

Silver Series Operator Interface Terminals

EZware-5000 Programming Manual



Operator Interface Terminals



1241 Bundy Boulevard, Winona, Minnesota USA 55987
Phone: +1 (800) 492-8569, Fax: +1 (507) 452-4507 <http://www.watlow.com>

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APPLICATIONS ASSISTANCE

This manual is designed to provide the necessary information for trouble-free installation and operation of your new Operator Interface Terminal (OIT). However, if you need assistance, please call Watlow at +1 (800) 492-8569 ext. 19205 between 7 a.m. and 5 p.m. Central Standard Time (CST). Ask for an Applications Engineer. Or you may e-mail your questions to winappeng@watlow.com.

Important Information Regarding Watlow Part Numbers

When you purchased your Operator Interface Terminal and accessories from Watlow, your ordered and received them under Watlow part numbers. The parts are also labeled with Maple Systems' part numbers and are referred to by those part numbers throughout this manual and other support documents. The table below correlates the Watlow and Maple Systems part numbers.

Watlow P/N	Maple P/N	Description
TS00-0043-0000	HMI5043N	4.3" (480 x 272) 65,536 (16-bit) color TFT LCD touchscreen, USB programming and two serial ports
TS00-0043-E000	HMI5043T	4.3" (480 x 272) 65,536 (16-bit) color TFT LCD touchscreen, two serial ports and Ethernet
TS00-0070-0000	HMI5070TH	7.0" (800 x 480) 65,536 (16-bit) color TFT LCD touchscreen, USB, three serial ports and Ethernet
TS00-0100-0000	HMI5100T	10.2" (800 x 480) 65,536 (16-bit) color TFT LCD touchscreen, USB, three serial ports and Ethernet
0601-0001-0000	N/A	Watlow Controller Support Tools DVD-ROM with EZware-5000 programming software and electronic product manuals
0830-0750-0000	4010-0010	Power supply Input: 85-264 VAC, Output: 24VDC, 1.7A, 25W (not Class 2) CE/UL rated
0847-0299-0000	N/A	Class 2 power supply, Input:90-264VAC, Output: 24VDC, 1.3A, 31W
0219-0388-0000	7444-0185-5	TS00-0043-0000 or TS00-0043-E000 communication cable, 5-foot, COM1 [2-wire 485] to bare wires for Watlow EZ-ZONE [®] controller screw terminals
0219-0374-0000	7446-0185-5	TS00-0070-0000 or TS00-0100-0000 communication cable, 5-foot, COM1 [2-wire 485] to bare wires for Watlow EZ-ZONE [®] controller screw terminals
0219-0382-0000	7431-0115	5-foot USB cable for downloading projects from a PC to the OIT
0830-0782-0000	2511-5043	Package of 5 ea. protective screen covers for the TS00-0043-0000 and TS00-0043-E000
0830-0753-0000	2511-5070	Package of 5 ea. protective screen covers for the TS00-0070-0000
0830-0754-0000	2511-5100	Package of 3 ea. protective screen covers for the TS00-0100-0000

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Chapter 1 – Introduction

Welcome

Welcome to the Maple Systems' Silver Series Operator Interface Terminals (OITs) from Watlow. Using graphic HMIs has never been easier. This powerful family of graphic OITs connects to programmable logic controllers (PLCs) to provide the human-machine interface in industrial applications. The Silver Series has several features not found in other graphic HMIs. This manual explains the programming and operation of the Silver Series HMIs and how to implement the many available features using the EZware-5000 Configuration Software.

EZware-5000 Support

HMI Models Supported

For the latest list of Silver Series models supported by Watlow, please visit our website at www.watlow.com.

PLCs Supported

For the latest list of PLCs and controllers supported by the Silver Series touchscreens, please visit www.maplesystems.com.

About Your Documentation

Watlow and Maple Systems provide many resources to allow you to get the most out of your Silver Series touchscreen.

- This EZware5000 Series Programming Manual describes the general operation and features of the Silver Series OITs using EZware-5000 configuration software.
- *Watlow Silver Series Operator Interface Terminal Manual Addendum* contains specific instructions and examples on communicating with and creating interfaces for Watlow controllers.
- *Watlow Silver Series Installation Guide* provides information on installing, powering, and connecting the Silver Series to a PLC/Controller.
- Controller Information Sheets provide important information specific to each supported protocol (available on Maple Systems' website).
- EZware-5000 Online Help covers the operation of EZware-5000. Help is always available by clicking HelpTopics from the Help menu in EasyBuilder, or press F1 from any dialog.

For more information, please visit the Support Center section on our website at <http://www.maplesystems.com/support.htm>. The Support Center provides links to manuals, FAQs, technical notes, training videos, sample projects, controller information sheets, and controller cables.

Conventions

When using EZware-5000, there are usually several ways to perform a task. For example, if you want to copy a graphics object, you can:

- Click the Copy command on the Edit menu.
- Click the Copy button on the Standard toolbar.
- Press the CTRL + C keys on your computer.

In most cases, we will describe each method when the task is first discussed. The menu method is then used whenever the task is used in later procedures. Other conventions used in this manual are listed in the following table.

Convention	Meaning
Bold	Characters that you must type exactly as they appear. For example, if you are directed to type a:\setup, you should type all the bold characters exactly as they are printed.
<i>Italic</i>	Placeholders for information you must provide. For example, if you are directed to type filename, you should type the actual name for a file instead of the word shown in italic type. Italics are also used to indicate a glossary term.
ALL CAPITALS	Directory names, file names, key names, and acronyms
KEY1+KEY2	A plus sign (+) between key names means to press and hold down the first key while you press the second key.
Click	Refers to clicking the primary mouse button (usually the left mouse button) once.
Double-click	Refers to quickly clicking the primary mouse button (usually the left mouse button) twice.
Right-click	Refers to clicking the secondary mouse button (usually the right mouse button) once. Right-clicking usually opens shortcut menus.

The following table identifies symbols and margin icons.

Icon	Meaning
	Identifies a procedure.
	Indicates a reference to additional information.
	Indicates an important note.

What You Need

The following items are needed to configure and operate your HMI.

Configuration Software	EZware-5000
Configuration Cable ¹	7431-0104 (Ethernet Crossover cable for Ethernet-equipped models) 7431-0115 (USB download cable for USB Client-equipped models)
Personal Computer ²	User Provided
Power Cable	6030-0009 2-conductor 18 AWG, shielded, no connectors
24VDC Power Supply	User Provided (or available from Maple Systems)
PLC	User Provided
Controller Information Sheet	Maple Systems provides Controller Information Sheets which contain important information specific to each PLC. Please locate the sheet that corresponds to your PLC on our website.
Communication Cable	Refer to our web site (www.maplesystems.com) for a list of available cables.

¹Allows you to connect the HMI directly to a PC Ethernet port or to a USB port to download/upload projects into the HMI.

²Computer requirements include a Pentium 1.7 GHz or higher processor, 512 MB RAM, 200 MB available Hard Disk Space, SVGA or higher resolution monitor, Keyboard and Mouse, available Ethernet port, USB 2.0 port for downloading project (depending on model), at least one RS232 port for online simulation, Windows XP, Vista, or Windows 7 operating system.

OIT/HMI Basics

Operator Interface Terminals (OITs) and Human Machine Interfaces (HMIs) provide much more versatility than traditional mechanical control panels. An OIT allows a plant floor operator to monitor current conditions of a control system and, if necessary, to initiate a change in the operation of the system. OITs connect to programmable logic controllers (PLCs) typically through the PLC's serial communications port. The OIT can be programmed to monitor and change current values stored in the data memory of the PLC.

OITs can have either text-based or graphics-based displays. A text-based OIT can display printable text characters but no graphics. Some text-based OITs can display text characters in various sizes. A graphics-based OIT can display printable text characters of varying fonts and sizes and graphics shapes such as icons, bitmaps, or pictures. Using pictures instead of words or characters often greatly simplifies the operation of the OIT, making the OIT much more intuitive to use.

Some OITs use touchscreen displays while others use a membrane-style keypad. Membrane-style keypads are best used in applications in which the keypad is likely to become dirty. Touchscreen displays are placed over the OIT screen thus providing much more flexibility than typical membrane-style keypads. Because of this, switches can be created on a touchscreen that appear only when needed.

The Maple Systems Silver Series are graphics-based touchscreen OITs. The terms OIT and HMI can be used interchangeably, so we will use HMI in most cases. Now let's define some terms that are used throughout the EasyBuilder-5000 Help files.

Projects

The HMI has two basic segments of internal memory. The *code memory* contains the information required by the HMI that controls how it operates such as the features supported and how it communicates to a PLC. The HMI programmer does not have the ability to change code memory. The *project memory* pertains to all the window screens created and any other features that the HMI programmer can create using the EZware-5000 configuration software. Therefore, the term *project* is used to designate the file that is sent to the HMI from the EZware-5000 software.

Backing Up Projects

We recommend that you frequently back up your projects to another folder or an external or network drive. In addition, when you have completed a project, archive it by running the compression utility (Tools > Compress/Uncompress), which bundles the project with the libraries that are associated with the project. This allows the project to be opened on another computer and retain all the shapes and pictures that are linked to the project. Refer to the Help menu for more information (Help > Help Topics > Contents > How Do I...Backup a Project?).

Objects

An *object* is any 'thing' that performs an action while the HMI is communicating to the PLC. In order to get the HMI to 'do anything', you must program the HMI with objects. Objects perform actions such as display text or graphics, write a value to a PLC register, or display an alarm. Objects most often are graphics shapes that are to be displayed on the HMI screen. For example, a *Text Object* is used to display text on the HMI. But objects are also used to configure the HMI to perform some action. For example, a *PLC Control Object* tells the HMI to continuously monitor a PLC register that is used by the PLC to request a new window. Some objects can display a graphics shape on the HMI screen and perform some action. For example, a *Toggle Switch Object* creates a graphic object on the HMI that, when pressed, activates a bit in the PLC.

Graphics Object

A *Graphics Object* is any text, icon, or picture that can be displayed on the HMI. Graphics objects are further defined by how they are composed or created. A *Text Object* is a graphics object that displays text on the HMI screen. A *Bitmap Object* is a graphics object that displays a bitmap on the HMI screen. Bitmaps are files stored in the HMI to display pictures. A *Shape Object* is a graphics object that displays a shape on the HMI screen. Shapes are also files stored in the HMI to display pictures. Shapes differ from bitmaps in that shapes are stored using a vector-based file format whereas bitmaps use a pixel-based file format. Each format has its advantages and disadvantages. For example, vector-based graphics can be resized without losing resolution, whereas bitmap graphics lose resolution as they are magnified. Finally, a *Group Object* is the most complex type of graphics object. It is a combination of other objects. Briefly, a group object consists of one or more objects that are 'grouped' together and stored as one object. A good example is a keypad, which is really a combination of several keys each designed to perform a specific task. When grouped together, a keypad can be stored as a group object for use in other projects or windows.

Windows

A *window* is a screen that can be displayed on the HMI. Windows can be full-sized to completely cover the HMI display or partially sized. Any partially sized window is usually referred to as a *popup window*. Windows can appear on the HMI display by a request from the PLC or by a press from the touchscreen. Windows can be configured to any size. Once a window is displayed, it can be moved around the HMI display or removed from the display. Windows can even overlap each other. Each window can display graphics objects and there is no limit to the number of graphics objects that can be placed on each window. The Silver Series is capable of storing up to 1999 windows, but the actual limit is determined by the total amount of memory used for the application.

What is an Silver Series OIT?

The Silver Series by Maple Systems are graphics operator interfaces designed to connect to PLCs in an industrial environment. The displays are covered with analog resistive touchscreens designed for harsh industrial environments. The touchscreens use the latest in touchscreen technology enabling the HMI programmer to create switches that are very fine in resolution. Unlike many other touchscreen HMIs on the market, the Silver Series are not limited to a fixed number of cells in which switches can be created. The project can contain as many switches of varying sizes and shapes as desired, limited only by the total amount of memory available for the project.

Three LED indicators are provided on the face of the Silver Series to provide instant feedback to the HMI operator of the current operating condition of the HMI.

LED Indicator	Purpose
PWR LED (yellow)	indicates if power is applied to the OIT
CPU LED (green)	indicates if the OIT is operating correctly
COM LED (red)	indicates communications activity on PLC port

The Silver Series have three serial ports (except the HMI5043N/T and HMI5056N), which provide a connection to a PLC using RS-232 or RS-485 communications, and some models have an Ethernet connection for PLC communication and project upload and download. The serial ports also provide the ability to use the EZware-5000 configuration software in Pass-Through Mode, enabling the HMI programmer to test his project on the PLC through the HMI instead of downloading the project to the HMI.

The Silver Series is powered using +24VDC. A reset switch is provided on the back of the HMI to reinitialize the HMI if an operational failure occurs. The Silver Series is designed for industrial environments and carries a NEMA4/IP65 rating as well as CE compliance for noise immunity and emissions.

List of Features

The next chapter will guide you through the creation of your first project. Before you proceed, you may wish to read this brief list of some of the features offered in the EasyBuilder-5000 programming software.

	Bit Lamp	Creates a graphic object to reflect the current status of a PLC bit.
	Word Lamp	Creates a graphics object to reflect the current state of a multi-state PLC data register.
	Set Bit	Creates a touchscreen graphics object that represents a two-state switch. When pressed it sets/resets a PLC bit.
	Set Word	Creates a touchscreen graphic object that represents a multi-state switch. When pressed it can place a constant value in a PLC register or jog the value.
	Toggle Switch	Creates a touchscreen graphic object that represents a two-state switch changing state (picture) based upon a PLC bit. When pressed, it can control another PLC bit.
	Multi-State Switch	Creates a multi-state touchscreen graphic object that changes state (picture) according to the value in a PLC data register. When pressed, it sends a value(s) to another PLC register.
	Option List	Displays a list of test items with the selected item being determined by the value in a register. Optionally, selecting an item can write the corresponding value to a register.
	Slider Object	Creates a touchscreen graphic object that changes the state according to the position of a slider switch.
	Function Key	Creates a touchscreen graphic object that changes windows, inputs data as part of a keypad, executes a macro, or prints the screen to a USB flash drive or printer.
	Numeric Display	Displays a number stored in a PLC register.
	Numeric Input	Displays a number stored in a PLC register. The number can be changed using a numeric keypad.
	ASCII Display	Displays ASCII characters stored in a PLC register.
	ASCII Input	Displays ASCII characters stored in a PLC register. Characters can be changed using an alphanumeric keypad.
	Indirect Window	Displays any Window based on the value in a PLC word address.
	Direct Window	Displays a specified Window based on a bit in a PLC register.
	Moving Shape	Creates a multi-state graphic object, which changes state (picture) and position on the screen according to a value in a PLC register.
	Animation	Creates a multi-state graphic object, which changes state (picture) on the screen according to a value in a PLC register. The positions on the screen are predefined.
	Media Player	Displays a video file from a connected USB flash drive or SD card (X-models only).

	Video In	Input and play video on the HMI from an external source (X-models only).
	Bar Graph	Creates a bar graph with alarm monitoring.
	Meter Display	Creates a scale meter.
	Trend Display	Creates a trend graph. Samples data in single or multiple 16-bit PLC registers and plots the data on a time graph.
	History Data Display	Displays historical data in a tabular format.
	Data Block Display	Displays the data stored in a series of registers as a line graph.
	XY Plot	Creates an XY Plot of data stored in a series of registers.
	Alarm Bar	Displays alarms detected by the Alarm (Event) Log Object on a single horizontal scrolling line.
	Alarm Display	Display alarms detected by the Alarm (Event) Log Object in a table format.
	Event Display	Displays messages detected in the Alarm (Event) Log and can acknowledge the message(s).
	Alarm (Event) Log	Contains the data for detecting alarm conditions.
	Data Transfer (Trigger-based)	Transfers data to the specified PLC registers based on a touch or PLC bit status.
	Backup	Copies recipe, event, or historical data to one of the USB flash drives or to a PC connected via Ethernet.
	Timer	Controls an internal bit or PLC bit based on a timer; supports five different configurations.
	PLC Control	Configures the HMI to monitor PLC data registers to display full window screens, execute a data transfer, control the backlight, play a sound, execute a macro, or print a screen.
	Data Transfer (Time-based)	Transfers data to the specified PLC registers on a timed basis.
	Data Sampling	Stores data for trending and archiving.
	System Message	Customizes the content of system-generated messages.
	Scheduler	Performs an action based upon a time schedule.
	Drawing Tools	Includes Line, Arbitrary Line, Link Line, Arc, Ellipse/Circle, Pie, Rectangle, Polygon, Scale, Text, Picture, Shape.

Chapter 2 – HMI Local Setup

Factory Configuration

Each HMI arrives from the factory with a demo project file that illustrates some of the most popular features of the HMI. For a first time user, it is worthwhile to navigate through the screens in the demo project and become familiar with the features and capabilities of the HMI and EZware-5000. Refer to the EasyBuilder-5000 Help file for more information about the features and operation of the HMI and EasyBuilder-5000.

The HMI also has a black reset push button and a four position DIP switch located through an access hole on the back of the enclosure. The reset switch can be used to reinitialize the HMI if the HMI malfunctions. DIP switch 1 puts the HMI into Touch Calibration mode. For normal operation, all of the DIP switches should be set to the OFF position.

This chapter describes how to use the Silver Series' local setup options. The local setup allows touchscreen calibration, transferring projects to and from the HMI, configuring the HMI's IP settings, passwords, time and date, screen contrast, as well as managing the storage of recipe and history files. Additionally, memory and other system information can be viewed.

Calibrating the Touchscreen

The touchscreen of the HMI is fully calibrated before it leaves the factory so there is no need to adjust it. However, over time the touchscreen may need to be recalibrated.

► To calibrate the touchscreen:

1. Turn DIP switch 1 ON.
 2. Cycle power to the HMI (or press the reset button next to the DIP switches).
 3. After the HMI displays a crosshair cursor, you are prompted to touch the cursor for:

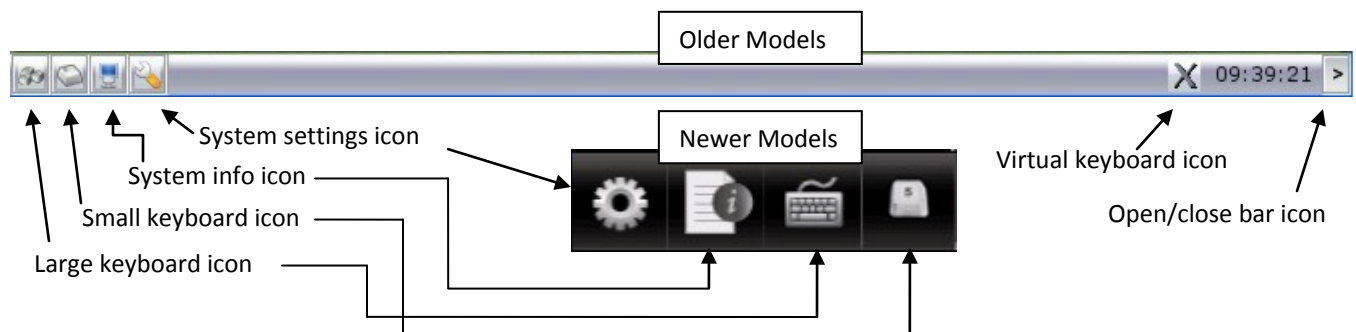
Top left position
Center position
Top right position

Bottom left position
Bottom right position
 4. You have the option to restore the system settings password to the default setting (111111). *If you choose **Yes**, a dialog box will inform you that the project will be erased in the HMI. You must type **Yes** to complete the operation.* After performing this operation, you must reset the Upload, Download, and Upload (History) Passwords in the System Settings Security tab. When you next download a project, check the Firmware and Font files checkboxes in the Download dialog.
- If you choose **No** or allow the option to timeout, the HMI will resume initializing and run the project.*

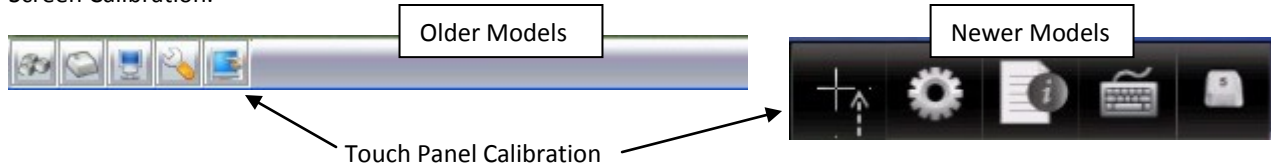
 Screen calibration is accessed through the System Setup Toolbar on the HMI5104XH, HMI5121X, and HMI5150X (see below).

Getting into Local Setup

Accessing the local setup menus requires a USB-mouse connected to the HMI (except the HMI5043N/T and HMI5056N). Using the mouse, point to the lower right-hand corner of the HMI. The open bar icon will appear. Click on the icon to call up the System Setup Toolbar (note this toolbar is on the HMI screen):



The X-models (HMI5104XH, HMI5121X, and HMI5150X) have an additional icon in the System Setup Toolbar for Screen Calibration.



Changing the System Settings

► To change the system settings on the HMI:

1. Open the System Setup Toolbar as described above, and click the System Settings icon.
2. A dialog will be displayed requesting the Local password. The default password is 111111.



You may have to move windows around a bit to gain access to the virtual keyboard.
You may also have to click inside the password field again.

3. Once the correct password has been entered, the System Settings dialog is displayed. For all tabs, the **Cancel**, **Apply**, and **OK** buttons are available.

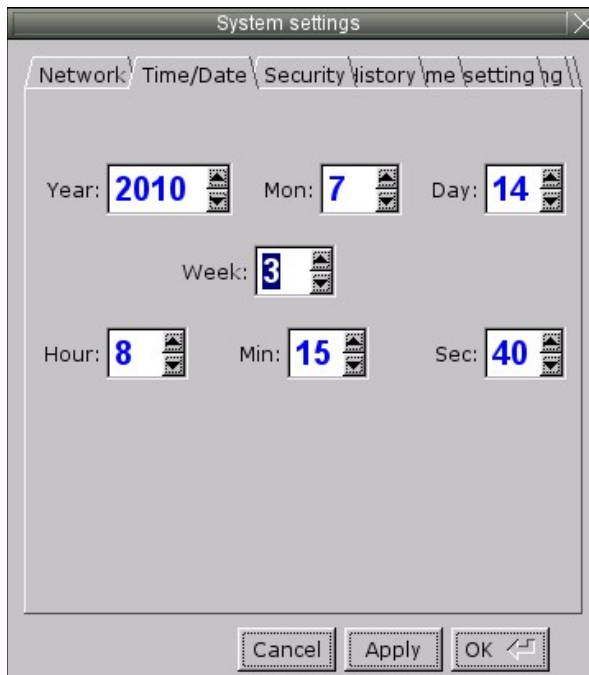
Cancel	Close the System Settings dialog without saving any changes.
Apply	Save the current settings without closing the System Settings
OK	Save the current settings and close the System Settings dialog.

4. Click on the **Network** tab to configure network settings. The Network dialog is displayed.



5. The Network tab allows configuration of the IP settings. The default setting is **Obtain an IP Address Automatically**. Use this setting if the HMI will obtain an IP address from a DHCP server. If connected to a DHCP server, this dialog will display the IP settings obtained by the HMI. The IP fields are disabled and are not editable.

6. If using a static IP address, use the **IP Address get from below** option. The IP fields are enabled. Enter the appropriate settings for your network.
7. Click the **Time/Date** tab to configure time/date settings. The time/date dialog is displayed.



8. Configure appropriate time and date settings.
9. Click on the **Security** tab to display the security settings dialog. Here, you can select your system passwords.



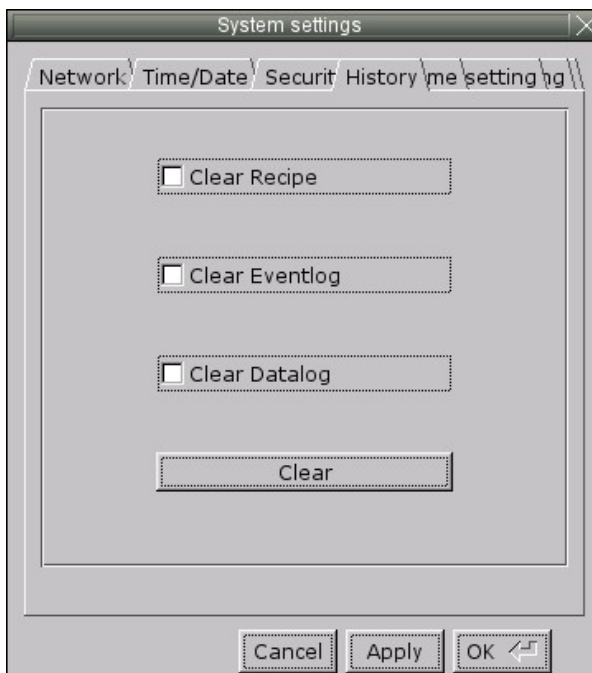
10. Configure your password settings.

Local Password	The password required to enter local setup.
Upload Password	The password required to upload data from the HMI to a PC or memory module.
Download	The password required to download data to the HMI from a PC or memory module.
Upload (History) Password	The password required to upload history files from the HMI to a PC or memory module.

11. The new password must be entered, and then entered again to confirm. As the password is entered into the confirm field, an indicator will show if the two passwords match.



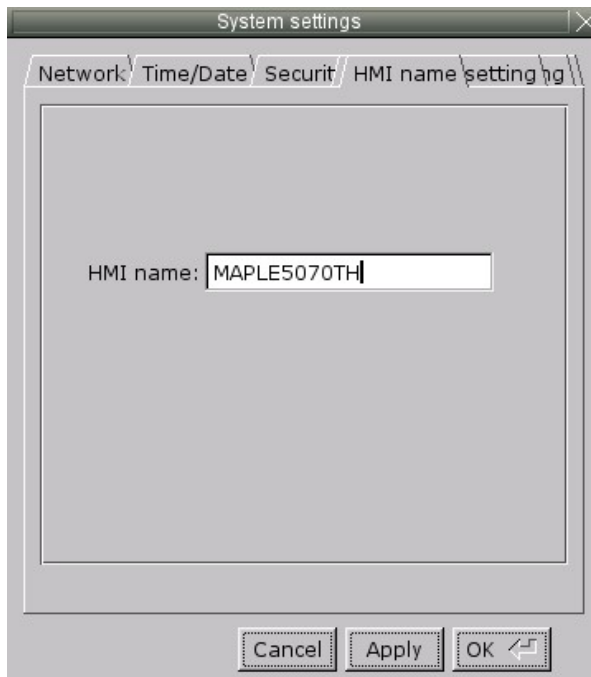
12. Click on the **History** tab to display the History dialog. This is where data stored in the HMI can be cleared.



 This will not clear data stored on an SD card or USB flash drive.

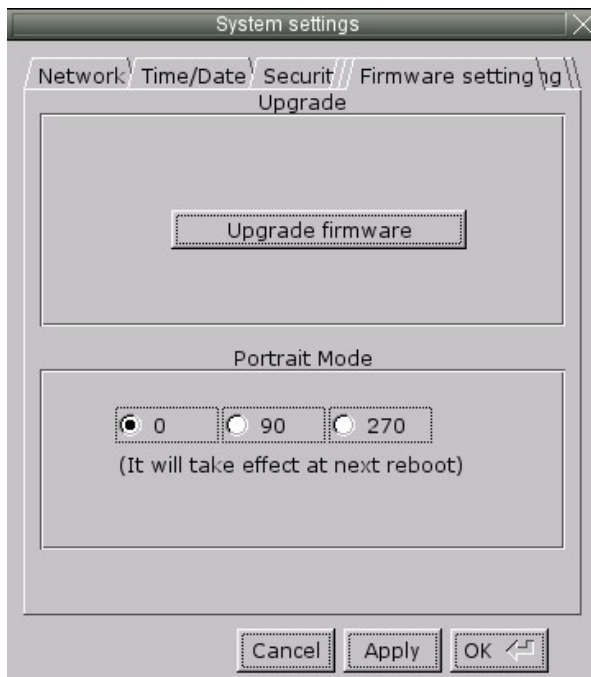
Clear Recipe	The HMI's stored recipe data will be cleared when the Clear button is clicked.
Clear Eventlog	The HMI's stored event log data will be cleared when the Clear button is clicked.
Clear Datalog	The HMI's stored data log data will be cleared when the Clear button is clicked.

13. Click on the **HMI name** tab to give the HMI a unique name. This name can be used to address the HMI for downloading over Ethernet.



Downloading by name is supported only on the HMI5070TH and HMI5100TH, with Firmware version 20091002 or later.

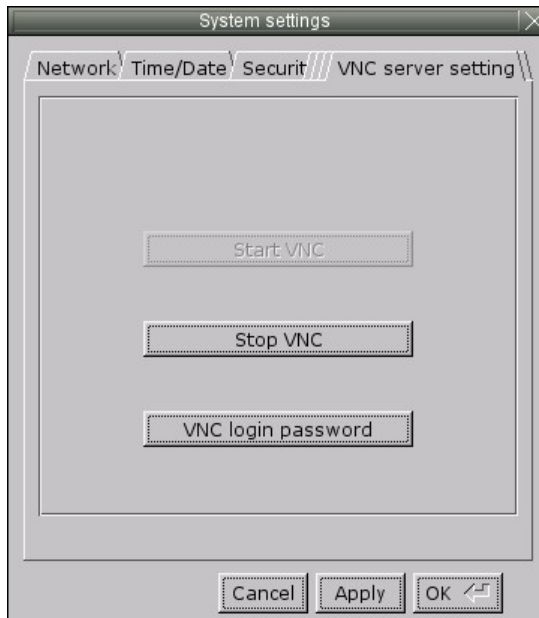
14. Click the **Firmware setting** tab to access the **Upgrade firmware** option and the **Portrait Mode** settings (for models with the Portrait feature).



Upgrade Firmware: Click this button to upgrade the firmware in the HMI from a USB flash drive or SD card.

Portrait Mode: Select the orientation of the display on the HMI when a project is configured for Portrait Mode (selected when a new project is created).

15. Click the **VNC server setting** tab to enable remote access using VNC (Virtual Network Computing).



Click **Start VNC** to enable the VNC server.

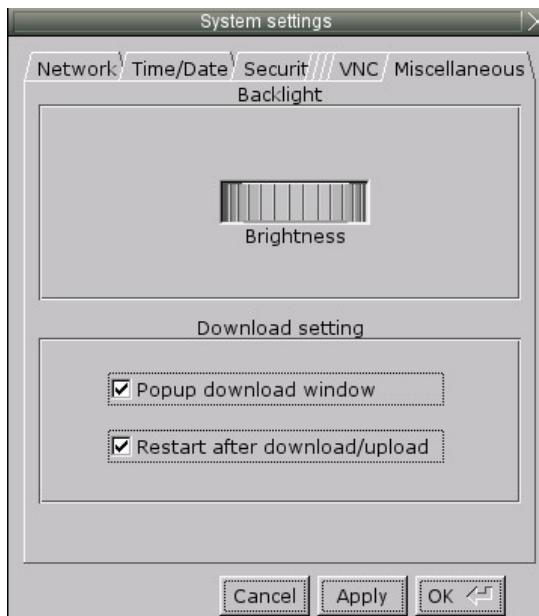
Click the **VNC login password** to enter the password used to login to the HMI with a remote VNC viewer. The default password is 111111.

Click **Apply** and then click **OK** to save the settings and exit the System Settings window.

 The VNC option is only available on Ethernet-equipped models.

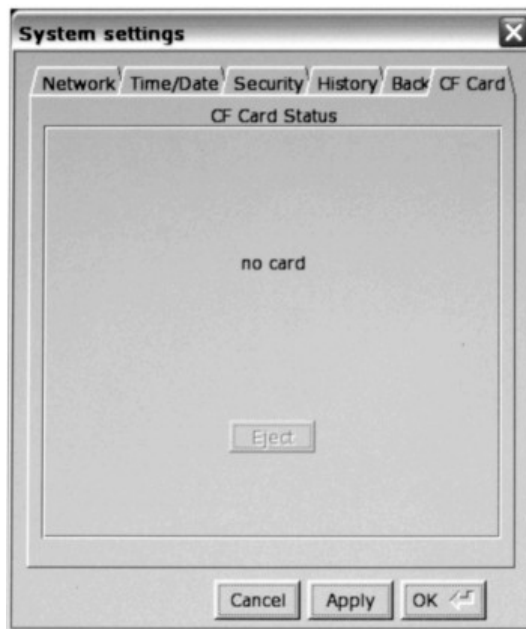
16. Click on the **Miscellaneous** tab to display the Backlight dialog. The **Brightness** control adjusts the brightness of the HMI's backlight. Use the mouse or touchscreen to roll the wheel. Rolling to the left decreases the brightness, rolling to the right increases the brightness.

 System tags "Backlight Up (LB9040)," "Backlight Down (LB9041)," and "Backlight Index (LW9040)" can be used to adjust the brightness at runtime.



The **Popup download window** option allows you to turn on or off whether the Download dialog window appears on the screen when a USB flash drive is connected to the USB port on the HMI. The **Restart after download/upload** option causes the HMI to reboot after a download or upload from a USB flash drive or SD card, when selected.

17. Click on the **CF Card** tab to display the CF card dialog (only CF Card equipped models). The CF Card tab displays information about the Compact Flash module. If no CF card is present, the dialog will show **no card**. Otherwise, volume data about the CF card is displayed.

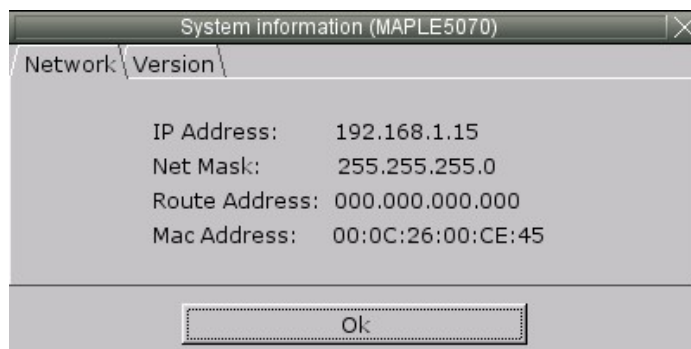


The **Eject** button will cause the HMI to ignore the CF device. It will not actually eject the card from the HMI. If the Eject button is pressed, the CF card must be removed and re-inserted before the HMI will recognize it again. Note that USB devices are not displayed on this tab.

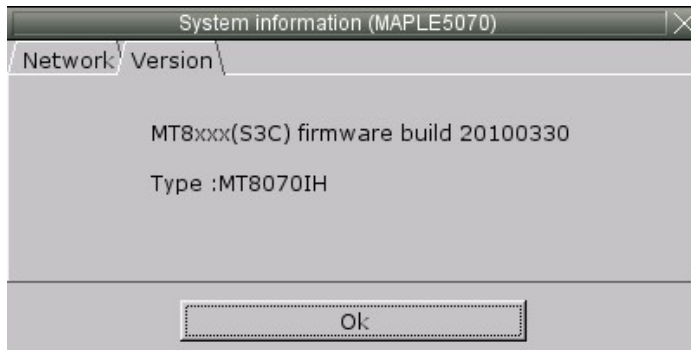
Viewing System Information

► To view system information:

1. Open the System Setup Toolbar as described above, and click the System Information icon. A dialog will be displayed with two tabs.
2. Click on the **Network** tab to display the current IP settings.



- Click on the **Version** tab to display the current firmware information.

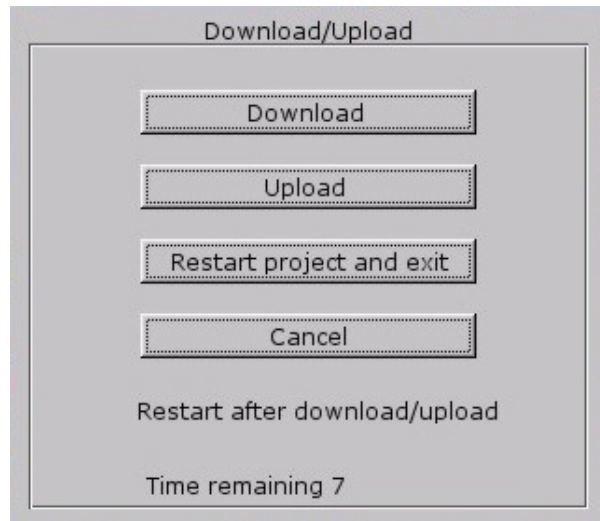


Transferring Projects and Data from USB/CompactFlash

When a USB or Compact Flash device is inserted into the Silver Series, a dialog is displayed. The same dialog is displayed for transferring projects or data.



Data is placed on the USB or CF device by EasyBuilder or Project Manager.



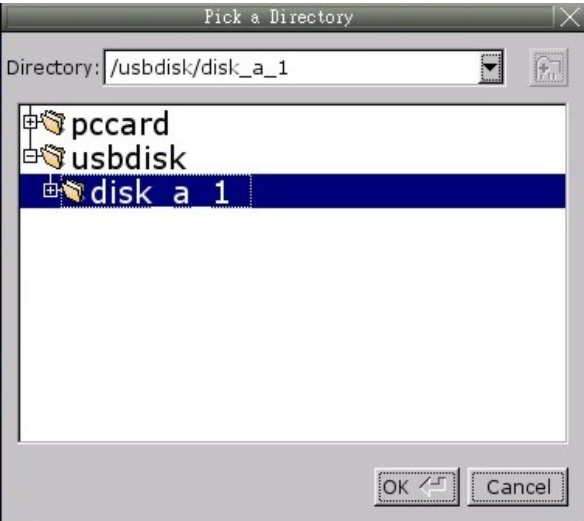
Download	Transfer data from the USB/CF to the HMI
Upload	Transfer data from the HMI to the USB/CF
Restart Project and exit	Close the dialog and restart the HMI
Cancel	Close the dialog without transferring
Time Remaining	The dialog will automatically close after 10 seconds if no selection is made; shows the time remaining

When **Download** is selected, a dialog will appear requesting the Download password and what data to download.



Password	Enter the Download password.
Download project files	When checked, the HMI will check the specified folder for project data, and transfer it if it exists.
Download history files	When checked, the HMI will check the specified folder for history data, and transfer it if it exists (includes data log files, event log files, and recipe files).
Clear history files	When checked, clears all history files in the HMI (includes data log files, event log files, and recipe files).

If a USB flash drive is being used to upload or download a project, select the folder under the **usbdisk** folder (if the project was saved on the root of the USB drive) and then click **OK**. If the project is in a folder on the USB drive, select the folder just above the MT8000 folder.



Chapter 3 – Connect the HMI to the PLC or Controller

The Silver Series family of HMIs can connect to one, two, or more PLC/controllers. This is accomplished via two 9-pin D-sub serial communications connectors (Port A and Port B) and one Ethernet port. Each PLC/Controller has its own wiring requirements. Maple Systems offers HMI-to-PLC/Controller communication cables for most PLC/Controllers that are built to any length and tested for high reliability. The Silver Series family has three software controlled communications ports (COM1, COM2, and COM3) located on two physical connectors, designated as Port A and Port B (see Figures 1 and 2, below).



Figure 1: COM Ports – Rear View

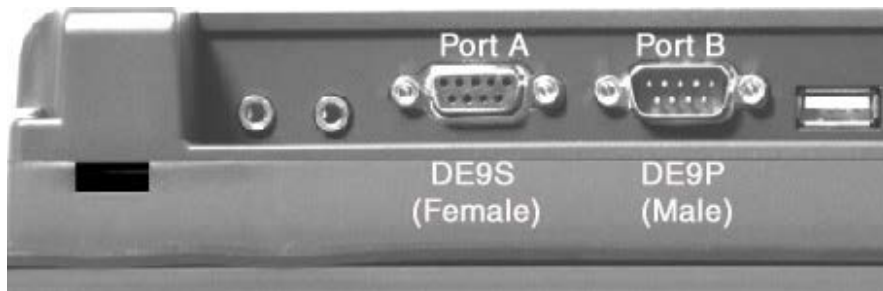


Figure 2: COM Ports – Bottom View

The three software controlled ports are COM1, COM2, and COM3. Each software controlled communications port can only be selected for one communication type. Once a communication type is selected for one of these software controlled ports, that port cannot be used for another communication type. Each of these communication ports has between one and three communication types. COM1 can be RS232, RS485 4-Wire, or RS485 2-Wire. COM2 is strictly RS232. COM3 is either RS232 or RS485 2-Wire. COM1 cables are readily available for purchase from Maple Systems. COM2 and COM3 cables are custom-made according to wiring diagrams that can be found on Maple Systems' web site. Connecting multiple PLCs and controllers may require a splitter.

 The HMI5043N/T only has one serial port (DE9P Male) with only COM1 and COM3 available. The HMI5056N has two serial ports but only COM1 available.

Figure 3: COM Ports for the HMI5070NH/TH, HMI5100N/T, HMI5104TH/HMI5104XH/HMI5121X/HMI5150X

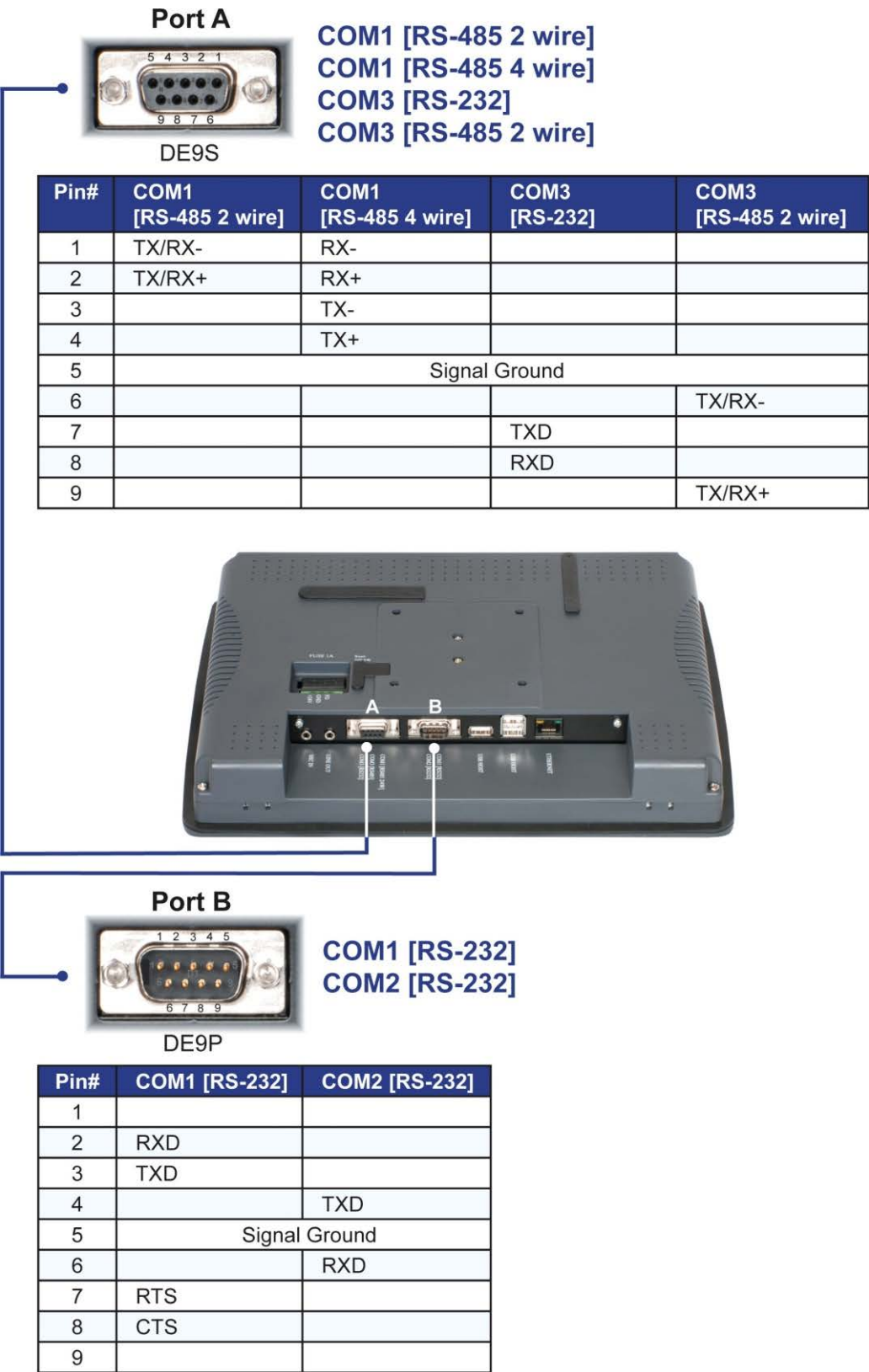


Figure 4: COM Ports for the HMI5056N

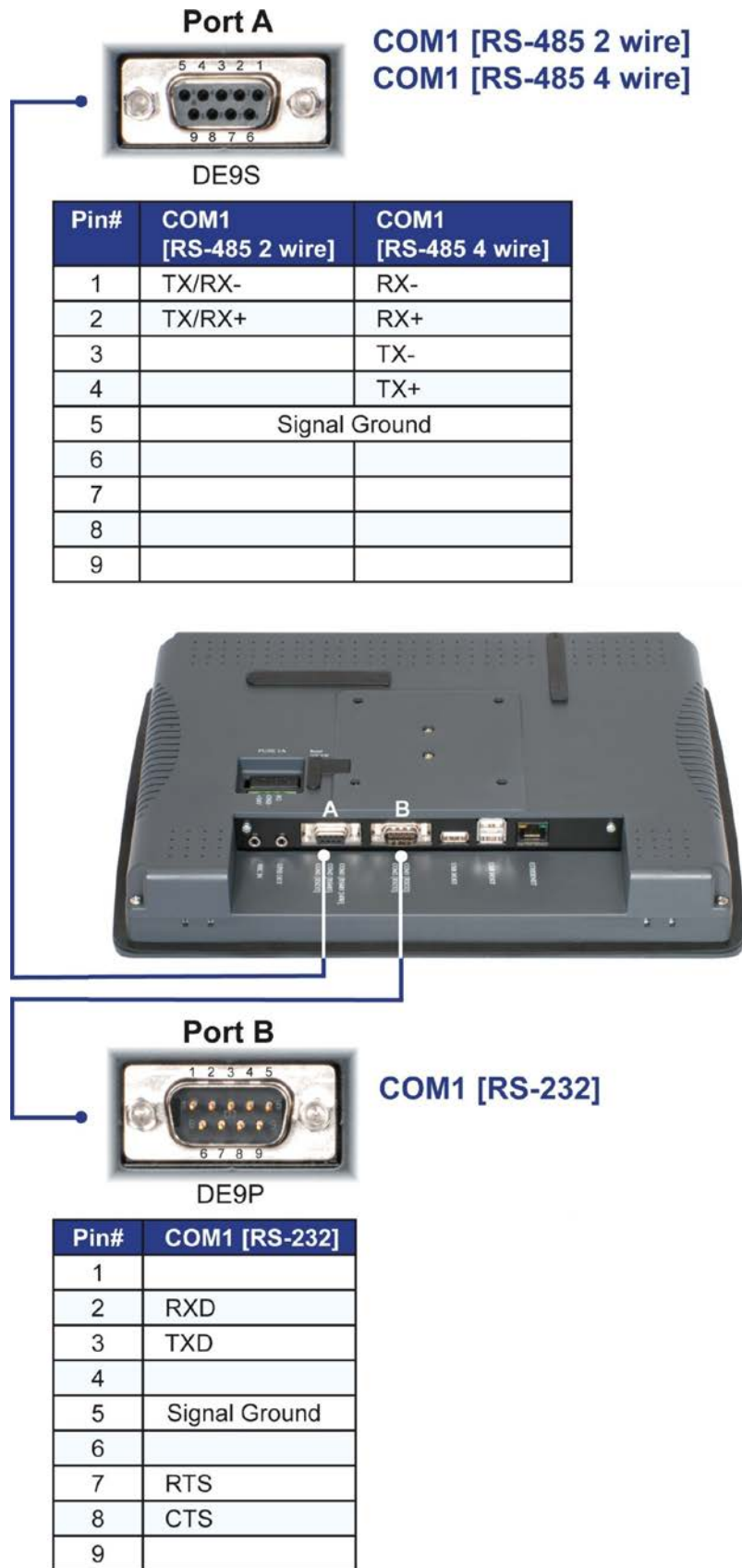


Figure 5: COM Port for the HMI5043N/T



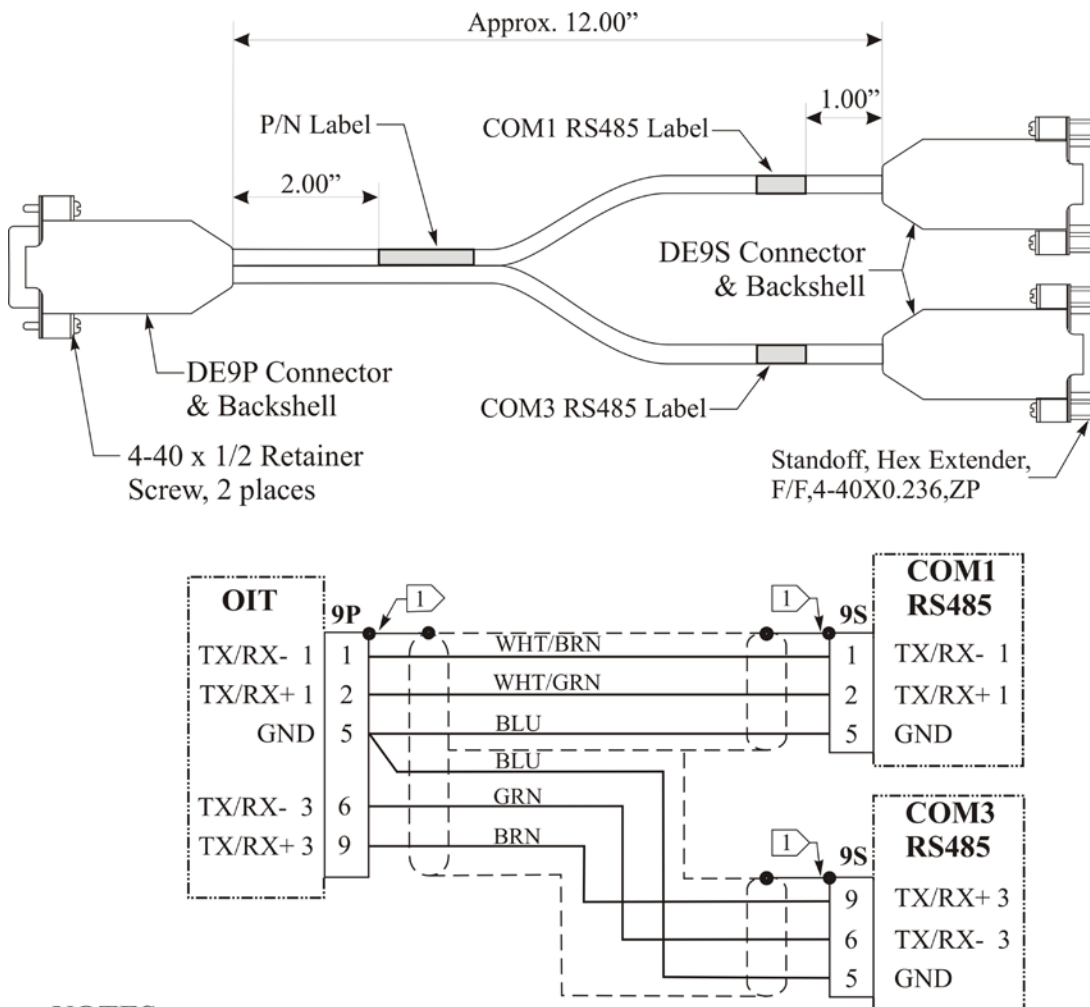
COM1 [RS-232]
COM1 [RS-485 2 wire]
COM1 [RS-485 4 wire]
COM3 [RS-485 2 wire]

Pin#	COM1 [RS-232]	COM1 [RS-485 2W]	COM1 [RS-485 4W]	COM3 [RS-485 2W]
1		TX/RX-	RX-	
2		TX/RX+	RX+	
3			TX-	
4			TX+	
5	Signal Ground			
6	TXD			
7				TX/RX-
8				TX/RX+
9	RXD			

Connecting to COM1 and COM3 on Port A

Maple Systems Silver Series family of HMIs is capable of connecting to multiple PLC/controllers. If you choose to take advantage of this feature, and one of your PLC/controllers uses either RS485-4 Wire or RS485-2 Wire communication, one of four splitters will be needed.

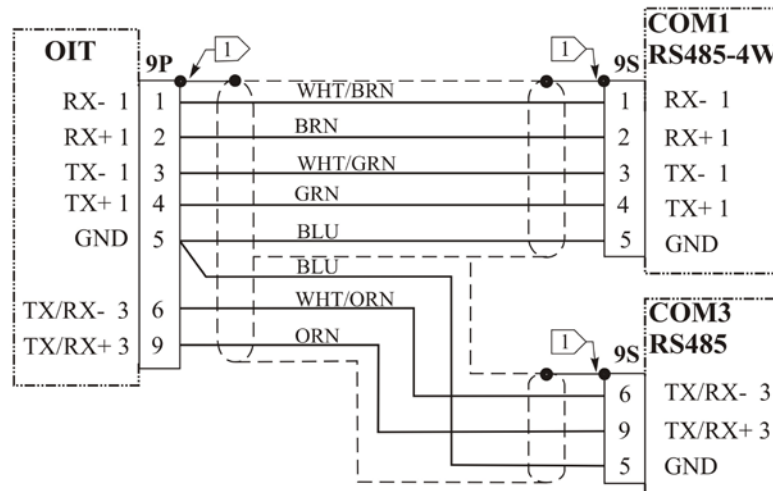
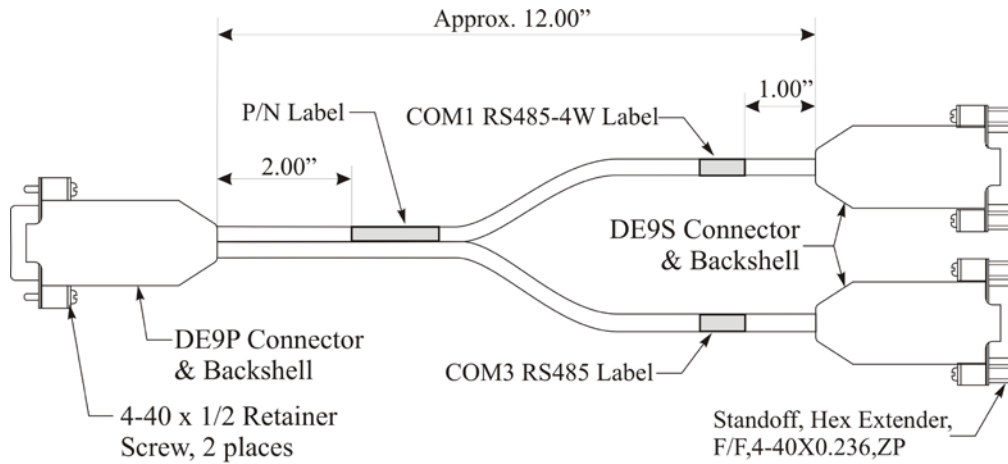
Scenario 1 – Two RS485 2 Wire PLC/Controllers, with COM1 configured for RS485-2 Wire and COM3 configured for RS485-2 Wire.



NOTES:

- ① Shield wire must be terminated to connector metal shell.

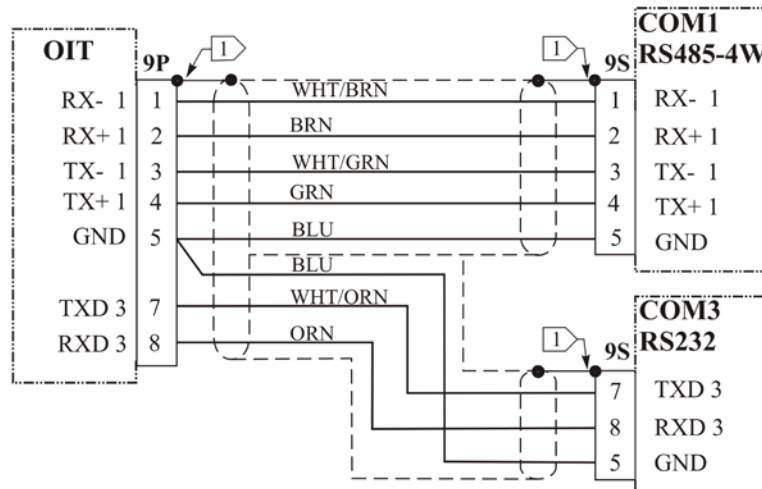
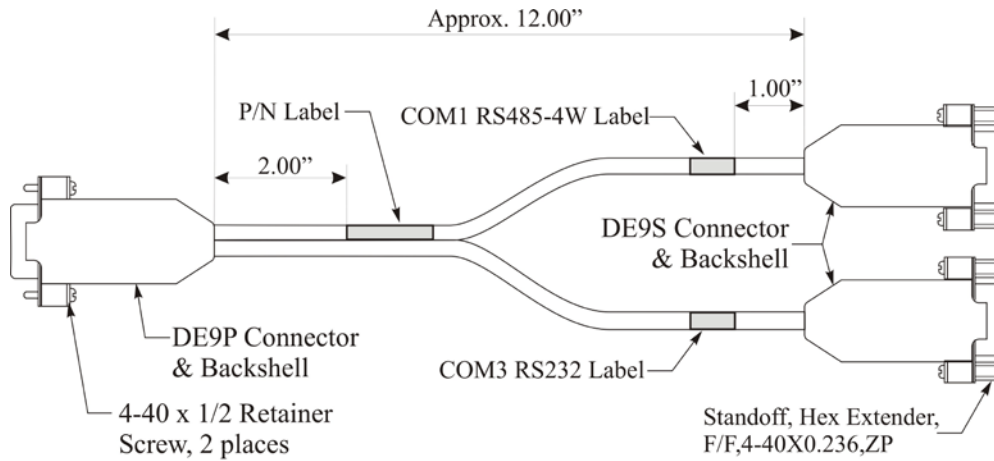
Scenario 2 – One RS485 2 Wire PLC/Controller with COM3 configured for RS485-2 Wire and one RS485 4 Wire PLC/Controller with COM1 configured for RS485-4 Wire.



NOTES:

- 1 Shield wire must be terminated to connector metal shell.

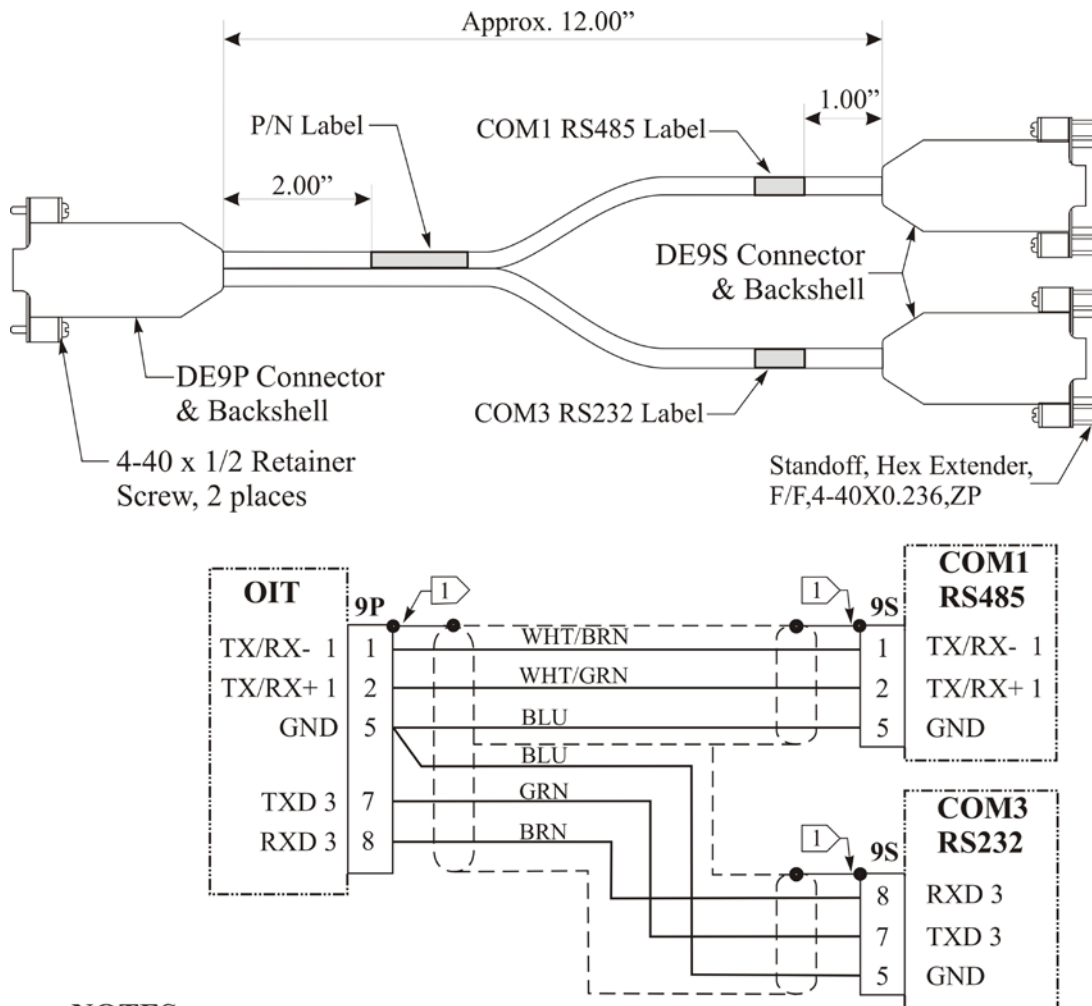
Scenario 3 – One RS485 4 Wire PLC/Controller with COM1 configured for RS485-4 Wire and one RS232 PLC/Controller with COM3 configured for RS232.



NOTES:

- 1 Shield wire must be terminated to connector metal shell.

Scenario 4 – One RS485 2 Wire PLC/Controller with COM1 configured for RS485-2 Wire and one RS232 PLC/Controller with COM3 configured for RS232.

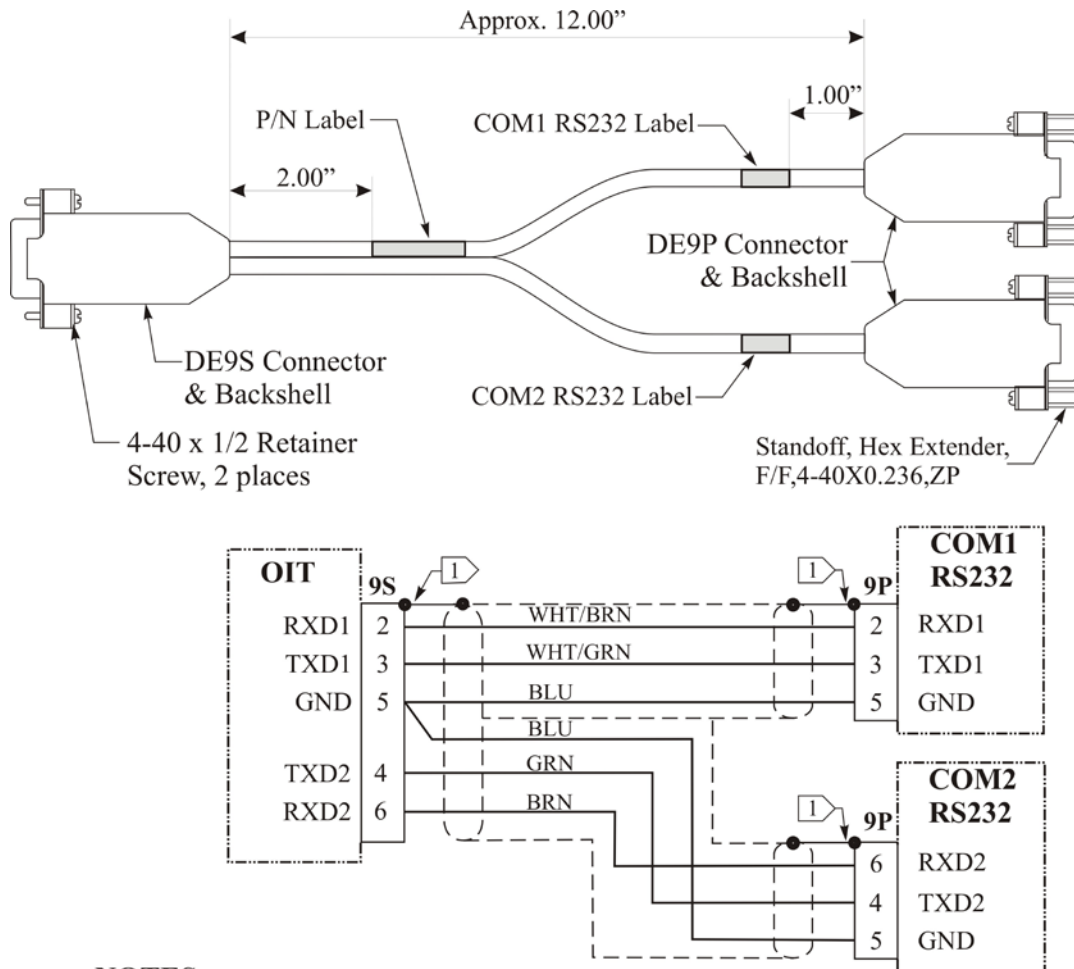


NOTES:

- ① Shield wire must be terminated to connector metal shell.

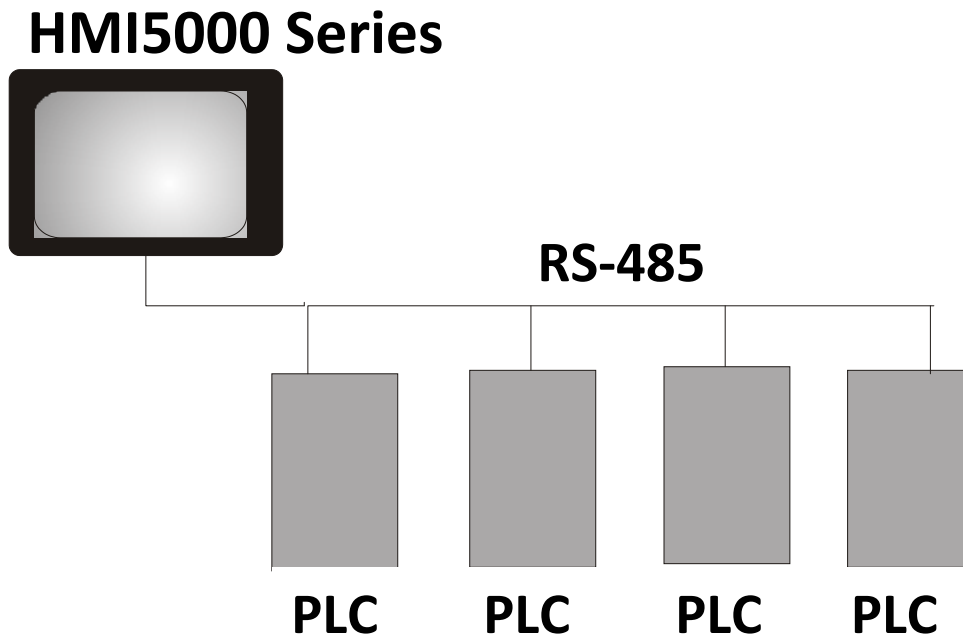
Connecting to COM1 and COM2 on Port B

Two RS232 PLC/Controllers, with COM1 and COM2 configured for RS232.



Connecting multiple PLC/controllers serially using daisy chaining

The RS485 4-wire and RS485 2-wire communications ports of the Silver Series family support multi-drop connections. A daisy-chain connection is made from the HMI to the first PLC/controller, and then from the first PLC/controller to the second and so on (see below). The network may need biasing resistors – refer to the PLC/controller documentation for more information.



Connecting one or more PLC/controllers via Ethernet

The Silver Series (Ethernet-equipped models) have a single RJ45 Ethernet connector configured for 10BaseT and 100BaseT operation. This port is for both communicating with a PC for configuration purposes, as well as for communicating with supported Ethernet PLCs and protocols.

The connector is wired just like the RJ45 Ethernet connector on a PC. The Ethernet connection to a PLC/controller will vary with each PLC/controller. Some will require a straight-through connection, while others require a crossover connection. See Maple Systems' website for cable drawings of Ethernet cables.

► To connect a single PLC/controller to an HMI:

1. Attach one end of the Ethernet cable to the RJ45 connector on the HMI.
2. Attach the other end to the RJ45 connector on the PLC/controller.

A router or switch is required to connect multiple PLCs/controllers to a single HMI. In general, standard straight-through type cables can be used when connecting to a PLC/controller through a router or switch. Some routers and switches may be auto-sensing. In this case, either type of cable may be used.

Troubleshooting

The HMI must be connected to a PLC/controller in order for the project to run correctly in the HMI. If there is a problem with communications between the HMI and PLC/controller, the “PLC no response” message (window 5) will appear on the screen and objects addressing PLC registers will *not* appear on the screen. Here are some things to check if this occurs:

1. Make sure you have selected the correct communication protocol (driver) for the PLC you are using in the System Parameters (Edit > System Parameters > Device Properties).

 The demo version of EasyBuilder-5000 will not download the driver to the HMI and will automatically generate a “PLC no response” error message.

2. Make sure the communication settings in the HMI (Edit > System Parameters > Device Properties) match the communication settings in the PLC.
3. Make sure the communication cable is wired correctly for your application. Refer to the Controller Cable Assembly drawings on our website for specific cabling information for your PLC/controller.
(<http://www.maplesystems.com/cables1023.htm>).
4. Check the address formatting for objects that are reading from or writing to registers in the PLC. If the objects cannot access specific registers in the PLC, they will not appear on the screen. Refer to the Controller Information Sheet for your particular PLC/controller for specific information about accessible registers in the PLC memory and the correct addressing format for the various registers.
(<http://www.maplesystems.com/products/prodbycon-bot.htm>)

Chapter 4 – Creating a Sample Project

Often the best way to learn about new software is to jump right in and begin using it. This chapter will step you through the process of creating a sample project that can be downloaded to your HMI. In this sample project, we will create a bargraph with a tank shape that will represent the level of the fluid in the tank, and create a pump with a pipeline connected to the tank to indicate when the pump is operating to increase or decrease the level in the tank.

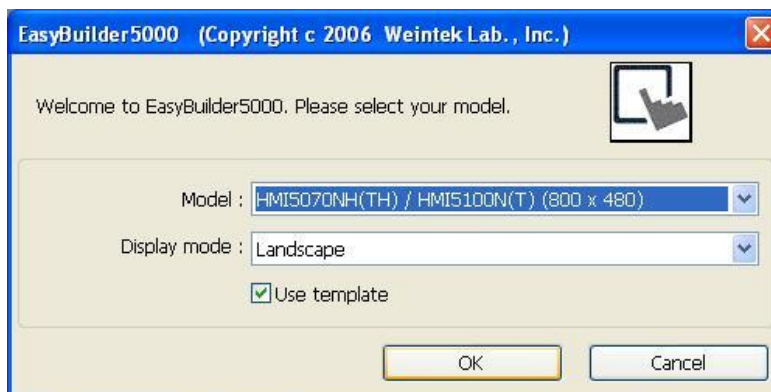
Starting EasyBuilder-5000

Before you can create a sample project, you must start the configuration software. The EZware-5000 software has two main applications:

- **EasyBuilder** – used to create the project downloaded to the HMI.
- **Project Manager** – used to place the HMI into different operating modes.

► To start Project Manager and EasyBuilder-5000:

1. From the Windows Task Bar, click the **Start** button, select **All Programs > Maple Systems > EZware-5000 > Project Manager**.
2. On the **Project Manager** dialog box, click **EasyBuilder5000**.
3. The **Welcome to EasyBuilder5000** dialog box appears (if you have previously opened EasyBuilder-5000, click **File** in the top menu bar and select **New**).
4. Select the HMI model that you intend to use with your project and whether you want to use the HMI in Landscape or Portrait mode (if available for your model). Select the **Use template** checkbox to open the project with the default template for your selected model.



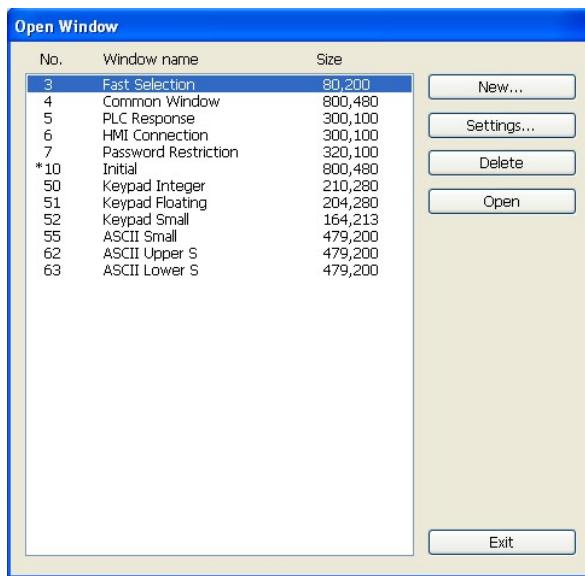
5. Click **OK**. The System Parameter Settings window opens next. Refer to the Help menu “How Do I... Set Up a PLC or Controller in EasyBuilder?” to configure the devices in the Device List. You may also jump ahead to “Chapter 6 – Using EZware-5000” (*System Parameter Settings* on page 82). For now, we will not add any more devices to the Device List and we will use the default settings in the System Parameters. Click **OK** to accept the settings.

Creating a Bargraph

Window 10 is the default initial screen that EasyBuilder 5000 uses when a project is opened. Let's create Window 11 to place the bargraph, and use a Function Key to change windows from window 10 to window 11.

► To create Window 11:

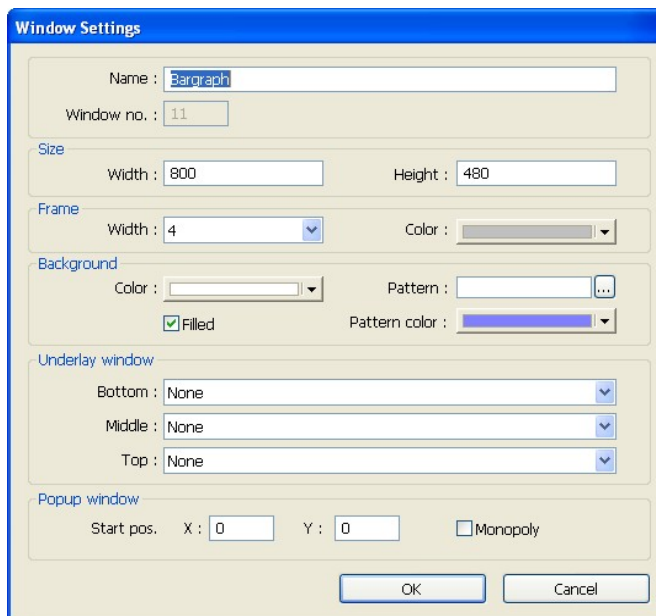
1. From the Window menu, click **Open Window**. The Open Window dialog box appears.



- Click **New...** The Select Window Style dialog box appears.



- Click **Base Window**. The Window Settings dialog box appears.



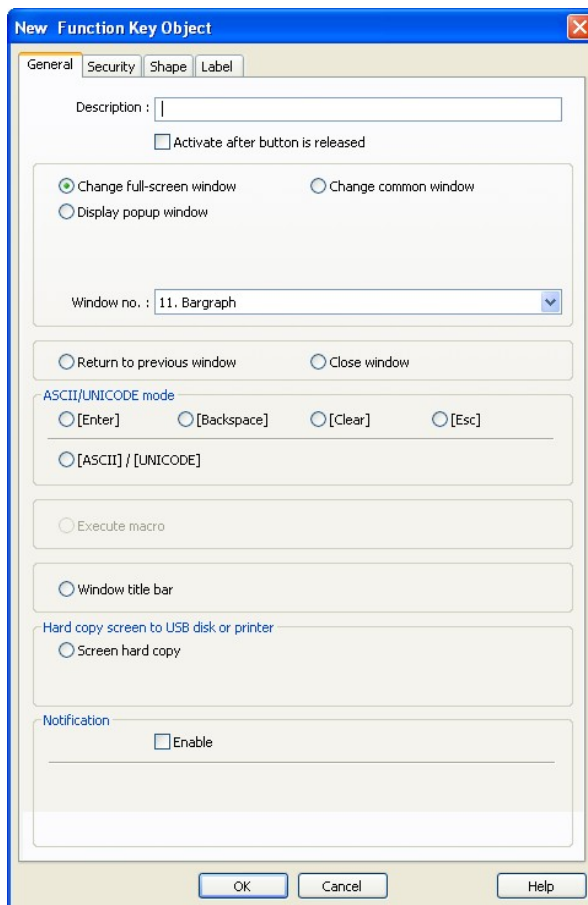
- Type "Bargraph" in the Name field. The number 11 should already be in the Window No. field.

5. Click the box for the Background color. The color palette box opens. Click on the white color box in the lower-right corner. The color box will reflect the color that you have selected.
6. Click **OK**. Highlight **Window 11: Bargraph** in the Open Window list, then click the **Open** button. Window 11 now appears on your work area.

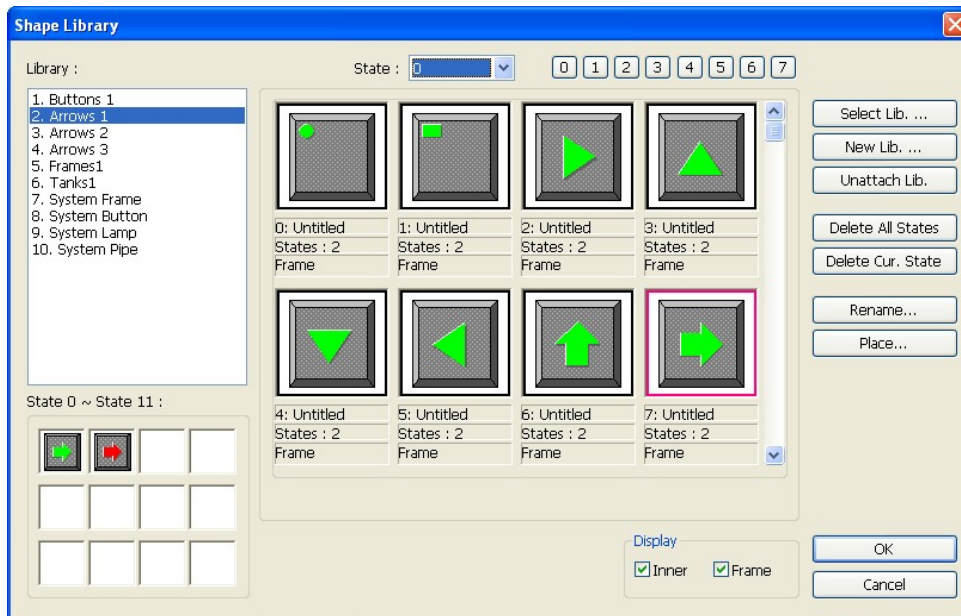
Now let's create a function key to open Window 11 from the initial screen, Window 10.

► To create a Function Key:

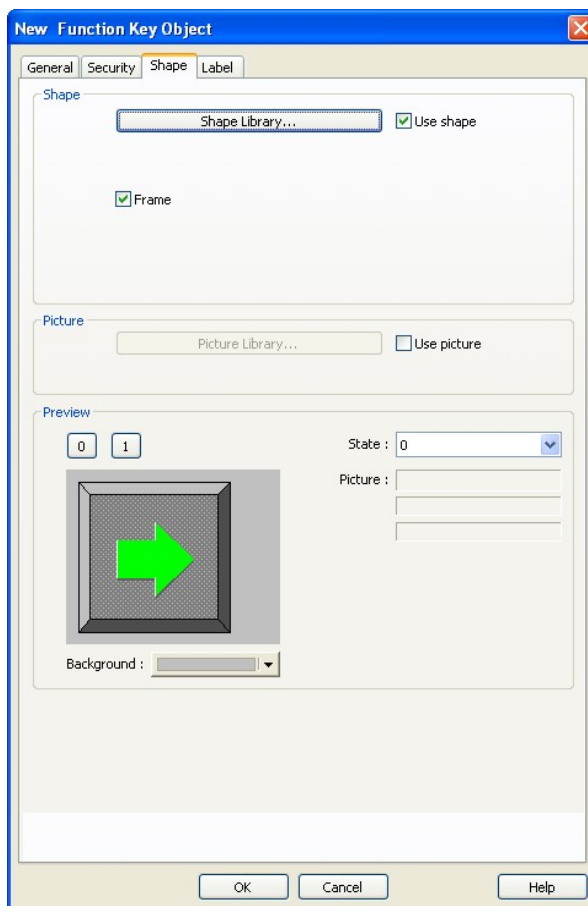
1. Click on Window 10 in the Windows Object List to open Window 10.
2. In the top menu bar in EasyBuilder 5000, click **Objects > Button > Function Key** (or select the Function Key icon in the Object 1 Toolbar).
3. In the Function Key Properties **General** tab, select **Change full-screen window** and select **11. Bargraph** in the Window no.: box.



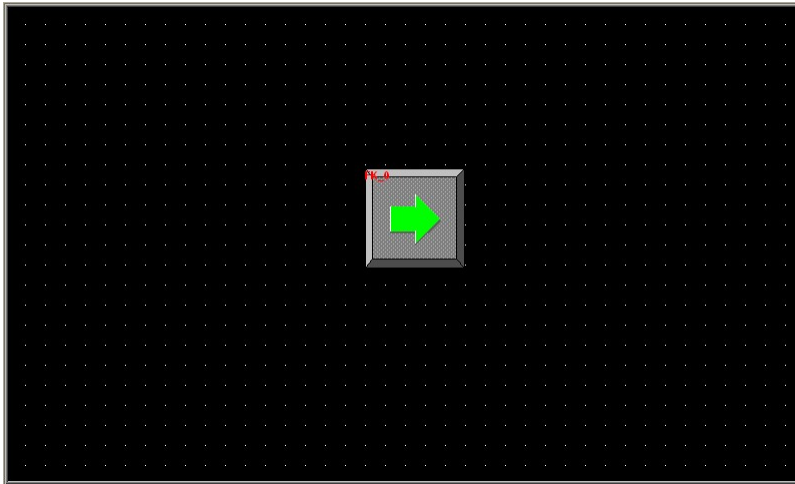
4. Click the **Shape** tab and select the **Use Shape** checkbox. Click the **Shape Library** button to open the Shape Library window. Click the **Select Lib.** button in the upper-right corner and browse to the **Arrows 1.plb** file and click **Open**.



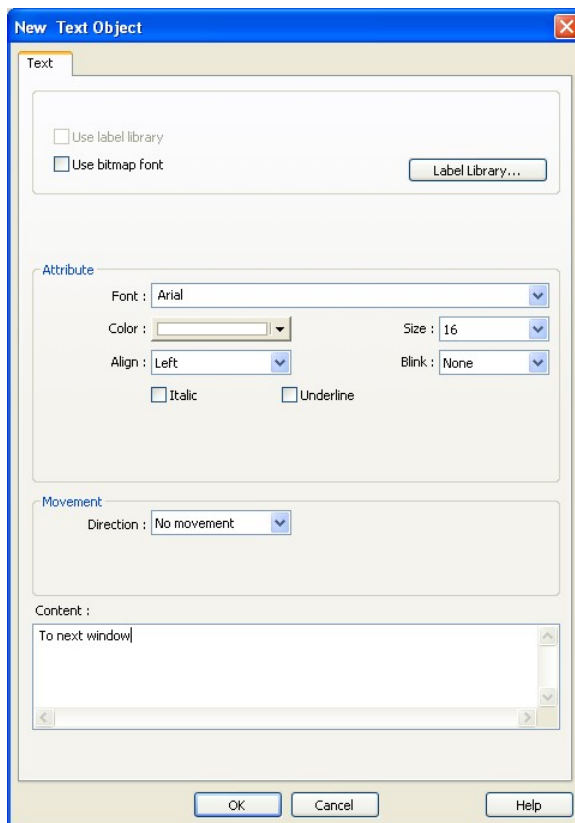
5. Select shape number 7 and click **OK**. The Function Key Object's Shape tab now shows a preview of how the function key will appear on the screen. Click **OK**.



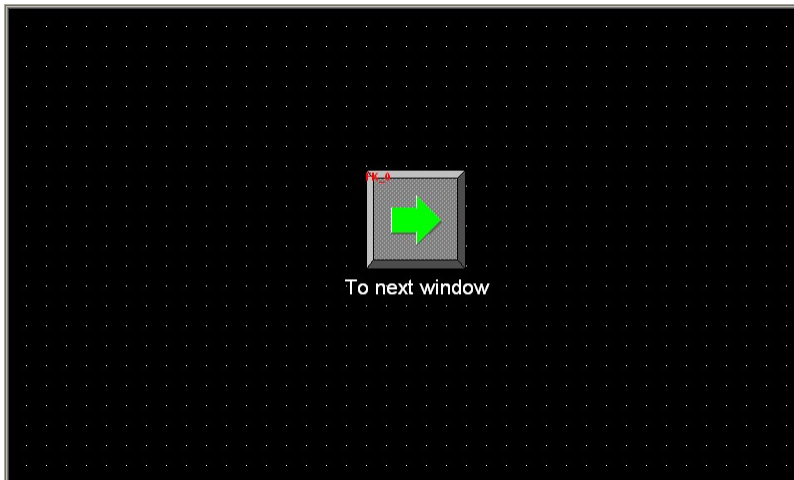
6. On the main screen of EasyBuilder you will see a white rectangle outline that is attached to your cursor in the work area. This represents the function key just created. Click to place the function key in the middle of Window 10. You can click and drag on the control buttons around the Function Key Object to resize it.



7. In the top menu bar in EasyBuilder 5000, click **Draw > Text** (or select the Text Tool icon in the Draw Toolbar). In the New Text Object properties window, select **Arial** in the Font box and **16 pt** in the Size box. Click the Color box and the color palette box opens. Click on the white color box in the lower-right corner. The color box will reflect the color that you have selected.
8. In the Content box at the bottom of the properties window, type **To next window** and click **OK**.



9. On the main screen of EasyBuilder you will see a white rectangle outline that is attached to your cursor in the work area. Click to place the text just below the function key in the middle of Window 10. You can click and drag it to center it beneath the function key.

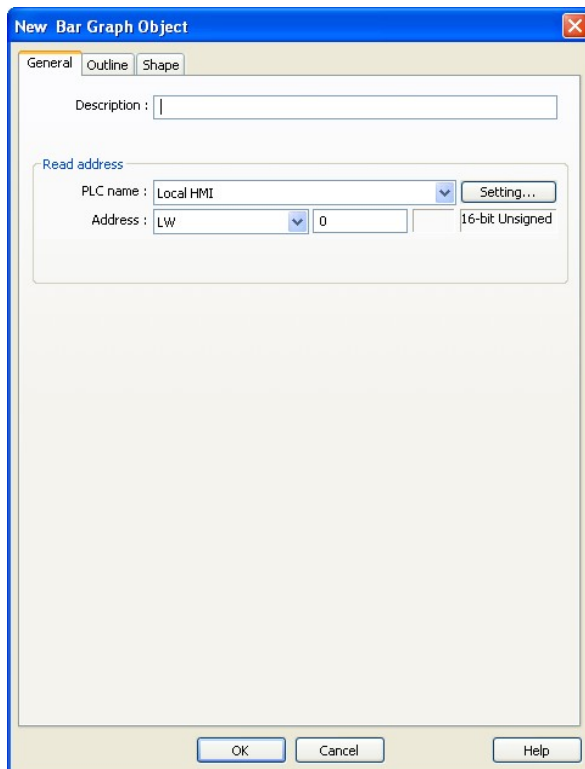


Now let's create a bargraph on Window 11. We will use the bargraph to indicate the level of a tank. We will create pushbuttons to increase or decrease the level of the tank by turning a pump on and off.

To open Window 11, select **Window > Open Window** and double-click Window 11 in the list. Alternatively, double-click on Window 11 in the Windows Option list on the left side of the EasyBuilder screen.

► To create a Bargraph:

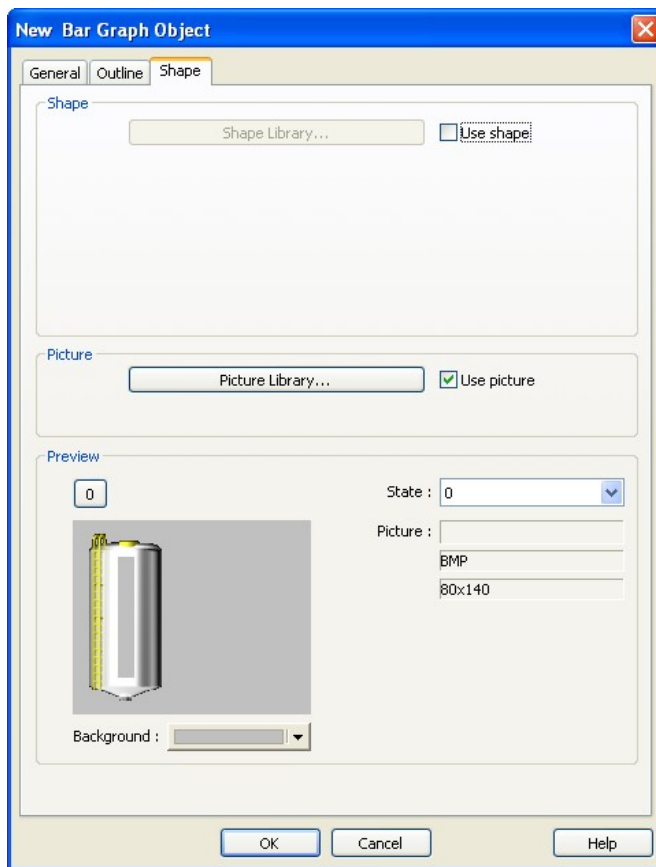
1. In the top menu bar in EasyBuilder 5000, click **Objects > Bar Graph** (or select the Bargraph icon in the Object 2 Toolbar).
2. In the Bar Graph Properties **General** tab, select LW0 for the Read address. Leave the numeric format set to the default 16-bit unsigned.



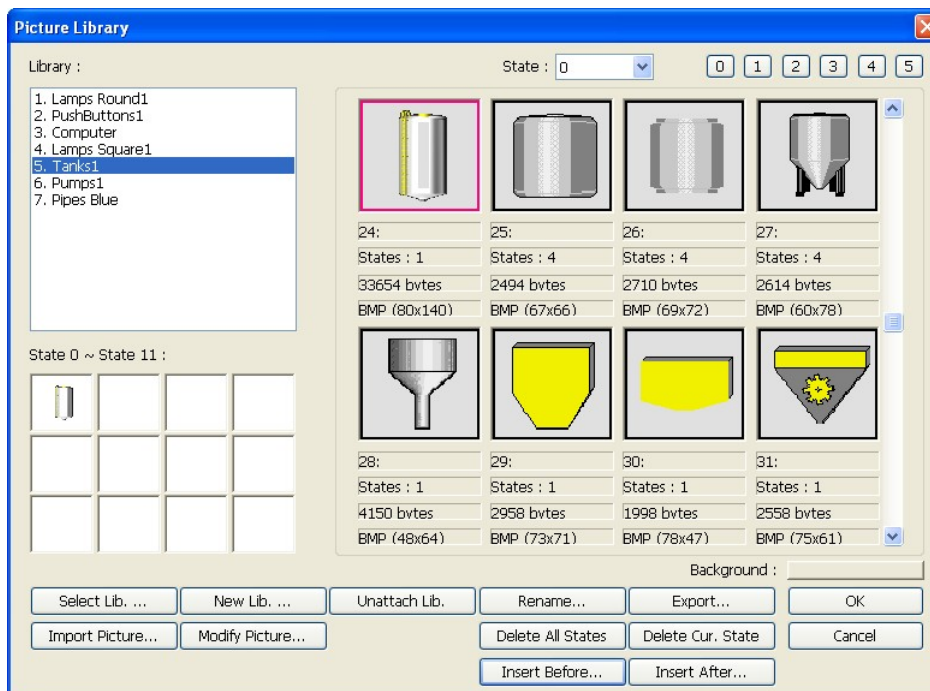
3. Click the **Outline** tab. In the **Attribute** section, select the following:
Type: Normal
Direction: Up
Zero: 0 (the register value represented when the bargraph is minimum)
Span: 100 (the register value represented when the bargraph is maximum)
Bar width ratio (%): 30

The screenshot shows the 'New Bar Graph Object' dialog box with the 'Outline' tab selected. The 'Attribute' section contains the following settings: Type: Normal, Direction: Up, Zero: 0, Span: 100, and Bar width ratio (%): 30. The 'Bar color/style' section has the 'Transparent' checkbox checked, and the 'Bar' and 'Bar style' color pickers are set to blue. The 'Target indicator' section has the 'Enable' checkbox unchecked. The 'Alarm indicators' section has 'Low limit' set to 25, 'High limit' set to 85, 'Low color' set to yellow, and 'High color' set to red. The 'Target/alarm/zero(span) dynamic address' section has the 'Enable' checkbox unchecked. The dialog box has 'OK', 'Cancel', and 'Help' buttons at the bottom.

4. In the **Bar color/style** section, click the **Transparent** checkbox. Leave the **Bar** and **Bar style** colors at their default blue.
5. Leave the Target indicator **Enable** box unchecked.
6. In the **Alarm indicators** section, select the following:
Low limit: 25
High limit: 85
Low color: yellow (the bargraph color is yellow when the register value is below 25)
High color: red (the bargraph color is red when the register value is above 85)
7. Click the **Shape** tab. Leave the **Use shape** checkbox unchecked and click the **Use picture** checkbox.

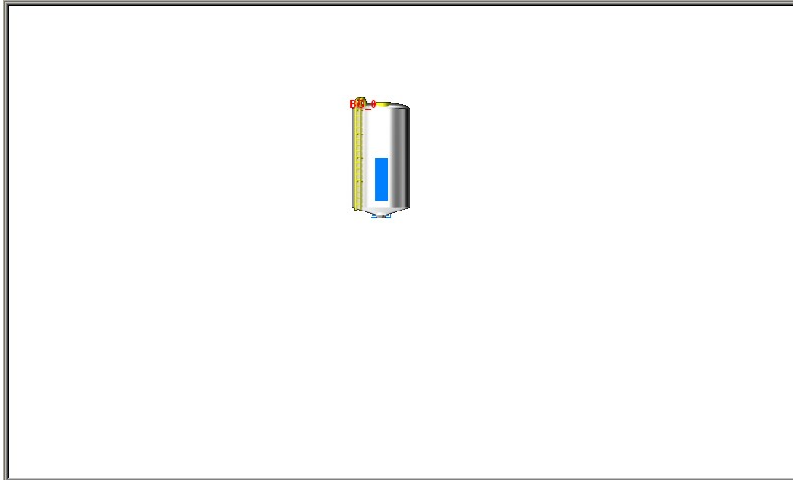


8. Click the **Picture Library...** button and select the Tanks1 library. If it does not appear in the Library list on the left side of the Picture Library window, click the **Select Lib...** button and locate Tanks1.flb in the Library folder. Select it and click **Open** to add it to the list.



9. Select picture number 24 and click **OK**. This is the picture that will appear over the bargraph on the screen.

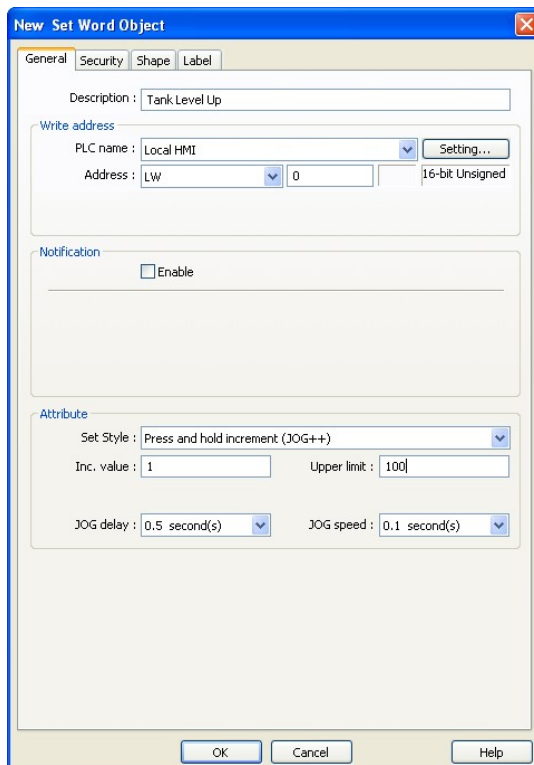
10. Click **OK** to accept the properties settings. On the main screen of EasyBuilder you will see a white rectangle outline that is attached to your cursor in the work area. Click to place the Bargraph Object in the middle of Window 11. You can click and drag it to adjust its position once you have placed it on the window.



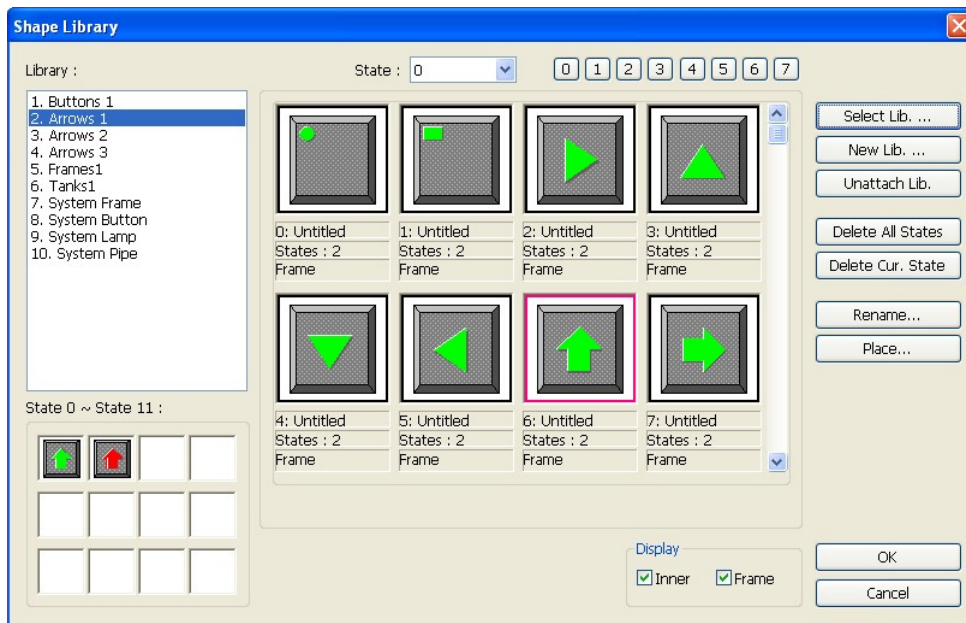
Next we will create a pushbutton to raise the level of the tank and another one to lower the level of the tank. This will use the Set Word Object to increment and decrement the value in LW0, the register that the bargraph is monitoring.

► To create a Set Word:

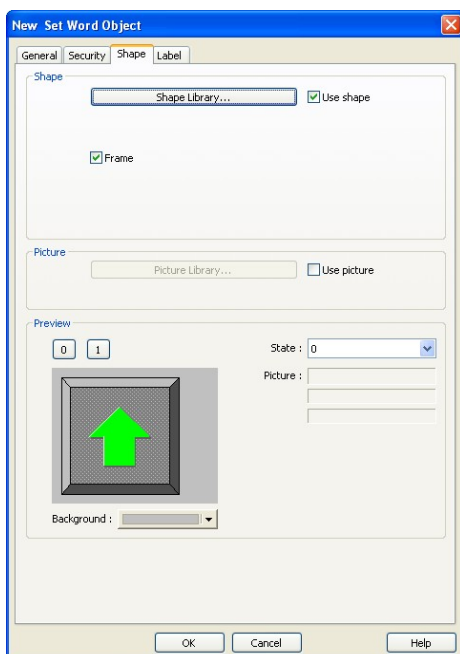
1. In the top menu bar in EasyBuilder 5000, click **Objects > Button > Set Word** (or select the Set Word icon in the Object 1 Toolbar).
2. In the Set Word Object's Properties **General** tab, you can enter a description of the object such as "Tank Level Up." Select LW for the **Device Type** and 0 for the **Write address**. Leave the numeric format set to the default 16-bit unsigned.



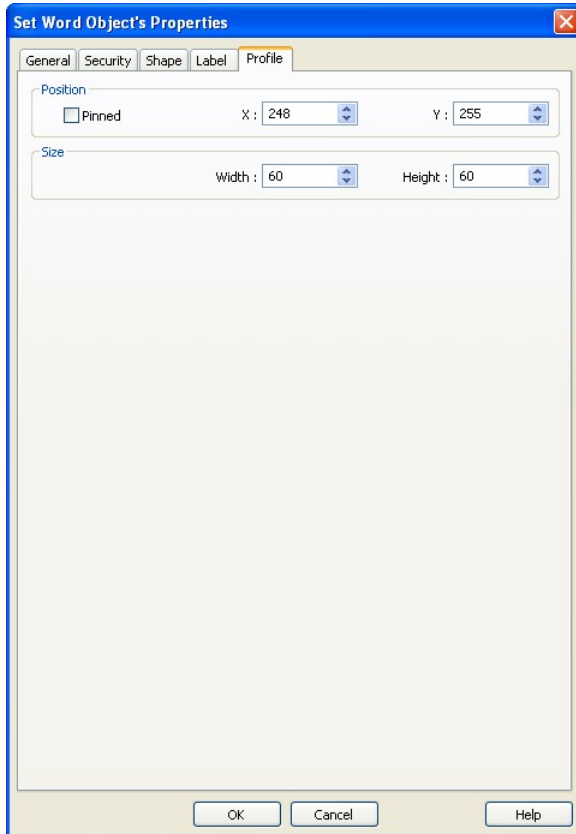
3. In the **Attribute** section, select the following:
Set Style: Press and hold increment (JOG++)
(this will cause the value in the register to increase while the button is pressed)
Inc. value: 1
Upper limit: 100
JOG delay: 0.5 second(s)
JOG speed: 0.1 second(s)
4. Click the Shape tab. Click the **Use Shape** checkbox and click the **Shape Library...** button. Select the Arrows 1 library. If it does not appear in the Library list on the left side of the Shape Library window, click the **Select Lib...** button and locate Arrows 1.plb in the Library folder. Select it and click **Open** to add it to the list. Select shape number 6 and click **OK**.



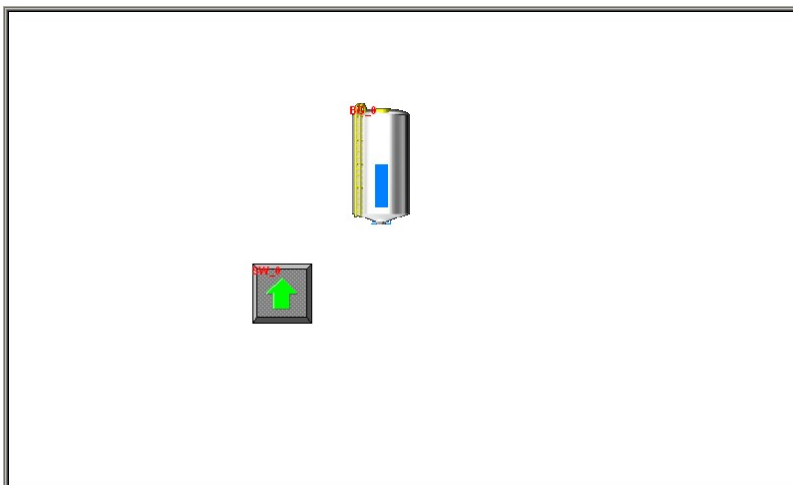
11. A preview of the selected shape appears in the properties window.



12. Click **OK** and place the Set Word Object below the bargraph on Window 11 in EasyBuilder. You can click and drag it to adjust its position once you have placed it on the window.
13. Click on the screen to deselect the Set Word Object, then double-click on it to reopen the properties (or right-click on it and select **Attribute**) and click the **Profile** tab (the Profile tab is not available when creating a new object). Set the **Width** and **Height** to 60 (pixels).

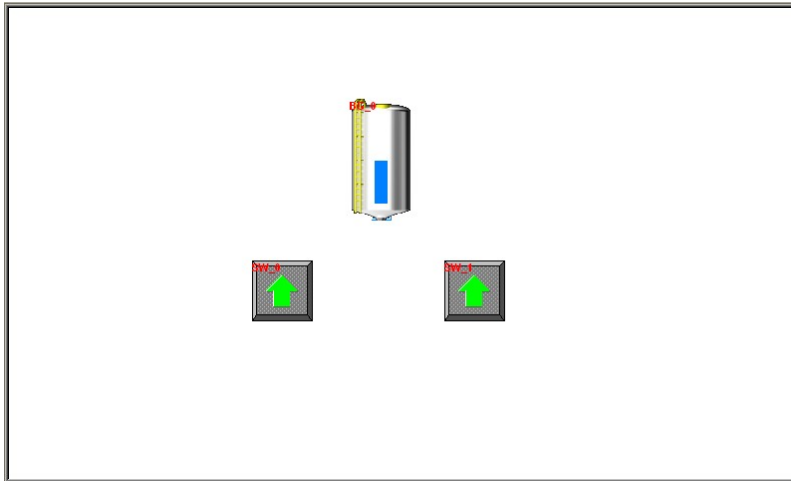


14. Click **OK** to accept the new profile settings.



15. Now we will create another Set Word Object to lower the level of the tank. Select the Set Word Object that we just created and copy it (**Edit > Copy** or Ctrl+C on the keyboard).

16. Paste the Set Word Object to the window (**Edit > Paste** or Ctrl+V) and drag it next to the other Set Word Object.



17. Click on the screen to deselect it, then double-click on the new Set Word Object to open the Properties window (or right-click on it and select Attributes).

18. In the Set Word Object's Properties **General** tab, you can enter a description of the object such as Tank Level Down. Select LW for the **Device Type** and 0 for the Write address. Leave the numeric format set to the default 16-bit unsigned.

19. In the **Attribute** section, select the following:

Set Style: Press and hold decrement (JOG--)

(this will cause the value in the register to decrease while the button is pressed)

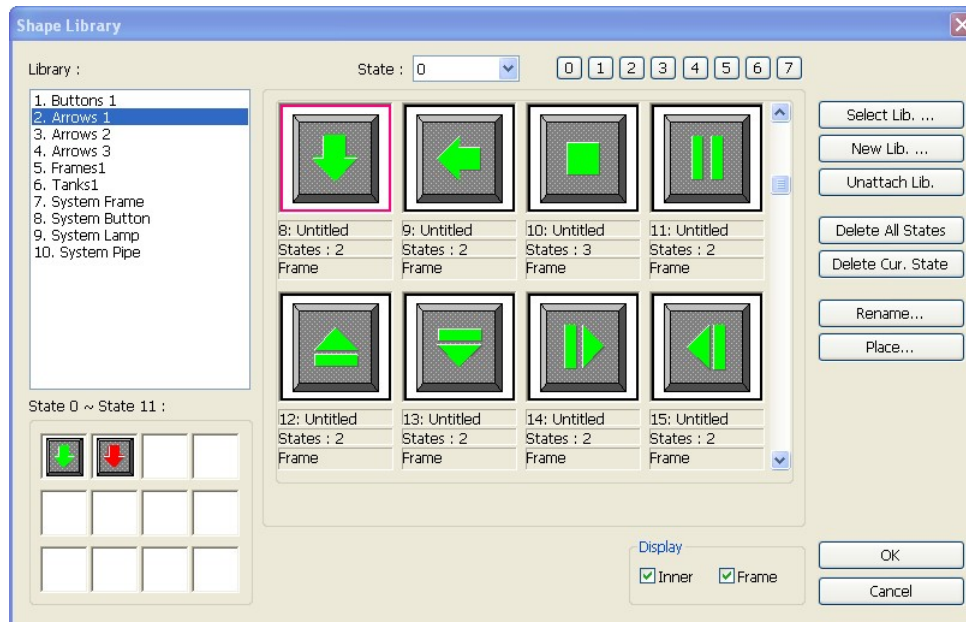
Dec. value: 1

Bottom limit: 0

JOG delay: 0.5 second(s)

JOG speed: 0.1 second(s)

20. Click the **Shape** tab. Click the **Shape Library...** button. Select the Arrows 1 library. Select shape number 8 and click **OK**.



21. Click **OK** to accept the properties settings.

Next we will create a Bit Lamp Object to represent a pump and another to represent a pipe connecting the pump to the tank.

► To create a Bit Lamp:

1. In the top menu bar in EasyBuilder-5000, click **Objects > Lamp > Bit Lamp** (or select the Bit Lamp icon in the Object 1 Toolbar).
2. In the Bit Lamp Object's Properties **General** tab, you can enter a description of the object such as Pump. Select LB for the Device Type and 0 for the Write address.

New Bit Lamp Object

General Security Shape Label

Description : Pump

Read address

PLC name : Local HMI Setting...

Address : LB 0

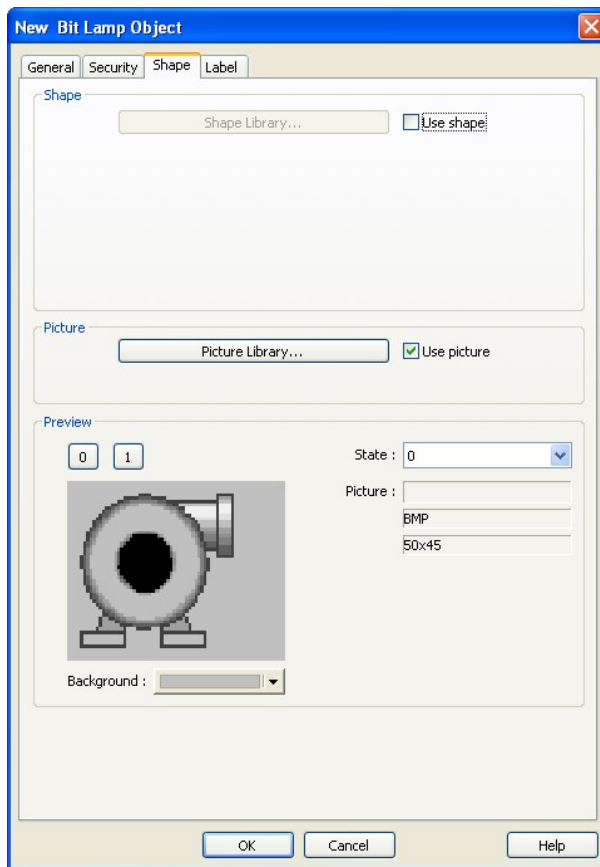
☐ Invert signal

Blinking

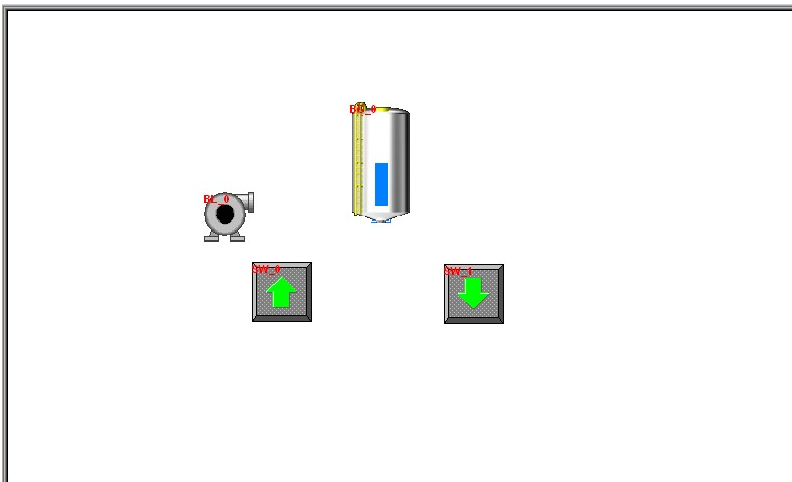
Mode : None

OK Cancel Help

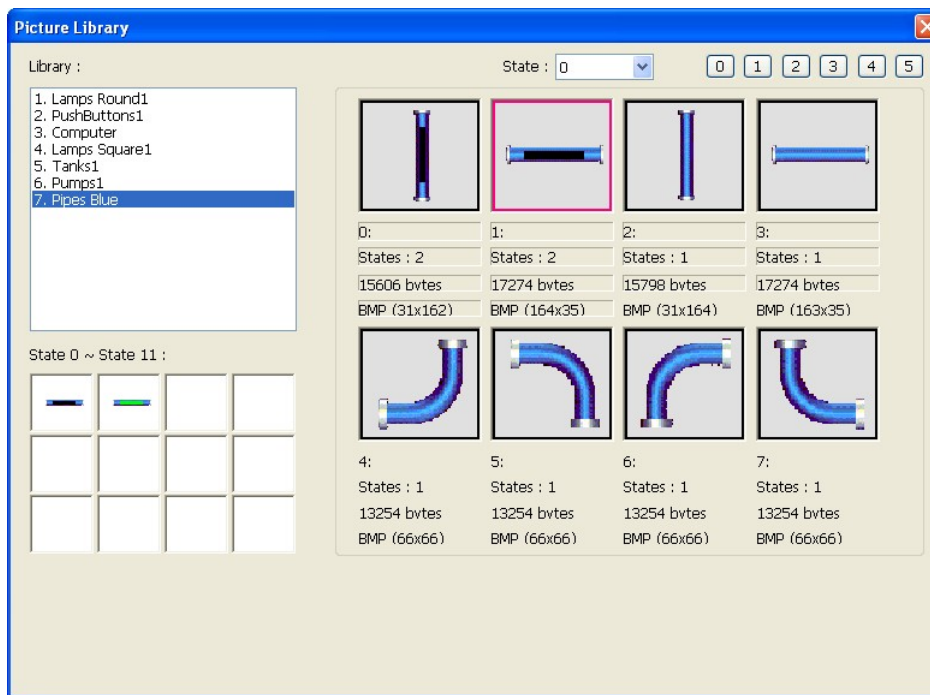
3. In the **Blinking** section, select None for the Mode.
4. Click the **Shape** tab and check the **Use Picture** checkbox (uncheck the **Use Shape** checkbox if it is selected).
5. Click the **Picture Library...** button and select Pumps1 in the Library list. If it does not appear in the Library list on the left side of the Shape Library window, click the **Select Lib...** button and locate Pumps1.flb in the Library folder. Select it and click **Open** to add it to the list. Select shape number 5. Notice that it has four states associated with it. We will use the first two states, grey and green. Click **OK** and a preview of the pump will appear in the Properties window.



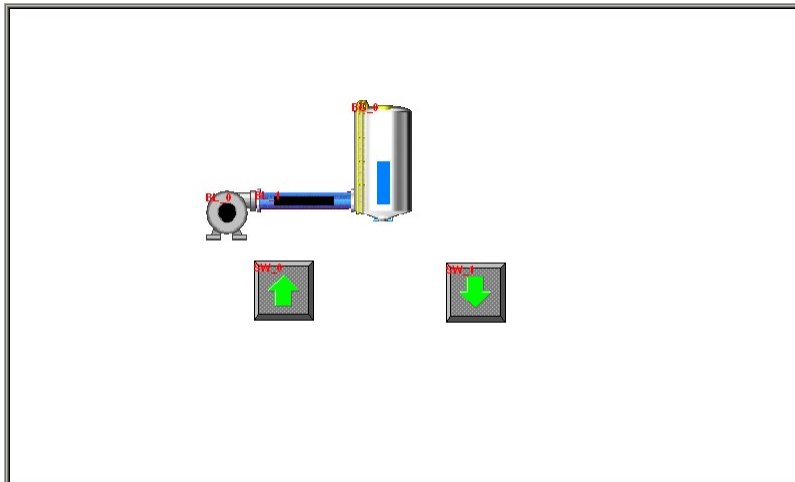
6. Click **OK** and place the Bit Lamp Object to the left of the tank. You can click and drag it to adjust its position once you have placed it on the window.
7. Click on the screen to deselect the Bit Lamp Object, then double-click on it to reopen the properties (or right-click on it and select **Attribute**) and click the **Profile** tab. Set the **Width** and **Height** to 50 (pixels).
8. Click **OK** to accept the new Profile properties.



9. Copy and paste the Bit Lamp Object (pump) to the same window and open the Properties window. Leave the read address set to LB0 and click the **Shape** tab.
10. Click the **Picture Library...** button and select the **Pipes Blue** library (use the **Select Lib...** button if it doesn't appear in the Library list). Select picture number 1 and click **OK**.



11. Click the **Profile** tab and set the **Width** to 100 and the **Height** to 25 (pixels).
12. Click **OK** to accept the properties. Click to place the Bit Lamp Object between the pump and the tank. You can click and drag it to adjust its position once you have placed it on the window.



Now we will create a Set Bit Object to turn the pump and pipe on and off whenever the Up or Down Arrows (Set Word Objects) are pressed.

► To create a Set Bit:

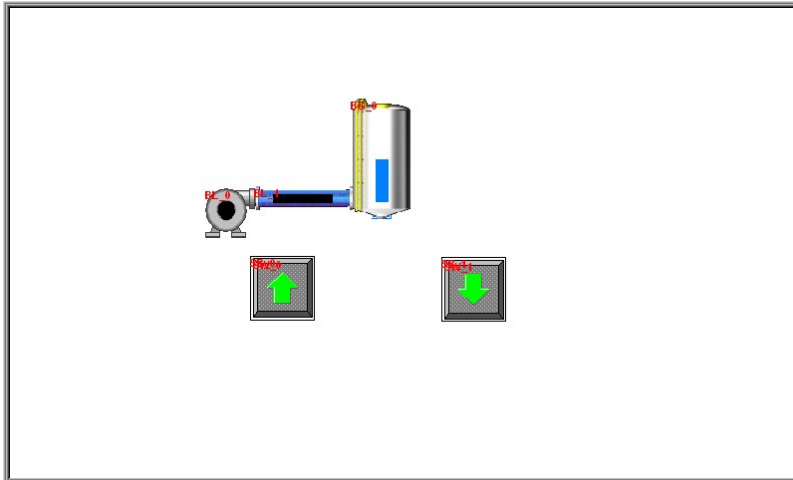
1. In the top menu bar in EasyBuilder 5000, click **Objects > Button > Set Bit** (or select the Set Bit icon in the Object 1 Toolbar).
2. In the Set Bit Object's Properties **General** tab, you can enter a description of the object such as Pump On. Select LB for the Device Type and 0 for the Write address. Select **Momentary** for the Set Style.

The 'New Set Bit Object' dialog box is shown with the 'General' tab selected. The 'Description' field contains 'Pump On'. Under the 'Write address' section, 'PLC name' is set to 'Local HMI' and 'Address' is 'LB 0'. The 'Attribute' section shows 'Set style' as 'Momentary'. The 'Macro' section has an unchecked 'Execute macro' checkbox. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

3. Click the **Shape** tab and deselect the **Use Shape** checkbox. This will make the Set Bit invisible on the screen.

The 'New Set Bit Object' dialog box is shown with the 'Shape' tab selected. The 'Shape' section has a 'Shape Library...' button and an unchecked 'Use shape' checkbox. The 'Picture' section has a 'Picture Library...' button and an unchecked 'Use picture' checkbox. The 'Preview' section includes a state indicator with '0' and '1' buttons, a 'State' dropdown set to '0', a 'Picture' field, and a 'Background' dropdown. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

4. Click **OK** and place the Set Bit Object on the window. It will appear as a square frame. Click on the screen to deselect it, then double-click on it to reopen the properties (or right-click on it and select **Attribute**). Click the **Profile** tab and set the **Width** and **Height** to 65 (pixels). Click **OK** to accept the new Profile settings.
5. Move the Set Bit Object over the Arrow Up button.
6. Copy and paste the Set Bit Object and place the second one over the Arrow Down button. When the Up or Down buttons are pressed, the pump and pipe will change states to indicate that they are on.



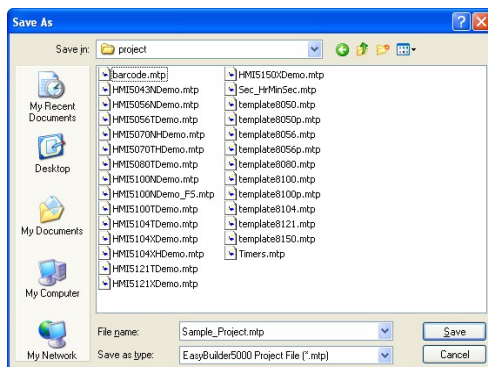
Finishing Up

There are still a few more steps to finish your first project. In this section, you will:

- save the project onto your computer hard drive
- compile the project into a format that can be understood by the HMI
- run the offline simulator to test the project
- download the project to the HMI
- verify that the HMI operates as expected
- exit the EZware-5000 software

► Saving your first project

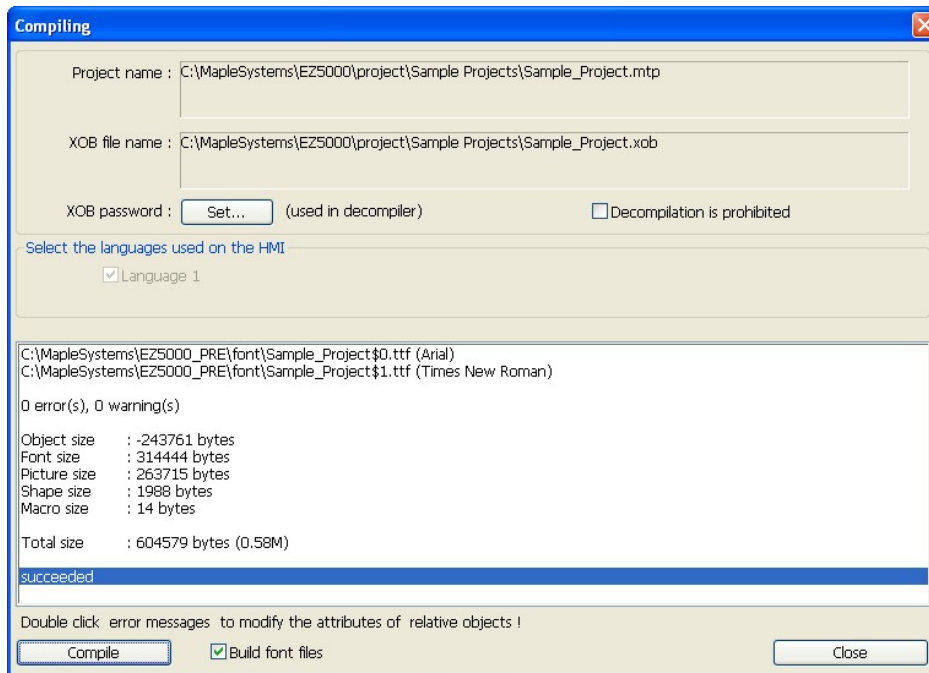
1. From the **File** menu, click **Save As**. The **Save As** dialog box appears.



2. Use the drop-down menus to locate the project folder in EZ5000.
3. In the **File name** text box, type **Sample_Project.mtp**.
4. Click **Save**. The file is saved onto your computer hard drive and the main screen of EasyBuilder reappears.

► Compiling your first project

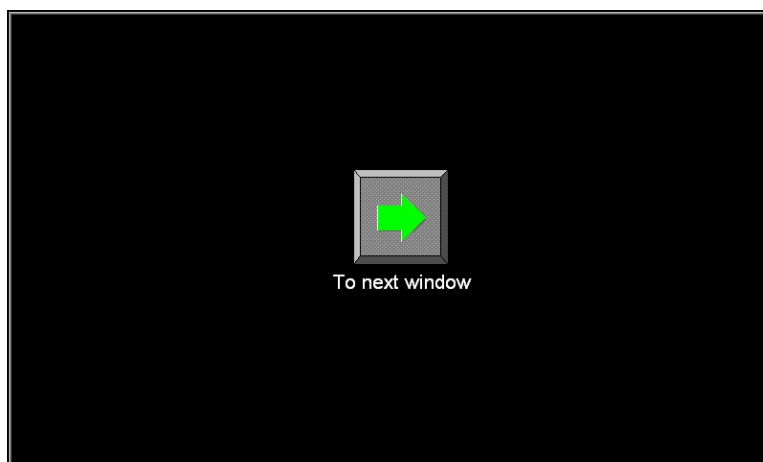
1. From the **Tools** menu, click **Compile**. The Compiling dialog box appears.



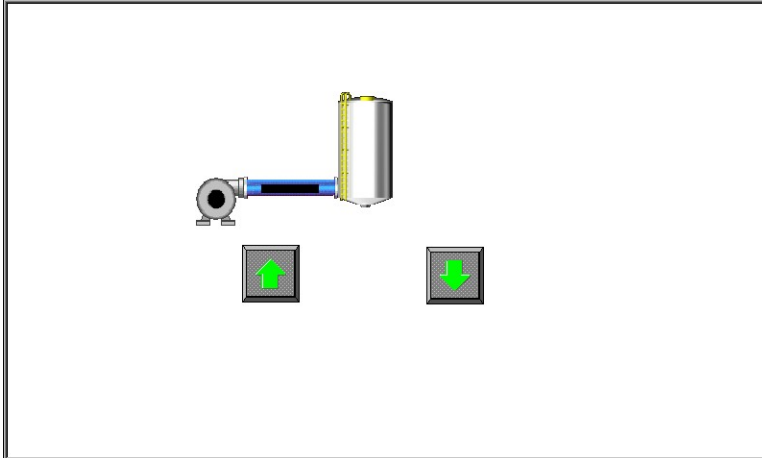
2. Click the **Compile** button. EasyBuilder will compile your project and display error results.
3. If no errors occur, click **Close**. The main screen of EasyBuilder reappears. If errors have occurred, repeat the steps in the “Creating a Sample Project” section.

► Simulating your first project

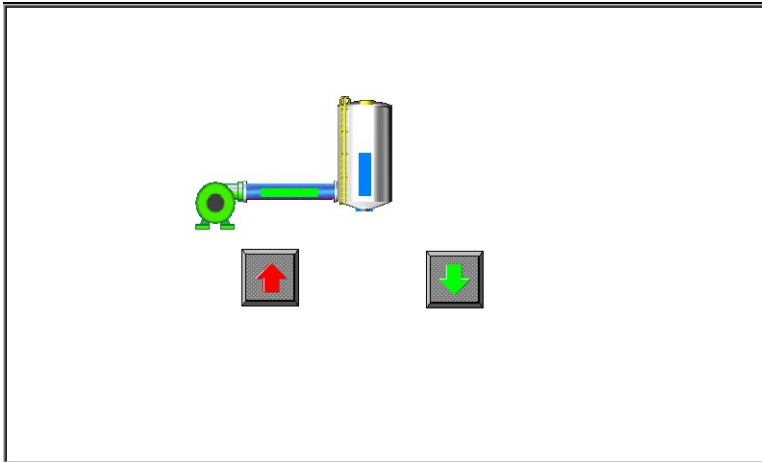
1. Click **Tools** in the top menu bar and select **Off-line Simulation** (Ctrl+T) or click the Off-line Simulation icon in the Project Toolbar. The Simulation Window will appear on the screen.



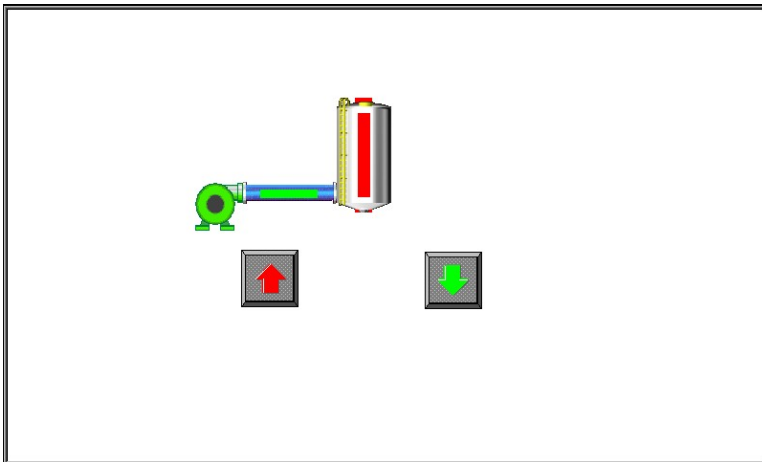
- Click the arrow button to go to the next window.



- Click and hold the arrow UP button to fill the tank. The pump turns green and the pipe starts blinking. The bargraph is yellow when the tank begins to fill and turns blue when it fills more than 25%.



- When the tank fills above 85% the bargraph turns red.



- Click and hold the arrow DOWN button to lower the tank level.
- Right-click in the simulation window and select **Exit simulation**.

► Downloading your first project

First, connect a +24 VDC power supply to the HMI. Refer to the **Silver Series Installation Guide** for more information.

In order to download your project, you must first connect the HMI to your computer. There are two methods of downloading to the HMI, Ethernet or USB, depending on your model.

Configuration Wiring

HMI Model	Ethernet Crossover Configuration Cable P/N 7431-0104	USB Configuration Cable P/N 7431-0115
HMI5043N, HMI5056N, HMI5070NH, HMI5100N		X
HMI5070TH, HMI5100T, HMI5104TH	X	X
HMI5043T, HMI5104XH, HMI5121X, HMI5150X	X	

Ethernet

It is necessary to determine the IP Address of the HMI. By default, the HMI is configured to get a dynamic IP address from a DHCP server. This setting can be changed. To determine or change the HMI's IP address:

1. Plug a USB mouse into the HMI.
2. Connect the HMI to your computer using an Ethernet crossover cable (7431-0104).
3. Move the mouse pointer to the lower right corner of the HMI screen. A menu bar will appear. Click the wrench icon on the menu bar.
4. On the **Network** tab of the System Settings dialog, the HMI's IP address will be shown. If set for Auto Get IP Address, the HMI's current IP setup information is displayed but is not changeable. To change the IP address, select IP Address Get From Below and enter the data.
5. Once the IP Address has been established, the project can be downloaded. Select **Tools > Download** from EasyBuilder's menu (or click the Download icon).
6. Enter the HMI's IP address and Download password. The default download password is 111111. The default IP address is 192.168.0.201, Subnet 255.255.255.0, Gateway (none).
7. Make sure that the **Ethernet**, **Firmware**, and **Reboot HMI After Download** boxes are checked.
8. Click the **Download** button. If the HMI is properly connected to the PC, the status box on the download dialog will update with messages indicating the progress of the transfer. The HMI itself will also display messages reflecting its status.
9. When the download is complete, the HMI will restart and will begin running your project. Click the **Exit** button on the Download dialog.

USB

1. Make sure the USB driver has been installed on your computer. See the Help menu "How Do I...Install the Maple Systems USB Driver" for more information.
2. Connect the HMI to your computer using the USB configuration cable (PN 7431-0115).

3. Select **Tools > Download** from EasyBuilder's menu (or click the Download icon).
4. Make sure that the **USB**, **Firmware**, and **Reboot HMI After Download** boxes are checked.
5. Click the **Download** button. If the HMI is properly connected to the PC, the status box on the download dialog will update with messages indicating the progress of the transfer. The HMI itself will also display messages reflecting its status.
6. When the download is complete, the HMI will restart and begin running your project. Click the **Exit** button on the Download dialog.

Note: When connecting two powered devices, a difference in potential can exist between the ground reference on each device. If there is a large difference in ground potential (voltage), making a connection via a USB cable can complete a ground loop that may damage the HMI and PC. *The connectors on the Maple Systems USB Configuration Cable (P/N 7431-0115) are electrically isolated to prevent a potentially damaging ground loop, and we recommend using this cable to connect the HMI to the PC. Maple Systems cannot be held responsible for any damage to the HMI, PLC, or PC due to improper wiring.* Please refer to page 5 of the *Silver Series Installation Guide* for proper wiring instructions.

CONGRATULATIONS. You have completed your first EZware-5000 project. Select **File > Exit** to close EasyBuilder.

Chapter 5 – Simulator Mode

As you saw from creating the sample project in the last chapter, downloading any changes you make to the HMI can take time. To decrease the amount of time required to download a project to the HMI, you can uncheck the Firmware option on EasyBuilder's download dialog once you have downloaded it once.

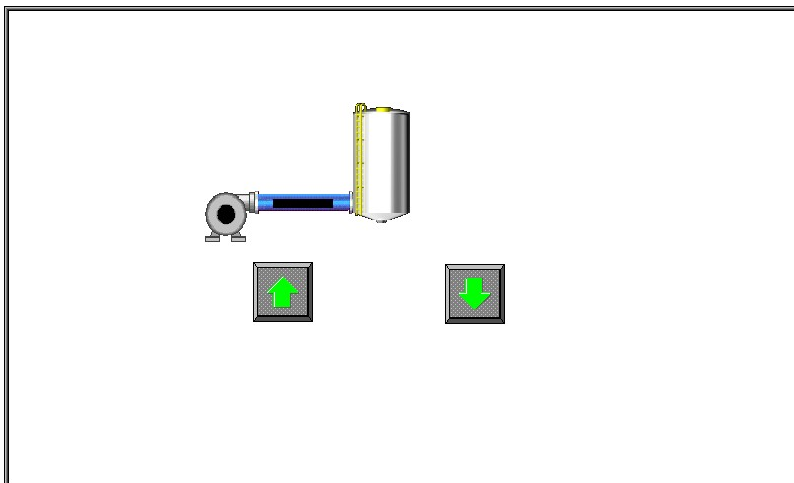
A better way of testing changes made to a project is to use the computer to simulate the operation of the HMI.

This chapter shows you how to dramatically save time when creating and testing a project by putting the computer into Simulation Mode. In Simulation Mode, the computer displays a screen that simulates what is seen when the HMI executes the project file. You can use the mouse on your computer to simulate the operation of the touchscreen on the HMI. Rather than waiting for the download to test each change you make to your project, you can now instantly switch to Simulation Mode to see if your project is working as expected.

You can enter Simulation Mode from EasyBuilder or from Project Manager.

The Simulation Screen

All modes of simulation use the same screen.



For our example, we are showing the sample project as it would appear after the “To next window” function key has been pressed. When the Simulation Mode screen first appears, it will always show the startup screen of the project. You can test any objects you have created which require touchscreen input by clicking on them. In this example, clicking on the increment key simulates the key as it is pressed on the touchscreen. Simulation Mode always uses the compiled version of the project that you have created (the *.xob file). Therefore, you must save and compile any changes you make to the project before you can simulate it.

Simulating the HMI is done in on-line or off-line mode.

On-line simulation is most useful when a project is near completion and you need to test the interaction of the project with the PLC. It is also very convenient when making minor changes to a project because these changes can be instantly checked for operation.

Off-line simulation does not require any connection to the HMI. Because of this, off-line simulation is most often used when starting a project. You can quickly test new ideas and create preliminary screens without the HMI.

Off-line simulation is also great for demonstrating the operation of the HMI and becoming familiar with the operation of the HMI before it is installed. If you want to simulate the interaction with a PLC when off-line, it can be done by creating additional windows on the HMI which allow PLC data input.

► **To use off-line simulation mode from EasyBuilder:**

1. If the project has been modified since the last time it was saved and compiled, or if it has not yet been compiled, it must be saved and compiled before the simulator can start.
2. Select **Tools > Off-line Simulation** from the top menu bar (or click the Off-line Simulation icon in the Project toolbar ).
3. The Simulation Mode screen will appear.
4. To end off-line simulation, right-click in the simulation screen and click **Exit simulation**.

Simulation mode can also be started from Project Manager. Project Manager requires only the compiled project file (*.xob). This can be useful in situations in which you want to demonstrate changes made to a project for a client without giving him access to your project file. It also allows you to rapidly switch from simulating one project to another without having to open, save, and compile each project.

► **To use off-line simulation mode from Project Manager**

1. Start the Project Manager software.
2. Click **Offline-Simulator**. The Open Project box appears.
3. Click on the compiled project file that you wish to simulate.
4. Click **Open**. The simulation screen will appear.
5. To end off-line simulation, right click in the simulation screen and click **Exit**.

Online simulation requires a direct connection between the PC and the controller. It is not necessary to have the HMI connected.

The HMI's COM1 RS232 connection is wired the same as a standard PC 9-pin serial connector. Therefore, the standard Maple Systems' COM1 RS232 cable for the selected PLC/controller can be used with online simulation. Connect the cable end marked "HMI" to the PC's serial port, and connect the other end to the PLC/controller.

► **To use on-line simulation mode from EasyBuilder**

1. If the project has been modified since the last time it was saved and compiled, or if it has not yet been compiled, it must be saved and compiled before the simulator can start.
2. Select **Tools > On-line Simulation** from the top menu bar (or click the On-line Simulation icon in the Project toolbar ).
3. The Simulation Mode screen will appear.
4. To end on-line simulation, right-click in the simulation screen and click **Exit simulation**.

► **To use on-line simulation mode from Project Manager**

1. Start the Project Manager software.

2. Click **Online-Simulator**. The Open Project dialog box appears.
3. Click on the compiled project file that you wish to simulate.
4. Click **Open**. The simulation screen appears.
5. To end on-line simulation, right click in the simulation screen and click **Exit**.

 The above method will work with a standard PC serial COM port, regardless of the COM number assigned to the PC serial port. EasyBuilder supports RS232 communication on ports COM1 – COM9. COM4 and higher are intended for use with online simulation only, since the HMI itself only supports RS232 communication on COM1 – COM3.

 If simulating with RS422 or RS485 communication, the PC will require some mechanism to support RS422/485. A communication card can be installed in the PC, a USB communications module can be used, or an external RS232-to-RS485 converter can be used. In any case, a standard Maple Systems cable may not work.

If simulating a project using Ethernet communications, an Ethernet cable between the PC and the PLC/controller is needed. Consult the PLC/controller documentation for details.

► To use EasySimulator

Online or offline simulation can be initiated without having to open EasyBuilder-5000 or Project Manager by using EasySimulator. EasySimulator is located in the same folder as EasyBuilder and Project Manager (C:\MapleSystems\EZ5000\EasySimulator.exe). If you have installed the EZware-5000 Downloader, it is located at C:\MapleSystems\EZ5000Util\EasySimulator.exe.

When EasySimulator starts, it reads the file “XOB_POS.def,” which is also located in the same folder as EasySimulator. This definition file determines whether to run offline or online simulation, the location of the com.exe and gui.exe files, and the location and name of the *.xob file to simulate. The following are the default settings for the XOB_POS.def file:

```
// mode – 0: offline, 1: online  
"0"
```

```
// directory containing com.exe and gui.exe  
"c:\MapleSystems\EZ5000Util"
```

```
// xob file  
"c:\MapleSystems\EZ5000Util\HMI5056TDemo.xob"
```

Edit the XOB_POS.def file in a text editor such as Notepad. See Technical Note 5053, “Using EasySimulator” for more information.

Now that you are familiar with using simulation mode, the next chapter guides you through the fundamental operation of three primary segments of the EZware-5000 configuration software.

Chapter 6 – Using EZware-5000

Overview

The EZware-5000 software is composed of three separate applications that are accessible from the EZware-5000 folder: EasyBuilder, Project Manager, and EasyConverter. EasyBuilder is the application software used to create a project file. Project Manager is a utility application that puts the HMI into different operating modes. EasyConverter changes certain binary files created by the HMI into text files.

By the end of this chapter, you should be quite familiar with the operation of Project Manager and be able to maneuver around EasyBuilder easily.

 EasyBuilder 5000 includes extensive online help. From any dialog box within the software, click on the **HELP** button, or press the computer's F1 key.

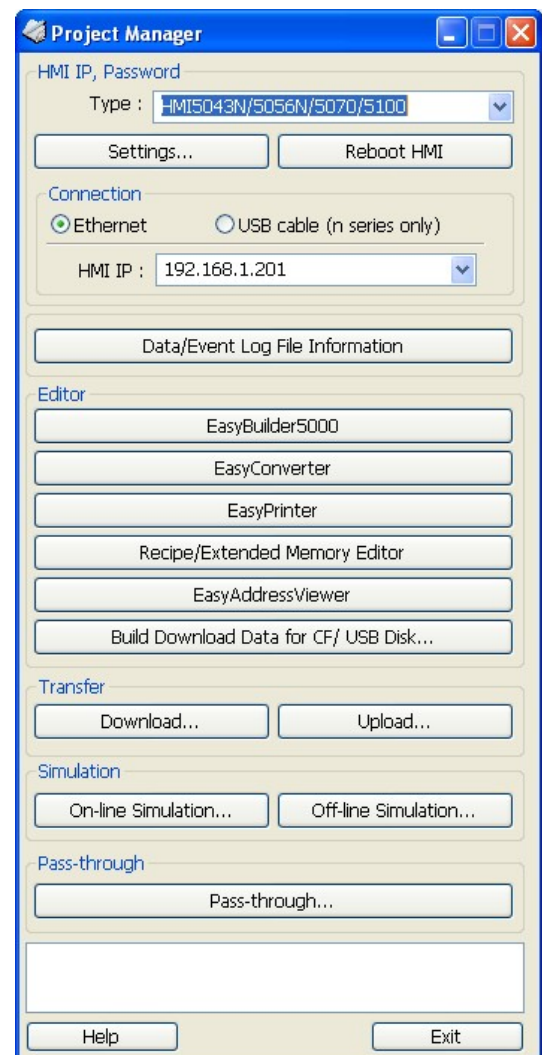
The Project Manager

The Project Manager utility sets the communications parameters that are used by the computer when communicating to the HMI. The utility can also be used to:

- Start EasyBuilder-5000.
- Write project data to a CompactFlash or USB device for transfer to an HMI.
- Download project data to the HMI or upload project data from the HMI.
- Start a project simulation session.

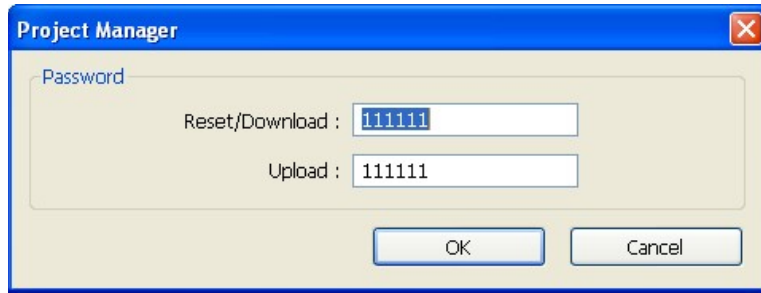
To access Project Manager, click on the Windows **Start** button and select

All Programs >Maple Systems > EZware-5000 > Project Manager.



HMI IP, Password Settings

Settings Button



Click the Settings button to view the Download/Upload passwords (default 111111). These must match the Download/Upload passwords in the HMI's System Settings Toolbar.

Reboot HMI

Connects to the HMI, checks password and resets the HMI in order to update system files.

Connection Setting

Select between **Ethernet** or **USB cable** (depending on model) for communication between the computer and HMI. When **Ethernet** is selected, enter the HMI IP address in the designated field.

Data/Event Log File Information

Click this button to list the data log files (*.dtl) and event log files (*.evt) in the HMI (HMI5043N/T, HMI5056N, HMI5070N/H, HMI5100N/T, and HMI5104TH only).

Editor Settings

EasyBuilder5000

Click this button to open the EasyBuilder-5000 software application for project creation and editing.

This section guides you in a basic understanding of the features and capabilities that EasyBuilder-5000 has to offer, from an overview of all the objects available in the software to enter and display data, to setting up the system parameters and selecting the target PLC. This information will be useful for understanding more advanced features explained in later chapters.



EasyBuilder-5000 Development Window

Objects Summary

EasyBuilder includes several active graphics objects that are used to represent data that is stored in the PLC or internal memory of the HMI. The data represented can be single bit coils, 16-bit, 32-bit, or 64-bit registers. The data can be represented as numbers, ASCII characters, or as graphic shapes or bitmap images. This section provides a summary of all the objects available in EasyBuilder-5000. Most of these objects are accessible by clicking **Objects** in the top menu in EasyBuilder, or by clicking on its icon in the Object 1 or Object 2 Toolbar.

Refer to the Help file (**Help > Parts List**) for more information relating to each object.

Bit Lamp

The Bit Lamp Object is used as an indicator to represent the ON or OFF status of a bit or coil in the PLC, or a bit in the HMI local memory (LB). If the bit is cleared (0, False), the State 0 Shape of the Bit Lamp will be displayed. If the bit is set (1, True), the State 1 Shape of the Bit Lamp will be displayed. The Bit Lamp can also blink in various ways.

Word Lamp

The Word Lamp Object is used as an indicator to represent the value in a PLC register, or the value in a register in the HMI local memory (LW). Creates a graphics object to reflect the current state of a multi-state PLC data register. It can display a different shape or picture depending on the value in the register. If the value is 0, the first shape is displayed, if the value is 1, the second shape is displayed, etc. A Word Lamp can display up to 256 different shapes and text strings, corresponding to register values of 0 – 255.

Set Bit

The Set Bit Object is used as a button to toggle ON or OFF the state of a bit or coil in the PLC, or a bit in the HMI local memory (LB). There are a number of different options (Set Styles) available to operate the button including touch (On, Off, Toggle, Momentary), window open or closed, and backlight on or off.

Set Word

The Set Word Object is used as a button to change the value in a PLC register, or the value in a register in the HMI local memory (LW). There are a number of different options (Set Styles) available to operate the button including touch (Write a constant value, increment or decrement), window open or closed, backlight on or off, and periodic bounce or jog.

Toggle Switch

The Toggle Switch Object is a combination of the Bit Lamp and Set Bit objects. It is used as a button to toggle ON or OFF the state of a bit or coil (specified by the Write Address), and as an indicator to represent the ON or OFF status of a bit or coil (specified by the Read Address) in a PLC register or HMI local memory. It can be configured with various Switch Styles including Set On, Set Off, Toggle, or Momentary.

Multi-State Switch

The Multi-State Switch Object is a combination of the Word Lamp and Set Word objects. It is used as a button to change the value of a register (specified by the Write Address), and as an indicator to represent the value in a register (specified by the Read Address). A Multi-State Switch can display up to 256 different shapes and text strings, corresponding to register values of 0 – 255.

Option List

The Option List Object provides a way to display a list of names corresponding to values in a register (**Monitor address**). The **Source of item data** selection determines how the Option List operates.

Predefine: The Option List displays a list of items where the item displayed or selected (configured on the **Mapping** tab) is determined by the value in a register. Optionally, selecting an item from the list can write its corresponding value to a register.

Dates of historical data: When data sampling (Data Sampling Object) or Alarms (Alarm/Event Log) are employed, the Option List can be used to list the dates corresponding to Historical data/event files for displaying in a Historical Trend Display, History Data Display, or History Event Display.

Item address: Custom text for the Option List can be stored in registers and changed or updated during runtime.

Control register: Set to 1 to update the item list.

Control register + 1: Determines the number of items in the list.

Item address: The starting address for the item list contents (ASCII or UNICODE).

Slider Object

The Slider Object is used as a control to change the value in a PLC register, or the value in a register in the HMI local memory (LW), based on the position of the slide control. Low and High limits can be configured based on constant values or on PLC/HMI register values, and the resolution of the slide control can be adjusted to accommodate the range of values in the register. The position of the Slider will change if the register value is changed by some other device.

Function Key

The Function Key Object is used to change windows, popup a window, return to a previous window, close a window, or input data as part of a keypad. It can also be used to execute a macro or print the screen to a USB flash drive, SD card, or printer.

Numeric Display

The Numeric Display Object is used to display the current value in a register. The value can be displayed as BCD, Hex, Binary, or Decimal (signed or unsigned).

Numeric Input

The Numeric Input Object is used to display the current value in a register and to change the value in the register using a popup numeric keypad (or external keyboard). The value can be displayed as BCD, Hex, Binary, or Decimal (signed or unsigned). The Numeric Input has the option to read and write to different registers, to set a notification bit when a value is entered, and to set a notification bit on an invalid (out-of-range) entry.

ASCII Display

The ASCII Display Object is used to display the value in one or more registers as text (ASCII characters or Unicode characters). Up to 64 registers can be displayed.

ASCII Input

The ASCII Input Object is used to display the value in one or more registers as text (ASCII characters or Unicode characters) and to change the value in the register using a popup ASCII (alphanumeric) keypad or external keyboard. Up to 64 registers can be written to and displayed.

Indirect Window

The Indirect Window Object is used to display a window based on the value in a register (specified by the Read Address). The window whose number appears in the register is displayed within the frame of the Indirect Window. The Indirect Window Object should be the same size as the window(s) that are being displayed. If the Indirect Window is too small, some information may not display properly.

The window is displayed as long as the value in the register contains the window number. Set the value to zero (or to a window number that hasn't been created) to clear the Indirect Window.

Direct Window

The Direct Window Object is used to display a window based on the state of a bit in a register (specified by the Read Address). The window being displayed is selected in the Attributes section of the Direct Window Object's Properties and appears within the frame of the Direct Window. The Direct Window Object should be the same size as the window being displayed. If the Direct Window is too small, some information may not display properly.

The window can be triggered to display for bit ON or bit OFF. Toggle the bit to turn the window on and off (the window can be triggered to display with bit ON or OFF).

Moving Shape

The Moving Shape Object is used to move a shape or picture on the screen based on values in consecutive registers (specified by the Read Address). The value in the Read Address register determines the state of the object and can be used to change its appearance. The value in the next consecutive register(s) determines the position of the part (relative to the object's initial position, in pixels). The position can be defined by X values, Y values, and XY values, where the Read Address + 1 = the X or Y position (for X axis only or Y axis only modes), or the Read Address + 1 = the X position and Read Address + 2 = Y position (for X & Y axis mode). These addresses define the position relative to the upper-left corner of the shape. The Min/Max XY values in the Moving Shape object's properties define the total area within which the object is allowed to move, regardless of the values in the controlling registers.

Animation

The Animation Object is used to move a shape or picture on the screen based on values in consecutive registers (specified by the Read Address). The value in the Read Address register determines the state of the object and can be used to change its appearance. The value in the next consecutive register (Read Address + 1) determines the preselected position of the part.

When the Animation Object is selected, the cursor changes to a crosshair (+). Left-click the mouse on each location where the object will appear. When all locations have been defined, right-click the mouse to finish drawing the object. There must be at least three positions defined. The first location is represented by a 0 in the register, the second location by a 1 in the register, and so on.

Media Player

The Media Player Object is used to play a media file on the HMI screen. The media file is stored on a USB flash drive or SD card connected to the HMI. Click the **Preview** tab to load the media file and view the file. If the file plays in the Preview tab, it will play in the simulator and the HMI. The media player supports the following formats: avi, flv, mov, mp3, mp4, mpg/mpeg, wav, wmv.

Specify the folder on the USB device where the media file(s) reside in the **Folder name:** field. The root folder is not allowed; and only one level is supported. For example, an entry of "video" specifies the folder "video" on the USB device, and is allowed. An entry of "video\files" specifies the folder "files" under the folder "video," and is not allowed.

Note: The Media Player is available only on the X series models.

Video In

The Video In Object is used to input and play video on the HMI from an external source. One of two video input channels can be selected either in the program or dynamically using a PLC register. The video inputs can be configured to accept NTSC or PAL video formats. A control function can be enabled that allows the value in a PLC register to control the video input.

Control Word address	0 = Stop playing 1 = Input Video 1 and display onscreen. 2 = Input Video 2 and display onscreen. 3 = Input Video 1 but don't display onscreen (available for capture function). 4 = Input Video 2 but don't display onscreen (available for capture function).
Control Word address + 1	0 > 1 transition toggles Pause/Play (register resets to 0 after each transition)

Recommended Format and Resolution

	100% (1:1)	50% (1:2)
NTSC	720 x 480	360 x 240
PAL	720 x 576	360 x 288

A capture function allows capturing video images and storing them as *.jpg files on a USB flash drive or SD card. The video capture is triggered by a PLC or local bit (OFF > ON) and can be configured to capture video once per second for a period of time defined by the **Record time**. The time **Before** and time **After** define the time period (up to 10 seconds each) before and after the trigger during which the video capture takes place. A buffer memory stores 10 seconds of captured video when the capture function is enabled. The capture function continues uninterrupted even if the video is in Pause mode.

Note: The Video In Object is available only on the X series models. It is standard on the HMI5150X and optional on the HMI5104XH and HMI5121X.

Bar Graph

The Bar Graph Object is used to display register data in a bar graph display. It can be configured to have alarm indicators using different colors on the bar graph to provide a warning when the value in the register is approaching a maximum or minimum allowable value.

Meter Display

The Meter Display is used to display register data in an angular position on an analog-style meter. The scale (tick marks) can be adjusted around the circumference of the meter and the pointer style can be changed. Scale values can be assigned to the tick marks by assigning a span range (e.g., 0-100).

It can be configured to have alarm indicators using different color bars around the inside of the meter to provide a warning when the value in the register is approaching a maximum or minimum allowable value.

Trend Display

The Trend Display Object is used to display real-time or historical data collected by the Data Sample Object on a line graph. Up to 20 channels can be displayed on the graph with data collected from consecutive addresses, and with different colors assigned to each channel (pen).

The Y-axis scaling is configured on the **Channel** tab with the **Zero** and **Span** fields (this defines the bottom and the top of the Trend Display and should contain the range of values in the data sample). The X-axis scaling is configured on the **General** tab with the **Distance between data samples** section. There are two options: **Pixel** (number of pixels between samples) and **Time** (sets the width of the entire Trend Display in seconds).

In **Real-time** mode, data is displayed on the graph as it is generated. In **History** mode, data is plotted from data log files saved in memory. A new data log file is created each day and can be displayed in the Trend Display by changing the value in the History Control register. When the value in the History Control register is 0, the data for today is displayed on the trend. When the value is 1, the data from yesterday is displayed, etc.

See Chapter 10 for more information on “Creating Trend Displays and Data Sampling Objects.”

History Data Display

The History Data Display Object is used to display historical data collected by the Data Sample Object in a table format. Up to 16 channels of data can be displayed from consecutive addresses, and can be any mix of data types (e.g., 16-bit unsigned, 16-bit signed, 32-bit float, etc.).

Note: The **History files** section in the Data Sampling Object must have a box checked (e.g., **Save to HMI memory**) and a **Folder name** defined in order for the data files to be stored and displayed in the History Data Display.

The History Control register is used to select the historical data file to display. When the value in the History Control register is 0, the data for today is displayed in the table. When the value is 1, the data from yesterday is displayed, etc.

Data Block Display

The Data Block Display Object is used to draw line graphs of the data contained in consecutive registers (up to 1024 consecutive registers). In addition, up to 12 individual sets of data can be displayed in the Data Block Display. The line graphs can display data in any supported format, but the data in each graph must be of the same format.

The Y-axis scaling is configured on the **General** tab with the **Minimum** and **Maximum** Limit fields (this defines the bottom and the top of the Data Block Display and should contain the range of data values). The X-axis scaling is configured on the **Display Area** tab in the **Data Samples** field (this defines the number of data samples to plot on a single screen).

The Control address specifies the address to use to control the selected channel (data set). Each channel has its own Control Word address. The following values can be written to the Control address to control the plot:

Trigger Value	Control Function
1	Draws the plot for the selected channel, leaves existing data. Can display up to 32 plots for 1 channel, 16 plots for 2 channels, 8 plots for 4 channels, etc.
2	Clears the plot for the selected channel.
3	Clears the plot for the selected channel, then redraws the plot with the current data.

The HMI will write a 0 to the Control Word address after the operation is complete.

If **Offset to start address** is unchecked, the following addresses are used by the Data Block Display:

Control Word address	Draws/clears the plot
Control Word address + 1	Defines number of data points to plot (n = up to 1024)
Data storage start address	First data point to plot
Data storage start address + 1	Second data point to plot
Data storage start address + n + 1	Last data point to plot

n = number of data samples

The number of data points must be stored at [control word address + 1], and the data must be stored starting at [Data storage start address] *before* the control value is written to the Control Word address.

If **Offset to start address** is checked, the following consecutive addresses are used by the Data Block Display:

Control Word address	Draws/clears the plot
Control Word address + 1	Defines number of data points to plot (n = up to 1024)
Control Word address + 2	First data point to plot
Control Word address + 3	Second data point to plot
Control Word address + n + 1	Last data point to plot

The number of data points must be stored at [control word address + 1], and the data must be stored starting at [control word address + 2] *before* the control value is written to the Control Word address. |

n = number of data samples

XY Plot

The XY Plot Object is used to plot one series of values against another series of values on a line graph.

The direction of the plot is defined in the **Direction** field as follows:

Direction	Result
Right	The origin is at the lower left. The X-axis moves to the right, the Y-axis moves up.
Left	The origin is at the lower right. The X-axis moves to the left, the Y-axis moves up.
Up	The origin is at the lower left. The X-axis moves up, the Y-axis moves to the right.
Down	The origin is at the upper left. The X-axis moves down, the Y-axis moves to the right.

The **No. of channels** field specifies the number of datasets to plot (up to 16 channels).

The **Control Address** specifies the address to use to control how the XY Plot operates. The following values can be written to the Control Address to control the plot:

Trigger Value	Control Function
1	Draws the plot for the selected channel, leaves existing data. Can display up to 32 plots for 1 channel, 16 plots for 2 channels, 8 plots for 4 channels, etc.
2	Clears the plot for the selected channel.
3	Clears the plot for the selected channel, then redraws the plot with the current data.

The HMI will write a 0 to the Control Word address after the operation is complete.

The **No. of data address** field is automatically assigned to the next consecutive address after the Control Address. It must be loaded with the number of pairs of X-Y data to plot. This value must be set before a trigger value is written to the Control Address. Up to 1023 data points can be plotted per channel.

The **Read address** field is the starting address of the data to plot. Each channel has its own **Read address**. Normally, the X and Y data are read from two consecutive addresses beginning with the Read address. To have the XY Plot use separate addresses for X and Y data, check the **Separated address for X and Y data** checkbox. Separating the X and Y data addresses also allows the X and Y data to have different formats. The first Read address field defines the X-axis data and the second Read address field define the Y-axis data.

The X-axis and Y-axis scaling is configured in the **Limits** section on the General tab. The Low and High limits define the left-to-right range and the bottom-to-top range for the X-axis and Y-axis respectively.

If **Dynamic limits** is checked, the limits are read from registers determined by the Read address as follows:

With **Separated address for X and Y data** unchecked

Read address	X minimum
Read address + 1	X maximum
Read address + 2	Y minimum
Read address + 3	Y maximum
Read address + 4	X Data 1
Read address + 5	Y Data 1
Read address + 6	X Data 2
Read address + 7	Y Data 2
Read address + n + 4	X Data n
Read address + n + 5	Y Data n

n = number of data samples

With **Separated address for X and Y data** checked

X Read address		Y Read address	
X Read address	X minimum	Y Read address	Y minimum
X Read address + 1	X maximum	Y Read address + 1	Y maximum
X Read address + 2	X Data 1	Y Read address + 2	Y Data 1
X Read address + 3	X Data 2	Y Read address + 3	Y Data 2
X Read address + 4	X Data 3	Y Read address + 4	Y Data 3
X Read address + n – 1	X Data n	Y Read address + n – 1	Y Data n

n = number of data samples

The appearance of the plot is configured on the **Display Area** tab, including the frame and background color of the display, and the color and width of the plot line. The **Maker** area lets you configure how the data for each channel is plotted:

Line: The data is plotted as a Line graph, with squares plotted at each data point.

Point: The data is plotted as squares at each data point.

X-axis projection: The data is plotted as a line graph (no squares). The plot is filled along the X-axis.

Y-axis projection: The data is plotted as a line graph (no squares) with the X and Y data transposed. The plot is filled along the Y-axis.

The **Reference line** section lets you configure up to four horizontal lines that can be drawn across the plot. Each line can be enabled separately, and can have a unique color and position. The position specified for each line is relative to the values entered in the **Low Limit** and **High Limit** fields. If the **Limit from PLC** box is checked, the reference lines are referenced to the values entered in the specified register addresses (low limit = value in register address; high limit = value in register address + 1).

Alarm Bar



The Alarm Bar Object is used to display alarms detected by the Alarm (Event) Log Object. It displays the alarm message for each current alarm in a single horizontal scrolling line across the Alarm Bar's display. Only the most recent alarm appears in the Alarm Bar.

Alarm Display



The Alarm Display Object is used to display alarms detected by the Alarm (Event) Log Object. It displays the alarm message for each alarm in a table format arranged in chronological order. All current alarms are displayed in the Alarm Display and are removed from the list once the alarm condition is cleared.

An Alarm Acknowledge function can be enabled, which provides a **Write address** for the Alarm Display. Each alarm/event can be acknowledged by touching the message in the Alarm Display. A different color can be assigned for the **Acknowledge** status.

An Indirect Window can be configured to popup when the alarm/event is acknowledged to provide additional information to the operator on how to proceed. The Indirect Window should be placed on the same window as the Alarm Display. The window number is configured in the Alarm (Event) Log's **Message** tab (**Write value for Event Display object**) and is written into the **Write address** assigned in the Event Display.

Event Display



The Event Display Object is used to display alarms or events monitored by the Alarm (Event) Log Object. Events can be displayed in **Real-time** or **History** mode. In **Real-time** mode, each alarm/event can be acknowledged by touching the alarm/event in the Event Display. Different colors can be assigned for the **Acknowledge** and **Return To Normal** statuses.

An Indirect Window can be configured to popup when the alarm/event is acknowledged to provide additional information to the operator on how to proceed. The Indirect Window should be placed on the same window as the Event Display. The window number is configured in the Alarm (Event) Log's **Message** tab (**Write value for Event Display object**) and is written into the **Write address** assigned in the Event Display.

In **History** mode, alarm/events from previous days can be displayed. The **Write address** changes to **History Control** address, and the value in the History Control register determines which historical data is displayed. When the value in the History Control register is 0, the data for today is displayed in the Event Display. When the value is 1, the data from yesterday is displayed, when the value is 2, the data from two days ago is displayed, etc. Use the Option List configured for "Source of item data: Dates of historical data" to select the day by date.

Check **Enable reading multiple histories** to display events from more than one day at a time. There are two modes:

With **Number of days** selected, the value entered in the History control register determines the starting day (most recent, where 0 = today) and the value in the History control register + 1 determines the number of days of data

to display (including the starting day). If three days are selected, but only two event files are included within the three day period, only two event files will be displayed.

With **Index of the last history** selected, the value entered in the History control register determines the starting day (most recent, where 0 = today) and the value in the History control register + 1 is the number of event files to display. This setting is not dependent on the date and the Event Display will display the designated number of event files from most recent to oldest.

 The Event Display can display up to 4MB of historical data. If the combined file size of the selected historical data exceeds 4MB, the most recent data is displayed and the oldest data beyond 4MB is not displayed.

Select **Enable event management** to control which events to display or hide, and allow users to delete selected events.

Control address	0 = All events are displayed. 1 = Confirmed events are hidden. 2 = Returned to normal events are hidden. 3 = Confirmed and returned to normal events are hidden.
Control address + 1	1 = Users can delete selected events in real-time mode.

Alarm (Event) Log

The Alarm (Event) Log Object is used to configure alarms and events. Select one of the **History files** checkboxes to save alarm/event files in HMI memory or to an SD card or USB flash drive. This is used when an Event Display is configured for History mode. The Preservation limit lets you limit the number of history files to save. A new file is created each day with the filename EL_yyyymmdd.evt where yyyy=year, mm=month, and dd=day. For example, the file for June 12, 2010 would be EL_20100612.evt.

Click the **New** button to create a new alarm/event. An alarm/event can be triggered by a bit or a word. The **Notification** field can be configured to set or clear a bit when the alarm is triggered.

The **Message** tab allows you to enter a message that will appear in the Alarm Bar, Alarm Display, or Event Display when the alarm/event is triggered. The **Write value for Event Display object** is used to enter a window number that is written to the Write address configured in the Event Display object. This window number is used by an Indirect Window configured to popup when an alarm/event is acknowledged.

For HMI5000 models with the audio line-out option, a sound can be played when the alarm/event is triggered. Click the **Enable** button and select a sound from the Sound Library.

The **WATCH** addresses can be used to display the data in up to four registers in messages. Click the **Syntax** button to see how to configure the message to display the data.

Data Transfer (Trigger-based)

The Data Transfer (Trigger-based) Object is used to transfer word-based data from the specified Source address(es) to the specified Destination address(es). This can be used to transfer data from one device to another.

The **Source** and **Destination** address fields define the starting addresses, and the **No. of words** field specifies how many consecutive addresses are transferred. The data transfer can be triggered by touch (**Touch trigger mode**) or by an external or internal bit (**External trigger mode**).

Backup

The Backup Object is used to copy recipe files (*.rcp), event files (*.evt), and data files (*.dtl) from the HMI's internal memory to a USB flash drive, SD card, or a PC connected via Ethernet.

When **Historical event log** or **Historical data log** is selected, the historical event logs or data logs can be saved in their native file formats (*.evt or *.dtl respectively) or in *.csv format. The range of history files can be selected and the backup can be triggered by touch (**Touch trigger** mode) or by an external or internal bit (**External trigger** mode).

When External trigger (word) is selected for the Trigger Mode, the following registers control the Backup, allowing the operator to define what files are backed up:

Trigger address: When the value changes from 0 to 1, the backup is triggered.

Trigger address + 1: Defines the start day for the backup.

Trigger address + 2: Defines the range of days to backup (maximum 90 days).

When the backup process starts, local bit LB9039 is set. When the backup is complete, local bit LB9039 is reset.

Timer

The Timer Object is used to control an output bit based on the state of an input bit and a measurement bit that is controlled by a preset time. There are five different configurations or modes for the timer including On Delay, Off Delay, Pulse, Accumulated On Delay, and Accumulated Off Delay.

When placed on a base window, the timer object is active only when that window is showing on the HMI. When placed on the Common Window (Window 4), the timer object is active at all times, regardless of which window is displayed on the HMI.

PLC Control

The PLC Control Object is used to perform a number of background tasks. Click the **New** button to set up a control object. Click **Type of control** to open a drop-down box with the following options:

Change Window

This causes the HMI to close the currently-displayed Base Window, and display the Base Window whose number is in the specified **Trigger address**.

The Change Window action occurs only when the HMI detects a *change* in the value of the specified Trigger Address. After the window is changed, the HMI will write the number of the newly-displayed window to (Trigger Address +1).

Write data to PLC (current base window)

When the HMI initializes, and when the Base Window changes (for any reason), the number of the new Base Window is written to the PLC Register specified by the **Trigger address**.

General PLC Control

Executes a data transfer of up to 32 words from the HMI to the PLC or from the PLC to the HMI when the value in the Trigger Address is set to a valid operation code. After the operation is complete, the HMI sets the value in the Trigger address to 0. A total of four values are needed to configure the General PLC Control attribute.

Address	Function	Details
Trigger address	Operation code. Valid codes are 1, 2, 3, 4. The Trigger address is set to 0 by the HMI when the transfer is complete.	1. PLC to HMI: RW (recipe words) 2. PLC to HMI: LW (local words) 3. HMI to PLC: RW to PLC 4. HMI to PLC: LW to PLC

Trigger address + 1	Number of words to transfer (32 words maximum)	The number of words to transfer from the PLC to the HMI or HMI to PLC.
Trigger address + 2	PLC Data Address Offset	The Address Offset (from the Trigger address + 4) at which the transfer of data to/from the PLC will start.
Trigger address + 3	HMI Data Address Offset	The Address Offset at which the transfer of data to/from the HMI will start.

Note: The HMI will transfer data to/from the Device Type specified by the Trigger address.

It is recommended that the data in (Trigger Addr + 1), (Trigger Addr +2), and (Trigger Addr +3) be set before writing the Operation Code to (Trigger Addr).

Backlight Control (Write Back)

Allows the PLC to control the HMI's backlight via the bit specified in the Trigger address. Once the requested operation has been performed, the HMI will reset the bit.

Note: The PLC Control Object may be configured with two *Backlight Control (Write Back)* items, with different bits for the On and Off control. The backlight can then be controlled directly from the PLC.

Backlight Control

Operates the same as the *Backlight Control (Write back)* attribute described above, but the HMI will *not* reset the bit specified in the Trigger address.

Sound Control

Plays the selected sound when the bit specified by the Trigger address matches the trigger mode conditions.

Execute Macro Program

Executes the designated macro when triggered by the bit specified in the Trigger address.

Note: Only available when a macro has been created in the project.

Screen Hardcopy

Prints the specified window when the bit specified by the Trigger address matches the trigger mode conditions. The **Source window for print** option provides the following selections:

Current base window: When the trigger occurs, the window currently displayed on the HMI is printed.

Window no. from register: When the trigger occurs, the window number is read from the specified register; the window is displayed and printed.

Designate window no.: The window is selected from a list during project development. When the trigger occurs, this pre-selected window is displayed and printed.

The Printer field allows you to select the destination for the screen hardcopy: a printer attached to the HMI, one of the USB ports, or the Remote Printer Server.

Data Transfer (Time-based)

The Data Transfer (Time-based) Object is used to transfer bit-based or word-based data from the specified **Source** address(es) to the specified **Destination** address(es) at periodic intervals. The interval is adjustable from 0.5 to 25.5 seconds, in 0.1 second steps.

The **Address type** selects whether the data transferred is word or bit, and the **No. of word/No. of bit** field specifies how many consecutive addresses are transferred. The **Source** and **Destination** address fields define the starting addresses.

Note: When transferring bits, bits can only be transferred to the local HMI's internal memory. It is not possible to transfer bits to a remote HMI or another PLC.

Data Sampling

The Data Sampling Object is used to create Data Logs. A Data Log gathers data that can be saved as History files to the HMIs internal memory, or to a compact flash, SD card, or USB drive (depending on the model). That data can then be displayed in a Trend Display or History Data Display in real-time or historical. The data can then be displayed in a Trend Display in real-time, and data files from previous days can also be displayed in History mode. The History Data Display can also display historical data in a table format.

The data files can also be transferred to a PC and saved in *.csv or *.xls format using the EasyConverter application (included with EZware-5000).

Note: Every 60 seconds, the HMI checks to see if the size of the updated data file exceeds 4000 bytes. If so, the data file is written to non-volatile memory.

Sampling can be configured to occur periodically (Time-based) with sampling intervals ranging from 0.1 second to 120 minutes, or it can be triggered by the state of a bit (Trigger-based). The **Read address** defines the starting address of the data samples and the **Data Record** area allows you to configure how many consecutive registers to sample.

The **Data Format** button opens a dialog to configure the format of a data log record. A record is a single line or group of lines of data. Different data formats can be used within the same record. When multiple items are configured in the same record, consecutive addresses are used beginning with the address specified in the **Read address**. The number of registers is determined by the number of items defined in the **Data Format** list and the size of each item (i.e., 16-bit or 32-bit). The first item is read from the specified **Read address**, the next item is read from the address after the **Read Address**, etc.

Note: When creating a Data Sample for use with a multi-pen Trend Object, use the **Data Format** button to configure the data for each of the trend's pens. Each additional item in the **Data Format** list will use the next consecutive address from the specified **Read Address**.

When logging data, one data file is created for each day. The data file has a file name of the form yyyyymmdd.dtl, where yyyy is the four-digit year; mm is the two-digit month (01 for January, 12 for December); dd is the two digit date.

System Message

The System Message is used to customize the content of system-generated messages.

Confirmation required: Message that is displayed when confirmation of an operation is required.

Password required: Message that is displayed when the current security level prevents an operation.

System error: Message that is displayed when the HMI experiences a critical internal error. Contact Maple Systems if this message is displayed.

Scheduler

The Scheduler is used to change a bit or a word based on a time schedule. Each scheduled action can have a start time and an end time. Up to 32 items can be entered in the Scheduler list.

Power-ON start/end action: Determines the action to perform when the HMI is turned ON.

When checked: If the HMI is turned ON within the scheduled time range, the start action is performed immediately. If the HMI is turned ON outside of the scheduled time range, the end action is performed immediately (if enabled).

When unchecked: If the HMI is turned ON within the scheduled time range but after the start time, the start action is not performed but the end action is performed (if enabled). If the HMI is turned ON outside of the scheduled time range, no action is performed.

Action modes include **Bit ON**, **Bit OFF**, or **Word write**.

Bit ON: Start action sets the **Action address** bit. End action clears the **Action address** bit.

Bit OFF: Start action clears the **Action address** bit. End action sets the **Action address** bit.

Word write value settings – Constant: Start action writes the **Start value** into the **Action address register**. End action writes the **End value** into the **Action address register**.

Word write value settings – Address: Start action writes the value stored in the designated register into the **Action address register**. End action writes the value stored in the designated register+1 into the **Action address register**.

Note: The end action is only available when **Enable termination action** is checked on the **Time Set** tab.

Click the **Time Set** tab to configure the start and end times for the scheduled action. When **Constant** is selected, the action is configured to occur on the specified days at the specified times. Multiple days can be selected. If the start and end times need to span several days, select the **Setting on individual day** checkbox.

When **Address** is selected, the start and end times are determined by values in 11 consecutive registers beginning with the designated **Time setting address** as follows:

Address	Function	Details
Time setting address	Control	Set to 1 to load the Scheduler with the current time data. Do this each time the start and end times are updated in the registers.
Time setting address + 1	Status	Bit 0 is set when the time data has been properly loaded. Bit 1 is set when there has been an error in loading the time data.
Time setting address + 2	Action mode	Set Bit 0 to use end time. Clear Bit 0 and the Scheduler will not use end time.
Time setting address + 3	Start time (day)	Bits 0-6 determine day of the week the Start Action is executed. Bit 0=Sunday; Bit 6=Saturday.
Time setting address + 4	Start time (hour)	This register determines the hour the Start Action is executed. Range is 0-23.
Time setting address + 5	Start time (minute)	This register determines the minute the Start Action is executed. Range is 0-59.
Time setting address + 6	Start time (second)	This register determines the second the Start Action is executed. Range is 0-59.
Time setting address + 7	End time (day)	Bits 0-6 determine day of the week the End Action is executed. Bit 0=Sunday; Bit 6=Saturday. Note: If bit 0 of the <i>Action Mode</i> register is clear, the Scheduler will not execute the <i>End Time</i> action.

Time setting address + 8	End time (hour)	This register determines the hour the End Action is executed. Range is 0-23.
Time setting address + 9	End time (minute)	This register determines the minute the End Action is executed. Range is 0-59.
Time setting address + 10	End time (seconds)	This register determines the second the End Action is executed. Range is 0-59.

Drawing Tools

Includes Line, Arbitrary Line, Link Line, Arc, Ellipse/Circle, Pie, Rectangle, Polygon, Scale, Text, Picture, Shape.

Refer to the Help file for instructions in using each individual drawing tool (Help > Parts List > By Function > Drawing Objects).

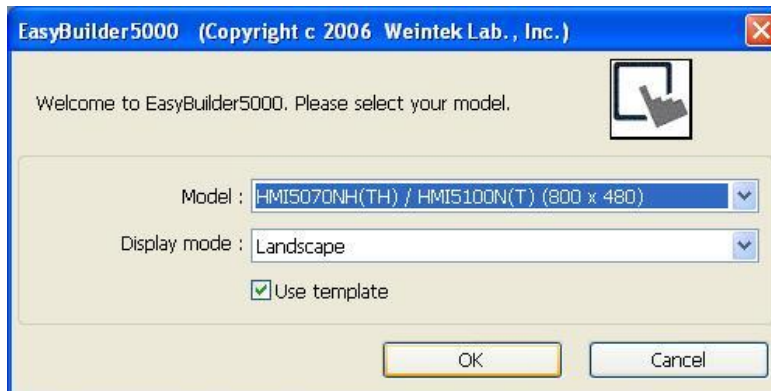
Managing Projects

Like most Windows™ application software, EasyBuilder will open, save, close, and print files using the standard windows format.

Opening, Editing Projects

► To create a new project

1. On the File menu, click **New** or click the **New** icon in the Standard toolbar. The EasyBuilder dialog box appears.



2. Select the HMI model that you intend to use with your project and whether you want to use the HMI in Landscape or Portrait mode (if available for your model). Select the **Use template** checkbox to open the project with the default template for your selected model.
3. Click **OK**. The System Parameter Settings window opens next. Refer to the Help menu "How Do I... Set Up a PLC or Controller in EasyBuilder?" to configure the devices in the Device List. You may also jump ahead to "Chapter 6 – Using EZware-5000" (*System Parameter Settings* on page 83). Click **OK** to accept the settings.

► To open an existing project

1. On the **File** menu, click **Open** or click the Open icon in the Standard toolbar. The Open dialog box appears.
2. Click on the project file you intend to open.
3. Click **Open**. The main screen of EasyBuilder appears with the initial screen of the project displayed.

► To close a project:

1. On the **File** menu, click **Close**.
2. If changes have been made to the project file, EasyBuilder will ask you if you would like to save the project. Then the main screen of EasyBuilder will remain but with no work area displayed. You must now use the **Open** or **New** commands to edit a project.

► To save an existing project

1. On the **File** menu, click **Save** or click the Save icon in the Standard toolbar.
2. If the project already has a name, then the project will automatically be saved. If this is a new project, then the **Save As** dialog box appears.

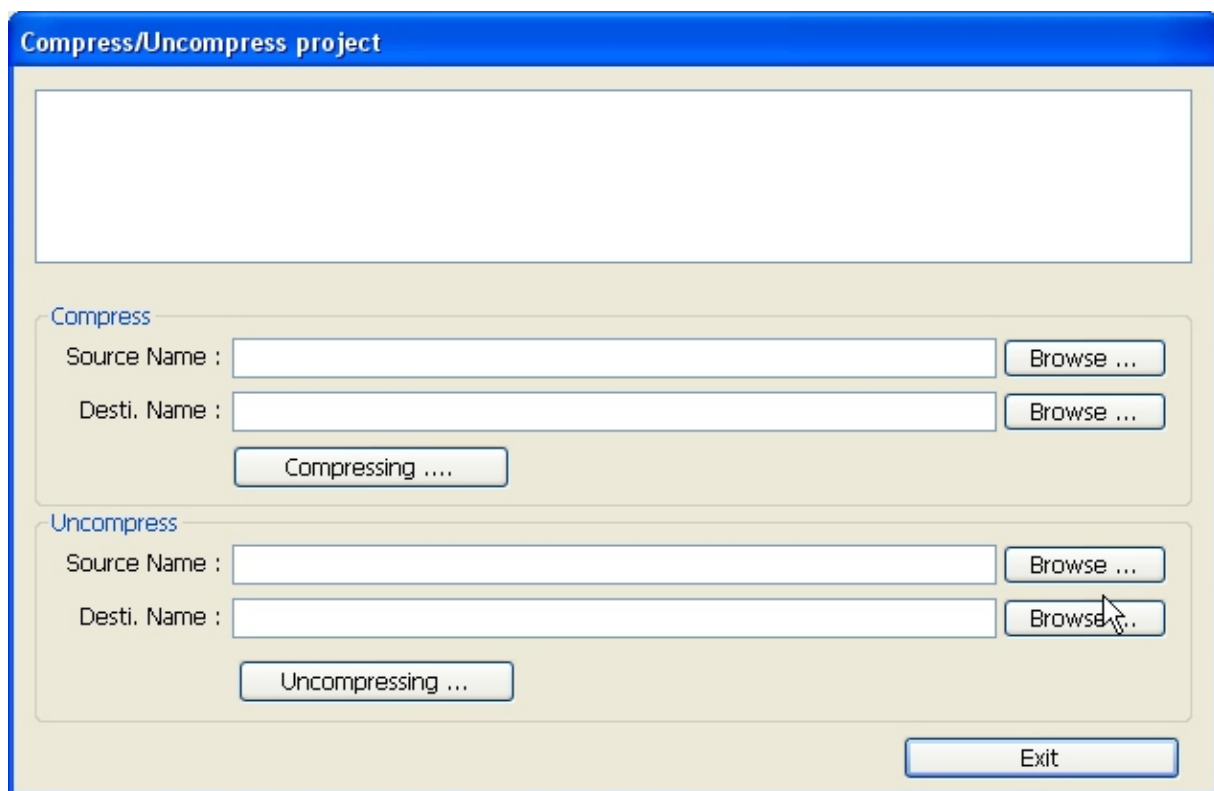
3. Enter a file name and then click **Save**.
4. The main screen of EasyBuilder reappears.

► *To save a project using the compress feature:*

The compress feature allows you to save a project in compressed format so that the project data takes less space on your hard drive. This utility also will save the graphics libraries associated with the project into the compressed file. This facilitates sending a copy of the project to another person who has EZware in order to open and download the project into an HMI. It is also the best way to archive and backup your projects when you have completed them.

⚠ The compress feature doesn't save the fonts used in the project. It is best to use common Windows True Type fonts (or the HMI True Type fonts) in your project so that if it is opened on another computer, EasyBuilder will have access to the same fonts.

1. From the **Tools** menu, select **Compress/Uncompress....** The Compress dialog box appears.



2. In the Compress box under **Source Name**, select the project (*.mtp) file that you wish to compress. The file must have a .mtp extension.
3. Click **Compressing...** to begin. The utility will compress the project file and all related graphics libraries into a single file.

► *To extract a compressed project file:*

1. From the **Tools** menu, select **Compress/Uncompress....** The Compress dialog box appears.
2. In the Uncompress box under **Source Name**, select the project (*.cmp) file that you wish to uncompress.
3. Click **Uncompressing...** to begin. The utility will extract the project file and all graphics libraries from the *.cmp file.

Note: It is a good idea to backup your Library folder before uncompressing a *.cmp file because the uncompress utility will overwrite any existing library files with the same name. You also have the option not to overwrite existing files, and in most cases this is okay unless the project being uncompressed uses modified libraries with the same names as the standard libraries in the Library folder.

► To exit EasyBuilder

On the **File** menu, click **Exit** or click on the standard windows Close icon in the upper right corner.

Display Options

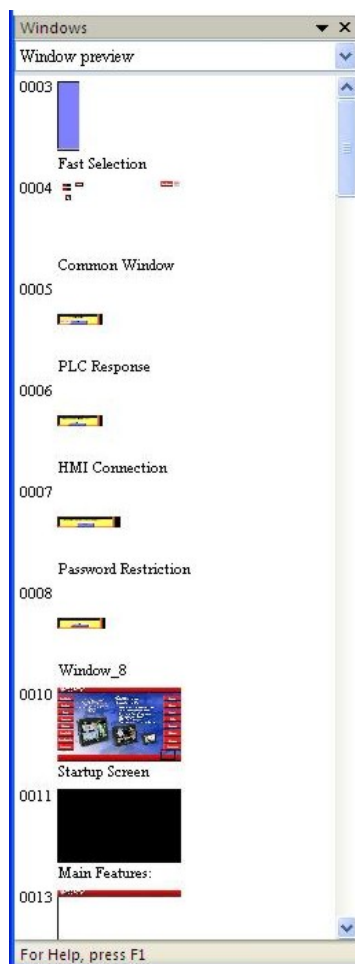
EasyBuilder provides a Window Tree that can be used to easily maneuver between windows of a project. It also allows you to select any object that is on the window that is currently displayed.

► To display/hide the Window Tree

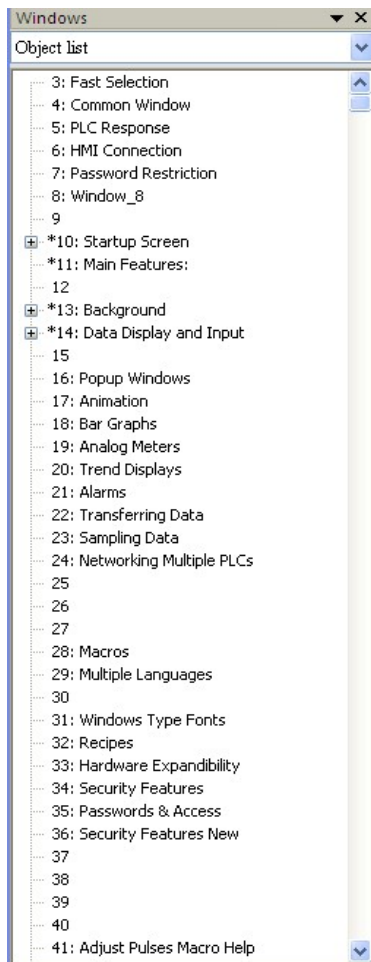
1. On the View Menu, click Window Tree

Using the Window Tree to display window screens

1. At the top of the Window Tree, there is a drop-down box that allows you to select either Object List or Window Preview. The Window Preview displays thumbnail views of each of the windows in the project.



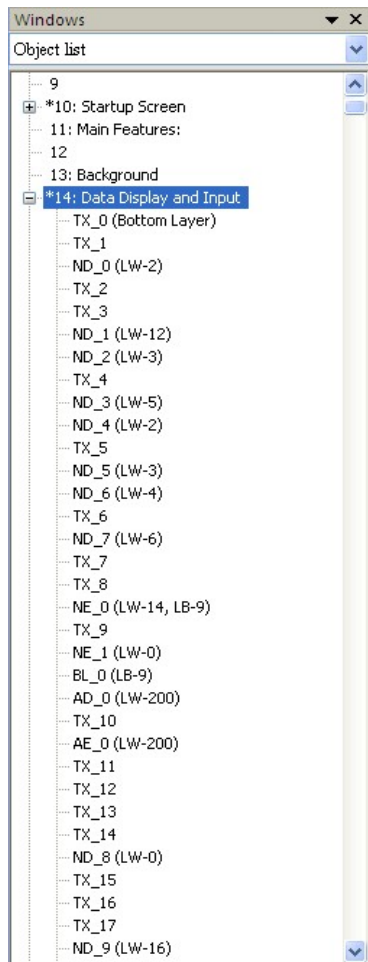
2. The Object List combines a list of all of the windows in a project, and all of the objects on each window, into a single tree. Notice that the tree displays the title for each window next to the window number. This makes it easy to determine the windows that have been created for a project. An asterisk (*) next to a window indicates that the window is currently open.



3. To display an open window, click on the *window number* in the Window Tree. To display a window that is not yet open, double-click on the *window number*. This will automatically open the window and display it.
4. To change any settings or close an open window, click on the *window number* to select it. Then right-click anywhere inside the Window Treebar to display a popup dialog box. Select **Close** to close the window or **Setting** to change any of the window settings.
5. Finally, to create a new window click on any window number that is not currently used. Then, right-click inside the Window Tree and select **New**.

Using the Window Tree to change object attributes

1. On the Window Tree, click + adjacent to any window number. The tree will expand to list the objects on that window, as shown:



2. The Object ID of each object will be listed. For example, TX_0 is Text Display #0, ND_0 is Numeric Display #0, etc.
3. To highlight a particular object on the screen, click on the Object ID in the list. This allows the quick selection of a particular object, especially on crowded screens or screens where objects may be overlapping.
4. To display the object's attribute dialog box, double-click the *Object ID* in the Window Tree.

Using the grid function



One display option is to have the work area covered with grid lines. These grid markings can be helpful when trying to align objects that are created on the work area. If grid lines are selected, you can decide what size each grid is.

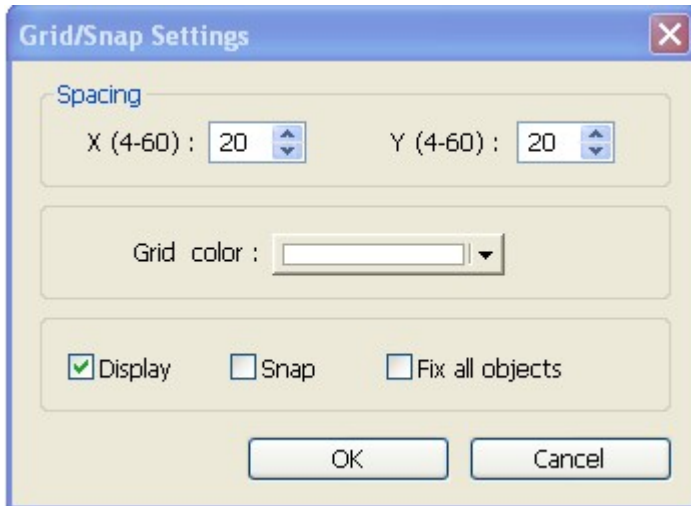
► Turning the Grid on and off:

1. On the **Option** menu, click **Grid/Snap**.
2. Click the Display box or click the Grid icon in the Standard toolbar to turn the grid on and off.

 If you still don't see the grid after you have enabled it, make sure that the color of the grid doesn't match the background color of the window currently displayed.

► *Changing the grid size and color:*

1. On the **Option** menu, click **Grid/Snap**.
2. Select the **X spacing** and **Y spacing** for grid size.



 Spacing is measured in pixels.

3. Select the **Grid color** in the drop down menu.

If you enable the Grid on the work area, you may also take advantage of a useful feature called Snap. The Snap option causes all objects placed into the work area to fall along the boundaries set by the grid lines. The Snap option can help provide a more ordered appearance to graphics objects.

► *Using the snap option*

1. The Grid option must be enabled.
2. On the **Option** menu, click **Grid/Snap**. The Grid/Snap Settings dialog box appears.
3. Click the **Snap** checkbox.
4. Click **OK**.

Finally, you will find that you can move objects by selecting them with the mouse cursor and dragging them to a new location. However, you may find it difficult to select an object *without* accidentally moving it just a little. At times this may be frustrating, so you may wish to disable the move feature using the mouse and only move an object by changing its X and Y position parameters in the Profile tab of the object's attributes box. This is the intent of the Fix all objects feature.

► *To enable the fix objects command*

1. On the **Option** menu, click **Grid/Snap**. The Grid/Snap Settings dialog box appears.
2. Click the **Fix all objects** checkbox.
3. Click **OK**. Movement by mouse cursor is now disabled.

► *To zoom in on the selected window*

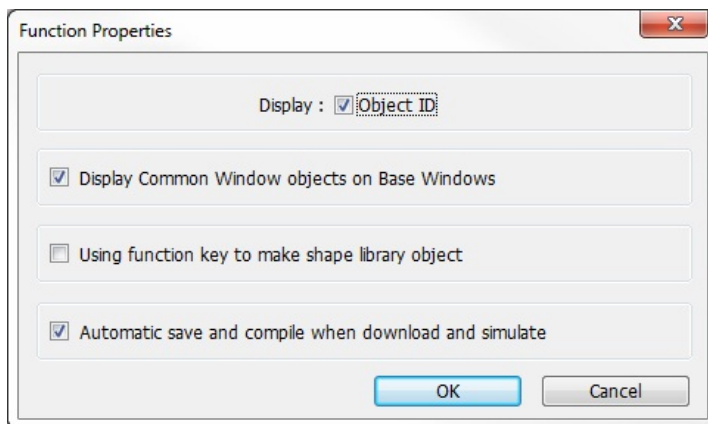
1. Use the zoom pull-down menu in the Edit Toolbar. Zoom levels range from 50% to 200% in 25% increments.
2. On the **View** menu, select **Zoom Level**. Zoom levels range from 50% to 200% in 25% increments.

Another option is to display what are known as Object ID tags. Every time you create a new object in EasyBuilder, an Object ID tag is assigned to the new object. This is done for several reasons:

- Object ID tags are required by EasyBuilder to differentiate each object created.
- If an error occurs during the compile process, EasyBuilder can refer to the window and object ID to indicate the object that is causing problems.

► *To enable/disable Object ID tags*

1. On the **Option** menu, click **Function Property**. The Function Properties dialog box appears.



2. Click the **Display Object ID** checkbox to display tags.
3. Click **OK**.

The **Function Properties** dialog also has the following options:

Display Common Window objects on Base Windows: When unchecked, objects on the Common Window will not appear on base windows in the EasyBuilder-5000 development screens. Objects on the Common Window will always appear on the base windows when the project is downloaded to the HMI. Check this to enable viewing the Common Window objects on the base windows in the development screens.

Using Function key to make shape library object: Allows shapes to be placed inside the area defined by a Function Key before being imported into a Shape library. This allows a shape to occupy any position inside a shape library cell. See "Help > How Do I...Add a New Shape or Picture into the Libraries?" for more information.

Automatic save and compile when download and simulate: This option causes EasyBuilder-5000 to automatically save and compile the project when a Simulation is started or prior to commencing a download to the HMI.

► *To change the state of the selected window*



1. Click the **State** pull-down menu in the State Toolbar and select the State number you wish to display (0-255).
2. The objects will appear as they would in the selected state.

Basic Editing Commands

► To select a graphics object



1. On the **Edit** Menu, click **Select** or click the mouse cursor icon in the **Draw Toolbar**.
2. Click on the graphics object. This causes the text box to be selected, with small square blocks around the edges indicating the boundaries of the object. Deselect the object by clicking somewhere else in the work area.
3. When a graphics object is selected, it can then be modified, copied, deleted, or moved to a new location.

► To select multiple graphics objects

1. On the **Edit** Menu, click **Select** or click the mouse cursor icon in the **Draw Toolbar**.
2. Click and hold down the left mouse button at the upper left corner of the graphics objects you wish to highlight.
3. Drag the mouse cursor to the lower right corner of the highlighted objects. Notice that a rectangle is formed as you do this.
4. Release the mouse button. The rectangle outline changes to small clear square blocks around the perimeter of the objects selected. Now both objects are selected.

 If you do not completely enclose any graphics objects you wish to highlight, then they will not be selected.

5. Alternatively, you may select objects by holding down the CTRL key while selecting each object until all objects are selected.
6. When several graphics objects are selected, they can easily be moved, deleted or copied together.

► To select next object



1. This option can be used to easily select an object that is underneath another object on the screen. To use this option, you must first select the overlapping object.
2. On the **Edit** Menu, click **Select Next Object** or click on the Select Next Object icon on the **Standard Toolbar**. You can also right-click on the top-most object on the screen. This will display a menu with a list of the overlapping objects on the bottom. Then check the object that you wish to access.
3. Once the object you are trying to access is selected, you can proceed to modify its attributes or delete it.

► To select all objects

1. On the **Edit** Menu, click **Select All Objects**.
2. Small, clear, square blocks appear around the perimeter of all the objects on the window.
3. You can now easily move, delete or copy the entire window screen to a new window.

► Using the Undo and Redo commands

1. The **Undo** command is used to cancel the last command or action that you made.
2. Press the **DELETE** key on your keyboard to delete the text box.

- From the **Edit** menu, click **Undo** or click the Undo icon from the **Standard Toolbar**. You can also press **CTRL+Z**. The deleted text box reappears.
- The **Redo** command is used to cancel the **Undo** command.

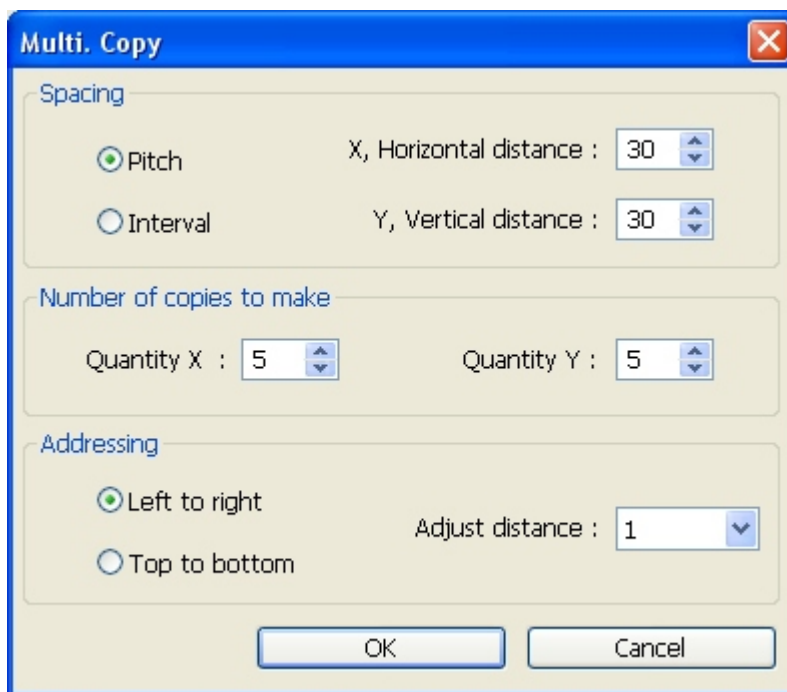
► Using the Cut , Copy , and Paste  commands

- These commands are all selected from the **Edit** menu.
- Select the graphics object or objects you wish to cut or copy.
- Click **Cut** to copy and remove the graphics object(s) from the work area or click **Copy** to copy the graphics object(s).
- Objects cut or copied from one window can be pasted into other windows. Once the object has been selected and cut or copied, open another window, then paste the object into that window.
- The pasted object appears highlighted in the upper leftmost corner of the work area.
- Move the object by clicking on the highlighted area and dragging it to the desired position.

► Using the Multi-Copy command

The Multi-Copy command is used to make multiple copies of a single object on a screen. This is most useful when creating new keyboards or data tables. In addition to copying the object, this command will automatically assign new memory addresses to each object.

- Select the object you wish to copy.
- From the **Edit** menu, select **Multi. Copy....** The Multi. Copy dialog box appears.



- Modify the settings according to your requirements.
- Click **OK**. The main screen of EasyBuilder is redisplayed with the Multi. Copy command executed.

Multiple objects can be created according to these parameters:

Pitch vs. Interval: This setting affects how EasyBuilder places the copies of an object on the screen relative to each other. The **Pitch** setting will interpret the X Distance setting as the distance from the left side of an object to the left side of the next object and the Y Distance setting as the distance from the top of one object to the top of another object.

The **Interval** setting will interpret the X Distance setting as the distance from the right side of one object to the left side of the next object. The Y Distance setting is the distance from the bottom of one object to the top of the next object.

X, Horizontal Distance and Y, Vertical Distance: These settings determine the spacing (in pixels) between objects.

Quantity X and Quantity Y: These settings determine the number of copies to be made along the X axis (horizontal) and the Y axis (vertical).

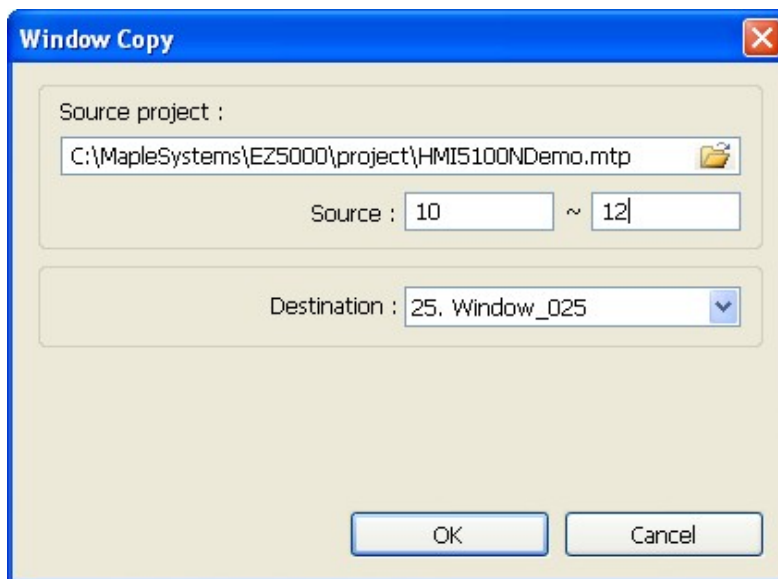
Left to right and Top to bottom: When **Left to right** is selected, objects are created and addressed in the X-axis first and then in the Y-axis. When **Top to bottom** is selected, objects are created and addressed in the Y-axis first and then in the X-axis.

Adjust Distance: This is the offset used when assigning a new address to each new copy. For example, if 1 is selected, then EasyBuilder will add one to the address for each new copy made.

► *Using the Window Copy command*

The Window Copy command is used to copy a window from an existing project into the project that you are currently editing. This feature reduces time spent creating new projects since you can now use windows that you created for other similar projects.

1. From the **Edit** menu, select **Window Process** and click **Window Copy....** The Window Copy dialog box appears.



2. In the **Source project** box, specify the path to the project that contains the window screen(s) you wish to copy. Use the Browse... button  to navigate to the project if you are unsure of the location or name of the project file.
3. In the **Source** boxes, enter the numbers of the window screen(s) you wish to copy. They must be consecutive windows. If you are only copying one window, put the same window number in both boxes.

4. In the **Destination** box, enter the number of the window in the current project that you wish to copy the selected window(s) to. If multiple windows are selected, they will be copied into consecutive windows beginning with the one designated in the **Destination** window.
5. Click **OK**. The EasyBuilder Destination window is redisplayed with the Window Copy command executed.

► *To delete a graphics object(s)*

1. Select the object or objects you wish to delete.
2. Press the **DELETE** key or from the **Edit** menu, click **Delete**.

 You can restore the deleted object by using the **Undo** command.

► *To move a graphics object(s)*

1. Select the object or objects you wish to move.
2. When you place the mouse cursor over a highlighted object, the cursor changes to a crosshair. This indicates that you are able to move the selected object. Move the object by clicking on it and dragging the object to the proper position on the work area.

► *To resize a graphics object*

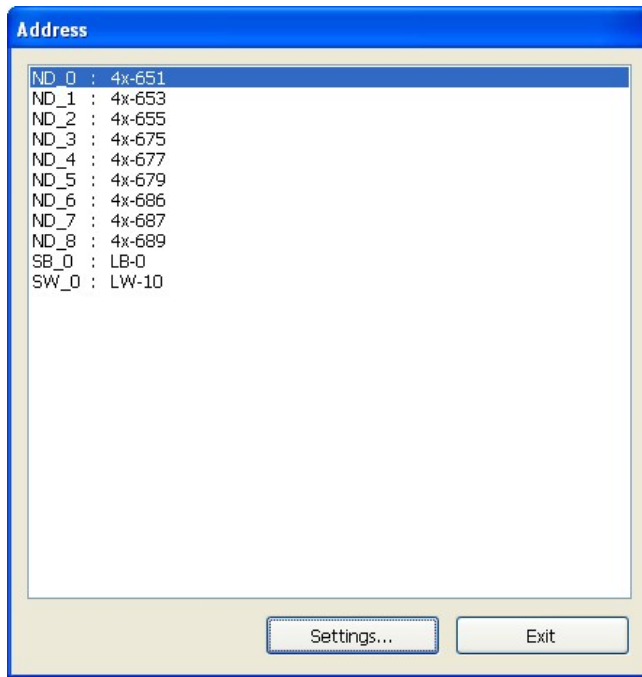
1. Select the object to be resized.
2. To resize the object, move the mouse cursor over one of the small black squares. The cursor changes to a double-arrow icon to indicate that it is in resizing mode.
3. Click and drag the mouse to resize the object.
4. Objects can also be resized by changing the width and height attributes in the **Profile** tab of the **Attributes** dialog box (see below).

► *To change attributes of a graphics object*

1. Select the object to be changed, then select **Change Object Attributes** from the Edit menu. You can also double-click the object.
2. The object's attribute dialog box is displayed. Object Attributes defines what the object is or how it behaves, (i.e., size, position, color, etc.). Click **OK** to accept any changes made or **Cancel** to cancel any changes.

► *To view object attributes of multiple graphics objects on a window*

1. There will be times when you may want to quickly determine what PLC data registers are tied to which objects in a window. This can easily be done using the object attributes command.
2. On the **Edit** menu, click **Select all objects**.
3. From the **Edit** menu, click **Change Object Attributes**. The Object Attribute dialog box is displayed.



4. All of the objects that use PLC data registers or the internal memory of the HMI are listed in this dialog box according to their Object ID tag. Alongside each ID tag is the PLC or HMI memory identifier.

Grouping Objects

When creating graphics on a window, you may create a complex graphic that is actually composed of several simpler objects grouped together. Grouping objects together makes it easier to move or copy multiple objects at the same time.

► To group objects

1. Select the objects to be grouped.
2. From the **Edit > Group** menu, click **Group** or click the Group icon from the Edit toolbar.
3. All objects within the group can now be copied, deleted, or moved by clicking on the group.

► To ungroup objects

1. Select the objects to be ungrouped.
2. From the **Edit > Group** menu, click **UnGroup** or click the **UnGroup** icon from the Edit toolbar.
3. All objects within the group can now be copied, deleted, or moved separately.

Layering Objects

Graphics objects can be overlaid upon each other. When 'layered' the graphics object on the topmost layer will be completely seen. How much of the other graphics objects are seen depends on what is on top of them. The following layer commands help to position the overlaid objects exactly how you want them.

Top Layer:  Brings the selected object to the top layer.

Bottom Layer:  Send the selected object to the bottom layer.

Previous Layer:  Moves the selected object to the previous layer.

Next Layer:  Moves the selected object to the next layer.

Normally, an object that is controlled by a PLC Register (i.e., a Word Lamp, Bit Lamp, Animation, etc.) is brought to the Top Layer when the value in the PLC Register changes. This behavior can be changed by the **Object Layout** option on the **General** tab of the System Parameters dialog. A setting of **Control** sets the behavior as outlined above. A setting of **Nature** (default setting) results in the object remaining at the layer assigned during development.

 The **Object Layout** setting is global and affects all PLC-controlled objects in the application.

Nudging Objects

Nudging is used to fine-tune the movement of objects in the work area of EasyBuilder. Using the nudge feature on a selected object will move that object in the specified direction either by one pixel or by the grid setting amount.

Use the nudge up , down , left , and right  commands (**Edit > Nudge** or the Nudge icons in the Edit toolbar) to move objects on the window. This function is duplicated with the arrow keys on the keyboard.

Aligning Objects

The alignment tools can be used to quickly align two or more objects. Aligning justifies objects to the desired position of the last-selected object. The last selected object will have "handles" of a different color than the other selected objects.

Use the align left , align right , align top , align bottom , horizontal center , and vertical center  commands (**Edit > Align** or the Align icons in the Edit toolbar) to clean up the alignment of objects on the window.

Making Objects the Same Size

This feature is handy if you want to quickly make two or more objects the same size. Objects are sized to the size of the last-selected object. The last-selected object will have "handles" of a different color than the other selected objects. This is most often used when you are trying to overlap objects that must be the same size. To better illustrate, refer to the left side of Window_12 of the sample project:

► To make objects the same width  :

1. Select the objects you wish to make the same width.
2. From the **Edit** menu, select **Make Same Size**, then **Width** or click the Make Same Width icon from the Edit toolbar.

► To make objects the same height  :

1. Select the objects you wish to make the same height.
2. From the **Edit** menu, select **Make Same Size**, then **Height** or click the Make Same Height icon from the Edit toolbar.

► To make objects the same size  :

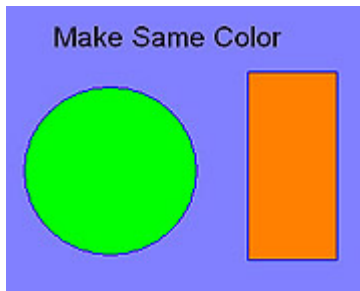
1. Select the objects you wish to make the same size.
2. From the **Edit** menu, select **Make Same Size**, then **Both** or click the Make Same Size icon from the Edit toolbar.

Making Objects the Same Color

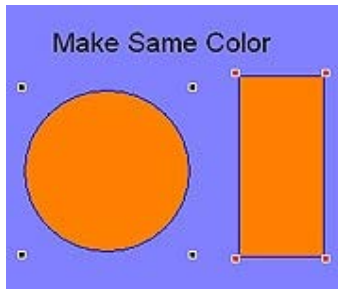
This feature can be used to make two or more drawn objects the same color.

► To make objects the same color

1. Select the objects that you wish to make the same color. EZware will choose the color of the last selected object.



2. From the **Edit** menu, select **Make Same Color**. The selected objects will all change to the same color as the last selected object.



Flipping, Rotating, and Locking Objects

These three commands allow you to quickly 'flip' or position an object in a new direction.

► To flip objects vertically  :

1. Select the object you wish to flip vertically.
2. From the **Edit** menu, select **Flip/Rotate > Flip Vertical** or click the Flip Vertical icon from the Edit toolbar.

► To flip objects horizontally  :

1. Select the object you wish to flip horizontally.
2. From the **Edit** menu, select **Flip/Rotate > Flip Horizontal** or click the Flip Horizontal icon from the Edit toolbar.

► To rotate objects :

1. Select the object you wish to rotate.
2. From the **Edit** menu, select **Flip/Rotate > Rotate 90 Degrees** or click the Rotate icon from the Edit toolbar.

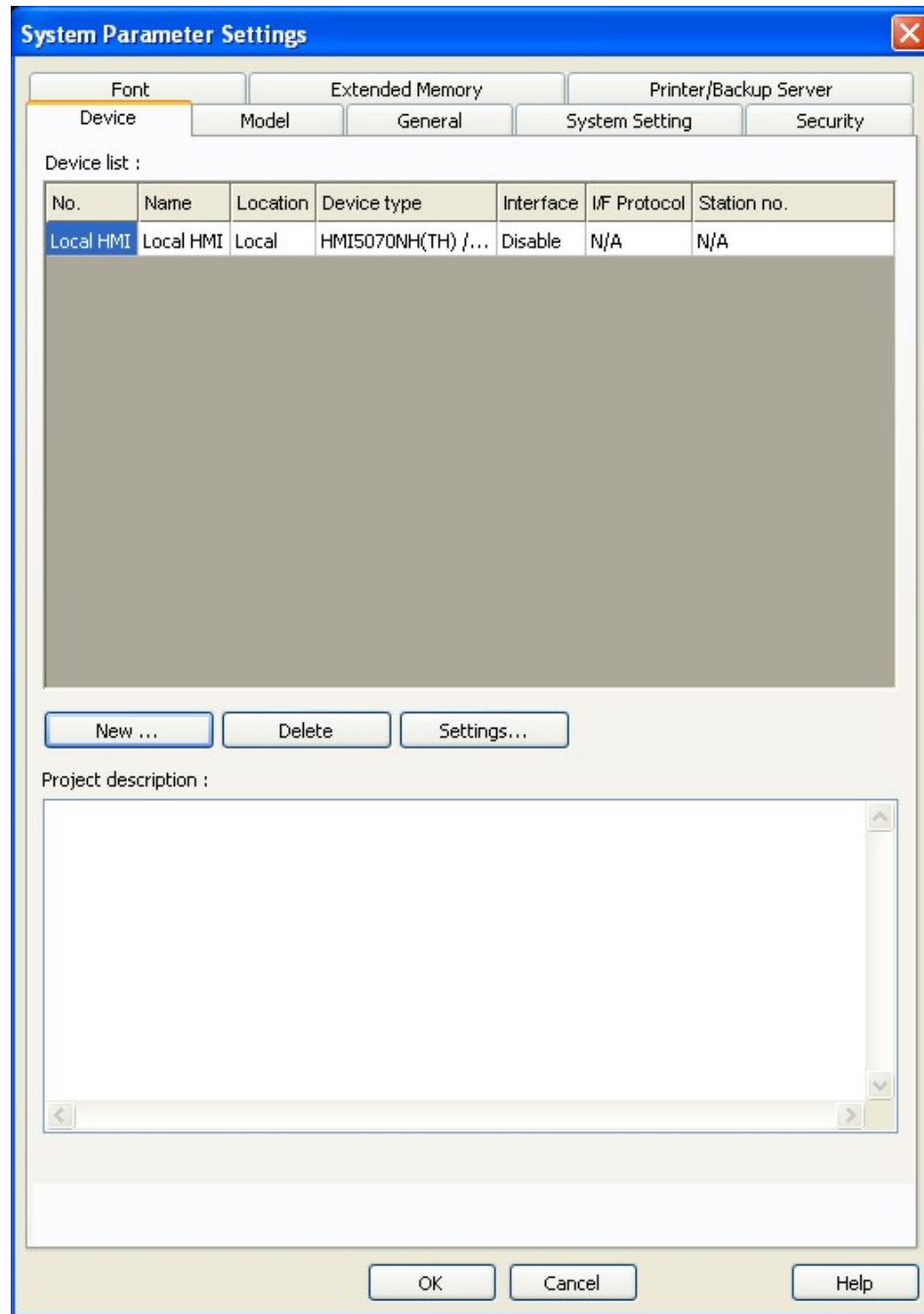
► To lock an object :

Each object position and size can be locked by using the Pin button. When the object is locked, its position and size cannot be changed.

1. Select the object you wish to lock.
2. From the **Edit** menu, select **Pinned** or click the Pinned icon from the Edit toolbar.
3. To unlock the object, deselect **Pinned** from the **Edit** menu or click the Pinned icon once again in the Edit toolbar.

System Parameter Settings

The final section of this chapter shows all the settings or parameters that can be configured using EasyBuilder. From the **Edit** menu, select **System Parameters**. The **System Parameter Settings** dialog box appears. The dialog box has eight tabs: Device, Model, General, System Setting, Security, Font, Extended Memory, and Printer/Backup Server.



► To configure Device tab settings:

1. Click the **New...** button. The **Device Properties** dialog appears.

☞ You can “export” a project created for one PLC brand to a different PLC brand by loading the project file into EasyBuilder, then entering a different PLC type in this box. EasyBuilder will go through your entire project and attempt to change each reference to PLC data registers to a logical selection for the new PLC protocol; however, we strongly recommend that you review these changes to assure that they are satisfactory.

2. Make sure the **PLC** button is selected.
3. There are two choices for **Location** – either **Local** or **Remote**. Select **Local** if the PLC will be connected directly to the HMI. Select **Remote** if the PLC will be connected to a remote HMI via Ethernet. If **Remote** is selected, then click the **Settings** button and configure the appropriate IP settings.

IP Address: Enter the IP address of the remote HMI.

Port No.: Enter the TCP/IP port assigned to the remote HMI during its configuration (default is 8000). Click **OK**.

4. Click the **PLC type** drop-down box and select the appropriate driver for your PLC type.
5. There are five selections for **PLC I/F**:
RS-232 / RS-485 2W / RS-485 4W / Ethernet / USB
Choose the PLC interface appropriate for your PLC model.

6. Select the PLC station number for your PLC if appropriate (see Controller information Sheet for your PLC) and then click **Settings...** The **COM Port Settings** dialog appears.

7. Select the appropriate **COM** port. This is the COM port used by the HMI.
8. Select **Baud rate**, **Data bits**, **Parity** and **Stop bits**. Use Maple Systems' Controller Information Sheets or the PLC manufacturer's operations manual for information on the communications parameters required by the PLC. These parameters must match the PLC settings.
Timeout adjusts the amount of time (in seconds) it takes for the *PLC no response* message to popup when communication is lost or disrupted between the HMI and PLC.
Turn around delay adjusts the amount of time (in milliseconds) that the HMI waits after receiving a reply before sending the next request.
Send ACK delay and the **Parameter 1-3** settings are optional depending on the PLC type. Refer to the Controller Information Sheet for the PLC selected.
9. Click **OK**.
10. **PLC default station no.:** Defines the station number or unit ID number of the PLC, if applicable (e.g., Modbus station number).
11. **Default station no. use station no. variable:** Enables using a Local Word (where LW10000-LW10015 corresponds to var0-var15) to define the station number. By using the var syntax in the address field (e.g., var0#100), the station number can be changed at runtime by changing the value in the corresponding Local Word.
12. **Use broadcast command:** When enabled, causes the HMI to not expect a response from the station number specified by the **Broadcast station no.** field.
13. **Interval of block pack (words):** Determines how many words are read from the PLC in one communication cycle. For more information on this feature, select **Help > Help Topics** in EasyBuilder-5000 and select **Miscellaneous > Optimizing the Update Rate With PLC Block Pack**.
14. **Max. read-command size (words):** The maximum data size to be read from a device at one time.
 The **Interval of block pack (words)** setting must be less than this setting.
15. **Max. write-command size (words):** The maximum data size to be written to a device at one time.
16. Click **OK**.

► To configure the Model tab settings:

The screenshot shows the 'System Parameter Settings' dialog box with the 'Model' tab selected. The dialog has a title bar with a close button. Below the title bar are five tabs: 'Font', 'Extended Memory', 'Printer/Backup Server', 'Device', and 'Model'. The 'Model' tab is active, showing three sub-sections: 'HMI model', 'HMI station no.', and 'Port no.'; 'Timer'; and 'Printer'. The 'HMI model' dropdown is set to 'HMI5070NH(TH) / HMI5100N(T) (800 x 480)'. The 'HMI station no.' dropdown is set to '0'. The 'Port no.' text box contains '8000' with a note '(used as MODBUS server's port no.)'. The 'Timer' section has a 'Clock source' dropdown set to 'HMI RTC'. The 'Printer' section has a 'Type' dropdown set to 'None'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Section	Parameter	Value
HMI model	HMI model :	HMI5070NH(TH) / HMI5100N(T) (800 x 480)
	HMI station no. :	0
	Port no. :	8000 (used as MODBUS server's port no.)
Timer	Clock source :	HMI RTC
Printer	Type :	None

1. **HMI model:** Select the HMI model that you are programming.
2. **HMI station no.:** When multiple HMIs are used, this selects the unique network address of the HMI. See Controller Information Sheet for more information.
3. **Port No:** Assign a TCP/IP port so that another HMI can access this port. For more information, select **Help > Help Topics > How Do I...Setup TCP Port Forwarding With the HMI**.
4. **Clock Source:** Select internal HMI RTC or External Device.
5. **Printer Type:** Select type of printer to be connected locally to the HMIs serial port or USB port.

Auto Resizing Using the Model Tab

This tab can be used to automatically resize your project when changing to another HMI model with a different size touchscreen. The project and all objects and graphics will be proportionately resized automatically.

► To auto resize your project using the Model tab in the System Parameters dialog:

1. In the **Model** tab, select a different display size from the **HMI model** drop-down box and click **OK**.
2. The **Resize popup windows/objects** dialog appears.



3. Check all the resize options and then click **OK**. The project will automatically resize.

► To configure General tab settings:

The screenshot shows the 'System Parameter Settings' dialog box with the 'General' tab selected. The dialog has several sections: 'Fast selection button' with an 'Attribute' dropdown set to 'Disable'; 'Screen saver' with 'Back light saver' and 'Screen saver' dropdowns both set to 'None' and 'minute(s)'; 'Options' with 'Startup window no.' set to '10. Initial', 'Common window' set to 'Above base window', 'Object layout' set to 'Nature', 'Keyboard caret color' set to black, and a checked 'RW_A enabled' checkbox; 'Event' with an unchecked checkbox 'Use LW9450~9455 as time tags of event logs' and 'Extra. no. of events' set to '0'; 'Keyboard' with a list of keypad options (51. Keypad Floating, 52. Keypad Small, 55. ASCII Small, 13. New Keypad, 50. Keypad Integer) and 'Add...' and 'Delete' buttons; and 'Project protection (N series only)' with an unchecked 'Enable' checkbox. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

1. **Fast selection button:** The **Attribute:** drop-down enables or disables the fast selection button, which is used to open the Fast Selection window (window number 3). The **Settings** button sets the look of the button including shape and color. The **Position** drop-down sets the fast selection button on either the lower left or lower right portion of the display. When checked, the **Hide button when HMI starts** option causes the fast select button to be hidden when the HMI starts. Use Local Bit 9014 to control the Fast Select button. Clear the bit to show the button and set the bit to hide it.
2. **Screen Saver:** The **Back light saver** sets the number of minutes (none-255) of inactivity after which the backlight is turned off. If the value **None** is selected, then the back light saver is disabled.
 ☞ The backlight is re-triggered when the screen is touched or when an alarm occurs (if the **Enable back light when alarm occurs** option is selected).

Screen Saver sets the number of minutes (none-255) of inactivity after which the screen saver is activated. If the value **None** is selected, then the screen saver is disabled.

Saver window no. designates the window that will be used as the screen saver.

3. **Options:** The **Startup window no.** selects the window number that will be displayed every time the HMI is started up. Window 10 is the default startup window.

The **Common window** determines if objects in the common window (window 4) are placed above or below the base window.

The **Object layout** drop-down determines the layout and display of objects by selecting either **Control** mode or **Nature** mode.

 Normally, an object that is controlled by a PLC Register (i.e., a Word Lamp, Bit Lamp, Animation, etc.) is brought to the Top Layer when the value in the PLC Register changes. This behavior can be changed by the **Object layout** option. A setting of **Control** sets the behavior as outlined above. A setting of **Nature** (default setting) will result in the object remaining at the layer assigned during development.

The **Keyboard caret color** drop-down allows you to set the color of the cursor.

The **RW_A enabled** checkbox enables an extra 64K of recipe storage memory.

4. **Event:** When the **Use LW9450-9455 as time tags of event logs** box is checked, the Time/Date stamp for items in the Event Display will be taken from Local Words LW9450-9455. You can select the data format of the Time/Date stamp – BCD (binary-coded decimal) or BIN (16-bit signed decimal). If unchecked, the Time/Date stamp is taken from the selected clock (HMI RTC or External).

Extra No of events: N/A

5. **Keyboard:** Lists the windows that have been configured as keyboards.

Add: Opens a window list from which you can select an additional window to be available as a project keyboard.

Delete: Deletes the selected keyboard from the list.

6. **Project protection (i series only):** When checked, the HMI will compare the value in the **Project key** field to the 32-bit unsigned value stored in HMI Local Words LW9046 and LW9047. If the value is different, the HMI will not run the project.

 i series includes the HMI5043N, HMI5043T, HMI5056N, HMI5070NH, HMI5070TH, HMI5100N, HMI5100T, and HMI5104TH.

► To configure System Setting tab settings:

The screenshot shows the 'System Parameter Settings' dialog box with the 'System Setting' tab selected. The dialog has several sections with various settings:

- Startup language after redownloading the project:** A dropdown menu set to 'Language 1'.
- Execute init. MACRO when power on:** A checked checkbox. A 'Macro' dropdown is set to '[ID:001] AdjustPulses'.
- Auto logout:** A checked checkbox. A dropdown is set to '1' minute(s). Below it, text reads: 'When a user does not operate the HMI for longer than the setting time, the system will automatically logout.'
- Hide system setting bar:** An unchecked checkbox.
- Hide mouse cursor:** An unchecked checkbox.
- * Use LB-9062 to open hardware setting dialog.**
- Disable buzzer:** An unchecked checkbox.
- Prohibit remote HMI connecting to this machine:** An unchecked checkbox.
- Disable upload function (effective after rebooting HMI)(or set LB9033 on):** An unchecked checkbox.
- Prohibit password remote-read operation (or set LB9053 on):** An unchecked checkbox.
- Prohibit password remote-write operation (or set LB9054 on):** An unchecked checkbox.
- Use a disconnection icon on relative objects when PLC communication fails:** An unchecked checkbox.
- VNC server:** A checked checkbox. A 'Password' field contains '111111'.
- LW protection:** A checked checkbox. Below it, 'LW range' is set from '0' to '0'.
- RW protection:** A checked checkbox. Below it, 'RW range' is set from '0' to '0'.
- EasyAccess server:** A checked checkbox. A text field contains 'www.ihmi.net'.

At the bottom are 'OK', 'Cancel', and 'Help' buttons.

1. **Startup language after redownloading the project:** Select the language that the HMI is to use when restarting after a download.
2. **Execute init. MACRO when power on:** When checked, the HMI will execute the selected macro on startup. Available only when one or more macros exist in the project.
3. **Auto logout:** When checked, the HMI will automatically log out of security if no touchscreen activity is detected during the specified interval. The time interval can range from 1 -256 minutes.
4. **Hide system setting bar:** When checked, the HMI will not display the button in the lower-right corner that displays the System Setting toolbar. Local Bit LB9020 can be used to control the button. Set the bit to show the button and clear the bit to hide the button.
5. **Hide mouse cursor:** When checked, the HMI will not display the mouse cursor. Local Bit LB9018 can be used to control the mouse cursor. Set the bit to hide the cursor and clear the bit to show the cursor.

6. **Disable buzzer:** When checked, the HMI will not sound the buzzer (beep) when the screen is touched. Local Bit LB9019 can be used to control the buzzer. Set the bit to disable the buzzer and clear the bit to enable the buzzer.
7. **Prohibit remote HMI connecting this machine:** When checked, the HMI will not allow connections from a remote HMI. Local Bit LB9044 can be used to control remote connections. Set the bit to disallow remote connections, clear the bit to allow remote connections.

 This setting controls whether or not other HMIs can connect to *this* HMI. It does not affect how this HMI connects to *other* HMIs.

8. **Disable upload function (effective after rebooting HMI):** When checked, prevents the project from being uploaded from the HMI (sets LB9033 ON). Reports “error: uploading /mt8000/001/mt8000.”
9. **Prohibit password remote-read operation:** When checked, a remote HMI cannot read from the local words containing the Project and User password data (sets LB9053 ON).
10. **Prohibit password remote-write operation:** When checked, a remote HMI cannot write to the local words containing the Project and User password data (sets LB9054 ON).
11. **Use a disconnection icon on relative objects when PLC communication fails:** When checked, any object that cannot be resolved due to communication loss will be displayed with a special icon:



12. **VNC server:** Check **Password from project** to use the password entered in the **Password** box for a VNC client to use to connect to the HMI’s internal VNC server (applies to Ethernet-equipped models only). When not checked, use the VNC password entered in the HMI’s System Settings **VNC Server Setting** tab.

 The VNC Server Password is stored in Local Words LW9530-9537.

13. **LW protection:** When checked, remote HMI(s) are prevented from writing to the range of Local Word addresses specified in the **LW range** boxes.
14. **RW protection:** When checked, remote HMI(s) are prevented from writing to the range of Recipe Word addresses specified in the **RW range** boxes.
15. **EasyAccess server:** Check **Login EasyAccess server** to enable EasyAccess in the HMI. See Technical Note 5082, “Using EasyAccess” for more information.

► To configure Security tab settings:

System Parameter Settings

Font Extended Memory Printer/Backup Server

Device Model General System Setting **Security**

Select operatable classes for each user

User	Enable	Password	A	B	C	D	E	F
User 1	☒	1111	☒	☐	☐	☐	☐	☐
User 2	☒	2222	☒	☒	☐	☐	☐	☐
User 3	☒	3333	☒	☒	☒	☐	☐	☐
User 4	☒	4444	☒	☒	☒	☒	☐	☐
User 5	☒	5555	☒	☒	☒	☒	☒	☐
User 6	☒	6666	☒	☒	☒	☒	☒	☒
User 7	☒	7777	☒	☐	☒	☐	☐	☐
User 8	☒	8888	☒	☐	☒	☒	☐	☐
User 9	☒	9999	☒	☒	☐	☒	☐	☒
User 10	☒	1010	☒	☐	☒	☐	☒	☐
User 11	☒	1011	☒	☒	☐	☐	☒	☒
User 12	☒	1012	☒	☐	☒	☐	☒	☒

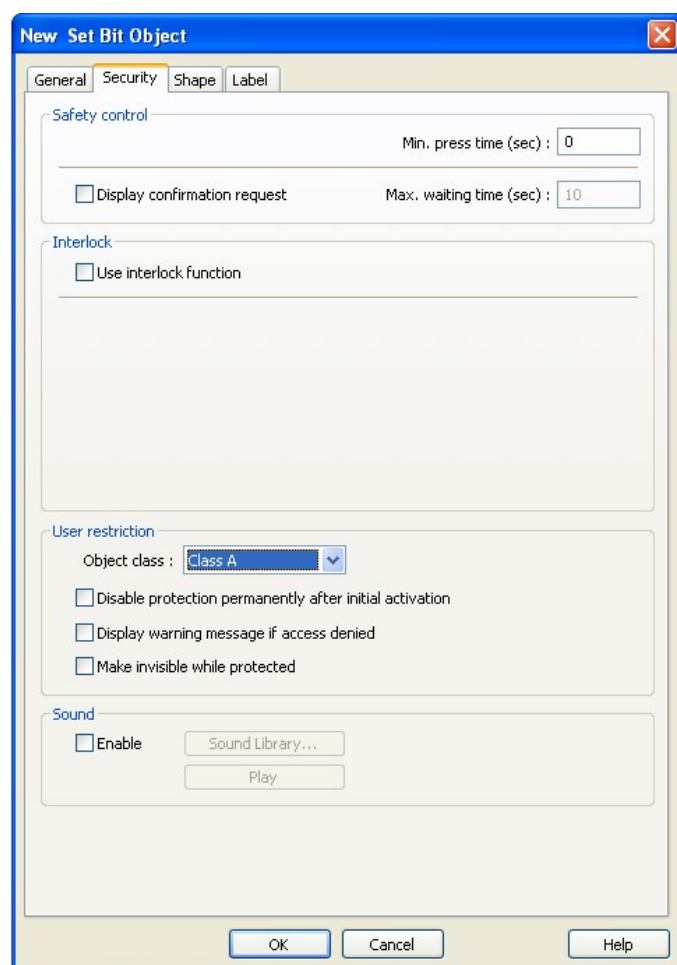
Project password (MTP file)

☒ Enable

The Security tab is used to set up a table of users, user levels (access classes), and passwords. Up to 12 users can be individually enabled, and each has a unique password and combination of any six access classes (A-F). Only numbers are allowed for password.

When an object is created, it can be assigned an access class (A-F). When that object is activated (for example, a button is touched), the HMI compares the access classes allowed for the currently logged-in user to the access class specified for the object. If the access class of the object is within the classes allowed, the object's action is executed.

The access class for an object is configured in the **User restriction** section of the **Security** tab for that object. So, for example, if you wish to set the access class for a set bit object, click on the **Security** tab of that object's properties dialog, as shown below:



The object can be configured to handle insufficient security in one of two ways:

- The object can be hidden while security is not sufficient.
- The HMI can display the message defined as Message 1 in the System Message object.

There are a number of local HMI addresses that can be used with the security features.

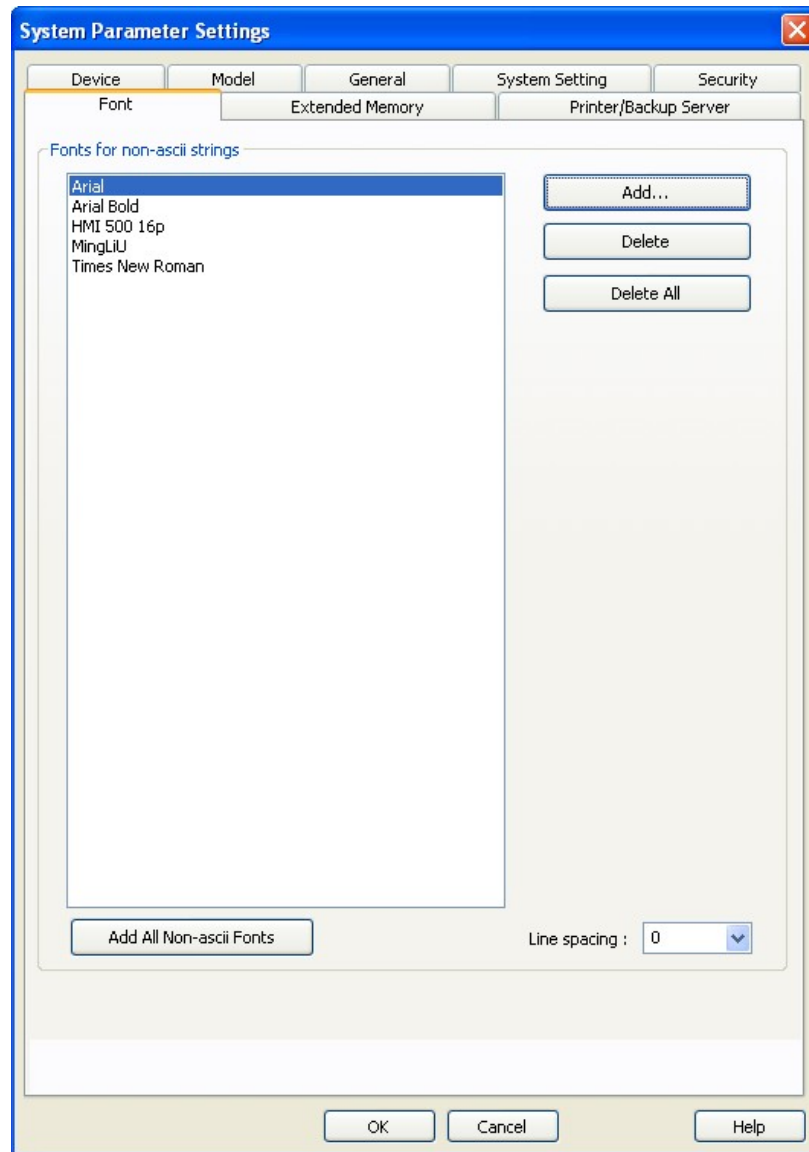
Address	Description	Data Type	Notes
LB9050	Reset security level to 0 (no security)	Boolean	Set momentarily to trigger.
LB9060	Invalid password	Boolean	Set by the HMI when an invalid password is entered. Must be explicitly reset.
LB9061	Load new passwords	Boolean	Loads new passwords as defined by LW9500-9523
LW9219	User level	16-bit unsigned	Set to 1-12. Determines which password is used.
LW9220	Password	32-bit unsigned	Enter password into this address to change the security level
LW9222	Current access classes	16-bit binary	Indicates the Access Classes currently allowed. Bit 0 indicates Class A; Bit 5 indicates Class F.

LW9500, LW9501	New password, user 1	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9502, LW9503	New password, user 2	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9504, LW9505	New password, user 3	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9506, LW9507	New password, user 4	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9508, LW9509	New password, user 5	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9510, LW9511	New password, user 6	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9512, LW9513	New password, user 7	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9514, LW9515	New password, user 8	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9516, LW9517	New password, user 9	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9518, LW9519	New password, user 10	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9520, LW9521	New password, user 11	32-bit unsigned	Loaded into security system when LB9061 is set momentarily
LW9522, LW9523	New password, user 12	32-bit unsigned	Loaded into security system when LB9061 is set momentarily

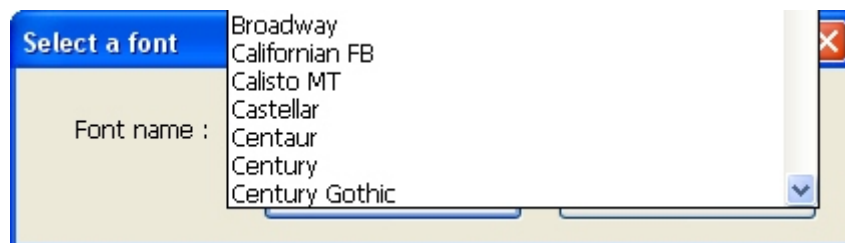
To log out a user, use a Set Bit Object to momentarily set bit LB9050.

Project password (MTP file): Select this option to set a password in order to prevent unauthorized users from opening and editing a project. The correct password must be entered in order to open the password-protected project.

► To configure Font tab settings:



Determines the font for non-ASCII strings. To add a Windows TrueType font that is on your computer, click **Add...** and select the font from the drop down menu that appears, and click **OK**.



► To configure the Extended Memory tab settings:

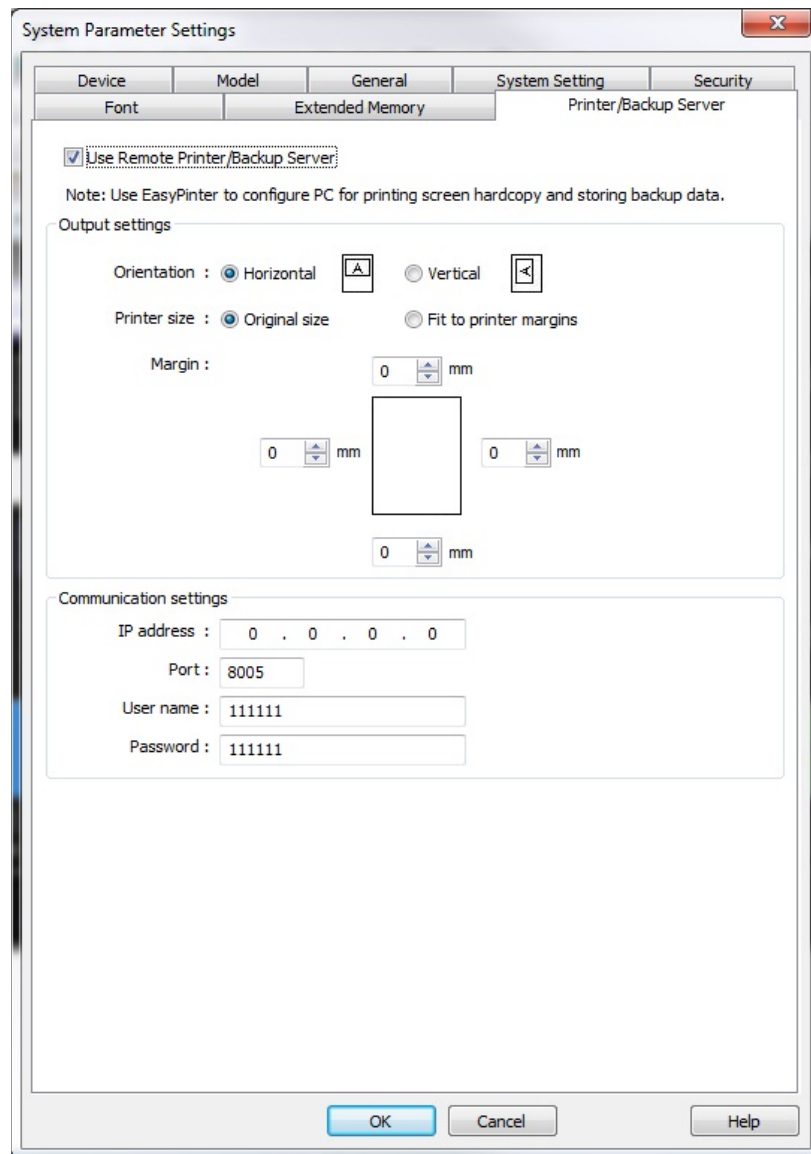
The screenshot shows the 'System Parameter Settings' dialog box with the 'Extended Memory' tab selected. The dialog has a title bar with a close button. Below the title bar are five tabs: 'Device', 'Model', 'General', 'System Setting', and 'Security'. Under the 'General' tab, there are three sub-tabs: 'Font', 'Extended Memory', and 'Printer/Backup Server'. The 'Extended Memory' sub-tab is active, displaying a list of 10 extended memory locations (EM0 through EM9). Each location has a 'File name' field (e.g., 'em0.emi', 'em1.emi', ..., 'em9.emi') and two radio buttons for storage: 'SD card' and 'USB 1'. The 'USB 1' radio button is selected for all locations. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Extended Memory Location	File name	SD card	USB 1	USB 2
EM0	em0.emi	☐	☒	☐
EM1	em1.emi	☐	☒	☐
EM2	em2.emi	☐	☒	☐
EM3	em3.emi	☐	☒	☐
EM4	em4.emi	☐	☒	☐
EM5	em5.emi	☐	☒	☐
EM6	em6.emi	☐	☒	☐
EM7	em7.emi	☐	☒	☐
EM8	em8.emi	☐	☒	☐
EM9	em9.emi	☐	☒	☐

The Extended Memory tab is used to configure the extended memory for saving data to an SD card or USB flash drive (only USB1 can be used). There are 10 files that can be configured for saving data, em0.emi through em9.emi. Each extended memory location can be accessed using the Device Type setting in an object's properties. There is no address limitation for the extended memory other than the size of the SD card or USB drive connected to the HMI. The HMI will assume 16-bit data registers for unused addresses, so if address 100 is used for em0.emi, the memory storage must have at least 200 bytes of available memory.

Extended memory files (*.emi) can be edited and converted to *.csv file format using the Recipe/Extended Memory Editor, which can be opened with Project Manager.

► To configure Printer/Backup Server tab settings:



1. Check the **Use Remote Printer/Backup Server** checkbox to enable the HMI to print to a printer connected to a PC on the network.

📄 The EasyPrinter utility (included with EZware-5000 and accessible through Project Manager) must be running on the PC with the network printer connected.

2. In the **Output settings** section, select page layout (horizontal or vertical), print area size, and margins.
3. In the **Communications settings** section, set the settings for the PC hosting the printer.

Automatically Reboot HMI

EasyBuilder can automatically reboot the HMI after download.

► *To enable automatic reboot of HMI after download:*

1. From the **Tools** menu, select **Download**. The Download dialog box is displayed.
2. Check the **Reboot HMI after download** checkbox.
3. Click **OK**.

Save and Compile the Project

EasyBuilder can automatically save and compile the project when downloading or simulating.

► *To enable automatic save and compile*

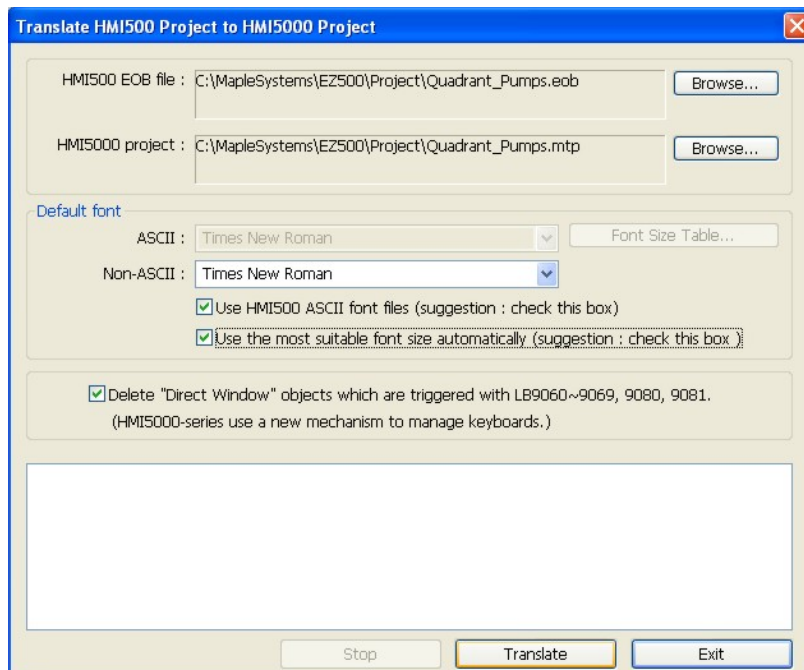
1. From the **Option** menu, select **Function Property**. The Function Property dialog box is displayed.
2. Check the **Automatic save and compile when download and simulate** checkbox.
3. Click **OK** to exit the Function Property dialog box.

EZware-500 Project Translation Utility

EZware-5000 has a translation utility that will convert projects created in EZware-500 into a project format that can be read and modified using the EasyBuilder-5000 software. Below is a brief description of how to use this utility (for more information, download technical notes on this subject from Maple Systems' website):

► *To convert a *.eob (EasyBuilder-500 compiled project) into a *.mtp (EasyBuilder-5000 project):*

1. From the **Tools** menu, click **Translate HMI500 Project**:

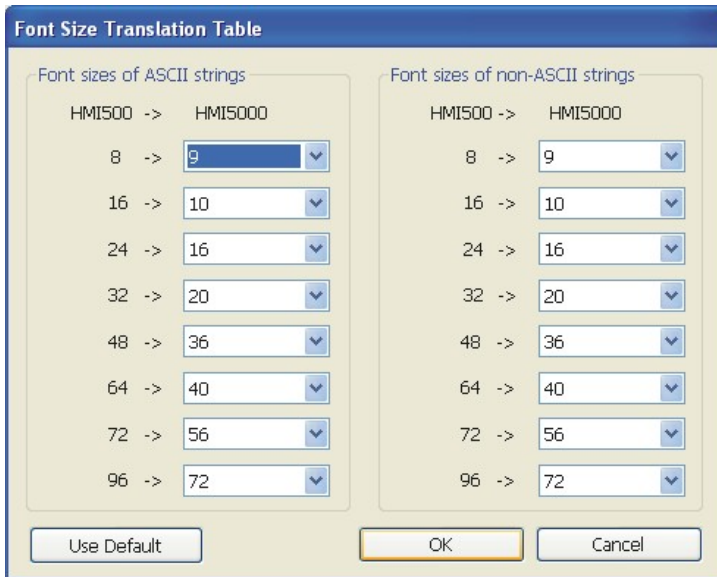


2. Click the **Browse...** button for the HMI500 EOB file and select the EasyBuilder-500 project file you wish to convert.

- By default, the converted file is automatically placed into the same directory. To modify the name of the file or location, click the **Browse...** button for the HMI5000 project file.
- Default font:** All text objects in the EasyBuilder-500 project file use a proprietary fixed font. When converting to an EasyBuilder-5000 project, these text objects are converted to TrueType fonts. Use this section to specify which TrueType fonts you wish to use.

 The EZware-500 configuration software uses proprietary fonts that must be replaced with a Windows TrueType font. EZware-5000 installs three TrueType fonts into the Windows > Fonts folder that closely resemble the fonts used in EZware-500 (HMI 500 16p, HMI 500 24p, HMI 500 8p). Select **Use HMI500 ASCII font files** to use these fonts. If you choose to use another Windows TrueType font (by unchecking **Use HMI500 ASCII font files**), additional ‘tweaking’ may be required after you have converted your project. We recommend using Calibri if you have this font available on your computer. Otherwise, another sans serif font like Helvetica should work.

You can allow EasyBuilder-5000 to automatically adjust the font size for you by selecting **Use the most suitable font size automatically**. If you uncheck this box, you can click on the **Font Size Table** button, which allows you to customize the transition size of the fonts from EasyBuilder-500 to EasyBuilder-5000 projects. This gives you maximum flexibility in deciding which font and which sizes you would like to use. For the Calibri font, we recommend those items as shown in the table below.



The dialog box titled "Font Size Translation Table" contains two panels. The left panel, "Font sizes of ASCII strings", and the right panel, "Font sizes of non-ASCII strings", each have a table with two columns: "HMI500 ->" and "HMI5000".

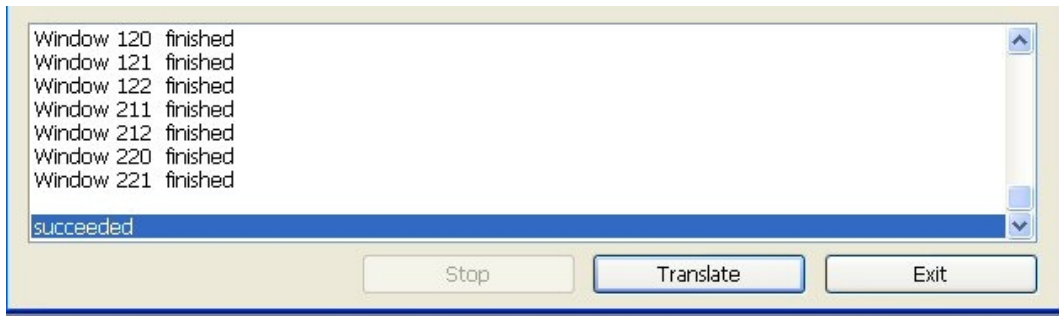
Font sizes of ASCII strings		Font sizes of non-ASCII strings	
HMI500 ->	HMI5000	HMI500 ->	HMI5000
8 ->	9	8 ->	9
16 ->	10	16 ->	10
24 ->	16	24 ->	16
32 ->	20	32 ->	20
48 ->	36	48 ->	36
64 ->	40	64 ->	40
72 ->	56	72 ->	56
96 ->	72	96 ->	72

At the bottom of the dialog are three buttons: "Use Default", "OK", and "Cancel".

- Delete “Direct Window” objects which are triggered with LB9060~9069, 9080, 9081, (HMI5000-series use a new mechanism to manage keyboards.):** Check this box to delete any Direct Windows objects in the EasyBuilder-500 project file that are triggered by the internal local memory bits LB9060-LB9069, LB9080-LB9081.

 In EasyBuilder-500, these local memory bits allowed a popup window to appear in the display based upon touching any Numeric Input or ASCII Input object located in a particular area of the screen. This feature is not available in EZware-5000. By default, this option is checked.

- Click the **Translate** button to begin conversion of the file. When done, you will see text in the comments field that indicates if the conversion is successful.



- Click the **Exit** button to go back to the main screen of EasyBuilder-5000. Open the converted file as you would normally open any EZware-5000 project file.

Due to some incompatibilities between the EZware-500 software and the EZware-5000 software, you should check each screen and test operation after conversion to make sure that your HMI works to your satisfaction.

The Shape Library and Picture Library file formats in EasyBuilder-5000 are different than those used in EasyBuilder-500. When a project is translated, EasyBuilder-5000 creates new libraries with the same file name as the translated project containing the shapes and pictures (bitmaps) from the original EasyBuilder-500 project. For example, if a 500 Series project is translated and saved with the filename "PumpStation4.mtp," a Shape Library is created with the name "PumpStation4_0.plb" and a Picture Library is created with the name "PumpStation4_0.flb" and saved into the EZ5000 Library folder (C:\MapleSystems\EZ5000\library).

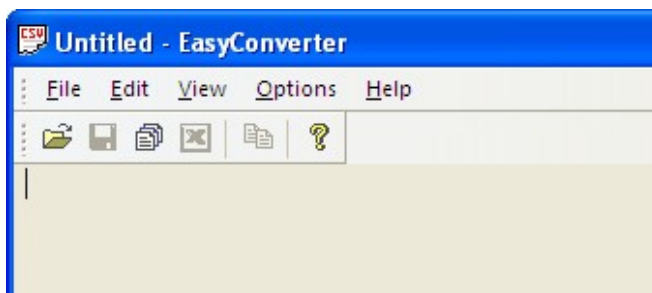
Easy Converter

The EasyConverter application is used to view data log files (*.dtl) and event log files (*.evt) that are created by the HMI during operation. Data log files are files the HMI creates when capturing data using the Data Sampling object. Event log files are history files the HMI creates when using the Event Log object. Both files are in binary format to minimize the amount of file space required.

To view these files with a computer, you must use the EasyConverter application. In addition, EasyConverter can take a data or event log file and convert it into a CSV (Comma Separated Value) file that can be easily imported into other applications such as Microsoft Excel. For more information on how to do data logging, see "Chapter 10 - Bar Graphs, Meters, and Trends" section "Creating Trend Displays and Data Sampling Objects." For more information on how to use Event Log files, see "Chapter 11 - Capturing Alarms and Events" section "Monitoring Alarms with the Alarm/Event Log."

► To start the EasyConverter Application 

- Click the **EasyConverter** button in the Project Manager window or click the EasyConverter icon in the Project Toolbar. The EasyConverter application appears.



- Click **File > Open** to display the Open dialog box. Search for the data log file (*.dtl) or event log file (*.evt) that you wish to view, then click the **Open** button.

Please Note:

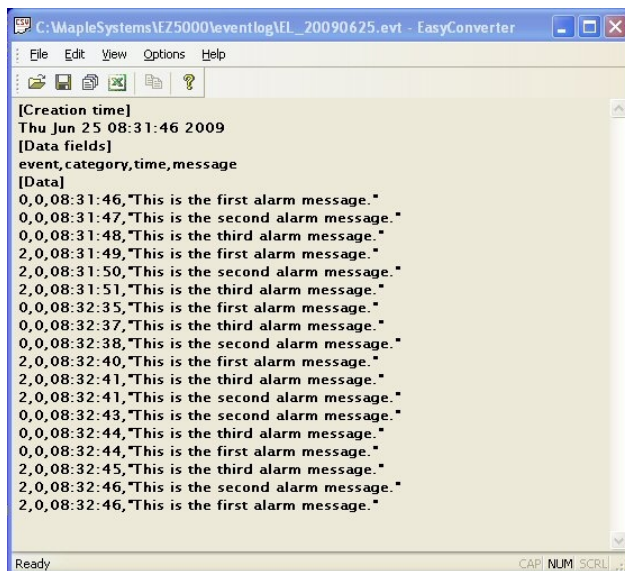
These files are captured by the HMI and stored in internal HMI memory, an attached SD card, or USB flash drive. You must copy these files into your computer before using the EasyConverter utility. If you are running a project that is capturing data log or event log files using the Offline Simulator, the EZware-5000 application automatically creates new folders on your computer and creates the files.

Data log files are stored in a folder using the name that you assigned in the Data Sampling Object attribute box (e.g., C:\MapleSystems\EZ5000\datalog\History Data1\20100618.dtl)

Event log files are stored in an eventlog folder (e.g., C:\MapleSystems\EZ5000\eventlog\EL_20100625.evt).

Viewing an Event Log File (*.evt)

1. From the EasyConverter application, click **File... Open** and locate the Event Log file (*.evt).



2. **[Creation time]:** The text line below the creation time heading shows the date and time that the file was initially created. Format is Day of Week, Month, Day of Month, Time (24Hr format), and Year.
3. **[Data fields]:** The text line below this header is used to label and identify each column of data under the [Data] header. The Data fields header shows the event number, category of event, time event occurred in 24HR format, and the event (alarm) message recorded.
4. **[Data]:** This is where the actual data is recorded.

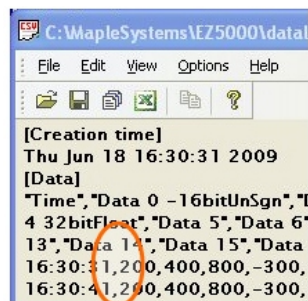
 This is read only – the EasyConverter application does not allow any edits.

Viewing a Data Log File (*.dtl)

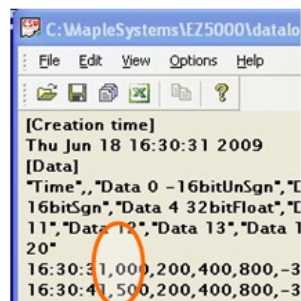
1. From the EasyConverter application, click **File...Open** and locate the Data Log file (*.dtl). As the file is loaded, the following popup window appears:



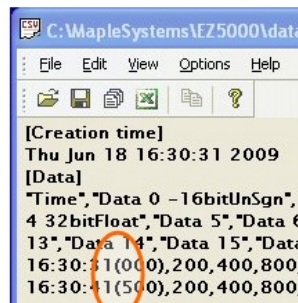
2. **Display Milliseconds:** This option determines how the time value for each data record is displayed. In this window you have four options:



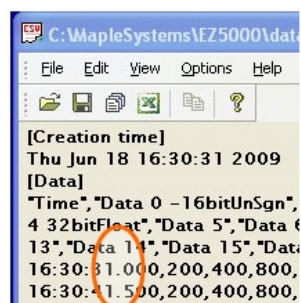
No Millisecond Option



Separated by Comma Option

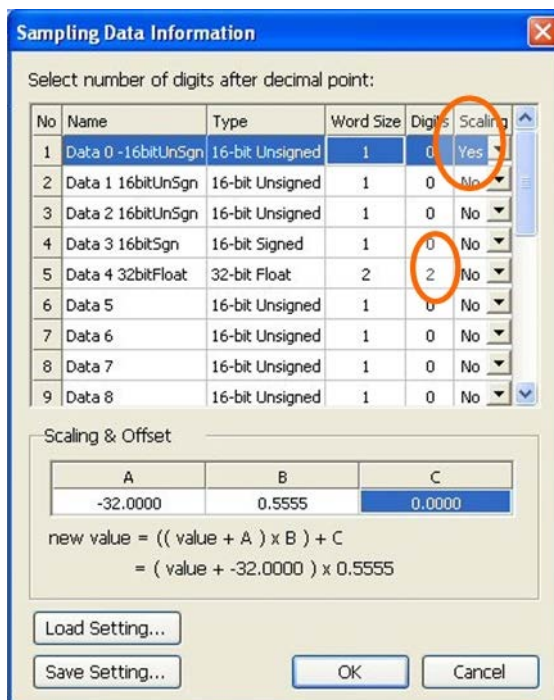


Parentesized Option



Separated by Dot Option

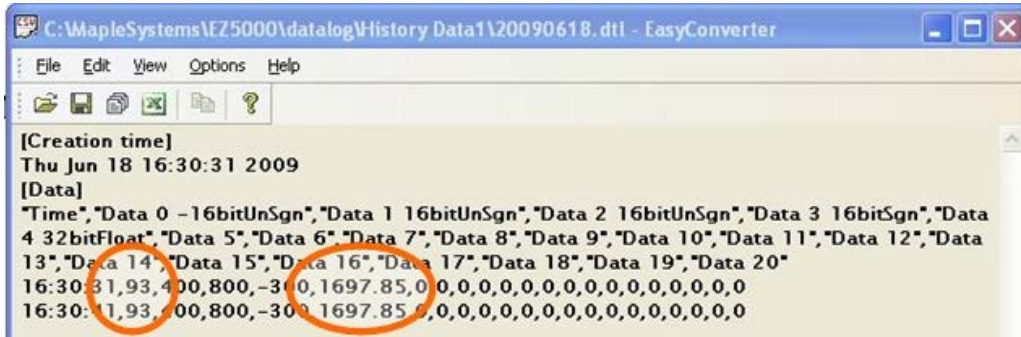
3. **Decimal display and Scaling option:** The dialog box below allows you to select different formats for the data before it is displayed.



4. For this example, we have elected to use the linear scaling formula on Data 0 to convert the raw data (which is measuring temperature in °F) to °C.
5. Also, the raw data collected for Data 4 is a floating point number calculated to three decimal places. However, we are only concerned with a two decimal accuracy, so we change the 'Digits' field from 3 to 2. If

we want to use these same changes on other files, click the **Save Setting...** button to save the changes as a conversion (*.lgs) file. When opening other data log files, we can apply the same changes by clicking on the **Load Setting...** button and selecting the proper conversion file.

6. Click **OK** to continue.
7. The data log file is shown:



8. In our example, notice that the value for Data 0 {200°F} has changed to 93°C and the value for Data 4 has two decimal places {1697.85} instead of three {1697.850}.
9. **[Creation time]**: The text line below the creation time heading shows the date and time that the file was initially created. Format is Day of Week, Month, Day of Month, Time in 24Hr format and Year.
10. **[Data]**: The text line below this header is used to label and identify each column of data recorded. The header shows the time each record was captured followed by the title given for each data column.

📖 This is read only – the EasyConverter application does not allow any edits.

Saving a Data/Event Log File as a CSV or XLS file

After opening a Data/Event Log file in EasyConverter, you can easily save the file as a CSV or XLS file.

1. Click **File > Save As...** or click the Save As icon. The **Save As** dialog opens.
2. Click the **Save as type:** drop-down box and select either **Text files (*.csv)** or **Excel files (*.xls)**. By default, the new file is saved in the same folder as the original file, but you can navigate to a different folder by clicking the **Save in** box at the top.

Exporting a Data/Event Log File as an XLS file to Excel

After opening a Data/Event Log file in EasyConverter, you can export the file as a XLS file and open it directly in Microsoft Excel.

📖 Microsoft Excel is required to convert the file when exporting to Excel.

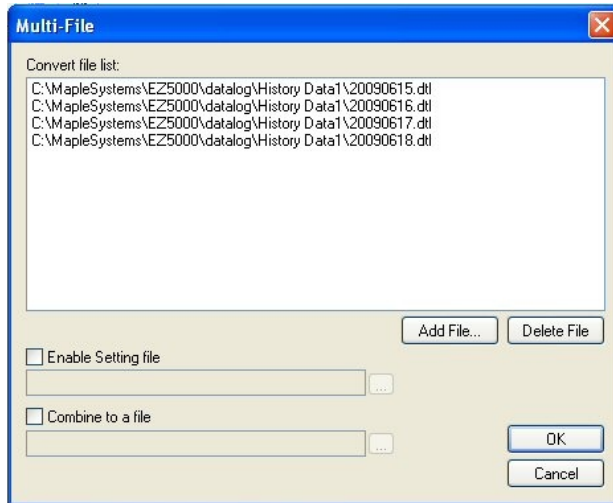
1. Click **File > Export to Excel** or click on the Excel icon.
2. Microsoft Excel opens and you should see the data in a spreadsheet format. Simply click **File...Save As** to save the file.

Converting Multiple Files



EasyConverter also has a feature that allows you to select multiple Data/Event Log files and save them to one XLS file.

1. Click **File > Multi-File** or click on the Multi-File icon.

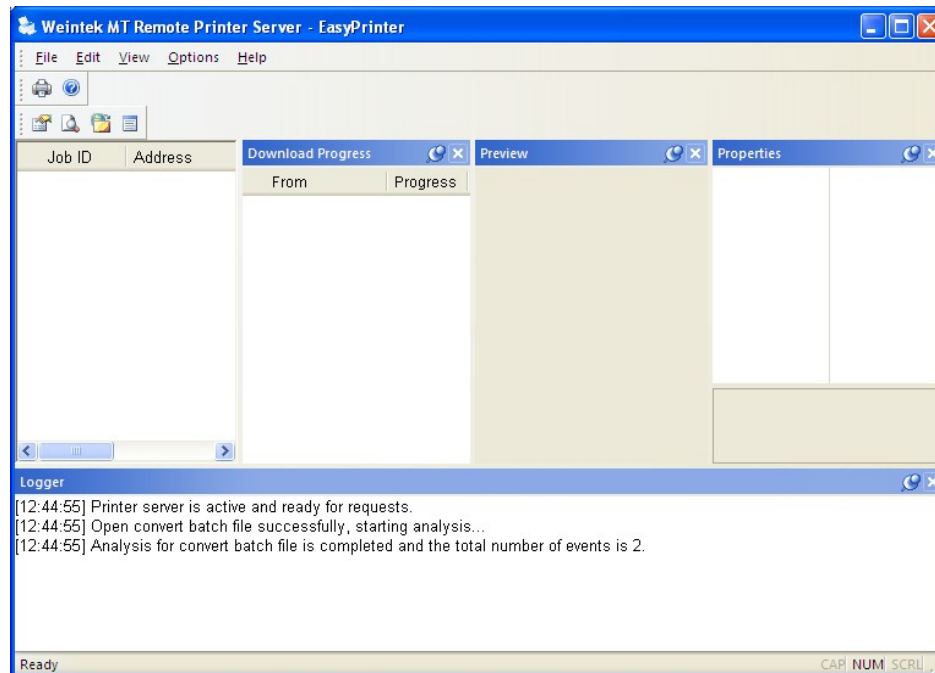


2. Click **Add File...**, then select which Data/Event Log files you wish to combine.
3. **Enable Setting file:** Check this box to select a conversion (*.lgs) file that performs a linear scaling conversion or decimal point conversion on the selected files.
4. **Combine to a file:** Check this box to combine the files and save them into an Excel spreadsheet. Click the browse button  to select the location and filename where you want to save the combined XLS file. Click **OK** to save the file.

EasyPrinter

The Easy Printer button allows monitoring of the print server through Project Manager. The EasyPrinter utility must be running on the PC that is hosting the networked printer from which you wish the Silver Series to print.

The printer is set up on the Printer/Backup Server tab in EasyBuilder-5000's Systems Parameters. Select the Use Remote Printer/Backup Server checkbox to enable remote screen printing and backup of datalog file (*.dtl).



File Menu

Enable Output: Enable the printer. If not enabled, nothing will be sent to the printer.

Exit: Terminates the EasyPrinter utility. If EasyPrinter is terminated, the HMI cannot send data to the printer.

Edit Menu

Edit: Edit the selected print job.

Delete: Delete the selected print job.

Select All: Select all print jobs.

View Menu

The **Jobs** area is always displayed and indicates the source of the data, the operation being performed, and the status of the job.

Properties Bar: Displays the properties of the selected print job.

Preview Bar: Displays an image of the data being sent to the printer.

Download Bar: Displays the status of the data being transferred from the HMI, not the status of the data being sent to the printer.

Logger Bar: Displays the status of the EasyPrinter utility.

Options Menu > Settings

The Settings window is used to configure the operation of EasyPrinter.

General

Port Number of the Server Socket: Specify the IP Port number to use. This must match the *Port* setting on the Printer Server tab of the EasyBuilder5000 System Parameters dialog.

User Name: Specify a User Name. This must match the *User Name* setting on the Printer Server tab of the EasyBuilder5000 System Parameters dialog.

Password: Specify a Password. This must match the *Password* setting on the Printer Server tab of the EasyBuilder5000 System Parameters dialog.

Naming Convention for HMI Folder (when writing files): Select **Use IP address** to create a folder named with the IP address of the HMI. Select **Use HMI name** to create a folder using the HMI name assigned in the Data Sampling Object's **Folder name**, which is used to save history data files. The folder name is stored in LW9032-LW9039.

Prefix: Optional prefix to append to the folder name defined above. For example, if Use IP address is selected for the naming convention, the IP address of the HMI is 192.168.1.211, and IP_ is entered in the Prefix box, the folder will be named IP_192.168.1.211.

Minimize to System Tray: If checked, the minimized EasyPrinter utility will appear in the System Tray. If unchecked, the utility will be minimized to the Task Bar.

Detailed Message: If checked, detailed messages will be written to the Logger window. If unchecked, general messages will be written to the Logger window.

Hardcopy

Print Out To: When checked, specifies the printer or device to send the data to. The drop-down list will be populated with devices available on the PC.

Save to files in: When checked, saves a *.bmp file of the screen print to the designated folder on the computer.

Backup

Backup files in: Specifies the location on the computer to save the data file (C:\MapleSystems\EZ5000\BackupData is the default).

When target file has existed: When **Overwrite it** is checked, the existing file will be overwritten by the new file. When **Append.BAK to the file name** is checked, the existing file will have .BAK appended to the filename so it will be preserved.

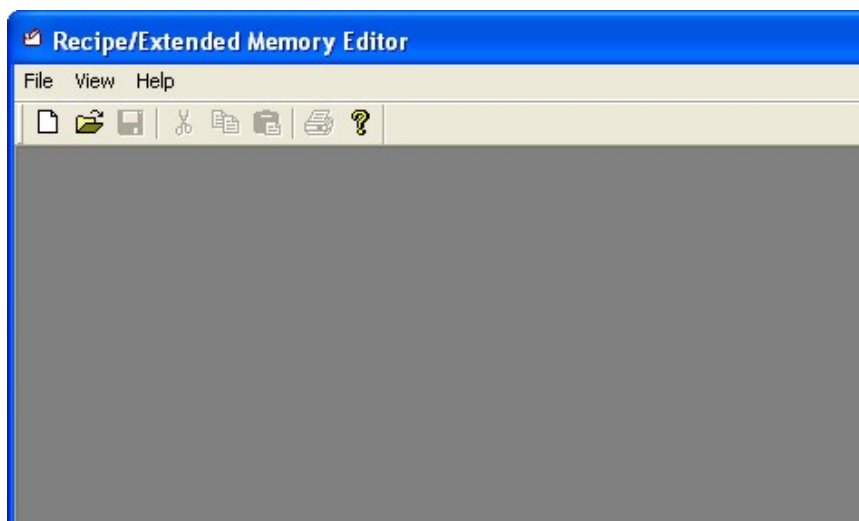
Convert Batch File: When enabled, defines the path to the definition file used to convert the data file to CSV file format (C:\MapleSystems\EZ5000\convert2csv.def is the default).

Recipe/Extended Memory Editor

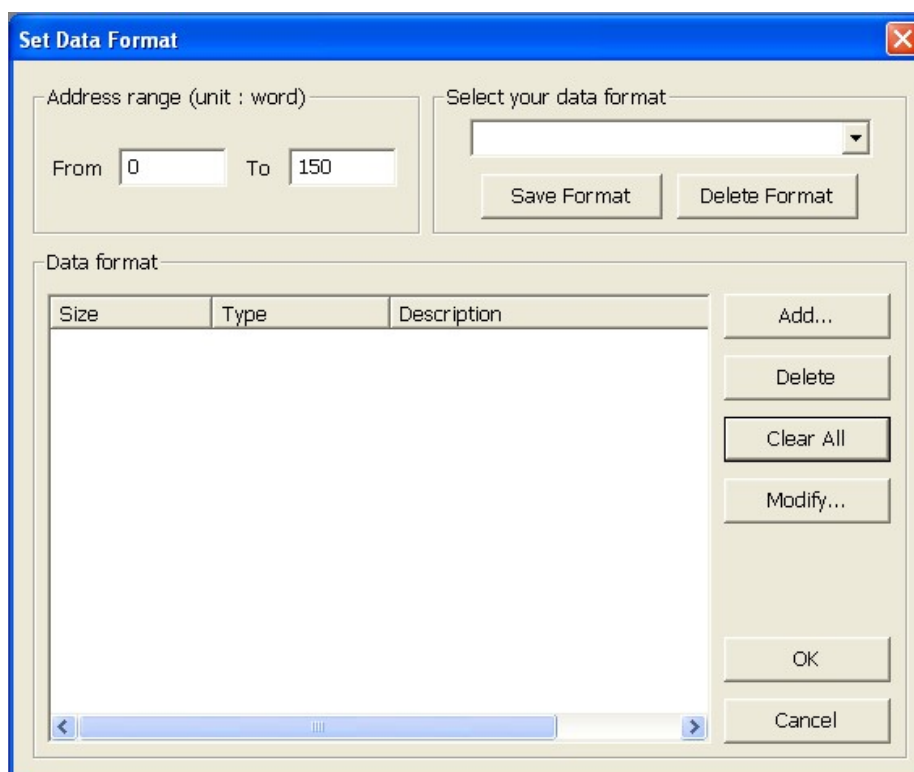
The Recipe/Extended Memory Editor is an application that allows you to create, view, and modify recipe (*.rcp) files and Extended Memory (*.emi) files. You can also use this editor to import/export recipe and extended memory files to CSV formatted files, which can then be shared by other applications.

► To create a new Recipe/Extended Memory file:

From the Project Manager application, click **Recipe/Extended Memory Editor**:



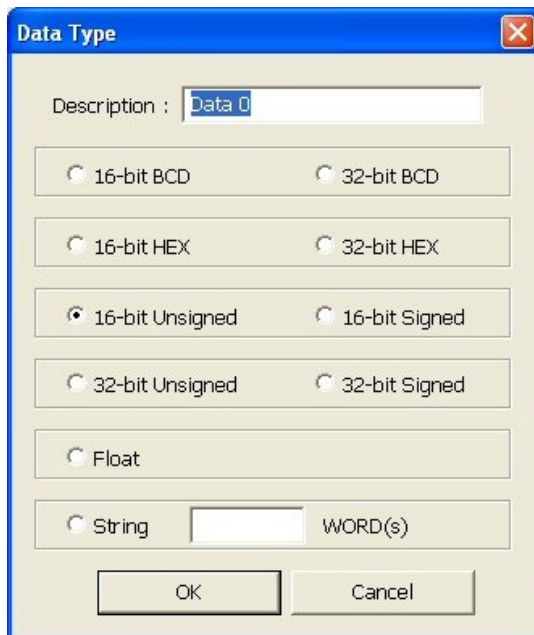
1. Click **File > New**. The following dialog box appears:



2. **Address range (unit: word):** Use this area to select the total number of RW (recipe word) registers or EMx (Extended Memory) registers that are used for the recipe or extended memory file. In the example above, RW0 thru RW150 will be used.
3. **Select your data format:** Use this area to enter how each data register element is be interpreted by the HMI. The data collected and stored in recipe/extended memory files is in binary format and does not contain any information about how each data should be interpreted by the HMI (for example, is the data in 16-bit signed

integer format or BCD?). Therefore, the data format is used to define how each data element is formatted (ie., Signed vs Unsigned, 16-bit vs 32-bit, Float, String, etc.).

- a. **Add:** Click to add a new data register format. The following dialog box appears:



The **Data Type** dialog box has a title bar with a close button. It contains a 'Description' field with the text 'Data 0'. Below this are several groups of radio buttons for selecting a data format:

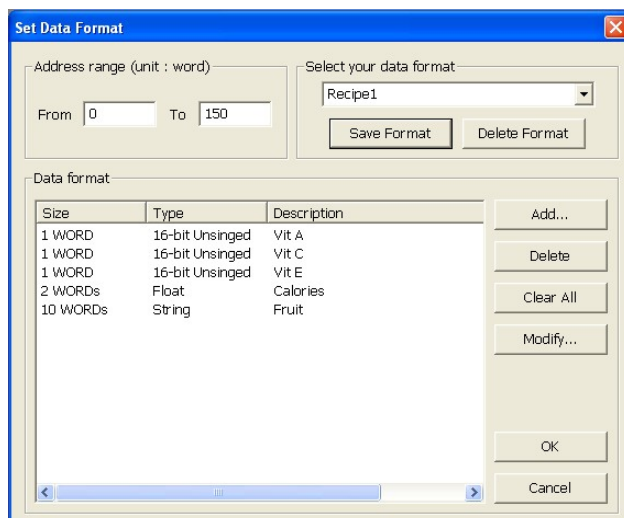
- 16-bit BCD and 32-bit BCD
- 16-bit HEX and 32-bit HEX
- 16-bit Unsigned (selected) and 16-bit Signed
- 32-bit Unsigned and 32-bit Signed
- Float
- String (selected) with a text field and 'WORD(s)' label

At the bottom are 'OK' and 'Cancel' buttons.

In the **Data Type** dialog box you can enter a description of the Data Type and select which format that the HMI will use to interpret the data.

For String format, you must enter the total number of 16-bit register words used for the character string.

- b. **Delete:** If you wish to delete an item from the list, highlight a data element and click **Delete** to remove from list.
- c. **Clear All:** Click to erase entire list of data elements.
- d. **Modify:** Highlight a data element and click **Modify** to revise the name of the data element or format.
- e. Below is an example of a list of data elements created:



The **Set Data Format** dialog box has a title bar with a close button. It contains an 'Address range (unit : word)' section with 'From' and 'To' fields (0 and 150). To the right is a 'Select your data format' dropdown menu showing 'Recipe1', with 'Save Format' and 'Delete Format' buttons below it. The main section is 'Data format' with a table:

Size	Type	Description
1 WORD	16-bit Unsigned	Vit A
1 WORD	16-bit Unsigned	Vit C
1 WORD	16-bit Unsigned	Vit E
2 WORDs	Float	Calories
10 WORDs	String	Fruit

To the right of the table are buttons: 'Add...', 'Delete', 'Clear All', 'Modify...', 'OK', and 'Cancel'.

6. **Select your data format:** Use to select or create a data format template that can be used for other recipes or extended memory files. In the example above, the data elements configured in the **Data format** list have been saved to a template called 'Recipe1'. Click **OK**.
7. A table of data elements appears that shows the recipe or extended memory table.

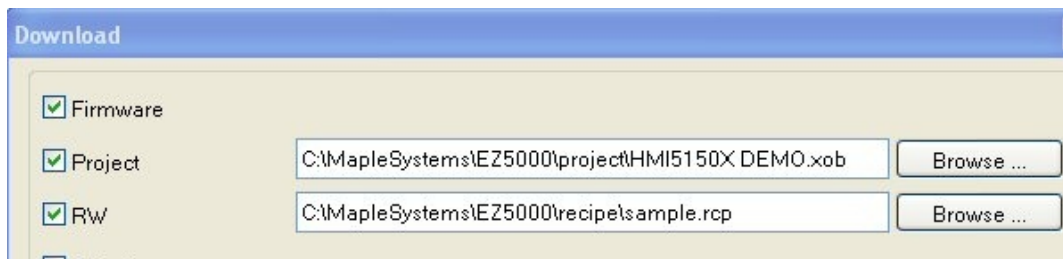
ID	ADDRESS	Vit A	Vit C	Vit E	Calories	Fruit
0	0	0	0	0	0	
1	15	0	0	0	0	
2	30	0	0	0	0	
3	45	0	0	0	0	
4	60	0	0	0	0	
5	75	0	0	0	0	
6	90	0	0	0	0	
7	105	0	0	0	0	
8	120	0	0	0	0	
9	135	0	0	0	0	
10	150	0	0	0	0	

8. This table has several columns with headers:
 - a. **ID:** This is the ID number for each record.
 - b. **ADDRESS:** This is the starting RW address or EMx address for each record.
 - c. **Data headers:** These are the descriptions used for each data element created in the step above.
9. Edit the table by clicking on each data element field and entering the preset value. Please note that you are only allowed to enter data according to the format defined for each data element.
10. Here is an example of a completed table:

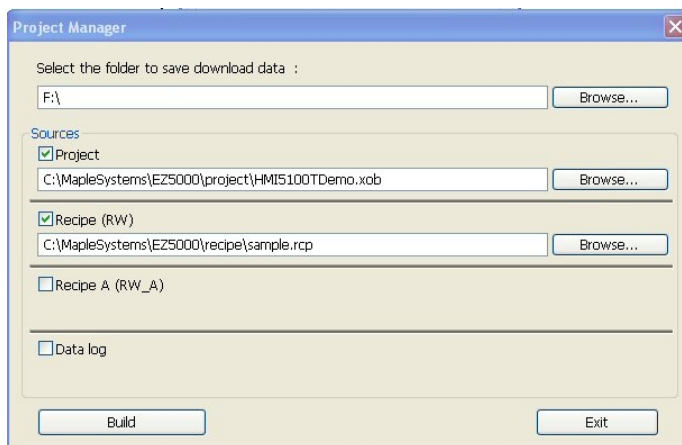
ID	ADDRESS	Vit A	Vit C	Vit E	Calories	Fruit
0	0	10	23	13	46.5	APPLES
1	15	25	67	37	14.7	ORANGES
2	30	12	434	5	67.9	PEARS
3	45	123	4	15	13.5	CHERRIES
4	60	12	155	43	34.7	GRAPES
5	75	76	23	42	23.5	PINEAPPLE
6	90	5	32	75	98.9	MELON
7	105	5	43	83	19.24	KIWI
8	120	100	90	24	598	PEACHES
9	135	7	83	64	12.34	BANANAS
10	150	34	77	102	8.64	GRAPEFRUIT

11. Click **File > Save** with the following options:
 - a. Save file as *.rcp for recipes.

- b. Save file as *.emi for extended memory files.
 ☞ You must use file names which correspond to the ten extended memory areas preconfigured in the HMI (ex. em0.emi, em1.emi, ..., em9.emi).
 - c. Save file as *.csv to open the file in applications such as Microsoft Excel.
12. Once the file is saved, you can copy the recipe file to your HMI by:
- a. Procedure 1-- Downloading the file using the Project Manager:



- i. With the computer connected to your HMI, click **Transfer...Download**.
 - ii. On the Download dialog box, check the **RW** enable box, then select the recipe file.
- b. Procedure 2 -- Downloading using a SD card or USB Flash Drive:
- i. Attach an SD card or USB Flash Drive to your computer.
 - ii. In Project Manager, click **Build Download Data for CF/USB Disk** button.



- iii. Select the folder to save download data. Enter the SD card or USB Flash drive location.
- iv. Check the **Recipe (RW)** enable box, then select the recipe file.
- v. Click the **Build** button. A folder called 'mt8000' is created on the root directory of your drive.
- vi. Remove the SD or USB drive and connect it to your HMI.

☞ If you are using more than one USB device, make sure that the USB Flash drive is connected first (this identifies the USB Flash Drive as USB1).

EasyAddressViewer

Starts the Easy Address Viewer application for viewing the device types and memory ranges for the selected communications driver.

Build Download Data for CF/USB Disk

Data can be downloaded to the Silver Series using CompactFlash (older HMI models only), SD card, and USB flash drives. The **Build Download Data** function builds the data files to do this.

► *To build download data for CompactFlash (CF), SD card, or USB jump drive:*

1. Start Project Manager.
2. Click **Build Download Data for CF/USB Disk...** The Project Manager dialog appears.
3. Insert CF card, SD card, or USB flash drive into PC. Note the drive that represents the USB/CF/SD device.
4. Click **Browse...** next to **Select the folder to save download data:** to select the drive that represents the USB/CF/SD device.
5. Check the boxes that will be the sources for your data and browse to the appropriate file for that source. Click **Build**.

Transfer Settings

Download

Sends a compiled project file stored on the computer to the HMI.

Upload

Receives a compiled project file from the HMI to be stored on the computer.

Simulation Settings

On-line Simulation

Opens a compiled project (*.xob) in on-line simulator mode.

Off-line Simulation

Opens a compiled project (*.xob) in off-line simulator mode.

Pass-through mode

The pass-through mode allows serial communications from the PC to the PLC, though the HMI. This can eliminate the need to disconnect the PLC from the HMI when it is necessary to configure the HMI.

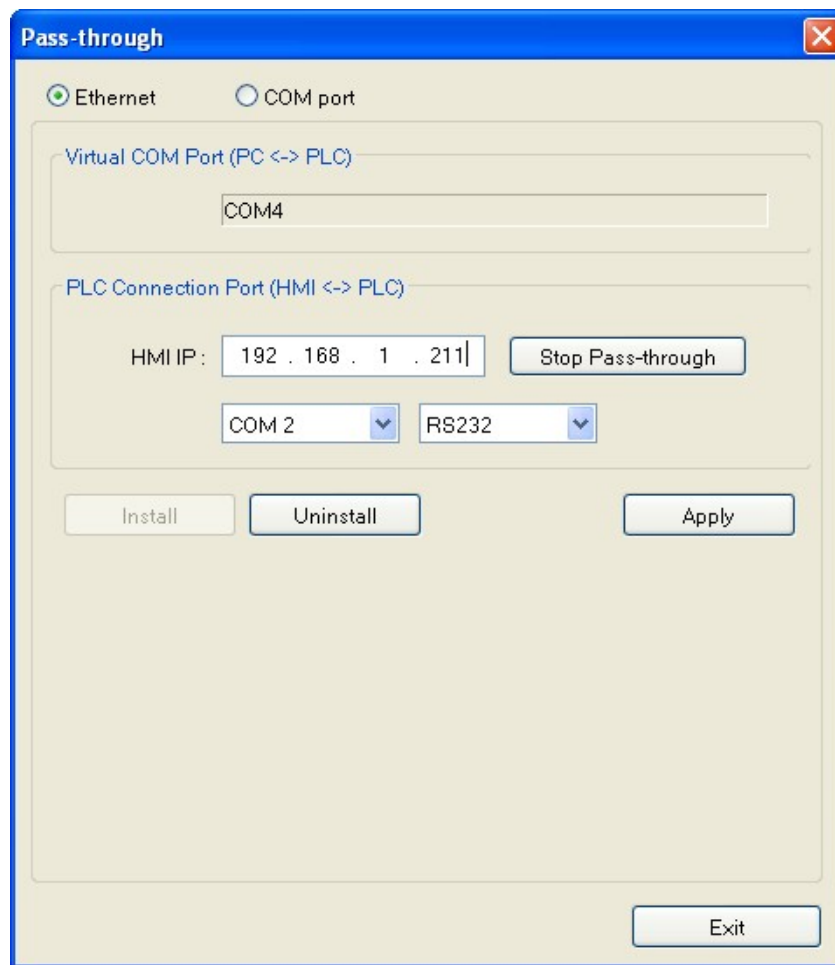
► To use the serial pass-through mode:

1. Select **COM port**. In the serial pass-through mode, data coming in on one serial port on the HMI is re-transmitted out another serial port to the PLC.
2. **HMI/IP**: If the HMI has an Ethernet port, Project Manager can query the HMI to get its communication parameters through the Ethernet port. Specify the IP Address of the HMI that is to be used in pass-through mode and click **Get HMI Communication Parameters** to read the current communication settings for the HMI (if the HMI is connected directly to the PC's Ethernet port, you must use a crossover Ethernet cable).
3. **HMI work mode**: Indicates the current mode of the HMI. After the communication parameters have been received, the mode will be either **Normal** (HMI set to communicate with PLC) or **Pass-through** (HMI is in pass-through mode).
4. **Source COM Port (PC -> HMI)**: Set COM settings for the HMI COM port that will be connected to the PC.

5. **Destination COM Port (HMI -> PLC):** Set COM settings for the HMI COM port that will be connected to the PLC.
6. Click **Start Pass-through** to begin pass-through communication and **Stop Pass-through** to end. Click **Exit** to exit pass-through mode.

☞ When the HMI is in serial pass-through mode, the HMI does not communicate with the PLC and the program in the HMI does not run.

► To use the Ethernet pass-through mode:



In the Ethernet pass-through mode, the HMI acts as an Ethernet-to-Serial bridge. A virtual COM port driver is installed on the PC (in this example, COM4), which provides the connection between EasyBuilder-5000 (or the PLC programming software) and the Ethernet port connected to the HMI. The virtual COM port uses the next available port on the PC.

1. Click **Install** to install the virtual COM port driver. The **Virtual COM Port (PC <-> PLC)** indicates the virtual COM port used on the PC.
☞ To change to another port, use the COM ports section of Device Manager on the PC.
2. **PLC Connection Port (HMI <-> PLC):** Enter the IP address of the HMI and the COM port and method of communication between the HMI and PLC.
3. Click **Apply** to accept the settings.
4. Click **Stop Pass-through** to end.

5. Click **Uninstall** to uninstall the virtual COM port driver on the PC.

 The HMI must be powered and connected to the PC or Windows will not recognize the virtual port as an available serial port.

 When the HMI is in Ethernet pass-through mode, the HMI suspends communications with the PLC and the application in the HMI does not run.

 Refer to Technical Note TN5047 for more information on “Using the Pass-Through Mode.”

Chapter 7 – Creating Windows

This section shows how to create and use windows using EasyBuilder.

Window Fundamentals

An operator interface terminal wouldn't be very useful if all of the information to be displayed could only be placed onto one screen. Therefore, most HMIs have multiple screens that you can use to display information. The Maple Systems Silver Series is capable of storing up to 1999 windows (actual limit is determined by memory requirements of each screen), giving you maximum flexibility in designing your operator interface. We prefer to call these screens 'windows' because they have several features not normally associated with screens:

- Windows can be created in any size. You can make the window full-sized so that it fits the entire area of the HMI display or you can create a window that partially covers the display.
- Windows can be overlaid on top of each other. All data on each window displayed is updated continuously regardless of whether or not it is covered up by another window.
- Windows can be moved around the HMI display to allow portions of other windows to come into view.

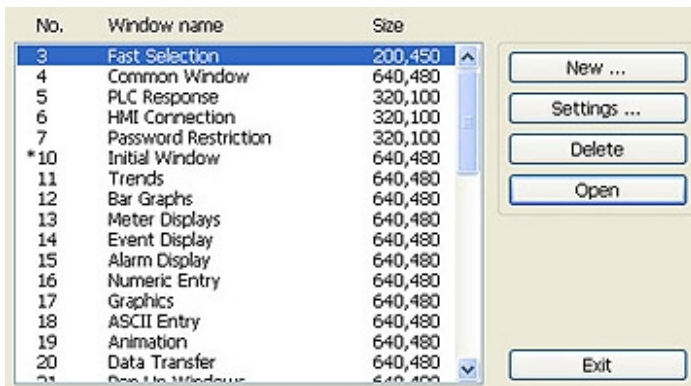
The Silver Series has four basic types of windows available for use: Base windows, a Common window, System Message window, and a Fast Selection window. Base windows are the windows that you will most often use. The Common window and Fast Selection window are two windows reserved for special functions. System Message windows are reserved for custom messages from the controller. By the end of this chapter, you will be able to create these windows and use the many features available to them.

Opening and Closing a Window

To view the contents of a window in EasyBuilder, it must first be opened. When you create or open an existing project file only the initial window is opened. To view any other windows that have already been created, you must first open the window. This can be done using the Window Tree (see "Chapter 3 - Using EZware-5000", Display Options) or by performing the following:

► To open a window:

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.



2. Click on the Window you wish to open. Then click Open.
 You can also open the window by double-clicking the window.

3. The Open Window dialog box closes and the opened window is displayed in the EasyBuilder work area.

The Open Window dialog box lists all of the windows currently created for the project. An asterisk next to a Window indicates that the window has already been opened. Each window is listed with the Window name and size. The window name is the name that you assign to the window when it is created. The window size is shown for quick reference. Finally, you will notice that the Open Window dialog box is also used to create a new window or change any of the settings for a window.

By default, when a window is opened it will replace any window that was displayed in the work area of EasyBuilder. To switch between open windows, click the Window menu and select from the list of windows currently open. You can also cascade (select Window-Cascade) or tile (select Window-Tile) the open windows to see the windows at the same time.

EasyBuilder requires more resources from your computer every time you open another window. When many windows are open, the performance of the computer may be affected. Therefore, you may wish to close some of the windows until you need to edit them.

► *To close a window:*

1. You will notice three small icons located in the upper right hand corner of each window: the minimize icon , the maximize icon , and the close icon . To close a window, click the close icon associated with that window. These icons show in the window if minimized. Otherwise, the icons are located on the rightmost end of the menu bar of EasyBuilder.
2. There is a close icon on each window tab as well, located just above the work area.

Creating a New Window

Whenever you create a new project, several windows have already been created by EasyBuilder:

#3: Fast Selection – The window controlled by the Fast Sel button that allows you to quickly jump to commonly accessed windows or objects.

#4: Common Window – A window that displays graphics (such as a company logo) or objects that are always on every screen of the display. The common window runs below every other window that is being displayed on the HMI.

#5: PLC Response – This is the window that is displayed when the HMI loses communications with the PLC.

#6: HMI Connection – This is the window that is displayed with the HMI loses communications with a remotely connected HMI.

#7: Password Restriction – This is a window that is displayed when access is attempted on a protected object without the proper password.

#8: Storage Space Insufficient – This is a window that is displayed when the available memory in the HMI, USB Flash drive, or SD card is running low. This window must be created by the programmer and a message placed on the window, such as, “Memory Low!” along with a Function Key to close the window. See *To create a new window* below.

#10: Startup Screen – The window that displays whenever the HMI is started up. The Startup Screen can be redefined in the System Parameter Settings, on the General tab.

#50: Keypad1 Integer – A style of numeric keypad.

#51: Keypad2 Integer – A style of numeric keypad.

#54:ASCII Middle – A style of an ASCII keypad.

#55:ASCII Small – A style of an ASCII keypad.

#60:ASCII Upper M – A style of an ASCII keypad.

#61:ASCII Lower M – A style of an ASCII keypad.

#62:ASCII Upper S – A style of an ASCII keypad.

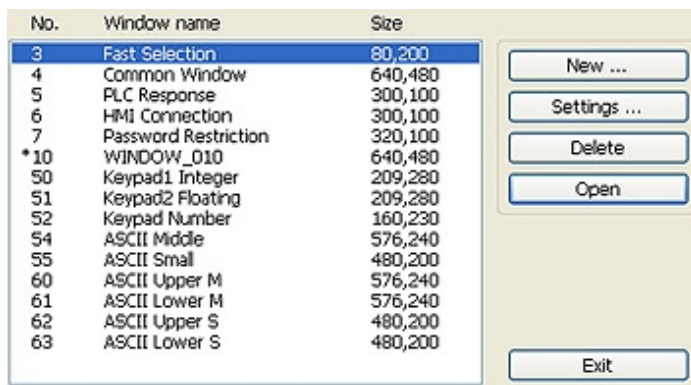
#63:ASCII Lower S – A style of an ASCII keypad.

 *Not every model uses every keypad listed.*

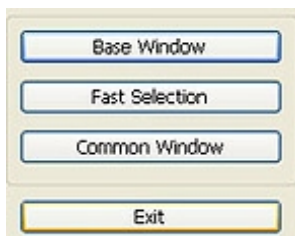
The remaining windows are available to be created as you desire for your project. In order to create new windows, the following steps must be performed.

► *To create a new window:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.



2. Click **New...** The Select Window Style dialog box appears.



3. Click **Base Window**. If the Fast Selection and Common Window buttons appear grayed out, then it is because those windows have already been created. The Window Setting dialog box appears.

4. Modify the window parameters, then press **OK**. The Open Window dialog box reappears.
5. If you wish to open the window you just created, click on the window and click **Open**. Otherwise, click **Exit** to return to the main screen of EasyBuilder.
6. An alternate method of creating a new window is to right-click on an unused window number in the **Windows Object List** and select **New**. The Window Settings dialog opens.

Window Settings

Let's look more closely at the parameters you can change when creating a new window.

 When a window is initially created, the window settings can be edited to make changes; however, once a window has been created, the window number cannot be changed. To change the window settings, highlight the desired window in the Open Window dialog and click on the **Settings...** button. Alternately, right-click on the desired window in the **Windows Object List** and select Settings.

Assigning a Window Name

The Name is a description box used to help you identify what the window is used for without having to actually open the window and look at the contents. Up to 50 characters can be entered into this field with space characters allowed.

Assigning the Window Number

Although 1999 windows are available on the Silver Series, two are specifically reserved for the Common Window and the Fast Selection window and several are reserved for internal use. Therefore, you can assign #10-1999 to any window you create. When you initially create a window, EasyBuilder will automatically assign the lowest available number to the window. However, you can assign any number within the allowed range. In this manner, you can group windows together that may share some common traits.

Assigning Size of Window

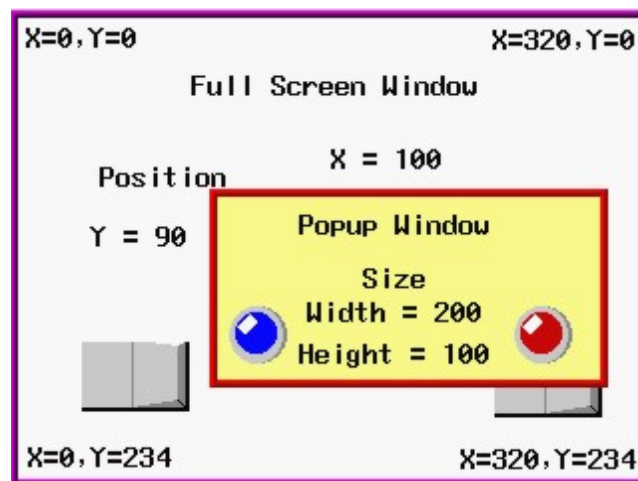
You can vary the size of a new window to create full screen or popup windows. Popup windows are most often used to display data that does not need to be on the HMI display all of the time. For example, you might want to configure an instructional message in a popup window that can be moved aside or closed when not needed. The message can be triggered to pop up when needed or appear with a keypress.

Assigning a Position

This is the starting position that the window goes to when it is initially called onto the HMI screen as a popup window. The starting position is labeled Start Pos: in the Window Setting Dialog box. The X and Y positions refer to the pixel location of the HMI display at which the upper left-hand corner of the window is to be displayed.

The default setting is X=0 and Y=0 which is the upper left-hand corner of the HMI display. The X-axis refers to the horizontal location and the Y-axis refers to the vertical location.

- The HMI5043N/HMI5043T have a 480 x 272 pixel display, so the ranges are X = 0-479 and Y = 0-271.
- The HMI5056N has a 320 x 234 pixel display, so the ranges are X = 0-319 and Y = 0-233.
- The HMI5070NH/HMI5070TH/HMI5100N/HMI5100T have an 800 x 480 pixel display, so the ranges are X = 0-799 and Y = 0-479.
- The HMI5104TH/HMI5104XH/HMI5121X have a 800 x 600 pixel display, so the ranges are X = 0-799 and Y = 0-599.
- The HMI5150X has a 1024 x 768 pixel display, so the ranges are X = 0-1023 and Y = 0-767.



Monopoly Feature

The monopoly feature is used to 'monopolize' all touchscreen action that can occur on the HMI screen. For instance, suppose the HMI display is currently showing a full screen window with several objects. If a popup window is displayed that does not have the monopoly feature enabled, the HMI operator is able to press and activate any objects on the popup window or the full screen window since objects on both screens are active.

If another popup window is displayed that does have the monopoly feature enabled, then the objects on the full screen window will not respond when pressed.

Please note that the monopoly feature only disables touchscreen objects on the full screen window. Objects on other popup windows can still be activated.

The monopoly feature can be used to display a popup window with some action that the HMI operator must perform before being allowed to do some other action on the HMI. For example, you might construct a dialog box that asks the HMI operator if some step in the control process has been performed. The dialog box would have Yes and No function key options which, with the monopoly feature enabled, the HMI operator must press before continuing.

Assigning Underlay Windows

An Underlay Window is a Base Window that is displayed at the same time as the Base Window that calls it. Each full-size Base Window can display up to three underlay windows. A popup window cannot display any underlay windows. There may be times when it is desirable to place the same information on multiple (but not all) windows. Underlay windows provide a means to accomplish that without the overhead of a Direct or Indirect Window, and without using the Common Window (which makes the information visible on all windows). Underlay windows also eliminate the need to actually place the same objects on multiple windows, which increases the memory required for the project. Each base window can display up to three underlay windows, which are called Bottom, Middle, and Top.

How to Display Underlay Windows

When you have common objects to display on multiple screens, use the underlay window feature to store these on underlay windows attached to a base window. This decreases the amount of memory required for the project. The base window “calls” the underlay window. Each full-size base window can display up to three underlay windows, which are called Bottom, Middle, and Top. Objects on the underlay windows cannot be edited from the base window on which they are displayed.

 It may be desirable to use Underlay Windows but temporarily hide them when developing the project.

The  button on the Standard Toolbar toggles the visibility of objects on Underlay Windows.

 A popup window cannot display any underlay windows.

To assign underlay windows to a base window, you must first create the underlay windows. Underlay windows are created the same way base windows are created. Then you can assign the underlay windows to the base window.

► *To assign underlay windows to a base window:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.
2. Highlight the base window you wish to use.
3. Click the **Settings...** button. The Window Setting dialog box appears.
4. Click the pull-down list box for each Underlay window selection to assign the underlay window screens to the base window.
5. Click **OK**. Click **Close** on the Window Setting dialog box.

Rules That Apply to Underlay Windows

- Only the objects of an underlay window are displayed on the base window. All background information about the underlay window (i.e. background color, frame color and size, etc.) are not displayed on the base window.
- Active objects can be ‘overlaid’ on top of each other over two or more underlay windows. For example, a Set Bit object that is configured to set an HMI local bit LB0 is located at X=20, Y=50 for Underlay Window #1. Another Set Bit object that controls LB1 is placed on Underlay Window #2 at the same location. When the Base Window displays these two windows, both objects will be active so that when they are pressed both LB0 and LB1 will be set.
- Static objects may be overlaid using underlay windows. However, any static object that is on the Base Window has the highest precedence and will be displayed over any static objects that are on the underlay windows. Active objects have higher precedence over static objects.
- Popup windows cannot display underlay windows.

- Underlay windows are always positioned from the top left corner of the screen. Any position settings you make when creating the underlay window are ignored when the window is displayed by a Base Window as an underlay window.

For more information and an example of how to use underlay windows, consult the EasyBuilder Help files.

Creating a Frame

The Window Settings dialog provides the option of having a frame around any window that you create. You can create a frame from 0-16 pixels wide in any of EasyBuilder's 65K available colors.

Window Background

You can also select a different background color for each window created. The default setting is black.

► *To select a different background color:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.
2. Click on the window that you wish to change the background color. Click **Settings**. The Window Setting dialog box appears.
3. In the Background section, check the **Filled** box.
4. Click the pull-down arrow of the **Color** box. The Color dialog box appears.
5. Select from one of the basic colors or add new colors from the customized list of colors. To create a customized color, click on the Custom button at the bottom of the Color dialog box..
6. The color table dialog box appears allowing you to select or modify one of the colors available.
7. Click **OK** in the Color dialog box to go back to the Window Setting dialog box. Click **Close** to return to the EasyBuilder main screen.

Instead of using a solid background color, you can select a pattern that is displayed in the background of a window.

► *To select a background pattern:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.
2. Click on the window that you wish to change the background pattern. Click **Settings**. The Window Setting dialog box appears.
3. In the Background section, check the **Filled** box. Select a background color as described above.
4. Click the pull-down arrow of the **Pattern** box and select a pattern, then click **OK**.
5. Click the pull-down arrow of the **Pattern color** box and select a color.
 To use the background pattern, the color selected for Pattern color must be different then the color selected for the Background color.
6. Once a pattern color is selected, click **OK** in the Color dialog box to go back to the Window Setting dialog box.
7. Click **Close** to return to the EasyBuilder main screen.

Deleting a Window

Before any window can be deleted from a project, the window must be closed. To close a window, see the section earlier in this chapter on opening and closing windows.

► *To delete a window:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.
2. Highlight the window that you wish to delete.
3. Click the **Delete** button. A dialog box appears asking if you want to delete this window.
4. Click **Yes**. The dialog box disappears and the selected window is deleted.
5. Click **Close** in the Open Window dialog box to go back to the EasyBuilder main screen.

 If the Delete button does not appear when the window is highlighted, this means that this is a Window that can't be deleted. Typically, if you are unable to delete a window, it is because it is one of the predefined windows discussed earlier in this chapter or the window is still open.

Using Base Windows

Of the four types of windows, base windows are the most commonly used. A base window is used to create a full screen window or a popup (partially sized) window. Popup windows can also be moved about on the HMI display and can overlap each other. The number of objects that can be placed onto each base window is limited only by the total amount of memory available within the HMI.

How to Display Base Windows

Base windows can be displayed on the HMI screen by using a function key to display the window or by using the PLC to call up the window.

Using a Function Key

The Function Key Object is a graphic touch object that is placed onto a window to perform an action. Function keys have many purposes, but two actions that a function key can perform are:

- Calling a full screen window
- Calling a popup window

Calling a full screen window

If a function key object is created to call a full screen window, the window that is displayed replaces all other windows that are on display regardless of how many are open; therefore, think of calling a full screen window as performing two actions -- closing any open windows and displaying a full screen window.

► *To call a full screen window using a function key object:*

1. From the **Objects** menu, select **Function Key**. The New Function Key Object dialog box appears.
2. In the **General** tab, click the **Change full-screen window** option button.
3. In the same section, enter the **Window No.** you want to call.
4. Select the **Shape** tab, click the **Use shape** or **Use picture** checkbox, and then click the **Shape Library** button or **Picture Library** button. Select the shape or bitmap you wish to use to represent the function key and click **OK**.

5. Select the **Label** tab and check **Use label** and create a label for the function key.
6. Click **OK** to return to the main screen of EasyBuilder.
7. Place the function key object where you want it on the window you are editing. You must select a window that is full size when using the Change Window function.

Calling a popup window

If a function key object is created to call a popup window, the window that is displayed is generally overlaid over all other windows that are on display. Think of calling a popup window as opening another active window for display.

► *To call a popup window using a function key object:*

1. From the **Objects** menu, select **Function Key**. The New Function Key Object dialog box appears.
2. In the **General** Tab, check the **Display popup window** option button. Note that the **Close this popup window when parent window is closed** checkbox will cause the popup to close automatically whenever the base window changes.
3. In the same section, enter the **Window No.** you want to call.
4. Select the **Shape** tab, click the **Use shape** or **Use picture** checkbox, and then click the **Shape Library** button or **Picture Library** button. Select the shape or bitmap you wish to use to represent the function key and click **OK**.
5. Select the **Label** tab and check **Use label** and create a label for the function key.
6. Click **OK** to return to the main screen of EasyBuilder.
7. Place the function key object where you want it on the window you are editing. You must select a window that is less than full size when using the Popup Window function.

To display a full screen or popup window, press the touchscreen where the function key object is located. The window displays in the location on the HMI display as determined by the X and Y position in the Window Settings box for that window.

Using the PLC

Three objects are used by the PLC to call or display a base window. The PLC Control Object is used by the PLC to display full screen windows. The Direct and Indirect Window Objects are used by the PLC to display popup windows.

The PLC Control Object

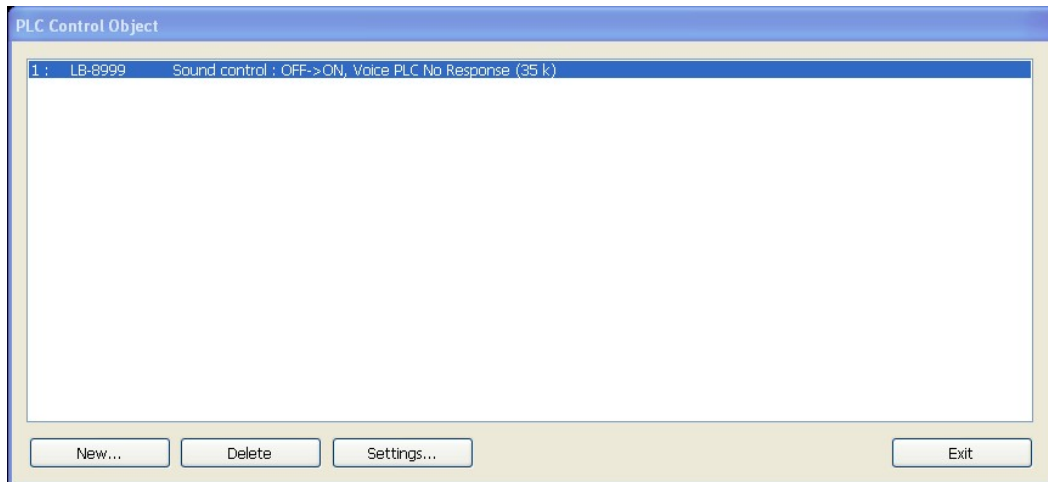
The PLC can display a full screen window by using the PLC Control Object. This object allows the HMI to continuously scan a PLC register to display a full screen window, which corresponds to the number in the PLC register.

Once the HMI displays a full screen that is requested by the PLC Control Object, the HMI will automatically write the number of the requested screen to the next consecutive register. For example, if you assign internal data register LW10 to a PLC Control Object/Change Window and the number 3 is placed into this register, then the HMI will display Screen #3. Finally, it will put the number 3 into LW11. This allows the PLC to confirm that the Screen has been properly displayed by the HMI.

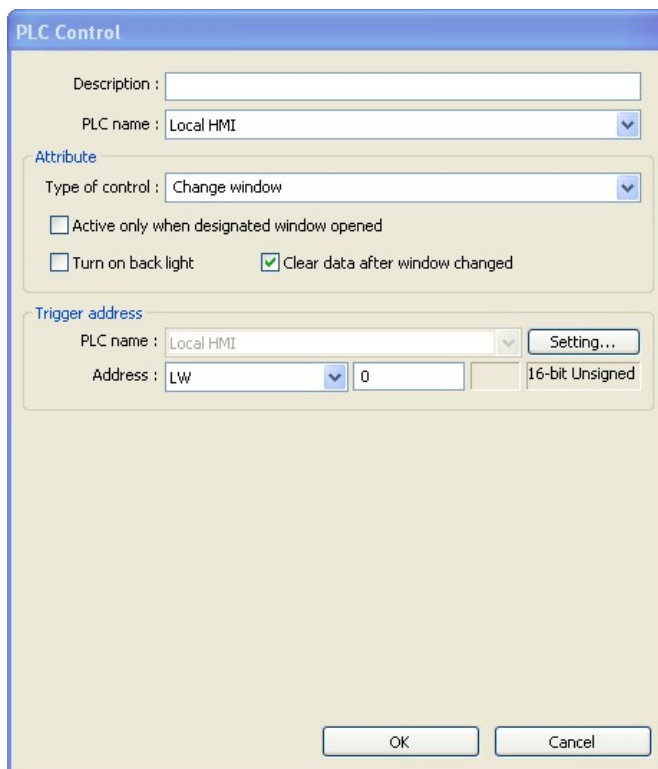
You can create as many PLC Control Objects as you need -- each object is universal and is not dependent upon which HMI screen is currently on display.

► *To call a full screen window using the PLC Control object:*

1. From the **Objects** menu, select **PLC Control**. The PLC Control Object dialog box appears.



2. Click **New...**. The PLC Control dialog appears.



3. Select **Change window** from the **Type of control** drop-down box in the **Attribute** section.
4. Click the **Setting...** button in the **Trigger address** section and select the **Device type** and **Address** for the actual PLC address you wish to monitor.
The HMI will write the number of the newly-displayed window to the next consecutive address after the address specified in this step.
5. Select the format from the drop down menu (e.g., 16-bit or 32-bit unsigned, signed or BCD).
6. Click **OK** to return to the PLC Control dialog box and click **OK** again to return to the PLC Control Object dialog box.

7. You will see a new entry that lists the PLC address that is monitored by the HMI.

The PLC must only enter window numbers that represent full size windows when using the PLC Control Object function. The HMI automatically closes any open windows before the window called by the PLC Control Object is displayed.

The Direct and Indirect Window Objects

If you want the PLC to call up a popup window that is to be overlaid on top of other windows already open, then there are two methods used to do this:

- Direct Window Object
- Indirect Window Object

Unlike the PLC Control Object, the Direct and Indirect Window Objects are only active for the windows into which they are placed.

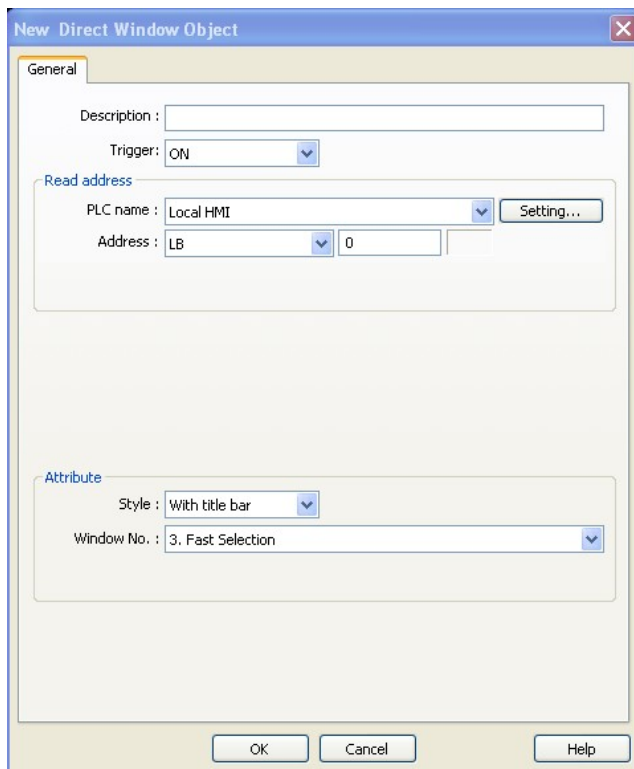
The Direct Window Object is used to display a popup window using a PLC coil. The HMI continuously reads the value of the PLC coil to determine its state. If the trigger state is detected, then the predefined popup window is displayed.

The Indirect Window Object is used to display a popup window using a PLC data register. Similar to the PLC Control Object, the HMI continuously monitors the selected PLC data register. It will display any popup window that corresponds to the number placed into the PLC data register by the PLC.

The PLC must reference a window that is less than full size when using the Direct Window and Indirect Window objects.

► *To call a popup window using the Direct Window Object:*

1. From the **Objects** menu, select **Direct Window**. The New Direct Window Object dialog box appears.

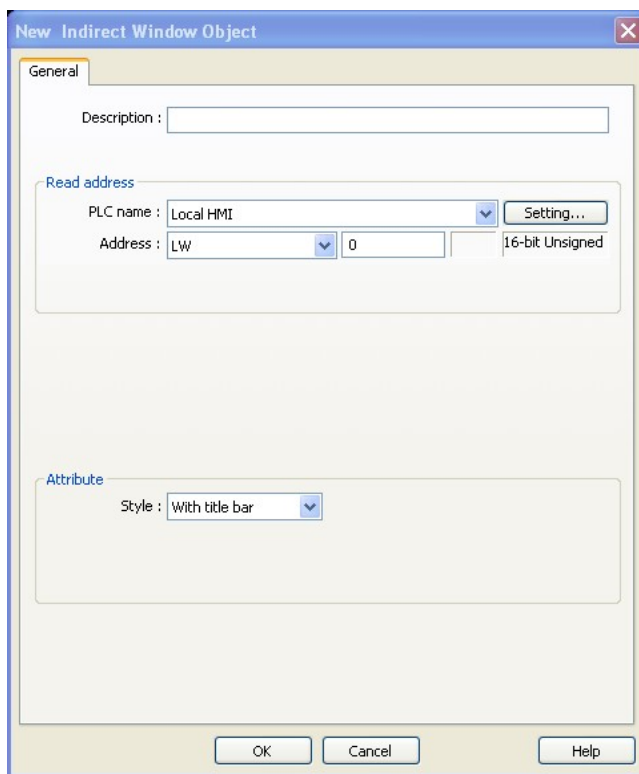


2. Select the trigger state in the **Trigger** drop-down box (ON or OFF).

3. Click the **Setting...** button in the **Read address** section and select the PLC address according to Device type selected from the drop down menu and then enter the address.
4. Select the format from the drop down menu and click **OK**.
5. Select the **Window No.** you want to call from the drop down menu under the **Attribute** heading.
6. Click **OK** to return to the main screen of EasyBuilder. The mouse cursor will have a square object that represents the size of the popup window.
7. Place the Direct Window object where you want the popup window to appear.
8. The Direct Window object should be the same size as the popup window it is calling. You can resize the object after you have placed it by clicking on the object and dragging on the sizing handles or selecting the **Profile** tab in the Direct Window Object's Properties window and adjusting the **Width** and **Height** settings.

► *To call a popup window using the Indirect Window Object:*

1. From the **Objects menu**, select **Indirect Window**. The New Indirect Window Object dialog box appears.



2. Select Click the **Setting...** button in the **Read address** section and select the PLC address according to Device type selected from the drop down menu and then enter the address.
3. Select the format from the drop down menu and click **OK**.
4. Click **OK** to return to the main screen of EasyBuilder. The mouse cursor will have a square object that represents the size of the popup window.
5. Place the Indirect Window object where you want the popup window to appear.
6. The Indirect Window object should be the same size as the popup window it is calling. You can resize the object after you have placed it by clicking on the object and dragging on the sizing handles or selecting the **Profile** tab in the Indirect Window Object's Properties window and adjusting the **Width** and **Height** settings.

Tips and Suggestions

Having trouble deciding which method to use to display a base window? Here are some suggestions:

- If you want to clear the HMI display of all open windows and display a new full screen window, then use the PLC Control Object function or select the Change Window option in the Function Key Object. The PLC Control Object is global (meaning it does not matter which windows are currently on display), so the HMI will always monitor the PLC address that you have selected. The Function Key Object can be made local to one or more windows by placing the object on only those windows. It can also be made global (meaning the HMI operator can always change to this window no matter which window is currently displayed), by placing the Function Key Object on the Common Window or the Fast Selection Window.
- If you want to display a popup window on one particular full screen window, then try using the Popup Window option in the Function Key Object. This is particularly useful if you want the HMI operator to control the ability to display the popup window. If you want the PLC to determine when to display the popup window, then use the Direct Window object.
- If you want to display a popup window that can be shown on any full screen window, then try using the Popup Window option in the Function Key Object. You should place the Function Key Object on the Common Window or in the Fast Selection Window. This will allow the HMI operator access to that popup window regardless of which full screen window is displayed. If you want to display the popup window only when some condition in the PLC has occurred, then use the Direct Window object on the Common Window.
- If you want to display one of many possible popup windows on any full screen window, then try using the Indirect Window object on the Common Window. You can then let the PLC determine which popup window should be displayed or you can create several Set Word objects to allow the HMI operator to select which window to look at.

Returning to a previous window

You can configure a function key to display the full-sized base window that was on the HMI screen before the currently shown window.

► *Create a function key to return to previous window:*

1. From the **Objects** menu, select **Function Key**. The New Function Key Object dialog box is displayed.
2. Select the **Return to previous window** option button.
3. Configure the rest of the function key, and then click **OK**.
4. Place the function key object onto the full-sized base screen.

 Placing a **Return to previous window** function key onto a popup window will not work.

Using a function key to close a window

You can configure a function key to close any popup window that is currently displayed on the HMI screen, and was called by a function key.

► *Create a function key to close a window:*

1. From the **Objects** menu, select **Function Key**. The New Function Key Object dialog box is displayed.
2. Select the **Close window** option button.
3. Configure the rest of the function key, and then click **OK**.

4. Place the function key object onto the popup window.

 Placing a **Close window** function key onto a full-size base screen will not work. To close a direct window, turn off the controlling bit. To close an indirect window, write a 0 to the controlling register.

Using the Common Window

Your project might require that some data be displayed on the HMI screen at all times, regardless of which window(s) are displayed. For example, you may want to display a company logo on the HMI screen at all times, or you may want to display some critical data or an alarm message which should be seen no matter what windows are displayed.

Using base windows to display this information requires that you configure every full screen base window with the same graphics object. The common window however, is a predefined window in the HMI that you can enable to display this information. When created, the common window always operates in the background as a full screen window that overlays any full screen base window displayed.

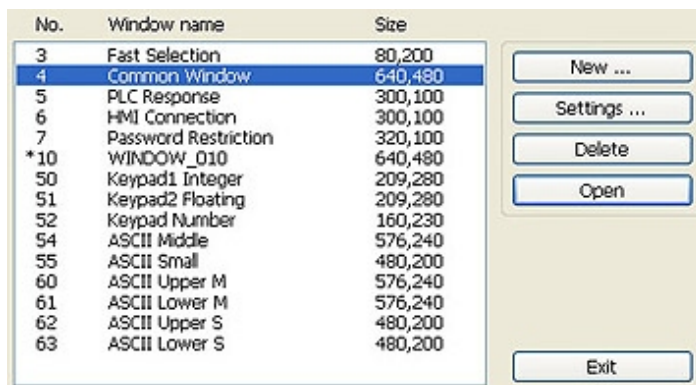
 It may be desirable to use the Common Window but temporarily hide it when developing the project.

The  button on the Standard Toolbar toggles the visibility of objects on the Common Window.

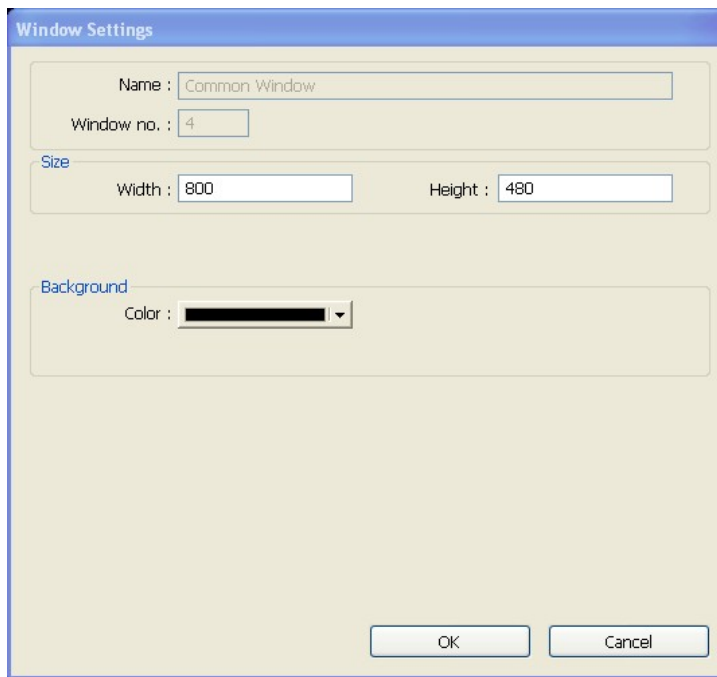
Whenever you create a new project, the common window (Window #4) is automatically created.

► *To access the common window:*

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.



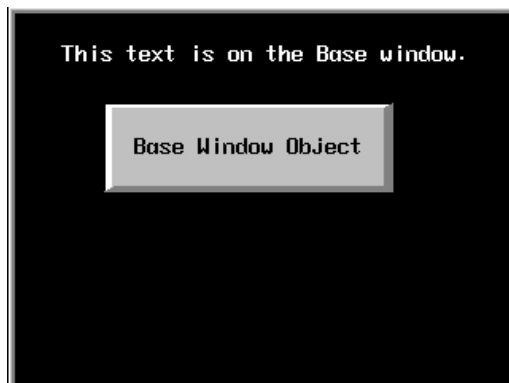
2. Highlight Window #4, **Common Window** and click **Settings**. The Window Setting dialog box appears.



3. As you can see, some of the parameters for a common window are disabled and cannot be changed. Window #4 is always reserved for the Common Window. Although the Background settings are active, none of these settings affects the operation of the common window.
4. Click **OK**. The Open Window dialog box reappears with the Common Window selected.
5. If you wish to open the common window, click **Open**. Otherwise, click **Close** to return to the main screen of EasyBuilder.

Displaying the common window above/below the base window

This setting resolves the conflict that can occur if a graphics object on the common window occupies the same space on the HMI display as a graphics object on a base window. Using the **Above base window** attribute forces the graphics object on the common window to cover the base window graphics object. Using **Below base window** has the opposite effect.



Base Window

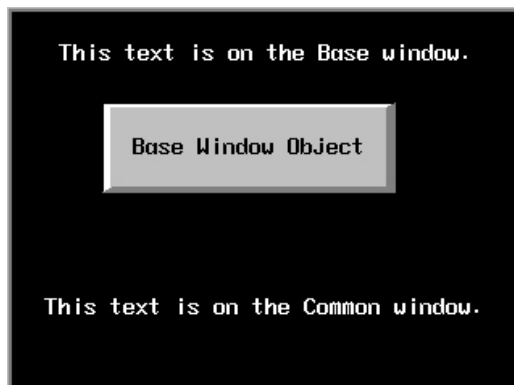


Common Window

When **Above base window** is set, the result is:



When **Below base window** is set, the result is:



► To set the *Above/Below base window option* for a common window:

1. From the **Edit** menu, select **System Parameters**. The Set System Parameters dialog box appears.
2. Select the **General** tab. In the **Options** section next to **Common window**, select either **Above base window** or **Below base window**.
3. Click **OK** to return to the main screen of EasyBuilder.

 Active graphics objects (objects that display information or graphics according to a data value in a PLC register or coil) take precedence over passive graphics objects (objects such as circles, lines, rectangles, etc.).

Therefore, a Set Word Object on a base window will cover a Rectangle Object on a common window that occupies the same space even with the **Above base screen** attribute enabled.

Changing the Active Common Window

Although only one common window can be on the HMI display at one time, you do have the ability to create multiple common windows by using base windows as common windows. Then, with the help of a Function Key object (using the **Change common window** checkbox), the HMI operator can change the active common window.

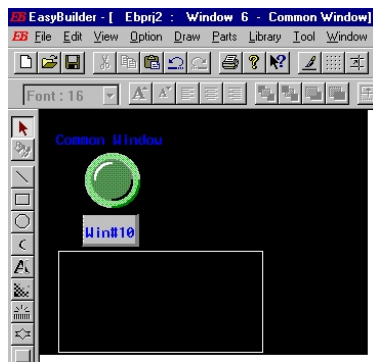
The ability to change the common window adds more flexibility to your project should you need it. For example, you may have a series of full screen windows which all need a keypad for entry. Another series of full screen windows may require a common alarm message. By changing the common window with each series of windows, you can customize each common window to contain only the graphics objects that are needed.

► To change the active common window:

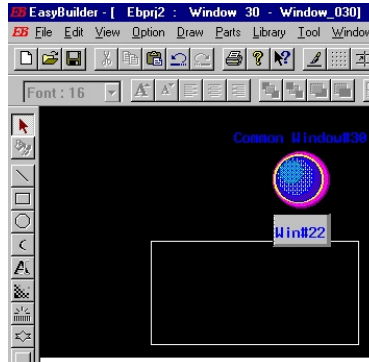
1. Create a common window.
2. Create a base window that is full screen. This will be used as another common window.

 Note that when a base window is used as a common window, the Start Pos:, Style, Frame, and Background settings are ignored by the HMI. For this example, let's use Window #30 as the alternate common window.
3. Create another full screen base window that can be displayed along with the common windows, (such as a startup window). Let's use Window #10, the initial window, for our example.
4. On Window #10, create a Function Key object that is used to change the common window. From the **Objects** menu, click **Function Key**. The New Function Key Object dialog box appears.
5. On the **General** tab, select the **Change common window** option button.
6. In the same section, select 30 from the **Window no.** drop down menu.
7. Click the **Shape** tab. Click **Use Shape...** and then click on the **Shape Library...** button. Select Shape #19 from the **Buttons 1** library. Click **OK** to return to the Create Function Key Object dialog box.
8. Click the **Label** tab. Click the **Use label** checkbox.
9. For our example, type CCW (meaning Change Common Window) into the **Content box**. Click **OK** to exit the Create Function Key Object dialog box and go back to the EasyBuilder main screen.
10. Place the new Function Key object somewhere on Window #10.

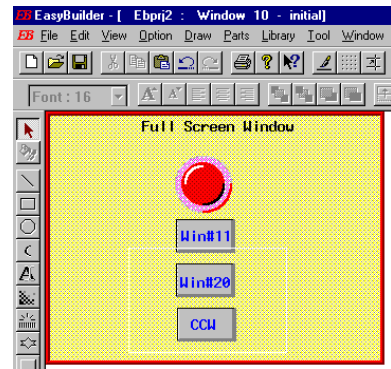
Below is an illustration of what the default common window, Window#30 (alternate common window), and Window#10 (startup window) might look like:



Default Common Window #4

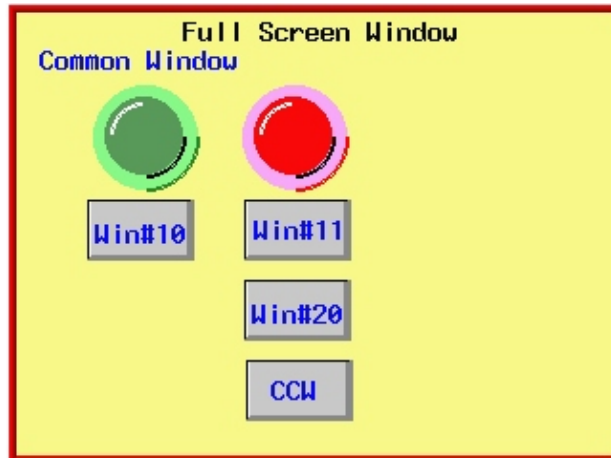


Alternate Common Window #30

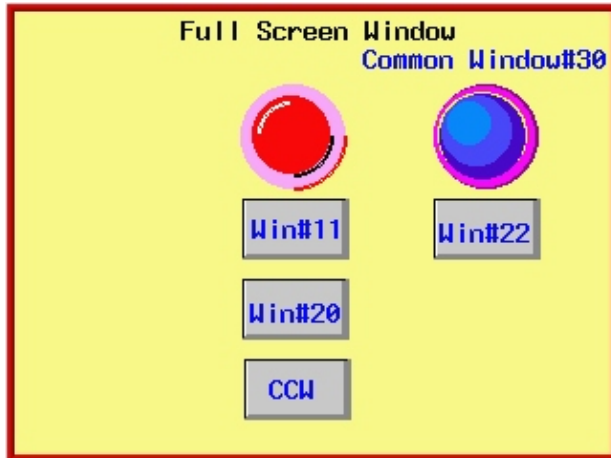


Initial Window #10

When the HMI initializes, it displays the startup screen (Window #10) and the default common window.



To change common windows, we press the CCW function key that has been configured to change the common window to Window #30.



Window #30 remains the common window until another function key object is pressed that changes the common window or until the HMI is reset.

Using the Fast Selection Window

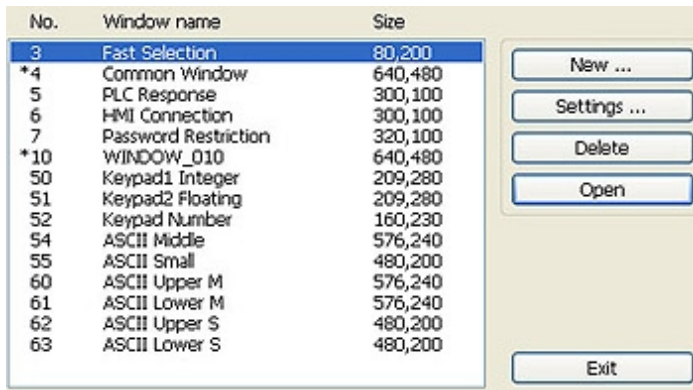
In the last section, you read that common windows are great for displaying information that should be displayed all the time, regardless of which base windows are active. You may also create projects that require a window that is always accessible (like a common window) but not always displayed. For example, you may want a numeric keypad available for any data entry; however, a keypad takes precious space on the HMI display. Ideally it should appear on screen only when a key was pressed and then, by pressing another (or the same) key, the keypad should disappear.

This is essentially the purpose of the Fast Selection window. The Fast Selection window can also be used as a menu key that allows the HMI operator to rapidly switch screens.

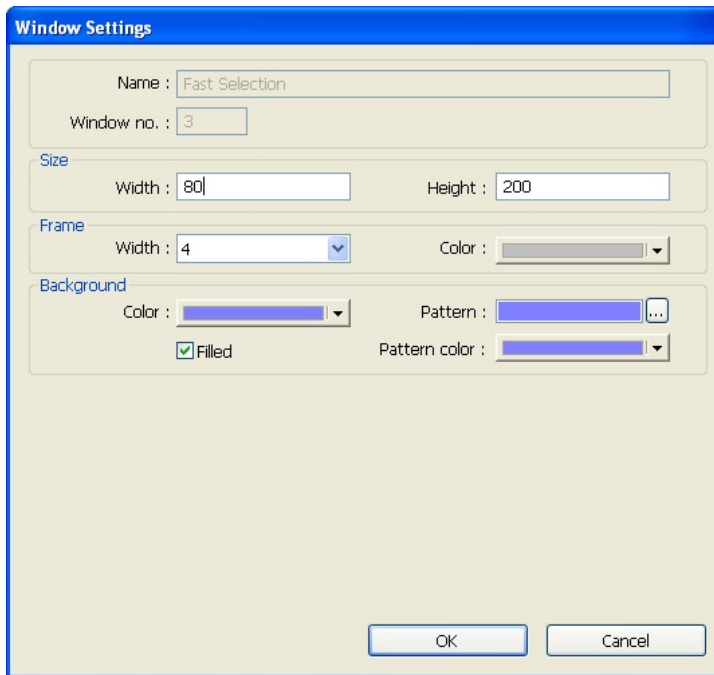
Whenever a new project is created, the fast selection window (Window #3) is automatically created (except when Portrait mode is selected; you can create a Fast Selection window using the **Window > Open Window > New... > Fast Selection** command).

► To open a fast selection window:

1. From the **Window** menu, select **Open Window**. The Open Window dialog box appears.



2. Highlight the Fast Selection Window and click **Settings**. The Window Setting dialog box appears.



3. The **Name:** and **Window No.:** are reserved to identify the Fast Selection window. The other parameters can be modified, (see the Window Settings section earlier in this chapter for more information). Notice that the default size is Width = 80 and Height = 200. The default was selected to create a 'sidebar' that contains function keys to display other windows. The example below illustrates how the Fast Selection Window can be used for this purpose.
4. Press **OK**. The Open Window dialog box reappears with the Fast Selection window selected.
5. If you wish to open the fast selection window, click **Open**. Otherwise, click **Close** to return to the main screen of EasyBuilder.

Using the Fast Selection Button

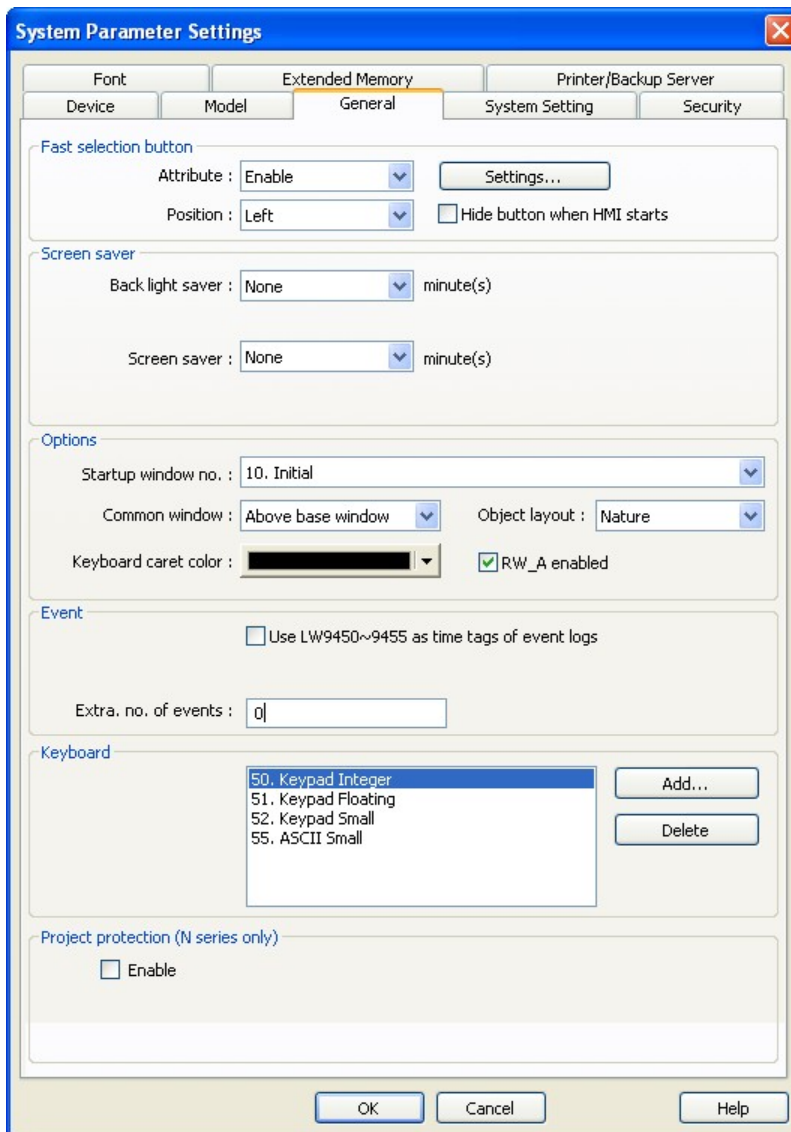
The fast selection button is used to display the Fast Selection window. Pressing the button again causes the Fast Selection window to close.

Creating the Fast Selection Button

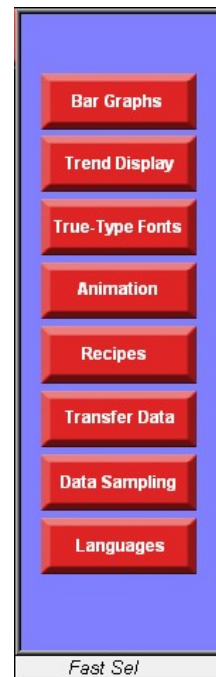
The fast selection button must be activated in the System Parameters in order to have it display on the HMI. When enabled, the fast selection button is always visible on the screen.

► To display the fast selection button:

1. Select **Edit > System Parameters**. The System Parameters Setting Dialog appears. Select the **General** tab.



2. In the **Fast selection button** section, select **Enable** from the **Attribute** drop-down menu.
3. Select either **Right** or **Left** from the **Position** drop-down menu to select whether the button will appear in the right-lower corner or left-lower corner of the screen.



4. Click **Settings...** Click the **Use shape** checkbox, and then click the **Shape Library...** button.
5. Select a shape for your fast selection button and click **OK**.
6. Click **OK**.

 The Fast Selection window can only call full screen windows, not popup windows. Therefore, you cannot use Function Key Objects configured to **Display popup window** in Fast Selection windows.

System Message Windows

EasyBuilder has four Windows designated as System Message windows. Window #5 is designated as the PLC Response Window that pops up automatically when the HMI loses communications with the PLC.



Window #6 is designated as the HMI Response window, which will pop up automatically with the HMI loses communications with another HMI that is remotely connected.



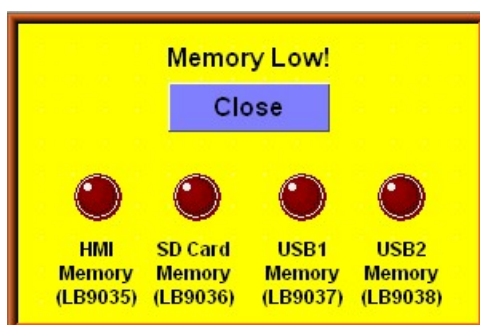
Window #7 is designated as the Password Restriction Window, which will pop up when access is attempted on a protected object without the proper password. The **Display warning message if access denied** checkbox must be enabled in the **Security** tab > **User restriction** section of the object.



These windows have been pre-configured with automated messages and a function key to close the window, so no changes are necessary, though you may customize them for your own application if desired.

Window #8 is designated as the Insufficient Memory Window, which will pop up when the available memory in the HMI, USB Flash drive, or SD card is running low. This window must be created by the programmer, and it can be configured to indicate which device has triggered the message. The following Reserved Local Bits indicate insufficient memory conditions:

LB9035	HMI free space insufficient alarm (when ON)
LB9036	SD Card free space insufficient alarm (when ON)
LB9037	USB 1 free space insufficient alarm (when ON)
LB9038	USB 2 free space insufficient alarm (when ON)



The amount of available memory is indicated by the following Reserved Local Words:

LW9072	HMI free space available in KB (32-bit)
LW9074	SD Card free space available in KB (32-bit)
LW9076	USB 1 free space available in KB (32-bit)
LW9078	USB 2 free space available in KB (32-bit)

 The default trigger value for the insufficient memory warning is 16MB, and is stored in LW9070 (in MB). This is a “read-only” register and cannot be modified.

Chapter 8 – Creating and Using Databases and Languages

EasyBuilder includes the ability to create and use both a Tag Database Library and a Label Database Library. The Tag Library is a database of PLC register addresses. Once created, the Tag Database allows individual object address assigning through Tag selection from the Tag Library. The Label Library is a database of text labels. Once created, the Label Database allows individual object text labeling through Label selection from the Label Library. The Label text may also be represented in up to eight languages, each selectable for display.

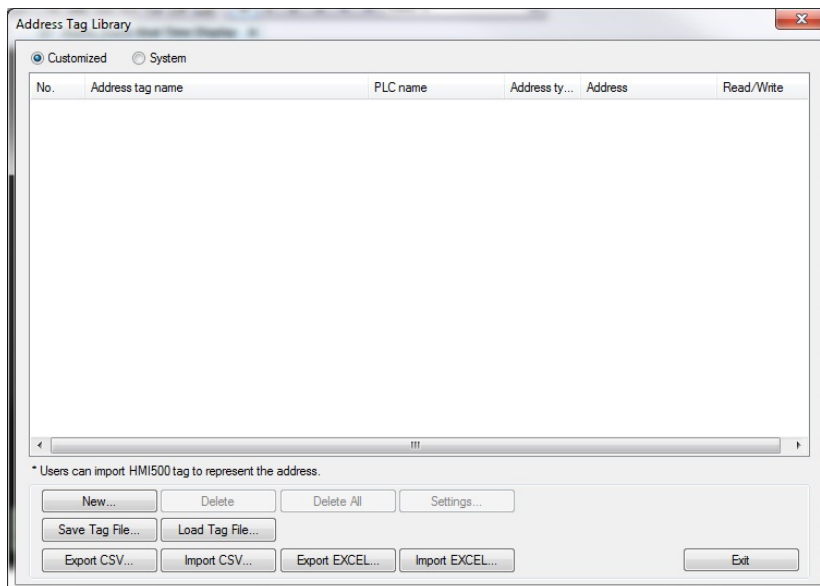
Creating and Using the Tag Library

The Tag Library is a database of register addresses, with each tag representing a single address. EasyBuilder gives you the option of using either Customized or System tags. Customized tags are tags that you build yourself. System tags are predefined tags that allow access to certain built-in functions and settings. You can select whether you will be using customized or system tags in the Address Tag Library dialog. The Tag listing does not contain display information, as display attributes are set when the individual object using the Tag listing is created.

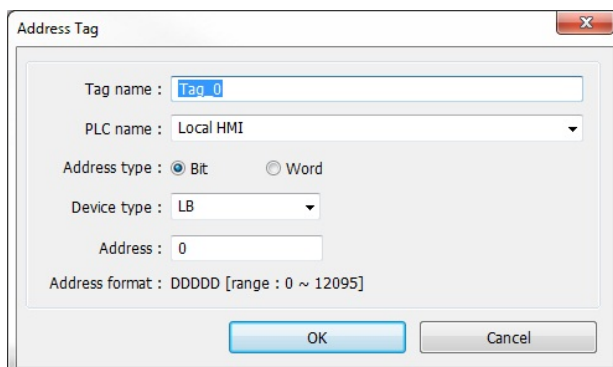
► To create a Tag Database Library:



1. From the **Library** menu, click **Tag...**, or click the Address Tag Library Manager button from the Library toolbar. The Address Tag Library dialog appears.



2. To create a new Tag listing, click the **New...** button to display the Tag dialog.



3. Enter the new **Tag name**. Tag names may be up to 100 characters, any character.
4. Select the **PLC name**: as configured in the Device Table from the drop-down menu.
5. Select the **Address type** (Bit or Word).
6. Select the Device type from the drop-down menu.
7. Enter the Register **Address**.
8. Click **OK**.
9. Make additional entries to the database by repeating the procedure.

► *To delete a tag:*

1. Open the Tag Library as directed above.
2. Select the tag to delete.
3. Click the **Delete** button.

► *To modify a tag:*

1. Open the Tag Library as directed above.
2. Select the tag to edit.
3. Click the **Settings...** button.
4. Edit as applicable and then click **OK**.

Importing and Exporting the Tag Library

This feature allows tags from the tag library to be saved into a .tgl file format. Once saved, the file can be loaded into another project.

► *To save the tag library:*

1. Click on **Save Tag File...** The Open dialog box appears.
2. Enter the name of the file where you wish to save the data.
3. Click **Open**.

► *To load the Tag Library from an existing .tgl file:*

1. Click on the **Load Tag File...** The Open dialog box appears.
2. Browse for the .tgl file that contains the tags.
3. Click **Open**.

 The .tgl file format cannot be edited.

The tag library can also be imported and exported using a comma-separated variable (.csv) file format or Excel (.xls) file format. These formats are very useful if you need to make several changes to the database; or, if creating a new project, it is easier and faster to create and edit the tags in a .csv or .xls file.

► To export the tag library to a .csv file or .xls file:

1. Click **Export CSV** or **Export EXCEL**. The Open dialog box appears.
2. Enter the name of the file where you wish to save the data.
3. Click **Open**.

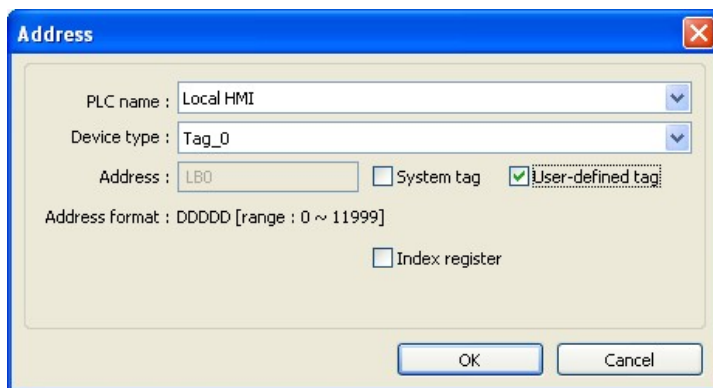
► To import the tag library from a .csv file or .xls file:

1. Click **Import CSV** or **Import EXCEL**. The open dialog box appears.
2. Brows for the CSV or XLS file containing the tags.
3. Click **Open**.

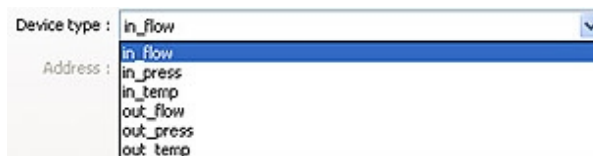
Using the Tag Library

Once the Tag Database has been created, individual objects can use the Library to assign a Tag to the object, referenced to the PLC register address.

1. On addressable objects, once the Tag Database has been created, a User-defined tag checkbox is available. This box is not available if no tags have been configured in the Database Library.



2. Check **User-defined tag** checkbox. The **Device Type** list will be filled with a list of available tags. Objects addressable as Register-type objects will display Tags configured as Word; Objects addressable as Bit-type objects will display Tags configured as Bit.



3. Select the desired Tag from the Device Type list to address the Object to the referenced Register Address.

Creating the Label Library

The Label library is a database of text Labels, for use with objects utilizing text labels descriptive of their status or condition. Each label can consist of up to 256 unique text strings (representing the maximum number of states available per object), displayable in up to eight separate languages.

☞ The number of states for each label is determined by the number of languages selected.

1 language = $256/1 = 256$ states

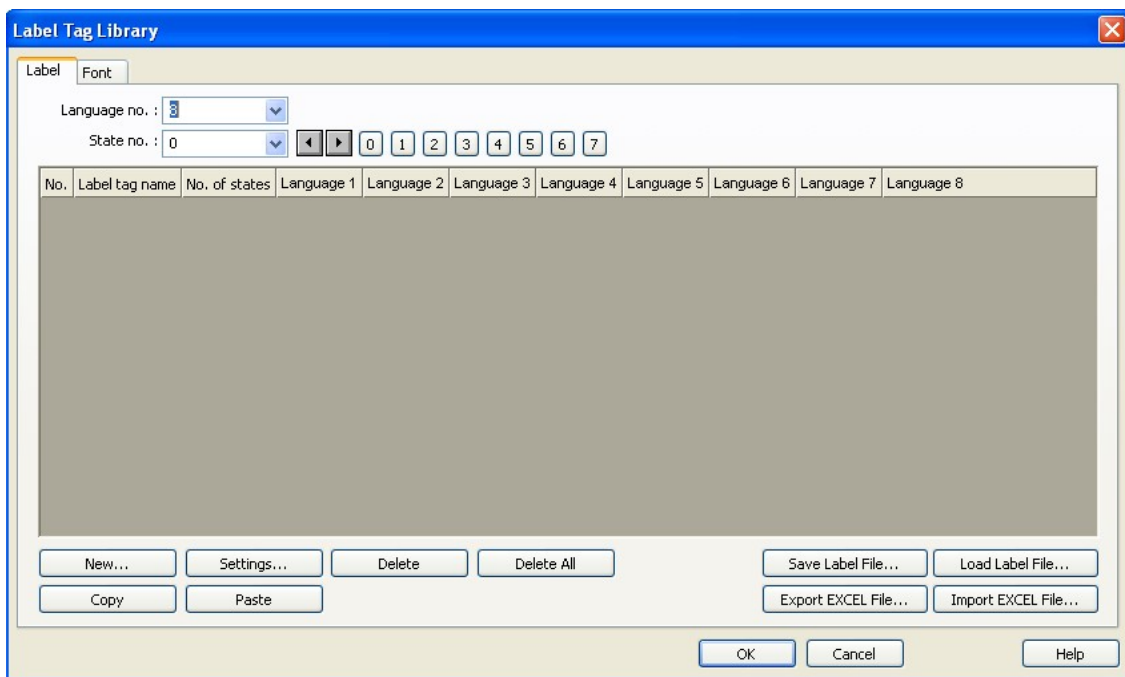
2 languages = $256/2 = 128$ states

4 languages = $256/4 = 64$ states

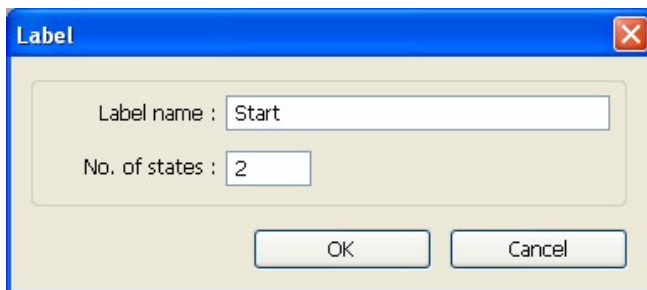
8 languages = $256/8 = 32$ states

► To create a label text database library:

1. From the **Library** menu, click **Label...**, or click the Label Library Manager icon from the Library toolbar. The Label Library dialog box appears.



2. Create a label by clicking the **New...** button to display the Label dialog.



3. Enter the **Label name** for the label, and how many states the new label requires. For example, a label titled "Start" requires 2 states to represent separate conditions, where condition one status is "START" and condition two is "STOP."
4. Click the **OK** button, and the new label is added to the database. The Name will appear in a selectable listing of available Labels for use with objects that support text field labeling.

No.	Name
1	fault
2	lang
3	on
4	run
5	start

- The new label is still selected. Click the Settings... button to display the Label Tag Content dialog. In the **State No.** list pull-down box, select the state that the text is representing.

Label Tag Content

Label Content Settings

Label name : Start State no. : 1

Language 1 Language 2 Language 3 Language 4

Language 5 Language 6 Language 7 Language 8

Change No. of States...

OK Cancel Help

- In each Language box, as needed, enter the text representing that state in each language.
- If further text labeling is required to represent conditions or status in additional states, while still in the **Settings...** mode for Label Content Settings, select the state requiring text labeling. Enter the text in the Language boxes as above.

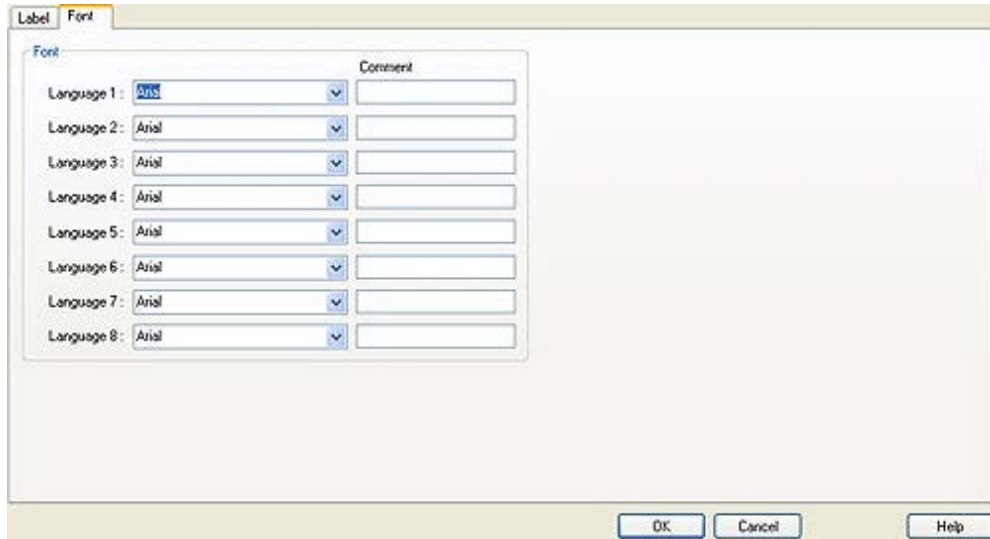
⚠ There is no inter-language conversion or translation capability. Entries must be made using the correct wording for the language designated, to display as entered.
- Continue to add state descriptive text labeling as required.
- When all text has been entered for all states desired, click **OK**. The Label is now contained in the Label Library and displayed when the Library is opened. View text labels for the various states of each label in the Library by selecting the State to display in the pull down box.
- Once a label text has been created and you wish to change the number of states, you may do so by double-clicking on the desired label text. On the Label Tag Content dialog box, click the **Change No of States...** button, and then enter the No. of states desired for the label.

Setting Different Fonts for Different Languages

If you would like to use different fonts for different languages, for instances, if the language you are using requires special characters or unicode fonts, you can select a different font for each language using the label library.

► *To set a different font for each language:*

1. From the **Library** menu, click **Label...**, or click the Label Library Manager icon from the Library toolbar. The Label Library dialog box appears.
2. Select the **Font** tab.



3. Select the font for each language from the drop down menu. Note that the fonts must be available to you in your **Windows > Fonts** folder.
4. Click **OK**.

Importing and Exporting the Label Library

This feature allows you to save the labels from the label library into a .lbl file format. Once saved, the file can be loaded into another project.

► *To save the label library:*

1. Click on **Save Label File...** The open dialog box appears.
2. Enter the name of the file where you wish to save the data.
3. Click **Open**.

► *To load the label library from an existing .lbl file:*

1. Click **Load Label File...** The Open dialog box appears.
2. Browse for the lbl file that contains the labels.
3. Click **Open**.

⚠ The .lbl file format cannot be edited.

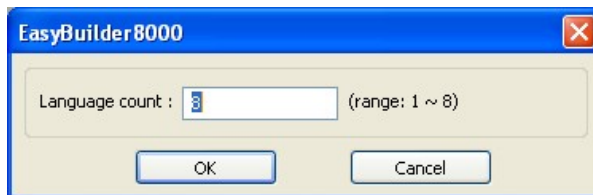
The label library can also be imported and exported using an Excel (*.xls) file format or comma-separated variable (*.csv) file format. These formats are very useful if you need to make several changes to the database. When creating a new project, it is easier and faster to create and edit tags in Excel or as *.csv files.

► *To export the label library:*

1. Click **Export EXCEL File...** The Open dialog box appears.
2. Enter the name of the file where you wish to save the data.
3. Select the type of file; *.xls or *.csv.
4. Click **Open**.

► *To import the label library:*

1. Click **Import EXCEL File...**
2. The Language count dialog box appears. Select the number of languages (1-8) you wish to use in the Label Library. Click OK.



3. The Open dialog box appears.
4. Select the type of file; *.xls or *.csv.
5. Browse for the file that contains the labels.
6. Click **Open**.

Using the Label Library

Once entries have been made to the Label Library, they can be used with any object that supports text field labeling.

1. Select an object that supports text field labeling as required. On the Label tab for the object's Attributes, check the **Use label library** checkbox. The Label Index list will be enabled, containing all of the labels in the database.
2. Select the applicable label from the label tag drop-down menu. The label will display on the object, representative for states and languages as entered in the Label Library dialog.
3. Once created with Labels assigned, objects can be viewed displaying the various text labeling in each of the states detailed, in each of the languages utilized. To view, on EasyBuilder's State and Test Toolbars, select the state and language for objects displayed on the window. The object's text labeling display will change according to the state and language selected for viewing.
4. To use the multiple language feature of the Label Library to display object labels in languages other than the default language (Language 0), the function must be enabled. Enable the multiple language capability as detailed below.

Using Languages with the Label Library

The Silver Series supports up to eight languages for use with the Label Library text labeling. In order to use the multiple language feature, a label configured in multiple languages must be created and stored in the Label Library, as detailed above. The language displayed is selected through Internal Local Word Control, LW9134.

1. Text Labels in any of up to eight languages can be displayed, as configured in the Label Library. In LW9134, a value of 0 enables Language 1 as configured in the Label Library, a value of 1 enables Language 2, a value of 2 enables Language 3, and a value of 3 enables Language 4, etc.
2. The appropriate value must be written to LW9134 to enable a designated language to display. For example, a series of set word objects writing a value to LW9134 could be placed on a setup screen. Each set word might be labeled with the Language to be enabled, and the appropriate value addressed to LW9134. If Set Word #0 enables English and English is the configured Language 0 in the Label Library, pressing the English Set Word Object writing a 0 to LW9134 will enable label text display in English. If Set Word #1 enables French and French is the configured Language 1 in the Label Library, pressing the French Set Word object writing a 1 to LW9134 will enable text display in French. Continue for all languages configured in the Label Library.



 LW9134 is the System Tag Language Mode.

Chapter 9 – Using and Creating Keypads

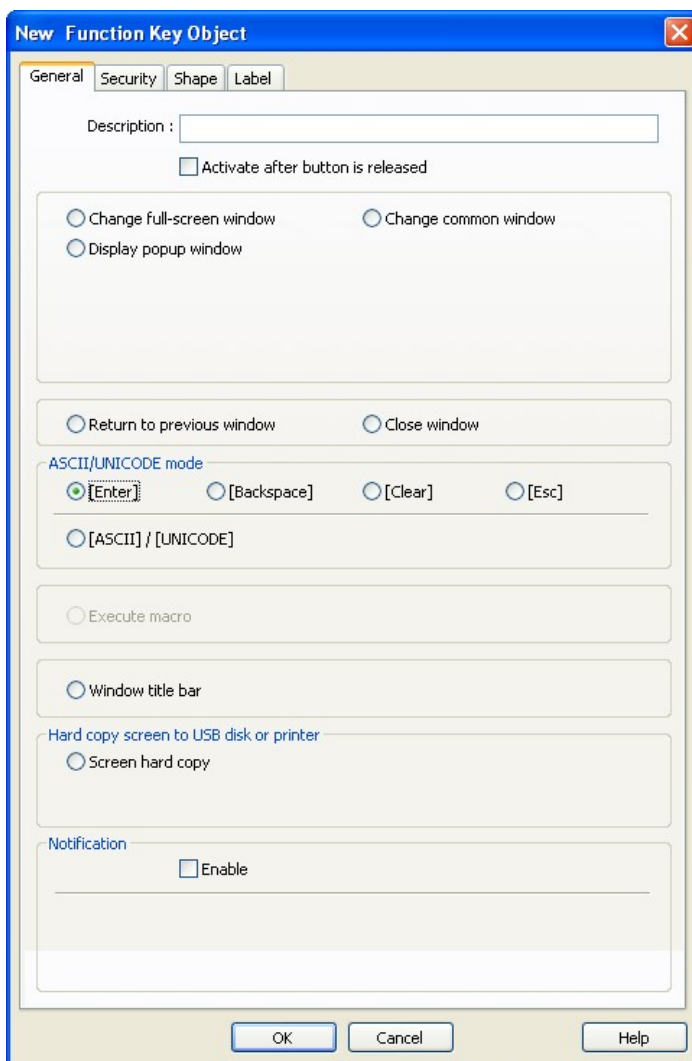
The HMI operator must have a keypad available to enter new data when using the Numeric Input Object or the ASCII Input Object. EasyBuilder includes group libraries that contain sample keypads to be placed onto a window screen. You can also create your own custom keypads. This chapter focuses on how to create keypads, display them on the window screen, and use them for entering data into PLC registers.

How to Create a Keypad

Any keypad that you create is actually composed of keys using the Function Key Object. The Function Key Object can create alphanumeric keys as well as control keys, (i.e., Delete, Enter, Clear, etc.)

► To create a Function Key Object: 

1. From the Objects menu, click **Button > Function Key** or click the Function Key icon in the Object 1 toolbar. The New Function Key Object dialog box appears.



2. Use the **Description:** box to enter a title for the Function Key part. A description is not necessary but does help you identify the purpose of the part.
3. In the **ASCII/UNICODE mode** section, there are four control key options. Control keys are used during data entry to perform a specific function.

Function	Description
[ENTER]	Configures the Function Key as an Enter key. When pressed, it will write the alphanumeric characters entered into a Numeric Input Object or ASCII Input Object to the target PLC register.
[BACK SPACE]	Configures the Function Key as a Delete key. When pressed, it will delete the last alphanumeric character entered.
[CLEAR]	Configures the Function Key as a Clear key. When pressed, it will clear the data displayed in the Numeric Input Object or ASCII Input Object. Note: this key does not clear the actual target PLC register until the Enter key is pressed.
[ESC]	Configures the Function Key as an Escape key. When pressed, it will exit the editing mode.

4. Just below the four control key options, is the ASCII/UNICODE checkbox. Select this when you want to configure the Function Key to enter an alphanumeric character. When this checkbox is selected, the character box is activated. Use this box to enter the ASCII character you want to use.
5. Click the Shape tab to select either a shape or bitmap to represent the Function Key.
6. Click the Label tab to display the Label for the Function Key. Click the **Use label** checkbox to use a label.
7. Click **OK**. The New Function Key Object dialog closes and the main screen of EasyBuilder appears with the cursor tied to a rectangular outline of the part you just created at the upper left corner of the screen. Move the part to the desired location on the window and click the mouse to place it.
8. Once the part is placed onto the window, you can adjust the location of the label inside the part by clicking once on the label. This will highlight the entire object. Now click on the label again. Now only the label is highlighted, allowing you to move it without moving the part.
9. Create a Function Key for each number, Enter, Back Space, Clear, and Escape key.
10. Add a display to the keypad by selecting **Objects > Numeric/ASCII > ASCII Display**. Configure the ASCII Display with a Read Address of LW9150, and six words (No. of words). Place the ASCII Display above the Function Keys to complete the keypad.

To create a custom keypad, group all of the keypad objects together on a window. You can then save the keypad to a group library for later use in other projects. Several predefined keypads are included with EasyBuilder. To use these keypads, click **Library > Group > Call up Library** in EasyBuilder-5000 and access the keypad library.

Alternately, you can create a custom keypad in a graphics program such as Paint and import it into the Picture Library. Place the picture on a window using the **Draw > Picture** tool, and overlay the Function Keys and ASCII Display on top of the picture. The computer.flb library has some keypad pictures you can use (picture no. 35 and 36).

Displaying and Using a Keypad

Let's go through a sample project that uses one of the predefined keypads included in EasyBuilder to enter values in a Numeric Input Object and an ASCII Input Object. This example will show you how to place these objects on a window screen, and then use the keypad to edit the data registers.

► To create a sample keypad entry screen:

1. Start a **New** project file in EasyBuilder-5000.
2. From the **Objects** menu, select **Numeric/ASCII > Numeric Input**. The New Numeric Input Object Properties box appears.
3. Create a Numeric Input Object with the following parameters:

Tab	Section	Parameter	Value
General	Description		Numeric Input Object
	Read Address	PLC Name:	Local HMI
		Device Type:	LW
		Address:	0
Data Entry	Keyboard (Select Use a popup keypad)	Window No.	50: Keypad integer
		Popup position	Middle, right-hand column
Numeric Format	Display	Data Format	16-bit signed
	Number of Digits	Left of Decimal Pt.	5

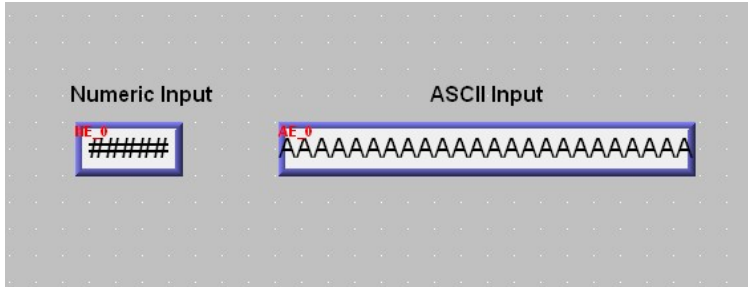
4. Create an ASCII Input Object with the following parameters:

Tab	Section	Parameter	Value
General	Description		ASCII Input Object
	Read Address	PLC Name:	Local HMI
		Device Type:	LW
		Address:	1
		No. of words:	12
Data Entry	Keyboard (Select Use a popup keypad)	Window No.	54. ASCII Middle
		Popup position	Middle, right-hand column

5. Create two text boxes; one to identify the Numeric Input register, and one to label the ASCII Input register.

► *Editing data registers using a keypad:*

1. Save and compile the new project, then test the operation of the keypad by either running in Simulation mode or by downloading the project to the HMI.
2. The following screen will appear:



3. Change the value of the Numeric Input register. Touch the Numeric Input Object to activate the edit mode. The keypad will pop up.
4. Using the keypad, enter digits 1, 2, 3, 4, and 5. As you enter the digits, each one should appear in the Numeric Input Object box.
5. Press the Backspace key to delete digit 5.
6. Try pressing any of the alpha characters (A-Z). Notice that alpha characters are not accepted into a Numeric Input Object register.
7. Press the Clear key. Notice that the entire register is cleared to 0.
8. Enter digits 5, 4, 3, 2, 1, and then press the Enter key. The keypad closes but the value was not accepted. This indicates that the value entered is out-of-range. Touch the numeric input object again. Press the Clear key and enter 32767. Press the Enter key. Notice that this value is accepted and blinking stops.
9. Touch the Numeric Input Object register again to activate editing mode. Enter five more digits then press the Esc key. Notice that the entry is cancelled and the previous number 32767 is restored.
10. Change the value of the ASCII Input register. Touch the ASCII Input Object to activate the edit mode.
11. Using the keypad, enter the character string "HELLO WORLD". As you enter the characters, each one should appear in the ASCII Input Object box. Press the Enter key to send the characters to the HMI internal data register.

The above example uses a popup keypad that can be moved onscreen by touching the title bar and dragging it around. You can create a fixed keypad without a title bar using a Direct Window Object, similar to how keypads were used in EasyBuilder-500.

To create a fixed keypad with a Direct Window:

1. In the above sample project, double-click on the Numeric Input Object to open its Properties window.
2. Click on the **Data Entry** tab and *deselect* **Use popup keypad**. Click **OK** to close the Properties window.
3. From the **Objects** menu, select **Direct Window**. The New Direct Window Object Properties box appears.
4. Select a **Read Address** of **LB10**. In the **Attribute** section, select **Style: No title bar** and **Window No.: 50. Keypad Integer**.

5. Click **OK** and place the Direct Window Object anywhere on the window.
6. From the **Window** menu, select **Open Window**. Select **Window 50 Keypad Integer** and click the **Settings** button to open the Window Settings Properties. Note the Width and Height of the window (e.g., 160x186). Click **OK** and then **Exit**.
7. Double-click on the Direct Window Object to open the Properties window. Click the **Profile** tab and enter the Width and Height of Window 50 into the Width and Height fields of the Direct Window. This will cause the Direct Window to be correctly sized for the keypad. Click **OK** to close the Properties window.
8. From the **Objects** menu, select **Button > Set Bit**. The New Set Bit Object Properties window opens. Select a **Write Address** of LB10 and select **Set Style: Set On**.
9. Click on the **Shape** tab and uncheck **Use Shape**.
10. Click **OK** and place the Set Bit Object over the Numeric Input Object. Resize the Set Bit Object by clicking and dragging its corners so it is the same size as the Numeric Input Object (or set the Width and Height in the Profile tab of the Set Bit Object to the same settings as the Numeric Input Object). This will trigger the Keypad to pop up in the Direct Window when the Numeric Input is pressed or clicked.
11. Copy the Set Bit Object and open Window 50. Paste the Set Bit Object into Window 50. Double-click on it to open the Properties. Change the **Set Style** to **Set Off**. Click **OK** and place the Set Bit Object over the **Enter** key on the keypad. Resize the Set Bit Object so it is the same size as the Enter key. Copy the Set Bit Object and place it over the **Esc** key. This will close the Keypad when the Enter or Esc keys are pressed.

To create a fixed keypad on a window instead of using a popup keypad or Direct Window:

1. In the above sample project, create a new Numeric Input Object and deselect **Use popup keypad** on the **Data Entry** tab. Click **OK** to close the Properties window.
2. Copy your custom keypad into the window, or open Window 50 and copy the keypad over to Window 10.
3. You must click or touch the Numeric Input Object first to activate it, enter a number using the keypad, then press Enter on the keypad to write the value to the register.

Chapter 10 – Bar Graphs, Meters, and Trends

This chapter focuses on three special graphic objects, which can be used to display PLC data registers. You've learned how to use shapes and bitmaps to represent the data in PLC registers as states. You've also learned how to use alphanumeric data fields to display the contents of PLC registers as either numbers or ASCII characters. We now introduce three more options to display the data in PLC registers:

Bar Graph Objects



Trend Display Objects



Meter Display Objects



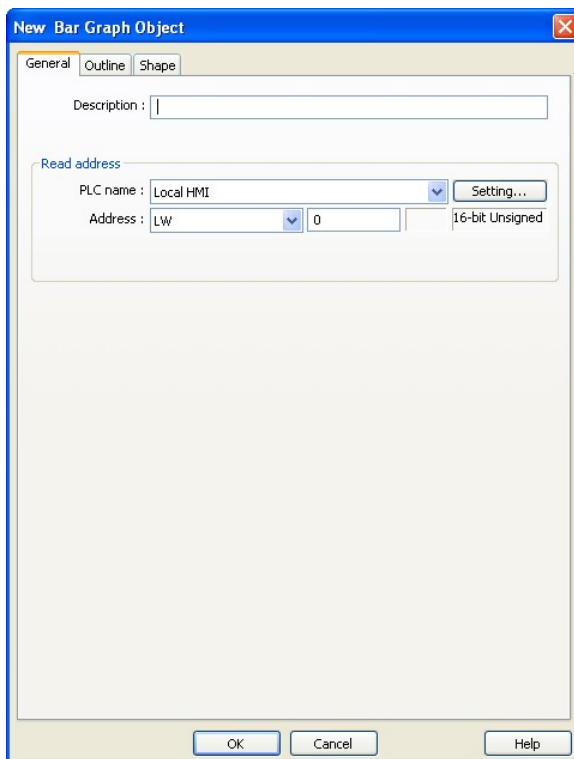
Creating Bar Graphs

The Bar Graph Object is used to represent the data in a 16-bit or 32-bit PLC register as a bar graph. You can configure the bar graph to move up, down, right, or left. The bar graph can be configured with any base number that represents 0 level and any span range. You can create the bar graph with an alarm low and high setting to indicate to the HMI operator that an underflow/overflow alarm condition exists. In addition, you can set the alarm low and high limits to be controlled by two additional PLC registers so that the low and high limits are variable. Bar graphs can even be constructed with a shape or bitmap overlaying the bar graph to create flow tanks, temperature gauges, etc.

► To create a Bar Graph Object:



1. From the **Objects** menu, click **Bar Graph**, or click the Bar Graph icon in the Object 2 toolbar. The New Bar Graph Object dialog box appears.



2. Use the **Description:** box to enter a title for the Bar Graph object. A description is not necessary but does help you identify the purpose of the part.
3. Click the **Setting...** button in the **Read address** frame. Select the device type from the drop down menu, and then indicate the PLC register address. Select the data format.
4. Click on the **Outline** tab to display the outline form.

5. In the **Attribute** section, select how the Bar Graph is to operate.

Function	Option	Description
Type	Normal	The bar starts at one end of the object, and moves to the other end.
	Offset	The bar starts at some non-zero point defined by the Origin, and moves through the origin as the value changes.
Zero		The PLC Register values corresponding to an unfilled bargraph.
Origin		The starting point of the bar when the Type is set to Offset.
Direction	Up	The bargraph starts at the bottom of the object, and moves up as it fills.
	Down	The bargraph starts at the top of the object, and moves down as it fills.
	Right	The bargraph starts at the left of the object, and moves right as it fills.
	Left	The bargraph starts at the right of the object, and moves left as it fills.
Span		The PLC Register values corresponding to a completely filled bargraph.
Bar Width		The percent of the object's width that the bar occupies.

6. The **Bar color/style** determines the appearance of the Bar Graph.

Function	Description
Frame	Set the color of the outside of the bar
Bar	Set the color of the filled part of the bar.
Background	Set the color of the unfilled part of the bar.
Bar Style	Set the pattern of the filled part of the bar.

7. Set up the **Target indicator**. This selects the color of the filled part of the bar when it reaches a preset value.

Function	Description
Enable	When checked, the Target Indicator is active.
Color	Set the color to change the bar when the value is equal to the Target Value.
Target Value	The value at which to change the color of the bar.
Tolerance	Set a tolerance for the Target Value. When the value is less than or greater than the Target Value by this value, the bar will remain in the selected color.

8. Select the **Alarm indicators** colors.

Function	Description
Low Limit	The value at which the bar will change to the Low Color.
Low Color	The color to change the bar when the value reaches the Low Limit.
High Limit	The value at which the bar will change to the High Color.
High Color	The color to change the bar when the value reaches the High Limit.

9. Set up **Target/alarm/zero (span) dynamic address**. When checked, this option allows certain alarm limits to be read from the PLC / Controller. The **Target value**, and **Low limit**, and **High limit** fields are disabled. Data is read from the PLC as follows:

Specified Address	Low Limit
Specified Address + 1	High Limit
Specified Address + 2	Target Value

10. Once the part is placed onto the window, you can adjust the attributes of the Bar Graph by double-clicking on the part.

Creating Meter Displays

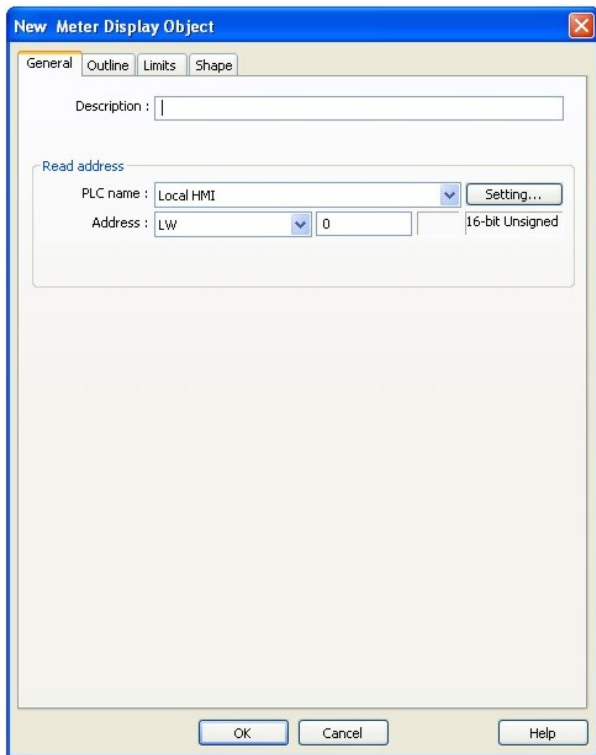
The Meter Display Object is used to represent the data in a 16-bit or 32-bit PLC register as a scaled meter. The meter can be easily customized to the look that you want.

The Meter Display can be configured with any base number that represents 0 level and any span range.

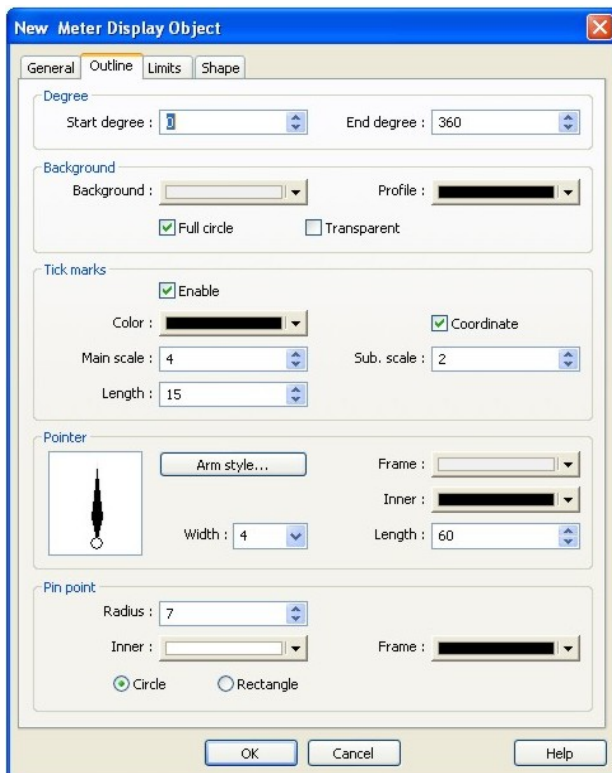
► To create a Meter Display Object:



1. From the **Objects** menu, click **Meter Display**, or click the Meter Display icon in the Object 2 toolbar. The New Display Meter Object dialog box appears.



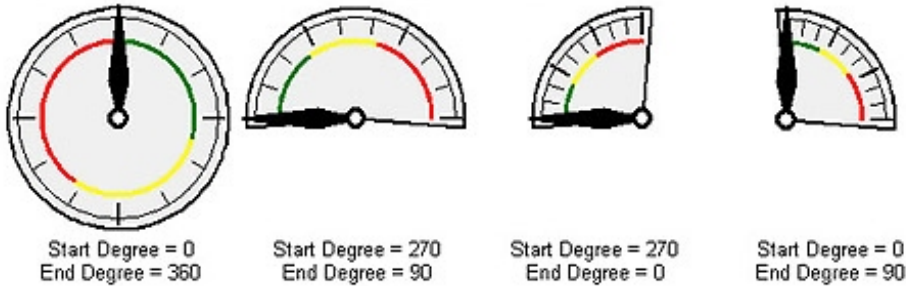
2. Use the **Description:** box to enter a title for the Meter Display object. A description is not necessary but does help you identify the purpose of the part.
3. Click the **Setting...** button in the **Read address** frame. Select the Device type from the drop down menu, and then specify the PLC register address. Select the data format.
4. Click the **Outline** tab. This is where you will configure all of the attributes of your meter.



5. In the **Degree** section, you can select the range of your meter, where the range is 0 to 360. The **Start degree** 0 is at 12:00. Below are four examples of start and end degrees for different meters:

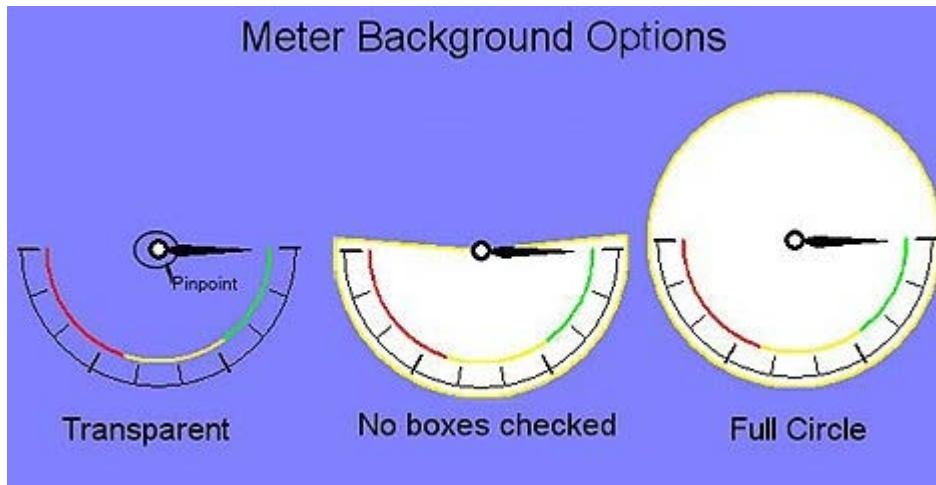
Start Degree

The position in a circle where the meter display starts. Range is 0-360.

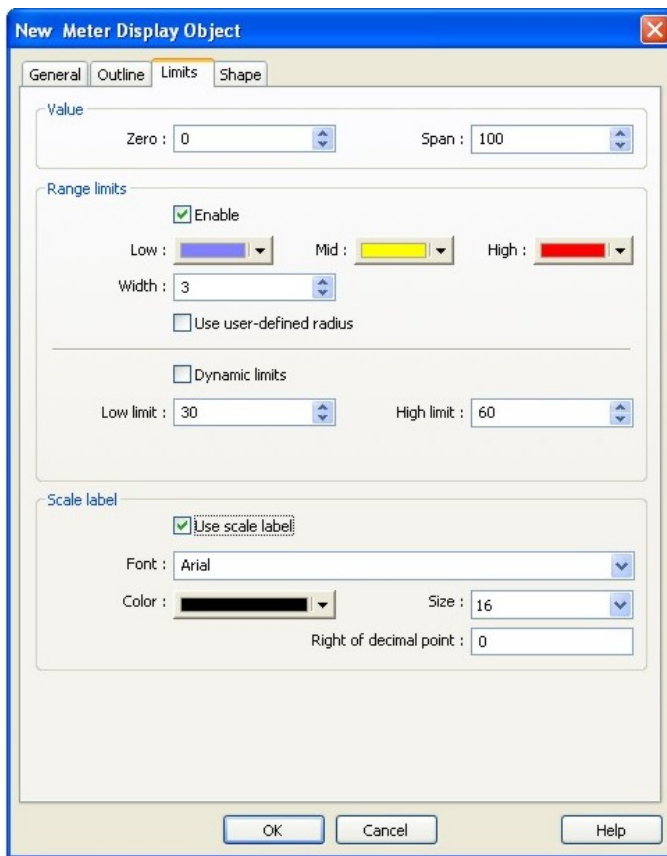


Note that meters can have any start and end degree between 0 and 360.

6. The **Background** section allows you to select background options for the meter. The following illustrations show how your meter will appear with different options checked:



7. The **Tick marks** section allows you to configure the length, scale and sub-scale of the tick marks.
8. In the **Pointer** section, select arm style, color, length, and width.
9. The **Pin point** section allows you to adjust the style and size of the pinpoint. See the illustration above to see the pinpoint (the center of the meter).
10. Select the **Limits** tab. In this section, you can configure a scale that goes on the face of the meter that shows by a color indication when high and low limits have been exceeded. If you look at the above examples, you will see this is represented on the face of the meter as a red, yellow and green strip.



11. In the **Value** section, select the Zero and Span values. These are the PLC register values that represent the zero and full-scale deflection of the meter's arm.
12. In the **Range limits** section, click the enable check box to enable the limits. Select the colors for low, mid and high. Select the width, in pixels, of the color band. The values from zero to low limit will be on the 'low' color band; values from low limit to high limit will be on the 'mid' color band; and values greater than high limit will be on the 'high' color band.
13. Select the **Low limit** and **High limit**. These are the values used for the range limit color bands. Click the **Dynamic limits** check box to allow PLC registers to determine the low and high limits. The low limit is the specified register, and the high limit is the next consecutive register.
14. The **Scale label** section allows you to enable labeling on the "main scale tick marks" inside the meter. You can select the font, color, size, and number of digits to the right of decimal point.
15. If you'd like a background shape to appear with your meter, click the **Shape** tab and select a shape.
16. Click **OK**. The meter appears on the work area of EasyBuilder. Click to drag and place your meter on your work area. If you need to reconfigure any of the properties, deselect the meter and then double click on it and the properties dialog box will reappear.

Creating Trend Displays and Data Sampling Objects

Data Sampling objects can be used to log historical data. Once data is historically logged, it can be saved to the HMI's internal memory, or to an external memory source such as Compact Flash, USB or a PC.

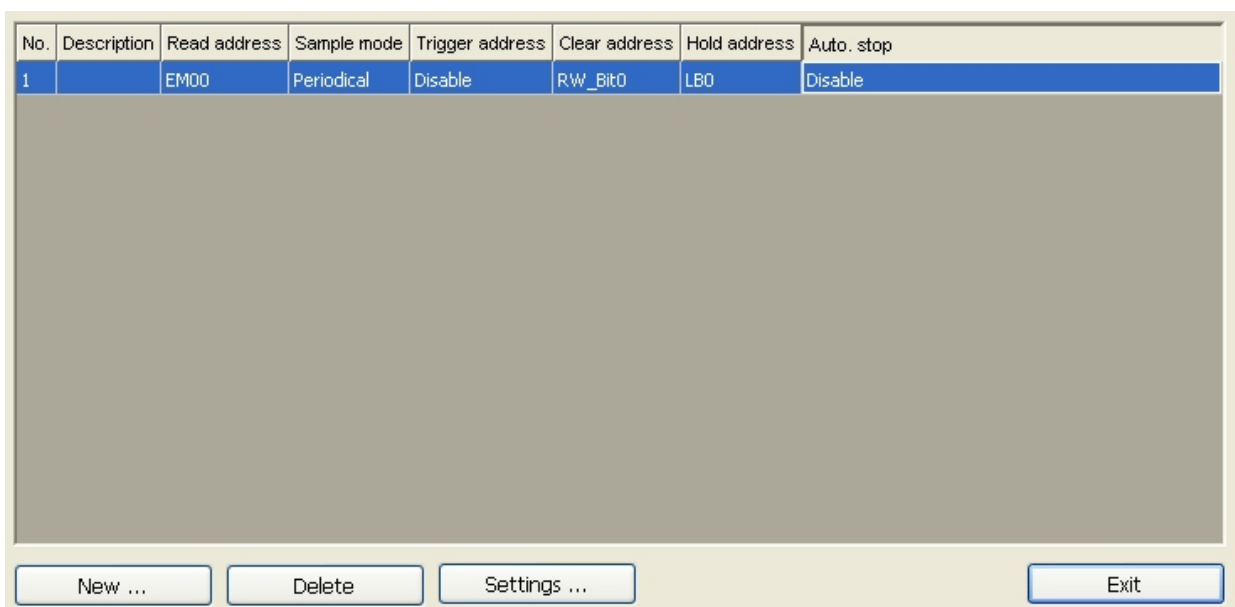
The Trend Display Object is used to sample the data in a single or multiple 16-bit PLC registers and plot this data on a time graph. You can configure the Trend Display as a single page or with multiple pages that can be viewed by scrolling through the pages. The sampling rate and number of plots per page can be customized per trend graph.

You can display a maximum of 20 channels with varying colors to distinguish the channels. Finally, a hold feature allows you to 'freeze' the graph and/or clear the graph.

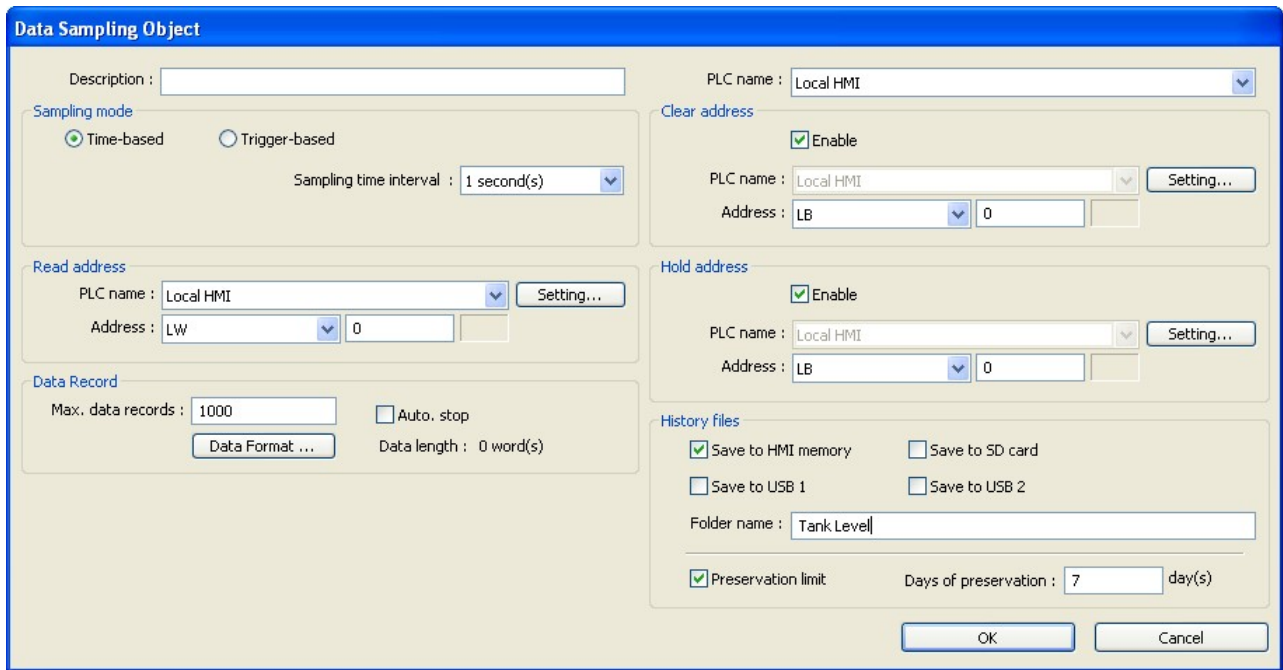
In order to create a trend object, you must first create one or more data sampling objects from which to sample the trends.

► *To create a data sampling object:*

1. From the **Objects** menu, select **Data Sampling**. The Data Sampling Object Dialog appears.



2. Click **New...** to create a new data sampling object.



Data Sampling Object

Description :

Sampling mode

☒ Time-based ☐ Trigger-based

Sampling time interval : 1 second(s)

Read address

PLC name : Local HMI

Address : LW 0

Data Record

Max. data records : 1000 ☐ Auto. stop

Data length : 0 word(s)

Clear address

☒ Enable

PLC name : Local HMI

Address : LB 0

Hold address

☒ Enable

PLC name : Local HMI

Address : LB 0

History files

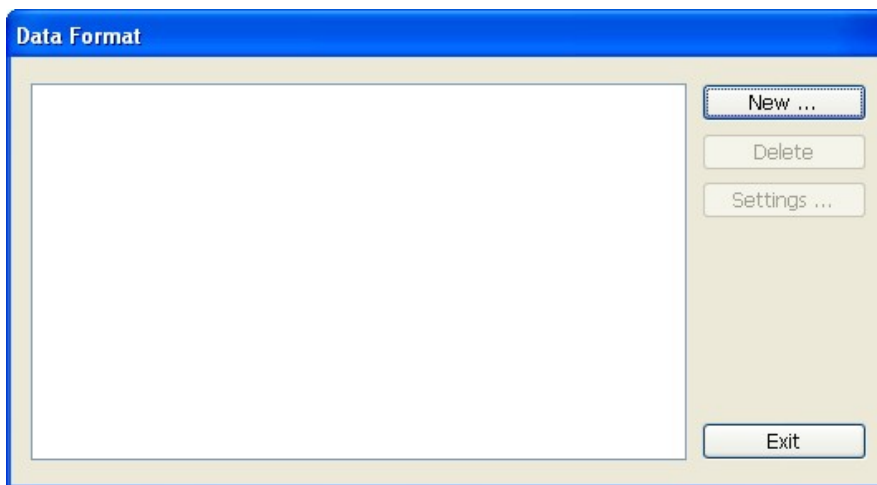
☒ Save to HMI memory ☐ Save to SD card

☐ Save to USB 1 ☐ Save to USB 2

Folder name : Tank Level

☒ Preservation limit Days of preservation : 7 day(s)

3. **Description:** Enter a name for the object. This isn't necessary, but will help in later identification of the object.
4. **Sampling Mode:** This can be either Time-based or Trigger-based. With Time-based selected, the sampling interval can range from 0.1 seconds to 120 minutes. With Trigger-based selected, a PLC bit-address can be configured to trigger each sample. The Mode can be OFF > ON, ON > OFF, or OFF <-> ON (toggle).
5. The **Read address** is PLC register being sampled. Click the **Setting...** button to select the Device Type and Address for the Data Sampling Object.
6. **Max data records:** Sets the maximum number of records to display in the Event Display (Real-time mode), up to 86,400 (1 sample/sec * 24 hr). If Auto. stop is selected, data sampling automatically stops when the number of records in Max data records has been reached. Otherwise, the existing logged data will continue to be recorded in the datalog file.
7. Click the Data Format... button to configure the format of each logged item. The Data Format dialog appears.



Data Format

8. Click **New...** to call the configuration dialog.



9. Enter a **Description** for the data format and then select the **Data type**. Click **OK** to return to the Data configuration dialog and then **Exit** to return to the Data Sampling dialog.

 **Note:** You must have at least one Data type configured in the Data Format list. If you want to display multiple channels in a Trend Display, you must configure multiple Data types in the Data Format list, one for each channel. The Data Sampling Object will sample data in consecutive registers starting with the register configured in the Read address of the Data Sampling Object, with the number of consecutive registers determined by the number of Data types in the Data Format list.

10. Click the **Enable** check box in the **Clear address** section if you would like the data sample to be cleared when the bit is momentarily set. If enabled, click the **Setting...** button and specify the PLC address and device type.
11. Click the **Enable** check box in the **Hold address** section if you would like to pause the data sampling as long as the specified bit is set. If enabled, click the **Setting...** button and specify the PLC address and device type.
12. In order to display history data files in a Trend Display or History Data Display, the sampled data must be saved to memory. Select the type of memory to which you would like to save the data files, and then specify the folder in which the data will be saved. The **Preservation limit** option allows you to specify the number of days of data files to save before they are deleted from memory.
13. Click **OK**.
14. Follow steps 2-13 to create additional Data Sampling Objects.
15. Click **Exit** to exit the Data Sampling Object.

► To create a Trend Display Object: 

1. From the **Objects** menu, click **Trend Display**, or click the Trend Display icon in the Object 2 toolbar. The New Trend Display Object dialog box appears.

 A Data Sampling Object must be configured before you can create a Trend Display.

New Trend Display Object

General Trend Channel Shape

Description :

Data Sampling Object index : 0

Trend type : Real-time

Note : if no. of channels is changed, you must reset HMI's data logs !!

Distance between data samples : ☒ Pixel ☐ Time

Distance : 100 pixel(s)

Hold control

☒ Enable

PLC name : Local HMI

Address : LB 0

Watch line

☒ Enable

PLC name : Local HMI

Address : LW 0

X axis time range : ☐ Pixel ☒ Time

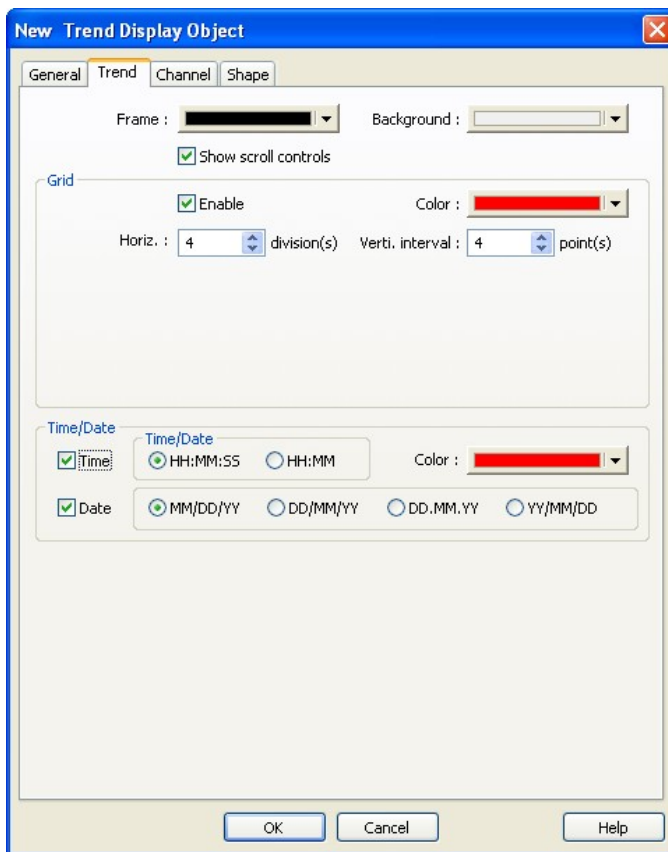
Distance : 100 second(s)

History control

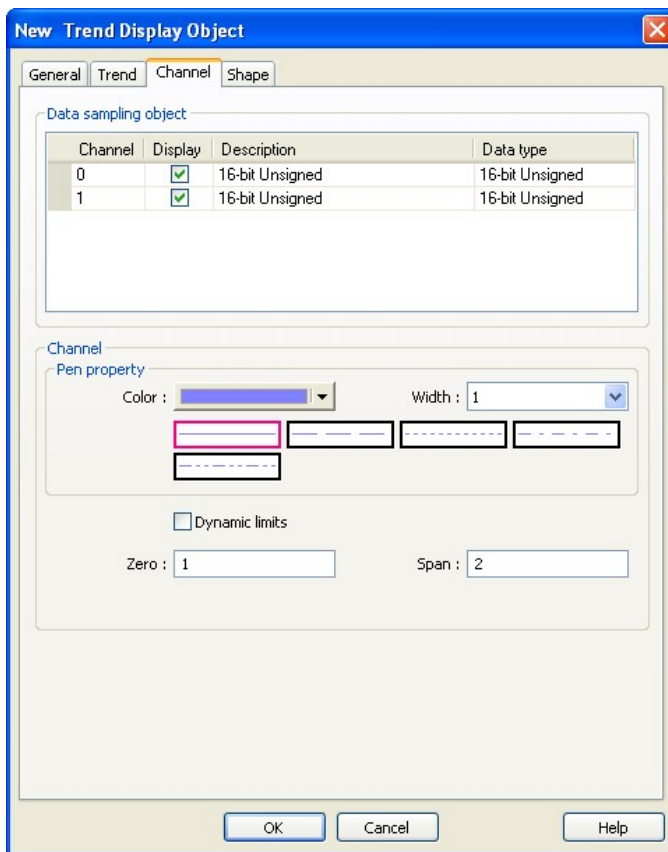
PLC name : Local HMI

Address : LW 0 16-bit Unsigned

- In the **Data Sampling Object Index**, select the data sampling object from the drop down menu whose data is to be displayed.
- For **Trend type**, select whether the data showing will be historical data or real-time data.
- The **Distance between data samples** option allows you to configure how the data is displayed in the X-axis on the Trend Display. When **Pixel** is selected, enter the number of pixels between data samples in the **Distance** field. When Time is selected, enter the number of seconds from left to right on the X-axis in the **Distance** field.
- Check the **Enable** checkbox in the **Hold control** section (Real-time mode only) if you'd like the trend to pause when a specified bit is set, and then configure the PLC address and device type.
- Configure the **History control** section (History mode only) to designate a register used to select the data log file to display in the Trend Display Object.
- Click the **Enable** checkbox in the **Watch line** section if you'd like to place a watch line on the trend that writes the value at that point to a specific register or registers, and then configure the PLC address and device type. If the selected Data Sampling Object is sampling two or more consecutive registers, the watch line will reserve the same number of consecutive registers as the number of registers being sampled, beginning with the specified register.
- Click on the **Trend** tab to display the Trend dialog box.



9. Select the **Frame** color and the **Background** color for the trend from the drop down menus.
10. Check the **Enable** checkbox in the **Grid** section if you would like the trend to display a grid, and then configure the X and Y axis of the grid from the scroll boxes.
11. Check the **Time** and **Date** checkboxes in the **Time/Date** section to display the current time and date on the Trend Display, and then select the format in which you'd like the time and date displayed.
12. Click on the **Channel** tab to display the Channel dialog box.



13. In the **Data sampling object** section, select the channels you want to display by clicking the checkboxes under **Display**. Select the pen properties for the selected channel in the **Channel** section.
14. Next, select the value at which the pen will be at the bottom of the display (**Zero**) and where the pen will be at the top of the display (**Span**).
15. Click the **Shape** tab to configure a different frame style or color for the display, if desired.
16. Click **OK** and click to place the Trend Display on EasyBuilder's work area. If you'd like to reconfigure any of its properties, double-click on the trend to display the Trend Display Object's Properties Dialog. Click the **Profile** tab if you'd like to resize or re-position your trend using the Width/Height and X/Y position boxes instead of dragging and placing it in the work area.

History Data Display

The History Data Display shows data captured by the Data Sampling object.

Data is displayed in tabular format with the option to show the time and date of when data was captured. A control register is used to determine which historical data record is displayed (i.e., most recent, yesterday, two days ago, etc.) based upon date of capture.

History Data Display

Seq	Time	Date	ch0	ch1	ch2	ch3	ch4
1	11:43	06/18/09	200	400	800	-300	1697.85
2	11:57	06/18/09	200	400	800	-300	1697.85
3	11:58	06/18/09	520	600	500	250	785.40

The HMI reads from the Sampling Object datalog file (*.dtl) immediately after the screen that contains the History Data Display object is displayed.

☞ The data is only read and updated whenever the screen is first displayed. Data recorded to the datalog file (*.dtl) after the History Data Display object is shown will not appear on the History Data Display object until the screen is refreshed (closed, then opened again). A maximum of 20 channels can be displayed.

► *To create a History Data Display Object:*

1. From the **Objects** menu, click **History Data Display**, or click the History Data Display icon in the Object 2 toolbar. The New History Data Display dialog box appears:

History Data Display Object's Properties

General | Data Format | Title | Shape | Profile

Data Sampling Object index : 0: Data Sample Test

Grid
☒ Enable
 Color : [Black] Column interval : 0

Profile color
☐ Transparent
 Frame : [Black] Background : [White]

Text
 Font : Arial Size : 10

Time
☒ Time HH:MM Color : [Blue]

Date
☒ Date DD/MM/YY Color : [Blue]

☒ Sequence no. Color : [Blue]

☐ Time ascending ☒ Time descending

History control
 PLC name : Local HMI Address : LW 25 [Setting...]

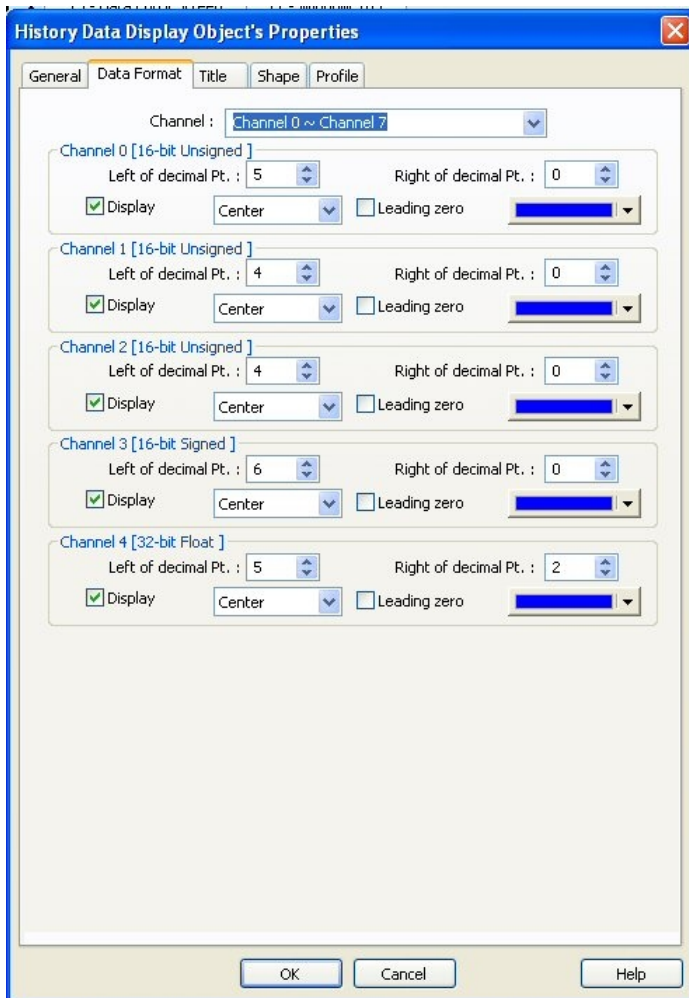
OK Cancel Help

2. **Data Sampling Object index:** Select from drop-down list which data file to use. Data files are created using the Data Sampling object.
3. **Grid:** Displays grid lines on the data table.
 - a. **Enable:** Check to enable grid lines.
 - b. **Color:** Select color used for grid lines.
 - c. **Column Interval:** Enter the number of pixels that separate each column of data.
4. **Profile color:** Determines the color of the background of the object.
 - a. **Transparent:** Enable if you do not want a background color or frame to appear.
 - b. **Frame:** Color for the perimeter frame.
 - c. **Background:** Color for the background of the object.
5. **Text:** Select the font and size for all text that appears.
 - a. **Font:** Select the Truetype font for the text.
 - b. **Size:** Select the size of the font.
6. **Time:** Enable to display the time when the data was captured by the Data Sampling object.
 - a. **Style:** Select from HH:MM:SS, HH:MM, or DD:HH:MM.
 - b. **Color:** Determines the color used to display the time.
7. **Date:** Enable to display the date when the data was captured by the Data Sampling object.
 - a. **Style:** Select from MM/DD/YY, DD/MM/YY, DD.MM.YY or YY/MM/DD.
 - b. **Color:** Determines the color used to display the date.
8. **Sequence no:** Enable to display a sequence number of when the data was captured by the Data Sampling object.
 - a. **Color:** Determines the color used to display the sequence number.
9. **Time ascending or Time descending:** Determines the order in which the data is displayed.
10. **History Control:** Use to select the target PLC or internal HMI register that is used to determine which data log file is displayed.

For example, suppose we have data log files that were recorded during a four day period- 20090615.dtl (June 15th), 20090616.dtl (June 16th), 20090617.dtl (June 17th), and 20090618.dtl (June 18th).

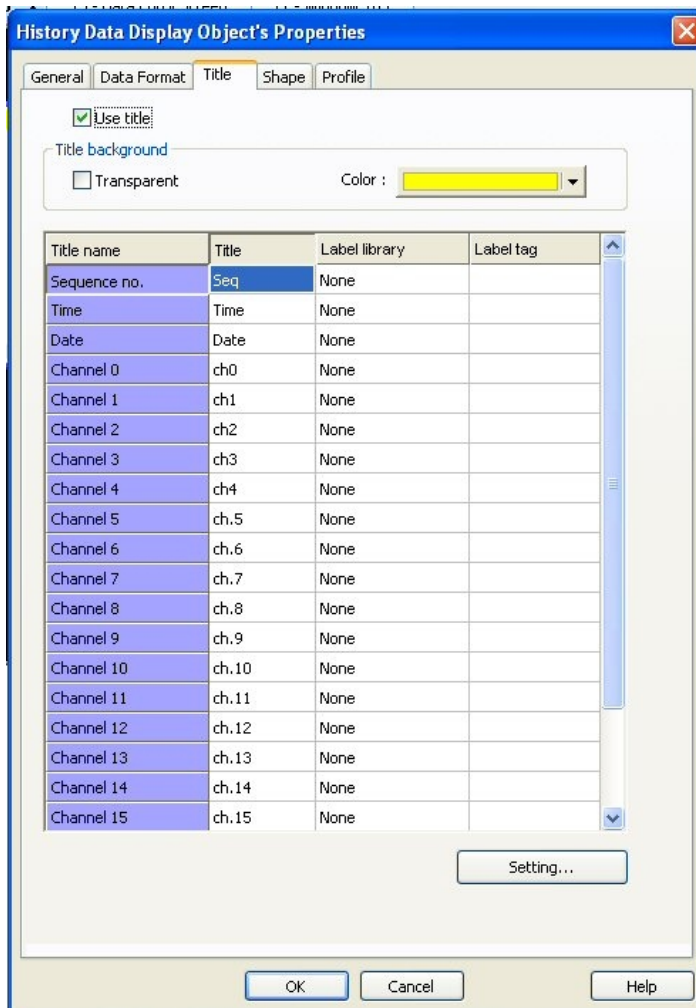
We choose to use internal HMI memory address LW100 for the History Control address. If the value in LW100 = 0, then the History Data Display object will display the most recent data log record- in this example, 20090618.dtl (June 18th). If the value in LW100 = 1, then 20090617.dtl (June 17th) is displayed, and so on.

Data Format tab: Used to configure how the data appears for each column:



1. **Channel:** Channels are configured in groups of eight (maximum of 20 channels). Use this pull-down box to select each group.
2. **Channel #0-19** (description in parentheses tells you what format is used for that data variable).
3. **Display** checkbox: Check to enable viewing that data variable.
4. **Left of decimal Pt.:** Determines the number of digits that can be displayed to the left of the decimal point.
5. **Right of decimal Pt.:** Determines the number of digits that can be displayed to the right of the decimal point.
 ☐ If 0, then no decimal point is displayed.
6. **Alignment:** Options are center, right, and left justified.
7. **Leading zero:** Check to display leading zeroes
8. **Color:** Select the color used to display the data.

Title tab: Used to configure a title bar or legend at the top of the data columns:



1. **Use title:** Check to use the Title bar option.
2. **Title background:** Determines color of background on title bar.
 - a. **Transparent:** Check to remove background color.
 - b. **Color:** Select from drop-down color box.
3. **Title name:** Default name of each column.
4. **Title:** Name assigned to appear at the top of each column.
5. **Label library:** None = not used, Used = Label Library used instead of direct text entry. To assign a Label Tag, highlight the channel you wish to modify and click on the **Setting...** button.
 ⓘ For more information on using Label Libraries, see "Chapter 8 – Creating and Using Databases and Languages."

Label tab: Blank = not used, or the particular name of the label tag used.

Shape tab: Use to configure the frame and background color of the display.

Chapter 11 – Capturing Alarms and Events

This chapter looks at how the Silver Series uses alarms and events.

Using Alarms

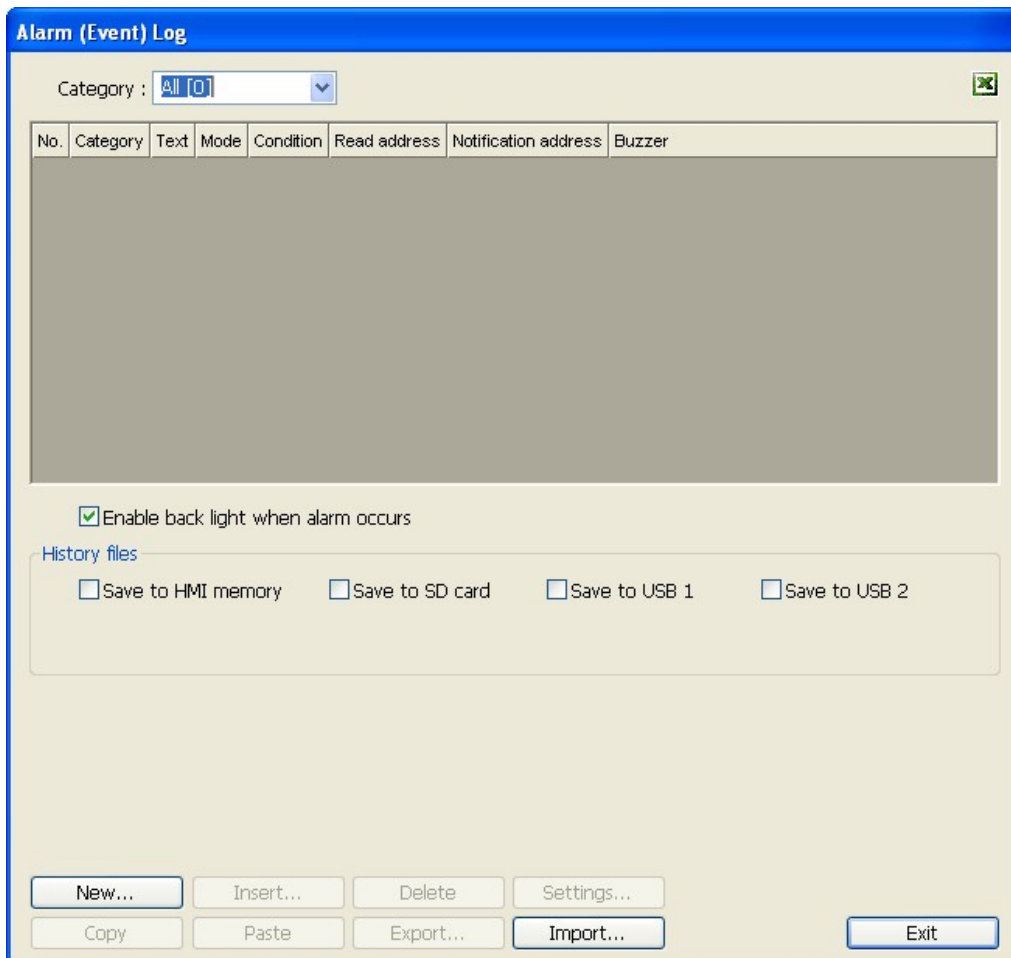
EasyBuilder has three parts that are used to perform alarm functions: the Alarm/Event Log object, the Alarm Display object, and the Alarm Bar object. The Alarm/Event Log object monitors alarm conditions and alerts the Alarm Display object and the Alarm Bar object when an alarm condition occurs. Use the Alarm Display object if you want to display a scrollable list of all alarms that are active. Use the Alarm Bar object to display all active alarms on a single horizontally scrolling line (like a marquee).

Monitoring Alarms with the Alarm (Event) Log

The Alarm/Event Log continuously monitors PLC coils to determine if an alarm condition has occurred. Once an alarm is active, the Alarm Scan Object directs a string of characters associated with that alarm to the Alarm Display Object and the Alarm Bar Object for display on the HMI screen.

► To create an Alarm/Event Log: 

1. From the **Objects** menu, select **Alarm > Alarm (Event) Log**, or click the Alarm (Event) Log icon in the PLC toolbar. The Alarm(Event) Log dialog box appears.

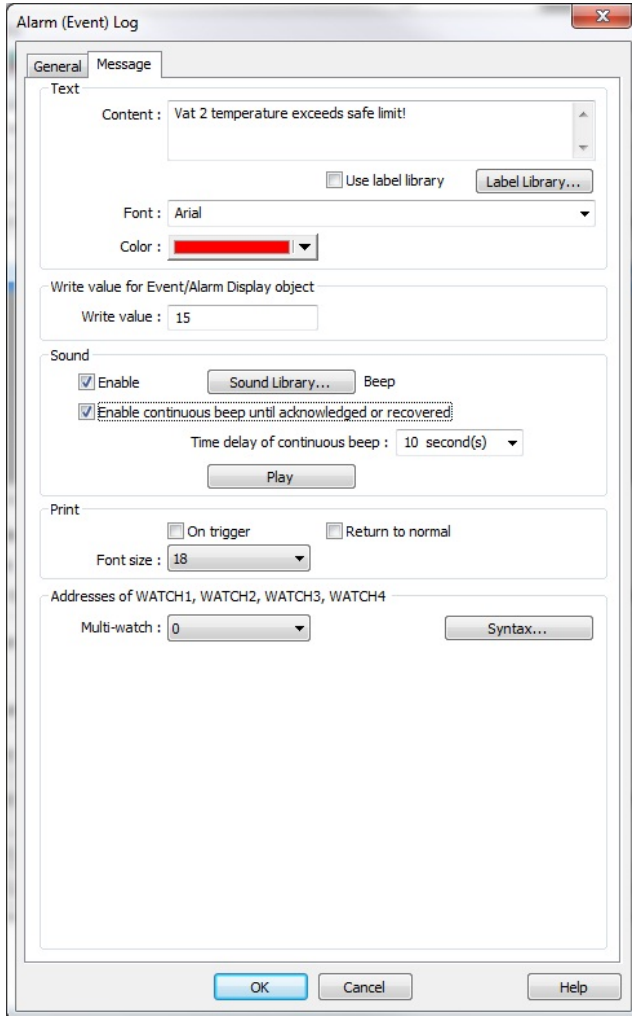


- Click the **New...** button. The Alarm (Event) Log Properties dialog appears.

The screenshot shows the 'Alarm (Event) Log' dialog box with the 'General' tab selected. The 'Category' is set to 0 and 'Priority level' is set to Low. The 'Address type' is set to Word. In the 'Read address' section, the PLC name is 'Local HMI', the address is 'LW 150', and the format is '16-bit Unsigned'. In the 'Notification' section, the 'Enable' checkbox is checked, 'Set ON' is selected, the PLC name is 'Local HMI', and the address is 'LB 11'. In the 'Condition' section, the trigger is set to 'Trigger if value is: >= 40'. The 'OK', 'Cancel', and 'Help' buttons are at the bottom.

- On the **General** tab, set the **Category** for the alarm. The Alarm Bar, Alarm Display, and Event Display can filter the alarms based on the category selected (range 0-255).
- Select a **Priority level** from the drop-down menu (Low, Middle, High, Emergency). The alarms are sorted by priority in the Alarm Bar and the Alarm Display with the highest priority shown on top (or first, in the case of the Alarm Bar).
- Select either bit or word from the **Address type** drop-down menu.
- Click **Setting...** and select the PLC name, device type and read address, as well as the numeric format in the **Read address** section.
- Click the **Enable** checkbox in the **Notification** section to have a specific bit set or cleared when the alarm condition is reached.
- Set the **Condition** to trigger the alarm (depends on Word or Bit selected for Address type).

9. Click the Message tab to display the Message dialog.



10. Enter the message to display when the alarm or event is triggered in the **Content** box. If you would like to configure the message in different languages, click **Label** and follow the instructions in “Chapter 8 - Creating Databases and Languages.” Select the **Font** and **Color** to use for the message being displayed.
11. In the **Write value** window, enter the window number to display once the alarm or event is acknowledged. This value is entered into the register configured in the Event Display’s **Write address** on the **General** tab.
12. Click the **Enable** checkbox in the **Sound** section to have the HMI play a sound when the alarm is triggered. Click the **Sound Library...** button to select a sound from the sound libraries. If no sound is selected, the default sound is a beep. Click **Play** to preview the sound.
13. If a local printer has been enabled in the **System Parameters > Model** tab, you can send the alarm message to a printer. Click the **On trigger** box to print when the alarm is triggered, and **Return to normal** box to print when the alarm condition has been resolved.
14. **Multi-watch:** The values of up to four data registers can be displayed in an Alarm/Event Message. Select the number of registers to be displayed. Click the **Syntax...** button to display a dialog explaining the syntax of embedding watch registers in an Alarm/Event Message.
15. Click **OK** to return to the Alarm (Event) Log dialog. You may select a location to save History files by selecting one of the check boxes. You may also configure additional Alarm (Event) log items here. Click **Exit** when you are finished.

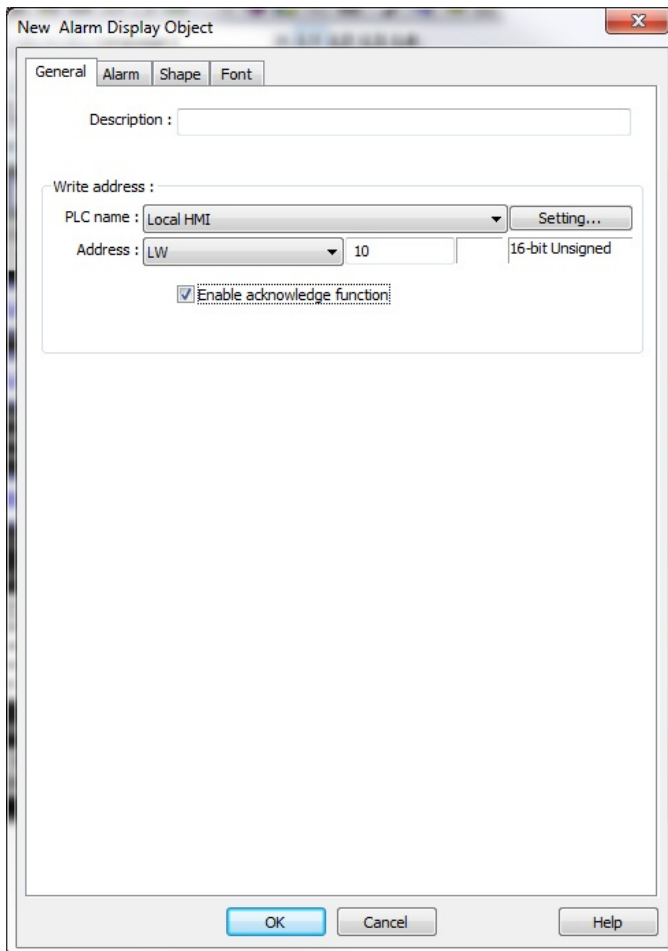
Displaying Alarms using the Alarm Display Object

Though the Alarm (Event) Log Object continuously monitors the PLC for alarms, it cannot display the alarms without the Alarm Display Object, the Alarm Bar Object, or the Event Display Object. The Alarm Display Object takes the alarm strings sent to it from the Alarm (Event) Log Object and displays them on a window screen as a list. The list contains all of the active alarms occurring with the most recently activated alarm at the top of the list.

► To create an Alarm Display Object:



1. From the **Objects** menu, click **Alarm > Alarm Display** or click the Alarm Display icon in the Object 2 toolbar. The New Alarm Display Object dialog box appears.



2. **Enable acknowledge function:** Select this to enable the acknowledge feature for the Alarm Display. The Write address is the register where the alarm or event writes the window number used to pop up an acknowledgement Indirect Window when the operator touches the Alarm Display to acknowledge the alarm or event.
3. Click the **Alarm** tab to configure the parameters for the Alarm Display.

New Alarm Display Object

General Alarm Shape Font

Include categories : 0 thru 0 {see Alarm (Event) Log object}

Acknowledge style : Click

Color

☐ Transparent

Frame : [Black] Background : [White]

Acknowledge : [Yellow]

Format

Sort

☐ Time ascending ☒ Time descending

Order & Characters

Display items	Display chars
☒ Event trigger date	0
☒ Event trigger time	0
☒ Event message	0

Display order

- Event message
- Event trigger time
- Event trigger date

If "Display chars" is 0, it means that the system will display all of characters.

Date : MM/DD/YY Time : HH:MM:SS

OK Cancel Help

4. **Include categories:** To include all categories, set this at 0 to 0.
5. **Acknowledge style:** Select either **Click** or **Double click** for the acknowledge style.
6. Select the **Frame** and **Background** colors from the drop-down menus. Select **Transparent** for no frame or background.
7. Select the sort order in which the alarms will appear, either **Time ascending** or **Time descending**.
8. Check the **Event trigger date**, **Event trigger time**, and **Event message** checkboxes to include them in the Alarm Display. Use the **Display order** list to arrange the order in which the selected event information is displayed.
9. Select the format for how the date and time is displayed in the **Date:** and **Time:** drop-down boxes.
10. Click the **Shape** tab to configure a background shape, if you'd like one.
11. Click the **Font** tab to configure the size of the font.
12. Click **OK** and click in the work area of EasyBuilder to place the Alarm Display. Drag it to place it in the desired location.

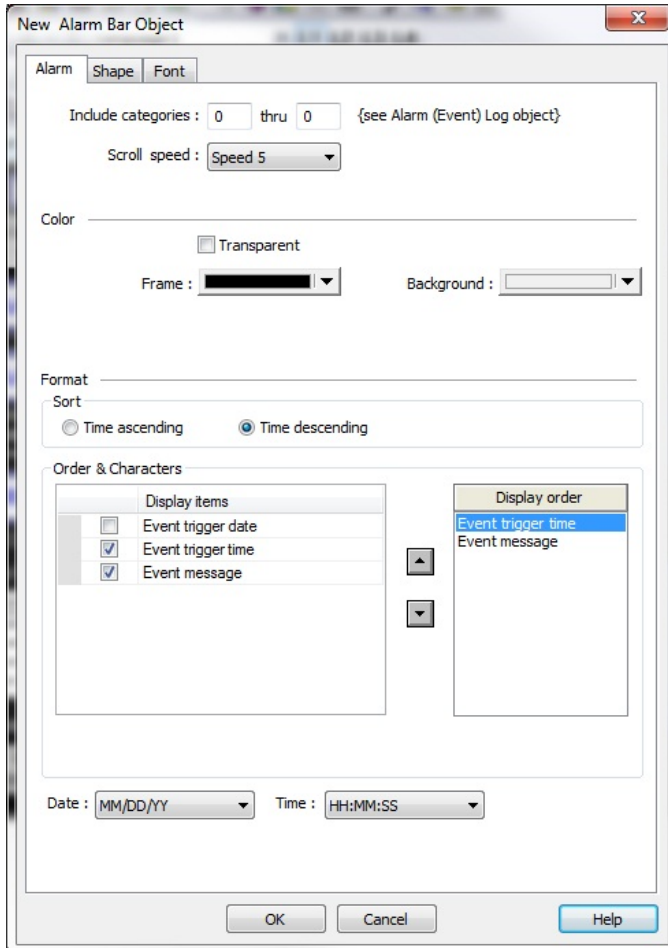
Displaying Alarms using the Alarm Bar Object

The Alarm Bar Object displays alarms scrolling horizontally along a single line. The alarm bar continuously scrolls each alarm until the alarm is no longer active. If more than one alarm is active, the Alarm Bar Object appends each alarm to the string of characters scrolled. This part can be used on window screens where space is very limited. It also allows you to display long alarm text strings that are too long to be shown in the Alarm Display Object.

► To create an Alarm Bar Object:



1. From the **Objects** menu, click **Alarm > Alarm Bar** or click the Alarm Bar icon in the Object 2 toolbar. The New Alarm Bar Object dialog box appears.



2. **Include categories:** To include all categories, set this at 0 to 0.
3. Select **Scroll speed** from the drop-down menu to adjust the speed at which the message scrolls across the alarm bar.
4. Select the **Frame** and **Background** colors from the drop-down menus. Select **Transparent** for no frame or background.
5. Select the sort order in which the alarms will appear, either **Time ascending** or **Time descending**.
6. Check the **Event trigger date**, **Event trigger time**, and **Event message** checkboxes to include them in the Alarm Bar. Use the **Display order** list to arrange the order in which the selected event information is displayed.

7. Select the format for how the date and time is displayed in the **Date:** and **Time:** drop-down boxes.
8. Click the **Shape** tab to configure a background shape, if you'd like one.
9. Click the **Font** tab to configure the size of the font.
10. Click **OK** and click in the work area of EasyBuilder to place the Alarm Bar. Drag it to place it in the desired location.

Using Events

EasyBuilder has two parts that are used to perform Event functions: the Alarm (Event) Log object and the Event Display object. The Alarm (Event) Log object monitors events and alerts the Event Display when an event is triggered. The Silver Series monitors a maximum of 200 events but you can program the HMI to monitor up to an additional 1000 events.

Monitoring Events with the Event Log Object

The Event Log Object continuously monitors PLC coils and registers to determine if an event has occurred. Once an event has triggered, the Event Log Object directs a string of characters associated with that event to the Event Display Object for display on the HMI screen. The HMI operator can acknowledge each event by touching the string of characters that have been displayed. Once acknowledged, the Event Log Object has the option of calling a popup window.

► *To create an Event Log Object:*

See the previous section on the Alarm (Event) Log (page 166).

Displaying Events Using the Event Display Object

Though the Alarm (Event) Log Object continuously monitors the PLC for triggered events, it cannot display the events without the Event Display Object. The Event Display Object takes the event strings sent to it from the Alarm (Event) Log Object and displays them on a window screen as a list. The list contains all of the events that have occurred with the most recently triggered event at the top of the list. You do not have to display the entire list of events on a window screen. You can limit the viewable events to a 'scrollable window' that displays a given number of lines. You can then create a register that allows you to scroll through the list of events using the scrollable window. An acknowledge feature allows the HMI operator to touch an event recorded in the event list to display a popup window. The popup window can then be used to display further instructions to the HMI operator or to perform some operation.

► To create an Event Display Object:



1. From the **Objects** menu, click **Alarm > Event Display** or click the Event Display icon in the Object 2 toolbar. The New Event Display Object dialog box appears.

2. Use the **Description:** box to enter a title for the Event Display object. A description is not necessary but does help identify the purpose of the part.
3. Select either Real-time or History as the mode for the events to be displayed.
In **Real-time** mode, the Write address is the register where the alarm or event writes the window number used to popup an acknowledgement Indirect Window.
In **History** mode, the History control address is the register used to select the history file to display, where 0 is the most recent events, 1 is yesterday's events, 2 is the events from two days ago, etc. Select **Enable reading multiple histories** to display more than one history file at a time (see Event Display on page 62 for more information).
4. Select **Enable event management** to configure a register to control the events that are displayed (see Event Display on page 62 for more information).

- Click on the **Event Display** tab to display the Event Display dialog.

New Event Display Object

General **Event Display** Shape Font

Include categories : 0 thru 0 {see Alarm (Event) Log object}

Acknowledge style : Click

Max. event no. : 200

Color

☐ Transparent

Frame : [Black]

Background : [White]

Acknowledge : [Yellow]

Return to normal : [Green]

Select box : [Blue]

Format

Sort

☐ Time ascending ☒ Time descending

Order & Characters

Display items	Display chars
☐ Sequence no.	0
☐ Event trigger date	0
☒ Event trigger time	0
☐ Acknowledge time	0
☐ Return to normal time	0
☒ Event message	0

Display order

- Event trigger time
- Event message

If "Display chars" is 0, it means that the system will display all of characters.

Date : MM/DD/YY Time : HH:MM:SS

OK Cancel Help

- Include categories:** To include all categories, set this at 0 to 0.
- Select **Click** or **Double-click** to acknowledge event with a single or double touch in the acknowledge style drop-down menu. Then select the maximum number of events to display in the Event Display (applies to Real-time mode only). The valid range is 10-1000.
- Select colors for **Background**, **Frame**, **Select box**, **Acknowledge**, and **Return to normal**.
- Select the order in which events will be sorted, **Time ascending** or **Time descending**.
- Check the **Sequence no.** check box to add a unique serial number to each event. Select the **Event trigger date** and **Event trigger time** to have the date and time the event is triggered added to each event. Select **Acknowledge time** and **Return to normal time** to have those times added to each event, and select **Event message** to include the message defined for the alarm/event appear in the display.
- Use the **Display order** list to arrange the order in which the selected event information is displayed, and select the format for how the date and time is displayed in the **Date:** and **Time:** drop-down boxes.
- Click the **Shape** tab to configure a background shape (if desired). Click the **Font** tab to configure the size of the font.
- Click **OK** and click in the work area of EasyBuilder to place the Event Display. Drag it to place it in the desired location. Click and drag the corners to resize it.

Chapter 12 – Security

The security feature in EasyBuilder-5000 allows you to create up to 12 users with individual passwords and assign up to 6 different access levels to each user. Access to windows and even individual objects can be secured so only individuals logged in with the correct access levels can operate certain functions.

System Parameter Settings Security tab

The security feature is enabled in the System Parameters. Open the System Parameter Settings (Edit > System Parameters) and click on the Security tab. Check the Enable box for each user you want to configure with security access. Enter a password for each user and check the boxes for the access level assigned to each user.

System Parameter Settings

Font Extended Memory Printer/Backup Server

Device Model General System Setting Security

Select operatable classes for each user

User 1
☒ Enable Password : 1111 ☒ A ☐ B ☐ C ☐ D ☐ E ☐ F

User 2
☒ Enable Password : 2222 ☒ A ☒ B ☐ C ☐ D ☐ E ☐ F

User 3
☒ Enable Password : 3333 ☒ A ☒ B ☒ C ☐ D ☐ E ☐ F

User 4
☒ Enable Password : 4444 ☒ A ☒ B ☒ C ☒ D ☐ E ☐ F

User 5
☒ Enable Password : 5555 ☒ A ☒ B ☒ C ☒ D ☒ E ☐ F

User 6
☒ Enable Password : 6666 ☒ A ☒ B ☒ C ☒ D ☒ E ☒ F

User 7
☒ Enable Password : 7777 ☒ A ☐ B ☒ C ☐ D ☐ E ☐ F

User 8
☒ Enable Password : 8888 ☒ A ☐ B ☒ C ☒ D ☐ E ☐ F

User 9
☒ Enable Password : 9999 ☒ A ☒ B ☐ C ☒ D ☐ E ☒ F

User 10
☒ Enable Password : 1010 ☒ A ☐ B ☒ C ☐ D ☒ E ☐ F

User 11
☒ Enable Password : 1011 ☒ A ☒ B ☐ C ☐ D ☒ E ☒ F

User 12
☒ Enable Password : 1012 ☒ A ☐ B ☒ C ☐ D ☒ E ☒ F

Project password (MTP file)
☒ Enable

OK Cancel Help

Note: There is no priority in assigning access levels. For example, access level F doesn't automatically provide access to levels A-E. In many cases, you will want higher security levels to include access to lower security levels. In the screen shot above, Users 1 – 6 are assigned increasingly higher security levels, with each security level including access to the security levels below it.

In order for a user to login, they must first enter their user number into reserved local word LW9219. Then they must enter their password into reserved local word LW9220 (32-bit unsigned).

 This procedure is different from what was used in EasyBuilder-500, where the user only needed to enter a password.

There are several other reserved local words and bits that can add functionality to your security implementation.

Reserved Local Memory	Function
LW9222	Displays the access levels assigned to the currently logged-in user in binary format (16-bit binary) Bit 0: A, Bit 1: B, Bit 2: C, Bit 3: D, Bit 4: E, Bit 5: F
LW9500-LW9523 (32-bit unsigned)	Stores user passwords 1-12
LB9050	Logs out user and resets password to zero when bit is set (HMI resets bit to zero)
LB9060	Indicates when an invalid password has been entered (bit resets to zero when valid password is entered)
LB9061	Set to update user passwords when changed locally (LW9500-LW9523) Use momentary style

Refer to the Security Sample Project on our website to see how to employ the above reserved local memory bits and registers in a security implementation.

(<http://www.maplesystems.com> > Support Center > Sample Projects > HMI5000 Series > Sample Prj: Security)

SECURITY FEATURES

Select a User and enter the password. User Security level is displayed in the Current Access Class field. Invalid password will set Password Error.

Log In

Select a User - LW9219

1

2

3

4

5

6

7

8

9

10

11

12

Selected User **3**

Password - LW9220

Logout

☐ Password Error
 LB9060 - Click lamp to reset

---- Not Used --- F E D C B A

0000000000000111

Current Access Classes
(binary, class A is right-most digit)
LW9222

LOG IN

Goto Window 11
Password Protection
Class B

Goto Window 11
Password Protection
Class F
Invisible if Protected

0

Password Protection
Class F
Access Denied Msg

0

Password Protection
Class F
Disable Protection Permanently

Update Passwords

User 1 1111	User 2 2222	User 3 3333	User 4 4444	User 5 5555	User 6 6666
User 7 7777	User 8 8888	User 9 9999	User 10 1010	User 11 1111	User 12 1212

Click field to modify password. Click SAVE to update passwords.

SAVE

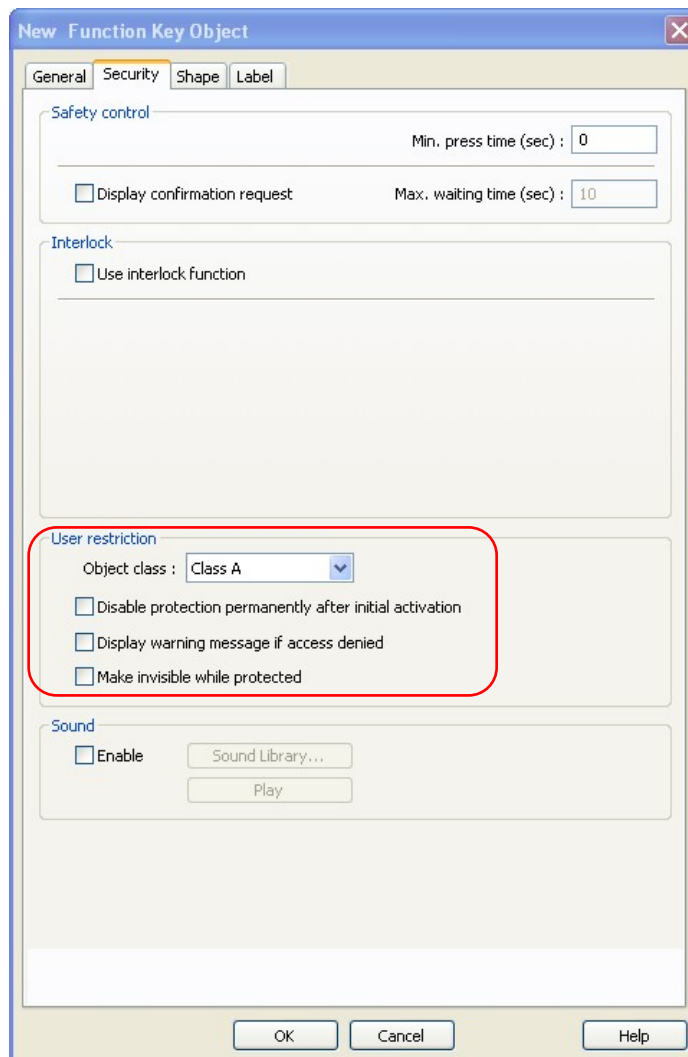
Save New Passwords
LB9061

Object Security

Many objects in EasyBuilder-5000 can be secured using the Security tab in the object's properties window. For example, a Function Key can be secured so that only user's with a specified access class can operate the Function Key and open a particular window.

User Restriction

The User restriction area is where the security class for the object is set.



Once an *Object class* is selected in the *User restriction* area, three options become available. With no option checked, the object simply will not operate when touched unless a user with the correct access class is logged in.

Disable protection permanently after initial activation: This option removes the user restriction from the object once the object has been activated by a user with the correct access class, even after that user logs out. The protection is disabled until the HMI is rebooted.

Display warning message if access denied: This option causes the message in Window 7 (Password Restriction) to popup when a user with an incorrect access class attempts to activate the object.



Make invisible while protected: This option causes the object to be invisible on the screen until a user with the correct access class is logged in.

Safety Control

The Safety control area is used to prevent an operator from activating a button or switch by accidentally touching it.



Min. press time (sec): This sets the minimum amount of time in seconds that the object needs to be pressed in order to activate it.

 This option is not available when *Display confirmation request* is enabled.

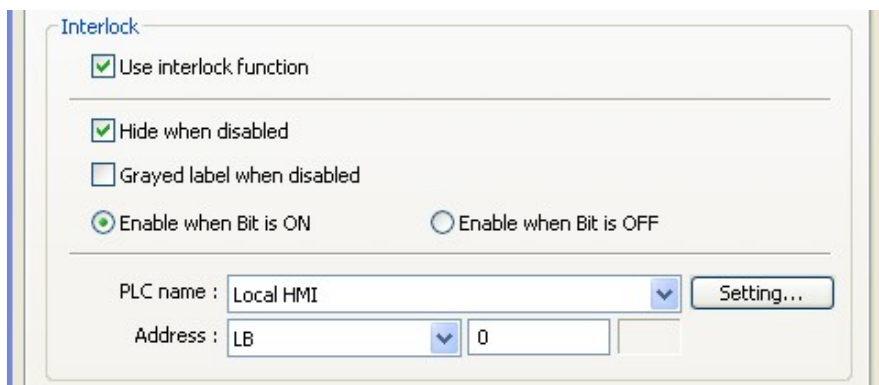
Display confirmation request: When enabled, the HMI will display a confirmation window before executing the action. The message in the confirmation window is configured in Message 0 of the System Message object (Objects > System Message).

Max. waiting time (sec): This sets the maximum amount of time in seconds that the confirmation window stays on the screen. If the time expires, the confirmation window closes and the action is not executed.

 This option is available only if *Display confirmation request* is enabled.

Interlock

The interlock feature uses the state of a bit to enable or disable the action of the object.



When Interlock is enabled, the following options are available:

Interlock

☒ Use interlock function

☒ Hide when disabled

☐ Grayed label when disabled

☒ Enable when Bit is ON ☐ Enable when Bit is OFF

PLC name : Local HMI [v] [Setting...]

Address : LB [v] 0

Hide when disabled: When this box is checked, the object is invisible on the screen until the designated bit is in the enable state.



Grayed label when disabled: When this box is checked, the object's label is grayed out until the designated bit is in the enable state.



Enable when Bit is ON/Enable when Bit is OFF: Choose the state of the designated bit that will enable the action of the object.

Sound

Enable the Sound option to play a sound when the object is activated.

Sound

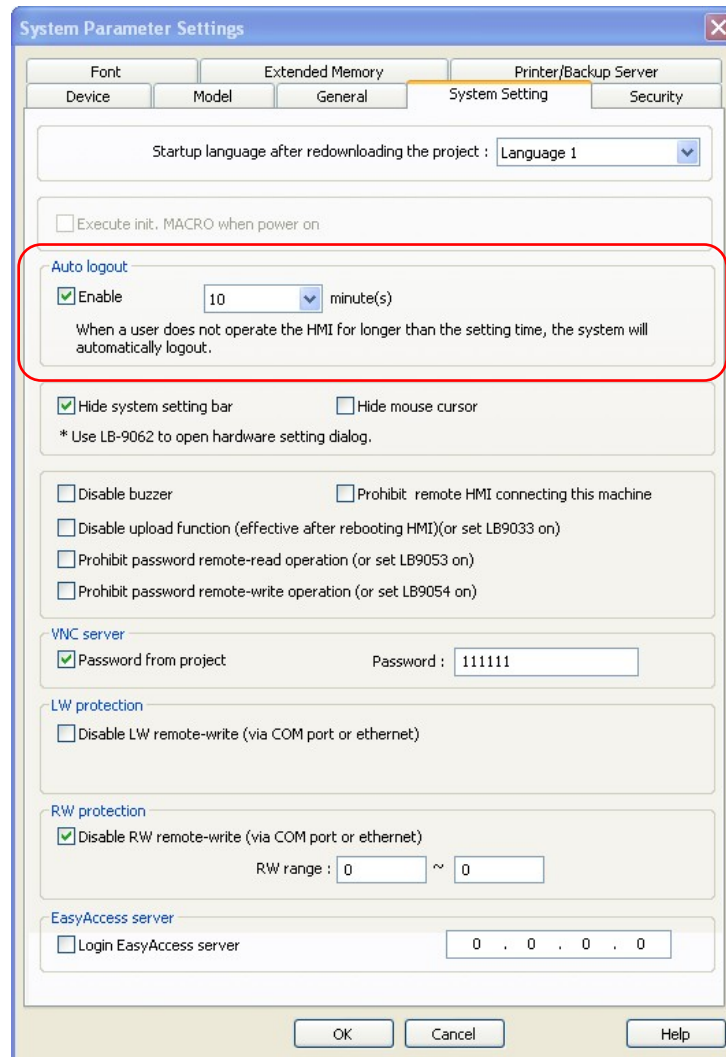
☒ Enable Sound Library... Sound Index : Default

Play

The default sound is the HMI's beep. For models equipped with an audio output jack, you can select other sounds from the sound libraries to play when the object is activated.

Auto logout

There is an **Auto logout** feature in the System Parameters on the System Setting tab (Edit > System Parameters > System Setting).

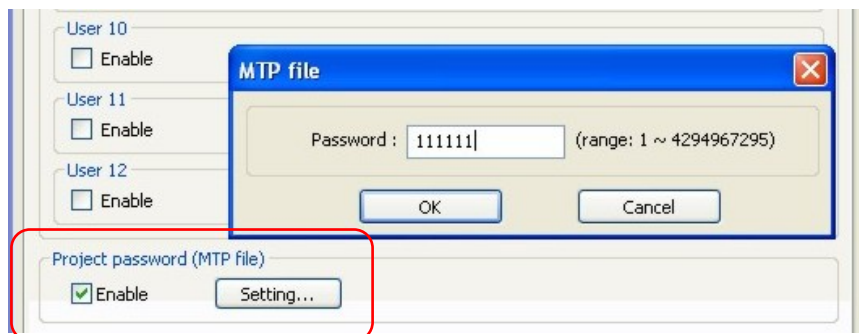


When this feature is enabled, you can select the number of minutes of inactivity before the HMI will automatically logout the user. This avoids a situation where a user logs in and forgets to log out before leaving the HMI (use LB9050 to manually logout a user).

Additional Security Features

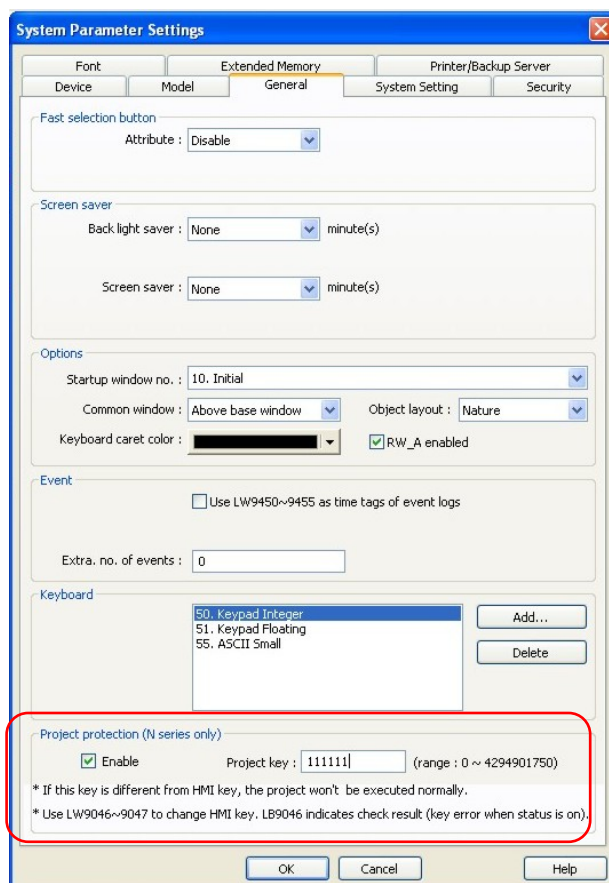
Project Password (MTP file)

Enable the Project Password in the System Parameter settings (Edit > System Parameters > Security tab). This secures a project and prevents it from being modified without the proper password. When the Project Password is enabled, you must enter the correct password in order to open the project in EasyBuilder-5000.

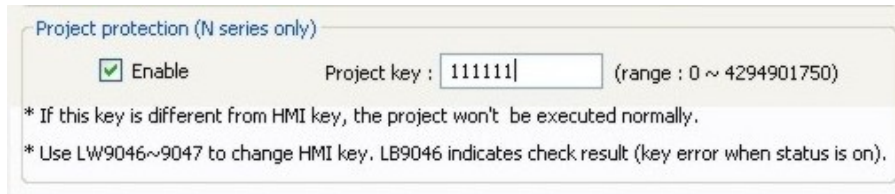


Project Protection

Enable Project Protection in the System Parameter settings (Edit > System Parameters > General tab). Use the Project Protection feature to set a unique password (Project key) in the project that will cause the project to run only on specific HMIs that have a matching password (HMI key).



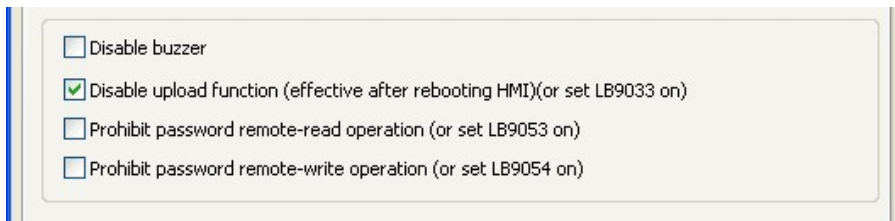
A developer can set the HMI key in the reserved local memory of the HMI (LW9046 configured for 32-bit unsigned numeric format). This value is stored in non-volatile memory, and once it is set, the value is hidden and cannot be read using a numeric display. In this way, only HMIs with the correct HMI key will be able to run the project. If the Project key does not match the HMI key, local bit LB9046 is set and the driver is disabled and will not communicate with the PLC.



☞ The HMI must be rebooted in order for the HMI key setting to take effect.
This feature is not available on the X-models (HMI5104XH, HMI5121X, HMI5150X).

Disable Upload Function

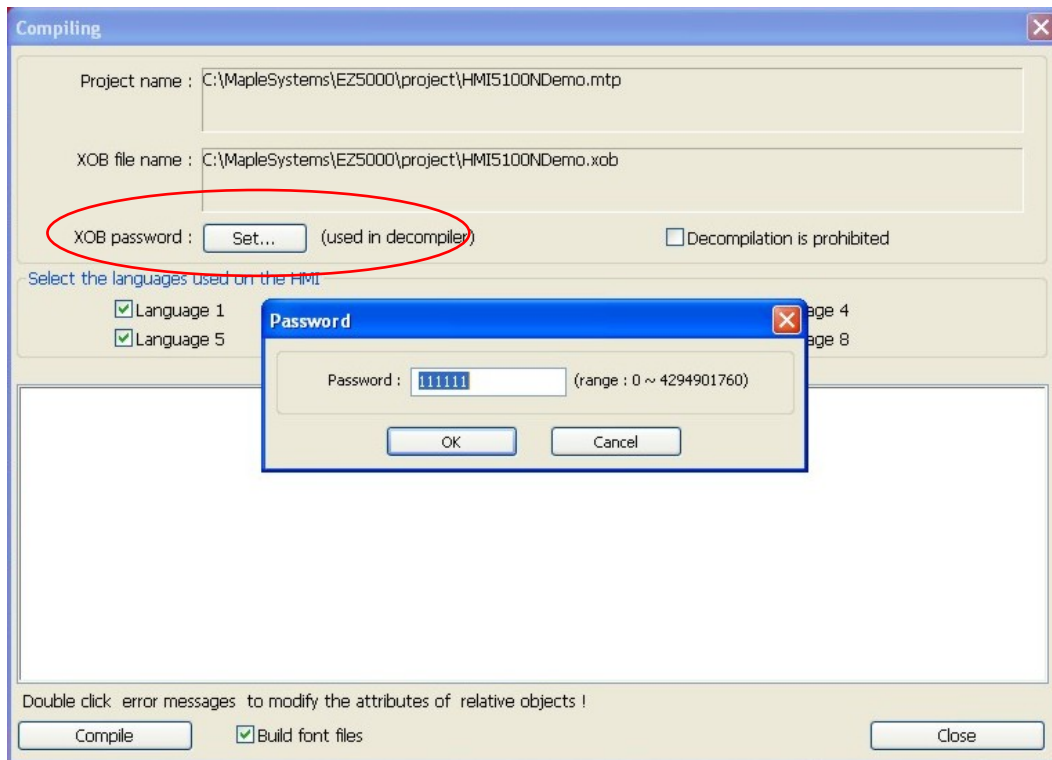
Activate the Disable Upload Function in the System Parameter settings (Edit > System Parameters > System Setting tab). Alternately, you can set LB9033 in the local reserved memory of the HMI to disable the upload function and prevent a project from being uploaded from the HMI.



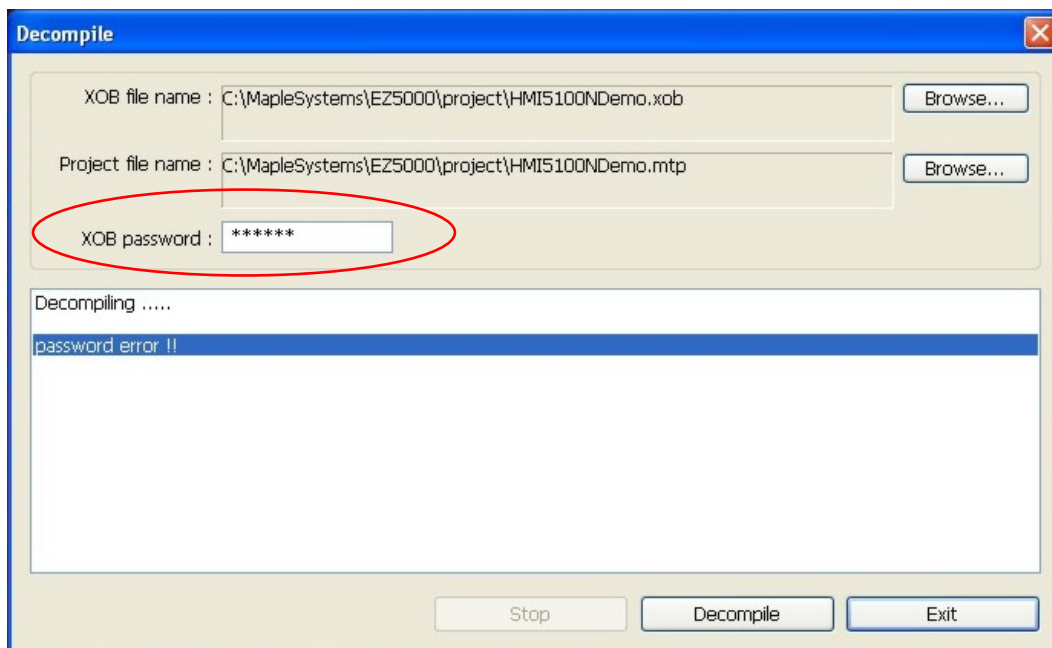
☞ The HMI must be rebooted after downloading the project in order for the Disable Upload Function to take effect.

XOB Password

A project (*.mtp) must be compiled (*.xob) before it can be downloaded to an HMI. When compiling a project, you have the option to change the default password (111111) to a unique number.

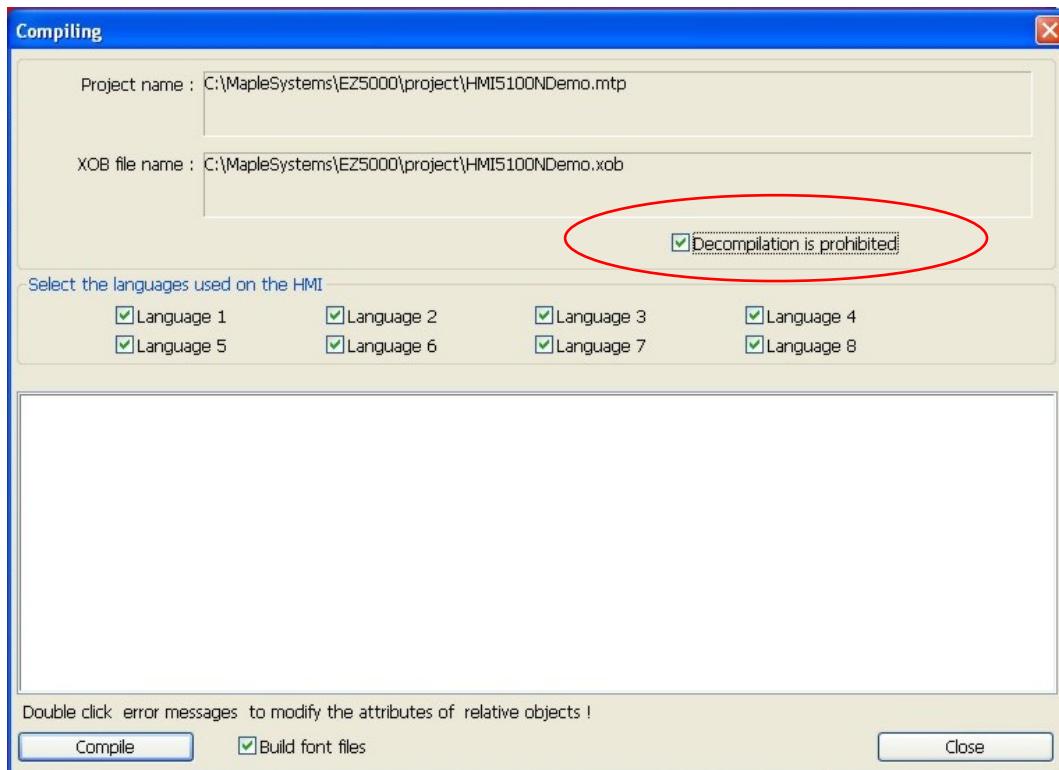


You must enter the correct password before you can decompile the file and open it in EasyBuilder-5000 or you will get a decompiling error.



Decompiling Prohibited

Click the **Decompilation is prohibited** checkbox in the **Compiling** window to prevent the compiled project from being decompiled.



Once a project is compiled with the **Decompilation is prohibited** option checked, it cannot be decompiled. There is no “backdoor” password to override it.

System Passwords

The System Setup Toolbar in the HMI has the option of changing several passwords from their default setting of 111111 to another number.

Open the System Setup Toolbar and click the System Settings icon.



Older Models



Newer Models

A dialog will be displayed requesting the Local password. The default password is 111111.



 You may have to move windows around a bit to gain access to the virtual keyboard. You may also have to click inside the password field again.

Once the correct password has been entered, the System Settings dialog is displayed. Click on the **Security** tab to display the security settings dialog. Here, you can select and modify your system passwords.



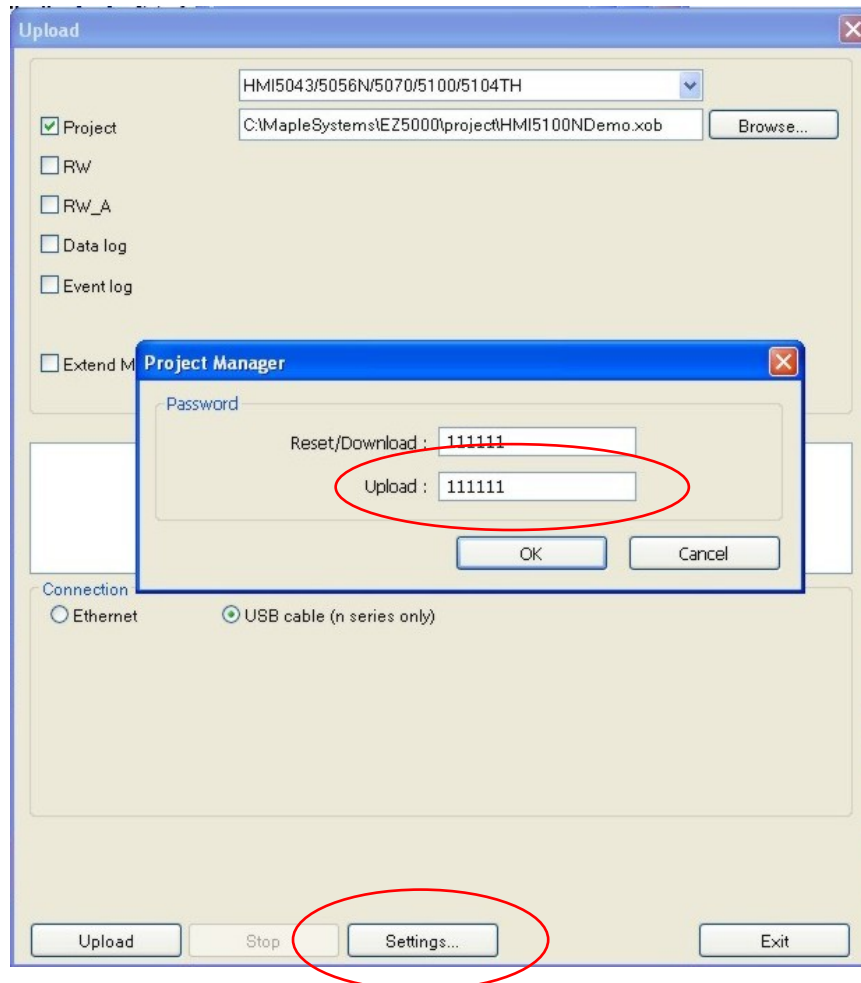
To change a system password, the new password must be entered, and then entered again to confirm. As the password is entered into the confirm field, an indicator will show if the two passwords match.



Local Password: The password required to enter local setup on the HMI.



Upload Password: The password required to upload data from the HMI to a PC or memory module.

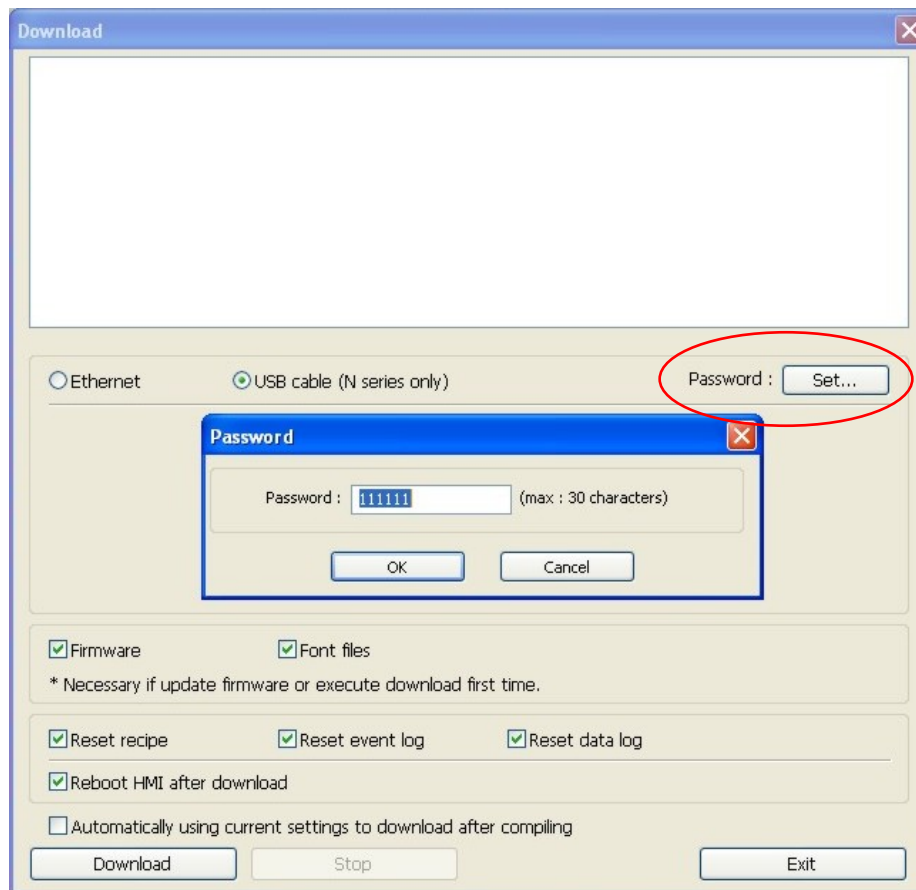


Upload to a PC using Project Manager



Upload to a USB Flash or SD Card

Download Password: The password required to download data to the HMI from a PC or memory module.



Download from a PC to an HMI



Download from a USB Flash or SD Card

Upload (History) Password: The password required to upload history files from the HMI to a memory module.



Upload to a USB Flash or SD Card

Chapter 13 – Using the Modbus Gateway

The Modbus Gateway allows any ModbusTCP Master to request HMI data using standard Modbus commands. The HMI uses the *ModbusRTU/TCP Slave* protocol to pass Modbus requests to any non-tag-based PLC or controller connected to the HMI, or the HMI's internal storage.

 Tag-based PLCs are those that use named tags instead of addresses, such as Allen Bradley Compact and Control Logix, Siemens S7-1200, and BACnet.

For example, the Modbus Gateway would allow a SCADA system to obtain data from a device that is not supported by the SCADA system, but is supported by the HMI. The Modbus Gateway also allows serial-connected devices access to the SCADA system.

The Modbus Gateway support the following Modbus function codes (decimal):

Code	Definition
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Register
15	Force Multiple Coils (LB addresses in the HMI only, not compatible with bits in a PLC)
16	Preset Multiple Registers

HMI Local Word LW9288 indicates Modbus communication errors:

Value	Error
0	No error
1	Attempt to read/write an undefined register
2	Illegal Data Value
3	Bad Command Format
4	Attempt to write to a Read-only register
5	Attempt to read to a Write-only register
6	Timeout
7	Invalid Function Code

Configuring the Modbus Gateway

1. Configure the PLC to which Modbus registers will be mapped. Refer to the *System Parameter Settings* section at the end of Chapter 6.
2. On the Model tab of the System Parameter dialog, change the HMI Station Number to the Modbus Unit Number desired for the HMI.
3. Change the Port Number to the port used by the ModbusTCP Master. Typically, port 502 is used.

Extended Memory | Printer/Backup Server | e-Mail | Recipes

Device | Model | General | System Setting | Security | Font

HMI model : HMI5070P (800 x 480)

HMI station no : 1

Port no. : 502 (used as MODBUS server's port no.)

Add the Modbus RTU/TCP Slave protocol to the project, and set the **PLC I/F** to *Ethernet*. Refer to the *System Parameter Settings* section at the end of Chapter 6.

1. Check the **Enable** checkbox in the *MODBUS TCP/IP Gateway* section

Name : Modbus RTU/TCP Slave

☐ HMI ☒ PLC

Location : Local Settings...

PLC type : Modbus RTU/TCP Slave

V.1.00, MODBUS_SERVER.e30

PLC I/F : Ethernet

IP : Local,Port=502(=HMI Port) Settings...

☐ Use UDP (User Datagram Protocol)

Station no. : 1

☐ Use broadcast command

MODBUS TCP/IP Gateway

☒ Enable Address Mapping Tables...

OK Cancel

This example will show how to use the Modbus Gateway to obtain data from an Animatics Smartmotor.

1. Click the **Address Mapping Tables** button.

Table	Description	MODBUS Address		PLC Name	Mapped PLC Address	Table Size	Read/Write
1	0x <==> LB	0x-1	<==>	Local HMI	LB-0	12400 Bit(s)	Read/Write
2	1x <==> LB	1x-1	<==	Local HMI	LB-0	12400 Bit(s)	Read only
3	3x <==> LW	3x-1	<==	Local HMI	LW-0	9999 Word(s)	Read only
4	4x <==> LW	4x-1	<==>	Local HMI	LW-0	9999 Word(s)	Read/Write
5	3x <==> RW	3x-10000	<==	Local HMI	RW-0	55536 Word(s)	Read only
6	4x <==> RW	4x-10000	<==>	Local HMI	RW-0	55536 Word(s)	Read/Write

*Note: No cross-table reading/writing, i.e. accessing data from multiple tables in one command.

* LW-9288 indicates the last communication error :

0 : normal	4 : read-only error
1 : read/write undefined registers	5 : write-only error
2 : out of read/write range	6 : timeout
3 : bad command format	7 : invalid function code

* Support the following function codes :

0x : 1, 5, 15 (15 used only to set LB)

1x : 2

3x : 4

4x : 3, 6, 16

By default, Modbus registers are mapped to HMI local storage.

2. Click the **Delete** button to remove the selected entry.

- Click the **Add** button to map a Modbus register.

In this example, Modbus registers are being mapped to array elements in an Animatics Smartmotor controller.

Description: Enter a text description for this mapping.

Device Type: Select whether the mapped data is a *Bit* or *Word* address.

Mode: Configure the access privileges.

MODBUS address: Specify the Modbus address.

Mapped PLC address: Specify the PLC and address to which the Modbus address will be mapped. In this example, Modbus registers are being mapped to the AL[] array in the Animatics Smartmotor.

Table size: Specify how many words or bits are to be mapped. The table starts with the addresses configured above. In this example, 10 Modbus addresses are being mapped.

Conversion: *AB -> BA* swaps the byte order during the mapping, *ABCD -> CDAB* swaps the word order.

- Click the **OK** button.
- Repeat for each address type to be mapped.

Configuring the ModbusTCP Master

The ModbusTCP Master must be configured to communicate with the HMI.

In general, there will be a one-to-one matching of the Modbus address and the address mapped in the PLC. If 32-bit types are used on one side, and 16-bit types are used on the other, addresses may be skipped.

When the ModbusTCP Master requests data, the HMI will send the request to the mapped device, and return the data to the ModbusTCP Master. In the Animatics example, when the ModbusTCP Master requests register 4x1, the HMI will request the data from Animatics register ArrayAL[0], and return the data to the ModbusTCP Master.

How to Reach Us

Corporate Headquarters

Watlow Electric Manufacturing Company
12001 Lackland Road
St. Louis, MO 63146
Sales: 1-800-WATLOW2
Manufacturing Support: 1-800-4WATLOW
Email: info@watlow.com
Website: www.watlow.com
From outside the USA and Canada:
Tel: +1 (314) 878-4600
Fax: +1 (314) 878-6814

Latin America

Watlow de México S.A. de C.V.
Av. Fundación No. 5
Col. Parques Industriales
Querétaro, Qro. CP-76130
Mexico
Tel: +52 442 217-6235
Fax: +52 442 217-6403

Europe

Watlow France
Tour d'Asnières.
4 Avenue Laurent Cély
92600 Asnières sur Seine
France
Tél: + 33 (0)1 41 32 79 70
Télécopie: + 33(0)1 47 33 36 57
Email: info@watlow.fr
Website: www.watlow.fr

Watlow GmbH
Postfach 11 65, Lauchwasenstr. 1
D-76709 Kronau
Germany
Tel: +49 (0) 7253 9400-0
Fax: +49 (0) 7253 9400-900
Email: info@watlow.de
Website: www.watlow.de

Watlow Italy S.r.l.
Viale Italia 52/54
20094 Corsico MI
Italy
Tel: +39 024588841
Fax: +39 0245869954
Email: italyinfo@watlow.com
Website: www.watlow.it

Watlow Ibérica, S.L.U.
C/Marte 12, Posterior, Local 9
E-28850 Torrejón de Ardoz
Madrid - Spain
T. +34 91 675 12 92
F. +34 91 648 73 80
Email: info@watlow.es
Website: www.watlow.es

Watlow UK Ltd.
Linby Industrial Estate
Linby, Nottingham, NG15 8AA
United Kingdom
Telephone: (0) 115 964 0777
Fax: (0) 115 964 0071
Email: info@watlow.co.uk
Website: www.watlow.co.uk
From outside The United Kingdom:
Tel: +44 115 964 0777
Fax: +44 115 964 0071

Asia and Pacific

Watlow Singapore Pte Ltd.
20 Kian Teck Lane 4th Floor
Singapore-627854
Tel: +65 6773 9488 Fax: +65 6778 0323
Email: info@watlow.com.sg Website: www.watlow.com.sg

Watlow Australia Pty., Ltd.
4/57 Sharps Road
Tullamarine, VIC 3043
Australia
Tel: +61 3 9335 6449
Fax: +61 3 9330 3566
Website: www.watlow.com

Watlow Electric Manufacturing Company (Shanghai) Co. Ltd.
Room 501, Building 10, KIC Plaza
290 Songhu Road, Yangpu District
Shanghai, China 200433
China
Phone:
Local: 4006 Watlow (4006 928569)
International: +86 21 3381 0188
Fax: +86 21 6106 1423
Email: vlee@watlow.cn
Website: www.watlow.cn

ワトロー ジャパン株式会社
〒101-0047 東京都千代田区内神田1-14-4
四国ビル別館9階
Tel: 03-3518-6630 Fax: 03-3518-6632
Email: infoj@watlow.com Website: www.watlow.co.jp

Watlow Japan Ltd.
1-14-4 Uchikanda, Chiyoda-Ku
Tokyo 101-0047
Japan
Tel: +81-3-3518-6630 Fax: +81-3-3518-6632
Email: infoj@watlow.com Website: www.watlow.co.jp

Watlow Korea Co., Ltd.
#1406, E&C Dream Tower, 46, Yangpyeongdong-3ga
Yeongdeungpo-gu, Seoul 150-103
Republic of Korea
Tel: +82 (2) 2628-5770 Fax: +82 (2) 2628-5771
Website: www.watlow.co.kr

Watlow Malaysia Sdn Bhd
1F-17, IOI Business Park
No.1, Persiaran Puchong Jaya Selatan
Bandar Puchong Jaya
47100 Puchong, Selangor D.E.
Malaysia
Tel: +60 3 8076 8745 Fax: +60 3 8076 7186
Email: vlee@watlow.com
Website: www.watlow.com

瓦特龍電機股份有限公司
80143 高雄市前金區七賢二路189號 10樓之一
電話: 07-2885168 傳真: 07-2885568

Watlow Electric Taiwan Corporation
10F-1 No.189 Chi-Shen 2nd Road Kaohsiung 80143
Taiwan
Tel: +886-7-2885168 Fax: +886-7-2885568

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