be hexadecimal positive integer and write address to be \$U150; minimum to be 0 and maximum to be 1000. The border and background colors of the title are 62 and 107.
 2. In the Scale Tab, select the position to be top, color to be 4, number of major ticks 5 and number of sub divisions 2. Check the box of scale axis. The font of scale marks is set to be 6*8, with minimum of 0 and maximum of 1000. Total digits are 4, with fractional digit of 0.
 3. In the External Label Tab, select font 4 and set the text to be Test.
- Use default settings for other parameters. Once the settings are done, click OK to finish configuring the properties of Slide Switch.

Once the screen is built, one can test the design using Simulating Execution (Offline), as shown in the following figure:

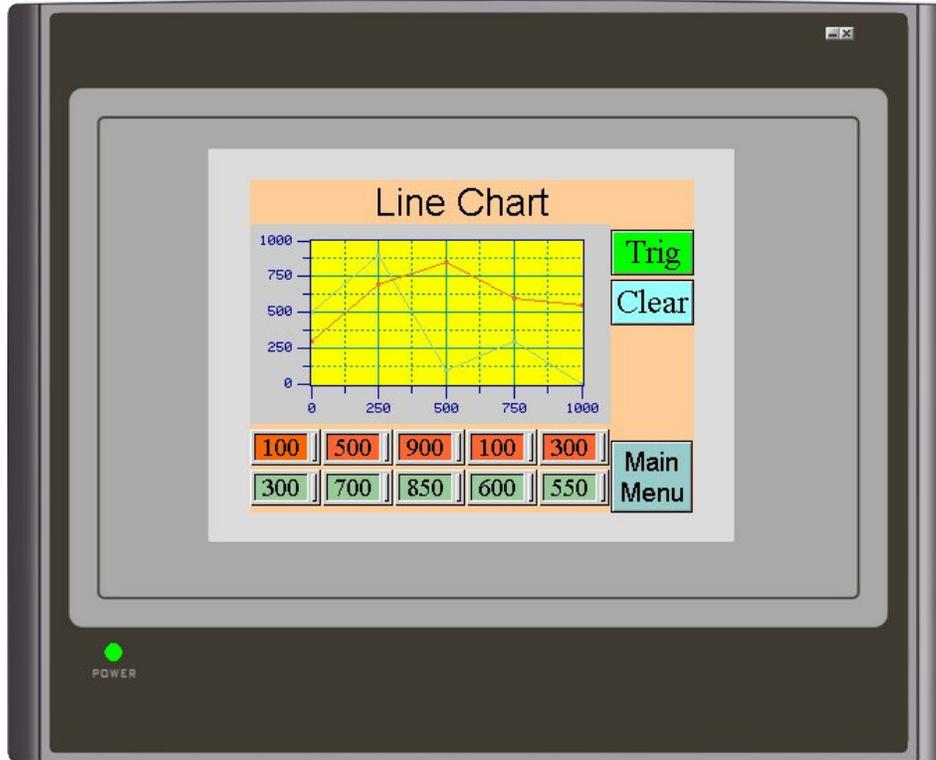


Chapter 8 Creating Line Charts

[Description of Line Charts: Line Charts can read a certain block in the internal register of the controller anytime and plot the readings as charts on the screen.]

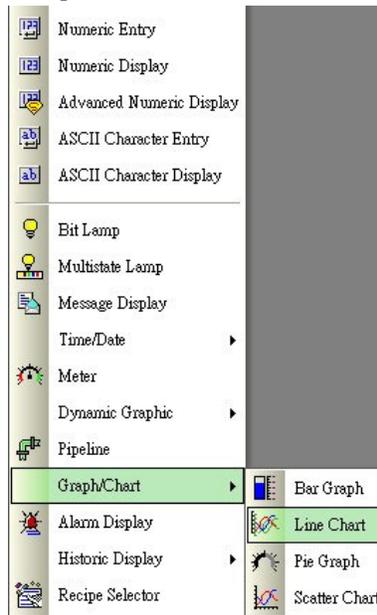
The completed screen is shown as the figure below and the devices used in the screen include:

● Historic Display ● Historic Data Display ● Slide Switch ● Screen Switching Button ● Scroll Button

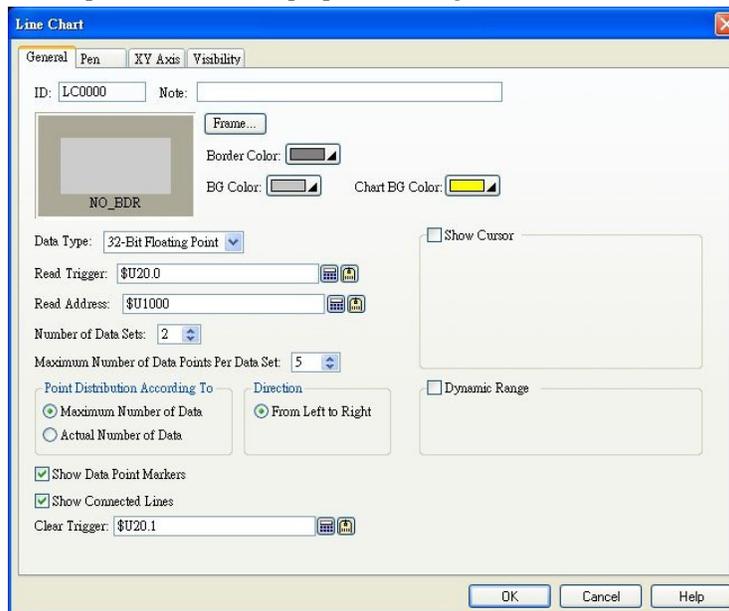


1. Add Line Chart in the Screen

- Select [Object] in tool list ⇒ click [Graph/Chart] ⇒ click [Line Chart], as shown in the figure below:



- Move the mouse to the Screen Edit Area and click the left button once to add a Line Chart device in the screen. Double click to open the Line Chart properties dialog box, as shown in the following figure:



1. [General] Tab

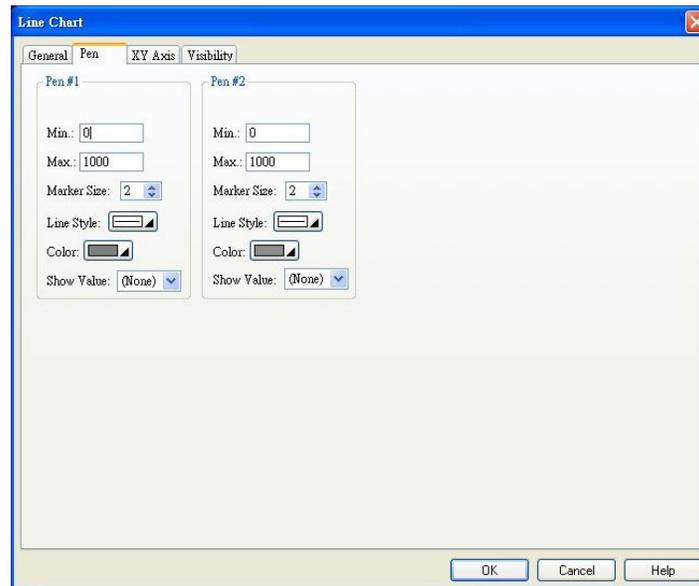
- ◆ **[Date Type]** Set the Data Type to read; and click the drop-down list to select desired type.
- ◆ **[Read Trigger]** Set the Read Trigger of the Line Chart Display. When the set address is ON, the line chart will be displayed.
- ◆ **[Read Address]** Set the address to read the line chart.

If the configured read address is \$U1000 and there are 4 sets of numbers, the value of \$U1000 is the actual number of sampling points. \$U1001 is the Y coordinate of the first data point for line 1, \$U1002 is the Y coordinate of the first data point for line 2, \$U1003 is the Y coordinate of the first data point for line 3, \$U1004 is the coordinate of the first data point for line 4, \$U1005 is the Y coordinate of the second point for line 1, with the following accordingly.

- ◆ **[Number of Data Sets]** Set how many data sets to display by the lines.
- ◆ **[Maximum Number of Data Points Per Data Set]** Configure the number of data points read from the controller by FV HMI each time.
- ◆ **[Direction]** Set the display direction of lines.
- Show Data Pointer Markers:** Select to mark every sampling point.
- Show Connected-Lines:** Select to connect each sampling point with lines.
- ◆ **[Chart BG Color]** Set the background color of the line charts.
- ◆ **[Clear Trigger]** Set the trigger address to clear the lines. When the configured address is ON, lines will be cleared. It takes another trigger to display again.

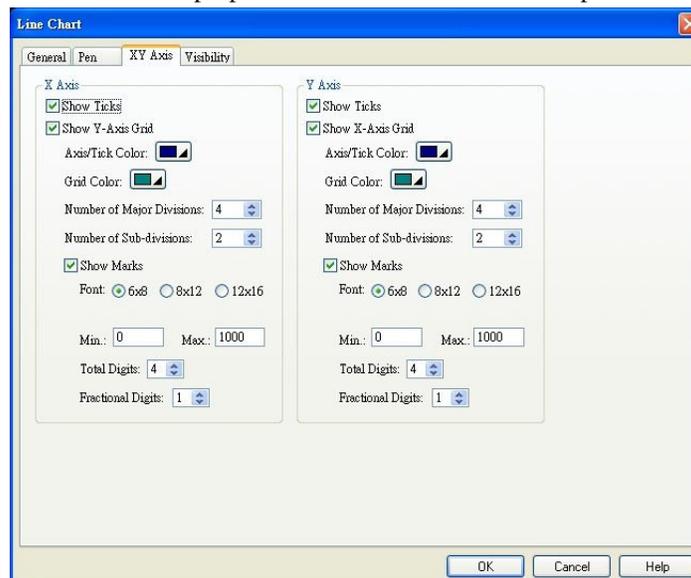
2. [Pen] Tab

Click [Pen] in tool list to set the line properties in the line plots, as shown by the figure below:



3. [XY Axis] Tab

Click [XY Axis] in tool list to set the properties of the XY axes in the line plots.



[Example]

1. In the General Tab, set the data category to be 16-digit integers and the Read/Clear Triggers to be \$U20.0/\$U20.1, with the Read Address at \$U1000.
2. Make 4 data sets, with 10 data points per data set.
3. Set the minimum value for lines #1/#2/#3/#4 to be 0 and the maximum value to be 1000. Color selections are 7/9/0/10.
4. Set the total digits of XY axis labels to be 4, with a fractional digit of 0.

Once these settings are done, click OK to finish the properties settings of the line charts.

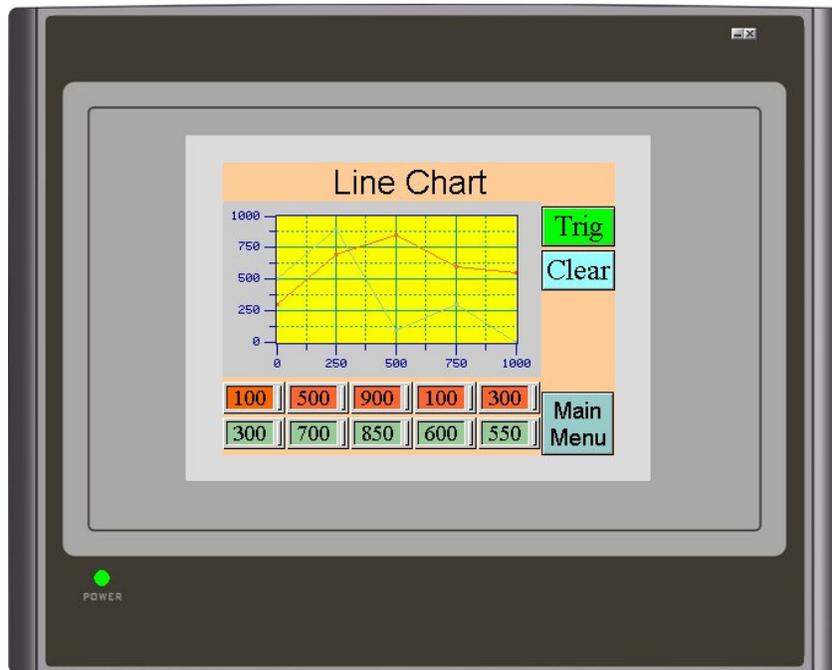
2. Add Auxiliary Devices to Test Line Chart

One can add a few Screen Buttons and Numeric Entries to test the line chart. Descriptions on how to create these devices have been given previously and how to add them to the program is described here.

[Example]

1. Add a rectangle in the Line Chart Screen and set the 3D effect to be concave, concentration 10, color 7, checked for fill, and background color to be 47. Click OK to finish setting.
2. Add 40 Numeric entry Buttons in the Line Chart Screen, with their write addresses set to be \$U1001-\$U1040 in PLC and divided into 4 groups by whether their last digit is odd or even number. Place them on the new rectangle.
3. Add another Numeric Entry in the Line Chart screen, with the Write Address set to be \$U1000 in PLC, checked the option of Show Marks. The mark text is set to be the Read data point, with red as the base color. Once the setting is finished, click OK to exit. Place the device on the upper right corner of the screen.
4. Add two Set ON Pulse Bit Buttons in the Line Chart Screen, with their Write Addresses set to be \$U20.0 and \$U20.1, respectively. Mark them as Trigger and Clear, respectively.

Once the screen creation is finished, one can perform the test using [Simulating Execution (Offline)], as shown in the figure below.



Chapter 9 Create the Contact Screen

After editing, the screen looks like as shown by the figure below. Devices that are used include:

●Picture Display ●GIF Display ●Still Picture Display ●Change Screen Button ●Static Text

◆ Only the instructions on how to create the screen will be given here since the making of the devices used in this screen has already introduced previously.



[Example]

1. Add a Static Text in the Contact Us Screen, with the text display of technical support.
2. Add 3 Static Texts in the screen, with the texts of TEL, FAX, and Email, respectively.
3. Add 5 Picture Displays in the screen.
4. Add 3 GIF Displays.

Chapter 10 Create the Idle Screen

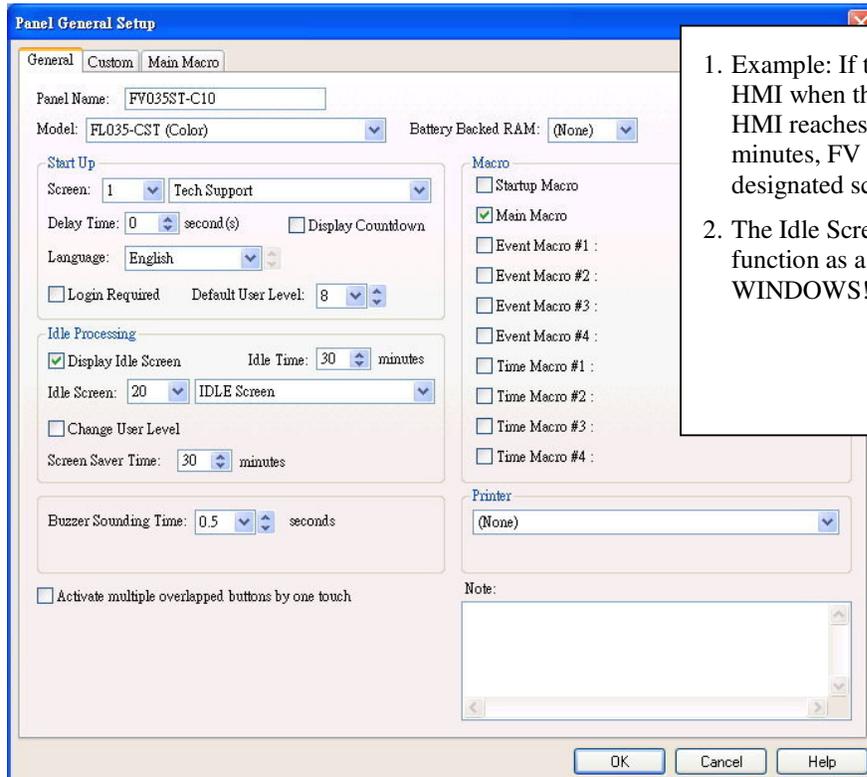
After editing, the screen looks like as shown in the figure below. Devices that are used include:

- Animated Graphic
- Idle Time



1. Animated Graphic Production

Step1: Select [Panel] in toolbar ⇒ click [Panel General Setup] ⇒ select the current screen as Idle Screen, as shown in the figure below:

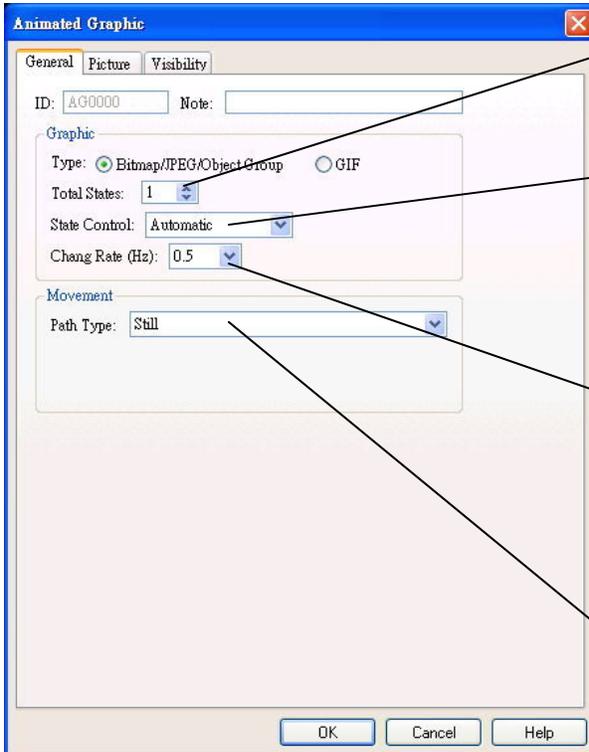


Step 2: Animated Graphic:



Animated Graphic

This function enables control of the changes and movements of pictures either through automatic mechanism or by the register in PLC and FV HMI.



Total States: Controls up to 256 pictures

Automatic: Cyclically change all pictures.

Location: Display location is controlled by the internal register in PLC or FV HMI (needs to work with Path Type: Dynamic Function).

Dynamic: Allows the internal register in PLC or FV HMI to change the picture.

Allows the internal system of FV HMI to change the picture by the **Change Rate** in Automatic mode.

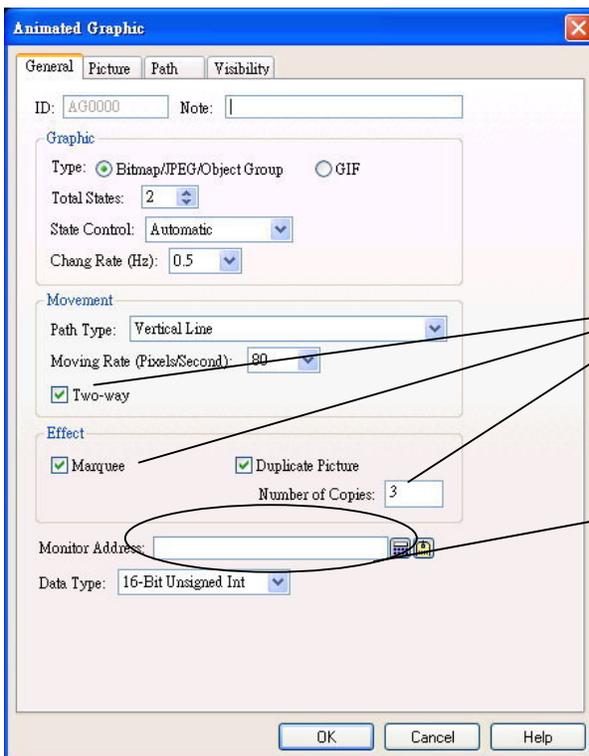
Still: No displacement of picture.

Horizontal: Picture moves along the horizontal path.

Vertical: Pictures moves along the vertical path.

Segment Connection: Picture moves according to the configured nodes, as shown in this example.

Dynamic: Change and displacement of pictures is determined by the internal register in PLC or FV HMI.



Two-Way: Move back and forth according to the defined direction.

Marquee: Same as the text marquee.

Duplicates Picture: Duplicate of a picture.

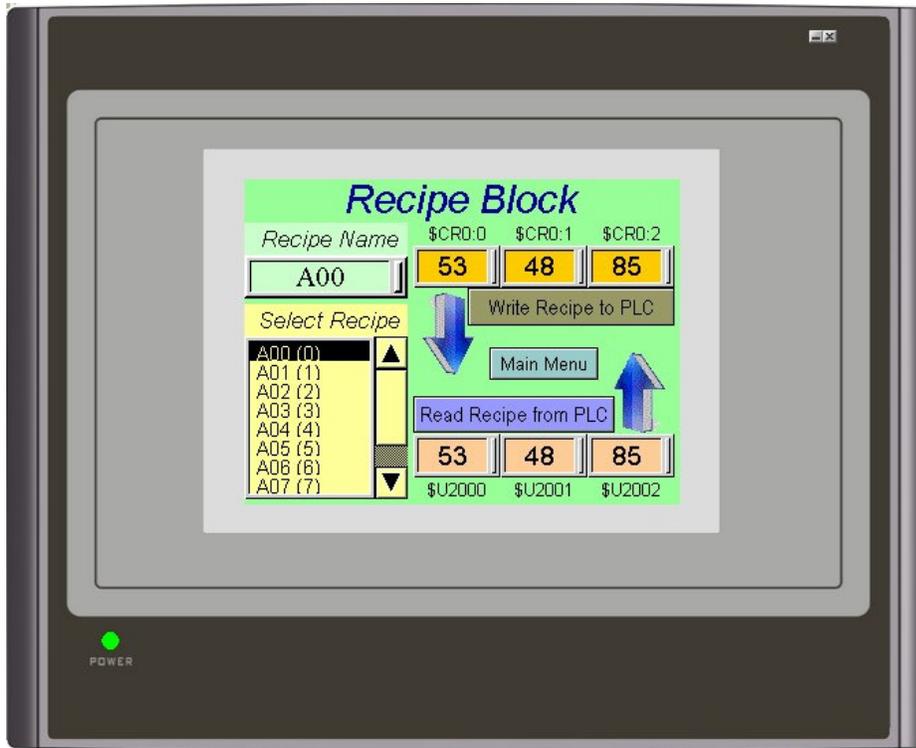
Control Address:

In the case of method of control: **location**; path type: **dynamic**, the **Control Address**: the first register shows the X coordinate of displayed picture and the second register shows the Y coordinate of the displayed picture {the upper left of the touch screen is origin (0,0)}. In the case of method of control: **dynamic**; path type: **dynamic**, the **Control Address**: the first register is in charge of picture change control, the second register shows the X coordinate of the displayed picture and the third register shows the Y coordinate of the displayed picture.

Chapter 11 Create the Recipe Screen

After editing, the screen looks like as shown by the figure below. Devices that are used include:

- Recipe Display
- ASCII Numeric Setting
- Still Picture Display



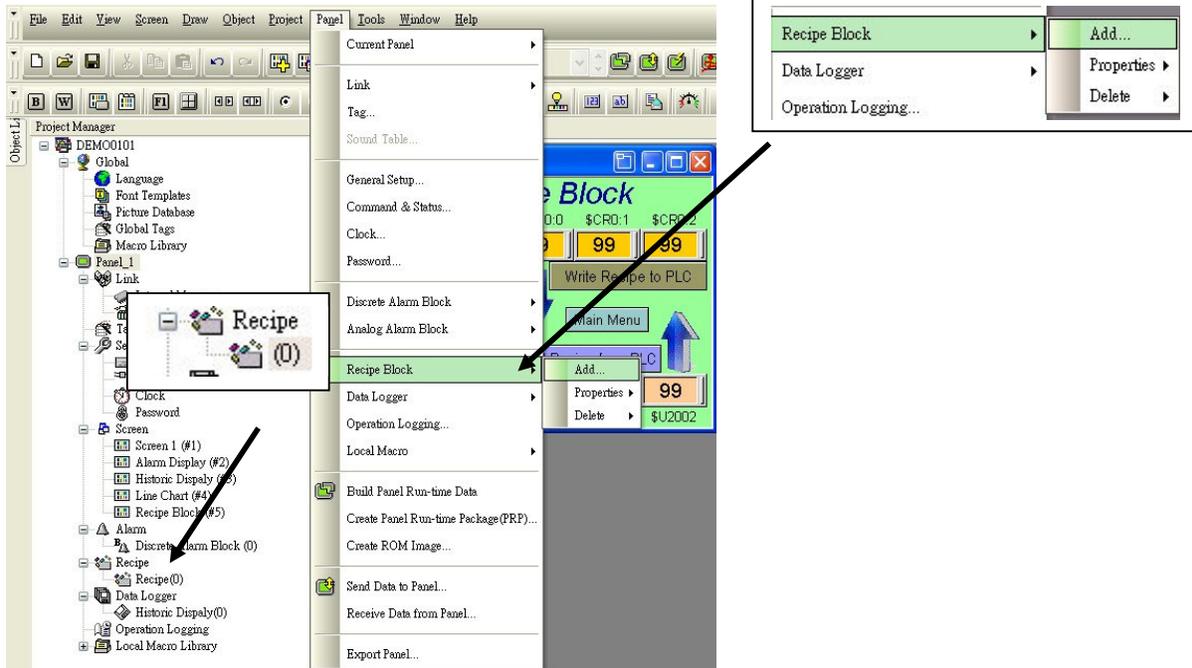
Step 1: Open Recipe: There are two ways to open a recipe

Method 1: Click [Panel] in Toolbar ⇒ find [Recipe Block] ⇒ click [Add] ⇒ 1. A new recipe will appear

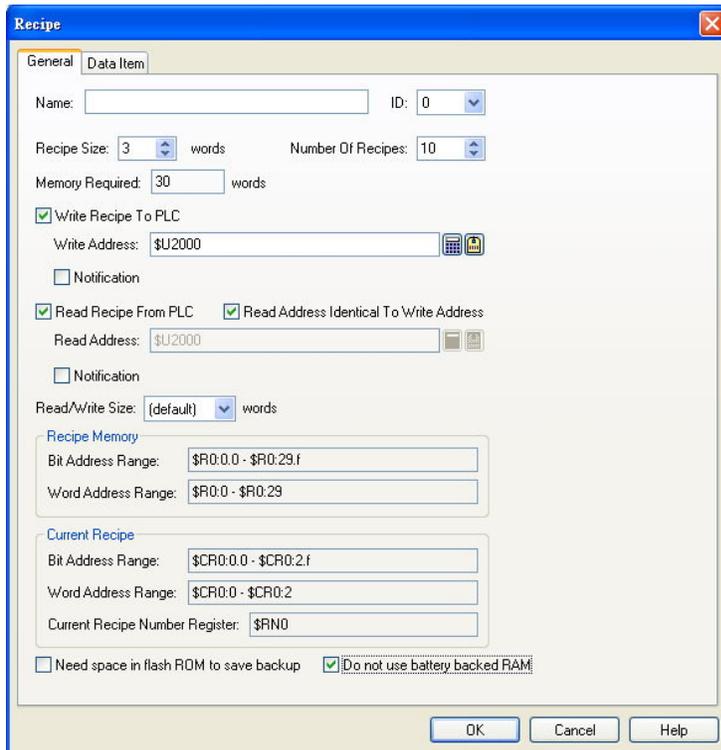


⇒ 2. Click the left button of mouse to define the recipe parameters.

Method 2: Enter Project Manager ⇒ click right button of mouse on Recipe in Recipe ⇒ click [Add Recipe Block] ⇒ a new recipe will appear.



Step 2: Define a Recipe



1. [General] Tab

- ◆ **[Name]:** Place notes that will be convenient for future search or use.
- ◆ **[ID]:** PM Designer provides additional ID Number to the group number to facilitate easier planning and management. Up to 16 areas can be assigned.
- ◆ **[Recipe Size]:** Number of words used in one set of recipe, with a maximum of 1023 words.
- ◆ **[Number of Recipes]:** Number of sets required by one recipe block, with a maximum of 65535 sets.
- ◆ **[Memory Required]:** Words to be used, which are automatically calculated by the system by (Recipe Size*Number of Recipes).
- ◆ **[Write Recipe to PLC]:** Send RCP Data to the initial word designated by PLC throughout the entire length of recipe.
- ◆ **[Read Recipe from PLC]:** Send the initial word designated by PLC to RCP Data throughout the entire length of recipe.
- ◆ **[Recipe Memory][Current Recipe]:** Display the length and location used by the internal register of the PM Designer system.

2. [Data Item] Tab

The screenshot shows the 'Recipe' dialog box with the 'Data Item' tab selected. The dialog has a blue title bar and a close button in the top right corner. It contains several input fields and checkboxes for configuring recipe properties.

General | **Data Item**

Name: ID:

Recipe Size: words Number Of Recipes:

Memory Required: words

Write Recipe To PLC
Write Address:

Notification

Read Recipe From PLC Read Address Identical To Write Address
Read Address:

Notification

Read/Write Size: words

Recipe Memory

Bit Address Range:

Word Address Range:

Current Recipe

Bit Address Range:

Word Address Range:

Current Recipe Number Register:

Need space in flash ROM to save backup Do not use battery backed RAM

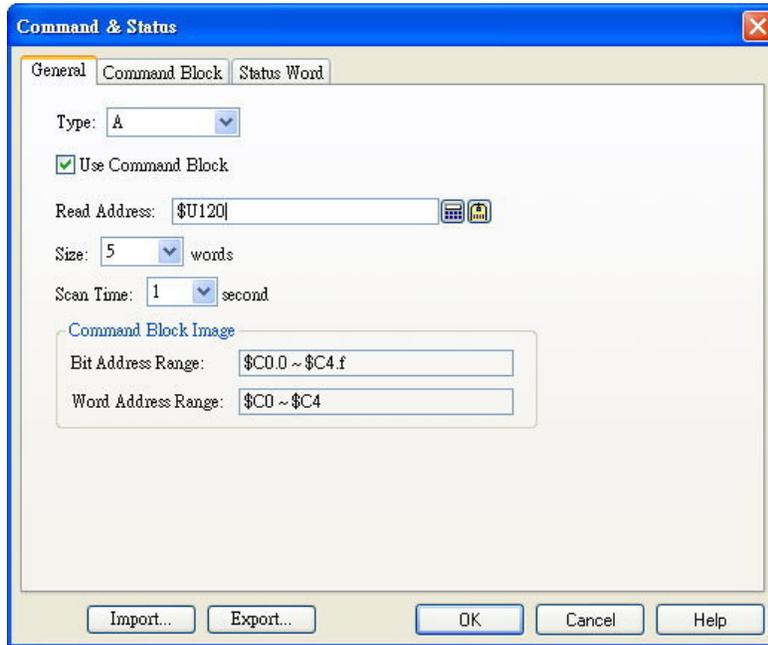
- **[Data Item Attribute] Address: Define the properties according to each individual RCP Data CRx:xx.**

Since this case requires the use of Recipe Display, CR0:0~CR0:1 are used as the ASCII storage locations (ASCII strings will automatically occupy the corresponding length of CRx:xx by their own length). The formats of other CRx:xx can be redefined by the user's needs.

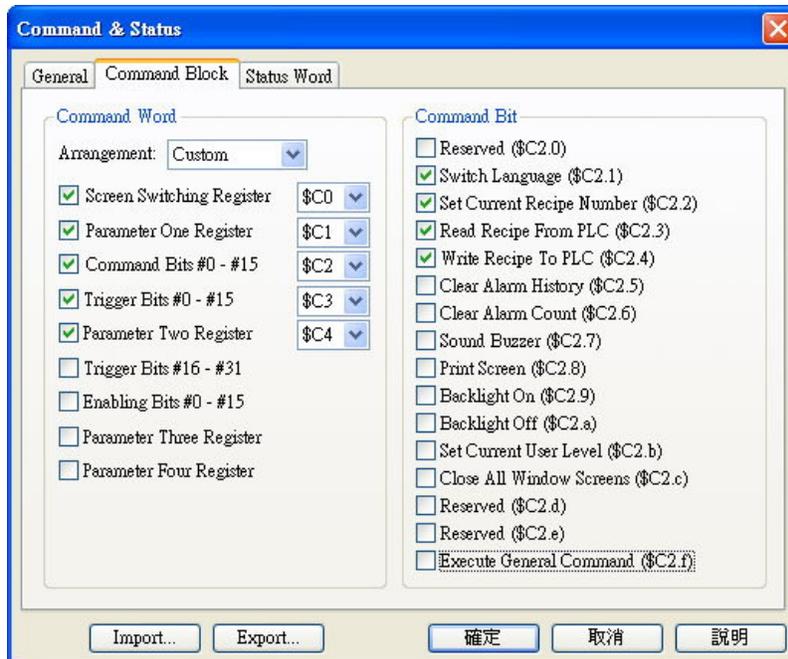
Step 3: Define System Parameters

Command and Status:

The following example only describes the corresponding location and flag related to the recipe. Other functions are available in Chapter 12.

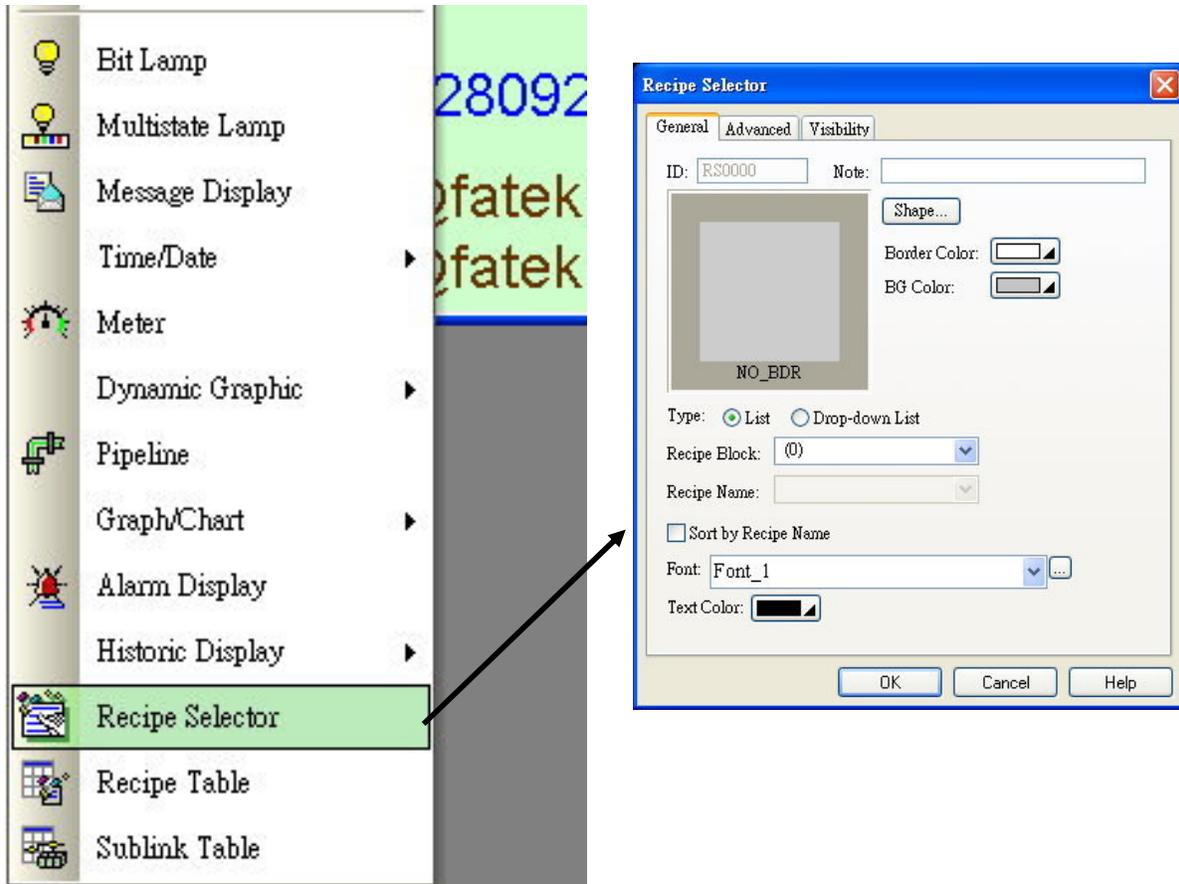


- **Command Block:** To use the recipe functions, the command block length must be at least 3 words.



- **\$C1 as Register of Parameter 2:** This parameter copies the recipe set number directed to location \$U121 in PLC. To read or save the recipe set, one must first have control of this parameter and follow the control command by the Command Bit to proceed.
- **D2 as Command Bit:** This parameter performs the corresponding processing by the control command sent by the controller to FV HMI.

Step 4: Planning of Recipe Selector



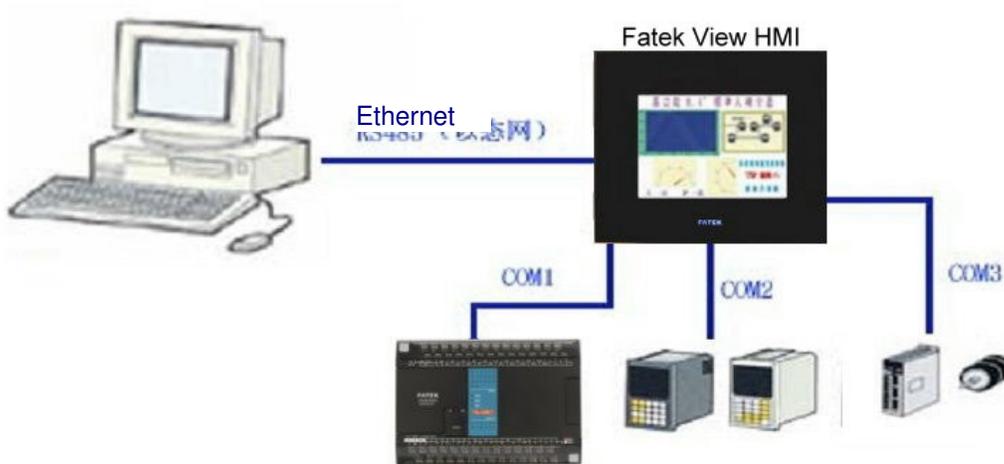
- **Type:**
 - List:** Click on the recipe name within a fixed area.
 - Drop-down list:** Works as a drop-down screen.
- **Recipe Block:** Select the recipe block to work with.
- **Recipe Name:** Select the location to place the ASCII recipe name. This example uses CR0:0~CR0:1 and the figure shows the corresponding selections.

Using the Recipe Selector set the Recipe Name allows the Recipe Name to be used in the future call up the recipe parameters directly.

Chapter 12 Setting Commonly Used Functions

1. Setting of Dual Communications

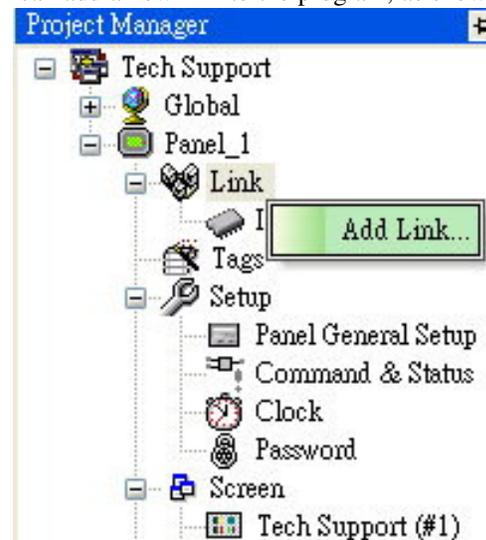
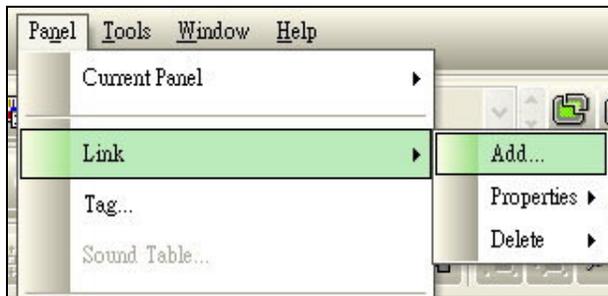
The standard for factory control screen has been set higher, with the systems therein becoming increasingly sophisticated. In addition to such control units as PLC and single-chip machine, there are other peripheral equipment like temperature controller, inverter, server, and electricity meter. Direct data exchange between these equipment appears to be relatively difficult. To solve this problem, the high-performance model FV HMI achieve data exchange with these equipment through communication ports and Ethernet, with up to three communication ports that can be simultaneously connected to PLC, temperature controller, and inverter. FV HMI can also upload the data to the computer. The actual configuration of connection is shown below:



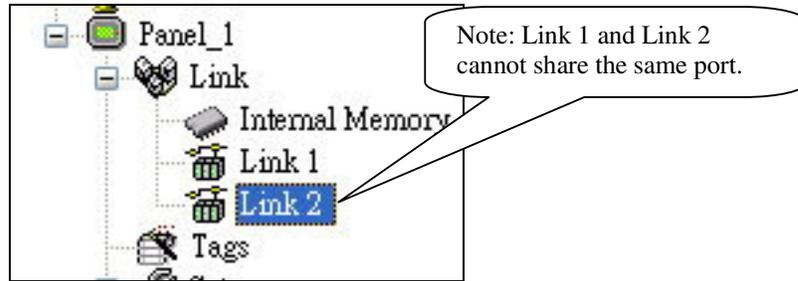
In the following, how to set up the connection will be described (COM1 connected to FATEK FBs PLC, COM2 connected to RKC temperature controller).

Step 1: Add a new link to the program

- Select [Panel] ⇒ find [Link] ⇒ click [Add] or click the right button of mouse on the [Link] under the [Panel] directory in Project Manager to select [Add Link]. Both can add a new link to the program, as shown in the figure below:

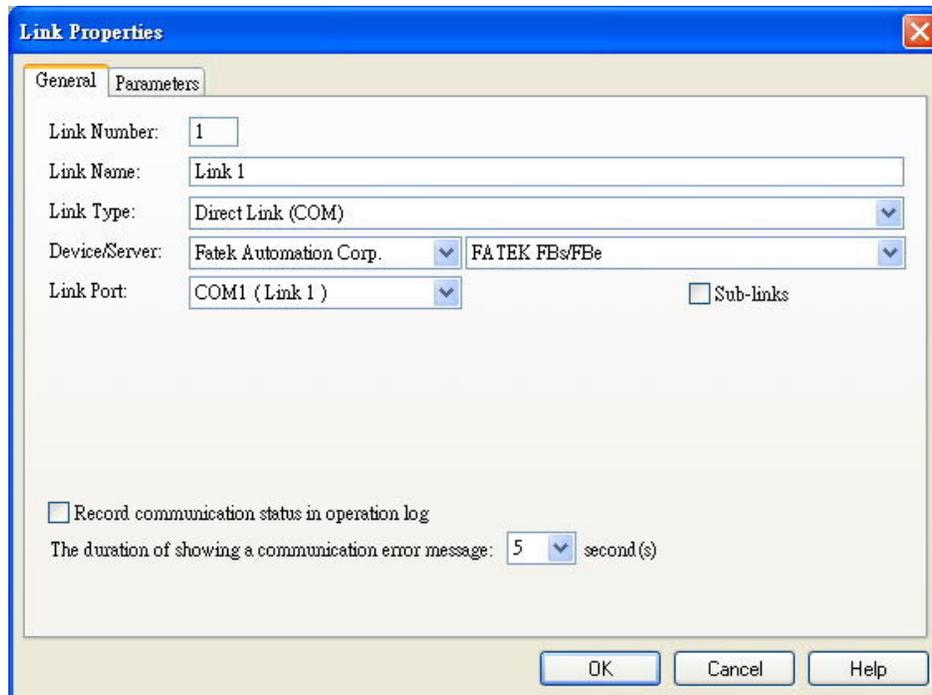


Once the new link is added, it can be seen in the [Panel] directory in Project Manager that there are two connections: [Link 1] and [Link 2], as shown by the following figure:



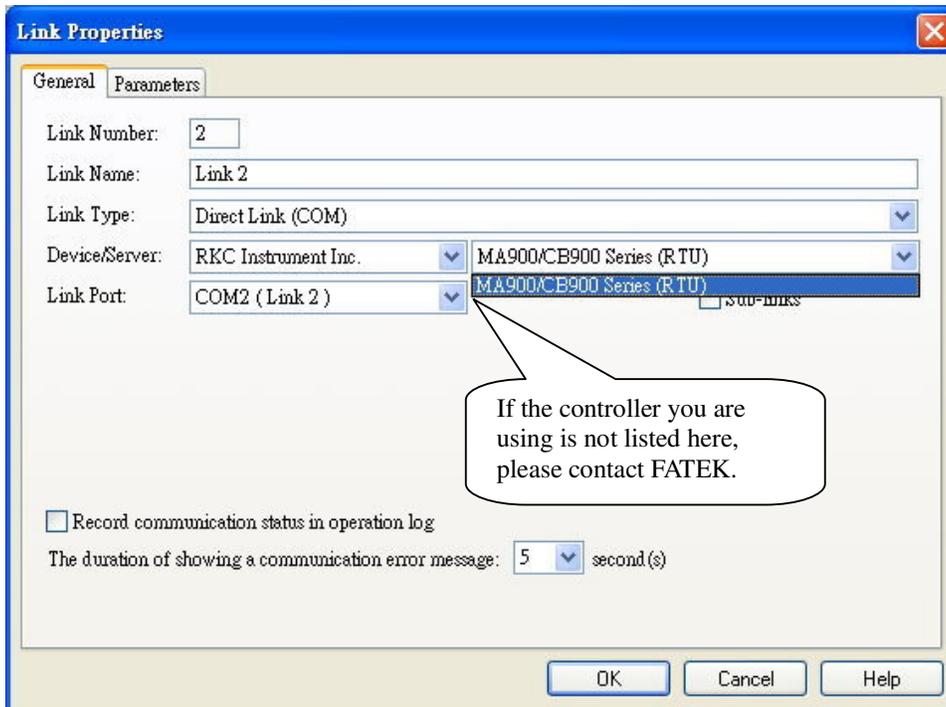
Step 2: Set the link properties

- Double click the [Link 1] or [Link 2] in Project Manager to open the corresponding Connection properties dialog box. In the properties dialog box, one can set the parameters such as link type, model number of link controller, link port, link rate and station number connected to the controller. See the figure below for details:



1. [General] Tab

- **[Link Type]:** Define the link type. Several different options are available depending on the models of FV HMI used.
 - ◆ **Direct Link (COM):** Use COM port in the direct link to the control unit, **which is the most common mode.**
 - ◆ **Direct Link (Ethernet):** Use the Ethernet port in the direct link to the control unit, **which is the fastest mode.**
 - ◆ **Communication Service (COM):** Selection available in the mode of multiple screens in one machine, which can enhance the communication speed.
 - ◆ **Communication Service (Ethernet):** Treat the current machine as a substation in the network.
- **[Device/Server]:** Select the controller that is linked to the current communication port by using the pull-down list, as shown in the figure below:

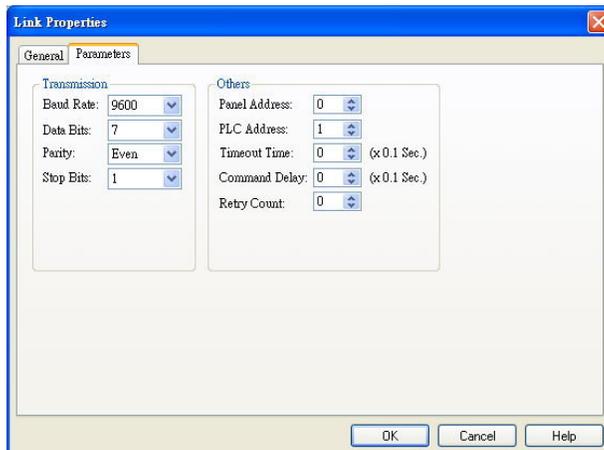


- **[Link Port]:** Select the link port to be used.

2. [Parameters] Tab

Click [Parameters] Tag to set certain basic parameters of communication, as shown in the figure below:

(Note: all of the parameter setting must match the corresponding PLC settings, otherwise the communication will fail.)



In this example, we make the following settings:

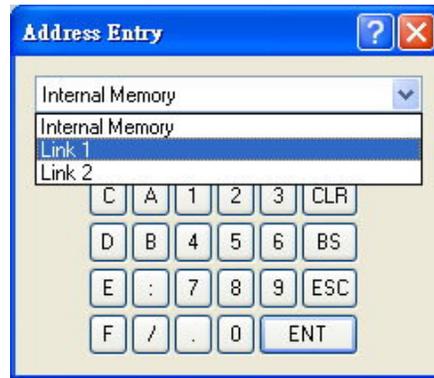
Both Link 1 and Link 2 are set to use direct link.

The Device/Server of Link 1 is set to be FATEK FBs/FBe, with COM1 as the link port.

The Device/Server of Link 2 is set to be MA900/CB900 Series (RTU), with COM2 as the link port.

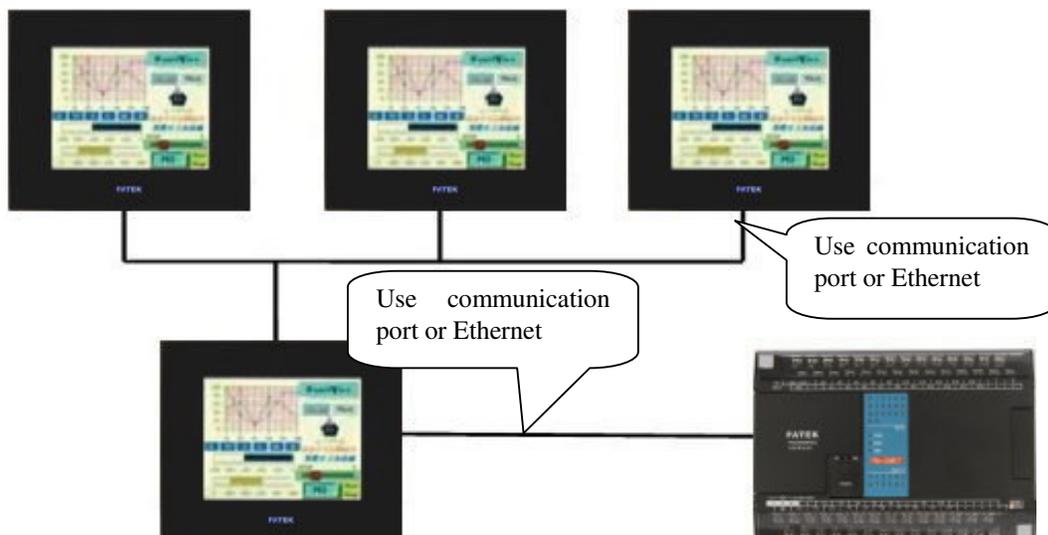
Other settings remain default. Once the configuration is done, click OK to finish setting the link properties.

Here we can build a Numeric Entry on the screen. In setting the monitor address, we will find that we can directly choose Link 1 and Link 2 as the objects to be controlled in the Address Entry dialog box, as shown in the figure below:



Note: If it requires using RS485 to control the temperature controller, the corresponding station number needs to be set in the temperature controller. Please refer to the manual of the temperature controller for details.

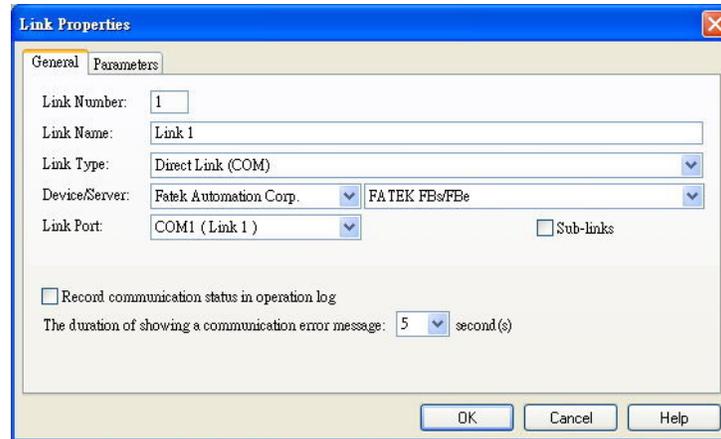
2. Setting Multiple Communications



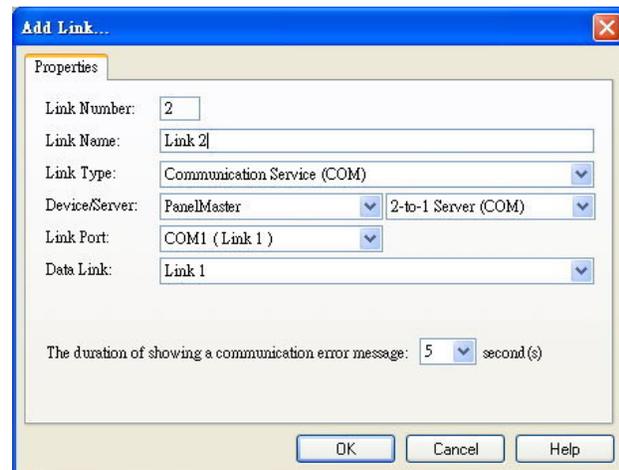
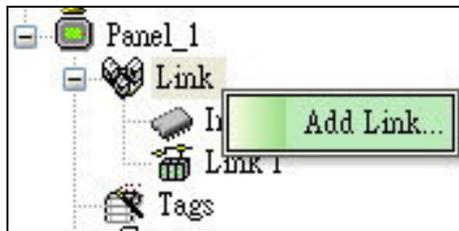
In addition to be able to communicate individually with PLC, FV HMI can communicate with other FV HMIs, which is realized by using various ports (RS-232, 422, and 485) or Ethernet.

Description of configuration:

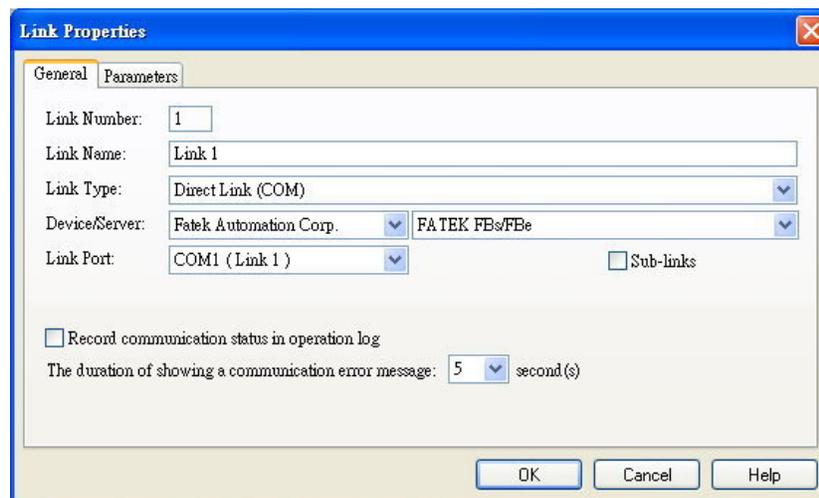
1. Properties of Link 1 of FV HMI are as follows:



2. A new link must be added to FV HMI with communication service selected (Ethernet or COM port), and named Link 2. Set the data link to Link 1.



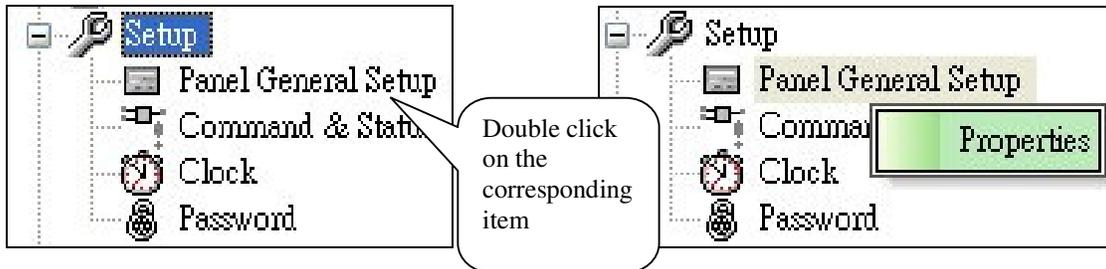
3. New link must be added to FV HMI with communication service selected (Ethernet or COM port).



4. The Device/Server for Link 2 in FV HMI must be the same as that for Link 1 in data link.

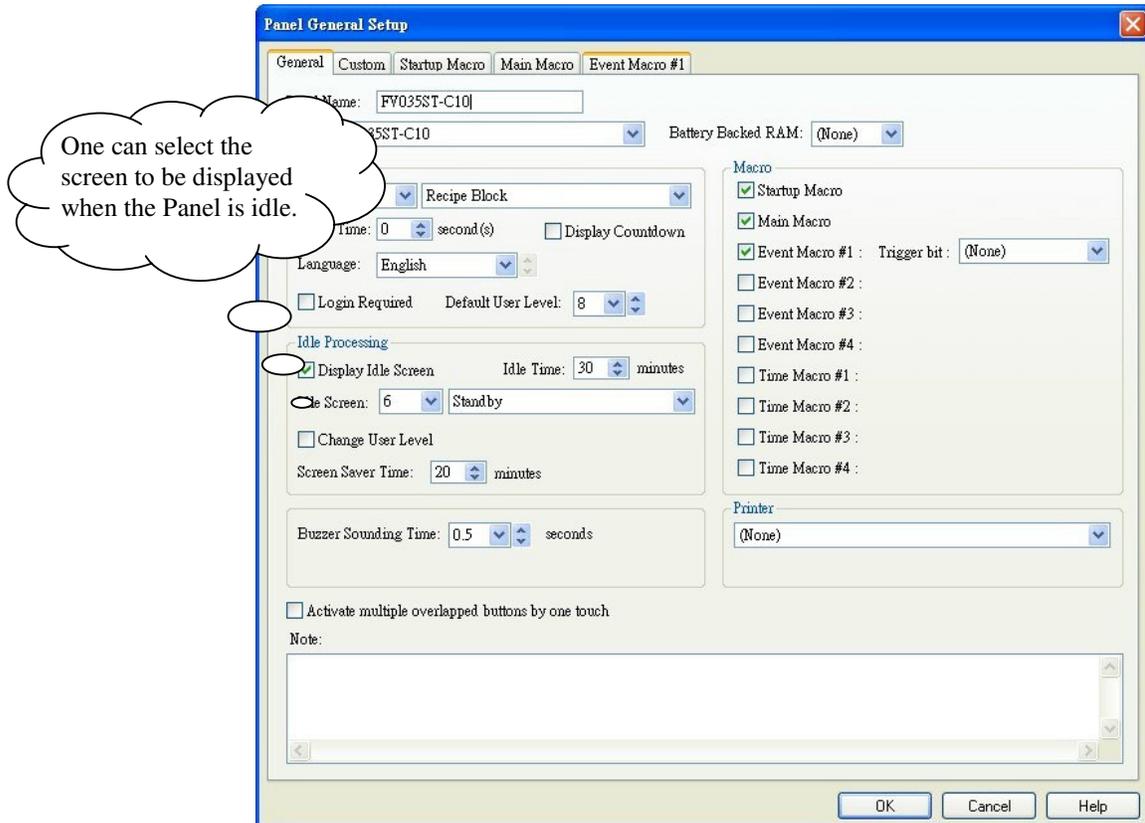
3. Introduction of Panel General Setup

The Setup list is used mainly to configure certain basic message and special applications in FV HMI. For example, the setting can allow PLC to control the screen change and recipe operation in FV HMI, or to transmit the clock of FV HMI to PLC and set password. To configure these functions, double click the mouse in Project Manager on the corresponding directory or click the right button on the directory, followed by clicking the Properties, as shown in the figure below:

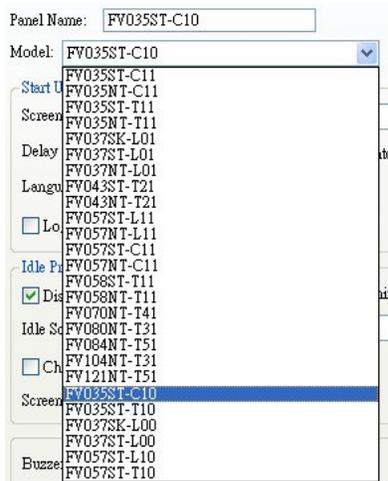


1. Panel General Setup

Follow the above descriptions and open the [Panel General Setup] dialog box, as shown in the following:



- ◆ **Panel Name:** Define the name of the FV HMI being edited.
- ◆ **Model:** Select the model for the FV HMI being edited by using the drop-down list, as shown in the following:



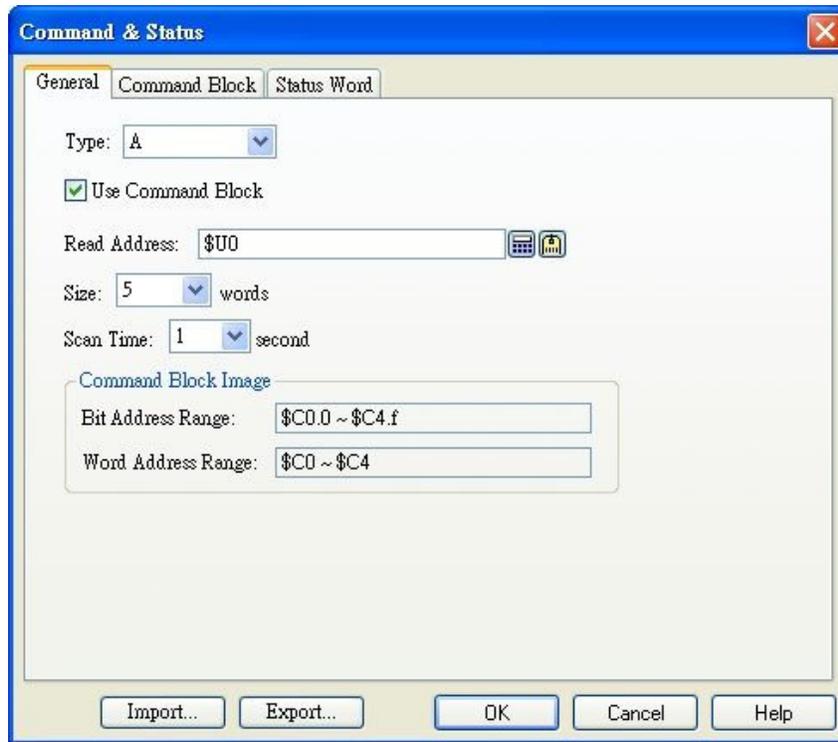
- ◆ **Start Up:** Specify the front page screen after FV HMI startup, programming language, and whether login is required for login or delayed login is used.
 - Screen: Define the screen displayed on FV HMI after startup by using the drop-down list.
 - Delay Time: Configure FV HMI to login after the preset delay time.
- Display Countdown:** Display the preset delay time before the startup screen, which will be loaded after the countdown.
- Language:** Define the initial language to be displayed after FV HMI startup.
- Login Required:** Check this option and the password list will appear after FV HMI startup. Password entry of the preset level or higher is required for login.
- ◆ **Idle Processing:**
 - Display Idle Screen:** After the preset display time is up, FV HMI screen will jump to the designated screen.



- ◆ **Screen Saver Time:** Define how long FV HMI will stay in the screen saver mode (back light will be off). A setting of 0 means no screen saver.
- ◆ **Buzzer Sounding Time:** Define the length of time for the buzzer sounding. A setting of 0 means no buzzer sound for button operation.
- ◆ **Macro:** Define the operation of the macro command for FV HMI, including:
 - Startup Macro:** Macro that is operated once at startup.
 - Main Macro:** Macro that keeps operating after startup.
 - Event Macro:** Macro that is operated by the trigger bit.
 - Time Macro:** Macro that is operated by the preset time.
- ◆ **Printer:** Define the printer model that executes the printing jobs for FV HMI.

2. Command & Status

The major function of this menu is to configure the command control and the status response, which can be skipped for simple functions of FV HMI. With this setting, the operation of FV HMI will be controlled internally, which can enhance the refresh speed of screen data. Double click the Command & Status directory to enter the Command & Status dialog box, as shown in the figure below:



1. [General] Tab

- Use Command Block:** Check this option to set the parameters of Command Block and the Command Label will appear.

The Command Block allows the designer to configure FV HMI to perform certain special operations through PLC or the internal macro commands of FV HMI. It is a continuous data block, with the minimum length of 0 word and a maximum length of 32 words. Appropriate management of the Command Block enables FV HMI to work with the control unit to accomplish various screen effects and to use less corresponding PLC programming, which can achieve better control precision and efficiency by delegating certain sophisticated actions to PLC.

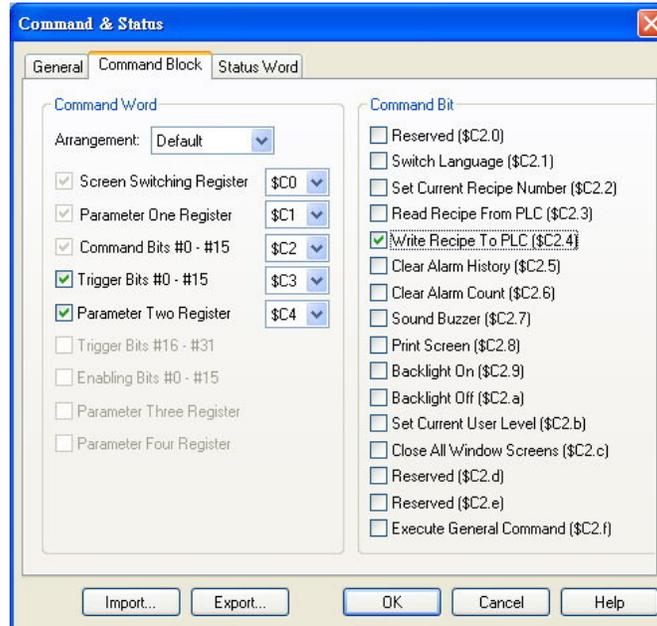
For example, when we set the write address of the Command Block to be D0 (FATEK PLC) with a length of 5 words, the following configurations are effective:

- **D0 for Screen Switching Register:** When D0 equals n, FV HMI automatically switches to screen n, which is often used in the operation of screen switching controlled by PLC.
- **D1 for Parameter One Register:** This parameter is usually used to represent language ID switching (1-10) or recipe set ID and it need to work with the control command sent by the command bit for further action.
- **D2 for Command Bits:** This parameter performs the corresponding process to control FV HMI following the control command sent by the controller.

- **D3 for Trigger Bits:** The trigger command sent by the Trigger Bit can execute macro commands, which can trigger lines or control the clock, etc.
- **D4 for Parameter Two Register:**

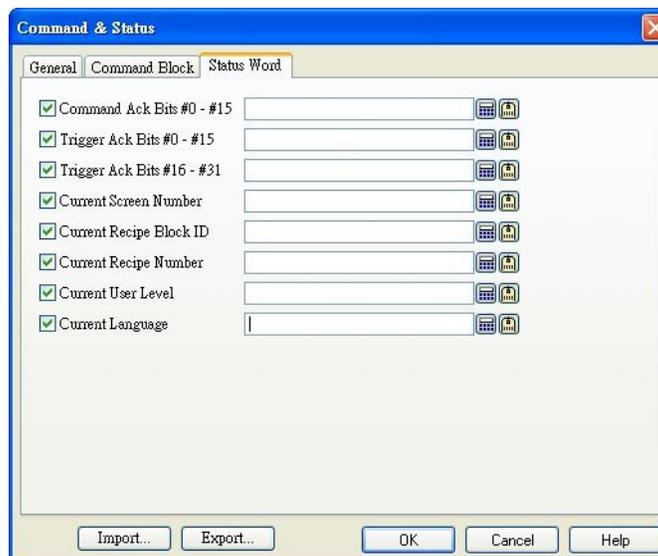
2. [Command Block] Tab

This tab is to verify the position of the command word and select which command bits to use, as shown in the following figure:



3. [Status Word] Tab

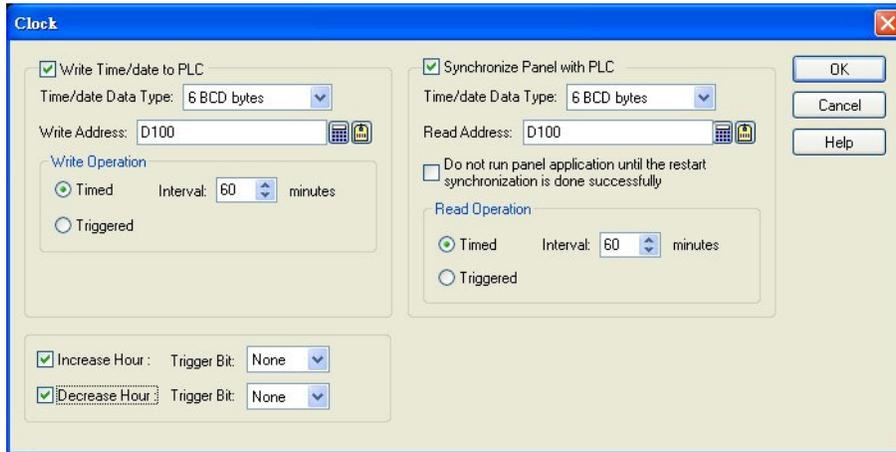
The function of Status Word is to send the FV HMI status back to the control unit after FV HMI completes the corresponding actions. The feedback includes current screen number, current recipe block ID, etc. Its address can be specified arbitrarily, as shown in the following figure:



Check the corresponding options to set the addresses. The address can be the internal register of PLC or the internal address of FV HMI. If the Current Screen Number is selected and the address is set to D100, the Current Screen Number will be sent to D100 after FV HMI completes screen switching.

3. Clock

There is a universal calendar available in FV HMI. To write the calendar of FV HMI to the PLC register, one needs to specify a calendar block in PLC. The configurations are as follows: double click the Clock list in Project Manager to open the Clock properties dialog box, as shown by the following figure:



Write Time/date/ to PLC: Send the clock data of Fv HMI to the designated PLC address.

Time/date Data Type: Define the data type.

Write Address: Define the write address of the clock. If it writes to D100 in PLC, its content looks like the following:

The time data types in clock configuration supports four formats: including 6-Byte (3 Words), 8-Byte (4 Words), 7 BCD Words and 7 Binary Words

The format of the 6-Byte type is

Hour:	word#0 high-bytestands for 0-23	Minute:	word#0 low-bytestands for 0-59
Month:	word#1 high-bytestands for 1-12	Date:	word#1 low-bytestands for 1-31
Week:	word#2 high-bytestands for 0-6	Year:	word#2 low-bytestands for 00-99

The format for the 8-Bytetype is

Hour:	word#0 high-bytestands for 0-23	Minute:	word#0 low-bytestands for 0-59
Month:	word#1 high-bytestands for 1-12	Date:	word#1 low-bytestands for 1-31
Week:	word#2 high-bytestands for 0-6	Year:	word#2 low-bytestands for 00-99
	Reserved	Second:	word#3 low-bytestands for 0-59

The format of the 7 BCD Words type is

Register 0	Second; Second Counter	0~59
Register 1	Minute; Minute Counter	0~59
Register 2	Hour; Hour Counter	0~23
Register 3	Date Day of Month Counter	1~31
Register 4	Month Month Counter and Century Bit	1~12
Register 5	Year Year Counter	0~99
Register 6	Week Day of week Counter	0~6

Note: the values for Week are 0, 1-6(WeekDate, Week 1~Week 6)

The format of the 7 Binary Words type is

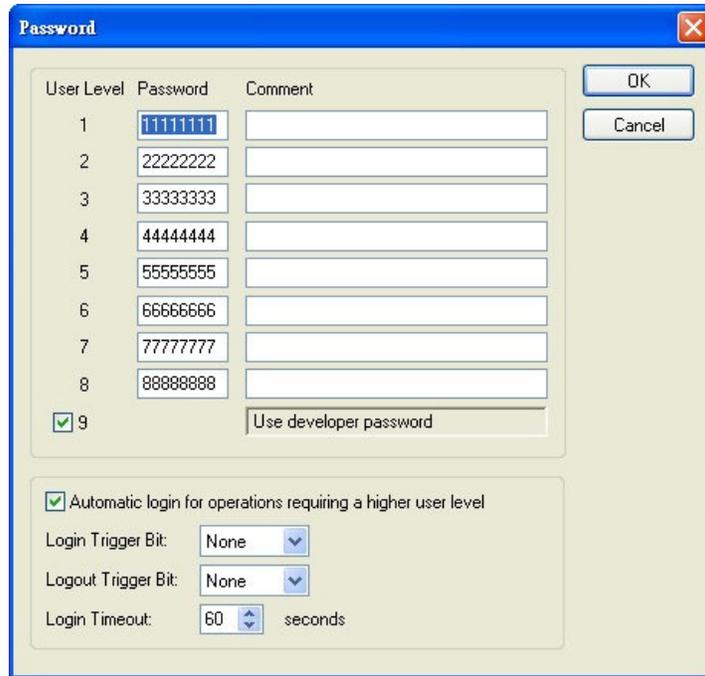
Register 0	Second; Second Counter	0~59
Register 1	Minute; Minute Counter	0~59
Register 2	Hour Hour Counter	0~23
Register 3	Date Day of Month Counter	1~31
Register 4	Month Month Counter and Century Bit	1~12
Register 5	Year Year Counter	0~99
Register 6	Week Day of week Counter	0~6

Note: the values for Week are 0, 1-6(Week Date, Week 1~Week 6)

- **Write Operation:** Define how the writing takes place.
 - ⊙ **Timed:** Select Timed operation, with settings of 1-255 minutes.
 - ⊙ **Triggered:** Select Triggered operation, which need to preset the trigger address in Command & Status.
- Synchronize Panel with PLC:** Synchronize the FV HMI clock with the PLC universal calendar.
- Increase Hour:** Check this option to increase the time of the system clock by one hour through the trigger bit.
- Decrease Hour:** Check this option to decrease the time of the system clock by one hour through the trigger bit.

4. Password

If there are functions of password setting available within FV HMI, the passwords for each individual levels must be defined in advance. PM Designer supports the password settings for up to 8 levels. The user can define how many sets of passwords to use depending on the actual requirements. Double click the Password in Project Manager, as shown by the figure below:



Note: this FV HMI supports any password with the length of 1-8 bits.

4. Setting Transparent Communication

Transparent Communication can facilitate the direct upload and download of PLC programs to the computer through FV HMI, which saves a lot of time in adjustments and testing.

The schematic diagram is as the following:



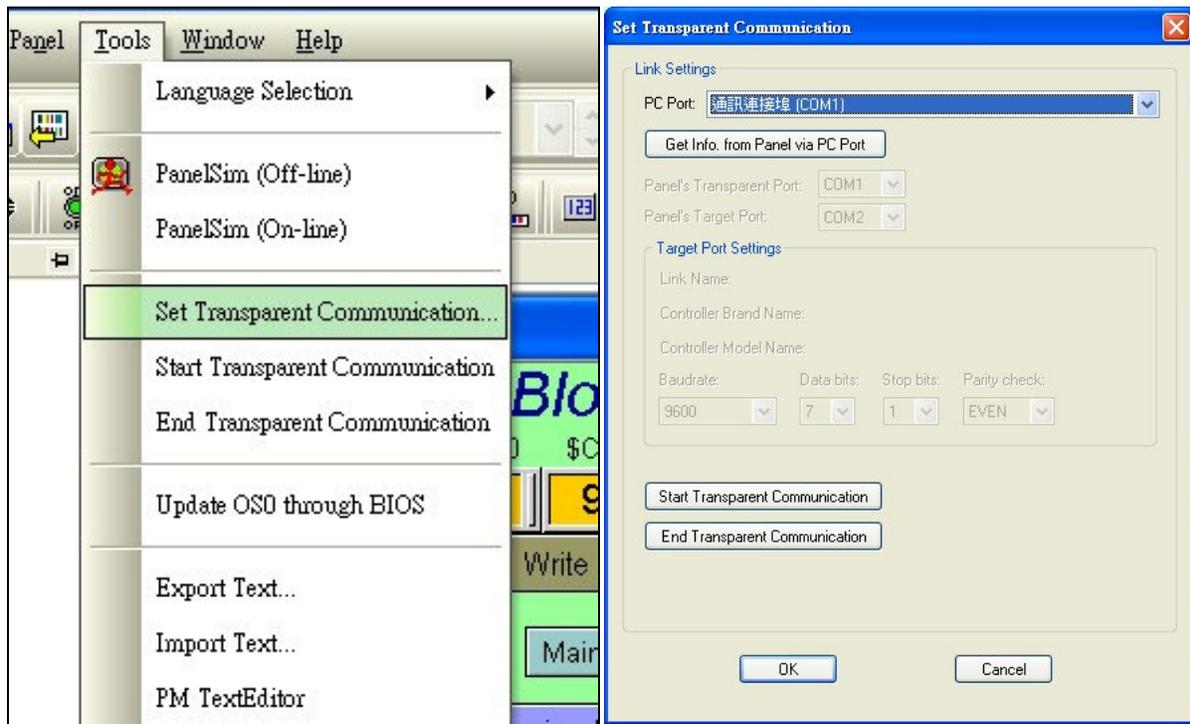
Note: Prior to setting up transparent communication, an FV HMI program corresponding to the program in the PLC currently used needs to be downloaded into FV HMI.

Step 1: Set up the connections following the above structure

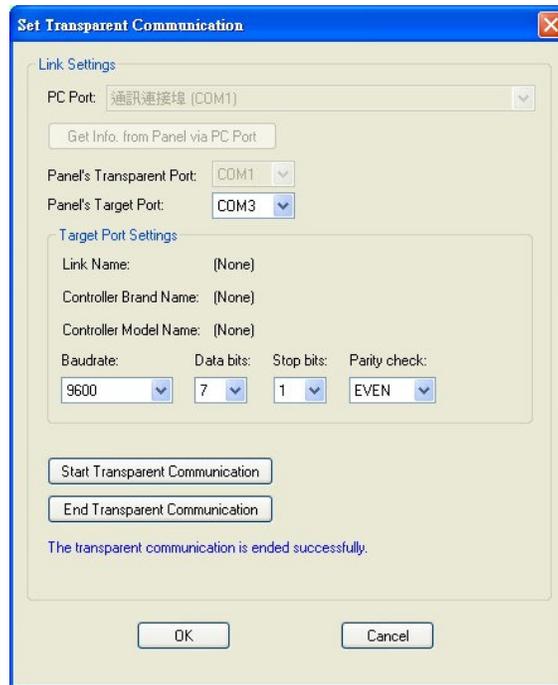
Connect COM1 of FV HMI to the computer and COM2 to PLC (make adjustments according to the actual situations).

Step 2: Start Transparent Communication

- Select [Tool] in the tool list ⇒ click [Set transparent Communication]. The Set Transparent Communication dialog box will pop up, as shown by the figure below:



- **[PC Port]:** Configure the communication port connected from the download cable of FV HMI to the computer, depending on the actual setup. Click **Get from Panel (via PC Port)** and the dialog box will change to:



In the drop-down list following the target Port Settings of FV HMI, select the current communication port between FV HMI and PLC. After the selection, the software will automatically adjust the parameters of the Target Port Settings to be the same as defined. Click **Start Transparent Communication**. The green texts in the dialog box should show that transparent communication is successfully activated. The FV HMI will also display the message of the transparent communication is in progress, indicating that the transparent communication is successfully activated.

Step 3: Operation of PLC Program Upload/Download

Now we can open the PLC softwares we are using and directly perform the operations of upload, download, and monitor.

Step 4: End Transparent Communication

When the PLC program editing is complete, take PLC offline first. Then select **End Transparent Communication** in the tool list to end the transparent communication. Now FV HMI is communicating to PLC and we can directly test the program.



5. Utilizing Multiple Communications

Multiple communications can be defined in more details as follows:

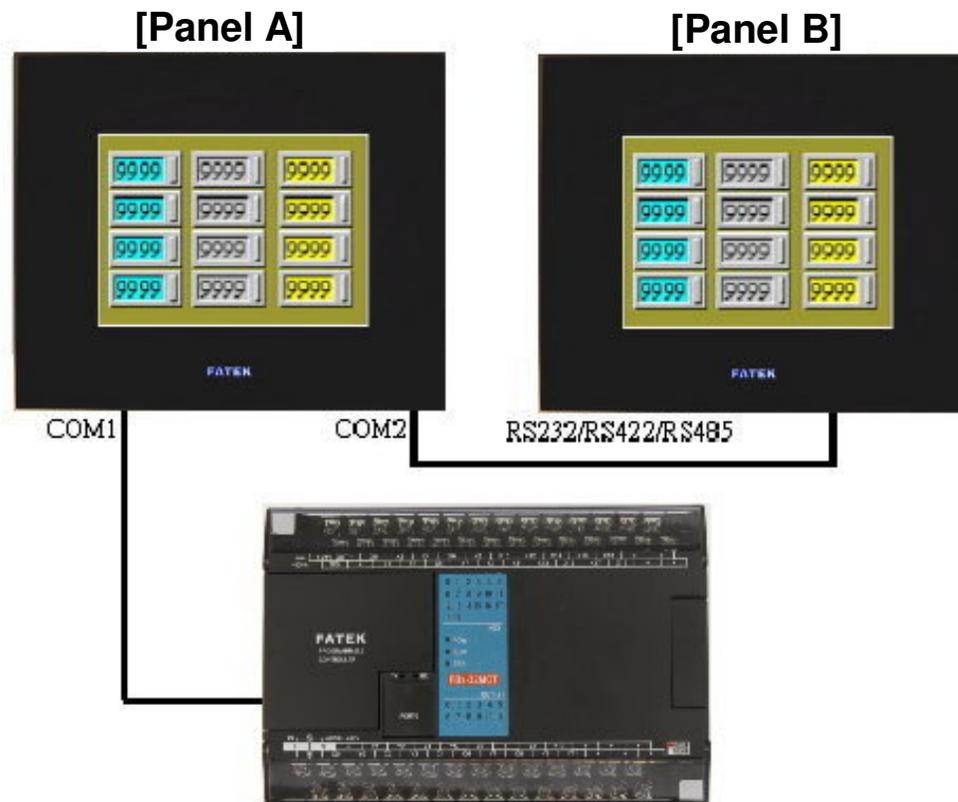
One controller to N FV HMIs; N controllers to one FV HMI; N controllers to N FV HMIs; Ethernet link, etc. The controllers mentioned here include: PLC, temperature meter, server, single-chip machine, inverter, etc.

- **One Controller to N FV HMIs:**

The following example will be given using one FATEK FBs PLC and two FV035

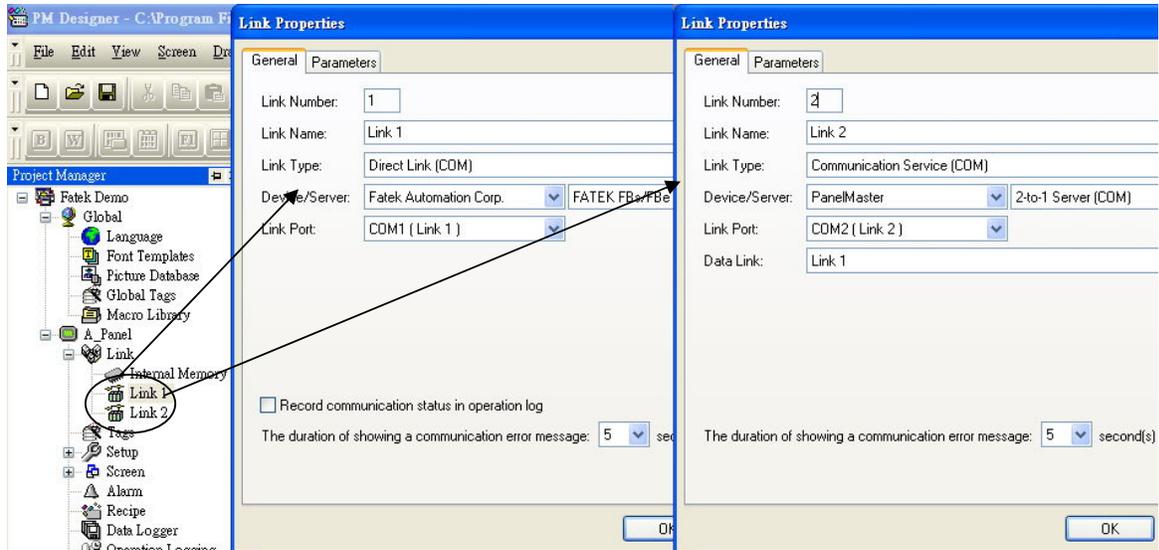
Steps:

Name the two FV HMIs [Panel A] and [Panel B], where the COM1 settings of [Panel A] are configured to link directly to FATEK FBs PLC while COM2 is defined as communication service (port). The communication port that connects [Panel B] to COM2 of [Panel A] must be defined as direct link via 2-to-1 server.

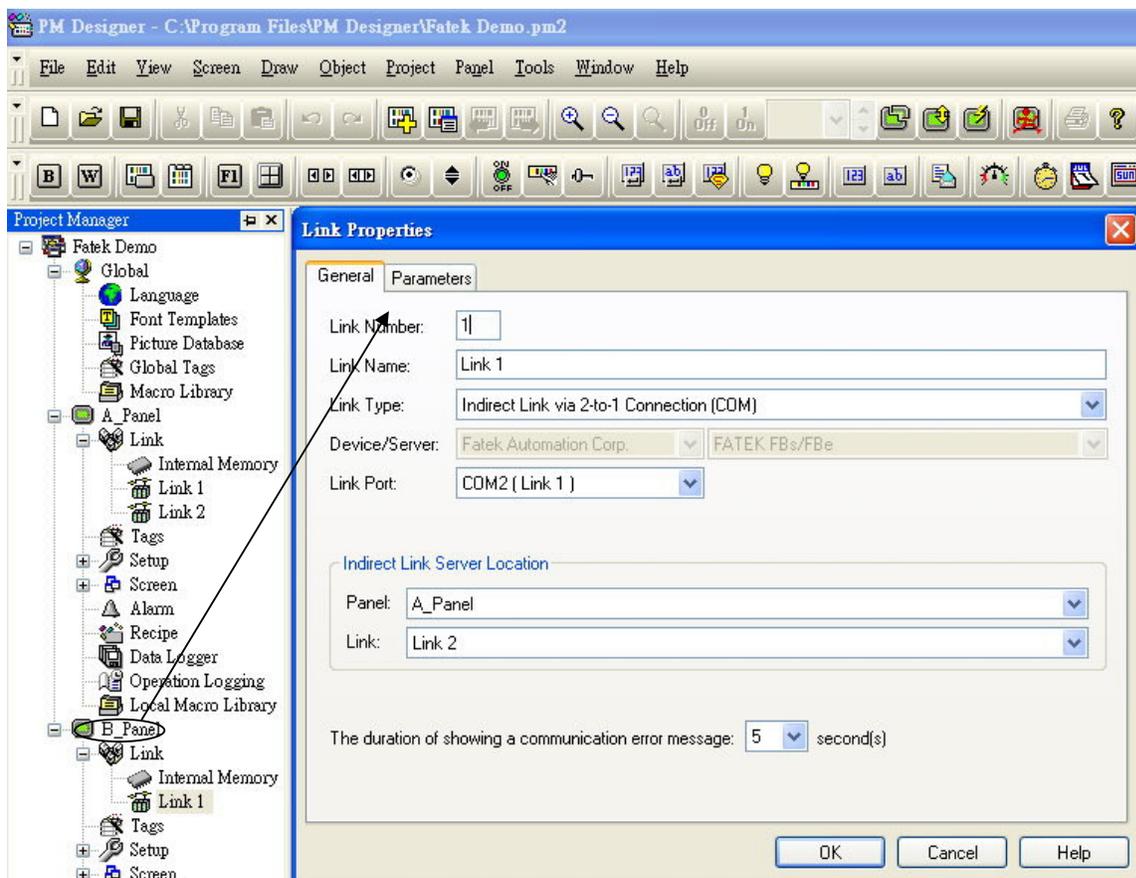


Note: When using this function, the operation management of the two FV HMIs must be located in the same file (AP) so that the options shown in the figure will be available to be selected.

Link Properties of Panel A:



Link Properties of Panel B:

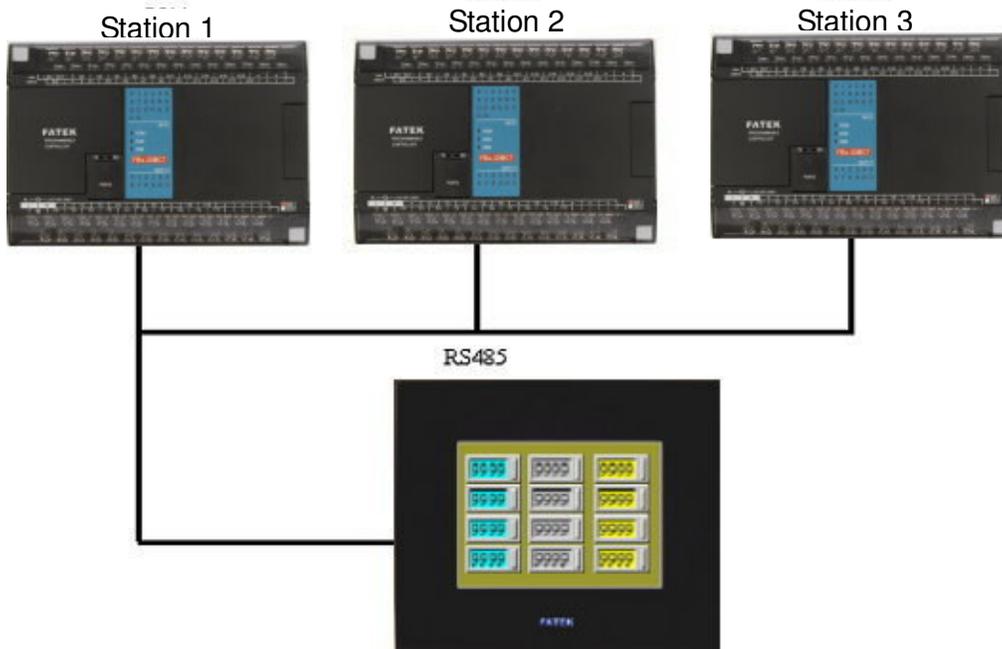


- **N PLC to one FV HMI**

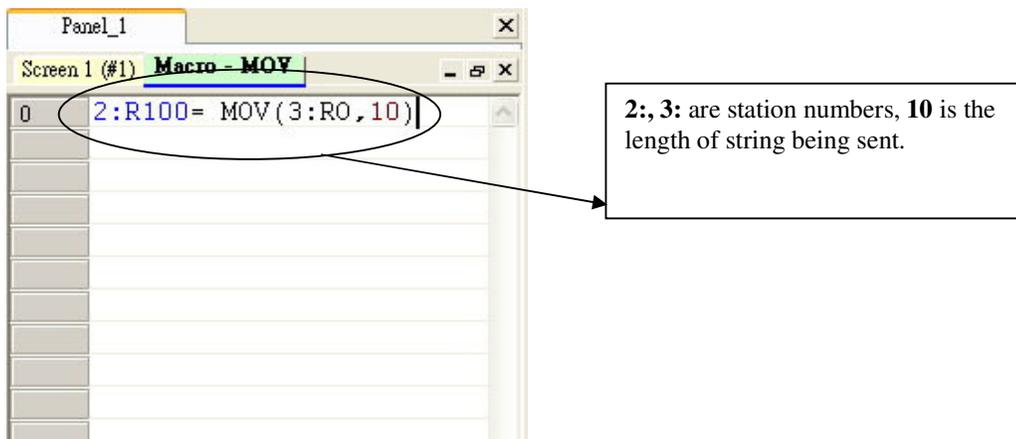
Use FV HMI as a terminal to perform exchange processing or control of the PLC data read from each station.

The following example will be given using three FATEK PLC and one FV035.

Steps: Configure the station IDs of the three PLC to be 1, 2, and 3 using WinProLadder, an editing software for FATEK PLC. Then connect the three PLC using RS485 and set communication between them and COM1 or COM2 of FV HMI FV035. Afterwards, one can perform data exchange or control on PLC using the macro commands of FV035.



For example, to write the first 10 words in the R0 register of Station 3 to R100 in Station 2, the program for the corresponding macro command can be written as follows; it can be located to be used when needed (please refer to the introductions of macro commands for details).

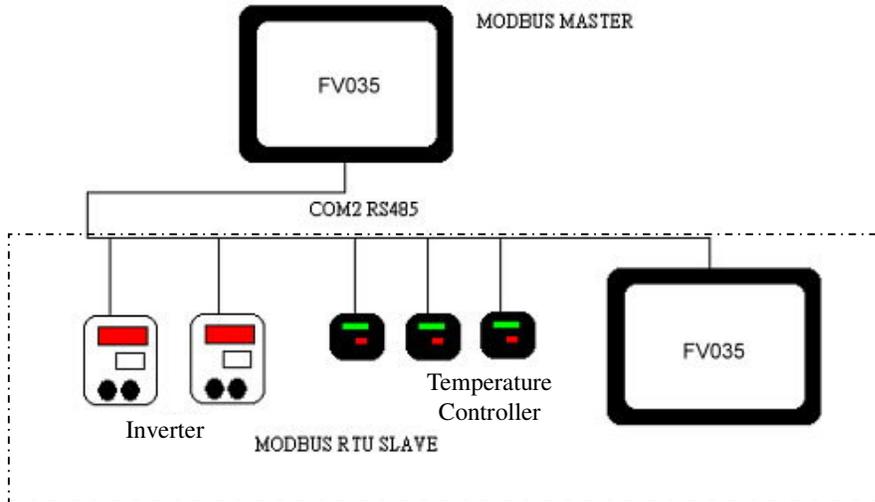


- **N Controller to N FV HMI**

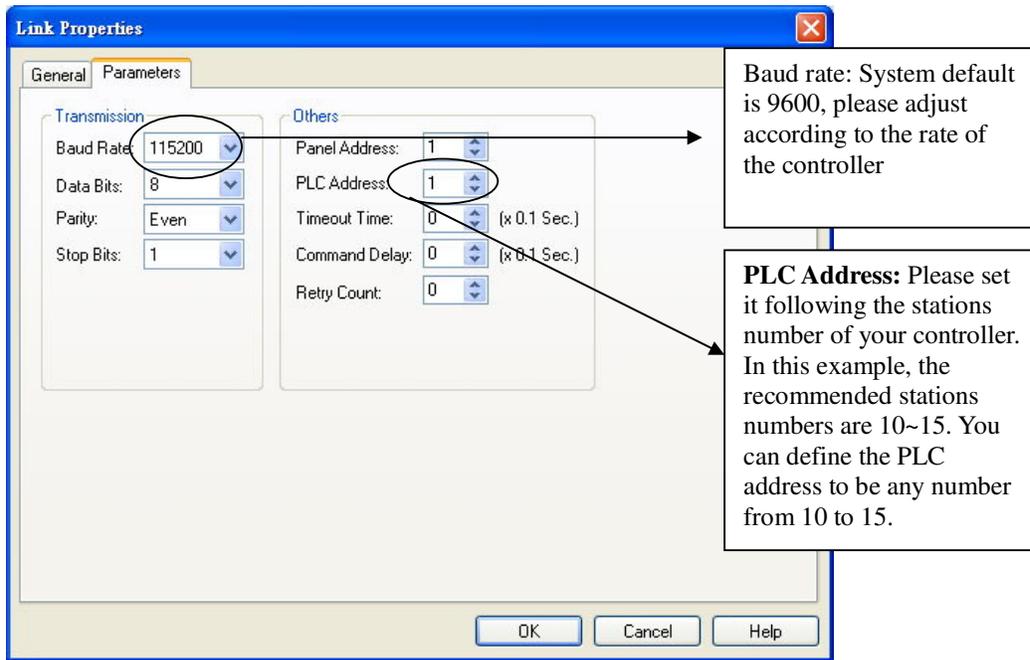
One can use the MODBUS in PM DESIGNER to connect multiple controllers or FV HMIs using RS485.

This example will use three temperature controllers, two inverters, and two FV035 HMIs.

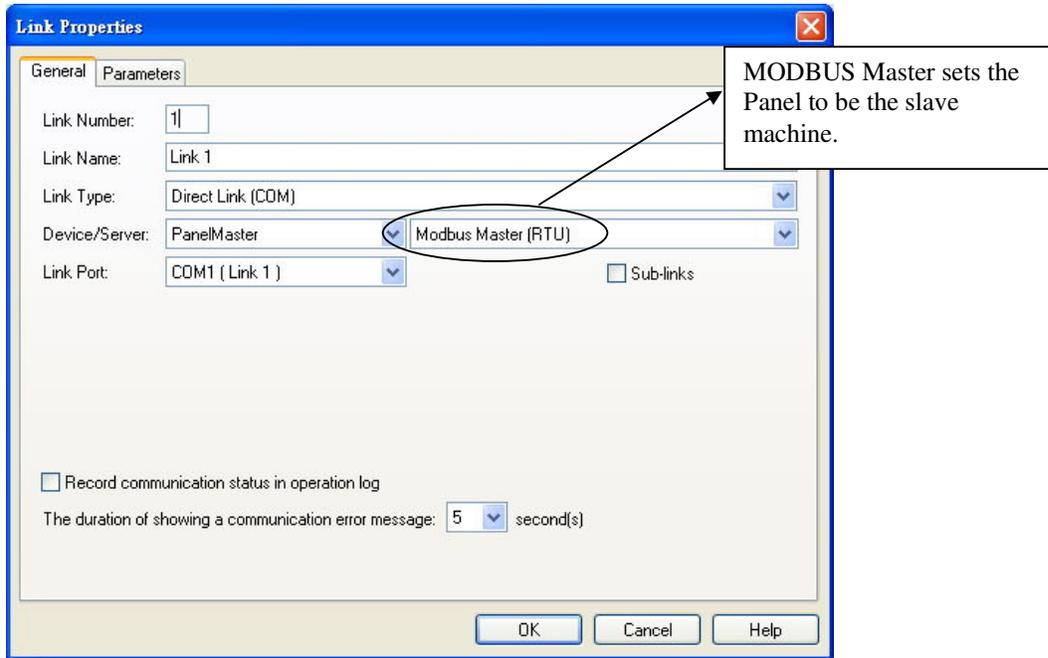
Steps: First you must verify the MODBUS communication function is available in the selected controllers. Then assign different station numbers to each controller (it is recommend to start the station number from 10), followed by linking all controllers by the connection scheme of RS485. One of the FV035 will be used as a terminal (main frame) to take care of the exchange or control of the data read from other machines.

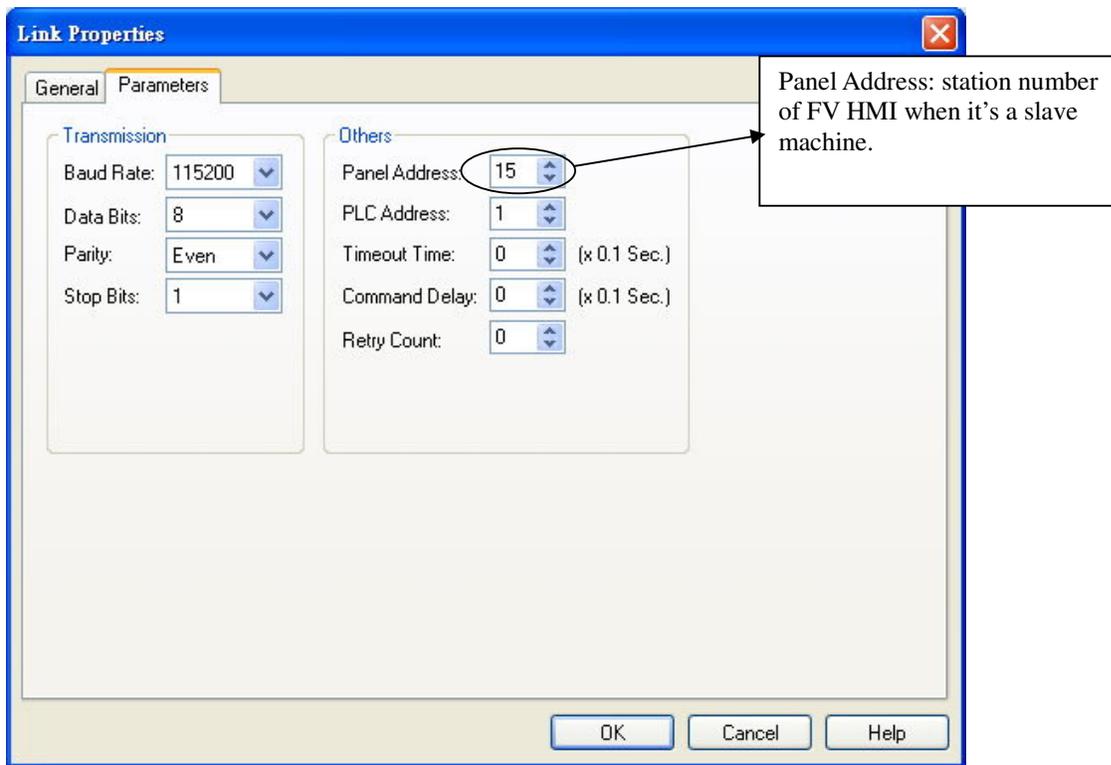


Properties of FV035 Main Station



FV035 Slave station setup





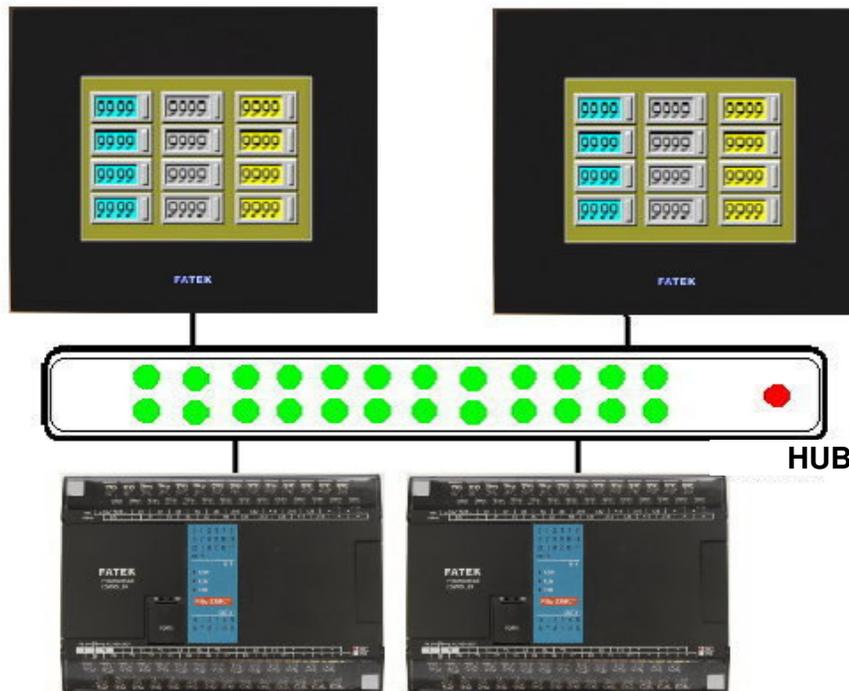
Note:

1. Please make sure that the communication function is activated for the controllers you are trying to link to (most temperature controllers or inverters need to turn on their settings).
2. In general, MODBUS can operate in the ASCII and RTU formats. Please use the same format on all machines.
3. The string address for the MODBUS driver in PM Designer is W0~W9998, which corresponds to 40001~49999 in standard MODBUS. If your controller has a hexadecimal MODBUS address, you can configure the MODBUS string address in PM Designer to be Wh0~WhFFFF.
4. Because of the limitation of communication rate of RS485, please pay attention to the quantity of controllers being used. It is recommended to link no more than eight machines. Link of more than eight machines will cause the response to slow down. To link more than eight machines, it is suggested to use the Ethernet link.

- Ethernet link

Ethernet link can be further defined to be the following types:

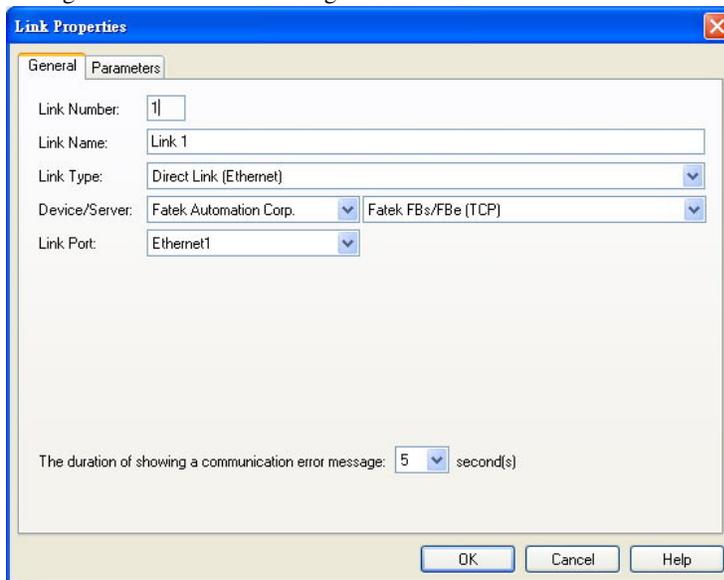
1. When Ethernet function is available in PLC, the link can be directly established to the HUB as shown in the figure below:



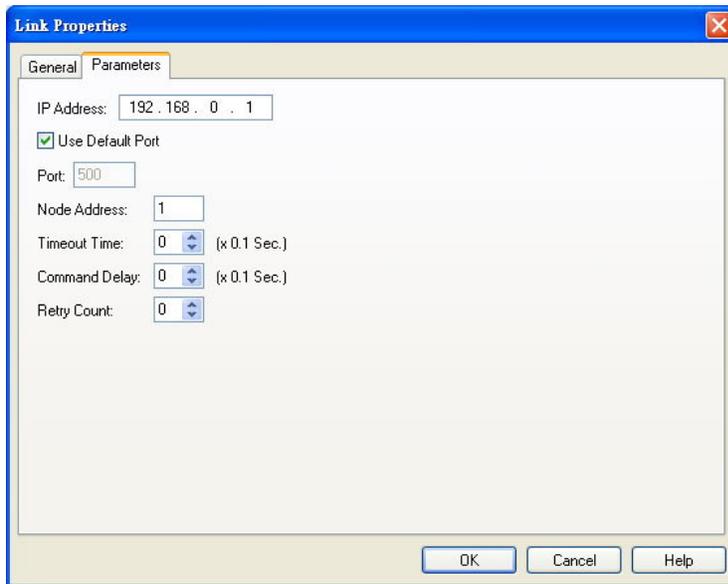
In this example, two FATEK PLC and two FV035 will be used in the description.

FBs-CBE network card is required and available for purchase for the FATEK PLC. Then define the IP address of PLC using FATEK Ethernet Module Configuration Tool (please read the manual of FATEK PLC). In this case, we set the IP addresses of the two PLC to be 192.168.0.1 and 192.168.0.2 and open two links in the Link Properties of PM Designer.

Configuration is shown in the figure below.



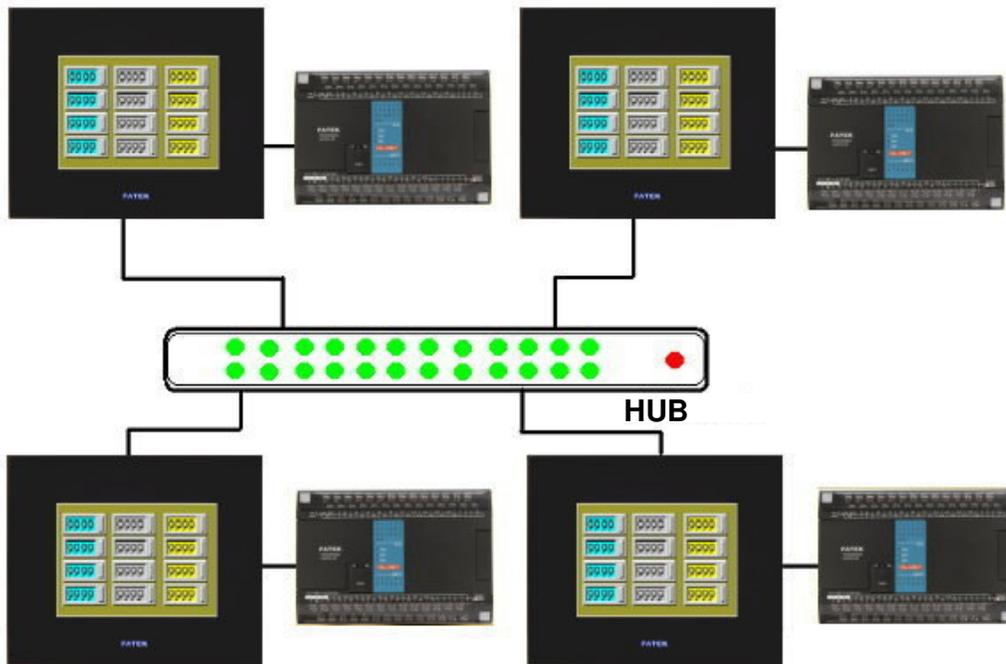
Link Number: defined by the system. This example has two PLC links, so two link numbers, 1 and 2, are defined by the system.
 Link Type: Select Direct Link (Ethernet).
 Device/Server: Select the corresponding PLC.



IP Address: Define the IP address same as the controller. In this example, the IP address of Link 1 is 192.168.0.1 and Link 2 is 192.168.0.2.

Note: Each FV HMI can have up to four links.

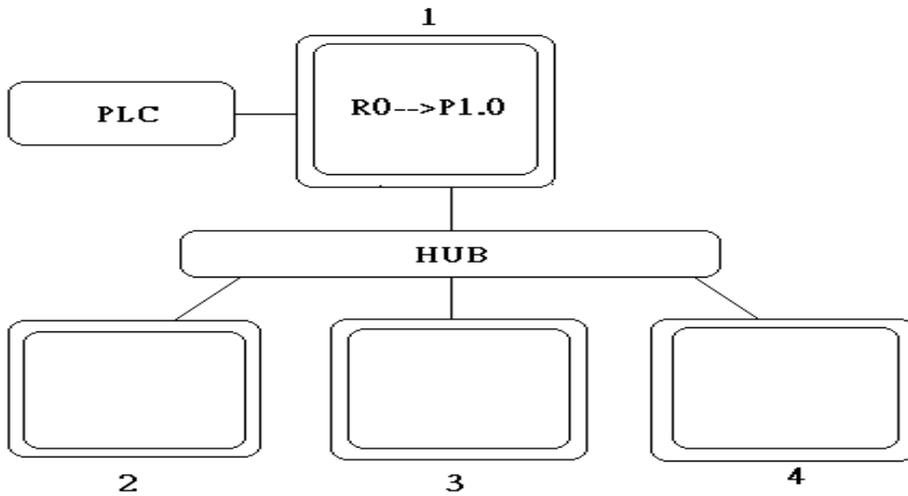
2. When there is no Ethernet function available in PLC, the link to the HUB can be established following the schematics shown below:



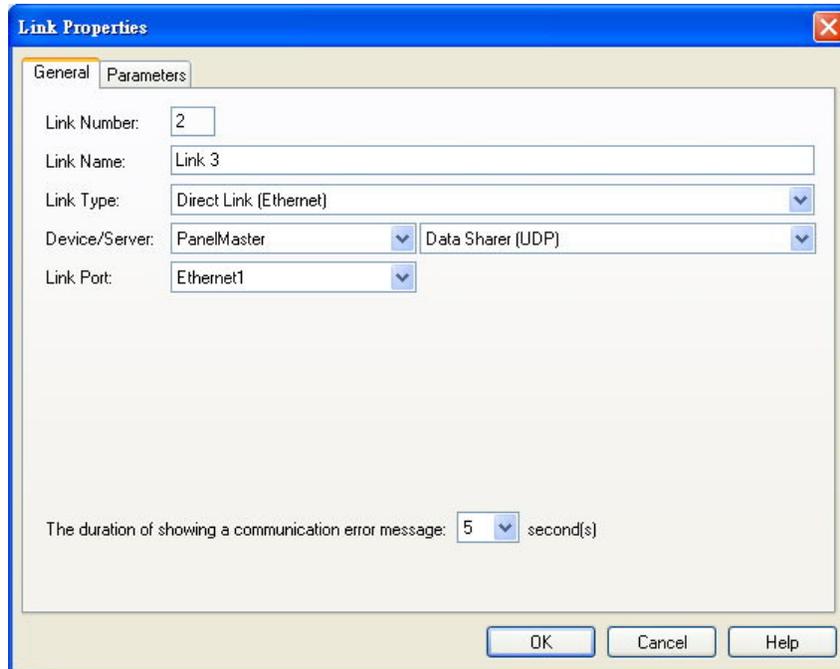
In this example, FATEK PLC and FV035 will be used in the description.

FATEK PLC uses the standard direct link to connect to FV035. The PLC data is sent by macros through Data sharer (UDP), a fast share program for Ethernet provided by PM Designer, to the HUB to be distributed.

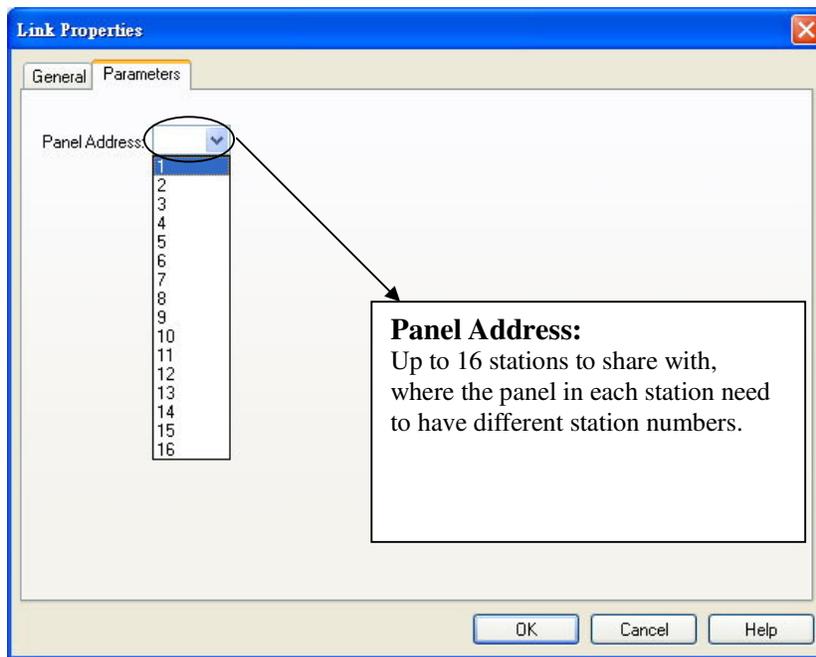
Steps: To share the Word position R0~R9 of the first station PLC with other stations:



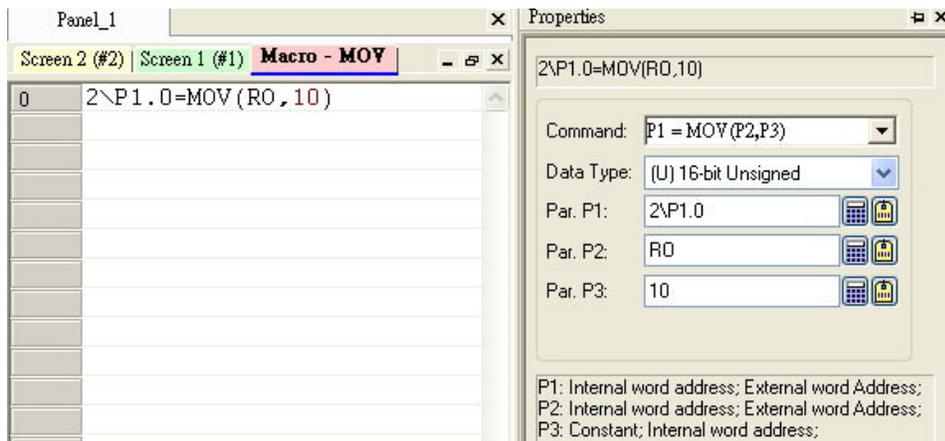
The Link Properties for Link 2 in Station 1 are as shown by the figure below:



For Data Sharer(UDP), the fast share for Ethernet provided by PM Designer, the data format is Pm.n, where m is the station number with up to 16 stations (1~16) and n is the Word address with up to 128 words (0~127).



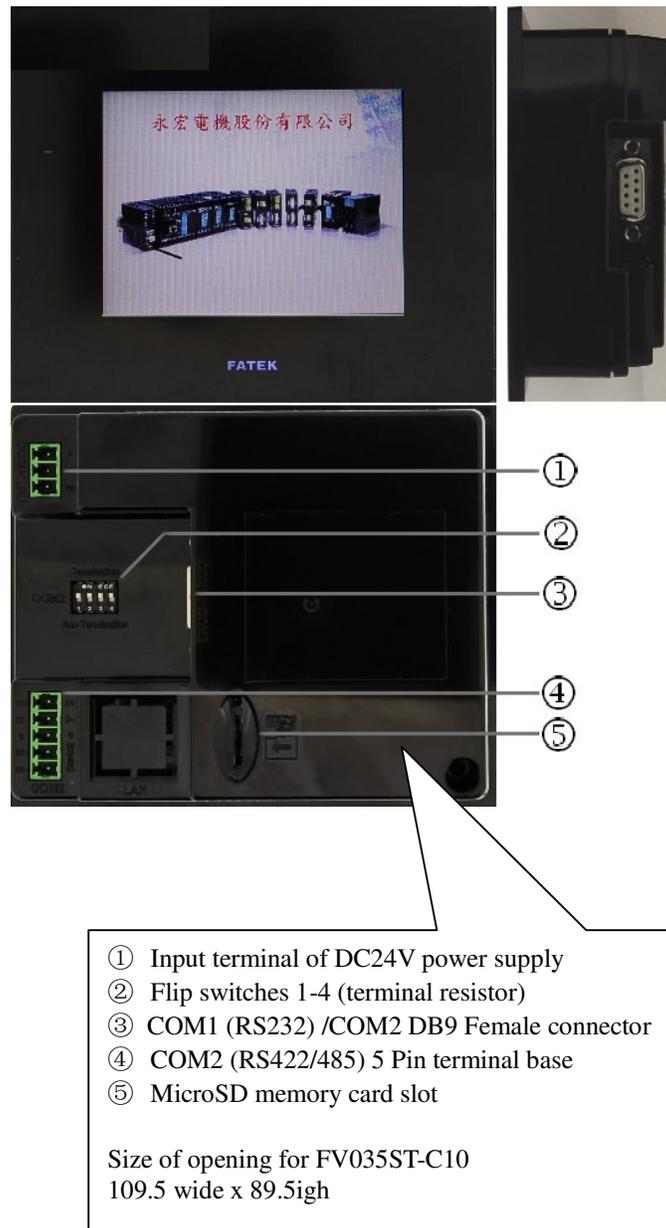
Once the link setup is finished, use the macro commands to send the PLC data to Data Sharer(UDP) as shown by the figure below:



Then Data Sharer(UDP) P1.0~P1.9=R0~R9. Afterwards each station can directly read the contents of P1.0~P1.9.

Appendix 1: Specifications of FV Series HMI

1. FV035ST-C10



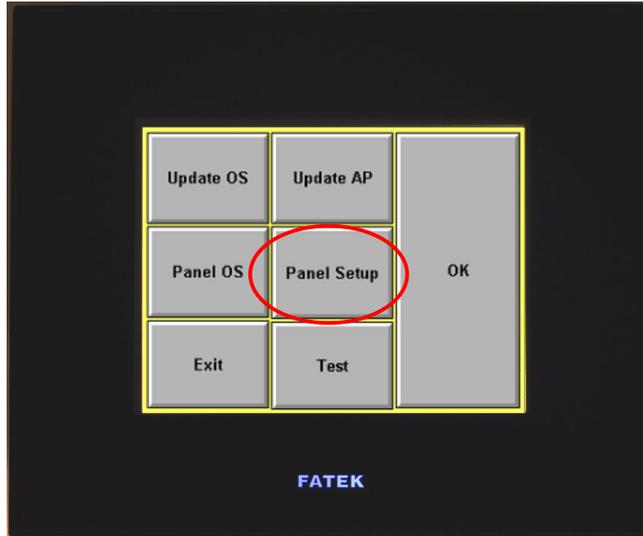
2. System Screen and Automatic Execution Settings of FV035ST-C10

Please note that the startup setting functions of FV035ST-C10 are different from the settings by flip switches.

(1) Operation upon entry into the Panel Setup Screen:

During startup, press and hold the FV screen for about 2 seconds and release, the screen will load the FV factory system settings, as shown by the figure below:

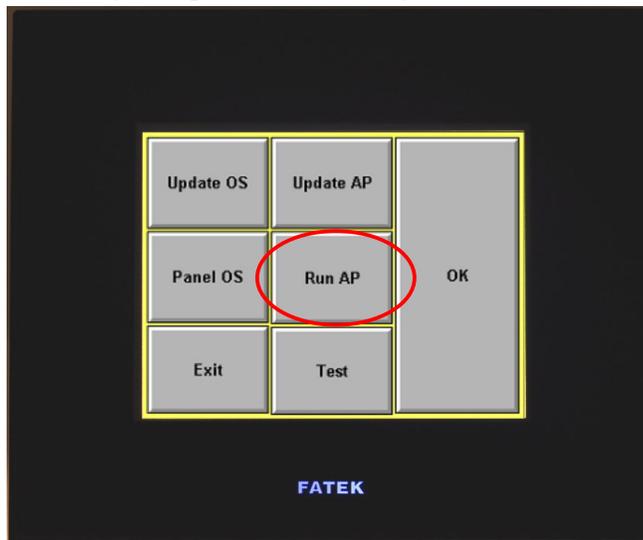
When the button is [Panel Setup], press ⇨ [OK] to enter the Panel Setup Screen. For every startup in the future, the system will be at the Panel Setup Screen.



(2) Operation upon entry into the Program Execution Screen

During startup, press and hold the FV screen for about 2 seconds and release, the screen will load the FV factory system settings, as shown by the above figure:

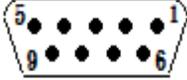
Press ⇨ [Panel Setup] and the button will switch to [Run AP] as shown in the figure below: press ⇨ [OK] to enter Program Execution Screen. For every startup in the future, the system will be at the Program Execution Screen.



To operate in the Panel Setup Screen of FV035ST-C10, one can quickly press the corners on the Touch Panel following the order of upper left, upper right, and upper left. The system will automatically switch to Panel Setup Screen and allows the user to modify the parameters in the system menu.

3. Pin Definition of Communication Ports

1. FV035ST-C10 Pin assigned.

COM 1	9-PIN	D-sub connector (female)	
1	→	RS422 TXD + / RS485 +	
2	→	RS232 RXD	
3	→	RS232 TXD	
4	→	RS422 RXD +	
5	→	GND	
6	→	RS422 TXD - / RS485 -	
7	→	RS232 RTS	
8	→	RS232 CTS	
9	→	RS422 RXD -	

COM 2	5-PIN	contact terminals	
1	→	RS422 TXD + / RS485 +	
2	→	RS422 TXD - / RS485 -	
3	→	GND	
4	→	RS422 RXD +	
5	→	RS422 RXD -	

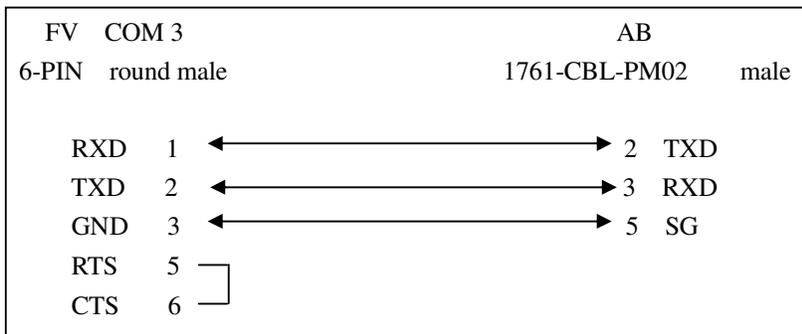
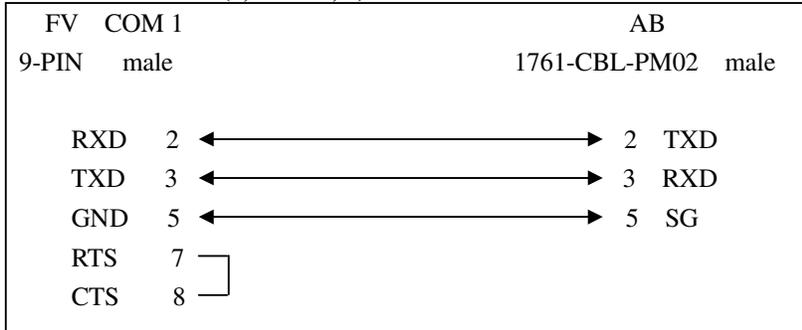
4. FV – Computer Download cable (Cable for PC download)

FV	COM 1		PC
9-PIN	D-sub connector (male)	Computer 9-PIN	D-sub connector (female)
RXD	2	←→	3 TXD
TXD	3	←→	2 RXD
GND	5	←→	5 SG
RTS	7	┌	7 RTS
CTS	8	└	8 CTS

Appendix 2: Common PLC Wiring Diagrams

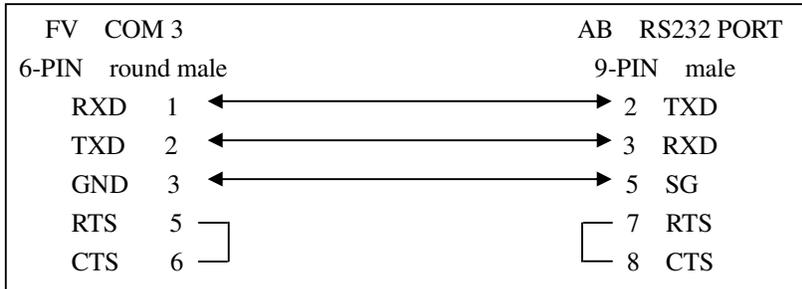
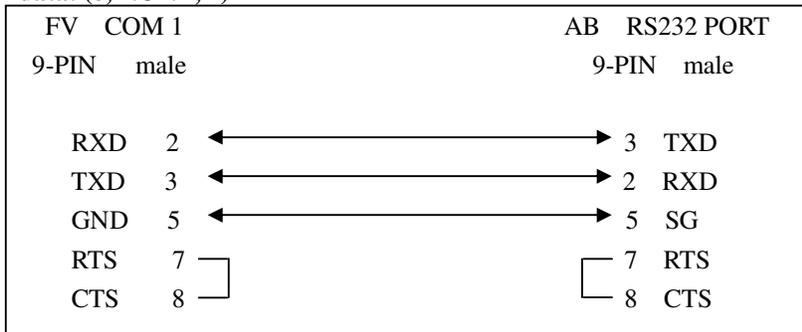
Allen-Bradley Micrologix 1000/1500

PM default setting: Communication Type: RS232 Communication rate: 19200bs Format of transmitted data: (8, NONE, 1)



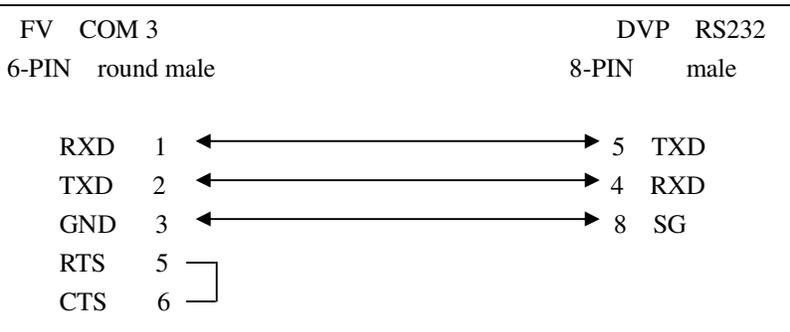
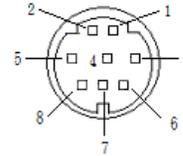
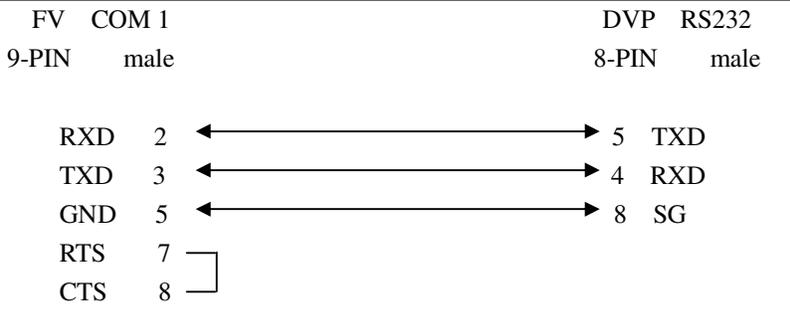
Allen-Bradley SLC 5/03,5/04

PM default setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (8, NONE, 1)



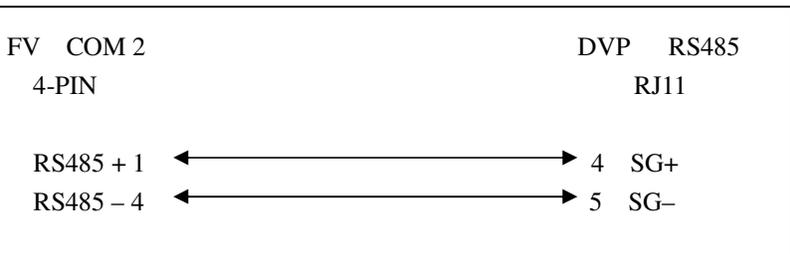
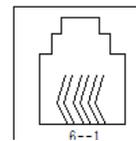
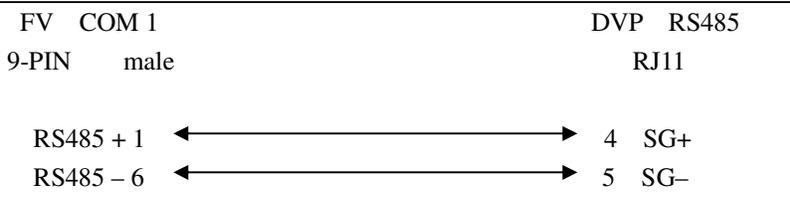
Delta Corporation DVP-ES/SS/EP/EH

PM default setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (7, EVEN, 1)



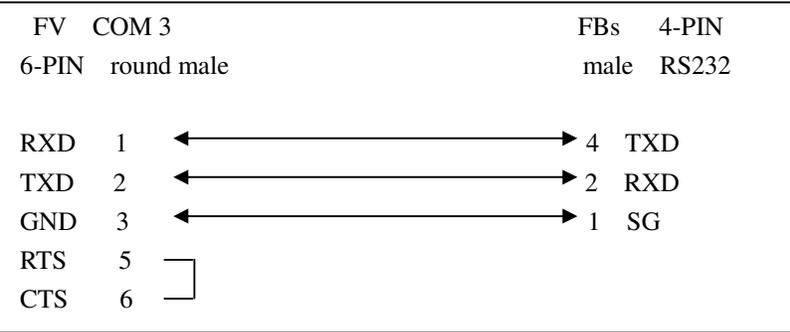
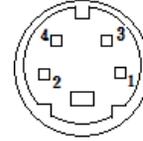
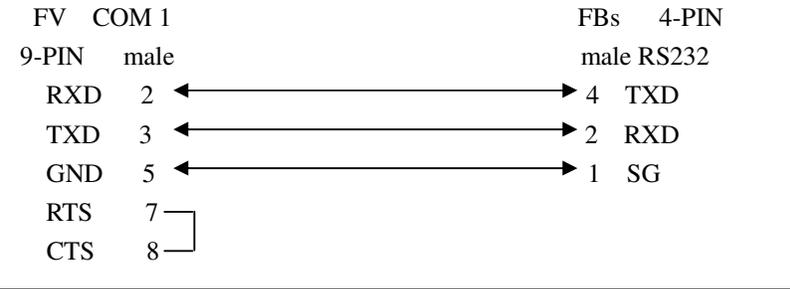
Delta Corporation VFD-B, VFD-M Inverter

PM default setting: Communication Type: RS485 Communication rate: 9600bs Format of transmitted data: (7, NONE, 2)



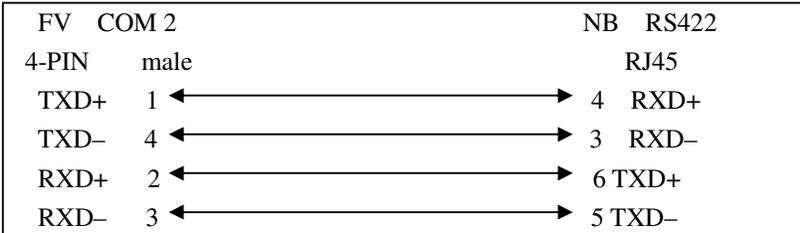
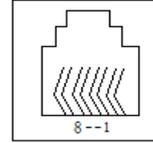
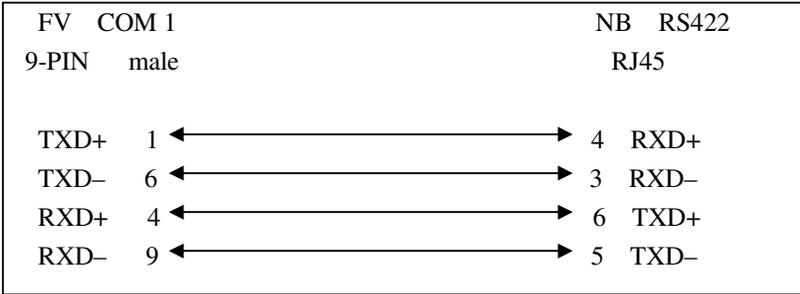
FATEK FBs

PM default setting: Communication Type: RS232 Communication rate: selectable 9600bs Format of transmitted data: (7, EVEN, 1)



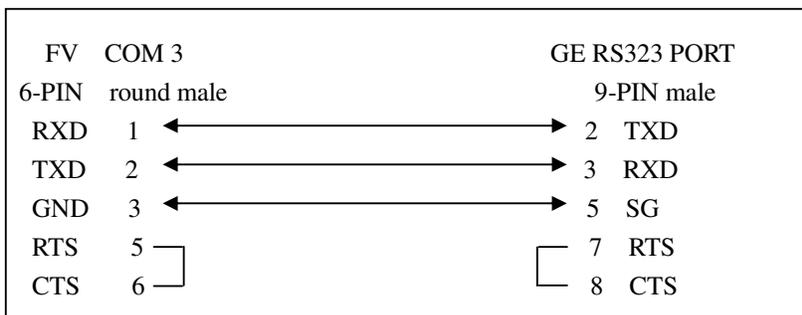
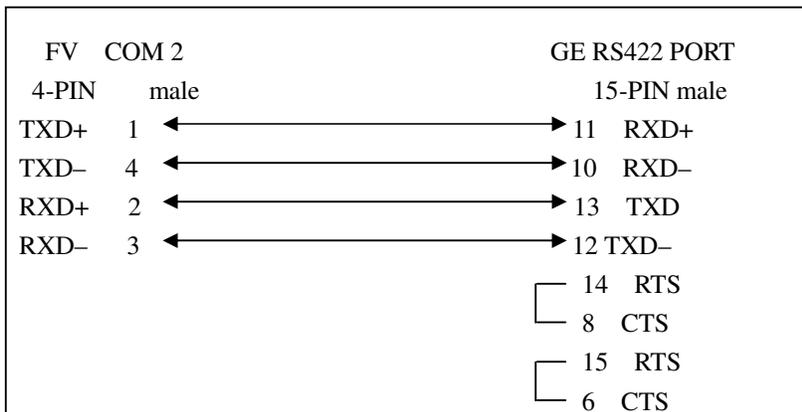
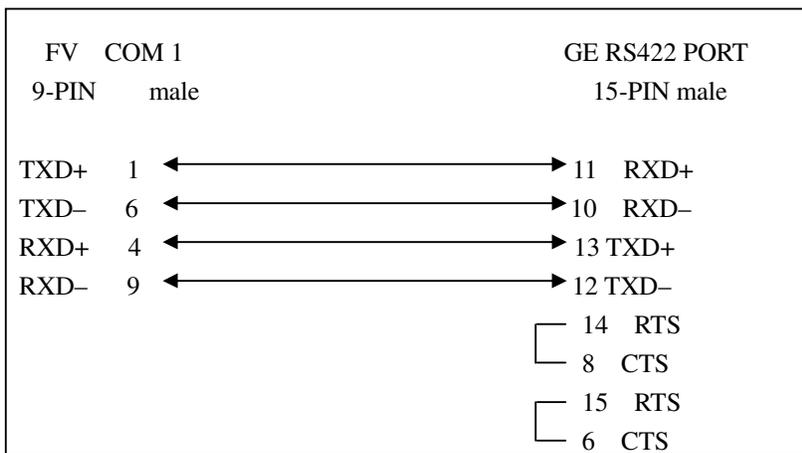
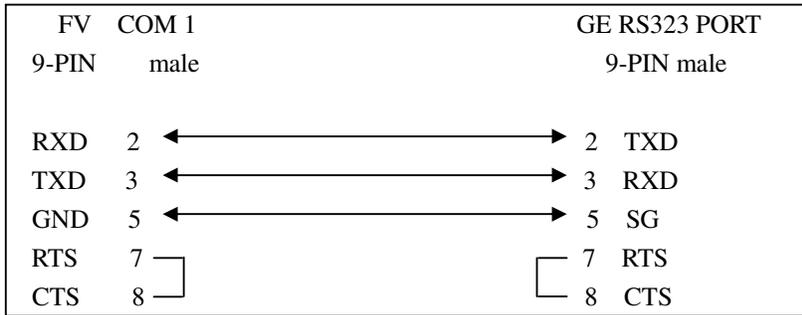
Fuji Electric Corporation NB Series

PM default setting: Communication Type: RS422 Communication rate: 19200bs Format of transmitted data: (8, ODD, 1)



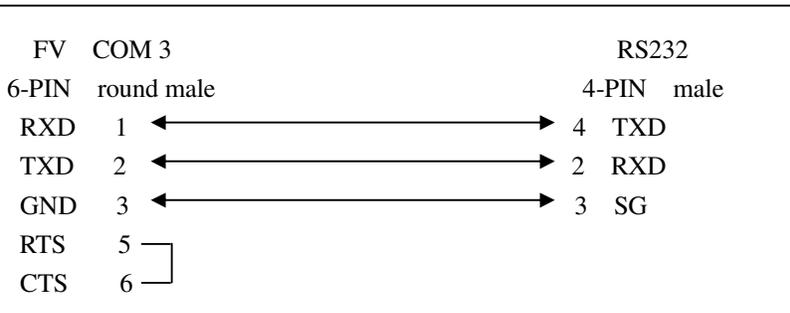
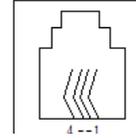
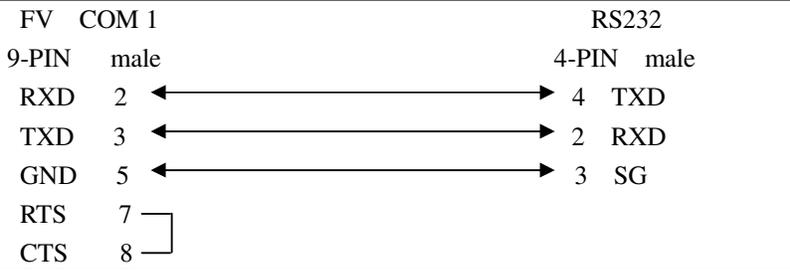
GE Corporation 90 Series SNP

PMdefault setting: Communication Type: RS323/422 Communication rate: 19200bs Format of transmitted data: (8, NONE,1)



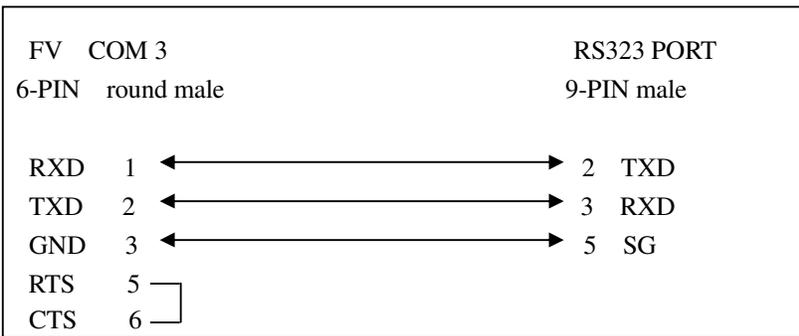
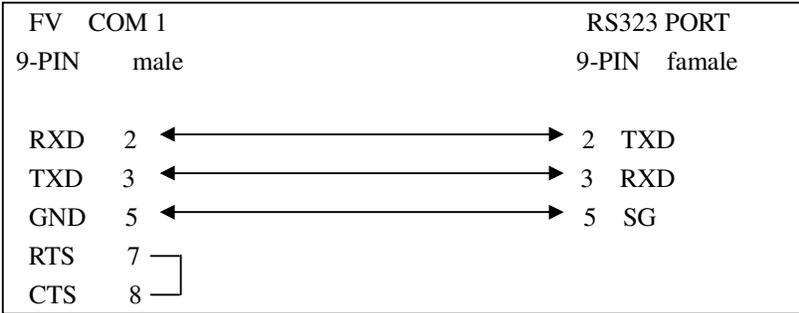
Keyence Corporation KV/KZ Series

PMdefault setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (8, EVEN, 1)



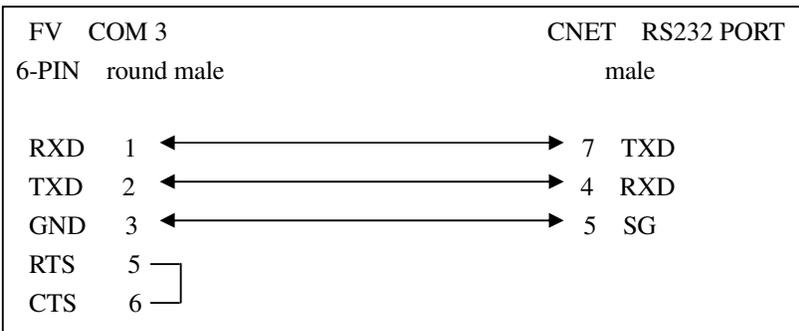
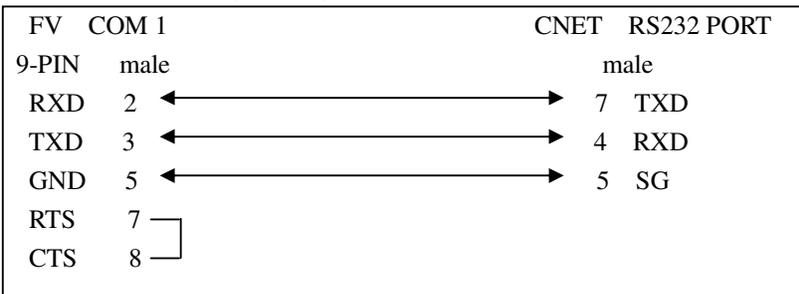
Klockner Moeller Corporation PS4-201

PMdefault setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (8, NONE, 1)



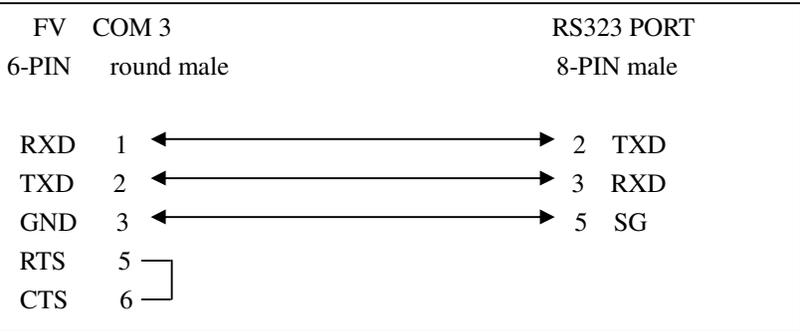
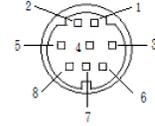
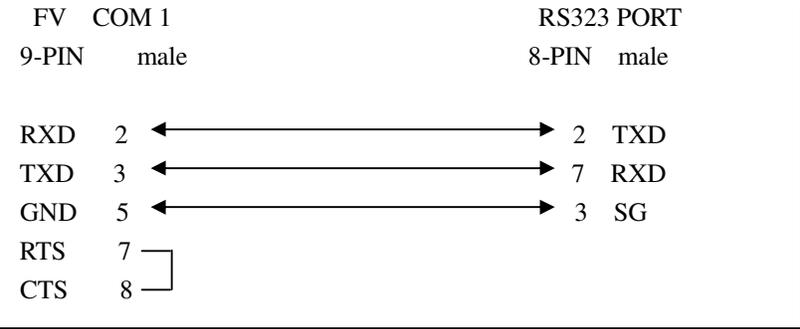
LG Industrial Systems Master-K Series CNET

PMdefault setting: Communication Type: RS232 Communication rate: 19200bs Format of transmitted data:(8, NONE, 1)



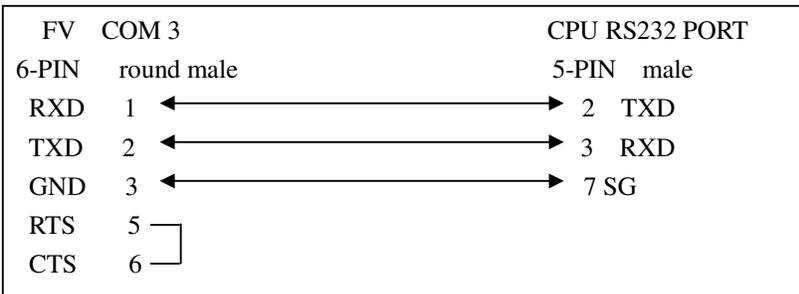
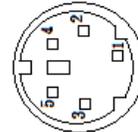
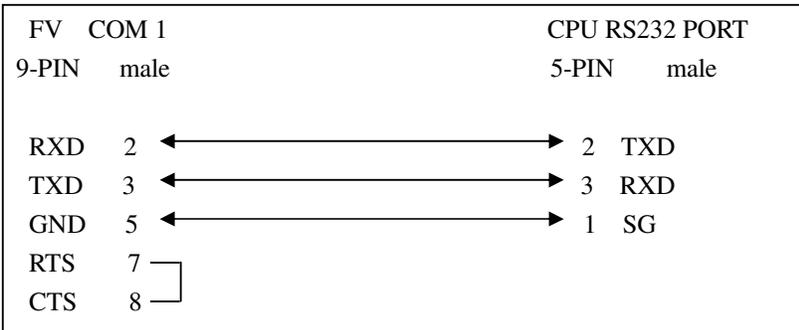
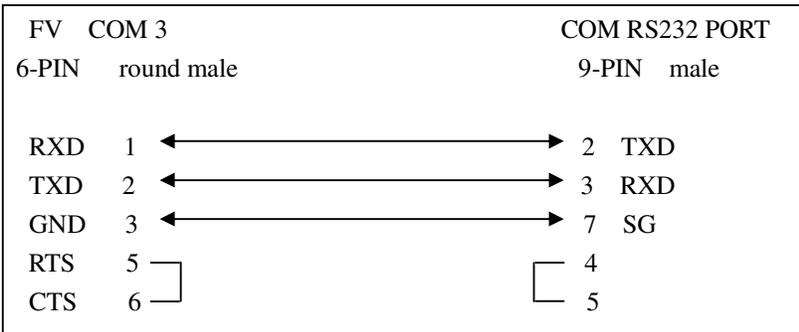
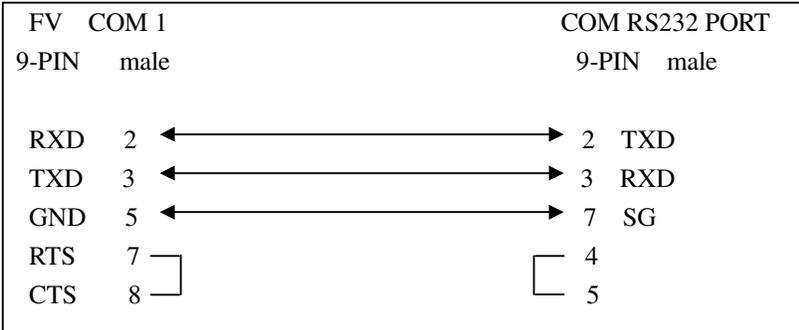
Liyan EX Series

PMdefault setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (7, EVEN, 1)



Matsushita FP Series

PMdefault setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (8, ODD, 1)

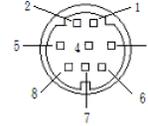


Mitsubishi FX0s,0n,1n,2n

PMdefault setting: Communication Type: RS422 Communication rate: 9600bs Format of transmitted data: (7, EVEN, 1)

Mitsubishi FX0S/FX1S/FX0N/FX1N/FX2N CPU Port

FV COM 1		RS422 PORT
9-PIN	male	8-PIN male
TXD+	1	2 RXD+
TXD-	6	1 RXD-
RXD+	4	7 TXD+
RXD-	9	4 TXD-

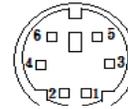


FV COM 2		RS422 PORT
4-PIN		8-PIN male
TXD+	1	2 RXD+
TXD-	4	1 RXD-
RXD+	2	7 TXD+
RXD-	3	4 TXD-

Mitsubishi Q Series CPU Port

PMdefault setting: Communication Type: RS232 Communication rate: 19200bs Format of transmitted data: (8, ODD, 1)

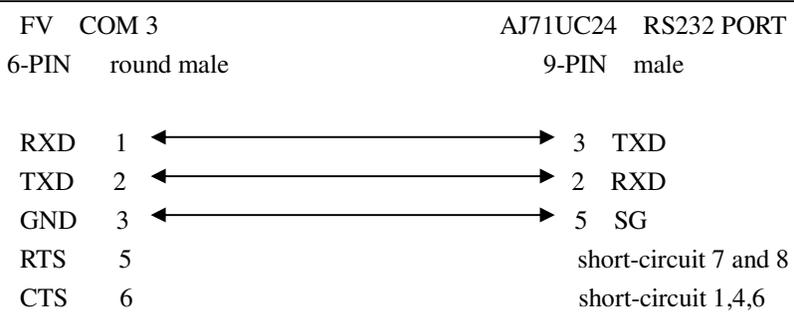
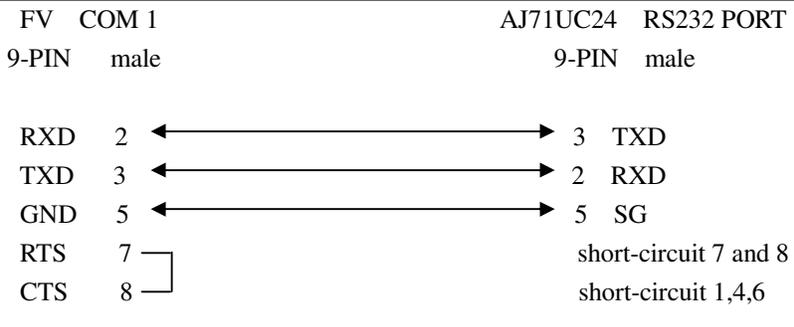
FV COM 1		CPU RS232 PORT
9-PIN	male	6-PIN male
RXD	2	1 TXD
TXD	3	2 RXD
GND	5	3 SG
RTS	7	
CTS	8	



FV COM 3		CPU RS232 PORT
6-PIN	round male	6-PIN male
RXD	1	1 TXD
TXD	2	2 RXD
GND	3	3 SG
RTS	5	
CTS	6	

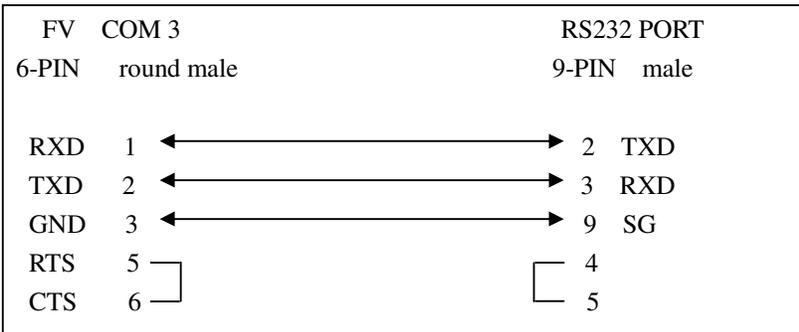
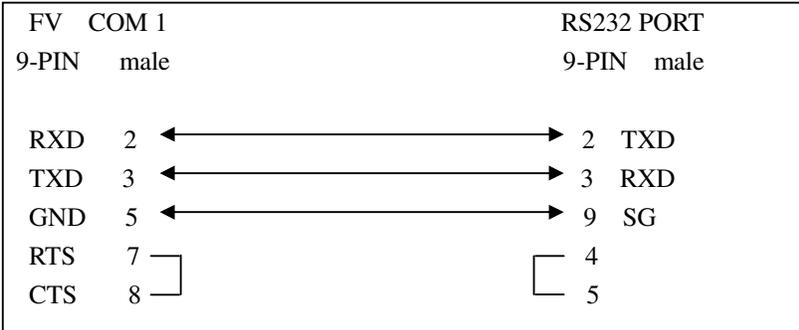
Mitsubishi A Series Link Port

PMdefault setting: Communication Type: RS232 Communication rate: selectable 9600bs Format of transmitted data: (8, ODD, 1)



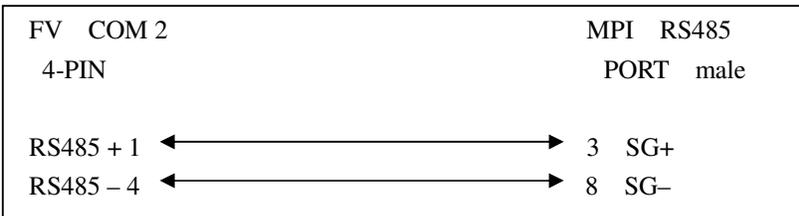
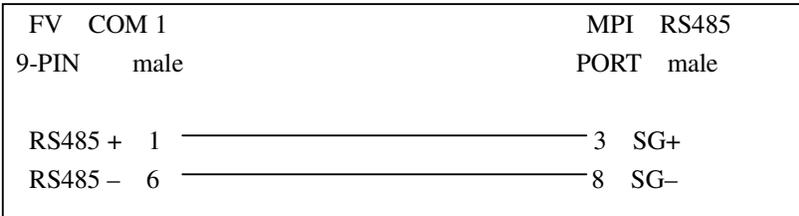
Omron C/CV/CS Series

PMdefault setting: Communication Type: RS232 Communication rate: 9600bs Format of transmitted data: (7, EVEN, 2)



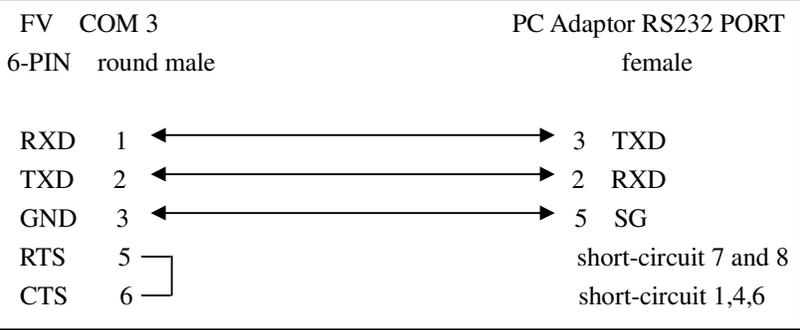
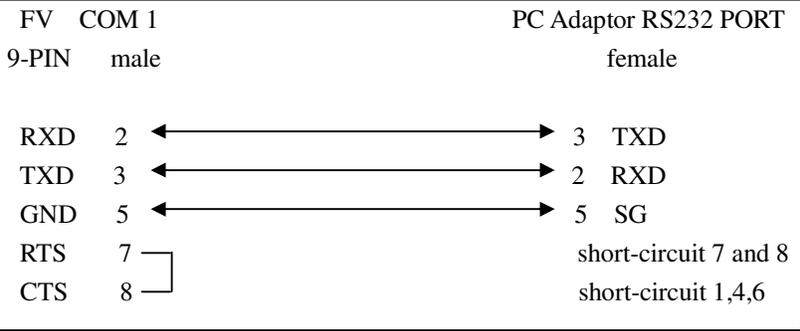
Siemens AG S7 Series MPI Port

PMdefault setting: Communication Type: RS485 Communication rate: 9600bs Format of transmitted data: (8, EVEN, 1)



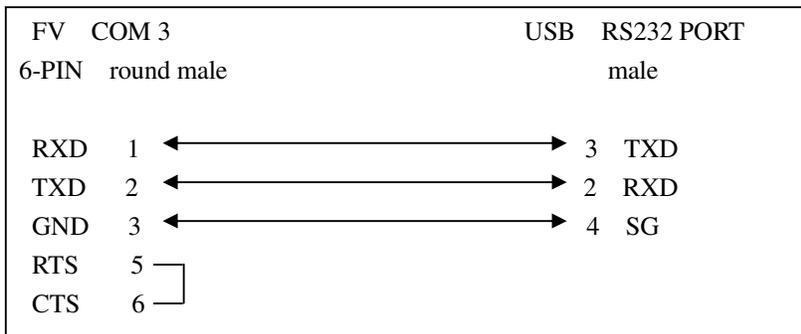
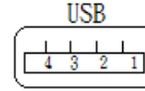
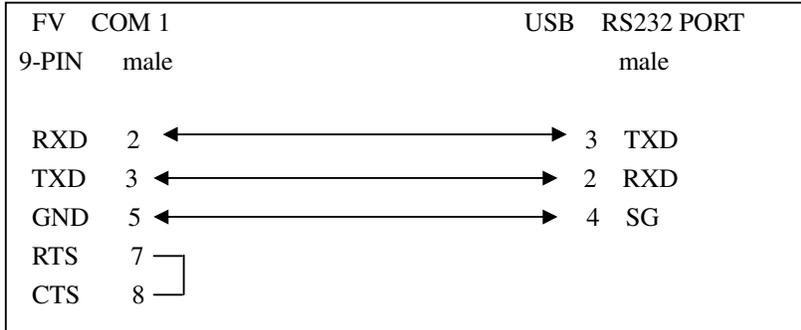
Siemens AG S7-300/S7-400 PC Adaptor

PMdefault setting: Communication Type: RS232 Communication rate: 19200bs Format of transmitted data: (8, EVEN, 1)



VIGOR VB Series

PMdefault setting: Communication Type: RS232 Communication rate:9600bs Format of transmitted data: (7, EVEN, 1)



Appendix 3: Device List of PLC that can communicate through PM Designer

PM Designer

Communicable PLC / Devices List

2007-09-28 PM Ver-1.1.20

	Brand Name	Code	Model Name ; Description
1	A&D Company Ltd.	CAD401	AD-4401 Weighing Indicator
2	AIGO Technologies Corporation	C87001	SE500 Series (Modbus RTU)
3	Allen Bradley	C10001	Micrologix 1000/1500
4		C10002	SLC 5/03, 5/04
5	Bosch Rexroth Group	C49001	Convo CVF-MN3 (RS485 Model)
6	CTB Technologies Corporation	CAA001	IMS Servo Controller
7	Delta Corporation	C16001	DVP-ES/SS/EP/EH
8		C16011	VFD-M Inverter (ASCII)
9		C16021	VFD-B Inverter (ASCII)
10		C16031	DTC1000/2000 Temperature (ASCII)
11		C16041	ASDA Servo Controller (ASCII)
12		C16051	ASDA-B Servo Controller (ASCII)
13	Dirise Electric Technology Co.,Ltd.	C15101	DRS2000 Series Inverter
14	Emerson Network Power	C81001	EC Series

15	Fatek Automation Corp.	C1A001	Fatek FBs/Fbe
16		C1A011	Fatek FBs/FBe (TCP)
17	Festo Corporation	C1C001	FPC/FEC Series
18	Fuji Electric Corporation	C1D001	NB Series
19		C1D011	PXR Series Temperature (RTU)
20	GE Corporation	C1E001	GE Series SNP Link
21		C1E011	GE Series CCM Link
22	Gigarise Technology Co., Ltd.	C90012	GA400 Temperature (RTU)
23		C87002	SE5000
24	Hitachi Industrial Equipment Systems Co., Ltd	CHA04LS	AD Series
25		C1F001	SJ200 Inverter
26	Hitech	C02001	Computer as Slave (COM)
27		C02011	Computer as Master (COM)
28		C02021	Computer as Slave V2 (COM)
29		C02031	Computer as Master V2 (COM)
30	Idec Corporation	C22001	FC Series
31	Integrated Flow Systems	CIF001	iPurge Source Controller
32	JETTER	C24001	NANO Series
33	Keyence Corp.	C25001	KV Series
34		C25011	KV-1000
35	Klockner Moeller Corporation	C26001	PS4-201-MM1
36	Koyo Electric Corp.	C27001	K Sequence Series
37		C27011	Direct Logic Series
38	LG Industrial Systems	C28001	Master-K Series CNet
39		C28011	K120S CPU Port
40		C28021	GLOFA GM Series CNet
41		C28031	XBM-DR16S
42	Liyan Electric Industrial Ltd.	C2B141	EX Series (CPU Port)
43	Matsushita Electric Works	C29001	FP Series Computer Link
44		C29011	VFOC Series Inverter
45	Maxtech	C85001	MC2 PID Controller
46	Maxthermo	C86001	MC5738 (RTU)
47	Micro Trend Corporation	C91001	UTC Servo Controller (Only for signed 32bit device)
48	Mirle Automation Corporation	C2A001	nDX Controller
49	Mitsubishi Electric Corp.	C2B001	Melsec-FX (CPU Port)
50		C2B011	Melsec-QnA (Link Port)
51		C2B021	Melsec-Q (CPU Port)
52		C2B031	Melsec-Q00J (CPU Port)
53		C2B041	Melsec-FX2n (CPU Port)
54		C2B051	Melsec-FX3U (CPU Port)
55		C2B061	Melsec-AnN/AnS (Link Port)
56		C2B071	FX2n 10GM/20GM

57		C2B081	Melsec-A1S/A2S (CPU Port)
58		C2B091	FR-E500 Series (485)
59		C2B0A1	Melsec-A3N/A1SH (CPU Port)
60	Modicon Corp.	C2C001	ModBus Master (TCP/IP)
61		C2C011	ModBus Device/Slave (TCP/IP)
62		C2C101	ModBus Master (TCP/IP; Type 2)
63		C2C111	ModBus Device/Slave (TCP/IP; Type 2)
64		C2C021	Modicon 984 Master (RTU)
65		C2C022	Modicon 984 Master (RTU; Little Memory)
66		C2C031	Modicon 984 Device/Slave (RTU)
67		C2C061	Modbus Master (ASCII)
68		C2C062	Modbus Master (ASCII; Little Memory)
69		C2C071	Modbus Device/Slave (ASCII)
70		C2C081	Modicon Device/Slave (RTU, Quantum)
71		C2C0A1	TSX Premium (Uni-Telway)
72		C2C0B1	TSX Quantum (Uni-Telway)
73		C2C0C1	Twido (Modbus RTU)
74	Muscle Corporation Inc.	CCM117L	Cool Muscle CM1-17L30
75	NTP	C80001	PSTC Temperature (RTU)
76	Omron Corporation	C2D001	Sysmac C Series Host Link
77		C2D011	Sysmac CV Series Host Link
78		C2D021	Sysmac CS/CJ Series Host Link
79		C2D041	E5CN Temperature (CompoWay/F)
80		C2D051	E5CN Temperature (Modbus RTU)
81		C2DE01	Sysmac CS/CJ Series FINS/TCP
82		C2DE02	Sysmac CS/CJ Series FINS/UDP
83	PM Designer	C01051	General Device (COM)
84		C2C091	Modbus Device/Slave (ASCII)
85		C2C093	Modbus Device/Slave (ASCII; No block read)
86		C2C041	Modbus Master (RTU)
87		C2C042	Modbus Master (RTU; Little Memory)
88		C2C051	Modbus Device/Slave (RTU)
89		C2C052	Modbus Device/Slave (Word order in big-endian)
90		C2C053	Modbus Device/Slave (RTU; No block read)
91		C00000	Null PLC
92		C01081	Profibus-DP Slave EP0920
93		C01E01	Data Sharer (UDP)
94	Pan-Globe Corp.	C90001	E9 Temperature Series
95		C90011	E904 Temperature (RTU)
96		C90021	HT Series Temperature Controller
97	RKC Instrument Inc.	C82001	MA900/CB900 Series (RTU)

98	Saia Burgess	C31001	PCD1 (S-Bus)
99	Samwon Technology	C88001	NOVA Series (RTU)
100	Sharp Corporation	CSJW10	JW10/20 Series
101	Shenzhen Step Servo Ltd.	C50001	Kinco Servo Controller
102	SIEMENS AG.	C39001	Simatic S7-200 (PPI; 1-to-1)
103		C39011	Simatic S7-200 (PPI; Network)
104		C39021	Simatic S7-300 (MPI Port)
105		C39031	Simatic S7-300 (PC Adaptor)
106		C39041	Simatic S5 3964R
107	Teco Electric & Machinery Co.,Ltd.	C51001	TSDA Series AC Servo
108		C51011	TP03 Series (Modbus RTU)
109	Tieon Electronics Co., Ltd.	C83001	IPC-03 Series (RTU)
110	TOHO Electronics Inc.	C3D001	TTX-700 (Modbus RTU)
111		C3D002	TTM-000 Series (TOHO Protocol)
112		C3D003	TTM-200 Series (TOHO Protocol)
113	Toshiba Schneider Inverter Corporation	C84001	TOSVERT VF Series (Modbus RTU)
114	Unitronics	C4A001	Vision 120 Series (Modbus RTU)
115	VIGOR	C42001	M/VB Series
116	Yamatake Corporation	C44001	SDC35/36 Temperature (RTU)
117		C44011	SDC35/36 Temperature (ASCII)
118		C44021	MA500 FA Controller (ECL Host)
119	Yaskawa Electric Corporation	C45001	Σ - II SGDM/H Series AC Servo
120		C45011	MP Series Controllers (Memobus)
121	Yokogawa Electric Corporation	C46001	FA-M3 Series (CPU Port)
122	Yudian Automation Technology Ltd.	C47001	AI-7/8 Series (AiBus)
123		C47011	AI518/708/808/518P/708P/808P Controller (AiBus)