



MAPware Programming Manual

Your Industrial Control Solutions Source

www.maplesystems.com



For use with the following:

HMC7000 Series
HMC3000 Series
HMC2000 Series
HMC4000 Series

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WARRANTY

Warranty Statements are included with each unit at the time of purchase and are available at www.maplesystems.com

TECHNICAL SUPPORT

This manual is designed to provide the necessary information for trouble-free installation and operation of Maple Systems products. However, if you need assistance, please contact Maple Systems:

- Phone: 425-745-3229
- Email: support@maplesystems.com
- Web: www.maplesystems.com

Intended Audience

A **Qualified Person** is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved. **Qualified Personnel** shall:

- Have carefully read the entire operation manual.
- Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
- Be trained in rendering first aid.

Purpose and Scope of this Manual

Thank you for purchasing from Maple Systems. This manual provides information on how to safely install, operate, and maintain your product.

Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review.

Maple Systems reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

General Precautions

The user must operate the product according to the performance specifications described in the operational manual.

- The HMI + PLC / MLC units are general-purpose products. It is a system component and is used in conjunction with other items of industrial equipment such as; sensors, actuators, Adjustable Speed Drives, etc.
- A detailed system analysis and job safety analysis should be performed by the systems designer or systems integrator before including the unit in any new or existing system. Contact Maple Systems for options availability and for application-specific system integration information if required.
- The product may be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely. Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards. The adjustable speed drive may start the motor without warning.
- Signs at the equipment installation must be posted to this effect. A familiarity with Auto restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command.
- Control through serial communications can fail or can also override local controls, which can create an unsafe condition. System safety features should be employed and designed into the integrated system in a manner such that system operation, even in the event of system failure, will not cause harm or result in personnel injury or system damage. Use of the built-in system protective features and interlocks of the equipment being controlled is highly recommended (i.e., emergency-off, overload protection, etc.).
- Never use the HMC units to perform emergency stops. Separate switches outside the product, the PLC, and the ASD should be used for emergency stops.
- Changes or modifications to the MAPware program should not be made without the approval of the system designer or systems integrator. Minor changes or modifications could cause the defeat of safety interlocks and permissives. Any changes or modifications should be noted and included with the system documentation.



WARNING It is extremely important that the unit and other peripherals be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human beings.



WARNING Do not use input functions as PT touch switches for applications where danger to human life or serious damage is possible, or for emergency switch applications.

Safety Precautions

Please observe the following precautions when installing the unit. Failure to comply with these restrictions could result in loss of life, serious personal injury, or equipment damage.



WARNING Do not operate the unit in areas subject to explosion due to flammable gases, vapors, or dusts.



WARNING Do not connect the unit to an AC power source. You will cause permanent damage to the unit.



WARNING Do not attempt to use a DC power supply that does not meet unit power requirements. You may cause malfunction or permanent damage to unit.



WARNING Do not power the unit with a DC power supply used for inductive loads or for input circuitry to the programmable logic controller. Severe voltage spikes caused by these devices may damage the unit.



CAUTION

Upon receipt of the equipment inspect the packaging and equipment for shipping damage.

Carefully unpack the equipment and check for parts that were damaged from shipping, missing parts, or concealed damage. If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify your Maple Systems representative.

DO NOT install or energize equipment that has been damaged. Damaged equipment may fail during operation resulting in further equipment damage or personal injury. Check to see that the model number specified on the nameplate conforms to the order specifications.

Modification of this equipment is dangerous and must not be performed except by factory trained representatives. When modifications are required contact your Maple Systems representative.

Inspections may be required before and after moving installed equipment.

Keep the equipment in an upright position as indicated on the shipping carton.

Contact your Maple Systems representative for assistance if required.

Handling and Storage

- Use proper lifting techniques when moving the product; including properly sizing up the load, and getting assistance if required.
- Store in a well-ventilated covered location and preferably in the original carton if the equipment will not be used upon receipt.

Safety Precautions for Storage

- Store in a cool, clean, and dry location. Avoid storage locations with extreme temperatures, rapid temperature changes, high humidity, moisture, dust, corrosive gases, or metal particles.
- Do not store the unit in places that are exposed to outside weather conditions (i.e., wind, rain, snow, etc.).

Installation Precautions

1 Location and Ambient Requirements

Adequate personnel working space and adequate illumination must be provided for adjustment, inspection, and maintenance of the equipment.

Avoid installation in areas where vibration, heat, humidity, dust, fibers, steel particles, explosive/corrosive mists or gases, or sources of electrical noise are present.

The installation location shall not be exposed to direct sunlight.

Allow proper clearance spaces for installation. Do not obstruct the ventilation openings. Refer to the recommended minimum installation dimensions as shown on the enclosure outline drawings.

The ambient operating temperature shall be between 0° and 50° C (32° and 122° F).

2 Mounting Requirements

Only **Qualified Personnel** should install this equipment.

Install the unit in a secure upright position in a well-ventilated area.

A noncombustible insulating floor or mat should be provided in the area immediately surrounding the electrical system at the place where maintenance operations are to be performed.

3 Conductor Routing and Grounding

Use separate metal conduits for routing the input power, and control circuits.

A separate ground cable should be run inside the conduit with the input power, and control circuits.

DO NOT connect control terminal strip return marked CC to earth ground.

Always ground the unit to prevent electrical shock and to help reduce electrical noise.

The Metal Of Conduit Is Not An Acceptable Ground.

Disposal

Never dispose of electrical components via incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

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Chapter 1 – Introductions


Welcome

Welcome to the Maple Systems' MAPware programming software. MAPware is used to program a powerful range of automation and display hardware.

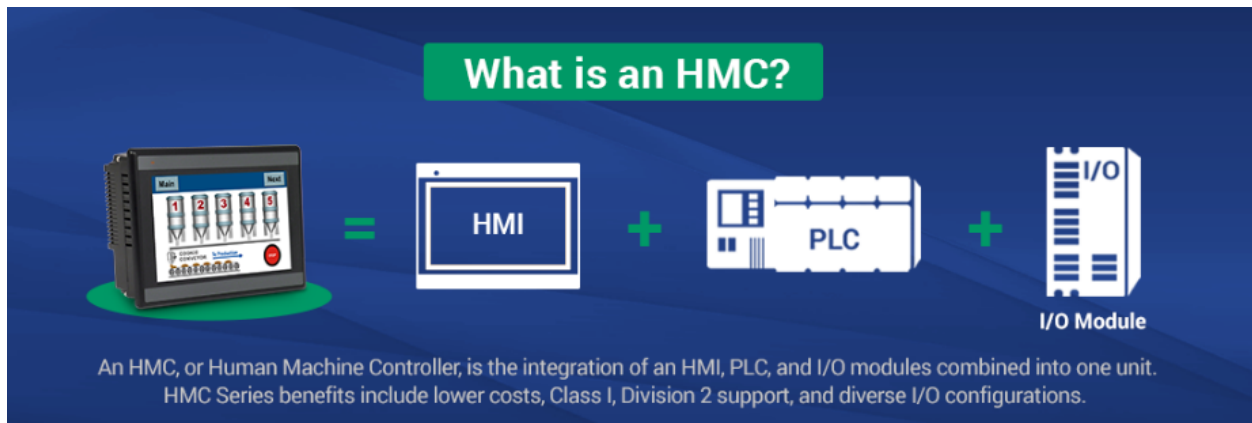
Supported Devices

The configuration software, MAPware, is used to program the series of products listed below.

- HMC7000 Series of HMI + PLC combo units. This series of display + PLC + I/O units includes base units with display sizes ranging from 3 to 7 inches. Each unit supports internal Programmable Logic Controller (PLC) functionality. HMC7000 base units can be combined with between 3 and 5 I/O expansion modules of the HMC7 family.
- HMC3000, HMC2000, and HMC4000 Series of HMI + PLC combo units. This series of display + PLC + I/O module units includes base units with displays ranging from 4.3 to 10.2 inches. Each unit supports internal Programmable Logic Controller (PLC) functionality. HMC3000, HMC2000 and HMC4000 base units can be combined with between 1 and 5 I/O expansion modules of the HMC3 family. The HMC4000 Series have a Linux-based operating system.
- MLC Series of Programmable Logic Controllers (PLCs). This line of PLCs includes fixed I/O and expandable PLCs.

 **Note:** For information on using MAPware to program an MLC series product, refer to the MLC Series programming manual.

New models are already planned for the future. For the latest list of models supported by the MAPware software, please visit our website at: www.maplesystems.com



HMC Series Products

The HMC Series are Human Machine Controllers (HMCs). An HMC is a combination operator-based HMI (human machine interface) with built-in PLC (programmable logic controller) operation.

This is accomplished using optional expansion I/O modules a configuration software that supports logic programming. Now you can have an HMI and a PLC in one unit. There are several advantages:

- Lower cost
- Easier to use and maintain
- Easier to program (only one software package to learn)
- Faster response time since HMI and PLC are in one unit


HMCs offer flexibility. Rather than using fixed I/O, the HMC employs expansion slots so that you can customize your I/O configuration. Maple Systems offers a wide assortment of expansion modules including combination digital input/output modules, digital input only, digital output only, analog modules, and high-speed counter modules. The HMC also has communication ports, so if you want to incorporate an MLC (see below) or other PLC to further expand the I/O count and processing power of the system, you can.

MAPware contains protocol drivers for the most popular brands of third party PLCs. If you have an existing PLC or want to combine an HMC with a favorite PLC, you can.

MLC Series products

The MLC series of products are more traditional PLC type devices. They include processor models with a fixed set of I/O, and models that can be combined with add on I/O modules to expand functionality. A complete suite of digital and analog input and output devices are available to interface with wide range of automation devices.

MAPware is used to program both HMC and MLC series products. This simplifies the programming process, reduces software cost, and improves project maintainability. The present manual will focus on programming HMC series products.

 **Note:** For information on using MAPware to program an MLC series product, refer to the MLC Series programming manual.

The HMC and MLC Series products are industrial grade equipment. They are certified to meet the European CE noise immunity/emission standards and they are UL listed for use in Class I Division 2 environments.

Please read this operation manual and visit www.maplesystems.com for the latest information on these products.

Logic Editor Environment

MAPware includes a full featured set of logic editors. There are two options for configuring PLC logic in a MAPware project. This selection is made in the Programming Language drop down list when a project is first created. The options are:

Native Ladder¹

The Native Ladder Logic editor is a Ladder Diagram editor. The programmer can define complex logic operations by building discreet logic blocks. A large library of built in ladder logic instructions is available to perform common automation tasks such as; math operations, timers and counters, data manipulation, feedback loops, input scaling and much more. The user can define Power Up Blocks evaluated once at power on, Main Blocks evaluated once per scan or subroutines and interrupt routines with execution controlled by other logic.

 For complete documentation on using the Native Ladder editor refer to the MAPware Ladder Logic Guide.


¹ Native Ladder is only available on the HMC7000 and HMC3000 Series.

IEC 61131-3 Logic Editors

Projects created using this option have access to the five logic editors defined by the IEC 61131-3 standard:

- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Instruction List (IL)
- Sequential Function Chart (SFC)

MAPware projects created using the IEC 61131-3 logic editors have access to an extensive library of built in function blocks that can be used to create robust automation solutions. In addition, the programmer can create their own User Defined Function Blocks (UDFBs) to make their own logic modular and re-usable.

 For complete documentation on using the IEC 61131-3 logic editors, refer to the MAPware IEC 61131-3 Programming Guide.

External 3rd Party PLCs Supported

MAPware includes various protocol drivers that allow you to connect an external third party PLC (such as Allen Bradley MicroLogix, GE Fanuc VersaMax, Schneider Electric Modicon, etc.) to the unit. For the latest list of PLCs and controllers supported please visit our website.

About Your Documentation

Maple Systems provides many resources to allow you to get the most out of your HMI + PLC Combo unit or MLC Series controller. There are several different manuals that cover different model series and different modes of operation. The table below lists the different manuals / resources available and describes the information they cover.

List of Documents

Title	Document #	Description	Notes
MAPware HMC Programming Manual	AW-10101040	Documents general use of MAPware programming software to configure HMC series devices. Does not cover use of logic editors (See IEC and Ladder Logic Guide below).	This Manual. Installed with MAPware.
MLC Series Programming Manual	AW-10101054	Documents general use of MAPware programming an MLC series programmable logic controller. Does not cover use of logic editors (See IEC and Ladder Logic Guide below).	Installed with MAPware.
MAPware 7000 Help File	N/A	Documents general use of MAPware programming software. Also contains documentation of IEC 61131-3 and Native Ladder instructions.	Accessed via help menu in MAPware.
IEC 61131-3 Programming Guide For MAPware 7000	AW-10101045	Documents how to configure a MAPware project using the IEC 61131-3 logic editors.	Installed with MAPware.
Ladder Logic Guide For MAPware	AW-10101041	Documents how to configure a MAPware project using the Native Ladder Logic editor.	Installed with MAPware.
HMC7000 I/O Module Guide	AW-10101043	Documents available expansion modules for the HMC7000 series of HMI + PLC combo units.	Installed with MAPware.
HMC3000 I/O Module Guide	AW-10101056	Documents available expansion modules for the HMC3000, HMC2000 and HMC4000 series of HMI + PLC combo units	Installed with MAPware.
MLC I/O Module Guide	AW-10101055	Documents built in I/O and available expansion I/O for the MLC series of PLCs	Installed with MAPware
Quick Start Guides	Multiple	Describes hardware installation, wiring and configuration for a particular HMI + PLC, MLC or expansion module.	Shipped with each product. Available on the Maple Systems website.
Controller Information Sheets	Multiple	Important information specific to each supported protocol when connecting to an external third party PLC.	Available on the Maple Systems website.

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 cable diagrams.

Conventions




When using MAPware, 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 introduced. 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 <i>filename</i> , 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 CAPS	Directory names, files 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.

Reading This Manual

This manual is designed as a training manual as well as a reference guide. In this effort, the manual tries to minimize the amount of time required to become familiar with the HMC product lines and how to configure these products using the MAPware programming software. Therefore, we strongly recommend that you read each chapter of this manual in the order that it is presented. To minimize redundancy, concepts explained in a chapter are not repeated in later chapters.

Through experience and many years of customer feedback, we have found that the quickest path to finish your project is to skim through the entire manual. By doing this, you will become familiar with the layout of the manual as well as learn basic concepts and operation of the product.

Next, install the MAPware software onto your computer and try creating a simple project. **Chapter 3 – Creating a Sample Project** provides you with a step-by-step example of creating a project for an HMC3043A-M. Even if you do not intend to use that particular model, we recommend you spend the time to go through this chapter, as it will be time well spent.

Do not forget to take full advantage of the Help files in MAPware. These are a good source of information when you quickly want to research some particular feature.

Finally, our technical support staff is available by phone or by email to assist you if you run into any problems not covered by this manual. Visit our website at www.maplesystems.com for contact information.

What You Need

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

Configuration Software	MAPware
I/O Expansion Modules	All modules for the HMC7000 begin with a Maple P/N of HMC7. All HMC3000 expansion modules begin with a Maple P/N of HMC3. Visit our website for a complete listing of all available modules.
Configuration Cable ¹	7431-0104 (Ethernet Crossover cable for Ethernet-equipped models) 7431-0116 (USB download cable with Type B USB connector for the HMC7000 Series) 7431-0119 (USB download cable with micro USB connector for the HMC3000 Series)
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)
3 rd Party PLC (optional)	User Provided
Controller Information Sheets	Maple Systems provides Controller Information Sheets specific to communicating to third party PLCs. Please locate the sheet that corresponds to your PLC on our website.
Communication Cable	Refer to our website (www.maplesystems.com) for a list of available cables.

¹Allows you to connect the HMC directly to a PC's Ethernet port or USB port to download/upload or go online with the project in the HMC.

² Computer requirements include a Pentium 800 MHz or higher processor, 256 MB RAM, 800 MB available Hard Disk Space, 1024x768 resolution color monitor, Keyboard and Mouse, USB 2.0 port for downloading project, one RS232 port for online monitoring, Vista, Windows 7 or Windows 8 operating system.

HMC Basics

The Maple Systems HMI + PLC Series are economical graphics-based touchscreen controllers. We use the term "HMC" (human machine controller) to signify this operator interface can perform the functions of an HMI (human machine interface) as well as a PLC (programmable logic controller). The HMC units are an ideal option for control systems that require a visual display interface for the plant floor operator and the functionality of a programmable logic controller for direct connection to digital/analog inputs and outputs (using optional I/O expansion modules).

Human Machine Controllers (HMCs) provide much more versatility than traditional mechanical control panels. An HMC 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.

For applications that require a larger I/O count than possible with the expansion modules attached directly to the HMC, the HMC can be paired with a Maple Systems PLC (MLC) or another third party controller. Both HMC lines and the MLC line are programmed using MAPware. Having one software package for the whole project simplifies the programming task, and improves system maintainability.

The HMC Series is designed for industrial environments and carries a NEMA4/IP66 rating as well as CE compliance for noise immunity and emissions. It is also UL listed and certified for Class I Division 2 installations.

Projects

The HMC has two basic segments of internal memory.

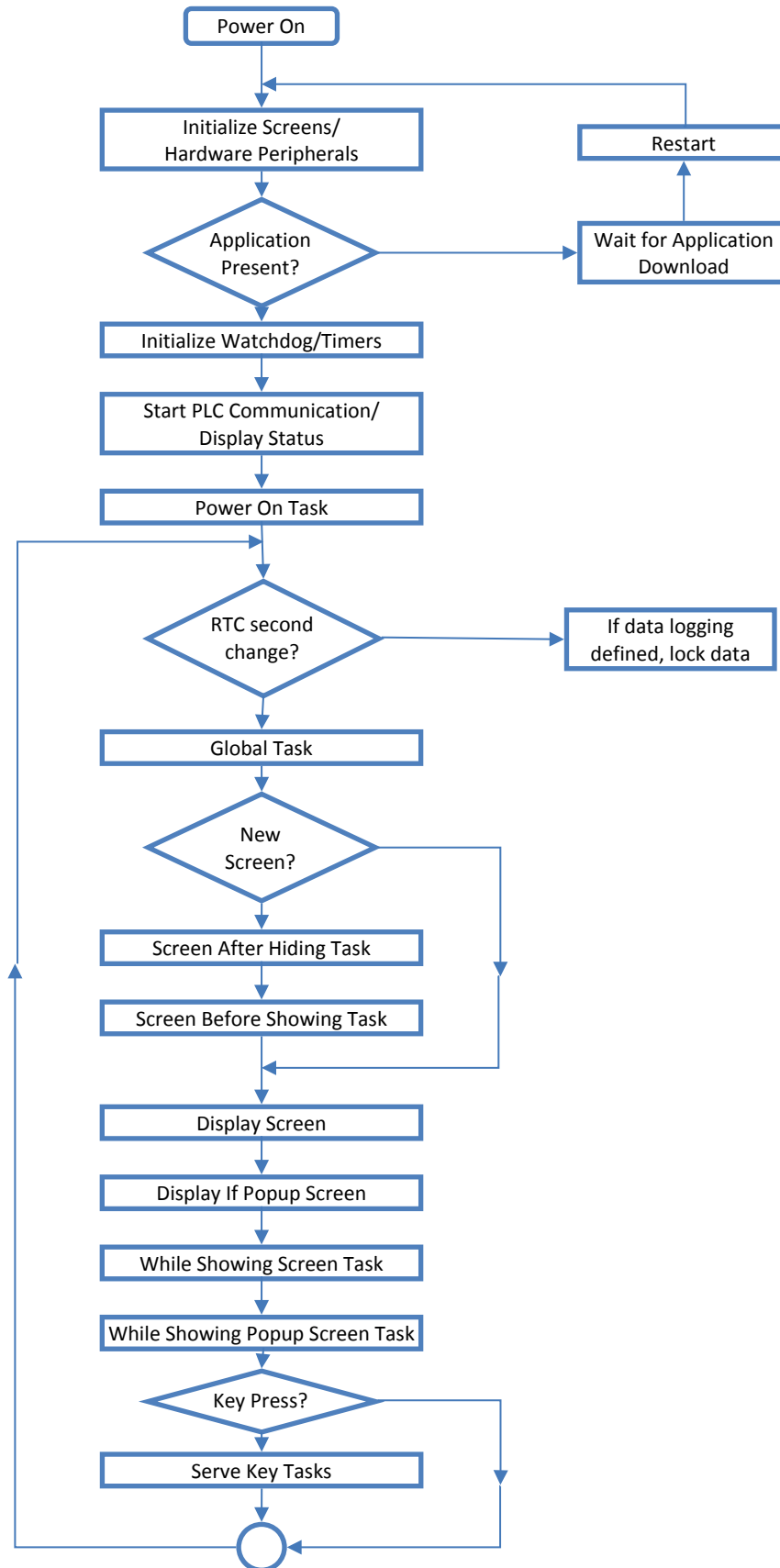
- The firmware contains the information required for the HMC to control how it operates at a low level and how it communicates with peripheral hardware devices. The HMC programmer does not have the ability to change this code memory.
- Project memory pertains to all the window screens, logic, and any other features that the HMC programmer can create using the MAPware configuration software. Therefore, the term project designates the file sent to the HMC from the MAPware software.

Backing Up Projects

The MAPware configuration software does not perform automatic saves of the open project. We recommend that you frequently save your project as you are working on it to make sure that no work is needlessly lost in the event of a power failure or computer error. When you have completed a project, we strongly urge that you archive it to another folder, an external network drive, or storage media for safekeeping. To archive your project, you must backup both the .mpl file and the associated folder with the same file name located in the same directory. Although Maple Systems does provide repair support on all of our products, we cannot guarantee that we will be able to restore a project on a damaged unit.

Operation Flowchart

The HMC series HMI + PLC units follow a specific sequence of power on and user defined tasks. The sequence is as shown on the next page.



Chapter 2 – Software Tour

The MAPware software is easy to use and requires a minimal amount of time to become familiar with operation. With the MAPware software, you can quickly create projects using the various features and tools that come with the software.

System Requirements

The following basic computer hardware is required to install and use the MAPware software

- 800 MHz Pentium-based processor or equivalent
- 256 MB of RAM (more memory improves performance)
- 800 MB (including 200 MB for the .NET Framework Redistributable) available hard disk space
- Monitor set for 16-bit color 1024x768 pixel mode
- Microsoft mouse or compatible pointing device and keyboard
- USB 2.0 port (to upload/download projects)
- Serial port (to upload/download projects – optional)
- Microsoft , Vista, 7, 8 or 10

Installing MAPware

Use the following procedure to install the MAPware software from the CD-ROM:

2. Turn on power to your development computer.
3. Make sure no other application programs are currently running.
4. Insert the MAPware software CD into the computer's CD-ROM drive.
☞ Note: if 'Auto Play' mode is not set for your CD-ROM drive, click setup.exe on the root directory of the CD drive using Windows Explorer.
5. The Welcome to MAPware software screen appears.



6. Click Next to continue.

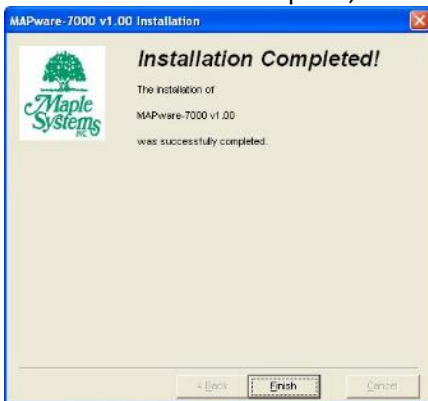
7. Select the preferred directory location on your computer to install the MAPware software (default is C:\Maple Systems\MAPware\):



8. Then click Next.
9. Confirm Installation.



10. Click Next to begin.
11. Once installation is complete, click Close.

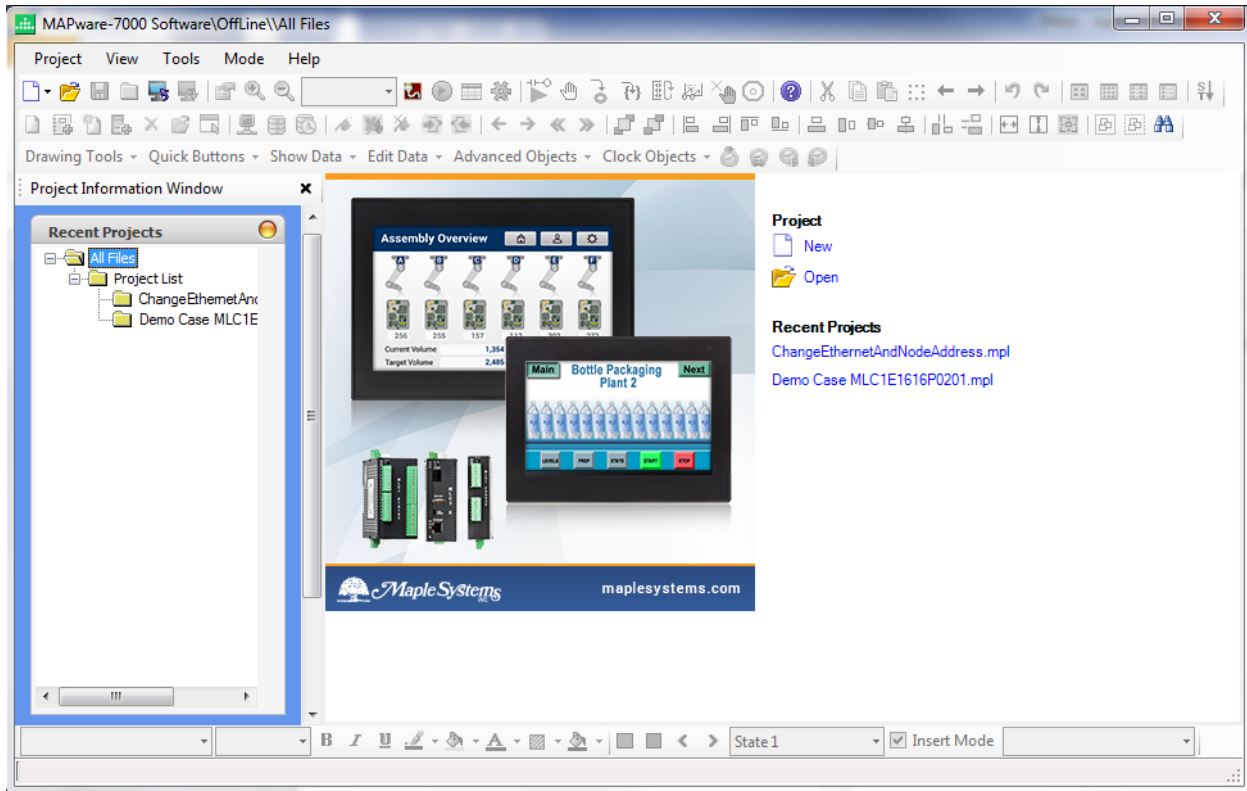



Starting MAPware

Once installed, MAPware can be started by clicking the icon in the windows start menu, or by clicking the MAPware desktop icon. When MAPware starts, the startup screen is displayed as shown below. This window provides a list of recent projects, the option to upload a project from a device, and the option to open an existing project or create a new project.

Opening Screen

The initial screen displayed when you start MAPware displays the overall workspace environment that you will be creating your projects in:

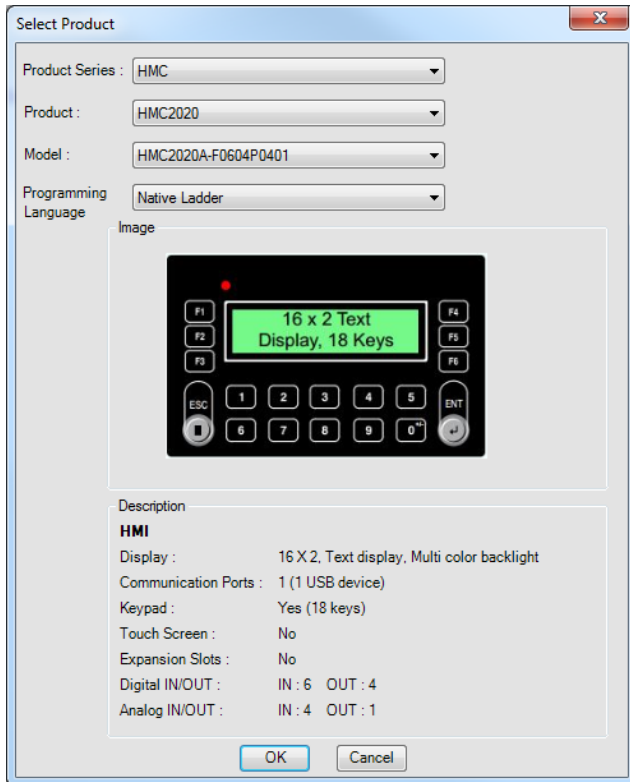



 The software requires that you set your monitor resolution to 1024x768 pixels or higher.

If you have prior experience programming HMIs, you will notice that the MAPware software is intentionally designed with the same look and feel as most HMI configuration software in the marketplace today. This is done to make your transition to using the HMC / MLC products as trouble-free as possible. If you are new to using the MAPware configuration software, this chapter will give you a brief rundown of how to take maximum advantage of the ease-of-use this software provides.

New Project Configuration


To create a new project click the **New** option under project, or select: **Project > New** from the menu bar. The **Select Product** window will appear, allowing the target platform and editor mode to be selected.



 Note: Not all selectable models are available at this time.

Product Series

The first option in the **Select Product** popup window is **Product Series**. This allows a project to be created for either an HMC (An HMI + PLC combo unit) or an MLC (A Programmable Logic Controller with no display).

 This manual documents configuring the HMC series of products. For information on configuring MLC series products, refer to the MLC Programming Manual.

Product and Model Selection

The next two dropdown menus in the **Select Product** window allow you to pick a specific target model. For units with fixed I/O, make sure that the correct model is selected.


Programming Language

The Programming Language drop down list provides two options:

- Native Ladder – A ladder diagram logic editor
- IEC 61131-3 – A suite of five logic editors defined by the IEC 61131-3 standard

Once a project is created in one of these programming modes, it cannot be changed to use the alternative programming language.

If you're not familiar with these two options you may want to create test projects for each of them to see how each works and which mode is better suited to the application and programmer skill set.

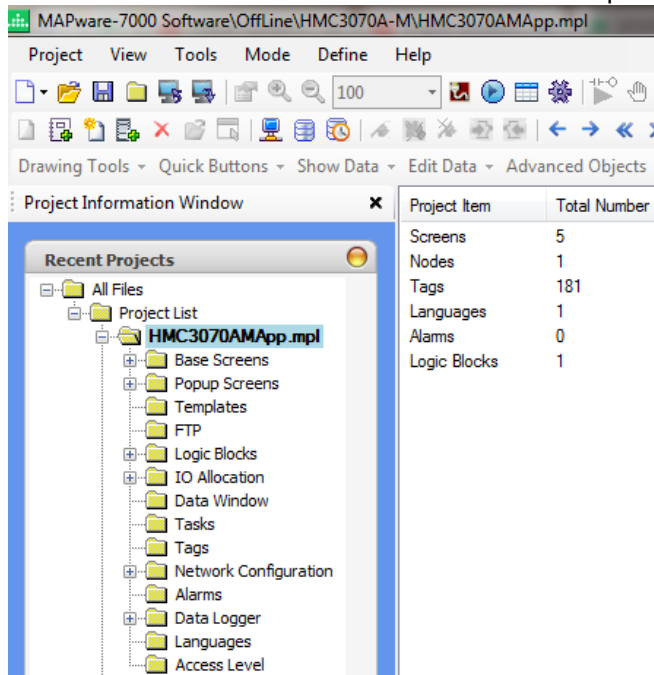
 Native Ladder is documented in the MAPware Ladder Logic Guide

 IEC 61131-3 is documented in the MAPware IEC 61131-3 Programming Guide.

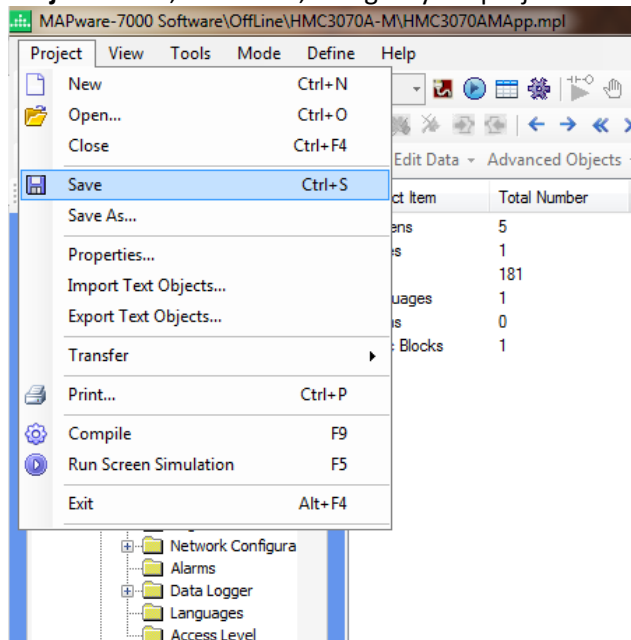
The screen shots that follow are from a project using Native Ladder as the programming language.

Saving the Project

Once you have selected your model and programming language and clicked **OK**, MAPware will give your project a default name based on the model number and open the project summary screen.

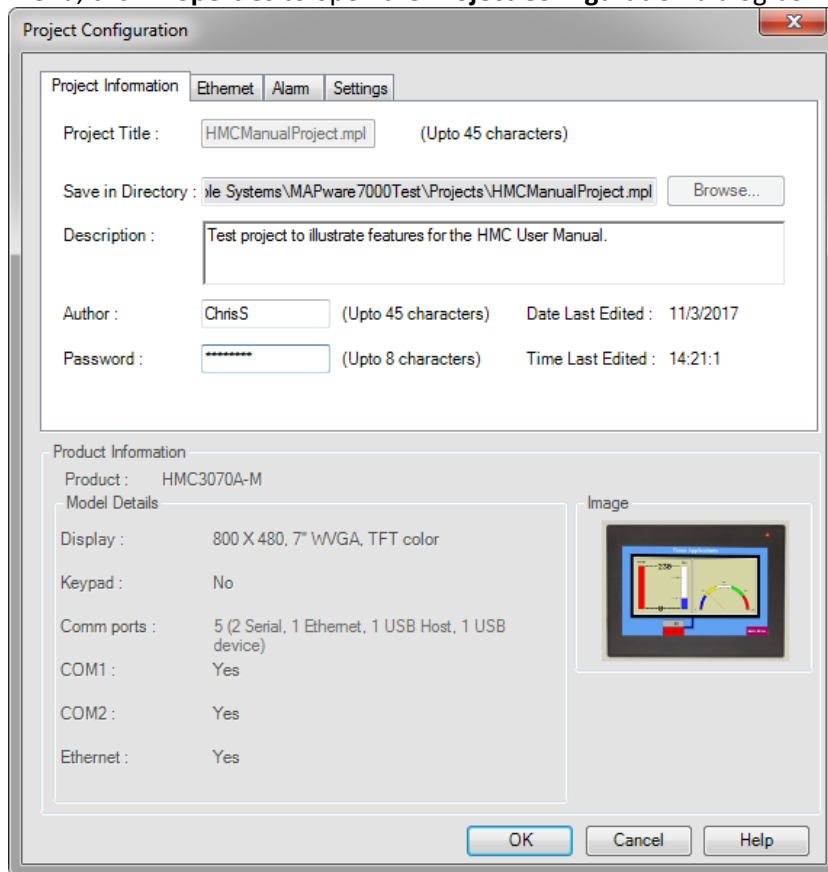


It is strongly advised that you save your project at this point with a unique name and then save frequently throughout development, as MAPware does not auto save any of your work. To save your project, from the **Project** menu, click **Save**, and give your project a name.




Project Configuration Window

Once the project is saved, we can edit the project's configuration and give it a password. From the **Project** menu, click **Properties** to open the **Project Configuration** dialog box.



Here you can add a description of the project and note the author. All fields are optional, and if a password is added to the project, it cannot be recovered if lost.


 Note: If the project has not already been saved with a unique name, changes made in the Project Configuration window will be lost when the project is saved.

Project Information Tab

- **Project Title:** The saved name of your project, up to 45 characters in length, ends in .mpl. Not editable from this window. New projects are given a default name of HMC[Model Number]App#.mpl.
- **Save in Directory:** The Windows directory your project has been saved to. Field will be blank before the project has been saved. Not editable from this window. From the **Project** menu, click **Save** to select where the project will be saved.
- **Description:** Optional area to give a description of the Project.
- **Author:** Optional area to note the project's Author/Programmer. Up to 45 characters available.
- **Password:** Optional way to protect the project with a password. Up to 8 characters in length. The password is not recoverable. If a password is entered, the programmer will be required to enter a password whenever project is opened or uploaded from the HMC.

 Note: See [Chapter 8 – Security](#) for more information on password protecting your project.

Ethernet Tab

 See the **Ethernet Settings** section later in this chapter for more information on this tab.

Alarm Tab

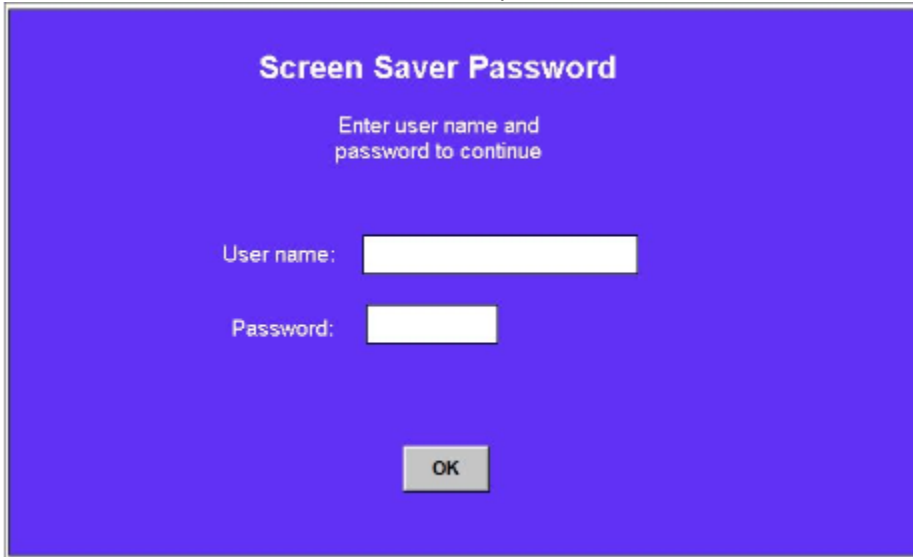
See **Chapter 9 – Alarms** for more information on the alarm settings available on this tab.

Settings Tab

The screenshot shows the 'Project Configuration' dialog box with the 'Settings' tab selected. The dialog is divided into two main sections: 'Settings' and 'Product Information'.
Settings Section:
- **Backlight saver:** Includes an 'Enable' checkbox, a 'Time (sec)' field set to 600 (range 1-5400), 'Username' (Max 14) and 'Password' (Max 4) fields, and a 'Re-enter Password' field.
- **Font Settings:** A 'Font' dropdown menu currently set to 'Arial'.
- **Others:** Includes 'Erase Data Logger Memory' (checked), 'Download Tag names' (checked), and 'Accelerate Scan Time' (unchecked).
- **Access Level Settings:** A 'Home Screen' dropdown menu set to '1 : Screen1'.
- **Logoff after:** A checkbox and a field set to 600 sec. (range 1-5400).
Product Information Section:
- **Product:** HMC3070A-M
- **Model Details:**
 - Display: 800 X 480, 7" WVGA, TFT color
 - Keypad: No
 - Comm ports: 5 (2 Serial, 1 Ethernet, 1 USB Host, 1 USB device)
 - COM1: Yes
 - COM2: Yes
 - Ethernet: Yes
- **Image:** A small thumbnail image of the HMC3070A-M device screen showing a graphical interface with gauges and data points.
At the bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

- **Backlight saver Enable:** Checkbox to enable the backlight saver. If enabled, a blank screen is displayed on the HMC after the specified time-out. The operator can reactivate the screen by touching it.
Time (sec): Enter the amount of time in seconds (of touchscreen inactivity) that must elapse before the backlight saver is engaged.
Username: Optional. If used, a screen is displayed that requires the operator to enter a username and password to reactivate the screen. Maximum of 14 alphanumeric characters allowed.
Password: Optional. If used, maximum of 4 alphanumeric characters allowed.

Re-enter Password: Re-enter the desired password to set it.



Screen Saver Password

Enter user name and password to continue

User name:

Password:

OK

- **Font Settings:** This is the default font used when creating new objects. Options are Arial, Times New Roman, and Tahoma.

- **Others**

Erase Data Logger Memory: If checked, this will erase the memory reserved for the Data Logger whenever the memory becomes full.

📖 See **Chapter 10 – Data Logger and Trending** for more information on setting up the Data Logger.

Download Tag names: If checked, all tag names assigned to the internal HMC and external PLC memory addresses are downloaded into the HMC/MLC Series unit. This allows the tag names to be regenerated when the project is uploaded from the HMC/MLC series hardware. If not checked, all tag names are uploaded from the hardware as Tag1, Tag2, etc.

Accelerate Scan Time: If checked, higher priority is given to processing the ladder logic.

📝 Note: You may notice a slight delay in screen update times, if enabled.

- **Access Level Settings**

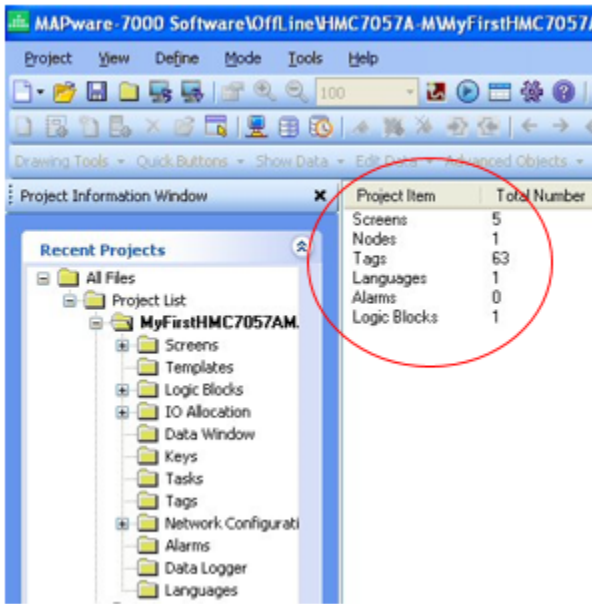
📖 See **Chapter 8 – Security** for more information on Access Level security.

Home Screen: If a protected screen is displayed when a user is logged out, the display will automatically switch to the **Home Screen** selected here. Any screen with an Access Level of 0 can be used as a home screen.

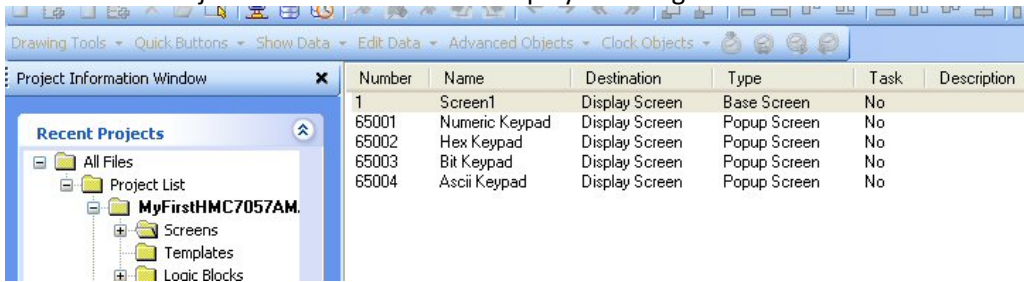
Logoff after: If enabled, this feature automatically logs out the current user after the specified time period.

Main Editor Window

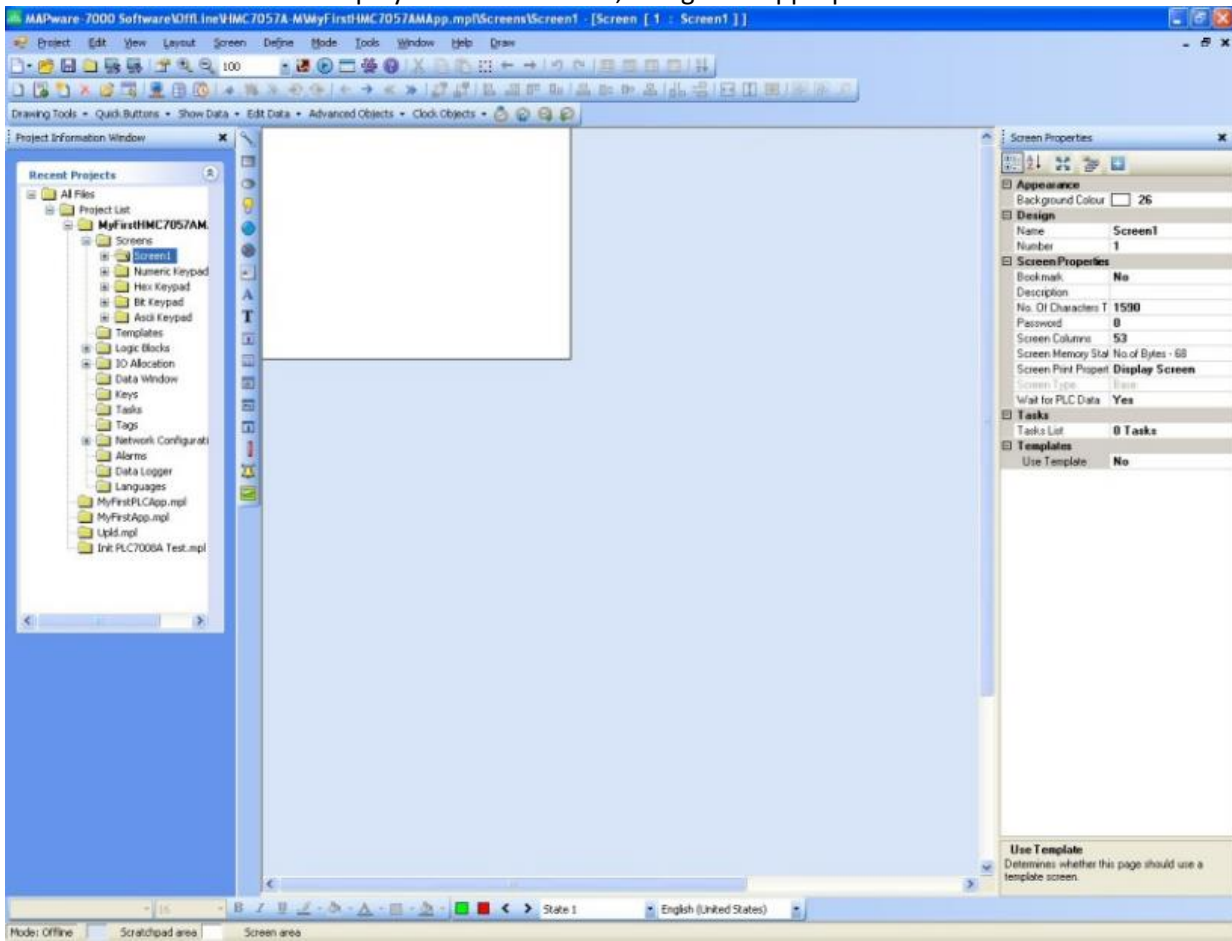
After the project is created, the following project summary screen is shown:



Double-click Project Item – Screens. This displays a listing of all current screens:

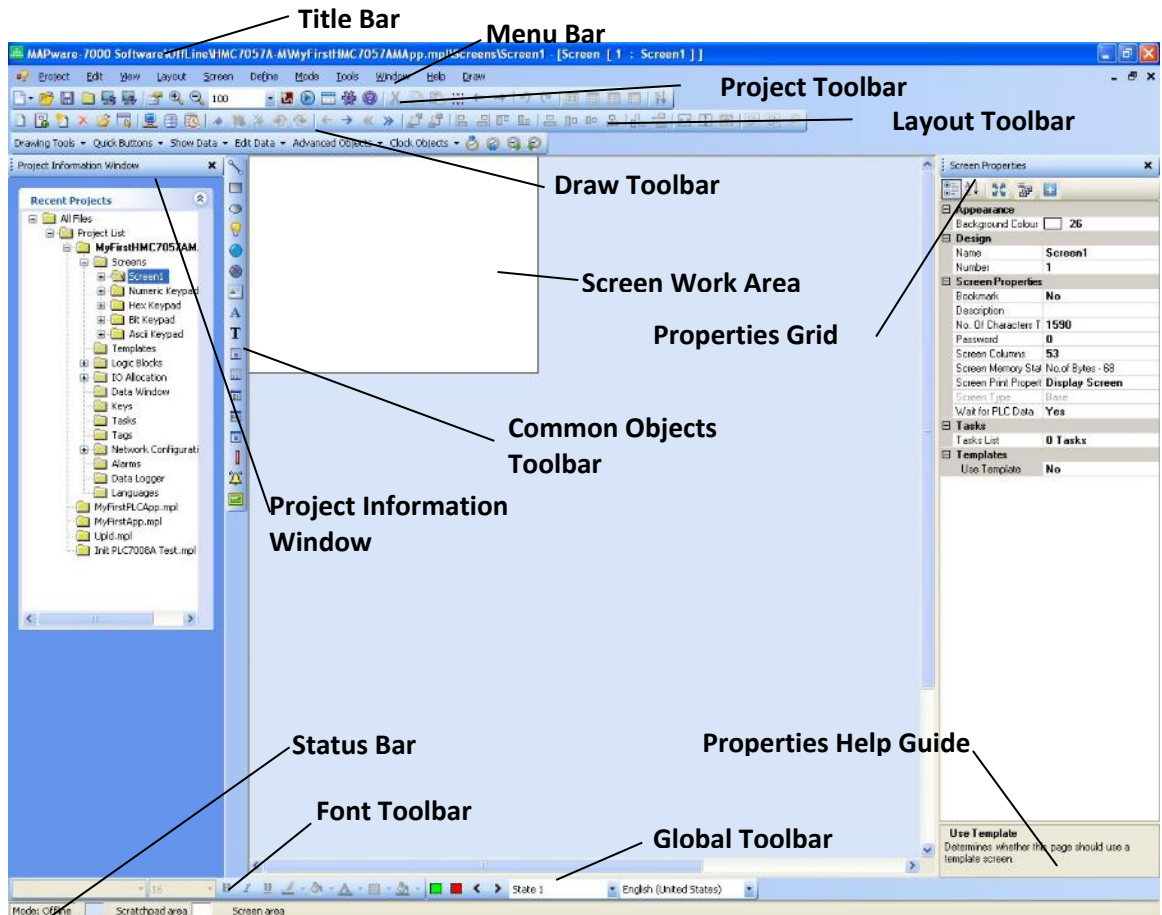


Double-click Screen1. This displays a blank screen 1, along with appropriate toolbars:



This is the primary window used to configure and edit HMC screens in MAPware project. Let us describe each section of the software in detail (on the next page).

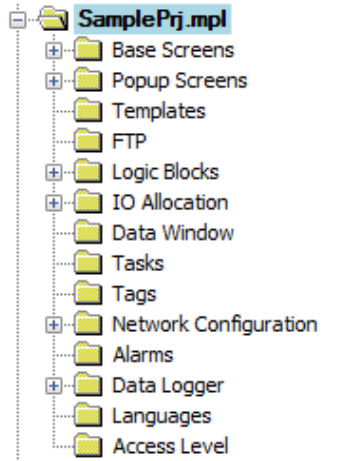
This is the primary window used to configure and edit HMC screens in MAPware project. Let us describe each section of the software in detail:



Section	Description
Title Bar	Indicates the current open project and directory location
Project Information Window	Folder-style depiction of the current project. This also shows a listing of past projects created.
Menu Bar	These are the standard menu options for the MAPware software
Toolbars	Shortcuts of features and commands that you may use with regularity
Project Toolbar	Commands used on a project level (i.e. Save, Open, Cut, etc.)
Layout Toolbar	Commands used on screens and objects (i.e. New screen, Align, etc.)
Draw Toolbar	Access to all objects placed onto a screen
Common Objects Toolbar	Access to most commonly used objects
Font Toolbar	Controls for text objects
Global Toolbar	Controls to view the various states of a highlighted object
Status Bar	Provides information about current project (i.e. offline, X Y coordinates)
Screen Work Area	Shows all objects and attributes of current open screen
Properties Grid	This is the area where attributes of the highlighted object are adjusted
Properties Help Guide	Quick help on each attribute highlighted for an object

Project Information Window

Before a project is opened or created, this window displays a list of recent projects. Double Click one of the projects to open it for editing. Once a project is open, the **Project Information Window** will display a list of features that can be configured using MAPware.



Double click any of these folders to bring an editor page for that feature into the Main Workspace.

This manual will cover configuring each of the features listed here, with the exception of the Logic Blocks folder. Configuring logic blocks is covered in separate manuals:

- 📖 The MAPware Ladder Logic Guide explains configuring Logic Blocks using the Native Ladder editor
- 📖 The MAPware IEC 61131-3 Programming Guide explains configuring Logic Blocks using the IEC 61131-3 suite of logic editors.

Menu Bar Options

As with most applications many tools and configuration tasks are accessed from a bar of dropdown menus. The sections that follow list the options available in the menu bars and provide a brief description of each option.

Project menu

Settings/controls used on the entire project

- New – creates a new project
- Open – opens an existing project
- Close – closes the project that is currently open
- Save – saves the currently opened project
- Save As – to save the currently opened project under a new file name
- Properties – this displays the **Project Configuration** dialog box
- Import Text Objects – import a CSV file that contains text for all labels and text objects in the project
- Export Text Objects – exports a CSV formatted file containing the text used in all labels and text objects of the project
- Transfer
 - Download – Sends the currently opened project to a HMC
 - Upload – Receives a project from a HMC
- Print – prints a hardcopy of the opened project
- Compile – compiles the opened project and checks for errors

- Run – runs the opened project in a simulation mode
- Exit – exits the MAPware application

Edit menu

Used to make modifications to objects on screens

- Undo – clears the last action performed
- Redo – if the Undo action is taken, pressing Redo will recapture and implement the last action performed
- Cut – deletes the selected object
- Copy – copies the selected object
- Paste – pastes the object selected using the copy function onto the screen
- Select All – selects all objects on a screen
- Group Objects – combines all objects that are currently highlighted into one object that can be moved, deleted, or copied as one object whenever selected
- Ungroup Objects – breaks a combined group of objects back into separate objects
- Bookmarks – bookmarks are a way of identifying ‘important’ screens, to make it easier to locate them when working on a project. Bookmarks are used only by the MAPware software and are not downloaded into the HMC.

Add Bookmark – this function attaches a bookmark () to a screen in the **Project Information Window**.

Clear Bookmark – clears a bookmark assigned to a screen.

Previous Bookmark – use this function to open and display a bookmarked screen prior to the currently displayed screen, (ex. if screen #3 is displayed and screen #2 is bookmarked, this function will display screen #2 when selected)

Next Bookmark – similar to above except displays next bookmarked screen that is in numerical sequence

Clear All Bookmarks – use this to clear all existing bookmarks in a project

View menu


Provides options for viewing screens and other sections of the opened project

- Data Monitor window – opens the data monitor window (used to monitor the current values in tags during simulation)
- Device Information – provides information about the HMC that is currently connected to your computer
- Icons – displays all screens (including base, popup, keypad, and template screens) as a series of small icons in the work area of the MAPware software. To implement this, you must first highlight the Screens folder in the **Project Information Window**.
- Lists – provides a brief list of all screens (according to screen number). As with icons, you must highlight the Screens folder in the **Project Information Window** to implement this view.
- Details – provides a detailed list of all screens. Details include screen number, name, type of screen, if it has an assigned task, etc. This is the default setting when you open a project.
- Arrange By – determines how the data displayed in the Details list above is ordered (i.e. according to screen number, name, etc.)
- Zoom to – enlarge or reduce the size of screen currently displayed in the workspace
- Screen Information – opens a window at the bottom of the workspace that shows detailed information about the currently displayed screen

- Errors and Warnings – opens a window at the bottom of the workspace that shows detailed information about any errors or warnings that may occur when the project compiles. This window helps you to locate potential problems with your project.
- Refresh – repaints the workspace area
- Screen/Object Properties – displays or closes the screen/object properties box that is displayed on the right hand side of the workspace area
- Projects Information – displays or closes the **Project Information Window** located on the left hand side of the workspace area

Layout menu

These are tools used to edit simple shapes or to quickly adjust the size of objects on screen

- Pattern – displays the Pattern Dialog box for any simple shape that has the ability to set a pattern
- Line Color – displays the Color Palette dialog box so that you can select a color for the line
- Fill Color – displays the Color Palette dialog box so that you can change color of the area inside one of the simple shapes (i.e. rectangle, ellipse, etc.).
- Text Color – allows you to quickly change the color of the text in a text or multilingual text object
- Pattern Color – use this to change the color of the pattern selected
- Bring to Front – if two or more objects are overlaid, this causes the selected object to be on top
- Send to Back – If two or more objects are overlaid, this will place the selected object on the bottom of the stack
- Align to – when two or more objects are highlighted, this will align the objects according to the left, right, top, or bottom sides of the objects
- Center Along – when two or more objects are highlighted, this feature moves the objects to the same location on the screen
 - Screen’s Horizontal – aligns along the horizontal center of the screen
 - Screen’s Vertical – aligns along the vertical center of the screen
 - Object’s Horizontal – aligns with respect to the horizontal center of the two objects
 - Object’s Vertical – aligns with respect to the vertical center of the two objects
- Place Equidistant – takes three or more highlighted objects and places them equidistant from each other along...
 - Along Horizontal – the horizontal plane
 - Along Vertical – the vertical plane
- Make Equal – takes two or more highlighted objects and makes them all the same size.
 -  Note: the height/width of the last selected object is used for the adjustment.
 - Height – affects only the height of each highlighted object
 - Width – affects only the width of each highlighted object
 - Size – both width and height are adjusted

Screen menu

Options on creating/deleting screens in the project.








 Note: this menu only appears if a current screen, keypad, or template is shown.

- New Base Screen – creates a new base (full-sized) screen
- New Popup Screen – creates a new popup (partially sized) screen
- New Template Screen – create a new template screen

- Open Screen – displays the Open Screen dialog box from which you can select which screen you would like displayed
- Open Template Screen – displays the Open Template Screen dialog box from which you can select which template screen you would like displayed
- Import Screen – Import a screen from an existing project with the same screen size
- Apply Template Screens – displays the Template Screen Setting dialog box which is used to assign any of the template screens to each base screen
- Close – closes the displayed screen
- Delete – deletes the displayed screen
- Duplicate – duplicates the currently displayed base screen or template
- First – displays the first screen (Screen 1) or first template (Template 1)
- Next – displays the next screen in sequence
- Previous – displays the prior screen in sequence
- Last – displays the last (highest numbered) screen

Define menu

Use this menu to configure many of the background tasks of the HMC

- Data Logger – displays the Data Logger screen. The Data Logger captures values from predefined tags. Capturing is based upon a time interval or a triggered event. Capture values are represented on the HMC screen using the Historical Trend Object or values are uploaded to a computer.
 Note: same as clicking the Data Logger folder in the **Project Information Window**.
- Global Keys – displays the Global Keys configuration screen. Global Keys determine how the function keys on the right side of the display function when pressed. These keys can also be configured locally per screen using the Keys folder under each Screen folder in the **Project Information Window**.
 Note: same as clicking the Keys folder in the **Project Information Window**.
- Nodes – use to assign a network node address to each serial com port on the HMC. You can also modify the settings for each serial port (i.e. baud rate, communications driver, etc.) as well.
 Note: same as clicking the Network Configuration folder in the **Project Information Window**.
- Tag Database – displays the Tag database. Use this to configure and assign tags to each internal memory address or PLC memory address you wish to access.
 Note: same as clicking the Tags folder in the **Project Information Window**.
- Alarm Database – displays the Alarm Configuration screen. Use this screen to assign and create alarm messages.
 Note: same as clicking Alarms folder in the **Project Information Window**.
- Languages – displays the Languages Configuration screen. Use this screen to select additional languages (up to 9) in text and labels for objects.
 Note: same as clicking Languages in the **Project Information Window**.
- System Parameters – displays the Systems Parameters dialog box to configure the Timer Interrupt and Keep Memory Area.
- Ethernet Settings – displays the Download Ethernet Settings dialog box for the HMC.
 Note: only available for models that have an Ethernet port.

Mode menu

Determines the operating mode of the MAPware software

- Edit – when selected, allows editing of the opened project (default mode)
- Online/Offline – when selected, the MAPware software connects to the HMC to read/write to internal memory addresses of the HMC. Data is edited and monitored using the Data Monitor window.

With upload – current project residing in HMC uploads into the MAPware before going online.

Without upload – MAPware simply connects to HMC without uploading the existing project that is in the HMC.

- PLC Control – controls how the ladder logic blocks in the HMC operate while in Online mode.
 - Run – starts execution of ladder logic in PLC7000 {future product}
 - Halt – temporarily stops execution of ladder logic
 - Run Force – very similar to Run mode except in this mode, the ladder logic continues to run even if the physical expansion I/O modules are not connected to the HMC. The registers assigned to the I/O modules are updated. This mode is useful to check operation of the program.
 - Hold – stops execution of the ladder logic but continues to update all inputs and outputs. This mode is primarily useful to troubleshoot external I/O signals connected to the expansion modules.
 - Hold Cancel – cancels the Hold mode and returns to normal (Run) operation.
 - Error Reset – the HMC has a self-diagnostics routine that continuously runs in the background during normal operation. If a problem is detected during normal operation, the HMC may go into shutdown mode. In this mode, execution of the ladder logic stops and all outputs are assigned to the Error State Output Condition. Once the cause of the error is corrected, normal operation resumes if this command is sent to the HMC.
- Debug – only available when Native Ladder is selected as the programming language. Allows breakpoints to be added to ladder logic for easier debugging of code while in Online mode.
 - 📖 For more information, see the MAPware Ladder Logic Guide.
 - Start Debug Mode – starts debug mode. The other options below become active once debug mode is started.
 - Set Breakpoint – set a breakpoint with a logic block. To set a breakpoint, you must first highlight an instruction. A red dot appears where the breakpoint is set. Up to eight breakpoints can be created. When enabled, a breakpoint is a location where ladder logic execution is temporarily suspended until a command is given to continue.
 - 🔍 Note that setting a breakpoint does not cause a halt in the execution of the ladder logic. To do that, you must use the Go to Breakpoint command.
 - Go to Breakpoint – after a breakpoint is created, this function causes the ladder logic to execute until the next breakpoint is reached. At that point, execution is temporarily suspended and the breakpoint will be highlighted in yellow. To get the ladder logic to run again after a breakpoint has tripped, you must either press the Go to Breakpoint command again, or you must press the Single Step command.
 - Single Step – executes ladder logic one instruction at a time. After an instruction is executed, the debugger will move on to the next instruction. The instruction that was last executed will be highlighted in yellow.
 - Single Scan – forces the ladder logic to perform a single scan, then stops at the current active (highlighted) step instruction.
 - 🔍 Note: the Single Scan command cannot be used when breakpoints are set.
 - Show/hide watch window – this option displays a watch window. Similar to the Data Monitor Window, a watch window is only available in Debug mode and is used to watch specified address tags.
 - Remove Breakpoint – displays a list of all breakpoints. Select the breakpoint that you wish to remove.
 - Stop Debug Mode – to exit debug mode. A dialog window will ask if you want to leave the HMC/MLC in run mode or halt mode.

Tools menu

These miscellaneous settings and tools are available with the MAPware software.

- Application Memory Status – display the Memory Status dialog box. This provides detailed information on memory required by the HMC for the currently opened project.
- Display Logged Data – displays logged data (in CSV format) that has been uploaded from the HMC. Logged data can be captured by the HMC using the Data Logger feature.
- Display Historical Alarm Data – displays data collected by the HMC on alarms
- Convert Application – allow programmer to convert a project using one HMC to a different model of the HMC
- Preferences – miscellaneous settings when using MAPware
 - Ladder Editor Colors – displays the Color Settings dialog box. These are color options when using the Logic Block feature
 - On line communication – determines which port on the HMC is used during an online connection – USB, serial, or Ethernet
 - Project Global Settings – displays the Project global settings dialog box where you can set the following
 - Show default tag name definition window when defining new tag – if enabled, a popup dialog box will appear when entering new tag names in a logic block It gives programmer ability to easily define new tags on the fly.
 - Show tag selection window when adding new instruction – if enabled, a popup dialog box will appear when entering instructions in a logic block It gives programmer ability to change the name of the tag easily.
 - Ladder instruction tag length – determines maximum number of characters shown for each tag address in the ladder logic
- Web Server Configuration – enable the web server feature and set the username and password required for login.
- Generate USB Stick Application – create a downloadable project application file to be placed on a USB stick for remote download.
- Import Tasks – import tasks from another project.
- Remove Unused Picture Files – removes any unused picture files that have been added to the project to reduce the project's file size.

Data Window menu

This menu is for the Data Monitor Window (View → Data Monitor Window) feature.

- New block – displays the Define Block dialog box. Use to define a block of data viewed in the Data Monitor.
- Delete block – displays the Delete Block dialog box. Select which block of data you wish to remove from the Data Monitor.
- Edit block – displays the Edit Block dialog box. Use to modify an existing block (i.e. change address, size, color, etc.).
- Import Data – import a Data Monitor file (in *.CSV format) that was created in a different project. Useful if you wish to monitor the same addresses
- Export Data – export a Data Monitor file (in *.CSV format) so that you do not have to recreate the Data Monitor list in another project

Window menu

MAPware provides many options for displaying open screens

- Cascade – cascades (overlapping windows) all open screens
- Tile Horizontally – displays all open screens horizontally (top to bottom of monitor)
- Tile Vertically – displays all open screens vertically (left to right of monitor)
- Close All – closes all open screens
- List of Open Screens – displays a popup dialog box of all open screens

Help menu

MAPware includes extensive help files that cover the operation of each feature.

- Contents – displays the Help files, Contents tab
- Index – displays the Help files, Index tab
- Search – display the Help files, Search tab
- About – provides information on Software revision

Draw menu

Use to place objects onto each screen. Also configures the grid function for screens.

- Graphical Objects – objects used to create simple shapes and text
 - Line – draws a line on screen
 - Ellipse – draws an ellipse or circle
 - Rectangle – draws a rectangle or square
 - Rounded Rectangle – draws a rectangle or square with beveled edges
 - Multilingual Text – use to create a static text box. This object differs from the simple text box in that this object allows use of Windows TrueType fonts.
- Buttons – objects that require input from the HMC touchscreen
 - Navigation Buttons – buttons used to change or navigate through screens
 - Go to Screen – creates a button that, when pressed, displays a base screen
 - Go to Next Screen – when pressed, goes to next screen in numerical sequence
 - Go to Previous Screen – when pressed, goes to prior screen in numerical sequence
 - Open Popup Screen – creates a button that, when pressed, displays a popup (partially sized) screen which overlays on top of the base screen already showing
 - Bit Action Buttons – buttons used to control a coil or bit
 - Set Bit – creates a button that, when pressed sets (turns On) a bit
 - Reset Bit – when pressed, clears (turns Off) a bit
 - Toggle Bit – alternates setting/clearing a bit each time button is pressed
 - Momentary Bit – button that sets a bit only while pressed and resets the bit when released
 - Word Action Buttons – buttons that write values to registers. Data can be 8-bit, 16-bit, or 32-bit formats depending upon how the registers are defined in the Tag database.
 - Write Value to Tag – writes a predefined constant value to the register
 - Add Value to Tag – adds a predefined constant value (addend) to the number already existing in the target register and places the resulting value (sum) in that register
 - Subtract Value from Tag – subtracts a predefined constant value (subtrahend) from the existing number (minuend) in the target register and places the resulting value (difference) in that register
 - Add Tag B to Tag A – when pressed, this button will

- read the current value in Tag B
- read the current value in Tag A
- add the Tag B value to the Tag A value
- write the resulting sum to Tag A

Subtract Tag B from Tag A – when pressed, this button will

- read the current value in Tag B
- read the current value in Tag A
- subtract the Tag B value from the Tag A value
- write the resulting difference to Tag A

Alarm Action Buttons – buttons used to control active alarms

Alarm Acknowledge – creates a button that, when pressed ‘acknowledges’ or indicates that an active alarm has been recognized by the plant floor operator

Acknowledge All – when pressed, this button will acknowledge all active alarms

Next Alarm – when pressed, displays the next active alarm (according to chronological order) in sequence

Previous Alarm – displays the prior active alarm (according to chronological order)

Recipe – these are buttons that control recipes

Transfer Recipe – when pressed, this button copies a block of internal memory registers in the HMC to a set of PLC registers or internal memory registers

Upload Recipe – when pressed, this button copies a predefined block of registers in the PLC to a set of internal memory registers in the HMC

Multi-task Single-state Button – this button is very similar to the Bit Action Buttons described above except that instead of controlling a single bit/coil, the Multi-task Single-state button performs one or more tasks. This button performs the same set of tasks every time the button is pressed and/or released.

Multi-task Multi-state Button – this button is similar to the Word Action buttons above, except that instead of writing to a single register, the Multi-task Multi-state button performs one or more tasks. In addition, unlike the Multi-task Single-state Button, this button can be configured for several ‘states’, meaning that every time the button is pressed, a different set of tasks can be initiated.

- Input Objects – keypads and data entry objects

Data Entry – objects that display a keypad to change the value of a bit or register

Bit Entry – this object is very similar to a Toggle Bit object but instead of writing immediately to the targeted bit whenever the button is pressed, this object displays a popup keypad. The popup keypad allows you to select a ‘1’ or ‘0’, then press the Enter key to write the new value to the bit.

Numeric Entry – this object displays the current value in a register. When pressed, a popup keypad appears that allows the operator to write a new value to the register.

Keypad – displays a ten-key keypad on the screen

ASCII Keypad – displays an alphanumeric keypad on the screen

Custom Keypad – displays a keypad on the screen but without any defined keys. Programmer defines each key as to operation.

- Display Objects – these are objects that display data stored in a bit or register as a number or as some graphic representation (i.e. lamp, bar graph, etc.).

Text – This simple text object displays static text using one of four predefined font sizes.

Date – displays the date using the internal clock

Time – display time

Data Display – these objects display the data in bits or registers as numbers or characters.

Numeric Display – displays the current value in the register

Message Display – displays predefined text strings based upon the value in the register. Each text string represents a predefined range of values.

Bit Display – displays two predefined text strings according to the state (On or Off) of the bit.

Bit Lamp – represents the state of a targeted bit using a predefined shape or picture (BMP, JPG or GIF)

Word Lamp – same as Bit Lamp except a Word Lamp represents registers.

Bar Graph – displays a single bar graph that represents the current value in a register.

Multiple Bar Graphs – displays up to four separate bar graphs

Real Time Trend – displays a trend graph that represents up to four registers. The graph polls the registers on a timed basis and displays the values as plots on a time graph.

Historical Trend – same as above except instead of real-time, the values are read from the Data Logger.

XY Plot – represents data as an XY scatter plot.


Analog Meter – represents a data register as an analog meter.

Alarm List – displays a list of alarm messages


- Grid – Turn on or off a grid displayed on the screens. Use the grid to help align objects.
- Snap to Grid – if enabled, objects will align on screen according to the location of the grid points.
- Configure Grid – displays the Configure Grid dialog box, which allows the programmer to set the size (in pixels) of the grid boxes

Block menu

This menu is for configuring the ladder logic in a Logic Block.

 Note: this menu is hidden unless you click a Block in one of the Logic Block subfolders in the **Project Information Window**.

- New – creates a new ladder logic block in one of the six types of logic block menus:
 - Power Up – this is a logic block that executes once when power is initially applied to the HMC
 - Main – logic blocks created under the Main menu are executed continuously during normal operation
 - Subroutine – these logic blocks are only executed when called from another logic block
 - Timer Interrupt – logic blocks created under the timer interrupt folder are given the highest priority of all logic blocks. They are executed continuously according to the time interval programmed.
 - I/O Interrupt 1 – this logic block is executed immediately when called (unless a timer interrupt is in process) and is called by the high speed counter function, when the count value reaches the preset value set.
 - I/O Interrupt 2 – similar to I/O Interrupt 1 except that, when called, it takes lower priority than the timer interrupt and I/O Interrupt 1
- Duplicate – copies the highlighted logic block and creates a new one identical to it.
- Open – displays the Open Block dialog box with a list of all logic blocks. Highlight a logic block to open and display it.
- Import – bring a logic block from another project into the existing project. Click this option to display the Open Project dialog box. Select the project that has the logic block you wish to import. An Import Block dialog box displays. Highlight all logic blocks for import, and then click **OK**.

 In Native Ladder programming mode the blocks are imported directly from an existing project. In IEC 61131-3 programming mode, logic blocks are exported (see below) to .xml files which can then be imported using this menu option.

- Export – (IEC 61131-3 programming mode only) Export a logic block as an .xml file for use in another project.
- Delete – removes the currently viewed logic block from the project
- Close – removes the currently viewed logic block from the workspace










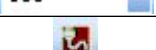










Toolbars









There are several toolbars available in MAPware to make it easier to access objects and features that you need. Below is a list of the toolbars and a brief description of each shortcut icon in the toolbar (for a more detailed description of the feature represented by the icon, check the Standard menu above or elsewhere in this manual).

Project Toolbar

Provides shortcuts to common project tasks






















Icon	Name	Description
	New Project	Create a new project
	Open Project	Opens an existing project
	Save Project	Saves the current project to the hard drive
	Close Project	Closes current project without exiting MAPware software
	Upload Project	Uploads a project from a HMC
	Download Project	Downloads a project to a HMC
	Screen/Object Properties	Opens/closes the Screen/Objects Properties box
	Zoom In Screen	Magnifies size of screens shown in the workspace
	Zoom Out Screen	Reduces size of screens shown in the workspace
	Zoom Factor	Adjust the magnification size of the zoom
	Go Online	This button causes MAPware to go online with the HMC without uploading the application.
	Run	Simulate the project on your computer monitor
	Data Window	Displays the data window; used to monitor values
	Compile	Compiles the project into a format that can be interpreted by the HMC and checks for errors
	Help	Displays the Help files
	Cut	Use to delete objects from displayed screen
	Copy	Copies the selected object(s) for pasting
	Paste	Pastes a copied object(s) onto the screen
	Select All	Highlights all objects currently on displayed screen
	Previous Object	Moves focus cursor (highlight) to prior object on screen

	Next Object	Moves focus cursor to next object on screen
	Undo	Undoes last executed action in MAPware
	Redo	If the Undo action was performed by mistake, Redo will bring back the recorded action last performed in MAPware
	Large Icons	Shows open screens in workspace as large icons
	Small Icons	Shows open screens in workspace as small icons
	List	Shows open screens in workspace as a brief list
	Details	Shows open screens in workspace as detailed list
	Hide System Tags	Toggles display of the system tags listed in the Tag Database

Layout Toolbar

Provides shortcuts for screen-related tasks



Icon	Name	Description
	New Base Screen	Creates a new base screen
	New Template Screen	Creates a new template screen
	New Popup Screen	Creates a new popup screen
	Delete Screen	Deletes the current screen shown in the workspace
	Open Screen	A popup dialog box lists all screens, click one to open
	Show Screen	Similar to Open Screen but you can only use this action if the highlight cursor is on Screens in the Project Information Window
	Nodes	Displays a list of all connections (serial, Ethernet) assigned. ☞ Note: same as clicking Network Configuration folder in the Project Information Window
	Tag Database	Displays the tag list (including predefined tags). ☞ Note: same as clicking Tags folder in the Project Information Window
	Alarm Database	Displays the alarm database. ☞ Note: same as clicking Alarms folder in the Project Information Window
	Add Bookmark	Places a bookmark on the screen in the workspace
	Clear Bookmark	Removes a bookmark assigned to the screen in the workspace
	Clear All Bookmarks	Removes all bookmarks from screens
	Next Bookmark	Displays the next bookmarked screen (in numerical order)
	Previous Bookmark	Displays the prior bookmarked screen (in numerical order)
	Previous	Displays the prior screen on the screen list (in numerical order)
	Next	Displays the next screen on the screen list (in numerical order)
	First	Displays Screen 1
	Last	Displays the last configured screen (typically Screen 65004 ASCII Keypad)
	Bring to Front	If two or more objects are overlaid on screen, the selected object is brought to the forefront

	Send to Back	If two or more objects are overlaid on screen, the selected object is sent to the background
	Align Left	If two or more objects are highlighted, this action aligns the objects along the left side of the leftmost highlighted object on screen
	Align Right	If two or more objects are highlighted, this action aligns the objects along the right side of the rightmost highlighted object on screen
	Align Top	If two or more objects are highlighted, this action aligns the objects along the top side of the topmost highlighted object on screen
	Align Bottom	If two or more objects are highlighted, this action aligns the objects along the bottom side of the lowest highlighted object on screen
	Center Along Screen's Horizontal	If one or more objects are highlighted, this action aligns the object(s) along the horizontal center of the screen.
	Center Along Screen's Vertical	If one or more objects are highlighted, this action aligns the object(s) along the vertical center of the screen.
	Center Along Object's Horizontal	If two or more objects are highlighted, this action aligns the objects along the calculated midpoint of the total vertical distance between the objects.
	Center Along Object's Vertical	If two or more objects are highlighted, this action aligns the objects along the calculated midpoint of the total horizontal distance between the objects.
	Place Equidistant Along Horizontal	If three or more objects are highlighted, this action places the objects equidistant from each other along the horizontal axis.
	Place Equidistant Along Vertical	If three or more objects are highlighted, this action places the objects equidistant from each other along the vertical axis.
	Make Equal Width	If two or more objects are highlighted, this action resizes the width of each object to the same width of the last selected object.
	Make Equal Height	If two or more objects are highlighted, this action resizes the height of each object to the same height of the last selected object.
	Make Equal Size	If two or more objects are highlighted, this action resizes each object to the same size of the last selected object.
	Group Objects	If two or more objects are highlighted, this action combines the objects into a 'group'. Once this is done, you can then move or resize the grouped object rather than perform these actions separately on each member of the group.
	Ungroup Objects	If a grouped object is highlighted, this action separates each object into the group so that you can now resize or move each object separately.
	Search Instruction	Used only in the Logic Blocks, this allows you to quickly locate a specific instruction of tag address that is configured in one of the logic blocks.

Draw Toolbar

Provides shortcuts to all objects that can be placed on screens



Refer to **Chapter 7 – Data & Display Objects** for a list of objects available from this toolbar, and for detailed instructions on using each object.

Common Objects Toolbar

This vertical toolbar is directly to the left of the screen workspace. It contains commonly used objects that are placed onto screens.



Refer to **Chapter 7 – Data & Display Objects**, for a list of objects on this toolbar and detailed instructions on using each of the objects.

Font Toolbar

This toolbar is located along the bottom of the MAPware software to adjust or modify text object boxes and simple drawn objects such as lines, rectangles and circles.




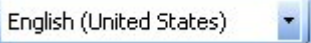
Icon	Name	Description
	Font Name	Change the font used in a text object. On other objects, this box changes to a font size box for simple fonts.
	Font Size	Change the size of the font used
	Bold	Use to bold characters
	Italics	Use to italicize characters
	Underline	Use to place an underline on characters
	Line Color	Change the color of the perimeter line of a simple object (i.e. line, rectangle, ellipse) or the border of the Multilingual Text object
	Fill Color	Change the color of the interior of a simple object (i.e. line, rectangle, ellipse) or the interior of data objects (i.e. Multilingual Text, Simple Text, Bit Entry, Message Display, Numeric Display, etc.)
	Font Color	Change the color of the text characters of data objects (i.e. Multilingual Text, Simple Text, Bit Entry, Message Display, Numeric Display, etc.)
	Pattern	Use to create a pattern of two colors for the fill area of a rectangle
	Pattern Color	Use to select the secondary color for the pattern (primary color based on Fill Color)

Global Toolbar

This toolbar is located along the bottom of the MAPware software and is used to view the different states of a highlight object.



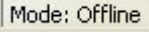
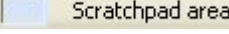
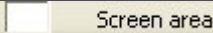
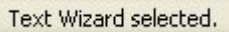
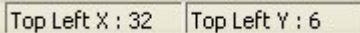
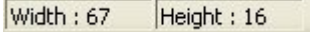
Icon	Name	Description
	On State	Displays the 'on' state of all two state buttons shown on screen.
	Off State	Displays the 'off' state of all two state buttons shown on screen.
	Previous State	Displays the 'previous' state on multi-state objects shown on screen.
	Next State	Displays the 'next' state on multi-state objects shown on screen.

	State	Use the pull-down list box to jump directly to a particular state on a multi-state object.
	Language	When using the Multi-Language feature, this allows you to see all of the text in each language state.

Status Toolbar

This toolbar is located along the bottom of MAPware and provides general information about the project currently loaded.



Icon	Name	Description
	Mode	Shows what operational mode the project is currently in: Offline, Online, Run, Halt, etc.
	Scratchpad area	This simply indicates that the area of the workspace that is not the screen is light blue
	Screen Area	This indicates the background color of the screen that is currently being modified
	Object selected	Indicates which object on screen currently has the focus.
	Object Position	Indicates the top left corner coordinates of the object selected.
	Object Size	Indicates the size of the object selected in pixels.

Properties Grid

The Properties Grid is a dialog box that shows the attributes for the screen/object currently highlighted. To make any changes to an attribute, simply click the attribute and edit the setting. More information about objects and the attributes available for each object are found in [Chapter 7 – Data & Display Objects](#). On the bottom of the Properties Grid is a local help guide. This is a brief description of the attribute highlighted.

Downloading/Uploading Projects

[Chapter 3 – Creating a Sample Project](#) gives you a step-by-step introduction into creating and downloading a new project. This section guides you through the specific steps and options of uploading/downloading a project into your HMC.

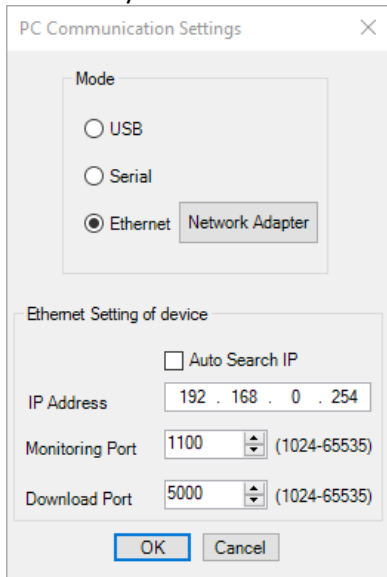
There are two methods to transfer projects:

- Using MAPware provides the option of uploading/downloading a project – the method that we discuss in this section.
- If a computer with MAPware is not readily available, you can also transfer a file using the USB Host port with a Flash drive connected to the HMC.
 - 📖 For more information on how to do this, see *The HMC Series Installation Guide*.

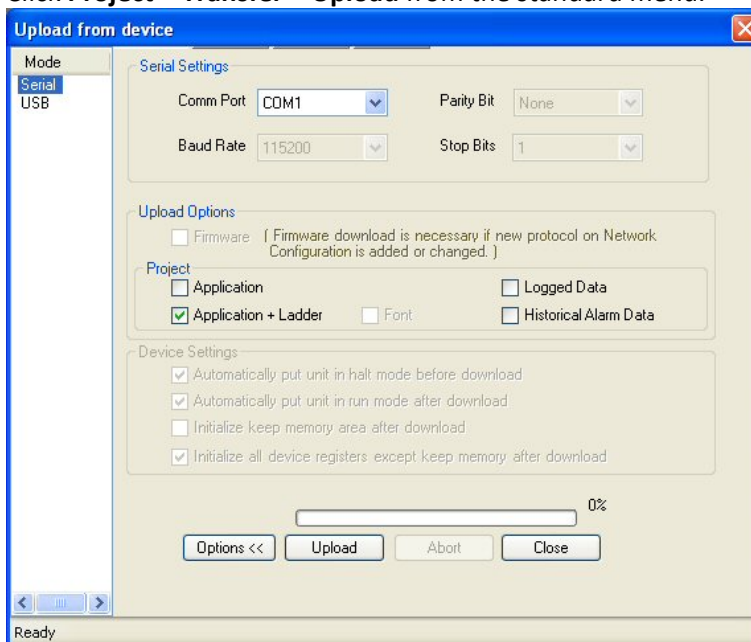
Uploading a project

- 4 To upload a project:

1. Start the MAPware configuration software. It is not necessary to open a project.
2. Connect to the HMC using either a USB or RS232 serial download cable. Or, an Ethernet cable, if using a model with an Ethernet port.
3. Apply power to the unit.
4. In MAPware, go to **Tools > PC Communication Mode**. Select the method of communication between the HMC and your PC.



5. Click **Project > Transfer > Upload** from the standard menu.




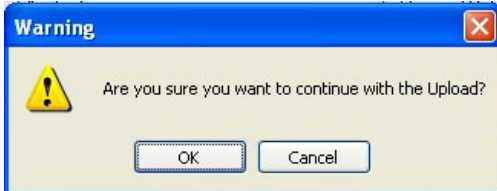
6. Under Upload Options (click the Options button **Options >>** if you do not see this section), select what data you wish to upload:

Application – uploads application only (this is the project that you would create using MAPware)
 Application + Ladder – uploads the application and the ladder logic. The ladder logic is any ladder instructions created using the Logic Blocks.

Logged Data – uploads any data collected using the Data Logger feature (see **Chapter 10 – Data Logger and Trending** “Upload to the MAPware software” section for more details). This option is not available using Ethernet.

Historical Alarm Data – uploads any alarm messages collected when using the Historical Alarm feature (see the **Chapter 9 – Alarms** section **Uploading Historical A** for more details). This option is not available using Ethernet.

7. Click the Upload  button:

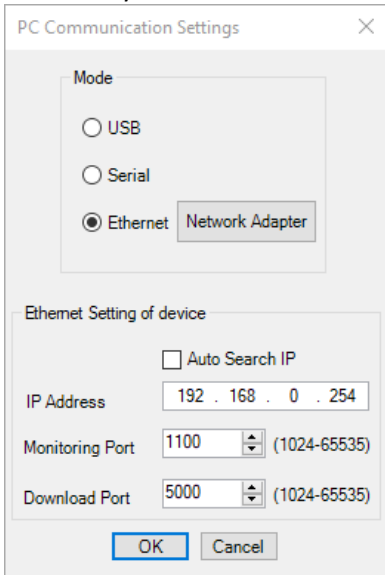


Click **OK**.

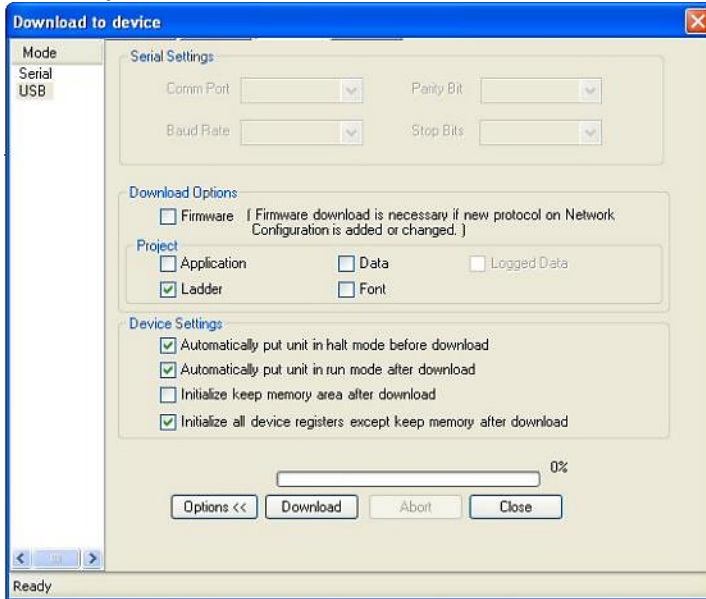
8. When the upload is finished, click Close.

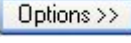
Downloading a project

5. To download a project:
1. Start the MAPware configuration software and open the project you wish to download to the unit.
 2. Connect to the HMC using either a USB or Ethernet cable, if using a model with an Ethernet port.
 3. Apply power to the unit.
 4. In MAPware, go to **Tools > PC Communication Mode**. Select the method of communication between the HMC and your PC.



- Click **Project > Transfer > Download** from the standard menu.



- Under Download Options (click the Options button  if you do not see this section), select what data you wish to download:

Firmware – the internal program inside the HMC that makes it run. If you are downloading:

- to a new unit

- upgrading the firmware of the unit to a newer version

- a project that was created in an older version of MAPware

- a project in which you have made any changes to the PLC communications drivers assigned to the Com ports on the HMC check this option. For subsequent downloads of the same project to a unit, it is not necessary to continue to download the firmware.

Application – downloads application only (this is the project that you create using MAPware)

Ladder – downloads the ladder logic. The ladder logic is any ladder instructions created using the Logic Blocks.

Data – this option allows you to download preset values into the internal memory of the HMC. This is created using the Data Monitor feature in offline

Fonts – check this box if the default fonts used in the software have been modified.

Logged Data – only available when uploading a project from the HMC.

Ethernet Settings – Downloads Ethernet settings configured in the **Project Configuration** window. Only available on models with an Ethernet port.

- Device Settings:

Automatically put unit in halt mode before download – check this option to stop operation of the project in the HMC while downloading a new project.


Automatically put unit in run mode after download – checking this option enables MAPware to command the HMC to begin running the project after the download is finished.

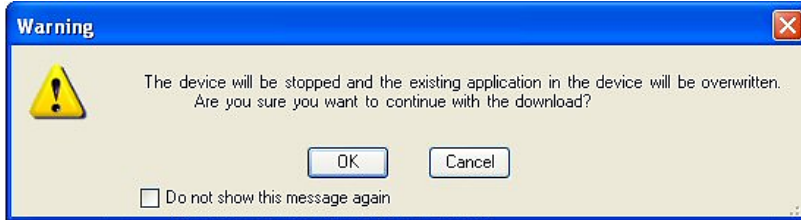
Initialize keep memory area before download – If you are using the Keep Memory


checking this option will initialize all keep memory to 0.

Initialize all device registers except keep memory after download – this option will initialize all internal memory of the HMC (except for the keep memory area as outlined in

Chapter 11 – Miscellaneous Features) to zero.

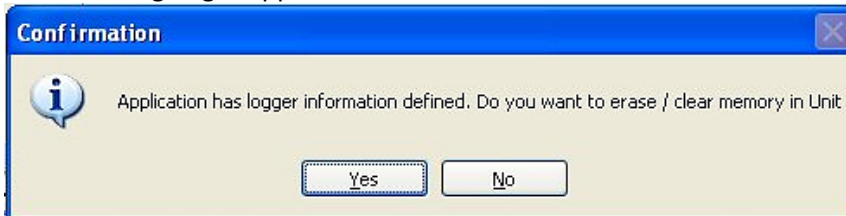
8. Click the Download  button:



 Note: If you check the 'Do not show' option then the next time you download, this dialog box will not be shown.


Click **OK**.

9. The following might appear:



This means you have used the Data Logger feature in your project, so MAPware is asking if you want to clear the memory in the HMC that is used to store data log information.

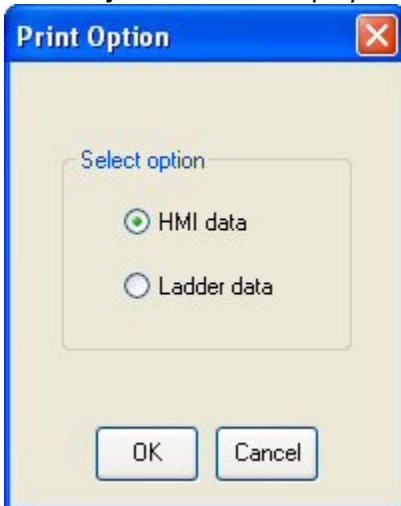
10. When the download is finished, click Close.

 Note: clicking Abort during a download may require that you perform a download of the original project since the existing project in the unit may have already been erased.

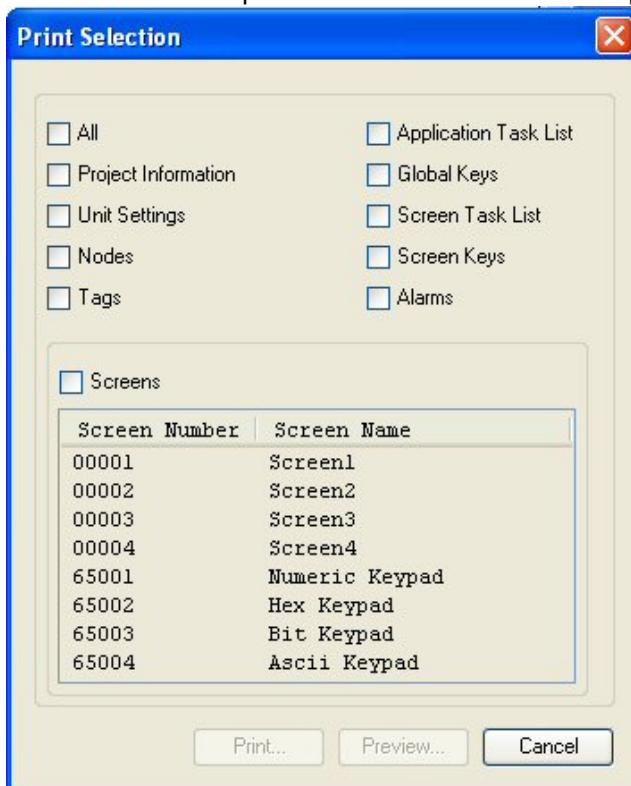
Printing a hardcopy of projects

- 6 The MAPware software allows printing a hardcopy of the project to a printer. Open the project you wish to print in MAPware, then:

1. Click **Project > Print** to display the **Print Option** box:



2. Select HMC data to print screen data. Click **OK** to display:



All – prints all screen data

Project Information – this is general information about the project such as title, author, date and time last edited

Unit Settings – serial printer port settings

Nodes – assigned PLC drivers to the COM ports

Tags – the tag database

Application Task List – displays all global tasks

Global Keys – displays settings for all global function keys

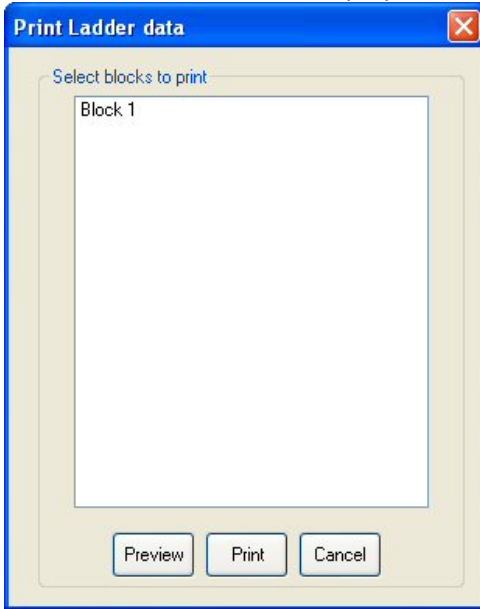
Screen Task List – displays all tasks created at the screen level

Screen Keys – displays configuration of all screen-based function keys

Alarm – displays the alarm database

Screens – shows the screens created, two per page

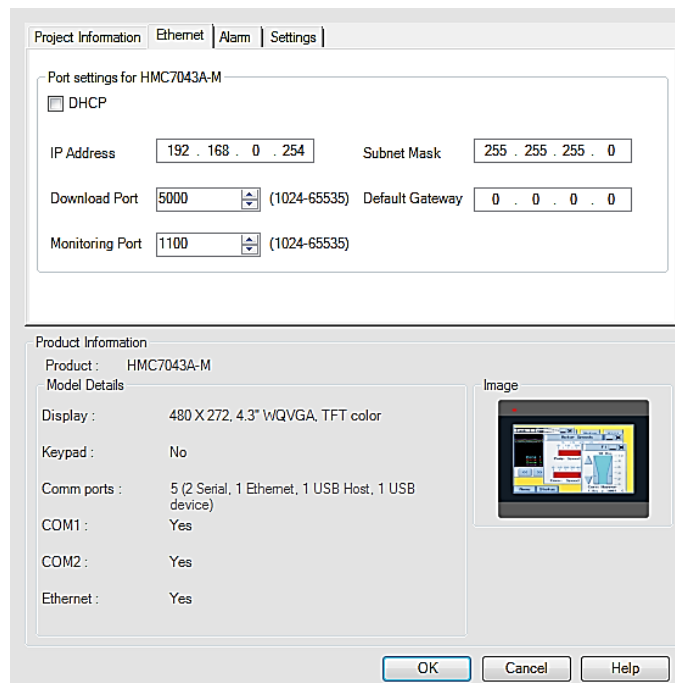
3. Select the Ladder Data to display:



4. Highlight (click) the blocks that you wish to print, and then click **Preview** or **Print**.

Ethernet Settings

The Ethernet port on the HMC can be used to upload / download projects, monitor PLC logic execution in Online Mode, communicate with an external PLC, or to act as a server to display Web pages. To configure Ethernet settings for the HMC2000, 3000 and 7000 open the **Project Configuration** window by clicking **Project > Properties > Ethernet**:



Default values for the IP Address, Subnet Mask, Download Port, Default Gateway and Monitoring Port are:

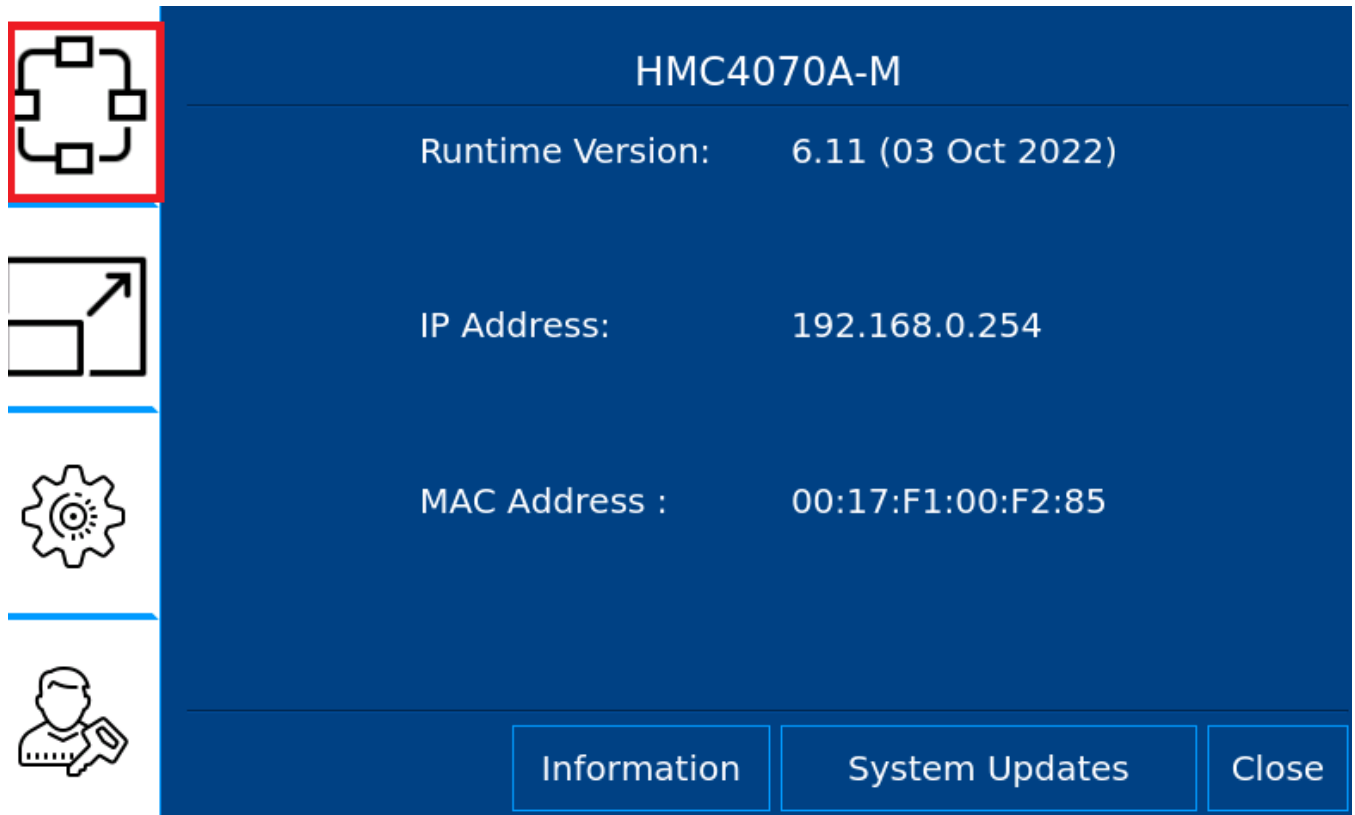
Parameter	Default Setting
-----------	-----------------

HMC IP address	192.168.0.254
Subnet Mask	255.255.255.0
Download Port	5000
Default Gateway	0.0.0.0
Monitoring Port	1100

The HMC4000 series doesn't have an Ethernet tab in the Project Configuration window. The only way to configure the IP address in the settings window on the HMC itself.

Once the application loads on the HMC device, hold your finger on the top left corner of the screen for 5-10 seconds. *(this will not work on startup, application has to load)* The blue system settings screen will pop up.

Click the "Network Button" on the top left.



Configure the IP address on this screen. (see next page)

DHCP
 Static IP

IP Address*:

Subnet mask*:

Default gateway:

PC Ethernet Settings

In order to communicate with the HMC the PC running MAPware must be configured with an IP address that is on the same Subnet as the HMC. This means that the portion of the IP address masked by the Subnet Mask must be the same on the PC and the HMC and the portion that is not masked must be unique for each device. For example, with the settings above, the PC would have to be configured with an IP address of 192.168.0.XXX where XXX is any number from 0 to 253.

If the PC is connected directly to the HMC Ethernet port a crossover cable should be used, if the HMC is connected through an Ethernet switch, a straight through Ethernet cable should be used.

DHCP

If a DHCP server is present on the network the DHCP checkbox can be checked to allow the HMC to receive an IP address from the server. The IP address assigned displays on the power up screen, and is also available in system registers beginning at SW-28 (see [Appendix B – System Tag Memory](#) for details).

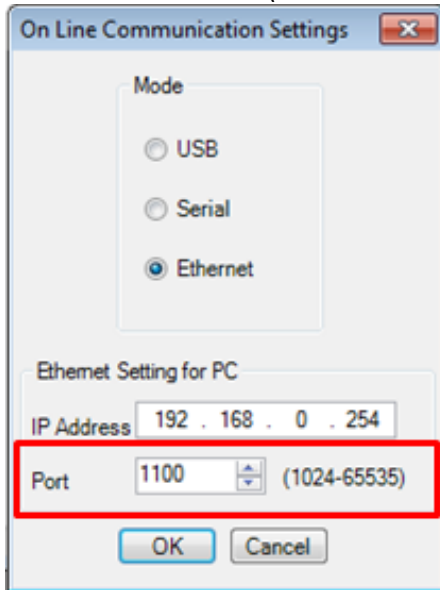
Download Port

The download port is the TCP port the HMC uses to upload and download projects. This must match the port number selected in the Upload / Download window.

Monitoring Port

The Monitoring Port is the TCP port that MAPware uses to monitor logic executing in an HMC in Online Mode. This port must match the port selected in the On Line Communication Settings window, when Ethernet is


selected as the Mode (**Tools > Preferences > Online Communication**).



Download Ethernet Settings to an HMC

The settings configured in the **Project Configuration** window above need to be loaded into the HMC in order to take effect. The settings can be downloaded using USB or serial or, if Ethernet communication is already established, through the Ethernet port.

☞ If Ethernet is used, communication with the HMC will be lost until PC settings are updated to reflect the changes.



To download the settings, open the download window by clicking **Project > Transfer > Download**, or click the download icon . In the Download to device window, check the Ethernet Settings checkbox in the Project section and then click the Download button.

Tips and Tricks when using MAPware

Here are some 'tools of the trade' in regards to using the MAPware software. These are miscellaneous suggestions that should make it easier to get around the software.

Placing and Editing Screen Objects



- 7 Only three steps are required to place any object onto a screen:
 1. Click the object you wish to place onto a screen. Most of the screen objects can be accessed via several locations in the MAPware software. For example, to place a GoTo Screen button on a screen, you can click one of the following:
 - On the Menu Bar, click **Draw > Buttons > Navigation Buttons > Go to Screen**.
 - From the Draw toolbar, click **Quick Buttons > Go to Screen**.
 - From the Draw toolbar, click **Advanced Objects > Buttons > Navigation Buttons > Go to Screen**.
 - On the Common Objects toolbar, click the Go to Screen icon.

2. Move the mouse cursor to the location in the Screen Work Area where you wish to have the object placed (the mouse cursor changes to the crosshair symbol ).
-  Note that the point at which you click is where the top left corner of the object is placed.
3. Click the left mouse cursor to place the object on screen. If you need to move the object after it is placed on screen, simply click and drag the object to the proper location.

Once the object is in position, you can easily edit the attributes for that object using the Properties Grid dialog box located on the far-right hand side of the MAPware software. To modify an attribute of an object, simply click the attribute in the Properties Grid box. Then edit the attribute. The options for changing an attribute depends upon which attribute is highlighted. Some attributes (i.e. On Text, Off Text, Label, etc.) require that you type in the text or number. Color attributes (i.e. On Text Color) require that you display a Color Palette dialog box and simply select the color of interest. Some attributes (i.e. Button Style) use a pull-down list box from which you make a selection. Other attributes require displaying a popup dialog box for further edits. See **Chapter 7 – Data & Display Objects** for a complete listing of attributes available for each object.

Moving and Resizing Screen Objects


After an object is placed onto a screen, you can easily move the object by clicking and dragging the object.

 Note that the mouse cursor changes to the crosshair symbol . You can also move an object by highlighting the object (click it), then use your keyboard arrow keys. This method will move the object one pixel at a time.





- 8 To move more than one object at the same time:

1. Highlight one object.
2. Hold down the CTRL key on your keyboard, and then click another object(s).
3. Click and drag to move the selected objects or use your keyboard as described above.

Two or more objects can be highlighted by clicking the left mouse button and dragging the mouse so that the dotted box that appears completely encloses the objects that you wish to highlight.

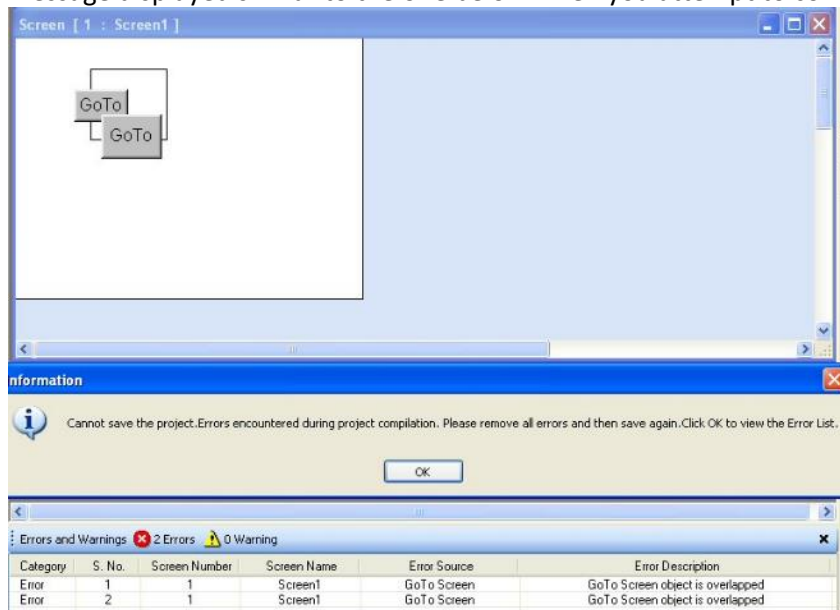
 Note: after performing this operation, if there is a highlighted object that you do not wish to be part of the selected group, simply hold down the CTRL key and click that item to deselect it.

- 9 Most objects can be resized. The easiest method for resizing an object on a screen is to:



1. Click the object to highlight it.
2. A series of small white boxes (called boundary delimiters) appear on the perimeter of the object. Move the mouse cursor over any of these white boxes until you see the cursor change to    .
3. Click and drag the boundary delimiter to a new position – the object will resize.

Overlaying Objects


MAPware does not permit most objects to be overlaid (placed on top of each other). You will see an error message displayed similar to the one below when you attempt to compile or save the project:



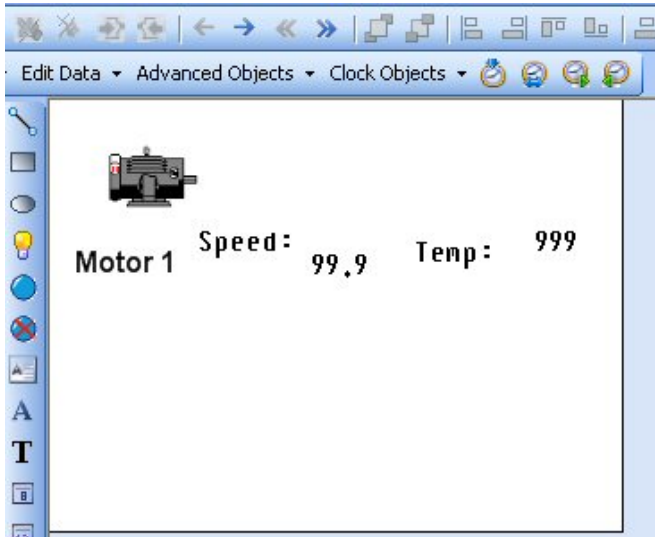
If you wish to perform multiple tasks with one object, try using the Task feature (see **Error! Reference source not found.**). However, some objects can be overlaid. The general rule of thumb is if two objects are *active* objects (meaning the object is used to display data from a register or is used to perform some action when pressed), then you cannot overlay them. If one of the objects is active and the other is static (i.e. text box, drawing tool, etc.) then overlaying is permitted *as long as the active object is on top*. If both objects are static, overlay them in any manner.

When two objects are overlaid, you can select which object is shown on top and which object is shown on bottom by using the Bring to Front  and Send to Back  controls located in the Layout menu and toolbar.

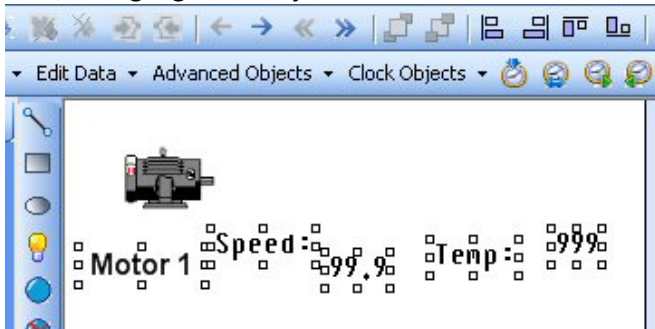
Aligning objects

As you create projects in MAPware, you will often wish to have two or more objects leveled either horizontally or vertically. The easiest method is to highlight the objects (see Moving and Resizing Objects) and then use the four alignment tools  located in the **Layout > Align** menu or Layout toolbar.

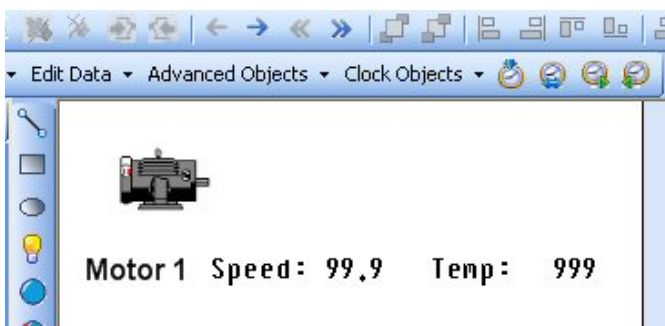
For example, the programmer wants the following objects to be horizontally level:



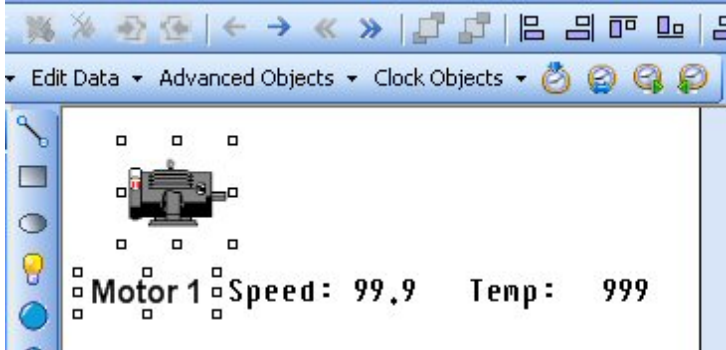
First, he highlights all objects to be leveled:



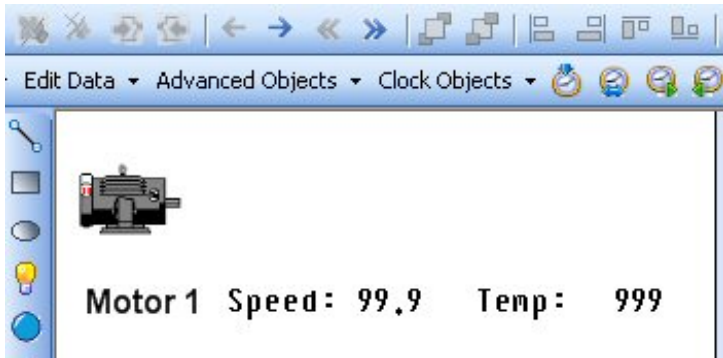
Then he clicks on the Align Bottom  icon:



He also wants to align the picture of the motor with the text label, so both of these objects are highlighted:

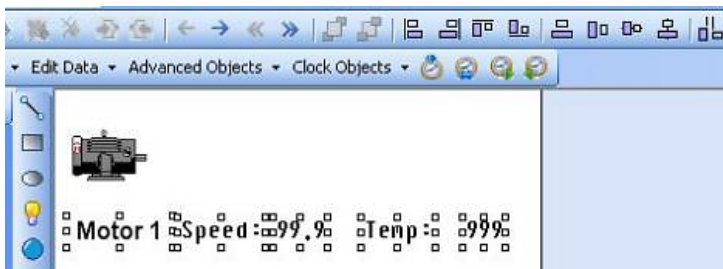


Then he clicks on the Align Left icon:

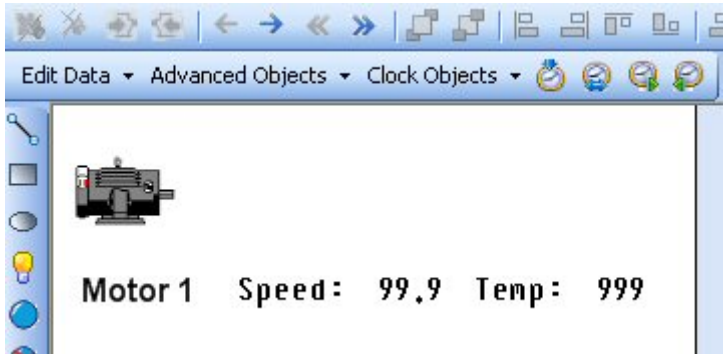


Finally, he wants all of the text and numeric objects to be spaced evenly across the screen.

He highlights these objects:



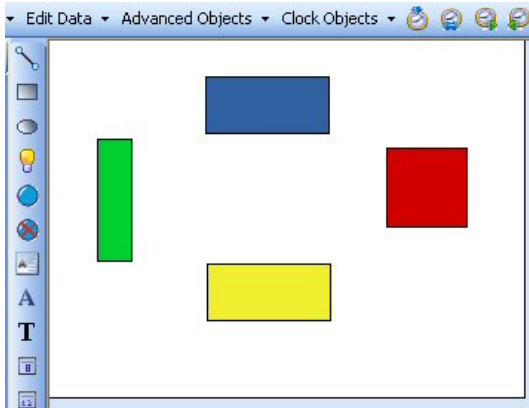
Then clicks the Place Equidistant along Horizontal icon:



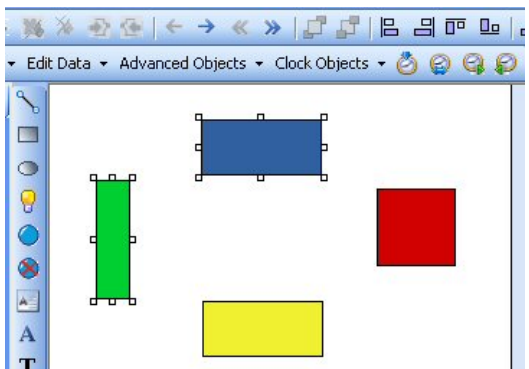
Making objects the same size

MAPware includes some tools that make it very easy to adjust two or more objects so that they are the same size. The three buttons: Make Equal Width, Make Equal Height, and Make Equal Size on the Layout toolbar are for this purpose.

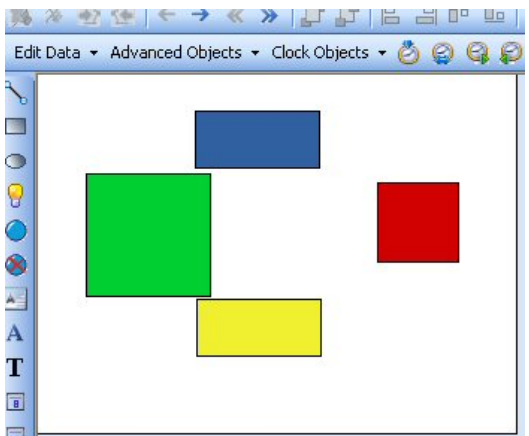
In this example, we wish to make the green rectangle and the blue rectangle the same width:



We start by highlighting (see Moving and Resizing Objects) both objects. Before you begin, make sure that the object you wish to use as the template for the new width is selected last. In this example, we wish to make the green rectangle have the width of the current blue rectangle. Therefore, we highlight the blue rectangle last:

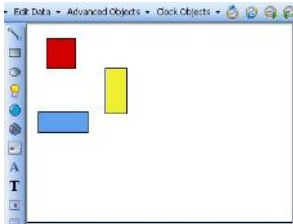


Then we click the Make Equal Width  icon:

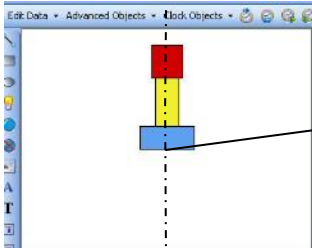


Centering Objects

There may be an occasion in which you wish to center two or more objects. MAPware has four control icons that can make this job a snap. Let us see how the shapes in the screen below change position using each of these controls:

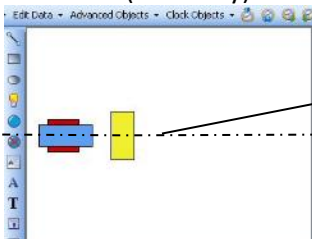


- Center along Screen's Horizontal – this control will center the selected objects along the horizontal (X) axis of the screen. What does this mean? If the entire screen size is 320 (width) by 240 (height) pixels, then the horizontal center of the screen is 160 pixels along the X-axis. MAPware will thus move each object along the X-axis (horizontally) until the center of that object is located at 160 pixels:



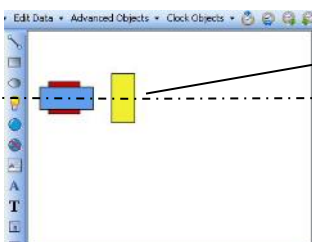
Center of screen along the vertical axis

- Center along Screen's Vertical – this control will center the selected objects along the vertical (Y) axis of the screen. What does this mean? If the entire screen size is 320 (width) by 240 (height) pixels, then the vertical center of the screen is 120 pixels along the Y-axis. MAPware will thus move each object along the Y-axis (vertically) until the center of that object is located at 120 pixels:



Center of screen along the horizontal axis

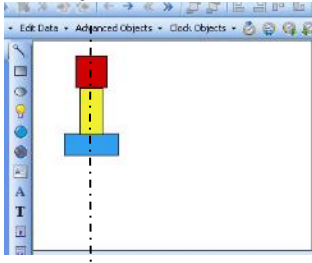
- Center along Object's Horizontal – this control centers the selected objects along the computed horizontal center of the selected objects. What does this mean? The MAPware computes the horizontal center of the topmost object and bottommost object then places the selected objects at the midpoint location between the objects.



Midpoint location of selected objects along the horizontal axis

- Center along Object's Vertical – this control centers the selected objects along the computed vertical center of the selected objects. What does this mean? The MAPware computes the vertical center of the leftmost object and rightmost object then places the selected objects at the midpoint location between

the objects.



Troubleshooting the USB Download Driver

Projects created in MAPware are downloaded into the HMC via the RS232 Com port on your computer, by connecting to a USB port or through Ethernet on models with an Ethernet port. If you intend to use the USB connection, a USB device driver is installed with MAPware so that, when you connect the HMC to your PC the correct device driver is automatically selected. If something goes wrong in the installation process you can manually install the correct driver by directing the windows device manager to the USB Drivers folder in the MAPware install directory. The default path to this folder is:

C:\Maple Systems\MAPware7000\USB Drivers\

Chapter 3 – Creating a Sample Project

Introduction

This chapter provides step by step instructions for creating a simple test project. When finished, instructions are given to download the project and run it on a unit.

For this example, we will use the following items:

- HMC3043A-M
- HMC3-M0808Y0401T expansion module
- MAPware software running on a PC
- Micro USB configuration cable (PN 7431-0119)
- Simple test circuit attached to the I/O module to test the inputs and outputs configured in the project.

The instructions presented here should be general enough that they can be adapted for equipment on hand.

The project will demonstrate:

- Configuration of Input and Output channels
- Writing a simple Native Ladder logic block that controls I/O points
- Scaling an Analog Input
- Configuring a screen with objects that display HMC data
- Navigating between screens

This chapter assumes that you have already installed MAPware and have some familiarity with the HMC hardware.


 If you have not done so, please read **Chapter 2 – Software Tour**, and *The HMC Installation Guide* before you begin.

Choosing a Programming Language: Native Ladder vs. IEC 61131-3 The HMC2000 and HMC4000 only have IEC 61131-3

MAPware projects use one of two programming language modes to create PLC Logic; Native Ladder mode, or IEC 61131-3 mode (HMC7030A-M and HMC7030A-L models only support Native Ladder). Native Ladder projects contain a Ladder Logic editor. IEC 61131-3 mode projects contain five different logic editors.

- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Instruction List (IL)
- Sequential Function Chart (SFC)

These are defined according to the IEC 61131-3 standard.

 Detailed information on the Native Ladder editor is in the HMC Ladder Logic Guide (1010041), and information on the IEC 61131-3 editors can be found in the MAPware IEC 61131-3 Programming Guide (1010045). Both modes are covered in the help file.

Once a mode is selected, the project cannot be converted to the other mode.

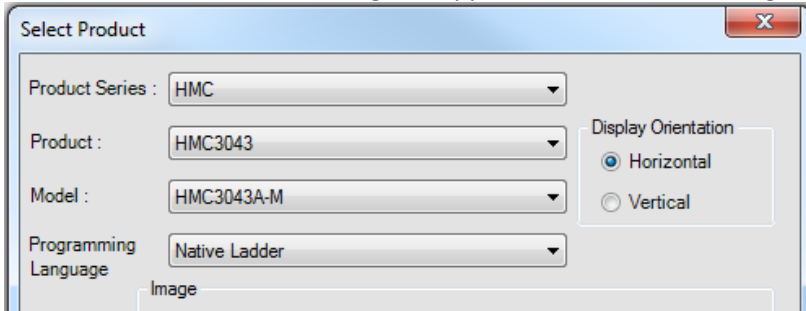
The Native Ladder mode editor will be used in this chapter.

Beginning a New Project

Starting a new project in MAPware is straightforward. After MAPware has started, it will display the opening screen. This screen displays a list of recent projects and the ability to open an existing, or create a new project.

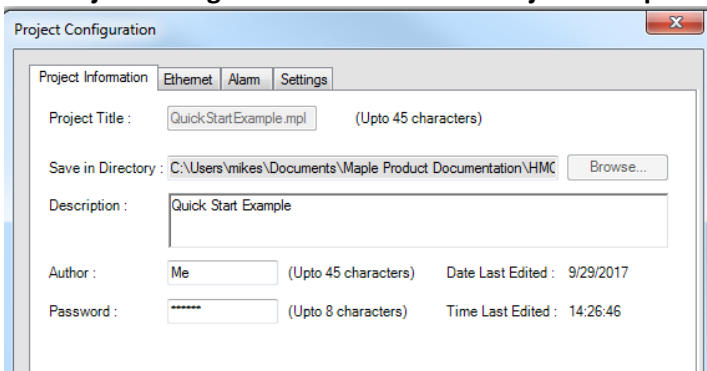
10 ► To create a new project:


1. Click the **New** option under the **Project** category, or Click **Project > New** in the menu bar.
2. When the **Select Product** dialog box appears, make the following selections:




Product Series: HMC
Product: HMC3043
Model: HMC3043A-M
Programming Language: Native Ladder
Display Orientation: Horizontal

3. Click **OK**.
4. From the menu bar select **Project > Save**. Select the directory where you want to store to project and enter a name for the project. Click **Save** to save the new project.
5. After the project is created and saved, a description and password for the project file can be entered in the **Project Configuration** window. Click **Project > Properties**.

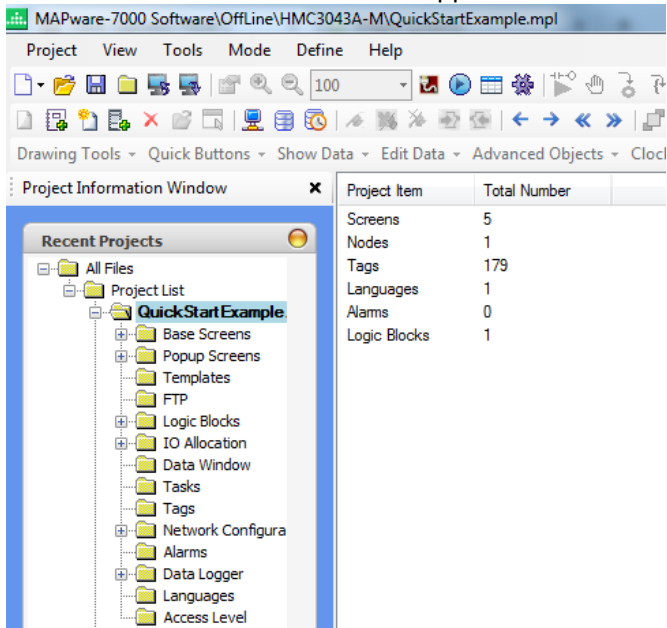


 **Note:** A password is not required. If one is configured make sure it is remembered. It is not possible to recover a project if the password has been forgotten or lost.

 **Note:** On models that support Ethernet, an Ethernet tab will also be available to configure the IP settings of the HMC. Refer to the Ethernet Settings section in **Chapter 2 – Software Tour** for more information.

6. Click **OK** to save these settings.

- The main screen area of MAPware appears:



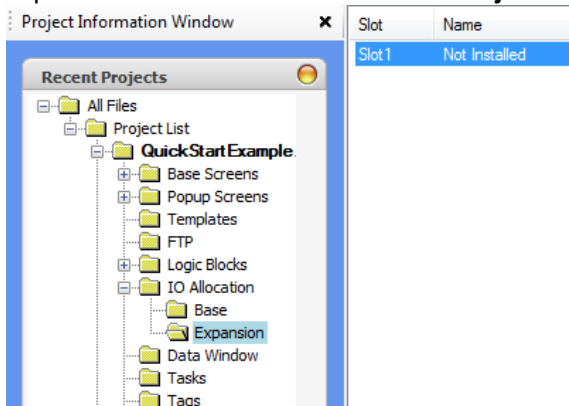
- Notice the project name lists on the title bar as well as in the Project List of the **Project Information Window**.

Configuring an I/O module

The first thing to set up in this new project is an I/O expansion module. This is done in the **IO Allocation** window.

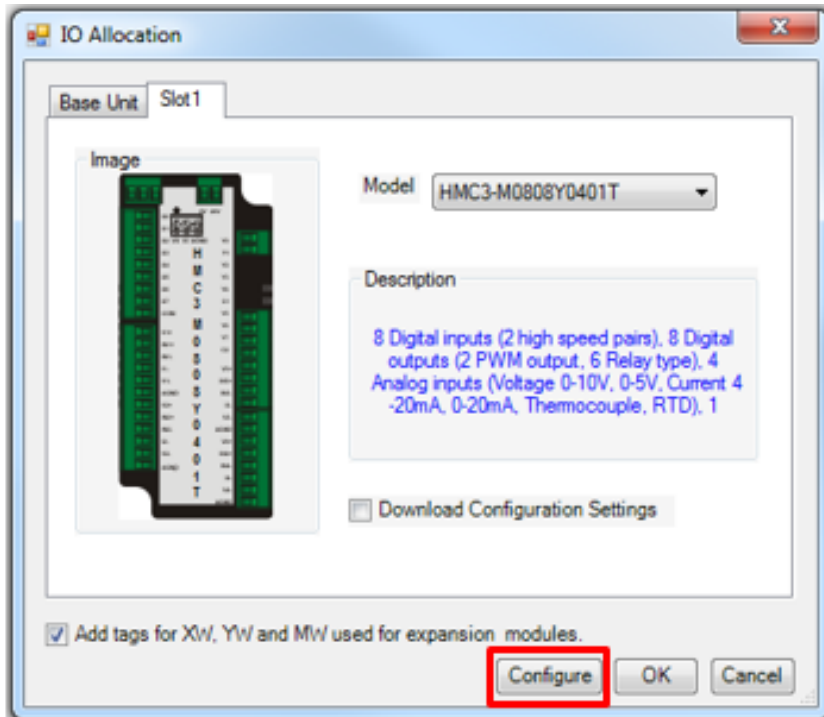
- To add an I/O module:

- Expand the **IO Allocation** node in the **Project Information Window** then click the **Expansion** folder:

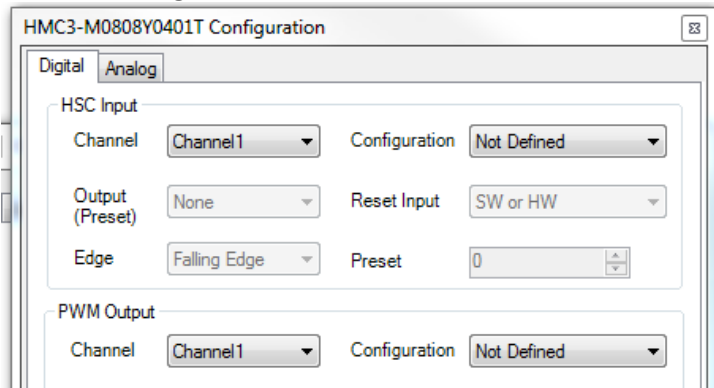


- The HMC3043A-M only has one expansion slot. This will be listed in the Main Workspace window, as shown above. Double click **Slot1** in the list to open the **IO Allocation** window for this module. In the **IO**

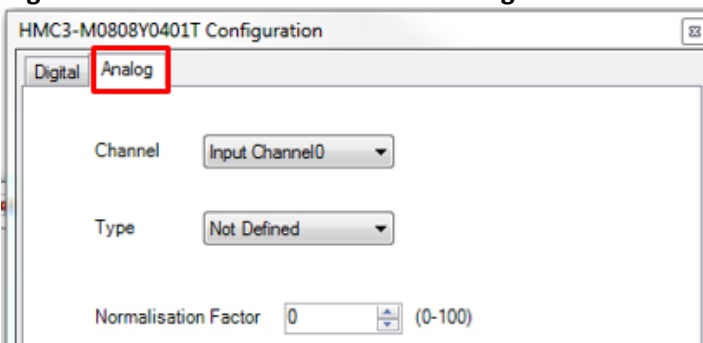
Allocation window select **HMC3-M0808Y0401T** for the **Model**:



3. Click the **Configure** button at the bottom of this window to configure the channels we are going to use:



4. In this quick start we are not going to use any of the special features of the digital I/O channels such as Pulse Width Modulation (PWM) or High Speed Counter (HSC) functionality, so leave the defaults on the **Digital** tab of this window. Click the **Analog** tab:



5. This example project will use **Input Channel 0** with a 0 to 5 V input range. Make sure **Input Channel0** is selected in the **Channel** dropdown list and select **Voltage(0-5V)** in the **Type** dropdown list.

Note: Scroll down in the **Type** dropdown list to find the **Voltage(0-5V)** option).

Channel

Type

- Click **Confirm** to save this selection.

Note that the selection now appears in the **Settings Preview** section:

Channels	Configuration
HSC Channel1	Not Defined
HSC Channel2	Not Defined
PWM Channel1	Not Defined
PWM Channel2	Not Defined
Analog Input Channel0	Voltage(0-5V)
Analog Input Channel1	Not Defined

- This completes the necessary I/O configuration for this project. Click **Close** in the **Configuration** window. In the **IO Allocation** window check the **Download Configuration Settings** checkbox.

The IO Allocation window displays the configuration for Slot 1. It includes a physical image of the module, a model dropdown set to 'HMC3-M0808YD401T', and a description of the module's capabilities. The 'Download Configuration Settings' checkbox is checked, and the 'Add tags for X/Y and M/W used for expansion modules' checkbox is also checked. Buttons for 'Configure', 'OK', and 'Cancel' are visible at the bottom.

- Click **OK** in the **IO Allocation** window. Doing this adds the selected module to the project, allocates a set of I/O module tags in the tag database, and sets the default values of those tags according to the selected configuration. For example, the settings above will create a tag called **Slot01-CH0_Analog_IP_Type** at address MW0160 and set the initial value of this tag to 6, which is the configuration register setting for the 0 to 5V input range. The raw input value can then be read from the tag named **Slot01-CH0_AnalogIPReg** at address XW0111.

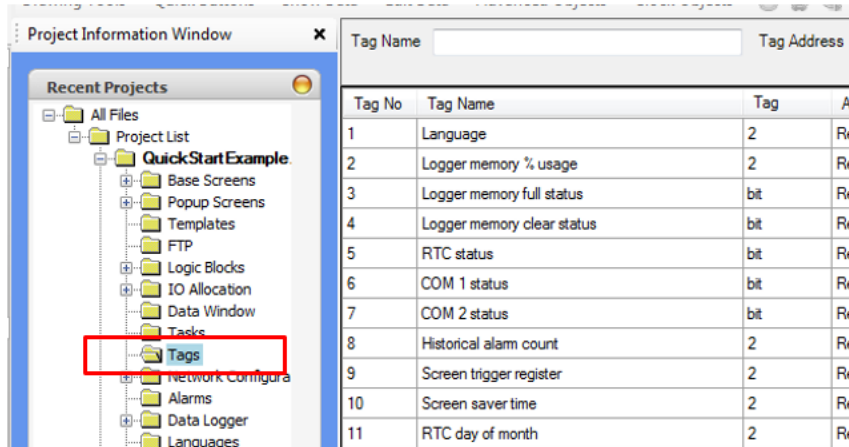
For more information on I/O modules and associated tags, see the appropriate *I/O Module Guide* for your series of product.

Adding Tags to the Project

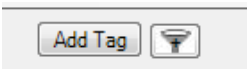
Tags map data registers to a descriptive name. Once defined, the tag name can be used throughout the project to refer to a particular register, without needing to remember its memory address.

12 In addition to the tags automatically generated for the I/O card, we will create custom tags to display values on the HMC screen or do calculations in a Ladder Logic block.

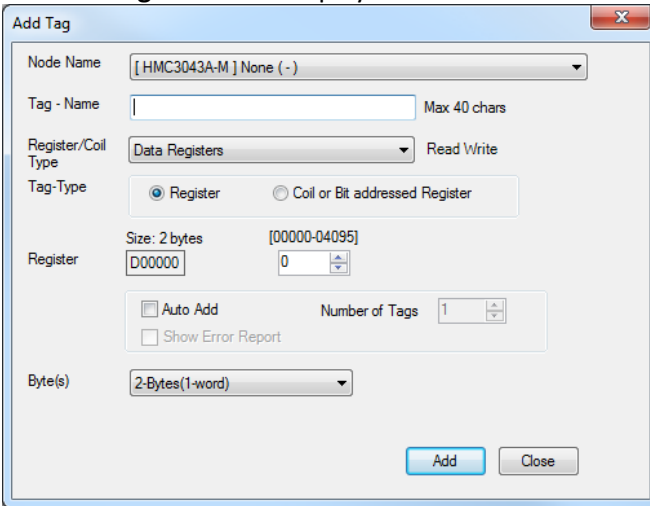
1. Click the **Tag** folder in the **Project List** to open the tag database window.



2. To add a tag, right click in the list of tags and select **Add** from the context menu, or click the **Add Tag** button.



3. The **Add Tag** window is displayed.



4. This window is used to configure the parameters for the new tag. The main options here are:

Node Name – Specifies the device where the tag is located. In this sample project there is only one Node which is the HMC3043A-M itself. If we had configured an external device in the **Network Configuration** window, such as an MLC, it would be available to select in this dropdown list.

Tag – Name – Enter a descriptive name for the tag.

5. Use this window to add the following tags to the project:

Name	Register / Coil Type	Register (address)	Byte(s)	Description
RawInputInt	Data Registers	D00000	4-Bytes	Integer register to contain raw input from analog input
RawInputFloat	Data Registers	D00002	4-Bytes	Floating point format tag to contain raw input from analog input

RawLow	Data Registers	D00004	4-Bytes	Smallest possible value input register can have. Used for scaling.
RawHigh	Data Registers	D00006	4-Bytes	Largest possible value input register can contain. Used for scaling.
EngLow	Data Registers	D00008	4-Bytes	Smallest possible value of scaled input.
EngHigh	Data Registers	D00010	4-Bytes	Largest possible value of scaled input.
ScaledInput	Data Registers	D00012	4-Bytes	Scaled input value.
HighLimit	Data Registers	D00014	4-Bytes	When ScaledInput is above this value set the high limit output
LowLimit	Data Registers	D00016	4-Bytes	When ScaledInput is below this value set the low limit output
DisableScaling	Internal Coils	B00000	Coil	Disable (ON) / Enable(OFF) Scaling Logic
EnableLimits	Internal Coils	B00001	Coil	Enable (ON) / Disable (OFF) limit logic
EnableIOFollow	Internal Coils	B00002	Coil	Enables (ON) logic to set outputs based on input state.

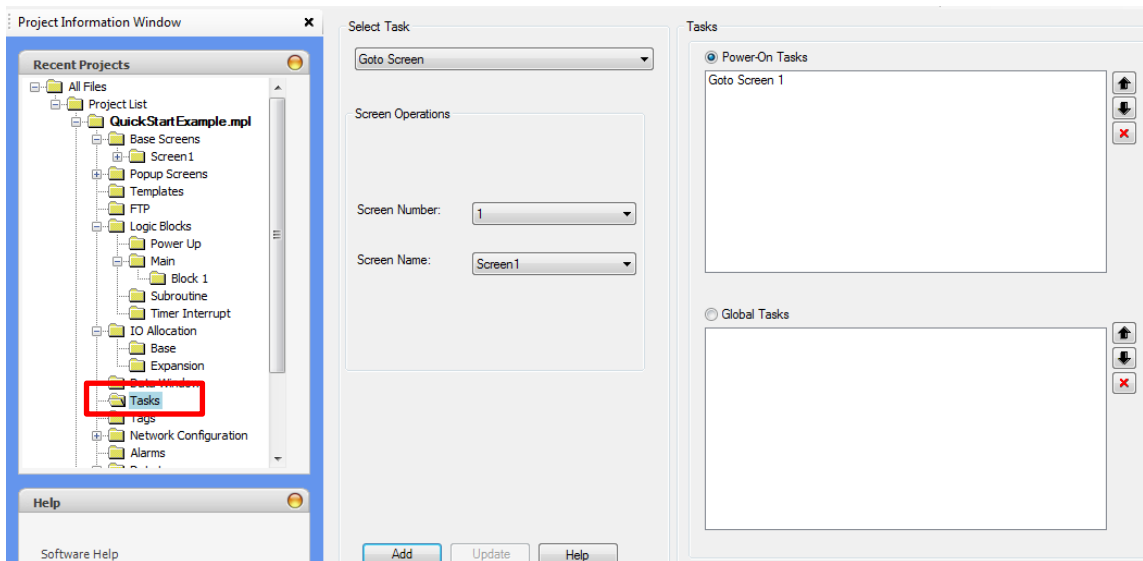
Initializing Tags with Power On Tasks

To perform the scaling operation in this sample project we need to initialize the tags used to define the input and output scales. There are two primary places available to perform initializations in MAPware:

- With a Power On Task
- With a Power Up Logic Block

In this sample we will configure a set of Power On Tasks.

Click the **Tasks** folder in the **Project Information Window** to open the task editor.

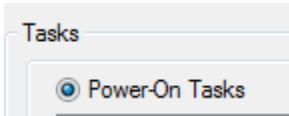


There are two Tasks sections in this window. Power On Tasks are executed one time when the HMC first powers up. Global Tasks are executed continuously while the HMC is running.

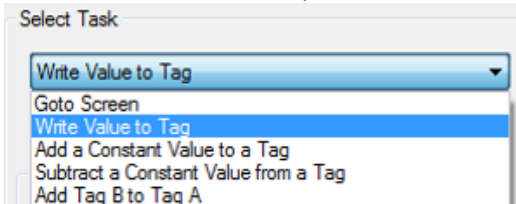
Notice there is a default Power On task that tells the HMC which screen to display first.

13 ► Add tasks to the Power On section to initialize the scaling tags:

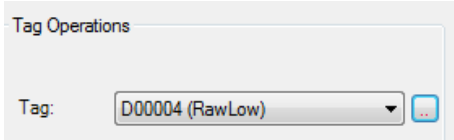
1. Make sure the **Power-On Tasks** radio button is selected.



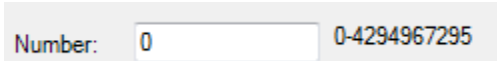
2. From the **Select Task** dropdown list, select the **Write Value to Tag** task



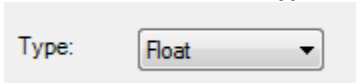
3. In the **Tag** selector choose **RawLow** as the tag to write to



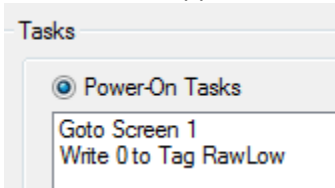
4. In the **Number** field enter: 0



5. Select **Float** from the **Type** dropdown list.



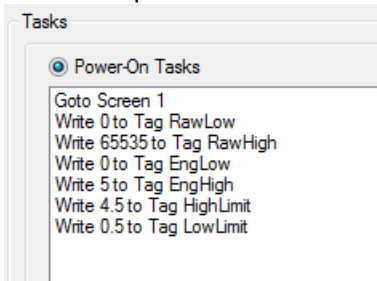
6. Click the **Add** button
7. The task now appears in the **Power-On Tasks** list:



8. Repeat this process to add Power On tasks that initialize the tags in the table below with the values shown Make sure to set the **Type** to float in each task.

Tag	Value	Type	Notes
RawLow	0	Float	Already completed above
RawHigh	65535	Float	
EngLow	0	Float	
EngHigh	5.0	Float	
HighLimit	4.5	Float	
LowLimit	0.5	Float	

- When complete the list of **Power-On Tasks** should look like this:



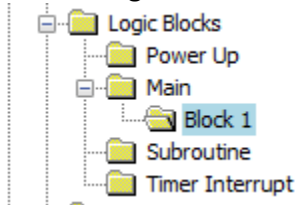
Ladder Logic Blocks

With the tags defined and initialized, it is time to put them to use in a Ladder Logic program.

Scaling Analog Inputs

- The first thing the logic block will do is scale the raw input from analog input channel 0 of the I/O card to an engineering value:

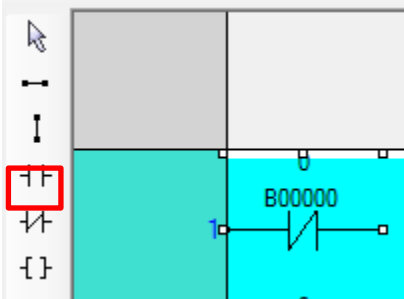
- Expand the **Logic Blocks** folder in the **Project Information Window**, then expand the **Main** folder:



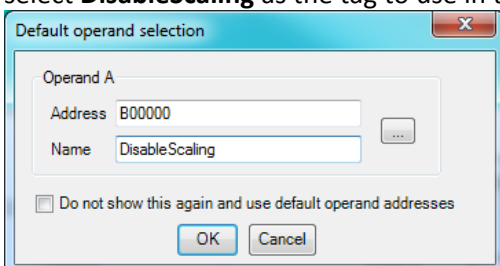
- MAPware creates a default block in the **Main** folder called **Block 1**. Click the folder for this block to open the Ladder Logic editor.
- Click the Normally Closed Contact option on the Common Objects Toolbar:

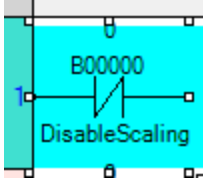


- Then click directly to the left of the connection point for rung 1:




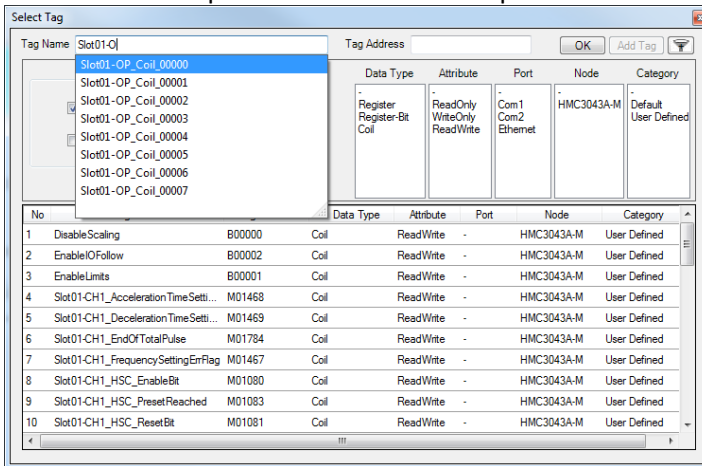
- This will place the Normally Closed Contact, and open the tag selection window. In the popup window select **DisableScaling** as the tag to use in this first contact, then click **OK**.





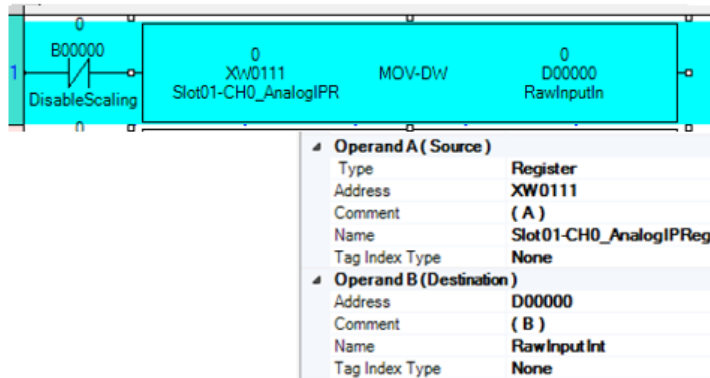
To get the entire tag name to display select **Tools > Preferences > Project Global Settings** and increase the **Number of tag name characters to be displayed in Instruction** setting to the maximum 20 characters setting.


In the tag selection popup window, the ellipsis button  can be used to open a tag browser window where all available tags are visible. A search field is available, and new tags can be created using this window. Keep this in mind for the steps that follow.



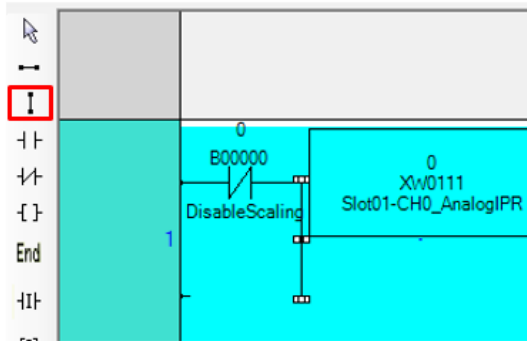
The engineering values will be floating point numbers. Before scaling, the raw input needs to be moved to a Data Register and then converted to floating point format. To move the input value into a data register, use the **Move DWord** instruction:

- Select **Data Transfer > Move DW** from the instruction menu then click directly to the right of the Normally Open Contact to place the instruction. Select **Slot01-CH0_AnalogIPReg** as **Operand A (Source)**, and **RawInputInt** as **Operand B (Destination)**.

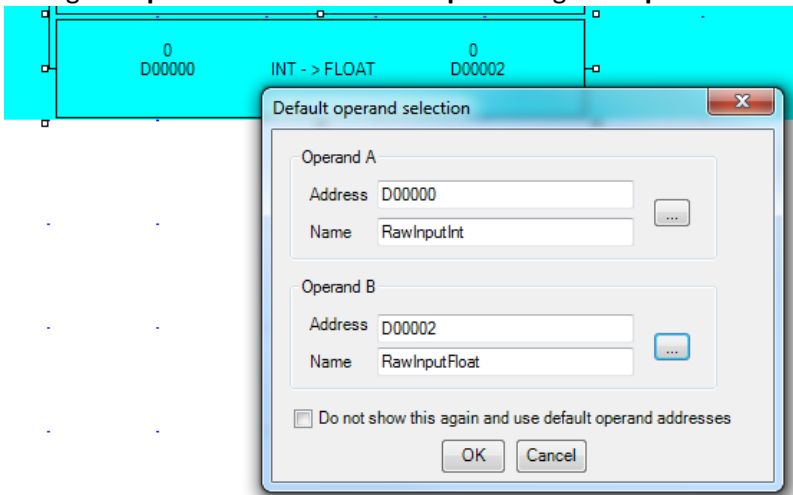


- Before placing the next instruction we need a vertical link, or branch, after the contact and before the move instruction. Click the vertical link icon  in the Common Objects Toolbar, then click the

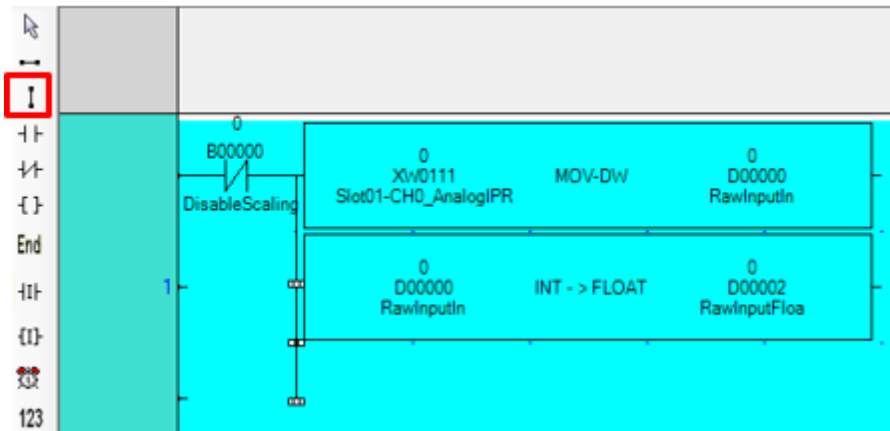
workspace between the Normally Closed contact and the move instruction to place the vertical link:



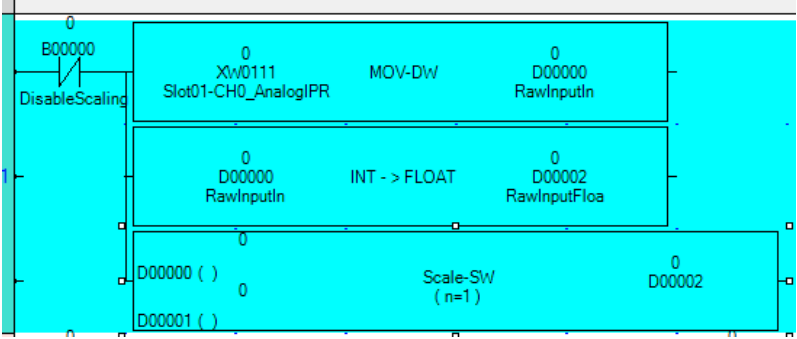
8. To the right of this link, place an **Integer to Float** instruction (**Conversion > Integer to float** from the instruction menu).
9. Configure **Operand A** with the **RawInputInt** tag and **Operand B** with the **RawInputFloat** tag.



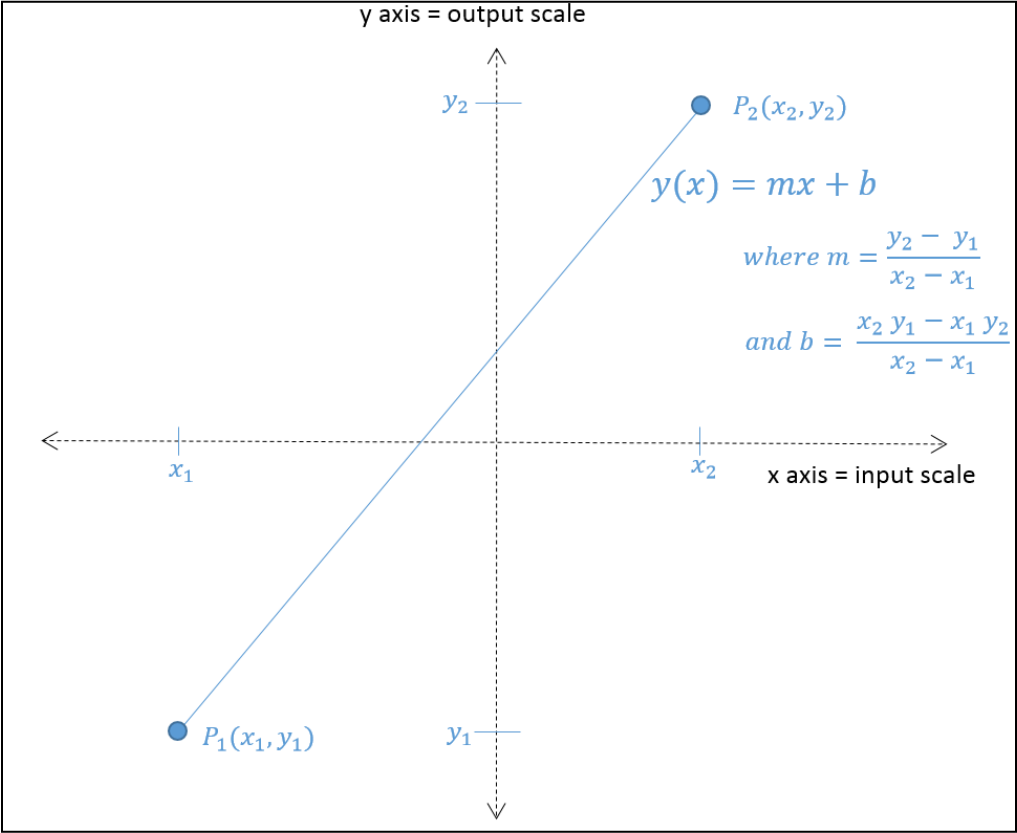
10. Another vertical link is required to add another instruction below the **Integer to float** instruction. Again, click the vertical link icon and then click immediately to the left of the **Integer to float** instruction.



11. To the right of this vertical link, place a **Scale** instruction (**Functions > Scale**).



► The **Scale** instruction has three operands. These are used to perform a linear mapping of the input (Operand A), to the output (Operand C). The figure below shows this operation graphically:



A graphic representation of the **Scale** instruction with $n=2$: The input value x (Operand A) is mapped to an output value $y(x)$ (Operand C) using the relationship shown. m and b , the slope and offset of $y(x)$, are determined by four tags starting at the address specified in Operand B. These correspond, in consecutive order according to tag address, to the parameters: x_1 , x_2 , y_1 , y_2 , as shown in the figure.

12. Operand A is the input, or x in the figure. For this operand use the output of the **Integer to Float** instruction (**RawInputFloat**).

Select **RawInputFloat** for Operand A.

Operand A

Address

Name

13. Operand B is the starting address of a block of four registers. The first of these registers defines the start of the input scale (the x coordinate of P_1 in the figure), the second register defines the end of the input scale (the x coordinate of P_2 in the figure), the third register defines the start of the output scale (the y coordinate of P_1 in the figure), and the fourth register defines the end of the output scale (the y coordinate of P_2 in the figure).

Conveniently, we've already defined a block of four consecutive tags for this purpose, starting with the tag: **RawLow** at address D00004.

Tag Name	Register	Coordinate
RawLow	D00004	x_1
RawHigh	D00006	x_2
EngLow	D00008	y_1
EngHigh	D00010	y_2

Select **RawLow** as Operand B.

Operand B configuration window showing Address: D00004 and Name: RawLow.

14. Operand C is the output, or $y(x)$ in the figure.

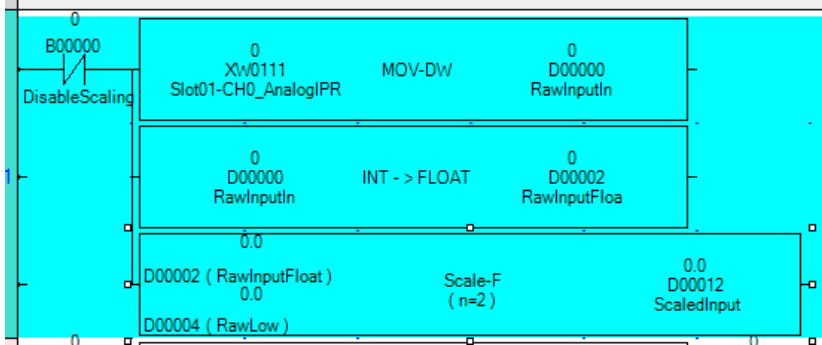
Use the tag **ScaledInput** for Operand C.

Operand C configuration window showing Address: D00012 and Name: ScaledInput.

15. After the instruction is placed the **Type** property will need to be changed to **Float**, and the **Data size** property to 2. The **Data size** specifies the number of points to use in the linear mapping. This appears as n in the instruction. Do this in the **Instruction Properties** window.

Instruction Properties window showing configuration for the Function Generator instruction. The **Data Properties** section has **Type** set to **Float**. The **Size** section has **Data size** set to **2**.

That completes the setup of the scaling operation. The rung should now consist of three instructions as shown here:



Setting Limit Outputs

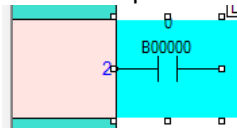
► Next we will add the high and low limit logic to control two digital outputs that will indicate when the analog input is either too high or too low. This logic will be enabled or disabled using an enable bit (**EnableLimits**).

15 First place a Normally Open Contact that can be used to enable / disable the logic rung we are about to create.

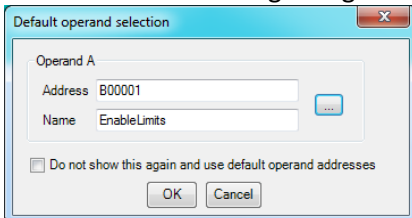
1. Click the NO Contact icon in the Common Objects Toolbar.



2. Click the input to the second rung of the Ladder Diagram to place the contact.



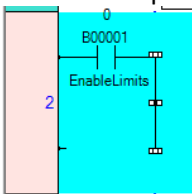
3. Select **EnableLimits** (*B00001*) to use as the tag for this contact and click **OK** in the tag selection window. This will allow this rung of logic to be turn on and off during runtime.



4. This rung will have two lines. One to check the high limit and one to check the low limit. This will require a vertical link to connect both lines to the output of the **EnableLimits** contact. Click the **Vertical Link** icon.

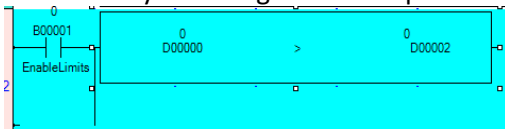


5. Click the output of the **EnableLimits** contact to place the link.

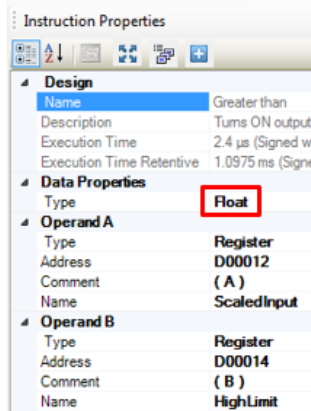


6. The first line will be used to check if the scaled input value is above the high limit. Select the greater than instruction from the Instruction menu (**Compare > Greater Than**)

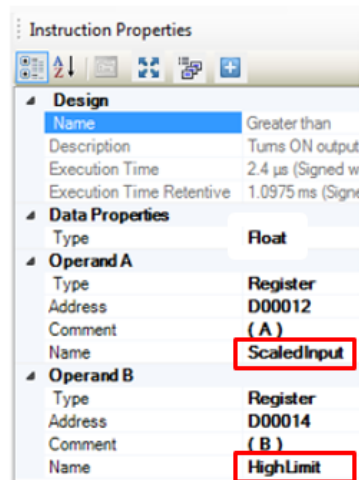
- Click directly to the right of the top of the vertical link to place the instruction




- Click **OK** in the **Default operand selection** popup window to accept the default operands
- After the instruction is placed the **Type** property will need to be changed to **Float**. Do this in the **Instruction Properties** window.



- Use the Instruction Properties grid to select ScaledInput as the Name for Operand A, and HighLimit as the Name for Operand B.

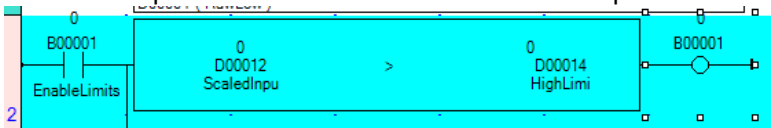


 You must change the instruction type to float before assigning operands because the instruction's default type is unsigned int. Attempting to select our previously created float type tags before changing the instruction's type to float will result in duplicate tags being created of the type unsigned int.

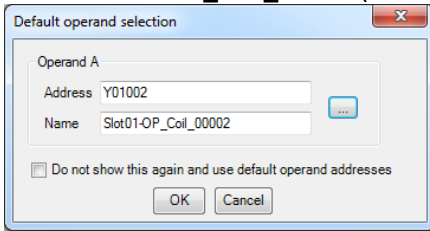
- If the input is above the high limit, the logic will set an output on the I/O card. A standard output coil instruction is used for this purpose. Click the output icon in the Common Objects Toolbar:



- Click the output of the **Greater Than** instruction to place the output.

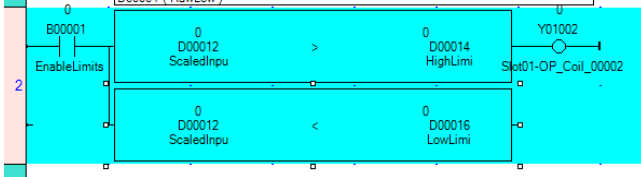


13. Select **Slot01-OP_Coil_00002** (Y01002) as the tag controlled by this output coil and click **OK**.

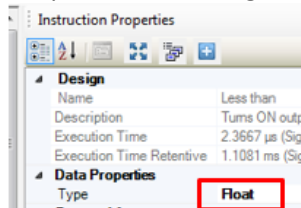


This is the coil controlling the first relay output on the I/O card (terminal Y2).

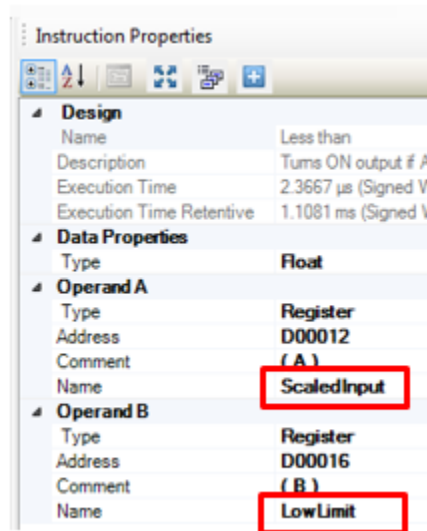
14. To complete this rung, we will add the logic to test the lower limit on the second line of the rung. Add a **Less Than** instruction (**Compare > Less Than**) to the right of the bottom end of the vertical link.




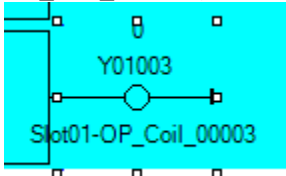
15. Accept the default tags and set the **Type** property to **Float** for this instruction.



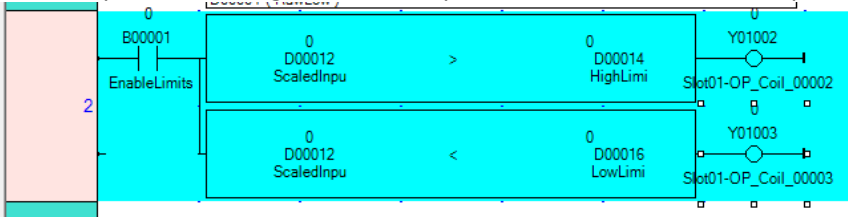
16. Set Operand A to ScaledInput and Operand B to LowLimit.



17. Add an output instruction  to the right of this **Less Than** instruction that sets coil **Slot01-OP_Coil_00003** (Y01003).



This completes the rung to test the input limit conditions. The completed run should look like this:



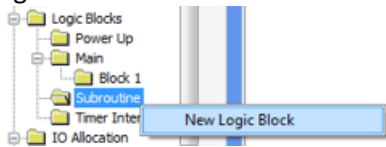
Mapping Inputs to Outputs

The last bit of logic will bind the state of two outputs to the state of two inputs (I/O Following).

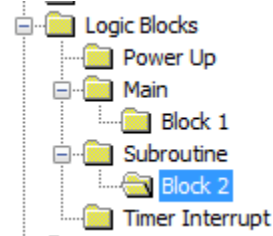
This logic will be enabled or disabled using an enable bit (**EnableIOFollow**) in an input contact. If the output coil instructions were placed on the same rung as this enable contact, the outputs would be forced OFF whenever the enable bit is OFF. We would instead like the outputs to be free to toggle states even if I/O Following is disabled. To accomplish this, the logic will be placed in a separate subroutine logic block, and the enable contact will be used to control whether or not the block is called (evaluated).


16 ► Create a new Subroutine logic block:

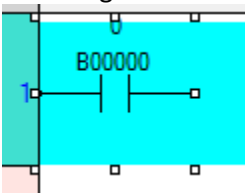
1. Right-click the **Subroutine** folder and select **New Logic Block** from the context menu.



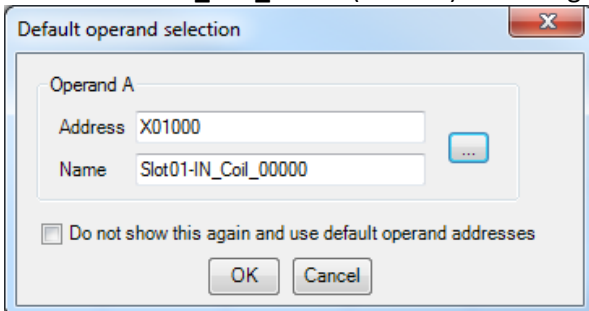
2. **Block 2** is created and a new editor window is opened.




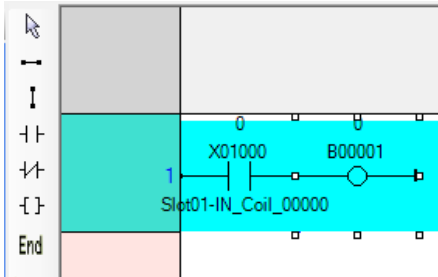
3. Click the Normally Open Contact icon  in the common objects toolbar, then click the input to rung 1 in the logic editor to place the contact.



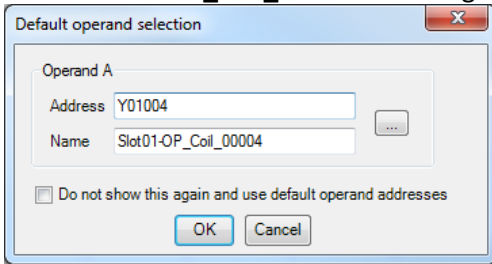
4. Select **Slot01-IN_Coil_00000** (X01000) as the tag to use in this contact.



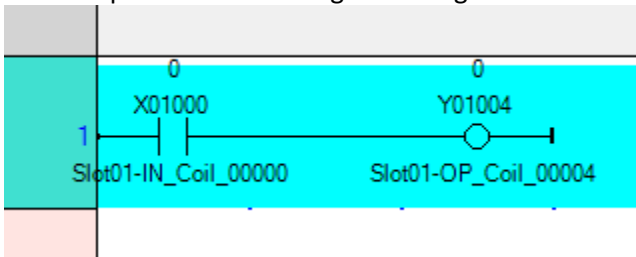
- Click the Output Coil icon , then click the output of the NO Contact to place an Output Coil.



- Select **Slot01-OP_Coil_00004** as the tag controlled by this output.

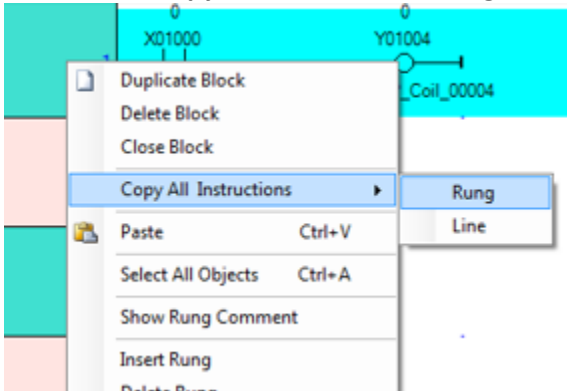


This completes the first rung of this logic block:

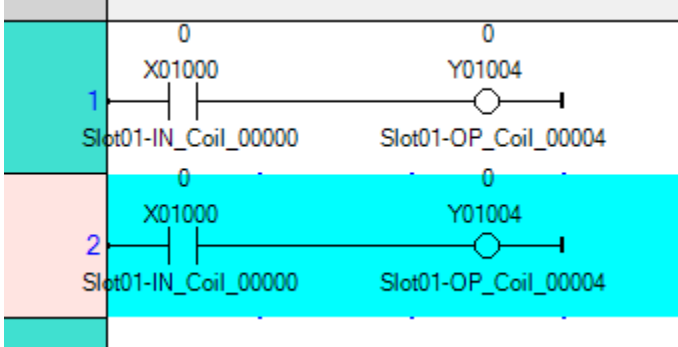


The next rung will be essentially the same, only it will use **Slot01-IN_Coil_00001** for the input contact and **Slot01-OP_Coil_00005** for the output coil.

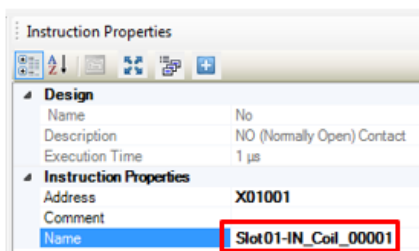
- Start rung 2 by making a copy of rung 1. Right click to the left of the input on rung 1. From the context menu select **Copy All Instructions > Rung**.



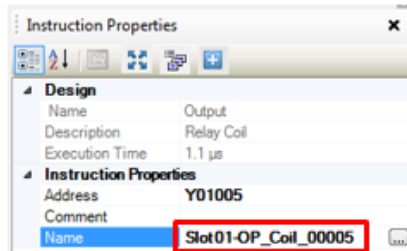
- Right click rung 2. From the context menu, select **Paste**. This will put a copy of the instructions from rung 1 on rung 2.



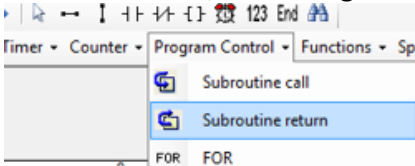
- Click the Normally Open Contact in rung 2 to open the property grid for this instruction. Change the **Name** property from **Slot01-IN_Coil_00000** to **Slot01-IN_Coil_00001**.



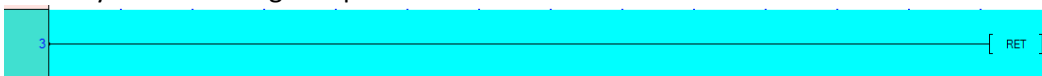
- Click the Output instruction in rung 2 to open the property grid for this instruction. Change the **Name** property from **Slot01-OP_Coil_00004** to **Slot01-OP_Coil_00005**.



- Because this logic block is a subroutine, it must end with a **Subroutine Return** instruction. From the instruction menu, select **Program Control > Subroutine return**.

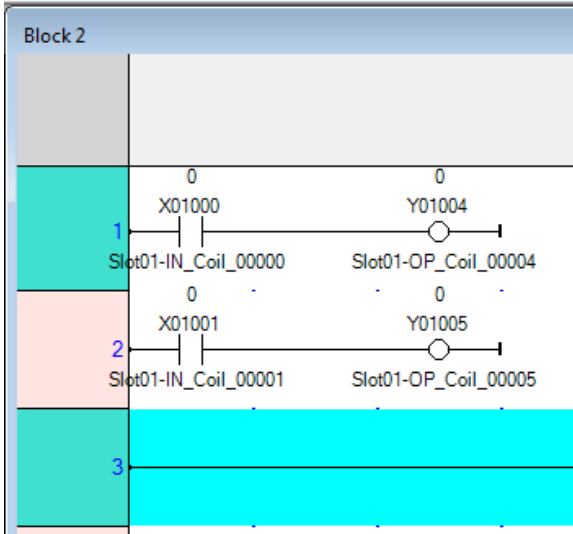


- Click anywhere on rung 3 to place the instruction.

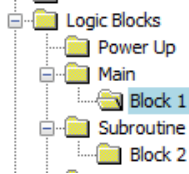



This completes the logic for the subroutine logic block. The completed block should look something like

this:



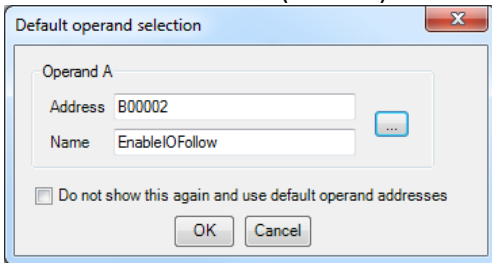
- Finally, we must add a rung to **Block 1** that will call the subroutine. Click the folder for Block 1 in the **Project Information Window** to reopen the Main Block 1 editor.



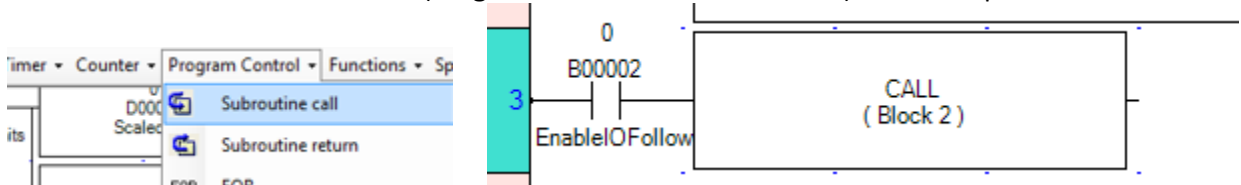
- Click the Normally Open Contact  icon in the common objects toolbar, then click the input to rung 3 to place the contact.



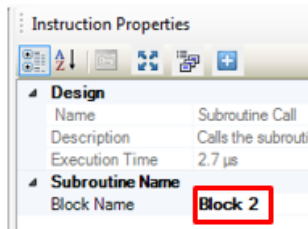
- Select **EnableIOFollow** (*B00002*) as the tag controlling this contact.



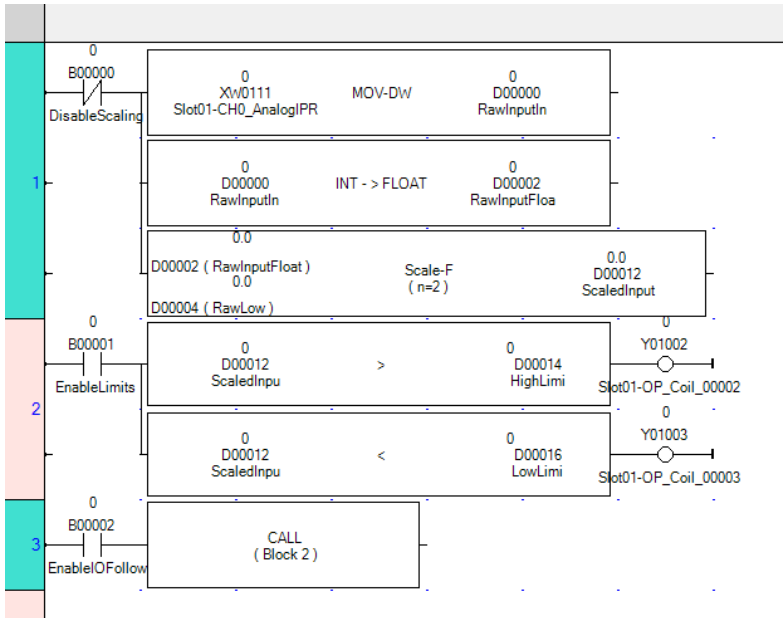
- Place a **Subroutine call** instruction (**Program Control > Subroutine call**) on the output of this contact.




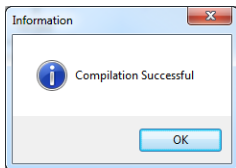
17. Make sure that the **Block Name** property for the subroutine call instruction is set to **Block 2**.



This completes the logic needed for this sample project. The completed logic block (Block 1) should now look something like this:



This is a good time to compile the project to make sure there are no errors. To do this, either click the compile icon: , select **Project > Compile**, or hit F9. A successful compile will show a **Compilation Successful** message:



If there are compile errors, they will be listed in the output window:

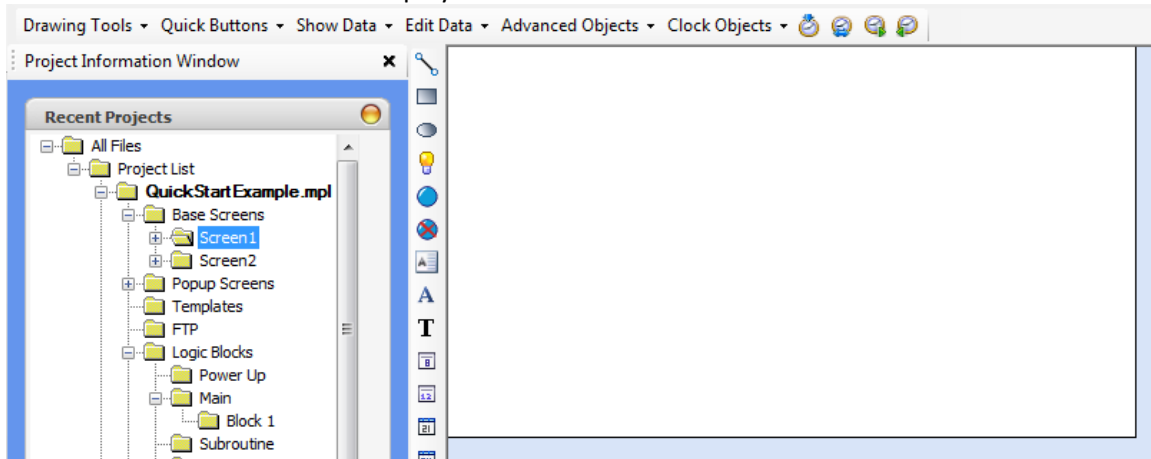
Errors and Warnings ✖ 2 Errors ⚠ 0 Warning			
S. No.	Block Name	Rung Number	Error Description
1	Block 1	3	Open circuit for Instruction.
2	Block 1	3	Open circuit for Instruction.

Fix any errors before moving on.

Screen Objects

- 17 ► To see what the logic is doing in real time, the project needs a couple of HMI screens. This first screen will be used to display the digital I/O points. It will show the current state of input channels X0 and X1 and control the outputs Y4 and Y5. It will also be used to enable and disable the output following logic created in the ladder logic block.

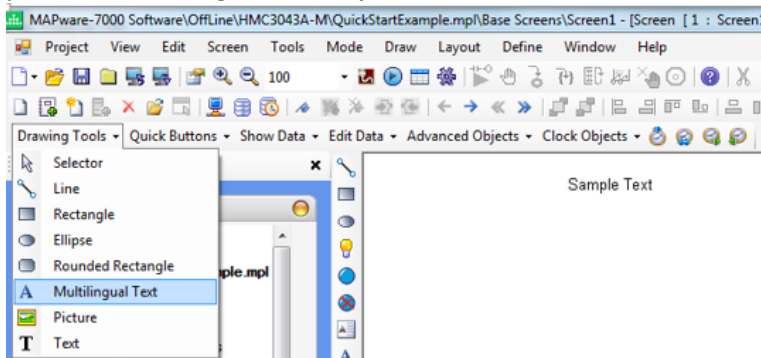
1. In the **Project Information Window**, click to expand the **Base Screens** folder. By default, Screen1 is already present.
2. Click the **Screen1** subfolder to display the work area for Screen1.



Labels

18 ► Before adding data display objects to the screen, we will add labels so that it is clear what data the screen is displaying:

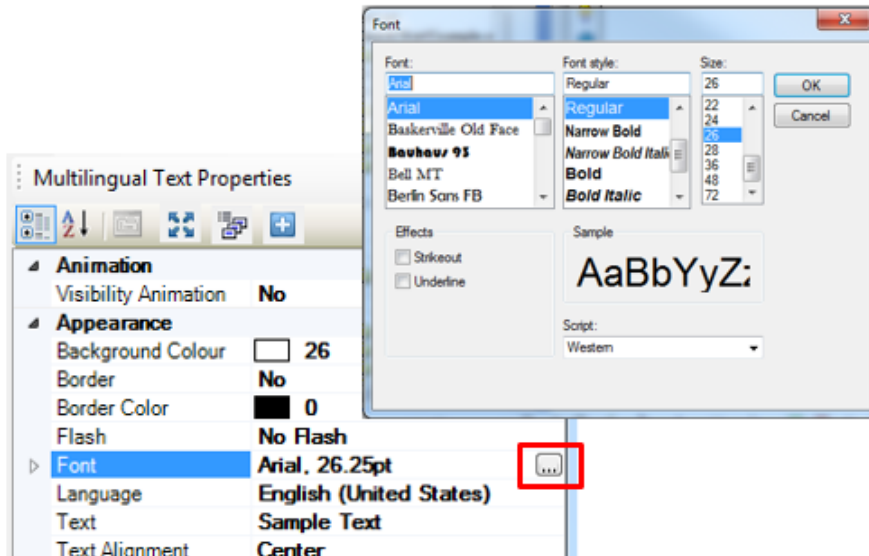
1. Select **Drawing Tools > Multilingual Text** from the Draw menu then click in the window work area to place the Multilingual Text object.



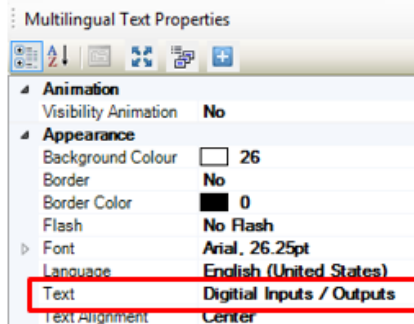
2. This text will provide a title for the window. Select the object and click and drag one of the corner icons to expand its size. Then center the object roughly in the top middle of the screen as shown.




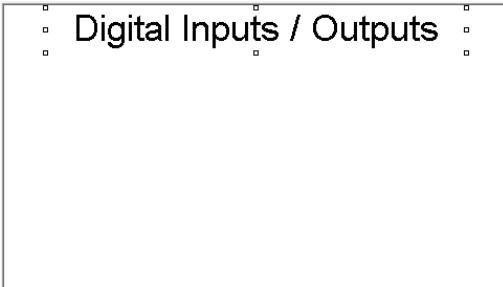
- In the Properties Grid, click the **Font** property and click the ellipsis button at right. Change the font to 26 point.



- Now change the **Text** property to an appropriate title for this screen.

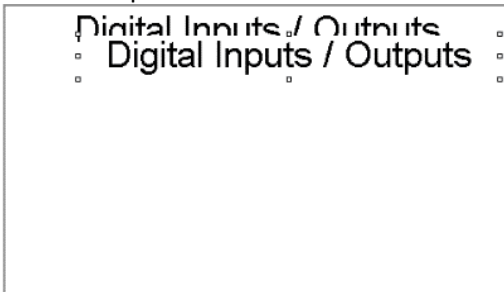


- Expand the text object and use the center horizontal toolbar icon  as needed to reposition the title.

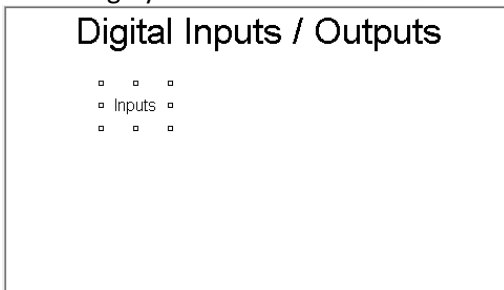


- Create a copy of this Multilingual Text object to use as a label for the input section. Right-click the object and select copy from the context menu. Then Right-click where you would like to place the next label

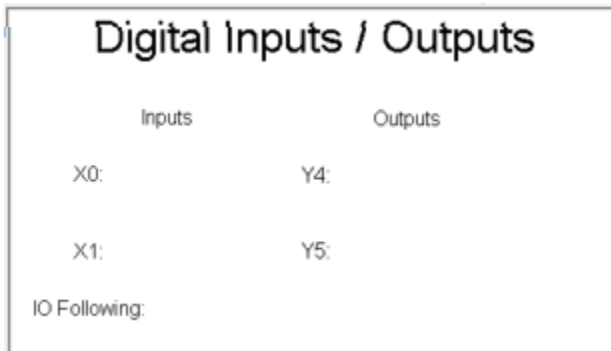
and select paste from the context menu.



7. Change the Font property for the copy to 12 point, and enter **Inputs** for the text property. Position the label roughly as shown.




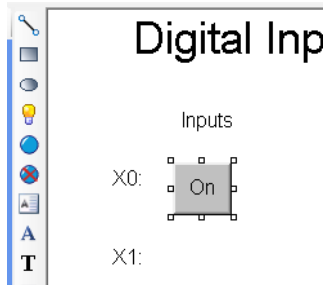
8. Continue to make copies to create the following labels as shown [Inputs, Outputs, X0:, X1:, Y4:, Y5:, and IO Following:].



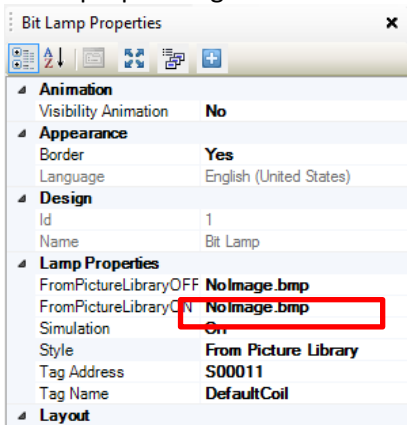
Bit Lamps


19 ► With the labels in place, we will now add bit lamps to monitor the state of the two inputs.

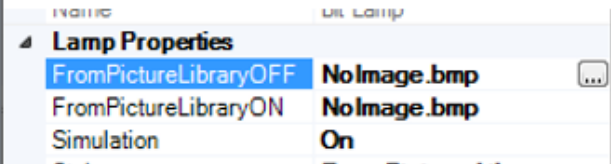
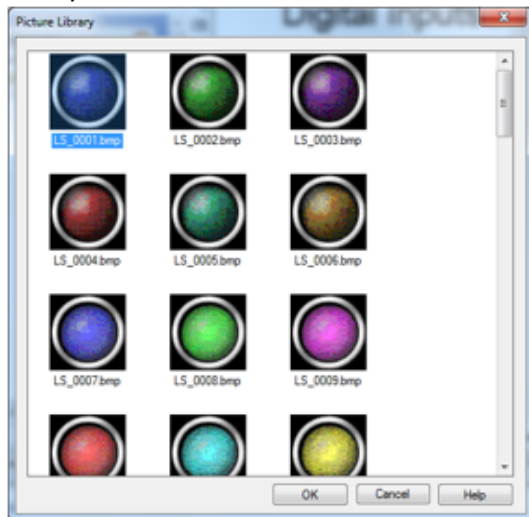
1. Click the Bit Lamp icon , then click the screen to the right of the label for X0.




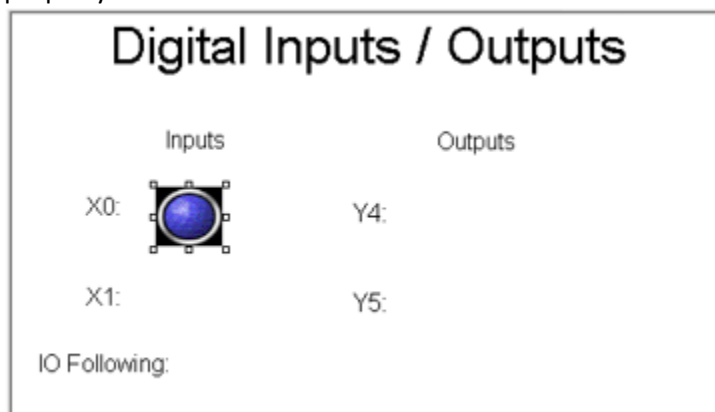
- In the properties grid for this Bit Lamp, change the **Style** property to **From Picture Library**.




- Click the field for the **FromPictureLibraryOFF** property then click the ellipsis button  to open the library browser.



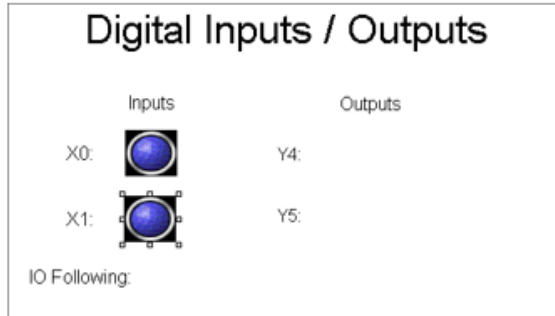
- Click any of the lamps, then click **OK** to select it.
 Note: this will automatically select the corresponding ON image for the **FromPictureLibraryON** property.



- Click the **Tag Name** property, then click the ellipsis button: . Select **Slot01-IN_Coil_00000** as the tag to use for this bit lamp.

Tag Address	X01000
Tag Name	Slot01-IN_Coil_00000

- Make a copy of this bit lamp, and place it to the right of the **X1:** label.



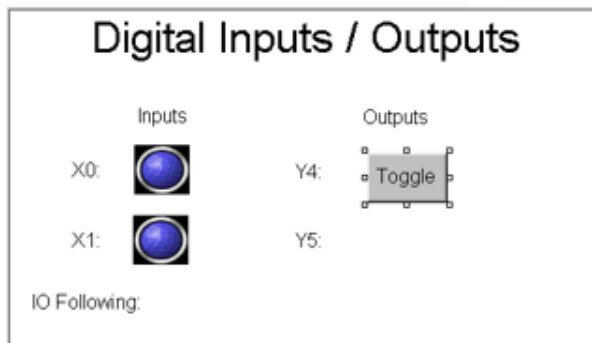
- Click the new bit lamp so that its property grid is shown. Change the **Tag Name** property from **Slot01-IN_Coil_00000** to **Slot01-IN_Coil_00001**.

Tag Address	X01001
Tag Name	Slot01-IN_Coil_00001

Toggle Bit Objects

- Next, we will add Toggle Bit objects to control the outputs and enable/disable the I/O following rung of logic.

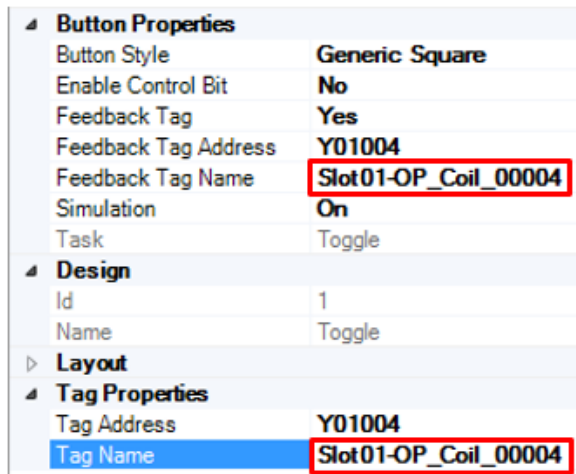
- From the Draw toolbar select **Advanced Objects > Buttons > Bit Action > Toggle Bit**. Click to the right of the label for output Y4 to place the Toggle Bit button.



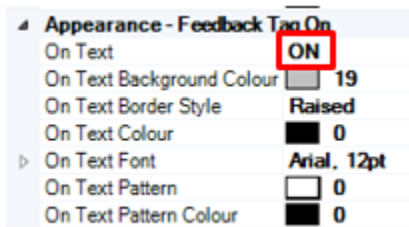
- In the properties grid for this Toggle Bit object change the **Feedback Tag** property to **Yes**. This allows a tag to control the appearance of the Toggle Bit object on the screen. It can be set to the same tag that the object is controlling, or to a different tag

Button Properties	
Button Style	Generic Square
Enable Control Bit	No
Feedback Tag	Yes
Feedback Tag Address	S00011
Feedback Tag Name	DefaultCoil

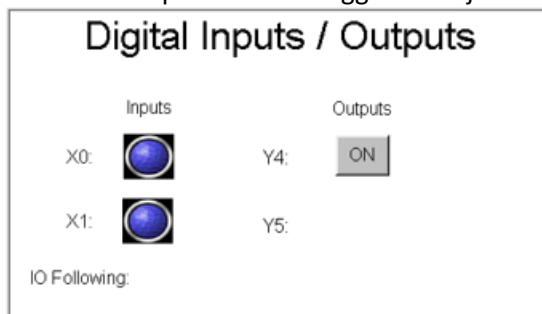
3. Select **Slot01-OP_Coil_00004** for both the **Feedback Tag Name** property and the **Tag Name** property.



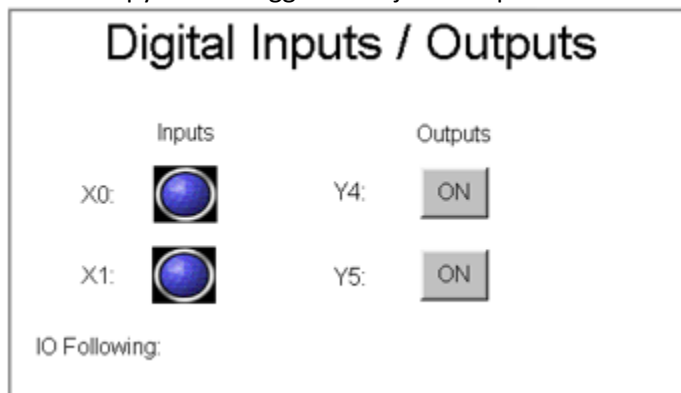
4. In the **Appearance – Feedback Tag On** section, change the **On Text** property to **ON**.



5. Resize and reposition the Toggle Bit object as needed to fit next to the Y4: label.



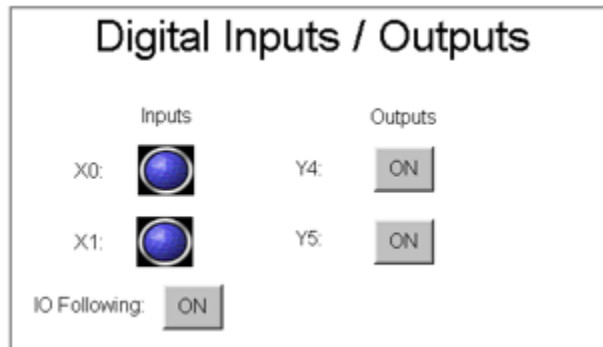
6. Make a copy of the Toggle Bit object and place it to the right of the Y5: label.



- In the properties for the new Toggle Bit object set both the **Feedback Tag Name** and **Tag Name** properties to **Slot01-OP_Coil_00005**.

Button Properties	
Button Style	Generic Square
Enable Control Bit	No
Feedback Tag	Yes
Feedback Tag Address	Y01005
Feedback Tag Name	Slot01-OP_Coil_00005
Simulation	On
Task	Toggle
Design	
Id	2
Name	Toggle
Layout	
Tag Properties	
Tag Address	Y01005
Tag Name	Slot01-OP_Coil_00005

- Create one more copy of the Toggle Bit object and place it to the right of the IO Following: label.



- In the property grid for this object, select **EnableIOFollow** for both the **Feedback Tag Name** and **Tag Name** properties.

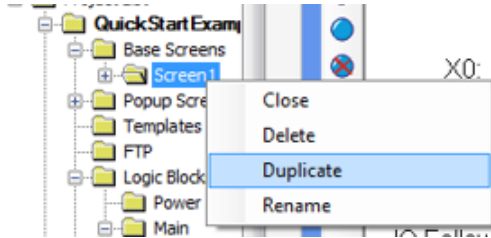
Button Properties	
Button Style	Generic Square
Enable Control Bit	No
Feedback Tag	Yes
Feedback Tag Address	B00002
Feedback Tag Name	EnableIOFollow
Simulation	On
Task	Toggle Bit
Design	
Id	12
Name	Toggle
Layout	
Size	47, 35
Top Left	122, 220
Tag Properties	
Tag Address	B00002
Tag Name	EnableIOFollow

That is all the objects that will be displayed on this screen.

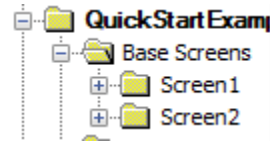
Duplicating a Screen

21 ► To save time setting up the next screen, we will duplicate this first screen and use it as a starting point for the second.

1. Right-click the **Screen1** folder in the **Project Information Window** and select **Duplicate** from the context menu.

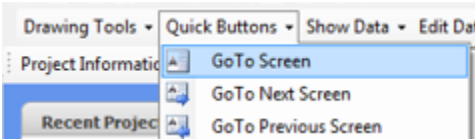


2. You should now see two screens listed in the project tree.

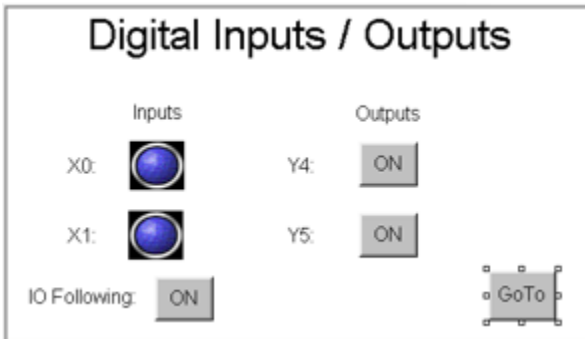


The editor screen has changed to the new **Screen2**, even though it looks exactly the same as **Screen1** because it is a duplicate.

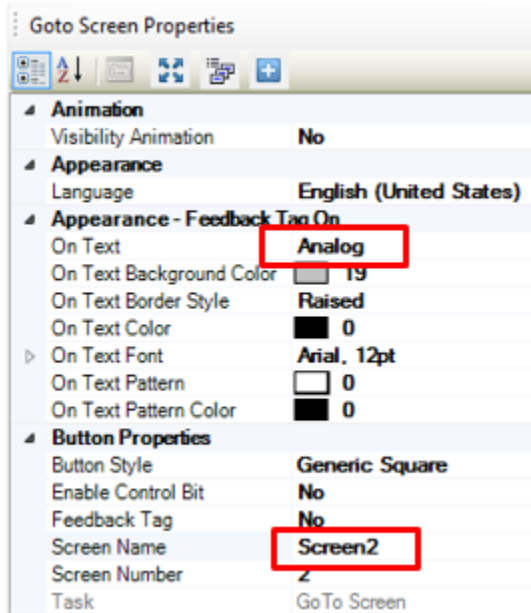
3. Before moving on to Screen2, we need to add a navigation button to Screen1 that opens Screen2. Click the **Screen1** folder to switch back to the editor window for that screen.
4. From the Draw toolbar select **Quick Buttons > GoTo Screen**



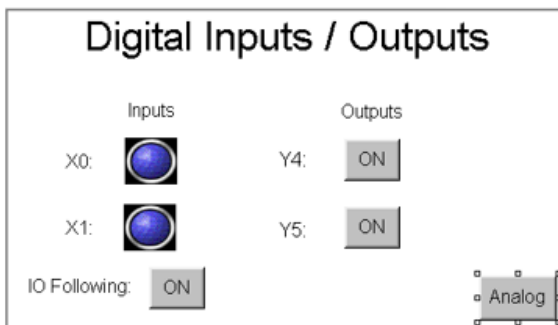
5. Click in the lower right of the screen to place the navigation button.



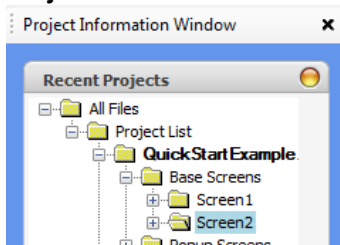
- In the Property Grid for the **GoTo Screen** button change the **On Text** property to **Analog**, and the **Screen Name** property to **Screen 2**.



- Resize and reposition the **GoTo Screen** button so that it fits neatly in the bottom right of the screen.



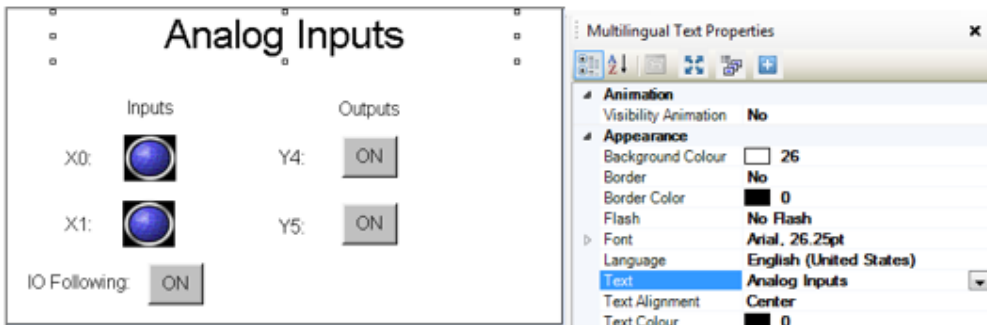
- Screen 2 will be edited next. This screen will be used to monitor analog input channel zero, along with the scaling and limits functionality created earlier in the logic blocks. Click the **Screen2** folder in the **Project Information Window**.



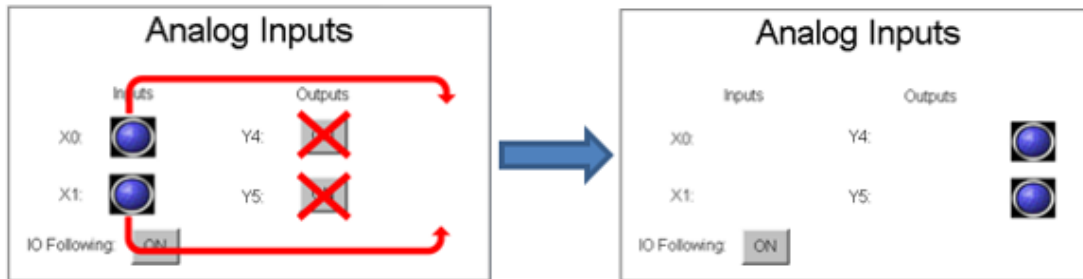
Screen2, looking exactly the same as **Screen1** without the **GoTo Screen** button, will appear in the work area.

► Modify labels and objects.

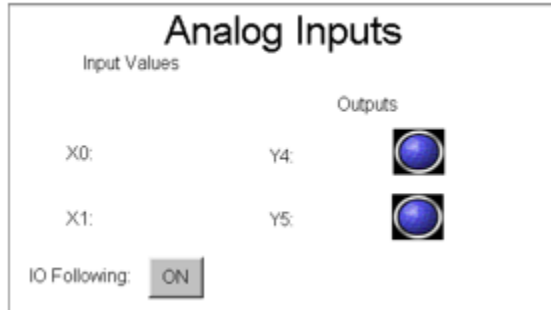
- To edit the text of an existing label, simply click the label to open its property grid. Then enter the desired text in the **text** property. Edit the title of Screen2 so that it reads: **Analog Inputs**.



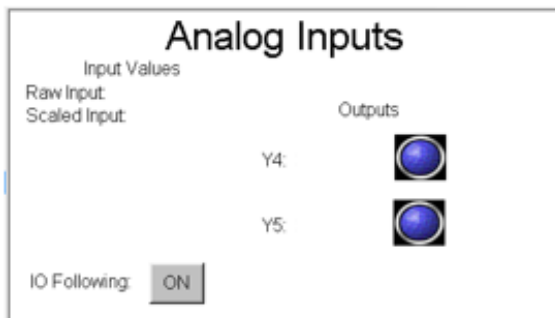
- To save time, use existing objects as starting points for new objects. Delete the two **Toggle Bit** objects for **Y2** and **Y1**, and move the two **Bit Lamp** objects to the right.



- Change the **Inputs** label so that it says **Input Values** and move it upward to make some room.




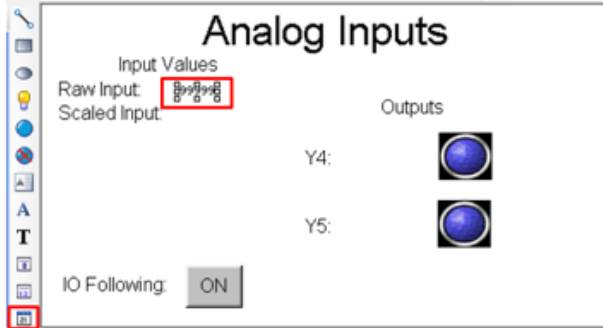
- The raw input and scaled input will be displayed under this **Input Values** section of the screen. Change the text property of the **X0:** label to **Raw Input:** and the text property of the **X1:** label to **Scaled Input:**. Move these two labels below the **Input Values** label as shown.



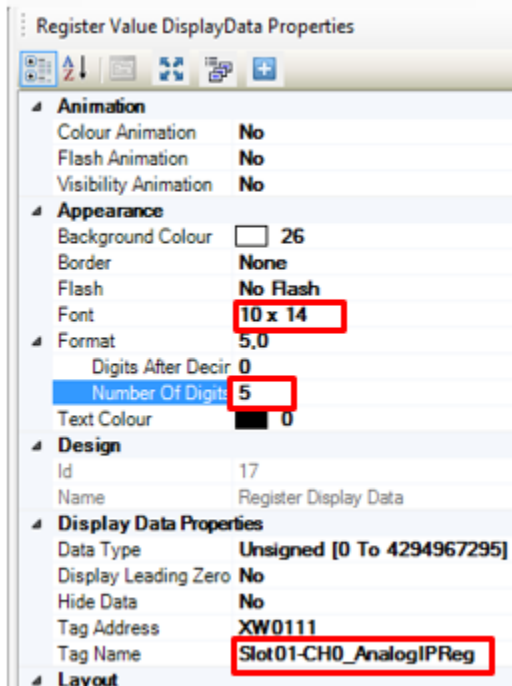
Numeric Displays

22 ► Next we will configure **Numeric Display** objects to show the raw input value and the scaled input value.

1. From the common objects toolbar click the numeric display icon , then click to the right of the **Raw Input** label.



2. In the property grid for this numeric display object, set the **font** property to **10 x 14** and the **Tag Name** property to **Slot01-Ch0_AnalogIPReg**. In the **Format** section, change the **Number Of Digits** to **5**.

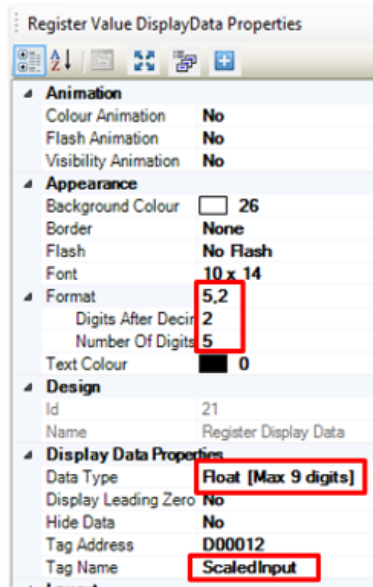


3. Create a copy of this Numeric Display object and paste it directly below to use as the scaled input display.

Input Values
Raw Input: 99999
Scaled Input: 99999

- In the property grid for the **Scaled Input** numeric display, change the **Format > Digits After Decimal** property to **2**, the **Data Type** property to **Float**, and the **Tag Name** property to **ScaledInput**.

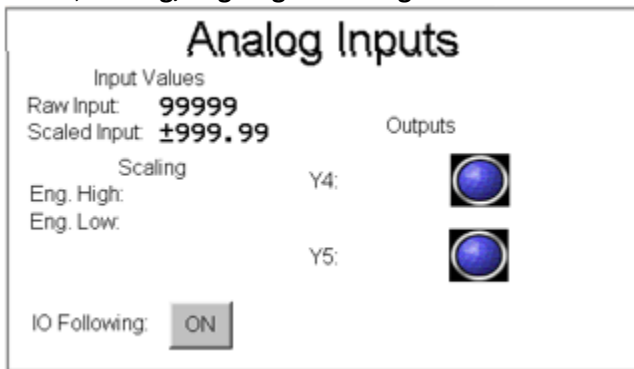
Input Values
 Raw Input: 99999
 Scaled Input: ±999.99



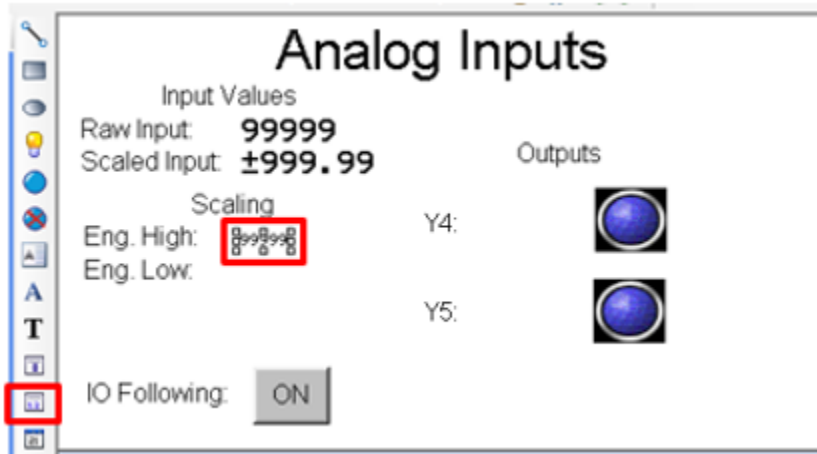
Numeric Entry

- Next we will place two **Numeric Entry** objects to allow the engineering scale for the input to be changed during runtime.

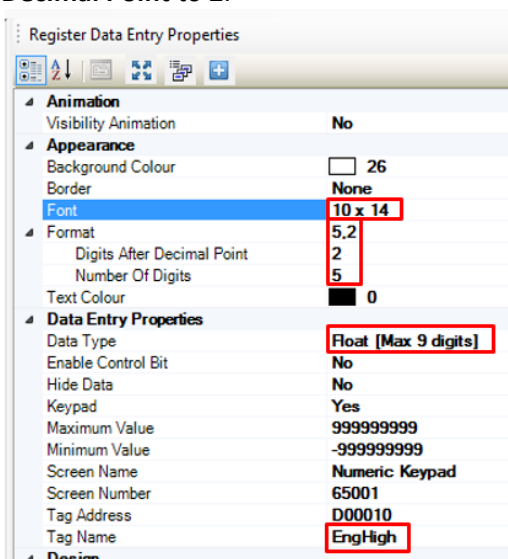
- Copy the labels from the **InputValues** section, paste them and edit the text properties of the copies to create; **Scaling, Eng. High:** and **Eng. Low:** labels as shown.



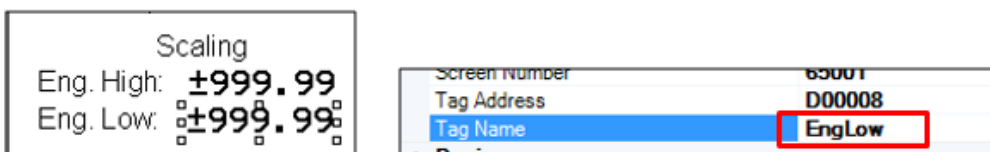
- From the Common Objects Toolbar, click the **Numeric Entry** icon , then click to the right of the **Eng. High:** label.



- In the property grid for the new Numeric Entry object set; the **Font** property to **10 x 14**, the **Tag Name** to **EngHigh**, the **Data Type** to **Float**, the **Format > Number Of Digits** to **5**, and the **Format > Digits After Decimal Point** to **2**.

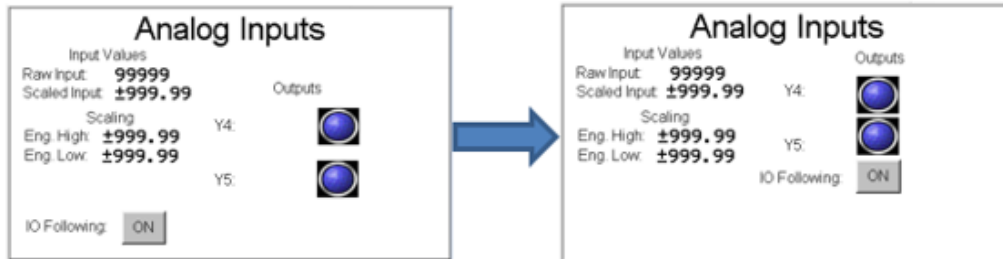


- Create a copy of this Numeric Input object and paste it directly below the original to create a Numeric Input for **EngLow**. Change the **Tag Name** property from **EngHigh** to **EngLow**.

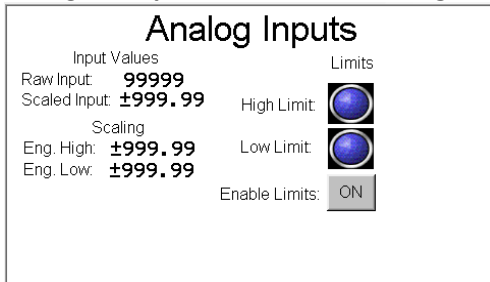


The last section of **Screen2** will display the limit indicators controlled by the ladder logic program. The existing bit lamps and toggle bit object will be modified for this section. Two numeric entry objects will be added, allowing the limits to be adjusted.

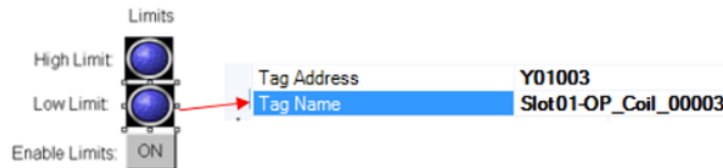
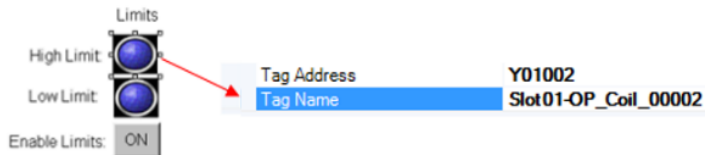
- Rearrange the existing objects as shown



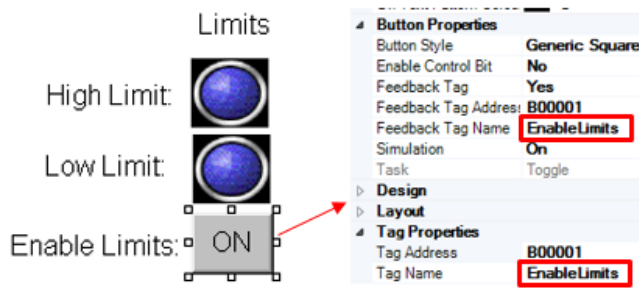
- Modify the **Text** property of the four multilingual text object labels on the right side of the screen. Change; **Outputs** to **Limits**, **Y4:** to **High Limit:**, **Y5:** to **Low Limit:**, and **I/O Following:** to **Enable Limits:**.



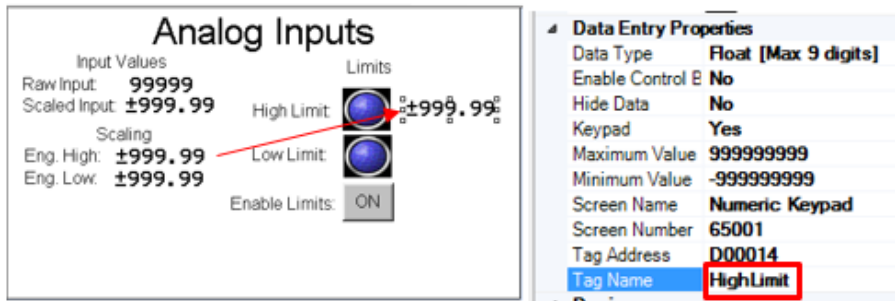
- Change the TagName property for the HighLimit bit lamp from Slot01-IN_Coil_00000 to Slot01-OP_Coil_00002. Change the Tag Name property in the LowLimit bit lamp from Slot01-IN_Coil_00001 to Slot01-OP_Coil_00003.



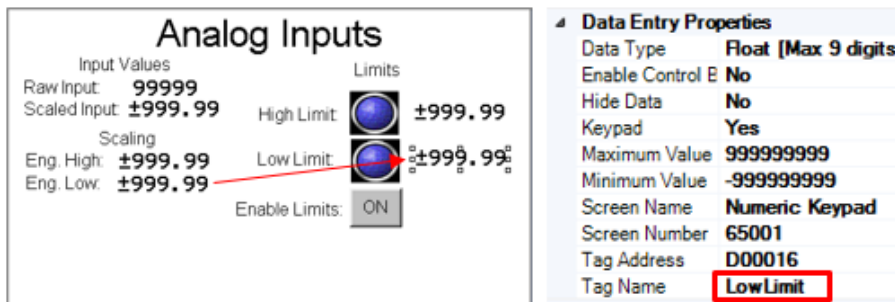
- Change both the **Feedback Tag Name** and **Tag Name** properties in the Enable Limits toggle bit object from **EnableIOFollow** to **EnableLimits**.



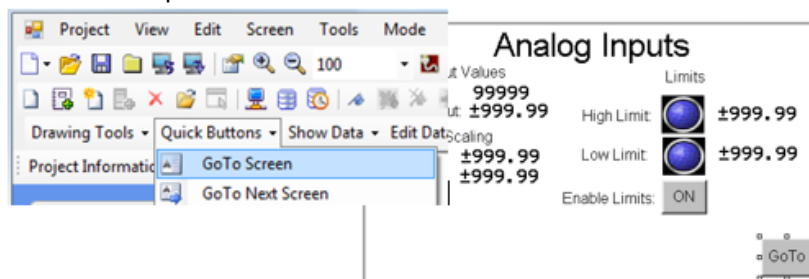
9. Create a copy of the Eng. High: Numeric Entry object and paste it to the right of the High Limit: Bit Lamp object. Change the **Tag Name** property in this new Numeric Entry object from **EngHigh** to **HighLimit**.



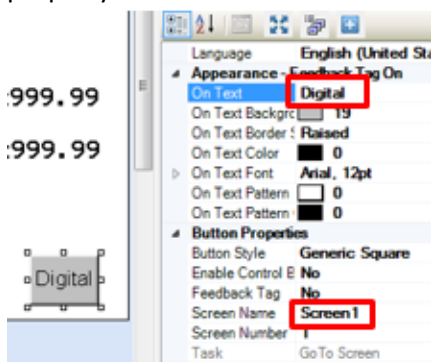
10. Create a copy of the Eng. Low: Numeric Entry object and paste it to the right of the Low Limit: Bit Lamp object. Change the **Tag Name** property in this Numeric Entry object from **EngLow** to **LowLimit**.



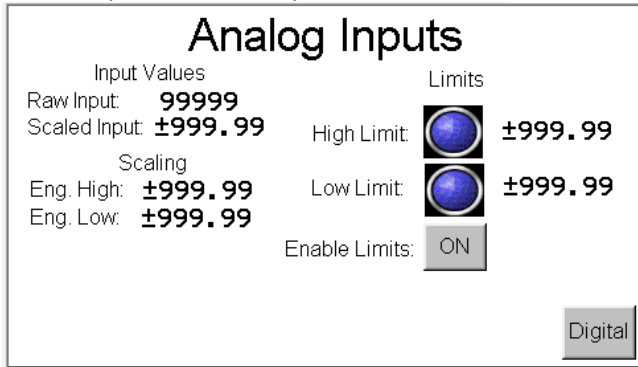
11. To complete the second screen add a **GoTo Screen** button allowing the operator to navigate back to **Screen1**. Select **Quick Buttons > GoTo Screen** from the Draw Toolbar. Click in the lower right corner of the screen to place the button.



12. In the property grid for the new button, set the **On Text** property to **Digital** and the **Screen Name** property to **Screen1**.



This completes the set up for the second screen. The finished Screen 2 should look something like this:



The project is now complete and ready to be downloaded to the HMC hardware.

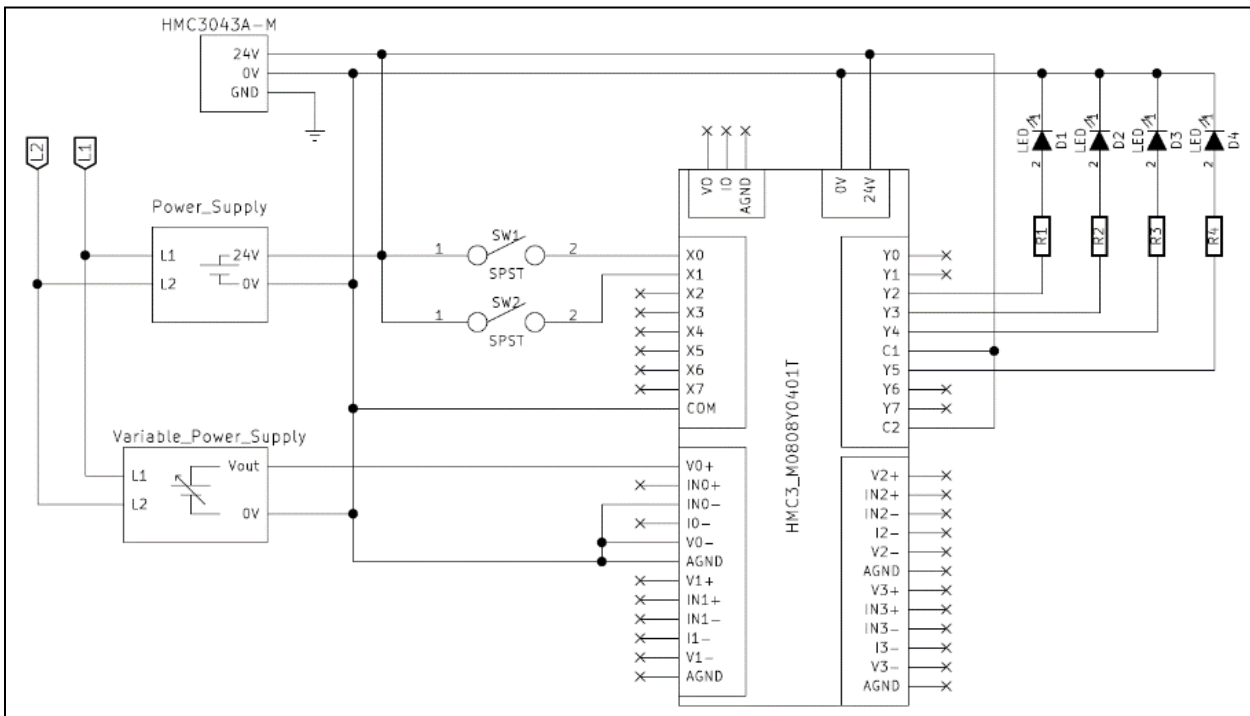
Testing the Project

Test Hardware Setup

Install the HMC3-M0808Y0401T expansion module into the expansion slot of the HMC3043A-M. Connect the HMC3043A-M to a 24VDC power supply. Connect the 0 and 24VDC connectors on the HMC3-M0808Y0401T to the 24VDC power supply.

See the *HMC3000 I/O Guide* and appropriate *Quick Start Guide* for more detail on how to install the expansion module.

A simple test circuit to control the inputs and view the outputs is shown below.



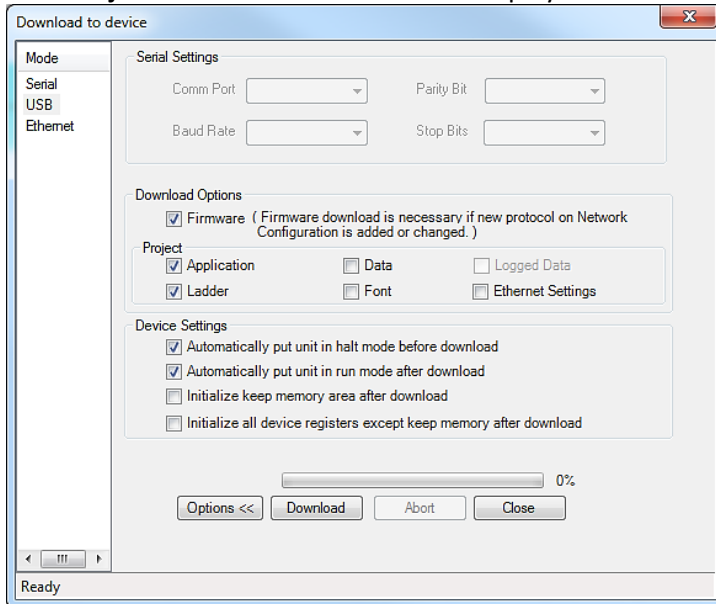
If indicator LEDs or lamps are not available, the continuity function on a digital multi-Meter can be used to test the state of the relay outputs. For outputs Y2, Y3, and Y4, test continuity between C1 and the output pin. For output Y5 test continuity between C2 and Y5. Do not connect 24V to C1 and C2 in this case.

Downloading the Project

This step assumes that you are using a USB download cable. If not, please consult **Chapter 2 – Software Tour**.

24 ► To download the project.

1. Connect a Micro USB download cable (PN: 7431-0019) between your programming computer and the HMC USB Slave Port.
2. Click **Project > Transfer > Download** to display the Download dialog box:

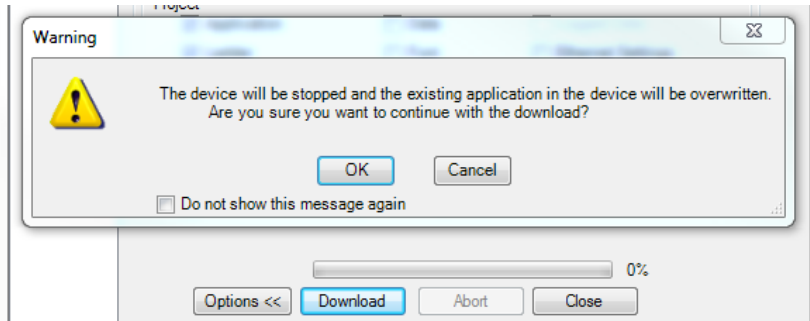


Under Download Options, check Firmware.

Under Project, check Application and Ladder.

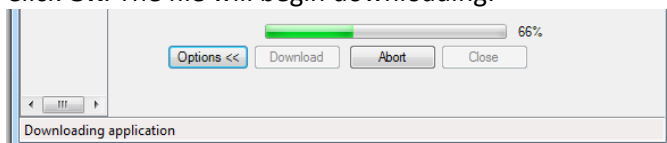
Under Device Settings, check 'Automatically put unit in halt mode' and 'Automatically put unit in run mode'

3. Click the Download button.

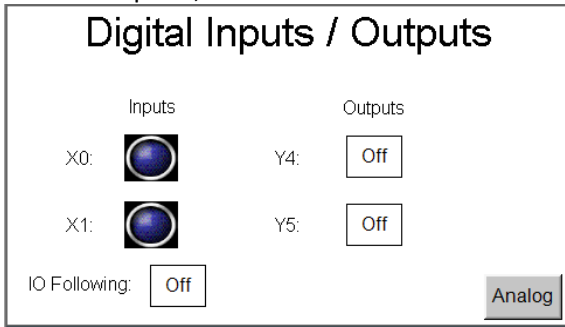


☞ Check the 'Do not show this message again' to hide this warning message on future downloads during this session.

4. Click **OK**. The file will begin downloading:

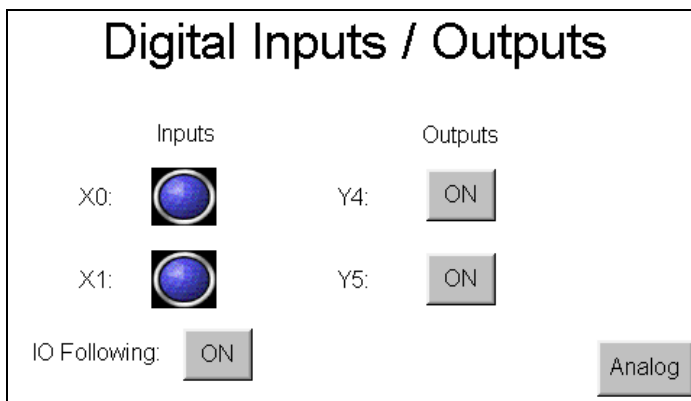


- When complete, the HMC3043A-M will reinitialize and display the application:

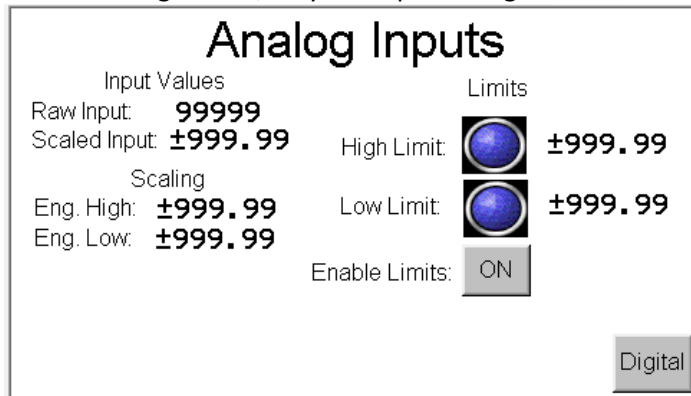


Running the Application

- Application test procedure.



- Toggle the output toggle bit buttons. Verify that the corresponding outputs come on.
- The bit lamp indicators should change state when the corresponding input switch is closed.
- Enable the I/O following feature and verify that the outputs do indeed follow the state of the inputs.
- On the analog screen, vary the input voltage and watch the raw and scaled values change.



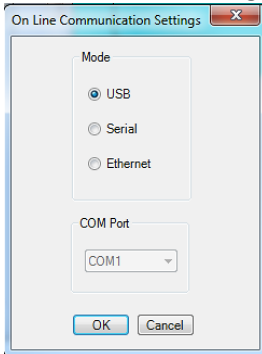
- Enable the High/Low limits and vary the input voltage to see Y2 and Y3 toggle on and off at each limit.
- Touch the High and Low limit numeric entry objects to change the values on the fly and verify that Y2 and Y3 toggle on and off at the new limits.
- Do the same for the Eng. High and Eng. Low to change the output scale of the scaling instruction.

Online Monitoring

With the project running in the HMC and the USB download cable still attached, MAPware can be used to monitor logic block execution in real time.

26 ► To begin an online monitoring session.

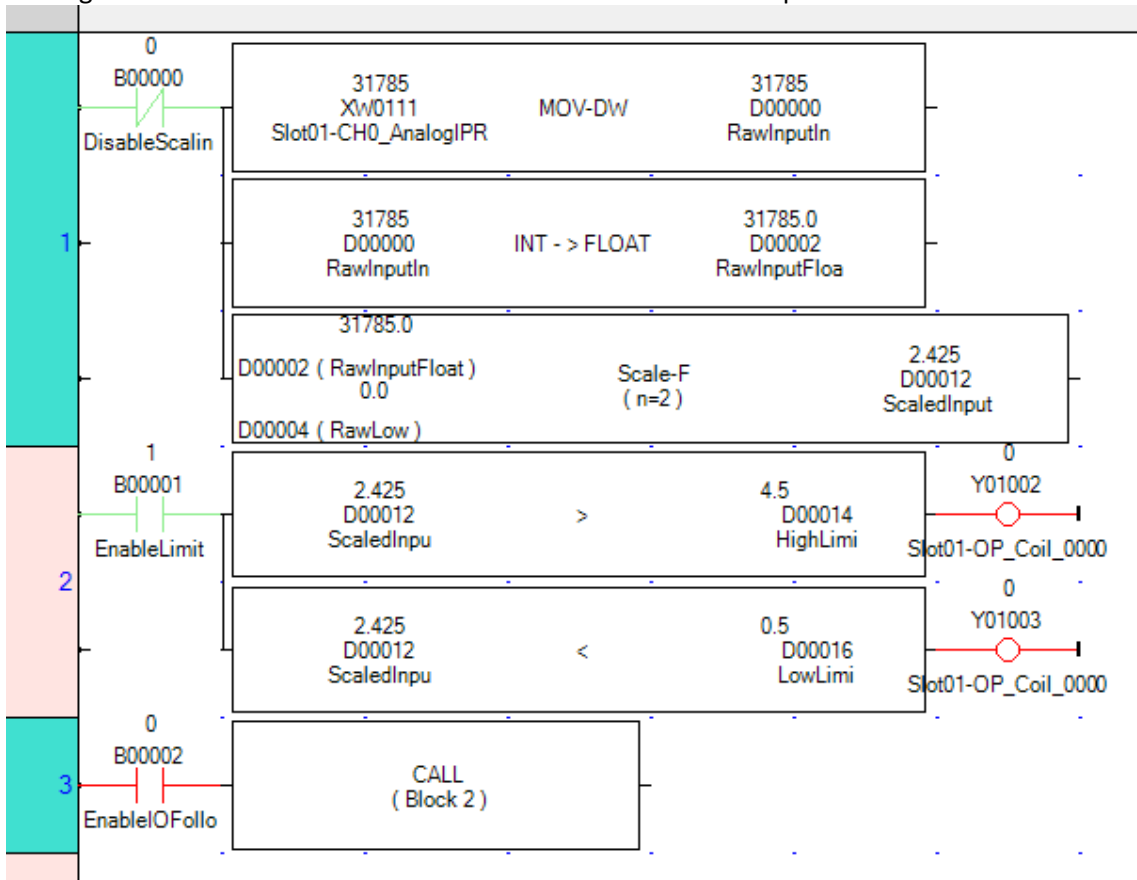
1. Open the editor for **Block 1**
2. Select **Tools > Preferences > Online Communications Mode** to select the communication method used for online monitoring.



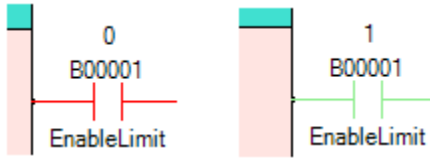
☞ If using Ethernet, the IP address of the HMC must be entered in this window. Here we assume USB is selected.

3. Select **Mode > Online > Without Upload** from the menu bar. This mode will use the currently open project to go online with the selected HMC.

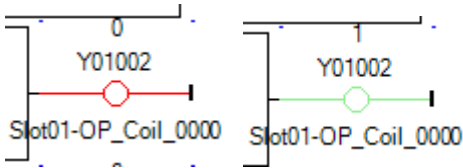
The logic block will be shown with the current values above the operands.



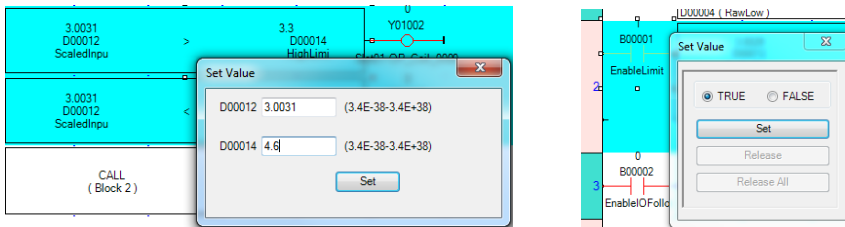
Contacts and coils are color coded according to their current state. Contacts are red when open (off), and green when closed (on).



Output coils are green when energized (on) red when not energized (off).



Values can be changed from within the logic block editor. Double click the contact or operand to be changed, and enter the state or value as needed:



For more information on using online monitoring mode or debugger mode, refer the *MAPware Ladder Logic Guide*, or the *IEC 61131-3 Programming Guide*.

Review

Before leaving this chapter, let's review what has been learned. Although not all of the features available in MAPware or the HMC Series have been covered, we have taken our first steps in using this software and becoming familiar with device operation. Consider what has been accomplished:

- A new project was created, and configured for an HMC model, including setting up and configuring an expansion module.
- The tag database was used to create new tags using internal HMC memory as well as I/O module registers.
- Two screens were created using data display, data entry and navigation objects.
- The project showed how to create a simple ladder logic program using Logic Blocks, including a subroutine block.
- The project was saved, compiled, and downloaded into the HMC.
- Online monitor mode was used to view the application as it executed.

The rest of this manual will go into greater detail on the many features available in the HMC Series, beginning with a more in-depth discussion on tags and screen features.

Chapter 4 – Tags

What are tags?

Tags are names assigned to internal memory registers of the HMC, contacts of an expansion module, and any PLC data registers/coils of an external PLC. Some system tags are predefined when you first begin a project (see **Predefined System Tags** below). Other tags are created by the programmer. For example, you must create and assign a tag to every PLC memory address that you wish to read/write to. When using the optional I/O Expansion modules tags are created in order to use them. The Tag Database collects and stores all tags for review and editing.

Once a tag is assigned, you can easily link any object (i.e. bit lamp, numeric register, etc.) to the tag. Tags have several advantages:

- Tags provide an organized method of tracking all memory addresses used in a project.
- Tags are much more descriptive of functionality than the name of the memory address.
- Tags are more easily edited, should a change be required.
- Tags can be exported and imported into other MAPware projects, regardless of which HMC unit is selected.

Tag Types and Addresses (Native Ladder vs. IEC 61131-3)

Tags created by the user are classified into different types which are stored in different memory locations on the HMC. How these tags appear to the user differs somewhat depending on whether the project is created in Native Ladder mode or in IEC 61131-3 mode.

In Native Ladder projects, tags are defined with a specific address in the HMC's memory. These addresses are grouped into different address spaces according to how a tag defined in each space is intended to be used. Examples are; D registers (general purpose data registers for 16 or 32 bit data), B registers (single bit internal registers), SW (S) registers (System tags that control how the HMC hardware functions). For a complete list and information on each of the available address spaces refer to MQTT

. In some circumstances IEC 61131-3 tags are assigned specific addresses. For example, retentive registers are assigned addresses and tags that are intended to be accessed from an external PLC using the HMC as a Modbus RTU slave can be assigned a Modbus address.

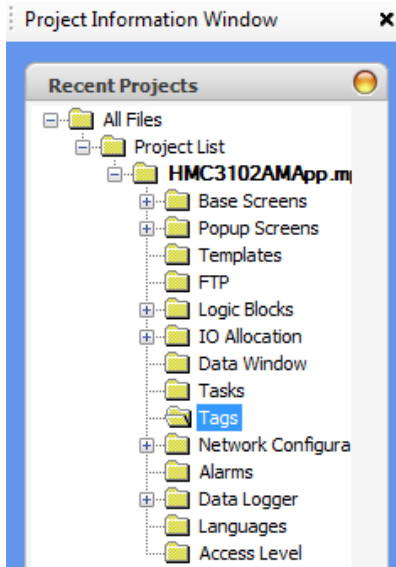
Predefined System Tags

In addition to user-defined tags, the tag database contains tags assigned to internal memory coils (bits) and registers of the HMC. These internal memory registers have predefined functions (e.g. beeper control, screen saver timer, RTC settings, etc.) which may be useful in your project. For more information on these predefined system tags, see **Appendix B – System Tag Memory**.

Creating and Modifying a Tag

To create a new tag and assign it to an internal memory address or PLC address, you must first open the tag database:

- Click **Define > Tag Database** from the standard menus or
- Click the Tag Database icon  located in the Layout Toolbar or
- Click the **Tags** folder in the **Project Information Window**.



The tag database displays:

MAPware-7000 Software\Offline\HMC3102A-M\HMC3102AMApp.mpl\Tags

Project View Tools Mode Define Help

100

Drawing Tools Quick Buttons Show Data Edit Data Advanced Objects Clock Objects

Project Information Window

Tag Name Tag Address Add Tag

Tag No	Tag Name	Tag	Attribute	Tag Address	Port	Node	Node Name	Tag Category	Export Tag
1	Language	2	Read Write	SW0001	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
2	Logger memory % usage	2	Read Only	SW0002	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
3	Logger memory full status	bit	Read Only	SW0003_00	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
4	Logger memory clear status	bit	Read Only	SW0003_01	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
5	RTC status	bit	Read Only	SW0003_02	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
6	COM 1 status	bit	Read Only	SW0003_14	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
7	COM 2 status	bit	Read Only	SW0003_15	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
8	Historical alarm count	2	Read Only	SW0004	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
9	Screen trigger register	2	Read Write	SW0005	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
10	Screen saver time	2	Read Write	SW0006	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
11	RTC day of month	2	Read Only	SW0010	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
12	RTC month	2	Read Only	SW0011	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
13	RTC year	2	Read Only	SW0012	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
14	RTC hour	2	Read Only	SW0013	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
15	RTC min	2	Read Only	SW0014	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>
16	RTC sec	2	Read Only	SW0015	-	0	HMC3102A-M	Default Tag	<input type="checkbox"/>

Each assigned tag in the database has attributes arranged and presented as columns:

- **Tag No.** – This is the tag number assigned to the tag when created. Tags are assigned in numerical order.
- **Tag Name** – When you create a tag, you must provide a name for the tag.
- **Data Type** (IEC 61131-3 projects only) – Defines the type (BOOL, INT, DINT, etc.) of the tag.

- Tag (Native Ladder projects only) – Specifies the size of the tag in bytes (1, 2, 4, or bit). For some system tags the data may occupy either the high or low byte of a two byte register. If that is the case High or Low will be specified in this column.
- Tag Address – this is the specific internal memory address or PLC memory address assigned to the tag.
- Port – If the address assigned to the tag comes from one of the external ports (i.e. Com1, Com2, Ethernet), then the port is shown.
- Node Name – where the tag memory address is located (i.e. internal memory or external connection to a PLC).
- Tag Category – either Default Tag (predefined tag) or User Defined Tag (programmer defined).
- Export Tag – checkbox to select which tags to export in a Tag Export operation.

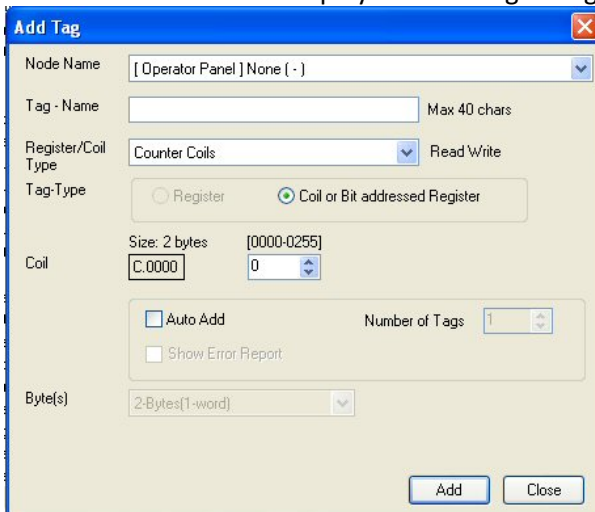
To modify the tag database, use the buttons displayed in the Tag Database popup window (see above) or right-click the Tags folder in the **Project Information Window** to display a popup dialog box:



Adding a New Tag

27 ► In the Tag Database, perform the following steps to add a new tag:

1. Click the Add button to display the Add Tag dialog box:



2. Node Name: click the list to select the node (i.e. internal memory or PLC communications driver attached to the COM/Ethernet ports) where the target address is located.
3. Tag Type: options are Register and Coil/Bit Addressed Register. If both options are available then the memory area selected is interpreted by the HMC as either a data register or a bit.
4. Coil/Register: The first field (Size: 2 bytes, 1 bit, etc.) indicates how much memory is allocated to each address in this memory range. The enclosed address underneath represents the particular address

targeted after entries are made in the 'address input' fields located to the right. Below are some examples:

HMC internal address

GE Fanuc Micro Address

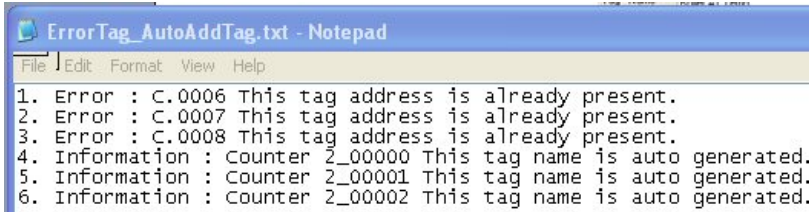
Allen Bradley MicroLogix Address

5. Auto-add: By checking this option, you can quickly add a series of tags based upon a consecutive set of registers. When used, the Tag Name will have a five digit number appended (ex. 00000, 00001, etc.):

Tag No	Tag Name	Port	Tag Address	Byte(s)
103	Activation Coil_00004	-	B00004	bit
102	Activation Coil_00003	-	B00003	bit
101	Activation Coil_00002	-	B00002	bit
100	Activation Coil_00001	-	B00001	bit
99	Activation Coil_00000	-	B00000	bit

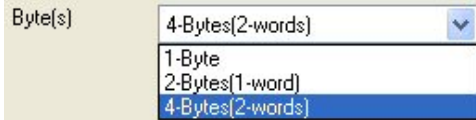
6. Number of Tag: enter the total number of consecutive tags you wish to create when using the Auto-add feature.
7. Show Error Report: if checked, then the MAPware software displays a Text Only file (ErrorTag_AutoAddTag.txt) that shows any errors that may have occurred when using the Auto-add

feature:

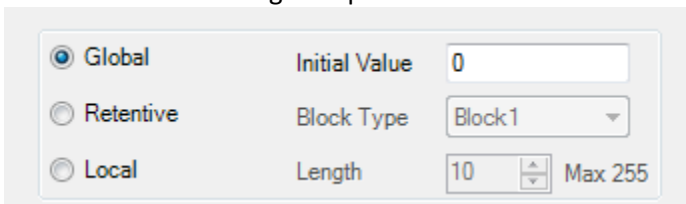


```
1. Error : C.0006 This tag address is already present.
2. Error : C.0007 This tag address is already present.
3. Error : C.0008 This tag address is already present.
4. Information : Counter 2_00000 This tag name is auto generated.
5. Information : Counter 2_00001 This tag name is auto generated.
6. Information : Counter 2_00002 This tag name is auto generated.
```

8. Byte(s): Some memory registers can be configured as a single byte, word, or double-word register:



9. Scope (Global / Retentive / Local) (IEC 61131-3 mode only) – There are three radio buttons that can be selected to define a tag’s scope:



Global – The tag can be used throughout the project. Tags created as Global can be changed to Retentive during project development.

Retentive – Same as Global but the value is retained through a power cycle. Tags created as Retentive can be changed to Global during project development. For more information on this option refer to the **Keep Memory Area and Retentive Tags** section.

Local – The tag can only be used in a specific logic block. The Block is selected in the Block Type dropdown list. Local tags can still be used in application objects such as screens and tasks.

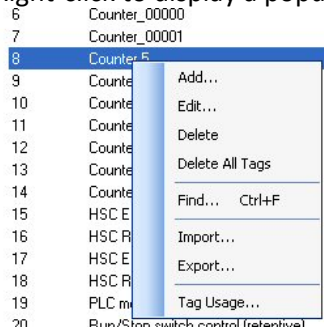
10. Initial Value (IEC 61131-3 projects only) – Specify the default value the tag will have when the project starts. This option is not available for Strings or Retentive Registers or if **Retentive** is selected for the scope (see item 9b above).
11. Block Type (IEC 61131-3 projects only) – Specify the block where a Local tag can be used when the Local option is chosen as the Scope (see item 9c above).
12. Length (IEC 61131-3 projects only) – Specify the length for a string. Available only when the Register / Coil Type is set to string.
13. Click the Add button to add the new tag to the tag database. The Add dialog box remains on screen so that you can create other tags. When you have finished, click the Close button.

Deleting a Tag

28 ► To delete a tag that is in the tag database, simply:

1. Open the tag database.
2. Highlight (click) the tag.

3. Right-click to display a popup dialog box and select Delete:



4. A popup dialog box appears asking if you are sure that you want to delete the tag. Click Yes. Note: all tags defined as Default Tags are system tags and cannot be deleted.

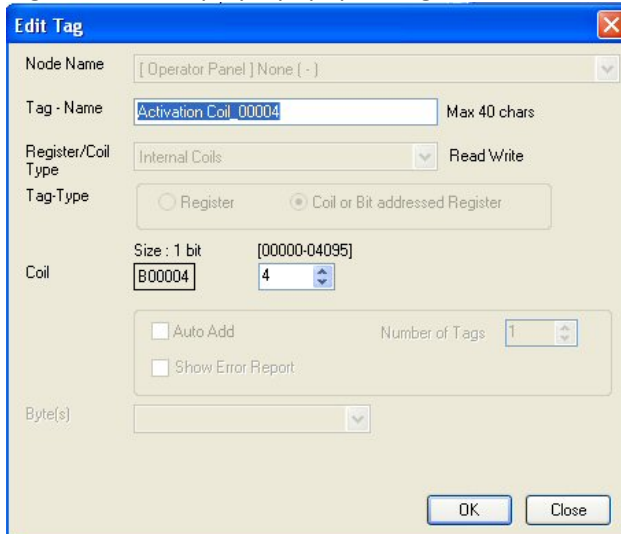
You can delete multiple tags simultaneously by highlighting one tag in the tag database, and then hold down the CTRL (or SHIFT) key and clicking other tags.

You also have the option of deleting all user-defined tags in the tag database by clicking Delete All Tags.

Editing a Tag

29 ► To edit a tag:

1. Open the tag database.
2. Highlight the tag.
3. Right-click to display a popup dialog box, and then click Edit:



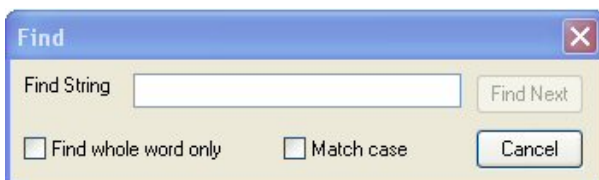
4. In Edit mode, you can only change the name of the tag and the target address. Any other changes require that you delete the tag entirely, and then recreate the tag.

Finding Tags

If you have created many tags and have a large database, it may be difficult to locate a particular tag. To help you locate a tag quickly, right-click anywhere in the tag database to display the popup dialog box:




Click the **Find** option to display the **Find** dialog box:




Enter the name of the tag or tag address – MAPware will then search through the database and highlight the tag.


You can also reorder the tag database by clicking any of the column headings. The tags reorder alphabetically according to the entries in that column.

There is also the option to  filter the Tag Database.



Tag Name	Language	Tag Address	SW0001	Add Tag	
----------	----------	-------------	--------	---------	---

Tag No	Tag Name	Tag	Attribute	Tag Address	Port	Node	Node Name	Tag Category	Export Tag
1	Language	2	Read Write	SW0001	-	0	HMC3102A-M	Default Tag	

Clicking the filter button at the top of the Tag Database opens the filter options.

Tag Name	Language	Tag Address	SW0001	Add Tag	
----------	----------	-------------	--------	---------	---

<input type="checkbox"/> Hide System Tags <input type="checkbox"/> Hide Unused Tags <input type="checkbox"/> Selected Export Tags Reset Filter	<table border="1"> <tr> <th>Data Type</th> <th>Attribute</th> <th>Port</th> <th>Node</th> <th>Category</th> </tr> <tr> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>Register</td> <td>ReadOnly</td> <td>Com1</td> <td>HMC3102A-M</td> <td>Default</td> </tr> <tr> <td>Register-Bit</td> <td>WriteOnly</td> <td>Com2</td> <td></td> <td>User Defined</td> </tr> <tr> <td>Coil</td> <td>ReadWrite</td> <td>Ethernet</td> <td></td> <td></td> </tr> </table>	Data Type	Attribute	Port	Node	Category	-	-	-	-	-	Register	ReadOnly	Com1	HMC3102A-M	Default	Register-Bit	WriteOnly	Com2		User Defined	Coil	ReadWrite	Ethernet		
Data Type	Attribute	Port	Node	Category																						
-	-	-	-	-																						
Register	ReadOnly	Com1	HMC3102A-M	Default																						
Register-Bit	WriteOnly	Com2		User Defined																						
Coil	ReadWrite	Ethernet																								

Tag No	Tag Name	Tag	Attribute	Tag Address	Port	Node	Node Name	Tag Category	Export Tag
1	Language	2	Read Write	SW0001	-	0	HMC3102A-M	Default Tag	
2	Logger memory % usage	2	Read Only	SW0002	-	0	HMC3102A-M	Default Tag	

Tag Usage

This feature allows you to select a tag in the tag database and view where used in your project:

Tag No	Tag Name	Tag	Attribute	Tag Address	Port	Node	Node Name
1	Language	2	Read Write	SW0001	-	0	HMC3102A-M
2	Logg	2	Read Only	SW0002	-	0	HMC3102A-M
3	Logg	bit	Read Only	SW0003_00	-	0	HMC3102A-M
4	Logg	bit	Read Only	SW0003_01	-	0	HMC3102A-M
5	RTC	bit	Read Only	SW0003_02	-	0	HMC3102A-M
6	COM	bit	Read Only	SW0003_14	-	0	HMC3102A-M
7	COM	bit	Read Only	SW0003_15	-	0	HMC3102A-M
8	Histo	2	Read Only	SW0004	-	0	HMC3102A-M
9	Scre	2	Read Write	SW0005	-	0	HMC3102A-M
10	Scre	2	Read Write	SW0006	-	0	HMC3102A-M
11	RTC	2	Read Only	SW0010	-	0	HMC3102A-M
12	RTC meth	2	Read Only	SW0011	-	0	HMC3102A-M

Tag Usage - Language Refresh ✕

- ... All Screen
- ... Project Tasks
- ... Alarm
- ... Internal memory
- ... External memory

State 1 Insert Mode English (United States)

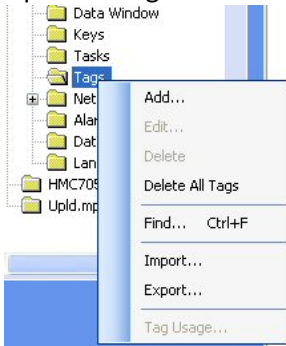
Importing and Exporting Tags

The tag database created in MAPware exports as a CSV (comma-separated value) file. You can edit this file then import back into MAPware. This provides the following advantages:

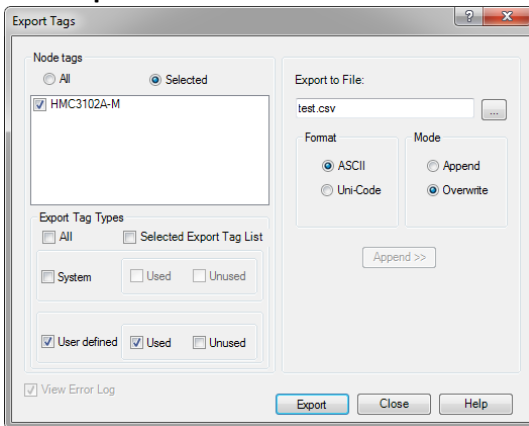
- Tag databases can be moved from one project to another without copying the entire project.
- If you wish to modify many tags, this is quickly done by editing a CSV file.
- In some cases, you may be able to import the PLC addresses you use in your external PLC ladder logic program, thus saving time.

30 ► To Export Tags:

1. Open the tag database and right-click to display the popup dialog:



2. Click **Export**:



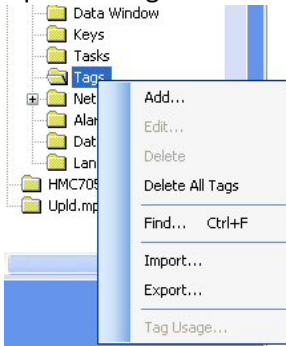
3. **Node tags** – select **All** to export all nodes (internal memory and tags assigned to all Com ports). Check **Selected** to use the checkboxes to filter which nodes you wish to export.
4. **Export Tag Types** – Check **All** to export all tags in the program (All System and User defined check boxes below will become checked). Check **Selected Export Tag List** to only export checked tags in the Tag Database. Check **System** and **Used** and/or **Unused** to export internal system (S and SW register) memory tags in the tag database. Check **User Defined** and **Used** and/or **Unused** to export tags created by the programmer.
5. **Export to File** – For **Format**, select **ASCII** or **Unicode**. For **Mode**, select **Append** (add to existing file) or **Overwrite**.
6. Click the **Export** button. The file is created:

	A	B	C	D	E	F	G	H
1	#	Version						
2	#	Date	1/17/2011 13:23					
3	#	TotalTags	5					
4								
5	@	Node Name	Protocol	Model	Port			
6		1 Operator Panel	None	simulator-DX	Com1			
7		2 Node 1	Allen Bradley DF	Micrologix Series PLCs	COM1			
8								
9	\$	tag name	tag type	prefix	tag address	byte(s)	port	node name
10		1 ON BIT	Coil	B	B00002	-	Device	Operator Panel
11		2 Boiler Alert	Coil	B	B00050	-	Device	Operator Panel
12		3 Copy of N7:50	Register	D	D00050	-	2 Device	Operator Panel
13		4 Slot 1 InputCoil_00000	Coil	X	X01000	-	Device	Operator Panel
14		5 Boiler Temp	Register	N	N007050**	-	2 Com1	Node 1

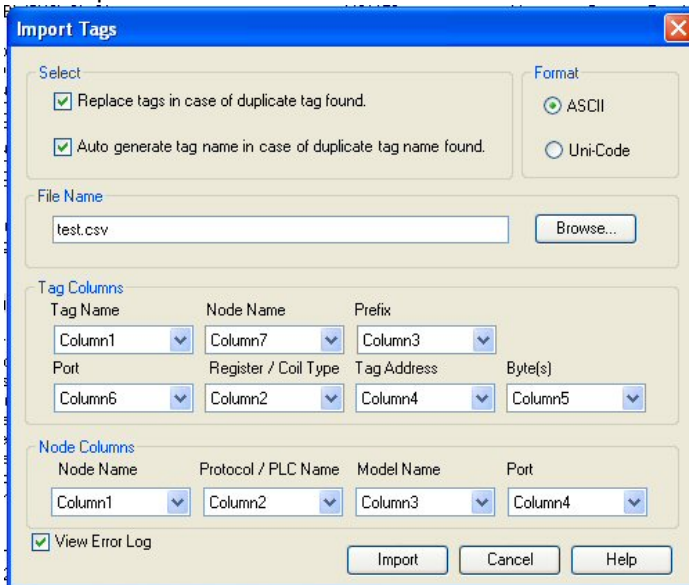
Sample Exported Tag Database File in Excel

31 ► To Import Tags:

1. Open the tag database and right-click to display the popup dialog:



2. Click Import:



3. **Replace tags in case of duplicate tag found** – check this box if you wish MAPware to replace a tag name in the tag database with one of the same name in the imported file.
4. **Auto generate tag name in case of duplicate tag name found** – checking this box will make MAPware append a number to the duplicate tag name.
5. **Tag Columns** – in order to import a CSV file, you must specify where each tag column (i.e. Tag Name, Tag Address, Node Name, etc.) is located in the CSV file. By default, the columns arrange in the same format used when exporting the tag database as a CSV file.
6. **View error log** – if checked, this will display a text file after MAPware000 has finished importing that shows any errors that have occurred.

Chapter 5 – Screens

What is a Screen?

A screen is a predefined collection of objects to be displayed at the same time. A screen is displayed by the press of a button, function key, or can be called by a request from a PLC.

How many different types of screens are there? In MAPware, you can configure or define a screen to be one of the following:

- Base Screen – this is the most common type of screen. Simply put, this is a full-sized screen that displays objects placed onto it. The term ‘full-sized’ varies, of course, depending upon the HMC model selected and the display size of that model. For example, a base screen for the HMC7043A-M model (4.3” diagonal screen) is 480x272 pixels. When displayed, a base screen covers the entire area of the display.
- Popup Screen – this is another common type of screen that is used to display a smaller ‘popup’ screen on top of a base screen. Popup screens allow you to display information or objects only when needed by the HMC operator. This keeps the HMC interface more intuitive and simpler to use. Because a popup screen displays on top of a base screen, a popup screen must be smaller than full-size for the display used.
- Template Screen – This screen is also full-sized but is not called directly by a button or function key on the HMC. It cannot display using a command from a PLC. A template screen displays by attaching it to a base screen. When displayed, all objects on the template screen overlay onto the base screen.
- Keypad Screens – there are four pre-defined popup keypad screens: numeric keypad, hex keypad, bit keypad, and ASCII keypad. These keypads can be used by objects (i.e. Bit Entry, Numeric Entry) to modify register values.
- Web Screens – (Only available on HMC models with an Ethernet port). This type of screen can be viewed by connecting to the HMC’s built in web server with an internet browser program. The screen is displayed in the web browser as if it were a website. Only text based objects and static images are supported in this type of screen.

Screen Types and Templates

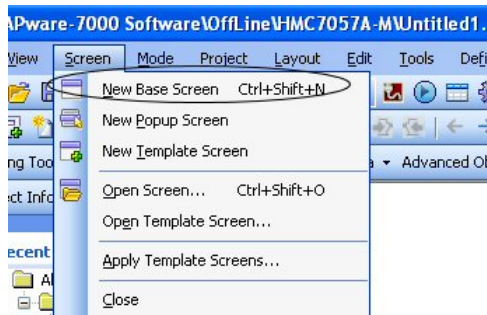
Base Screens


Base screens are full-sized screens that display groups of objects (i.e. Bit Lamps, Buttons, Bar graphs, etc.) on the HMC display.

How to create a base screen

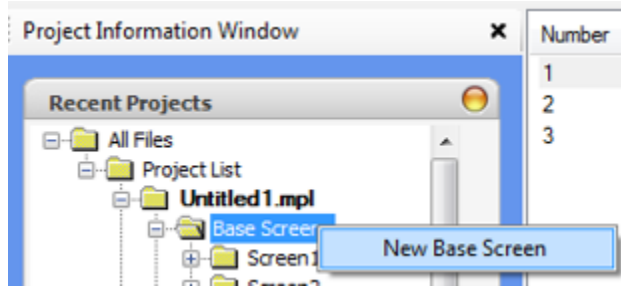
- Use one of the following:

Click **Screen > New Base Screen** from the standard menu



Click the New Base Screen icon  in the Layout Toolbar.

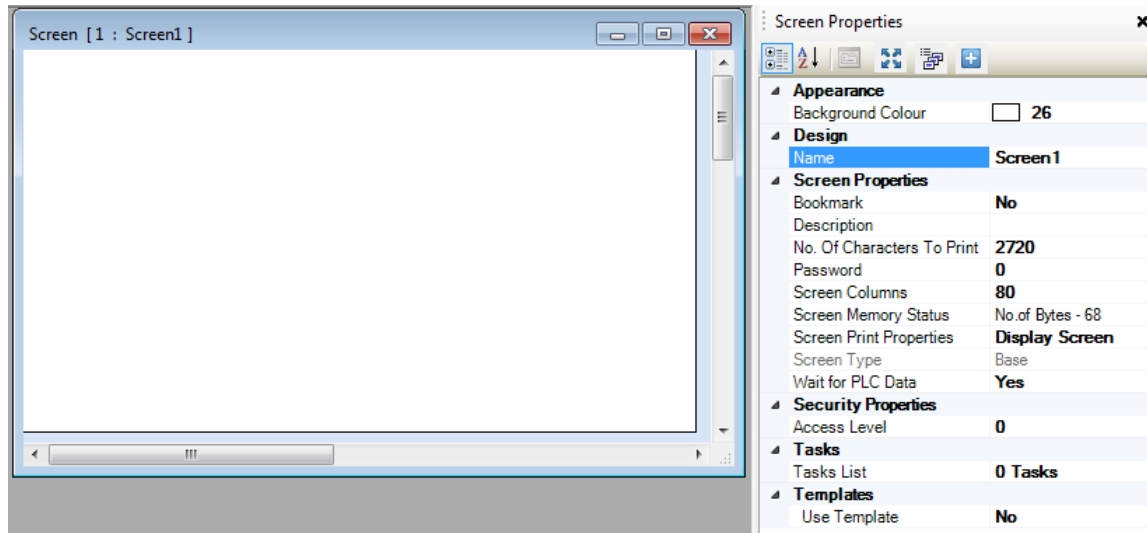
Right-click the Base Screens folder located in the **Project Information Window**. A popup dialog box appears – click New Base Screen.




- The new screen appears in the work area of MAPware and the Screen Properties box displays.


Base Screen Properties

Click anywhere on the screen (but not on any objects that have been placed onto the screen) to display the Screen Properties box on the right side of the screen.




- Appearance
 - Background Color – determines the fill or background color of the screen. Click the  button to display the color palette and select a color.
- Design
 - Name – this is the name assigned to the selected screen. The text entered for the name appears as the title for the screen in the Projects Information window. By default, the name is simply Screen1, Screen2, etc. However, you may wish to assign a new name that helps define the purpose of the screen, (i.e. numeric keypad).
 - Number – this is the number assigned to the screen. A number assigns to each screen when created. By default, the number assigned is the next available number in sequence but you can edit this field to assign a new number. Range is 1 to 49999.
- Screen Properties –
 - Bookmark – option to assign a bookmark to this screen. For more information on using bookmarks, see **Chapter 2 – Software Tour**.

Description – Enter text to help describe the purpose of this screen.

 Note: this text is not downloaded to the HMC.

No. of Characters To Print – if this screen is configured to print to a serial printer, this value determines how many of the characters displayed on the screen will be sent to the serial printer.


 Note: maximum is 1590 characters (using smallest font). If there is more text on the target screen than the value entered, then only the specified number of characters prints, beginning with text at the top of the screen.

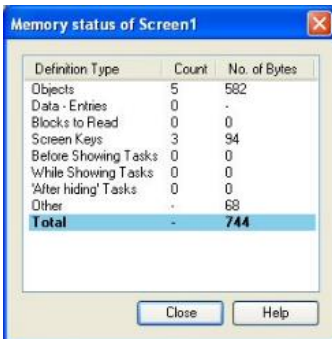
Password – user can protect access to the selected screen by assigning a numeric password. Range is 0 to 9999 (0 is no password assigned). When password-protected, a request to display the target screen causes a dialog box to appear, asking user to enter correct password:



If correct, screen displays.

Screen Columns – determines the total number of characters (columns) in each row that print.

Screen Memory Status – this indicates the total amount of memory required (in bytes) for selected screen. Click the  button to display a more detailed description of the memory used:




Definition Type	Count	No. of Bytes
Objects	5	582
Data - Entries	0	-
Blocks to Read	0	0
Screen Keys	3	94
Before Showing Tasks	0	0
While Showing Tasks	0	0
'After hiding' Tasks	0	0
Other	-	68
Total	-	744

Screen Print Properties – determines how the screen is to be used when requested:

Display Screen (default) – screen is displayed on the HMC and not sent to a serial printer.

Print Screen – screen data is sent to a serial printer only and is not displayed when requested. However, a message “Printing in Progress” displays on the HMC and remains until the HMC is finished sending all text on the screen to the serial printer. Then the prior screen displays.

Print Once and Display Screen – screen is displayed and printed. Please note that the screen does not appear on the HMC display until the entire text is output to the serial printer. To shorten the time interval, use the fastest baud rate available for the printer, and reduce the No Of Characters to Print setting to the minimum required.

 Note: the target screen will print again every time the screen displays.

Screen Type – identifies what type of screen this is (i.e. base, popup, or template).



Wait for PLC Data – if enabled, the HMC does not display the screen until after it has read the current values of all PLC-related objects. Disable this option if you wish to increase the speed of screen updates.

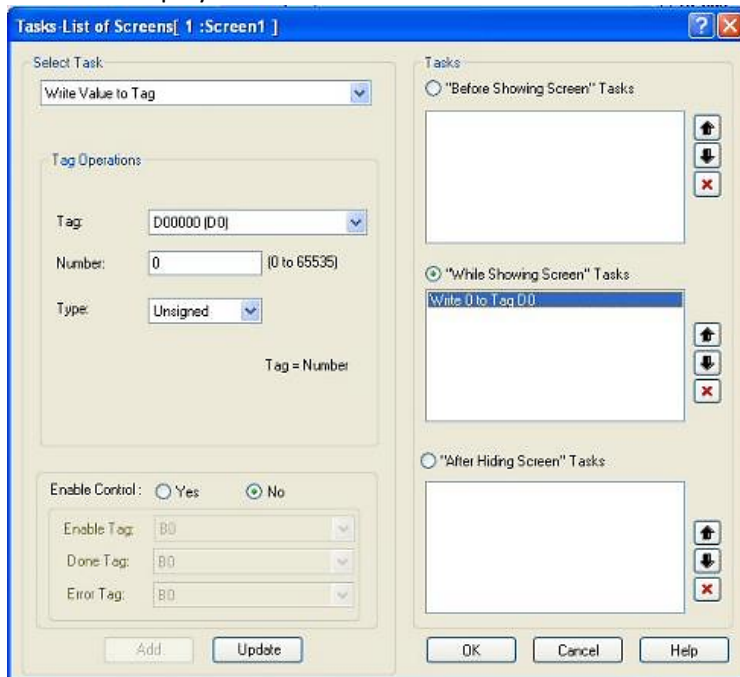
- Security Properties

Access Level – Allows an Access Level to be assigned to this screen. Users and Access Levels are assigned using the **Define > Access Level** menu option. If a screen is assigned an access level other than zero, the operator must log in using a valid Username and Password in order to view the screen. See the **Chapter 8 – Security** for more information.

- Tasks –

Task List – option to assign tasks to the target screen.

 Note: this method of configuring screen tasks is the same as clicking the Tasks subfolder under each Screen Name listed in the Screens directory of the **Project Information Window**. Click the  button to display the Task List for the selected screen:



For more information on tasks, see **Chapter 6 – Task Management**.

- Templates

Use Template – enable this option to attach one or more template screens to the selected screen (see **Template Screens** later in this chapter).

No. Of Templates – determines the total number of template screens assigned to this screen.


Template 1, 2, etc. – choose a template screen from the pull-down box.

Placing Objects onto a Base Screen


Any of the objects described in **Chapter 7 – Data & Display Objects** can be placed onto a base screen.

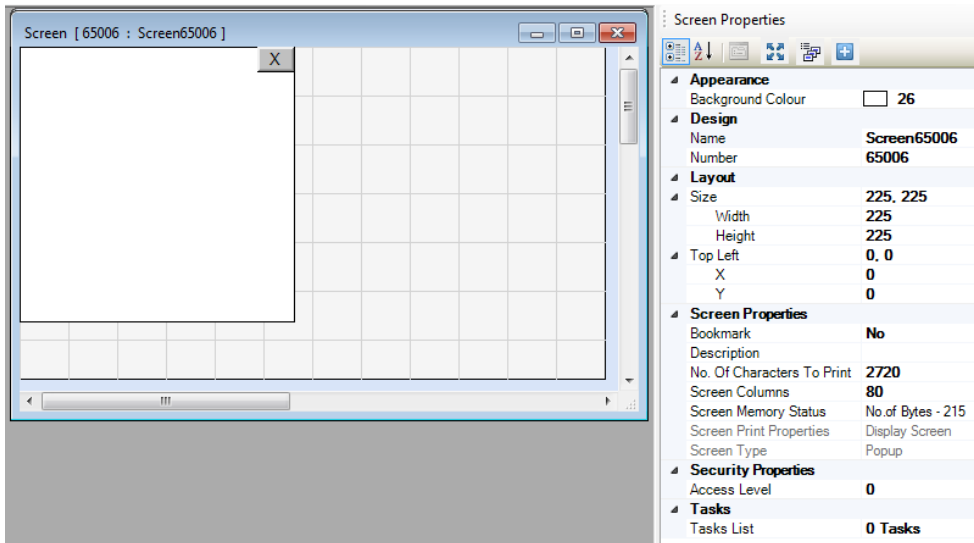
Popup Screens

Popup screens are screens that display groups of objects (i.e. Bit Lamps, Buttons, Bar graphs, etc.) on the HMC. They display on top of base screens and are smaller than the size of the HMC LCD display.

 Note: although you can configure several popup screens to display on a base screen, only one popup screen displays at a time.



How to create a popup screen

- Use one of the following:
 - Click **Screen > New Popup Screen** from the standard menu
 - Click the New Popup Screen icon  in the Layout Toolbar.
 - Right-click the Popup Screens folder located in the **Project Information Window**. A popup dialog box appears – click New Popup Screen.
- The new screen appears in the work area of MAPware and the Screen Properties box displays:




Popup Screen Properties


Click anywhere on the screen (but not on any objects that have been placed onto the screen) to display the Screen Properties box on the right side of the screen.

- Appearance
 - Background Color – determines the fill or background color of the screen. Click the  button to display the color palette and select a color.
- Design
 - Name – this is the name assigned to the selected screen. The text entered for the name appears as the title for the screen in the Projects Information window. By default, the name is simply Screen65005, Screen65006, etc. However, you may wish to assign a new name that helps define the purpose of the screen, (i.e. numeric keypad).
 - Number – this is the number assigned to the screen. A number is automatically assigned to each screen when created. By default, the number assigned is the next available number in sequence (starting with 65005), but you can edit this field to assign a new number.
 -  Note: popup screens must be in the range of 65005-65534.
- Layout
 - Size – sets the pixel size (width x height) of the popup screen. Default is 237x180 pixels.
 - Width – the width (in pixels). Range is 30 to 319.
 - Height – the height (in pixels). Range is 30 to 239.
 - Top Left – this position indicator places the top left corner of the popup screen in relation to the base screen when called.

X – Position (in pixels) along the horizontal (X) axis.

 Note: the maximum setting must be less than the width of the popup screen and the base screen + one pixel. For example, if the width of the popup screen is 237 pixels, then the maximum position along the X-axis is 320 (width of base screen) minus 237 (width of popup) – 1 pixel equals 82 pixels.


Y – Position (in pixels) along the vertical (Y) axis.

 Note: the maximum setting must be less than the height of the popup screen and the base screen + one pixel. For example, if the height of the popup screen is 180 pixels, then the maximum position along the Y-axis is 240 (height of base screen) minus 180 (height of popup) – 1 pixel equals 59 pixels.


- Screen Properties –

Bookmark – option to assign a bookmark to this screen. For more information on using bookmarks, see **Chapter 2 – Software Tour**.


Description – Enter text to help describe the purpose of this screen.

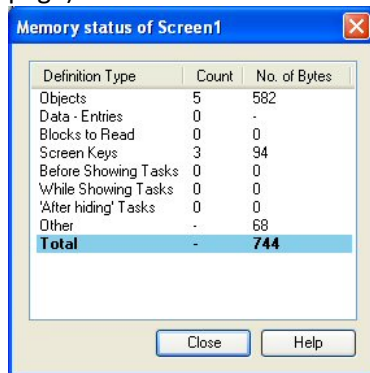
 Note: this text is not downloaded to the HMC.

No. of Characters To Print – if this screen is configured to print to a serial printer, this value determines how many of the characters displayed on the screen will be sent to the serial printer.

 Note: maximum is 1590 characters (using smallest font). If there is more text on the target screen than the value entered, then only the specified number of characters prints, beginning with text at the top of the screen.

Screen Columns – determines the total number of characters (columns) in each row that print.

Screen Memory Status – this indicates the total amount of memory required (in bytes) for selected screen. Click the  button to display a more detailed description of the memory used: (see next page)



Definition Type	Count	No. of Bytes
Objects	5	582
Data - Entries	0	-
Blocks to Read	0	0
Screen Keys	3	94
Before Showing Tasks	0	0
While Showing Tasks	0	0
'After hiding' Tasks	0	0
Other	-	68
Total	-	744


Screen Print Properties – determines how the screen is to be used. For popup screens, this option is always set to Display Screen.

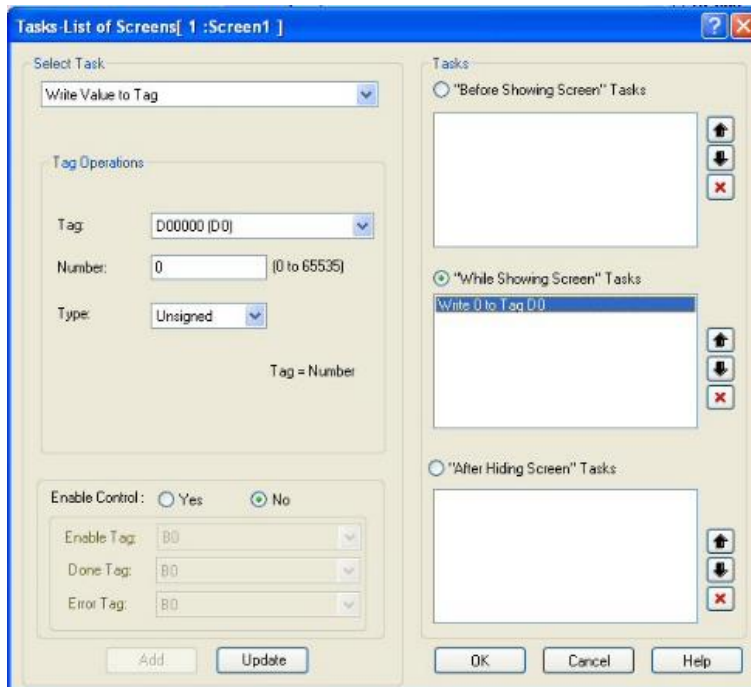
Screen Type – identifies what type of screen this is (i.e. base, popup, or template).

- Security Properties-

Access Level – Allows an Access Level to be assigned to this screen. Users and Access Levels are assigned using the **Define > Access Level** menu option. If a screen is assigned an access level other than zero, the operator must log in using a valid Username and Password in order to view the screen. See the **Error! Reference source not found.** section below.

- Tasks –

Task List – option to assign tasks to the target screen. Click the  button to display the Task List for the selected screen:



For more information on tasks, see Chapter 6 – Task Management.

Placing Objects onto a Popup Screen

Any of the objects described in **Chapter 7 – Data & Display Objects** can be placed onto a popup screen with the exception of the Bit Entry and Numeric Entry objects.

Template Screens


Template screens are screens that overlay onto base screens. Template screens are used for two primary reasons:

- To conserve project memory – If you have a project that requires the same objects (like a Text box or Company Logo picture) to be displayed on multiple screens, place these objects on a template screen. This reduces the amount of memory required to display these objects.
- To save time and cost of updating projects – If some objects in a project are shared in a number of screens, using a template reduces the amount of time required to make changes to these common objects.

How to create a template screen

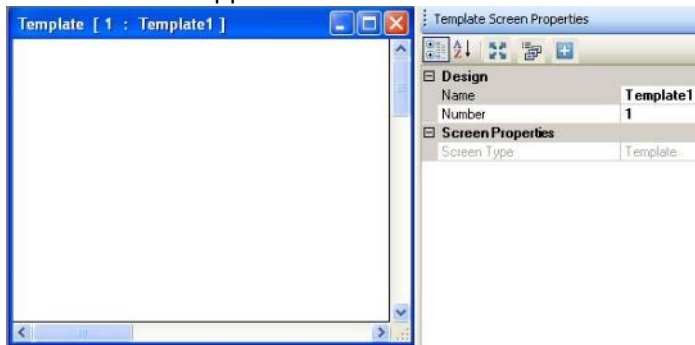
- Use one of the following:

Click **Screen > New Template Screen** from the standard menu

Click the New Template Screen icon  in the Layout Toolbar.


Right-click the Templates folder located in the **Project Information Window**. A popup dialog box appears – click New Template Screen.

- The new screen appears in the work area of MAPware and the Template Screen Properties box displays:



Template Screen Properties

Click anywhere on the screen (but not on any objects that have been placed onto the screen) to display the Template Screen Properties box on the right side of the screen.

- Design
 - Name – this is the name assigned to the selected screen. The text entered for the name appears as the title for the screen in the Projects Information window. By default, the name is simply Template1, Template2, etc. However, you may wish to assign a new name that helps define the purpose of the screen, (i.e. company logo).
 - Number – this is the number assigned to the screen. A number assigns to each screen when created. By default, the number assigned is the next available number in sequence (starting with 1), but you can edit this field to assign a new number.
 -  Note: template screens must be in the range of 10.
- Screen Properties
 - Screen Type – identifies what type of screen this is (i.e. base, popup, or template).

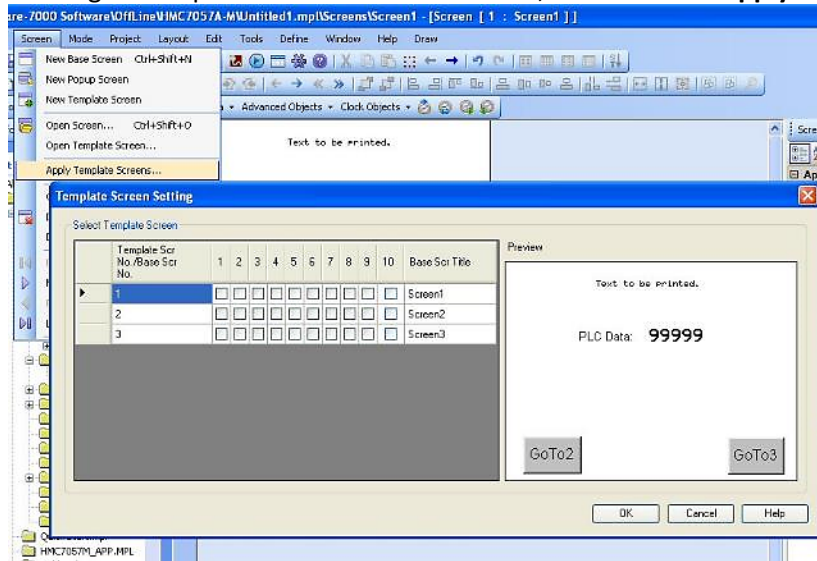
Placing Objects onto a Template Screen

Any of the objects described in **Chapter 7 – Data & Display Objects** can be placed onto a base screen.

Applying a template screen

After you have created your template screens, you must then assign the templates to base screens. Then when a base screen is displayed on the HMC display, the assigned template screens will show as well.

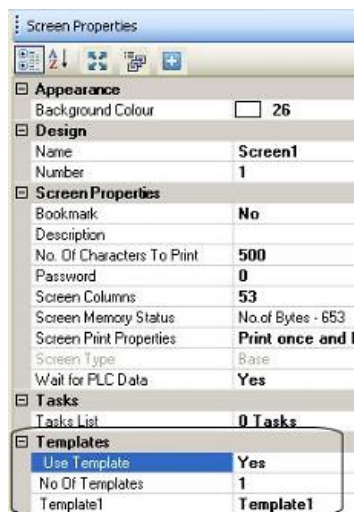
To assign a template screen to a base screen, click **Screen > Apply Template Screens** from the standard menus:



The table is a list of all base screens created in the project (each row corresponds to a base screen). Ten columns represent the Template screens (maximum of ten template screens can be created). To assign a particular template screen to a base screen, simply check the appropriate template.




















Note that the Preview screen indicates how the template screens overlay onto the selected base screen.

Another method of assigning template screens to a base screen is to display the base screen and assign the template using the **Templates** attribute listed in the **Screen Properties** dialog box:



Web Screens (Ethernet Models Only)

Web screens can be viewed through a web browser connected to the HMC's web server, allowing remote access to HMC data from a remote computer on the Ethernet network or, if exposed to the internet, from anywhere in the world. Web screens allow the remote user to both view and modify data in the HMC. The objects used on web screens are restricted to text based data display / input objects, static images and navigation buttons. The following objects are available for use on web screens:

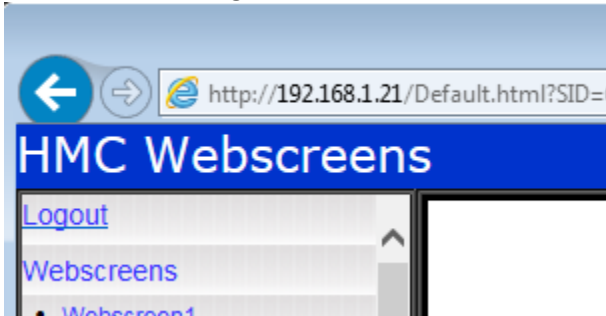
Icon	Command	Description
	Bit Display	Represent the state of a bit in a text format (1 for On, 0 for Off).
	Numeric Display	Displays a number stored in a data register.
	Bit Entry	Use this object to change the state of a bit (1 for On, 0 for Off).
	Set Bit	Use this object to latch a bit on
	Reset Bit	Use this object to latch a bit off
	Momentary Bit	Use this object to set a bit when the object is actuated and reset the bit when the object is released
	Toggle Bit	Use this object to toggle the status of a bit (set when pressed once; reset when pressed again)
	Write Value to Tag	Use this object to write a constant value to a tag
	Add Value to Tag	Use this object to add a constant value to a tag
	Subtract Value from Tag	Use this object to subtract a constant value from a tag
	Add Tag B to Tag A	Use this object to add the value of Tag B to Tag A
	Subtract Tag B from Tag A	Use this object to subtract the value of Tag B from Tag A
	Numeric Entry	Allows numeric entry to a targeted data register.
	Multilingual Text	Create a text box using Windows TrueType fonts.  Note: the browser must be able to display the selected font, otherwise a default font is displayed.
	Picture Object	Display a JPG, BMP, or GIF picture using either predefined libraries or your own custom image.
	Go To Screen	Allows the remote user to navigate to other web screens.
	Go To Next Screen	Allows the remote user to navigate to the sequentially next web screen
	Go to Previous Screen	Allows the remote user to navigate to the previous web screen

Enabling the Webserver

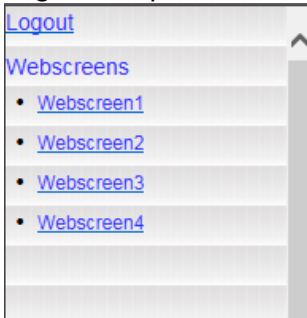
Before a web screen can be created the web server must be enabled and configured. To do this click **Tools > Web Server Configuration**, and check the checkbox to enable the web server:

Once enabled, several fields are activated allowing the web server to be configured:

- Username / Password – A username and password are required. The remote operator will be prompted to enter these credentials before they can view the web screens in their browser. Both Username and Password can be up to 14 characters and can contain alpha numeric characters as well as; ‘*’, ‘-’, ‘_’ and ‘.’ characters.
- Header – If enabled, the text entered here will be displayed in the browser window as banner with white text on a blue background.



- Show Navigation – If enabled, a navigation bar will appear in the browser to the left of the active web screen with links to all of the web screens in the project. The operator can click any of the screens listed to go directly to that screen.

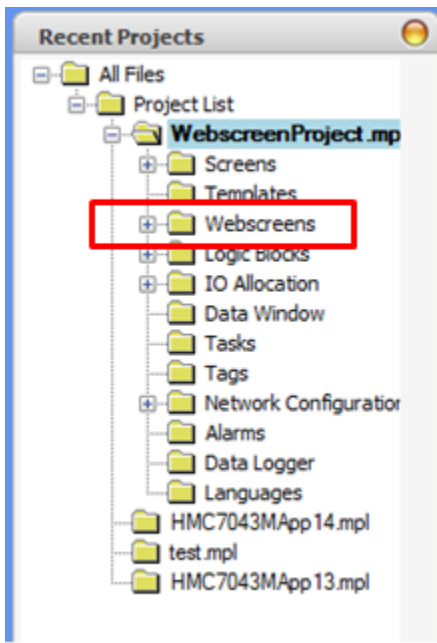


- Show Border – If enabled, a border will appear around the web screens.

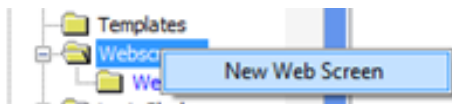
Ethernet Settings – This button is a shortcut to the Ethernet Settings tab on the **Project Configuration** window. The IP address entered here is the address the remote user will point their browser to in order to view the screens. See the **Error! Reference source not found.** section in **Chapter 2 – Software Tour** for more information.

Creating Web screens

Once the web server is enabled, as described above, a Web screens folder will appear in the **Project Information Window**.



In this folder a default web screen will be created. The default screen name will appear in blue indicating that this is the first screen displayed when the user connects the web server. To create additional web screens simply right click the Web screens folder and select New Web Screen from the context menu:



Once there are multiple web screens, a different web screen can be designated as the default screen by right clicking the screen name in the **Project Information Window** and selecting Set as Default screen from the context menu.

The process for adding objects to a web screen is the same as adding objects to a base screen. Only objects available for use on web screens will be selectable. There are some differences in how the objects behave on a web screen as opposed to on a base screen:

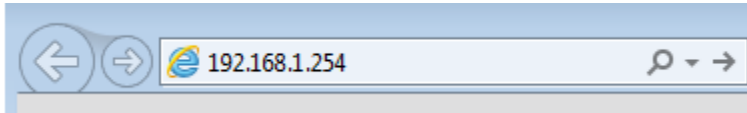
- Input objects used on web screens will not have a keypad associated with them, instead the browser will have an input method that can be used to enter data. For example, on a desktop, the remote user can click a numeric input object with their mouse then enter data with a keyboard, pressing enter on the keyboard writes the data to the HMC.
- Not all properties are available on web screens
- A font selected for an object on a web screen must be present on the browser; otherwise the browser will use a default font to display the object.
- GoTo buttons can only be used to go to another web screen. Popup screens are not allowed.

- External PLC tags cannot be used on a web screen.
- A maximum of 100 tags can be used per web screen.
- A maximum of 100 web screens can be configured per project.

Once the web screens are created, download the application to the HMC. If the Ethernet settings have been changed, don't forget to check the Ethernet Settings checkbox in the download window.

Connecting to Web Screens with an Internet Browser

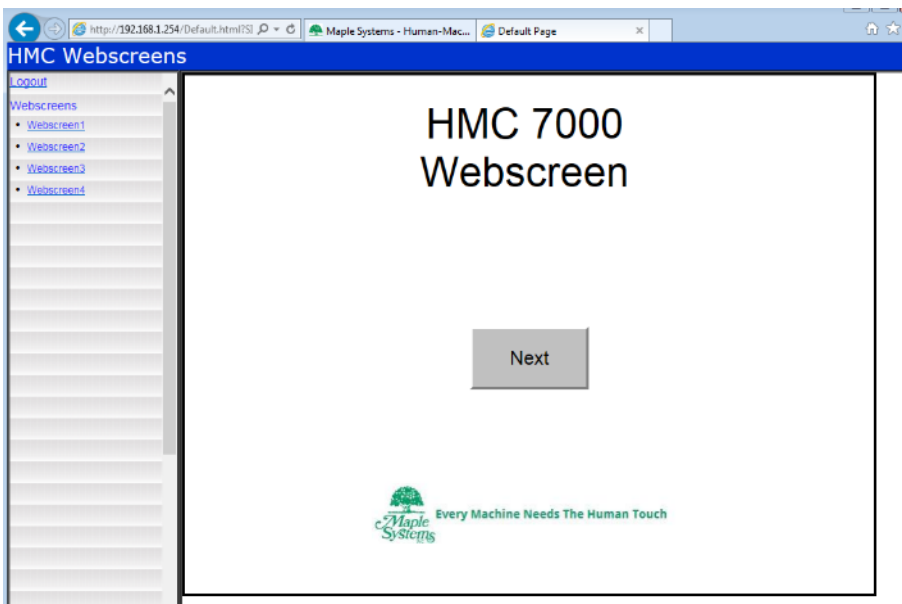
Once the screens have been created and downloaded to the HMC, the next step is to connect to the web screens with an internet browser. If the computer running the browser is on the same Local Area Network (LAN) as the HMC, simply enter the IP address assigned to the HMC in the web browser's address bar:



A prompt will appear to enter the Username and password configured for the web server:

 A screenshot of a login prompt window. The window has a blue title bar that says "Enter your Username and Password". Inside the window, there are two input fields: "Username:" with the text "User" entered, and "Password:" with four black dots. Below the password field is a "Sign in" button.

Once that is entered click the Sign in button to display the default web screen:




The following notes apply to web screens:

- A maximum of 10 users can connect to a single HMC's web server.
- TCP port 80 is used to serve the web screens.
- Web screens have a refresh time of one second.

Connecting from the Internet

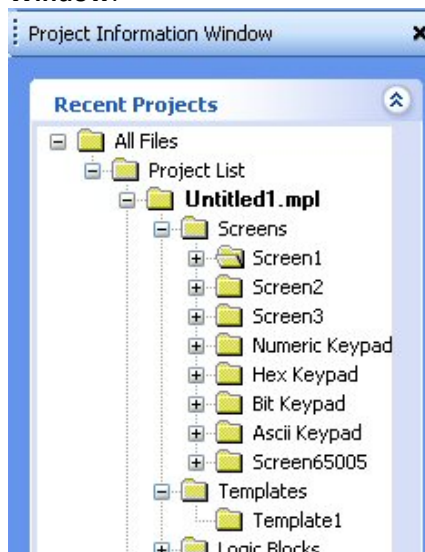
If the browser used to connect to the HMC is not on the same Local Area Network as the HMC it will be necessary to expose the HMC's web server to the Internet. Typically this is done by opening port 80 in the router or by forwarding port 80 to the HMC's IP address by adding an entry in the port forwarding table in the router. On the Ethernet Settings tab of the **Project Configuration** window set the default gateway to the router's private IP address. Once the router is configured, connect to the HMC sever by entering the router's public IP address in the web browser address bar.

 Network set up issues are beyond the scope of this manual. Contact a networking specialist for further information.

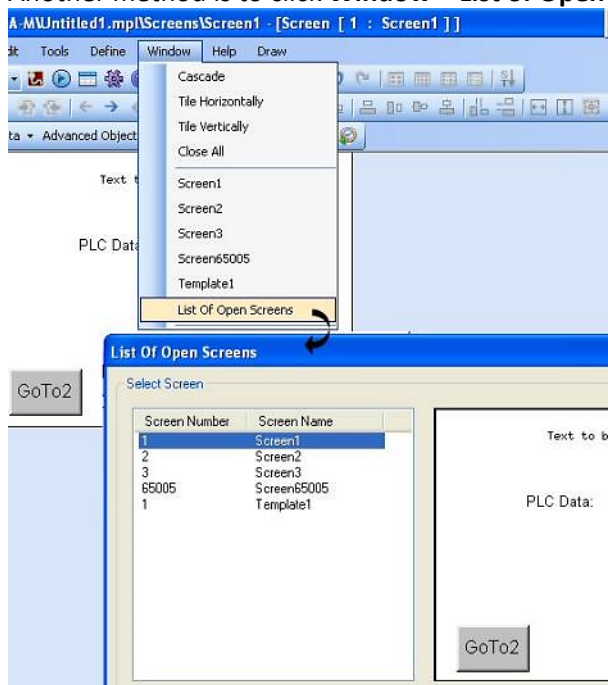
Modifying screens

Navigating Screens

The easiest way to navigate to a screen is to select it from the Screens folder in the **Project Information Window**:



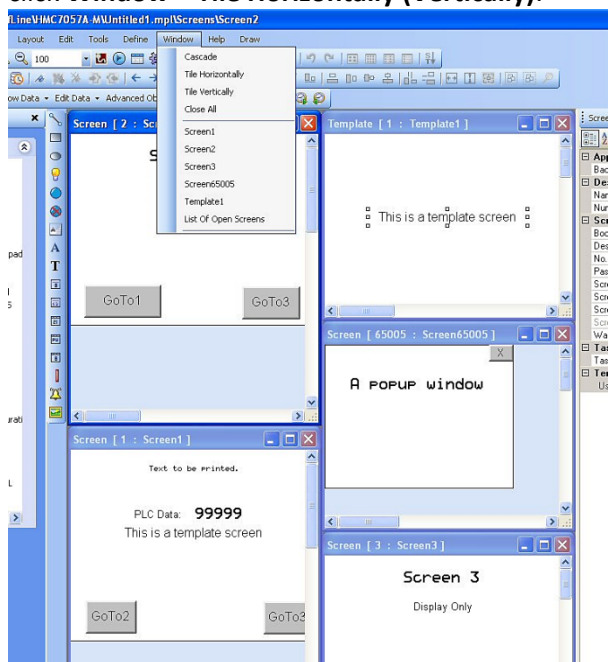
Another method is to click **Window > List of Open Screens** from the standard menu:




If you have many screens and you wish to work on a subset of screens, then the bookmark feature may be useful. Bookmarks provide a means to switch quickly from one screen to another. For information on how to use bookmarks, see **Chapter 2 – Software Tour**.

Viewing multiple screens


You may wish to look at several screens at a time in the workspace area of the MAPware software. To do this, click **Window > Tile Horizontally (Vertically)**:

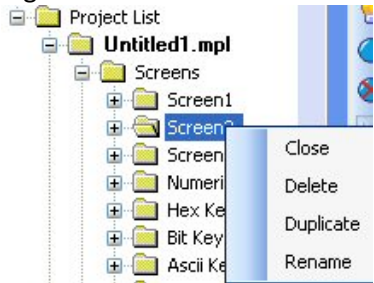


 Note: click the Close All option in Windows to close all open screens.

Deleting a screen

Select one of three methods to delete a screen. Display the screen in the work area of MAPware:

- Click **Screen > Delete** from the standard menu.
- Click the Delete Screen icon  in the Screen Toolbar.
- Right-click the Screen name listed in the **Project Information Window**, then click Delete.



Duplicating a screen

Select one of two methods to duplicate a screen. Display the screen in the work area of MAPware:

- Click **Screen > Duplicate** from the standard menu.
- Right-click the Screen name listed in the **Project Information Window**, then click Duplicate.

Renaming a screen

Select one of two methods to rename a screen. Display the screen in the work area of MAPware:

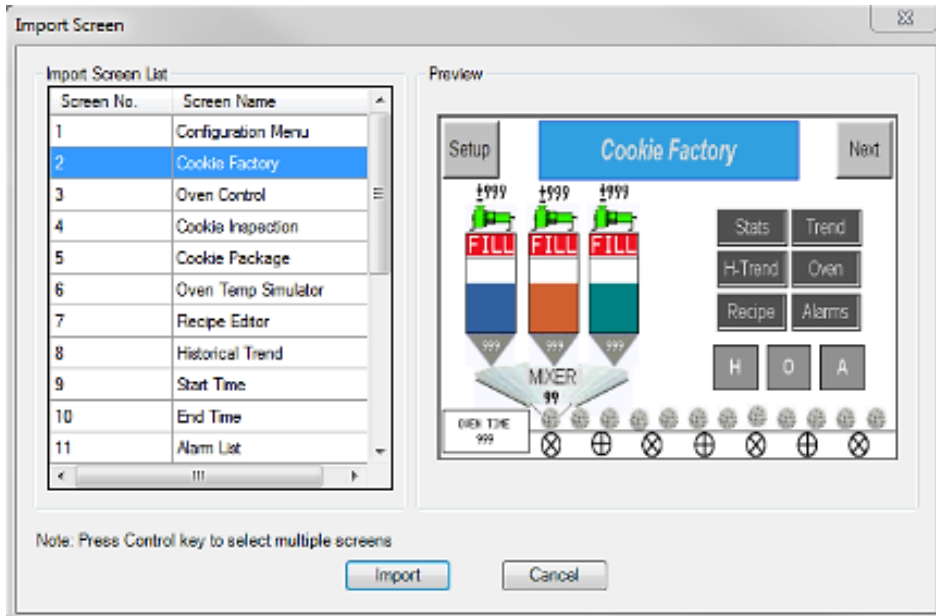
- Click any area of the screen to display the Screen Properties dialog box, and then enter a new name under the **Design > Name** attribute.
- Right-click the Screen name listed in the **Project Information Window**, then click Rename.

Importing a screen

Full size screens and popup screens can be imported from an existing project, provided that the screen size in the source project is the same as the screen size of the destination project.

32 ► To import a screen:

1. Click **Screen > Import Screen** from the menu bar.
2. An open file dialog window will be displayed. Browse to the source project file (.mpl) and click open.
3. A preview window is displayed allowing you to browse through the available windows and select the desired window(s) to import.



Multiple windows can be imported by holding down the Control key and clicking the windows in the Import Screen List.



4. Select the tags you would like to import with the screen(s).
5. Click the Import button, the selected screens will be added to the Screens folder in the project tree. The screen will retain the screen number from the source project unless a screen with that number already exists in the destination project.

Chapter 6 – Task Management

What is a Task?

An integral part of the MAPware software is the ability to create tasks. Tasks are specifically predefined actions taken by the controller such as writing a value to a tag register, displaying a new screen, turning a bit on/off, etc. The number of tasks is limited only by the total amount of memory available in the controller. Each task has two fundamental components: the action taken when the task activates and the triggering mechanism that starts the action.


Tasks can be activated from the following sources in MAPware:

- **Quick Button keys** – all of the quick button keys (i.e. Go to Screen, Set Bit, Write Value to Tag, etc.) are, in fact, designed to implement a simple task. For example, the Go to Screen button key, when pressed, executes the GotoScreen task.
- **Touchscreen button keys** – in addition to the quick button keys, there are two ‘specially designed’ advanced button keys that can perform multiple tasks: the Multi-Task Single-State button  and the Multi-Task Multi-State button . Button tasks are further split into three types:

Press tasks: task(s) execute each time the button is pressed by the operator. It does not matter if the button is pressed and released or pressed and held down, the associated task(s) will execute only once per button press.

Pressed tasks: task(s) continuously execute while the associated button is held down. With this option, the HMC will repeatedly send the command(s) until the button is released.

Released tasks: task(s) execute when the operator releases the pressed button.

 Note that the associated task only executes once per button release.

 Note: see [Chapter 7 – Data & Display Objects](#) for more information on these buttons.

- **Screen Tasks** – these are tasks that are ‘tagged’ to a particular screen. Therefore, screen tasks execute when the screen displays. There are three types of screen tasks:
 - ‘Before showing Screen’: task executes before the tagged screen is displays
 - ‘While showing Screen’: task executes continuously while the tagged screen displays
 - ‘After Hiding Screen’: task executes immediately after the tagged screen is closed
- **Global Task** – these tasks execute continuously while HMC is on. Tasks are ‘global’ meaning that it does not depend on any particular screen to display.
- **Power-on Task** – tasks that execute once during initial power-up of the HMC.

Membrane key tasks – tasks attached to one or more of the membrane-style keys. Key tasks can be assigned globally (task is executed no matter what screen is currently displayed) or by screen. See

- [Chapter 11 – Miscellaneous Features](#) for more information on Membrane Function Keys.

Task List

Over fifty actions can be performed by a task. The tables below provides a list of all tasks available and a brief description.

Task Action	Description
Add a Constant Value to a Tag	Add a constant value to the current value residing in an internal HMC or external PLC tag
Add Tag B to Tag A	Add a value residing in the Tag B register to the current value residing in the Tag A register
Copy HMI Block to HMI/PLC Block	Copies the values in a block of continuous registers beginning with the Tag B register to the block of registers designated with the Tag A register
Copy HMI/PLC Block to HMI Block	Copies the values in a block of continuous registers beginning with the Tag B register to the block of registers designated with the Tag A register
Copy RTC to PLC Block	Copies the real-time clock (RTC) data in the HMC to a consecutive set of 16-bit registers (using BCD format) in the PLC beginning with the target tag
Copy Tag B to Tag A	Copies a value residing in the Tag B register to the target Tag A register
Copy Tag to LED	Controls the Function Key LEDs
Delay	Any tasks in the list that are after this task will not be executed until the delay time has expired
Go to Popup Screen	Displays a popup screen
Go To Screen	Displays a new screen
Previous Screen	Displays the prior screen (in numerical order)
Next Screen	Displays the next screen (in numerical order)
Print Data	Prints the displayed screen (to a connected serial printer)
Set RTC	Change a set value (i.e. year, month, day, etc.) of the internal real-time clock of the controller
Swap Tag A and Tag B	Swaps (exchanges) the values residing in the Tag A register and the Tag B register
Switch Screen From Tag	Displays a base screen according to the value in a targeted tag
Subtract a Constant Value from a Tag	Subtract a constant value from the current value residing in an internal HMC or external PLC tag
Subtract Tag B from Tag A	Subtract a value residing in the Tag B register to the current value residing in the Tag A register
Toggle Bit	Toggles (turn off/on) an internal HMC or external PLC tag coil/bit
Turn Bit ON	Set (turn on) an internal HMC or external PLC tag coil/bit
Turn Bit OFF	Clear (turn off) an internal HMC or external PLC tag coil/bit
USB Data Log Upload	Copies (uploads) a series of data registers into a USB Flash Drive
Wait While	Any tasks in the list that are after this task will not be executed until this condition is true
Write Value to Tag	Write a constant value to an internal HMC or external PLC tag
Key Specific Tasks	Tasks that can only be executed using an Advanced Bit or Word button on screen. See next table for a detailed list.

Key Specific Tasks:	Description
Clear Data Entry	Clears value displayed in Data Entry window of keypad
Cancel Data Entry	Restores the original value in the Data Entry window of keypad and discontinues entry
Accept Data Entry	Writes the value displayed in Data Entry window of keypad to target register
Switch to Next Data Entry	Moves to next Bit/Register Entry object according to Object ID number
Switch to Previous Data Entry	Moves to prior Bit/Register Entry object according to Object ID number

Increase Value by 1	Adds +1 to the existing value
Decrease Value by 1	Subtracts from the existing value
Increase Digit by 1	Adds +1 to the highlighted digit of existing value. If highest digit value already shown, then cycles back to lowest digit value
Decrease Digit by 1	Subtracts from the highlighted digit of existing value. If lowest digit value already shown, then cycles back to highest digit value
Shift Value to Left	Shifts value one digit to the left (same as multiplying by 10)
Move Cursor to Left	Shifts focus cursor one digit to the right
Move Cursor to Right	Shifts focus cursor one digit to the right
Sign Key (+/-)	Toggles signed value
Sign Key (+/-) and 0	Toggles signed value when pressed once. Changes to 0 when pressed again
Numeric keys 0-9 and A-F	Enters specified numeral into entry field
Edit Bit On	Changes Bit Entry value to 1
Edit Bit Off	Changes Bit Entry value to 0
Acknowledge Alarm	Acknowledges the top-Most alarm displayed
Acknowledge All Alarms	Acknowledges all currently active alarms
Previous Alarm	Move all alarms down one line in the list of alarms
Next Alarm	Move all alarms up one line in the list of alarms
Previous Historical Alarm	Move all alarms down one line in the list of historic alarms
Next Historical Alarm	Move all alarms up one line in the list of historic alarms
Refresh All Trends	The Historical Trend graph is updated when this task is executed
Start Logger for all Groups	Begins logging data as specified in Data Logger for all groups
Stop Logger for all Groups	Discontinues logging data as specified in Data Logger for all groups
Start Logger of Group #	Begins logging data as specified by Data Logger group number
Stop Logger of Group #	Discontinues logging data as specified by Data Logger group number
Clear Log Memory	Clears all data collected in HMC memory by the Data Logger
Move to Latest Historical Alarm	Move to the last recorded alarm in the list of historic alarms
Key Specific Tasks:	Description
Move to Oldest Historical Alarm	Move to the oldest recorded alarm in the list of historic alarms
Move to Latest Alarm	Move to the last recorded alarm in the list of active alarms
Move to Oldest Alarm	Move to the oldest recorded alarm in the list of active alarms
Start Printing of Group #	Begins printout of data as specified by Data Logger group number
Stop Printing of Group #	Discontinues printout of data as specified by Data Logger group number
Clear Historical Alarm Memory	Clears out all alarms listed in the Historic Alarm list
Show Ethernet Configuration Screen	Displays a predefined window that allows the user to change Ethernet settings during runtime.
Copy Screen Data to USB	Copy data to the attached USB drive.
Copy Screen Data to SD Card	Copy data to the attached SD card.
Show Login Screen	Displays a user login screen to enable Screen Access Levels.
Log Out	Logs out the current user.
Change Password	Allows the current user to change their password. Password changes are not retained through power cycle.

Start External Logger for All Groups	Begins logging data as specified in Data Logger for all external groups
Stop External Logger for All Groups	Discontinues logging data as specified in Data Logger for all external groups
Start External Logger of Group #	Begins logging data as specified by Data Logger external group number
Stop External Logger of Group #	Discontinues logging data as specified by Data Logger external group number

Execution Table

Not all tasks are available for each method of execution (i.e. global vs. power-on, etc.) as some tasks are not suitable in some circumstances. Below is a table that indicates which tasks are available for each method of execution: (see next page)

Task Description	Touchscreen Buttons/ Membrane Keys		Screen Tasks		Power-On	Global
	Press/ Released Tasks	Pressed Tasks	Before /After Screen Tasks	While Showing Screen Tasks		
Go To Screen	X		X		X	
Previous Screen	X		X			
Next Screen	X		X			
Switch Screen From Tag	X		X		X	X
Go to Popup Screen (Touchscreen models only)	X					
Write Value to Tag	X	X	X	X	X	X
Add a Constant Value to a Tag	X	X	X	X	X	X
Subtract a Constant Value from a Tag	X	X	X	X	X	X
Add Tag B to Tag A	X	X	X	X	X	X
Subtract Tag B from Tag A	X	X	X	X	X	X
Turn Bit ON	X		X	X	X	X
Turn Bit OFF	X		X	X	X	X
Toggle Bit	X		X	X	X	X
Copy Tag B to Tag A	X	X	X	X	X	X
Swap Tag A and Tag B	X		X	X	X	X
Print Data	X					
Set RTC	X					
Copy Tag to LED (models w/ membrane keys only)	X		X	X	X	X
Copy HMI Block to HMI/PLC Block	X	X	X	X	X	X
Copy HMI/PLC Block to HMI Block	X	X	X	X	X	X
Copy RTC to PLC Block						X
USB Data Log Upload	X	X	X	X	X	X
Wait While				X		
Delay				X		
Key Specific Tasks	X	X				

Task Descriptions

Add a Constant Value to a Tag

Description: Add a constant value to the current value residing in an internal HMC or external PLC tag .

Parameters:

- Tag – target address
- Number – constant value added to the target tag when the task executes.
- Type – format (Unsigned, Signed, Hexadecimal, BCD, Binary, or Float) of data.

Add Tag B to Tag A

Description: Add a value residing in the Tag B register to the current value residing in the Tag A register.


Parameters:

- Tag A: destination address
- Tag B: source address

Copy HMI Block to HMI/PLC Block

Description: Copies the values in a block of continuous registers beginning with the Tag B register to the block of registers designated with the Tag A register.


Parameters:

- Tag A: destination location of values. Can be either internal memory or a block of PLC registers
- Tag B: source location of values. Must be internal memory
- Number of words: This is the total number of consecutive registers copied.
- Enable Control: Allows tags to control this task.
 Note: this option is only available if configuring a global task or a “while showing” screen task. Only internal HMC tags are used.
 - Enable: if ON, allows task to be executed
 - Done: HMC sets this coil after completion of task
 - Error: HMC sets this coil if error performing task

Copy HMI/PLC Block to HMI Block

Description: Copies the values in a block of continuous registers beginning with the Tag B register to the block of registers designated with the Tag A register.

Parameters:

- Tag A: destination location of values. Must be internal memory
- Tag B: source location of values. Can be either internal memory or a block of PLC registers
- Number of words: This is the total number of consecutive registers copied.
- Enable Control: Allows tags to control this task.
 Note: this option is only available if configuring a global task or a “while showing” screen task. Only internal HMC tags are used.
 - Enable: if ON, allows task to be executed
 - Done: HMC sets this coil after completion of task
 - Error: HMC sets this coil if error performing task

Copy RTC to PLC Block

Description: Copies the real-time clock (RTC) data in the HMC to a consecutive set of 16-bit registers (using BCD format) in the PLC beginning with the target tag.


Parameters:

- First PLC Tag – target location that is used to write RTC values as follows:
 - Address 0 (Specified by First PLC Tag): Hour (hh) – range 0 to 23
 - Address +1: Minute (mm) – range 0 to 59
 - Address +2: Seconds (ss) – range 0 to 59
 - Address +3: Day of Month (DD) – range 1 to 31
 - Address +4: Month (MM) – range 1 to 12

Address +5: Year (YY) – range 0 to 99

Address +6: Day of Week (DY) – range 1-7 with 1=Sunday,..., 7=Saturday

- Enable Control – Allows tags to control this task.

 Note: this option is only available if configuring a global task or a “while showing” screen task. Only internal HMC tags can be used.

Enable – if ON, allows task to be executed

Done – HMC sets this coil after successful completion of task. Coil clears (reset) the next time the task executes.


Error – HMC sets this coil if error occurs during performance of task. Coil clears (reset) the next time the task executes.

Copy Tag B to Tag A

Description: Copies a value residing in the Tag B register to the target Tag A register.

Parameters:

- Tag A: this is the destination address
- Tag B: this is the source address
- Enable Control: Allows tags to control this task.

 Note: this option is only available if configuring a global task or a “while showing” screen task. Only Internal HMC tags are used.

Enable: if ON, allows task to be executed

Done: HMC sets this coil after completion of task

Error: HMC sets this coil if error performing task

Copy Tag to LED

Description: Controls the Function Key LEDs. Use an 8-bit register to turn on/off the LEDs. Each bit in the tagged register controls an LED. The least significant bit (Bit 0) controls F1 LED, and so on.

Parameters:

- Tag: target location that is read to determine LED position.

Delay

Description: Any tasks in the list that are after this task will not be executed until the delay time has expired.

Parameters:

- Delay: the constant value (in seconds) used to determine the delay time. Maximum value is 3600 seconds.
- Unit: always in seconds.

Go to Popup Screen

Description: Displays targeted popup screen.

Parameters:

- Popup Screen Number: Target popup screen to display
- Popup Screen Name: Assigned name of popup screen

Go to Screen

Description: Displays targeted base screen.

Parameters:

- Screen Number: Target base screen to display
- Screen Name: Assigned name of base screen

Print Data

Description: Prints the displayed screen (to a connected serial printer).

Set RTC

Description: Change a set value (i.e. year, month, day, etc.) of the internal real-time clock of the HMC. This is done by configuring the key to increment or decrement the current value by 1 whenever the key is pressed.

Parameters:

- Real Time Clock Settings:
Increment: add +1 to the current value
Decrement: subtract from the current value
- Options:
Year – range 0 to 99
Month – range 1 to 12
Date {Day of Month} – range 1 to 31
Hour – range 0 to 23
Minute – range 0 to 59
Seconds – range 0 to 59
Day of Week – range 1-7 with 1=Sunday, ..., 7=Saturday

Subtract a Constant Value from a Tag

Description: Subtract a constant value from the current value residing in an internal HMC or external PLC tag.

Parameters:

- Tag: this is the target address
- Number: constant value to subtract from the target tag when the task is executed.
- Type: format (Unsigned, Signed, Hexadecimal, BCD, Binary, or Float) of data

Subtract Tag B from Tag A

Description: Subtract a value residing in the Tag B register to the current value residing in the Tag A register.

Parameters:

- Tag A: this is the destination address
- Tag B: this is the source address

Swap Tag A and Tag B

Description: Swaps (exchanges) the values residing in the Tag A register and the Tag B register.

Parameters:

- Tag A: target location for Tag B value
- Tag B: target location for Tag A value

Switch Screen from Tag

Description: Displays a new screen based upon the value in the Tag register. The requested screen must be a base screen. If the number in the tag register does not represent a valid screen, an error message displays on the HMC screen.

Parameters:

- Tag: target location that is read to determine screen

Toggle Bit

Description: Toggles (turn off/on) an internal HMC or external PLC tag coil/bit.


Parameters:

- Tag: this is the target address

Turn Bit ON

Description: Set (turn on) an internal HMC or external PLC tag coil/bit.

Parameters:

- Tag: this is the target address
- Enable Control: Allows tags to control this task.
 Note: this option is only available if configuring a global task or a “while showing” screen task. Only internal HMC tags are used.

Enable: if ON, allows task to be executed


Done: HMC sets this coil after completion of task

Error: HMC sets this coil if error performing task

Turn Bit OFF

Description: Clear (turn off) an internal HMC or external PLC tag coil/bit.

Parameters:

- Tag: this is the target address
- Enable Control: Allows tags to control this task.
 Note: this option is only available if configuring a global task or a “while showing” screen task. Only internal HMC tags are used.

Enable: if ON, allows task to be executed

Done: HMC sets this coil after completion of task

Error: HMC sets this coil if error performing task

USB Data Log Upload

Description: Copies (uploads) a series of data registers into a USB Flash Drive

Parameters:

- DateTime: 16-bit register that is used to record the date and time
- Group: 16-bit register used to record group data
- Start Register For File Name or Filename option
- File Name
- Status Register

Wait While

Description: Any tasks in the list that are after this task do not execute until this condition is true.

Parameters:

- Tag: Register that is continuously monitored to see if the condition is met
- Operation: the operation performed to determine if the condition is met. Options are:
 Equal to (==)
 Not Equal to (!=)


Less than (<)
Less than or equal to (<=)
Greater than (>)
Greater than or equal to (>=)

- Operand Type: option compares the value in the target tag address with another address (Operand) or a constant value.
 - Tag – select another tag address for the operand
 - Number – use a constant value when comparing to Tag address
- Operand: this is the Operand Tag address or the constant value
 - Type: if Number is selected for Operand Type, select what format type is used. Options are Unsigned, Signed, Hexadecimal, BCD, or Float (for 32-bit registers)

Write Value to Tag

Description: Write a constant value to an internal HMC or external PLC tag .

Parameters:

- Tag: this is the target address
- Number: constant value placed into the target tag when the task executes.
- Type: format (Unsigned, Signed, Hexadecimal, BCD, Binary, or Float) of data
- Enable Control: Allows tags to control this task
 -  Note: this option is only available if configuring a global task or a “while showing” screen task Only internal HMC tags are used.
 - Enable: if ON, allows task to be executed
 - Done: HMC sets this coil after completion of task
 - Error: HMC sets this coil if error performing task

Key Specific Tasks

Description: tasks execute using a membrane function key or the Multi-State Single-Task or Multi-State Multi-Task buttons on screen.

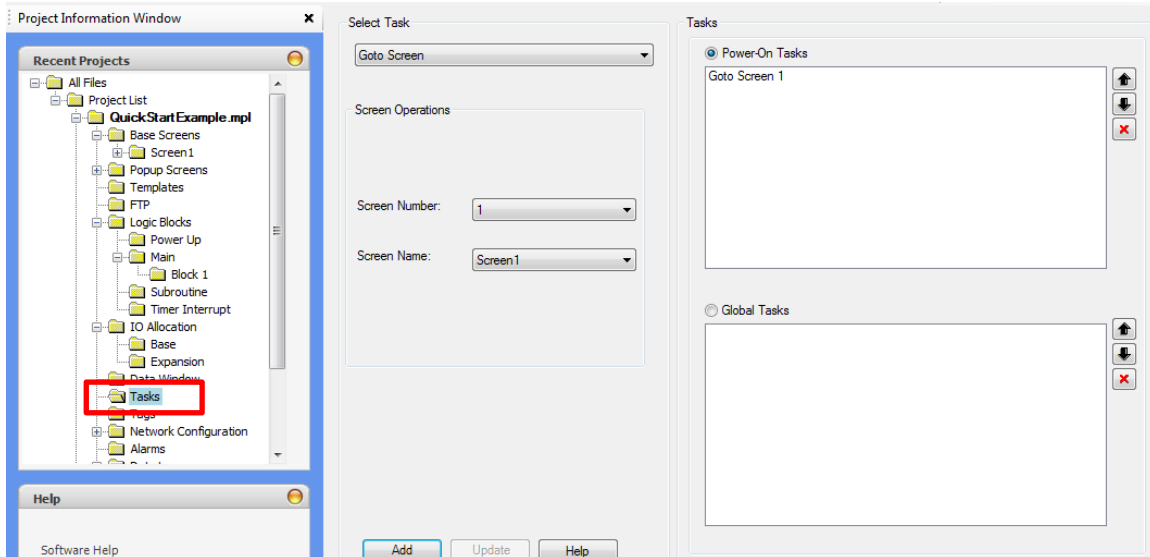
Parameters:

- Clear Data Entry: Clears value displayed in Data Entry window of keypad.
- Cancel Data Entry: Restores the original value in the Data Entry window of keypad and discontinues entry.
- Accept Data Entry: Writes the value displayed in Data Entry window of keypad to target register.
- Switch to Next Data Entry: Moves to next Bit/Register Entry object according to Object ID number.
- Switch to Previous Data Entry: Moves to prior Bit/Register Entry object according to Object ID number.
- Increase Value by 1: Adds +1 to the existing value.
- Decrease Value by 1: Subtracts from the existing value.
- Increase Digit by 1: Adds +1 to the highlighted digit of existing value. If the highest digit value is shown, then cycles back to lowest digit value.
- Decrease Digit by 1: Subtracts from the highlighted digit of existing value. If the lowest digit value is shown, then cycles back to highest digit value.
- Shift Value to Left: Shifts value one digit to the left (same as multiplying by 10).
- Move Cursor to Left: Shifts focus cursor one digit to the right.
- Move Cursor to Right: Shifts focus cursor one digit to the right.
- Sign Key (+/-): Toggles signed value.

- Sign Key (+/-) and 0: Toggles signed value, and then enters 0.
- Numeric keys 0-9 and A-F: Enters designated digit.
- Edit Bit On: Changes Bit Entry value to 1.
- Edit Bit Off: Changes Bit Entry value to 0.
- Acknowledge Alarm: Acknowledges the top-Most alarm displayed.
- Acknowledge All Alarms: Acknowledges all currently active alarms.
- Previous Alarms: Move all alarms down one line in the list of alarms.
- Next Alarm: Move all alarms up one line in the list of alarms.
- Previous Historical Alarm: Move all alarms down one line in the list of historic alarms.
- Next Historical Alarm: Move all alarms up one line in the list of historic alarms.
- Refresh All Trends: The Historical Trend graph is updated when this task is executed.
- Start Logger for all Groups: Begins logging data as specified in Data Logger for all groups.
- Stop Logger for all Groups: Discontinues logging data as specified in Data Logger for all groups.
- Start Logger of Group #: Begins logging data as specified by Data Logger group number.
- Stop Logger of Group #: Discontinues logging data as specified by Data Logger group number.
- Clear Log Memory: Clears all data collected in HMC memory by the Data Logger.
- Move to Latest Historical Alarm: Move to the last recorded alarm in the list of historic alarms.
- Move to Oldest Historical Alarm: Move to the oldest recorded alarm in the list of historic alarms.
- Move to latest Alarm: Move to the last recorded alarm in the list of active alarms.
- Move to oldest Alarm: Move to the oldest recorded alarm in the list of active alarms.
- Start Printing of Group #: Begins printout of data as specified by Data Logger group number.
- Stop Printing of Group #: Discontinues printout of data as specified by Data Logger group number.
- Clear Historical Alarm Memory: Clears out all alarms listed in the Historic Alarm list.
- Show Ethernet Configuration Screen: Displays a predefined window that allows the user to change Ethernet settings during runtime.
- Copy Screen Data to USB: Copy data to the attached USB drive.
- Copy Screen Data to SD Card: Copy data to the attached SD card.
- Show Login Screen: Displays a user login screen to enable Screen Access Levels.
- Log Out: Logs out the current user.
- Change Password: Allows the current user to change their password. Password changes are not retained through power cycle.
- Start External Logger for All Groups: Begins logging data as specified in Data Logger for all external groups.
- Stop External Logger for All Groups: Discontinues logging data as specified in Data Logger for all external groups.
- Start External Logger of Group #: Begins logging data as specified by Data Logger external group number.
- Stop External Logger of Group #: Discontinues logging data as specified by Data Logger external group number.

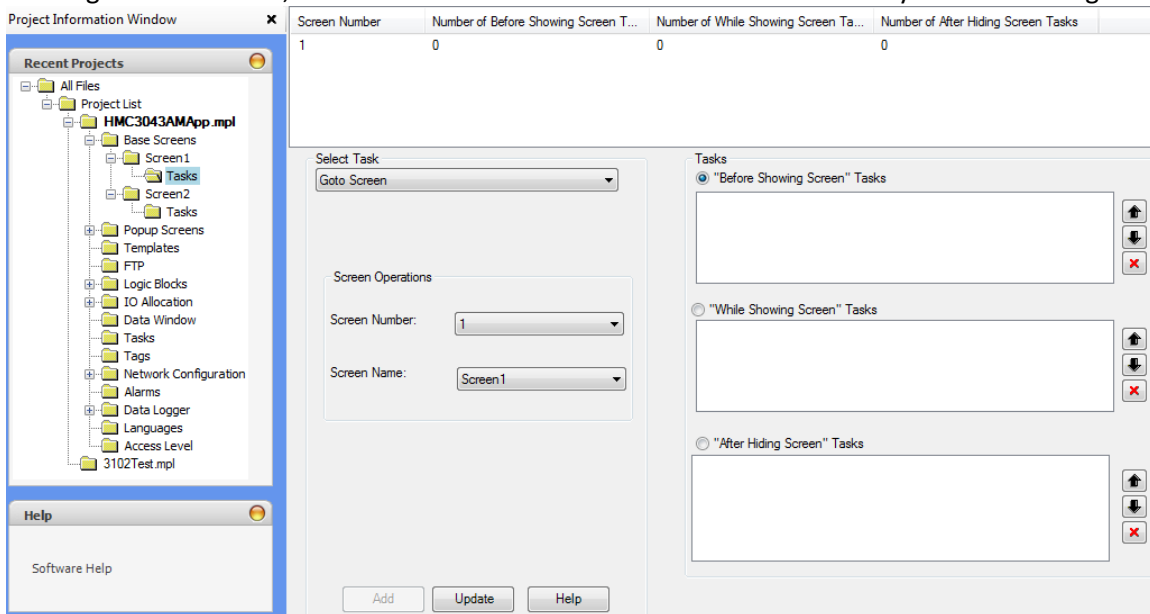
Assigning Tasks

- To assign Global or Power-On Tasks, click the Tasks folder in the **Project Information Window**. Power On Tasks are executed one time when the HMC first powers up. Global Tasks are executed continuously while the HMC is running



Notice there is a default Power On task that tells the HMC which screen to display first.

- To assign a Screen Task, click the Tasks subfolder located under the screen you wish to assign a task to.

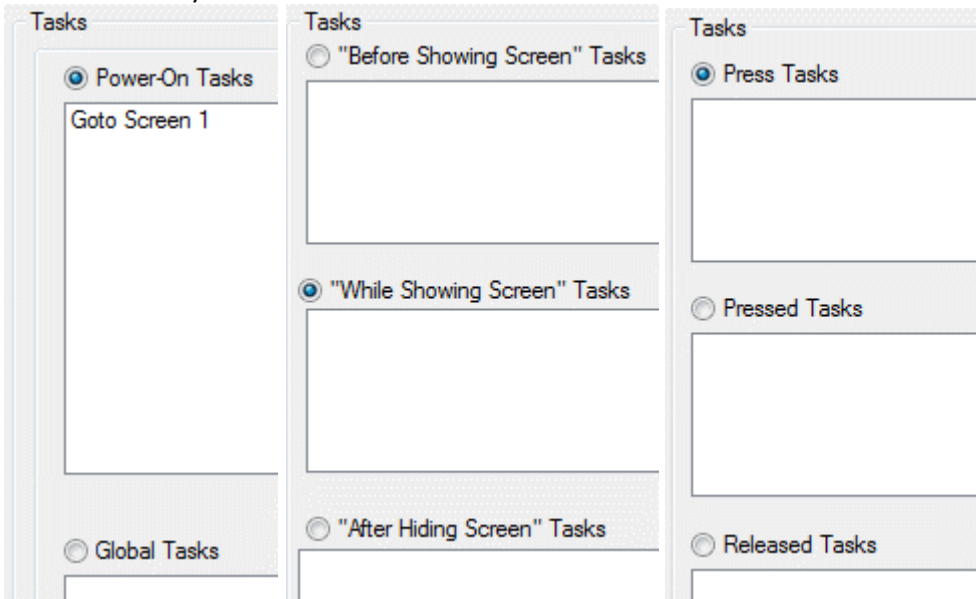


A summary of the number of assigned tasks for that screen shows across the top.

- To assign a touchscreen button task, see **Chapter 7 – Data & Display Objects** for more information.
- To assign a membrane function key task, see
- Chapter 11 – Miscellaneous Features** for more information.

33 ► *Creating a Task*

1. **Tasks:** Before you select which task you would like to execute(see Select Task below), you must click the radio button for when you would like the task to execute. Options are Power-On and Global in the global task folder, Before, While and After for screen tasks, and Press, Pressed, and Released for the button and function key tasks.

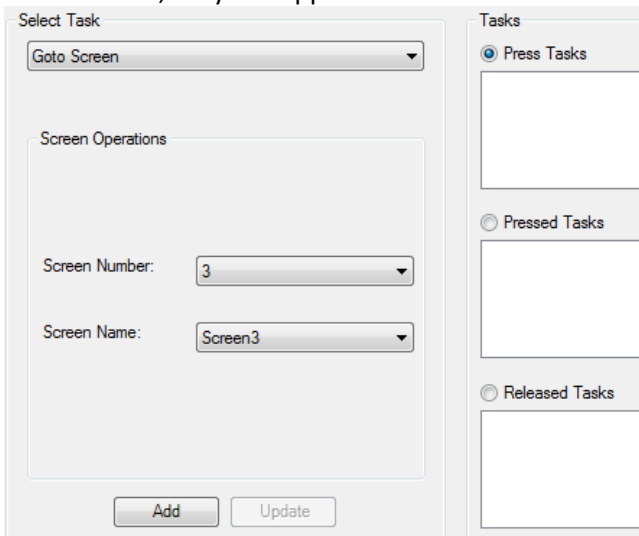


Global Tasks Folder

Screen Tasks

Button/Key Tasks

2. **Select Task:** Click the drop-down menu to select one of the tasks available (see descriptions earlier in this chapter for more information on what each task does). If additional parameters are required for the selected task, they will appear in the area below. Enter the required additional parameters.



3. Click the Add button. The task is entered into the selected tasks action.

Select Task

Goto Screen

Screen Operations

Screen Number: 3

Screen Name: Screen3

Add Update

Tasks

Press Tasks

Goto Screen3

Pressed Tasks

Released Tasks

► *Modifying a Task*

4. To change the parameters for an existing task, highlight the task you wish to modify. The Update button becomes active.

Select Task

Goto Screen

Screen Operations

Screen Number: 3

Screen Name: Screen3

Add Update

Tasks

Press Tasks


Goto Screen3

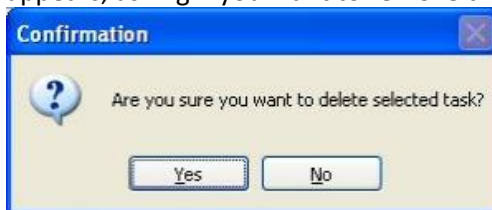
Pressed Tasks

Released Tasks

- Change your parameter to the desired option and click Update.


► *Deleting a Task*

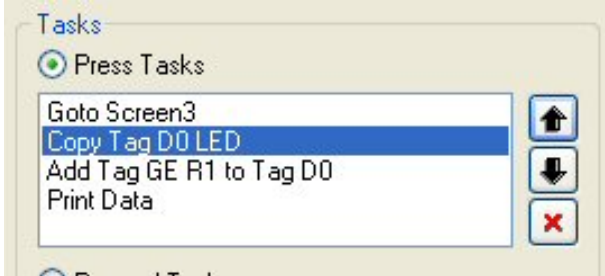
- To delete a task, highlight the task you wish to delete and click the  button. A popup dialog box appears, asking if you want to remove the task.



► *Task Order of Operation*

You can create multiple tasks for each key action. During operation, the HMC executes the list of tasks from top to bottom, in the order that they appear. There is no limit to the number of tasks you can add, (except for the overall memory limit of the HMC).

7. If you wish to reorder the tasks listed, simply use the up/down  arrows to rearrange the order:


















Chapter 7 – Data & Display Objects


What is an Object?










Screens and tags, as described in the previous chapters, are not useful in and of themselves. Tags contain data that represent machine operation, but without a means of interacting with this data there is no way for an operator to understand or control what the machine is doing. This chapter explores the various graphic objects a programmer can place on HMC screens, exposing program data to the operator, and fulfilling the Human Machine Interface function of the HMC.

Object List

The table below lists all of the objects that can be placed on a screen. Properties available for each object are indicated by letters which refer to the property list in the next section. Information specific to each object is given in the sections that follow. For clarity, objects used to display alarm data are detailed in **Chapter 9 – Alarms**, and trending objects are detailed in **Chapter 10 – Data Logger and Trending**.

Icon	Name	Description	Properties
	<u>Line</u>	Straight line of varying angle, length and color	A,B,C,D,E,S,T
	<u>Rectangle</u>	Rectangle of varying size and color	A,B,C,D,E,F,S,T
	<u>Ellipse</u>	Ellipse of varying size and color	A,B,C,D,E,F,S,T
	<u>Round Rectangle</u>	Rectangle of varying size and color with rounded edges	A,B,C,D,E,F,S,T
	<u>Picture Object</u>	.bmp, .jpg, .gif image using either predefined libraries or custom image	C,S,T
	<u>Simple Text</u>	Single line of static text using predefined system fonts and various colors	A,B,C,D,F,G,K,S,T
	<u>Multilingual Text</u>	Multi-Line static text using either predefined system fonts or Windows TrueType fonts in various colors	C,D,F,G,I,J,K,S,T
	<u>Time</u>	Time of day according to the HMC's RTC	A,B,C,D,F,I,S,T
	<u>Date</u>	Date according to the HMC's RTC	A,B,C,D,F,I,S,T
	<u>Goto Screen</u>	Button that will change the screen displayed on the HMC	J,L,M,N,O,S,T
	<u>Goto Next Screen</u>	Button that will change the screen displayed on the HMC to the next screen according to screen number	J,L,M,N,O,S,T
	<u>Goto Previous Screen</u>	Button that will change the screen displayed on the HMC to the previous screen according to screen number	J,L,M,N,O,S,T
	<u>Open Popup Screen</u>	Button that will open a popup screen on the current screen	J,L,M,N,O,S,T
	<u>Bit Lamp</u>	Display one of two images selected by the state of a bit	G,H,J,L,M,Q,S,T
	<u>Bit Display</u>	Display one of two predefined messages determined by the state of a bit	A,B,C,D,F,G,I,K,Q,S,T

	<u>Set Bit</u>	Button that turns a bit ON when pressed	J,L,M,N,O,Q,S,T
	<u>Reset Bit</u>	Button that turns a bit OFF when pressed	J,L,M,N,O,Q,S,T
	<u>Momentary Bit</u>	Button that sets a bit when pressed and resets the bit when released	C,J,L,M,N,O,T
	<u>Toggle Bit</u>	Button that toggles (inverts) the state of a bit	J,L,M,N,O,Q,S,T
	<u>Bit Entry</u>	Change the state (On or Off) of a bit using a keypad to enter a 1 or a 0	F,G,I,K,P,Q,S,T
	<u>Word Lamp</u>	Graphic display that is controlled by the value in a data register	G,H,J,S,T
	<u>Numeric Display</u>	Display a number stored in a data register	A,B,C,D,F,G,I,K,P,Q,S,T
	<u>Message Display</u>	Displays predefined text for multiple states depending upon the current value in a data register	A,B,C,D,F,G,I,K,P,Q,S,T
	<u>Write Value to Tag</u>	Write a predefined value to the target tag when the button is pressed	J,L,M,N,O,P,Q,S,T
	<u>Add Value to Tag</u>	Add a predefined constant value to the target tag whenever the button is pressed	J,L,M,N,O,P,Q,S,T
	<u>Subtract Value from Tag</u>	Subtract a predefined constant value from the target tag whenever the button is pressed	J,L,M,N,O,P,Q,S,T
	<u>Add Tag B to Tag A</u>	The value in tag A is increased by the value in tag B when this button is pressed	J,L,M,N,O,R,S,T
	<u>Subtract Tag B from Tag A</u>	The value in tag A is decreased by the value in tag B when this button is pressed	J,L,M,N,O,R,S,T
	<u>Numeric Entry</u>	Enter data into internal HMC or external PLC tags through a keypad / Display the current value	F,G,I,K,P,Q,S,T
	<u>Numeric Keypad</u>	Place a keypad on the screen that can be used to enter numeric data in input objects	F,H,J,S,T
	<u>ASCII Keypad</u>	Place a keypad on the screen that can be used to enter alpha numeric data into input objects	F,H,J,S,T
Icon	Name	Description	Properties
	<u>Custom Keypad</u>	Place a keypad on the screen that can be customized to suit specific input requirements	F,H,J,S,T
	<u>Multi – Task Single – State Button</u>	Creates a touchscreen graphics object that can perform multiple tasks when pressed, while pressed, or when released.	G,H,J,L,M,N,O,S,T
	<u>Multi – Task Multi – State Button</u>	Button to perform multiple tasks and have multiple states, changing state every time the button is pressed	G,H,J,O,R,S,T
	<u>Bar Graph</u>	Display values in data registers as a bar graph	A,C,Q,S,T
	<u>Multiple Bar Graphs</u>	Displays values from multiple registers as separate bar graphs within a single object	C,J,S,T
	<u>Analog Meter</u>	Display values in a data register as an analog meter.	C,G,H,J,Q,S,T
	<u>Trend</u>	Plot the values in up to four registers over time	F,H,I,J,Q,S,T

	<u>Historical Trend</u>	Plot data from up to four channels recorded by the data logger vs. time	F,I,J,Q,S,T
	<u>XY Plot</u>	Plot data in one register against the data in another register, a single point is displayed on the plot that moves as the values in the registers change	H,S,T
	<u>Transfer Recipe</u>	Transfer data from a predefined set of consecutive HMC memory addresses to a set of PLC memory addresses	J,L,M,N,R,S,T
	<u>Upload Recipe</u>	Transfer data from a predefined set of consecutive PLC memory addresses to a set of HMC memory addresses	J,L,M,N,R,S,T
	<u>Alarm List</u>	Displays a list of preconfigured alarm messages when the trigger bit specified for each message is activated	C,J,S,T
	<u>Alarm Acknowledge</u>	Acknowledge the alarm on the top of the alarm list	J,L,M,N,S,T
	<u>Acknowledge All Alarms</u>	Acknowledges all of the alarms displayed in an alarm list	J,L,M,N,S,T
	<u>Next Alarm</u>	Shifts that alarms displayed in an alarm list object up by one	J,L,M,N,S,T
	<u>Previous Alarm</u>	Shifts the alarms displayed in an alarm list down by one	J,L,M,N,S,T

General Object Properties

Object Properties control an object's appearance and function. The programmer can configure these properties using the Property Grid which displays the properties of the currently selected object. Most of the objects placed onto a screen share common properties described (for the sake of brevity) in this section. Later sections will examine each individual object in more detail to provide information that may be particular to the operation of that object.

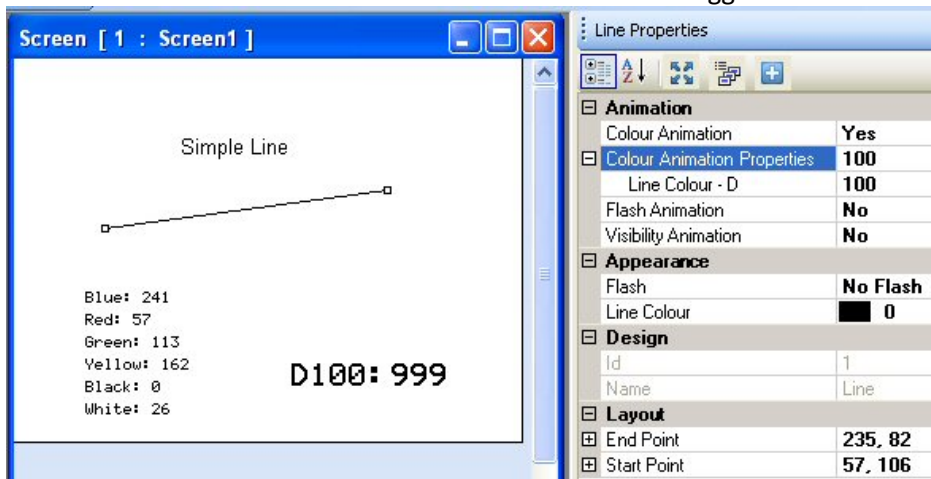
Property List

	General Properties
A	Color Animation
B	Flash Animation
C	Visibility Animation
D	Flash
E	Line Color
F	Background Color
G	Border
H	Label
I	Font
J	Language
K	Text
L	Feedback Tag On/Off Text
M	Button Style
N	Feedback Tag
O	Task(s)

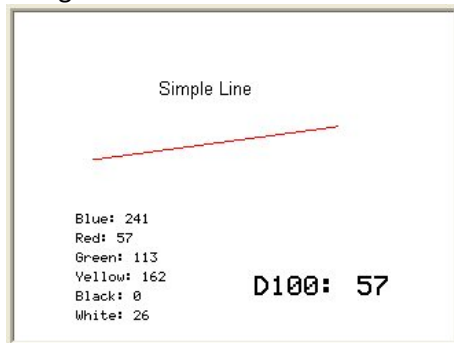
A	Color Animation
P	Value or Data Properties
Q	Tag Properties
R	Tag A/B
S	Design
T	Layout

A. Color Animation:

Dynamically change the color of the selected object. Enter a number between 0-255 (number assigned to each color can be determined by looking at the color palette) to select a color. The default tag address is internal memory register D4095 but you can select any register in the D memory of the HMC. In this example, we will enable Color Animation on a Line and select D100 as the tagged address used to control the color of the line:



Using Color Animation in MAPware



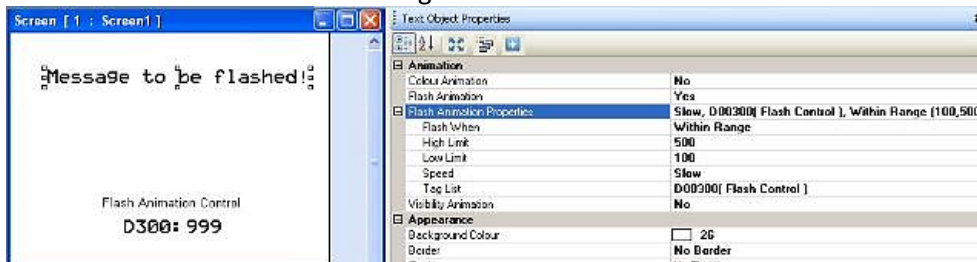
Changing the color of the line to red using simulation mode.

B. Flash Animation:

Dynamically 'flash' selected object. 'Flash' means the object displays on screen periodically depending upon the value (0-65535) in a tag register. This can indicate an alarm condition or attract the operator's attention. When enabled, the following options are displayed:

- Flash Animation Properties: this lists a brief summary of all the options selected.
- Flash When: determines when flashing should occur. Options are 'within range' (flash when the current value is within the set high and low limits) and 'out of range' (flash when the current value is above the high limit or below the low limit set).
- High Limit: the upper limit that determines when to flash

- Low Limit: the lower limit that determines when to flash
 - Speed: the rate at which flashing occurs when activated. Options are slow (0.5 fps – flashes per second), medium (1 fps), and fast (2 fps).
 - Tag List – the default tag register is D4095 but any 2-byte tag register can be selected.
- In this example, we will enable Flash Animation on a simple Text object and select D300 as the tagged address used to control the flashing of the text:



- When the value in D300 falls within 100 to 500, the text will slowly flash:



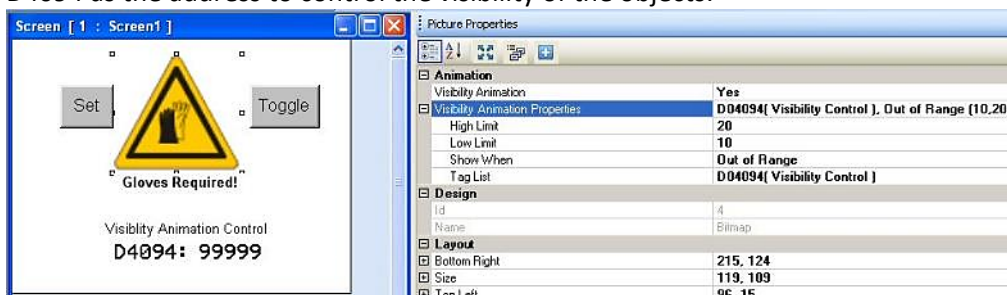
Example of flashing message text

C. Visibility Animation:

Use this feature to make the object disappear. A tag address monitored to determine when the object becomes invisible – made visible only when needed. This helps to reduce clutter on screen and focus the operator's attention to the area of the screen that is most important. Options are:

- Visibility Animation Properties: this lists a brief summary of all the options selected.
- High Limit: the upper limit determines when to make the selected object invisible.
- Low Limit: the lower limit determines when to make object invisible.
- Show When: determines when visibility should occur. Options are 'within range' (show when the current value is within the set high and low limits) and 'out of range' (show when the current value is above the high limit or below the low limit set).
- Tag List – the default tag register is D0 but you can select any 2-byte tag register.

In this example, we enable Visibility Animation on a multilingual Text object and a picture object. Select D4094 as the address to control the visibility of the objects:



When the value in D4094 is outside the range of 10-20, the two objects are visible:



Example of visibility feature using a text object and a picture


D. Flash:

This is similar to the Flash Animation feature described above except a tag register does not control this option. Therefore, if enabled, the Flash feature continues as long as the object displayed.

Options are:


- No Flash – default state. Object will not flash.
- Flash – Slow – Object flashes at 0.5 fps (flashes per second)
- Flash – Medium – Object flashes at 1.0 fps.
- Flash – Fast – Object flashes at 2.0 fps.

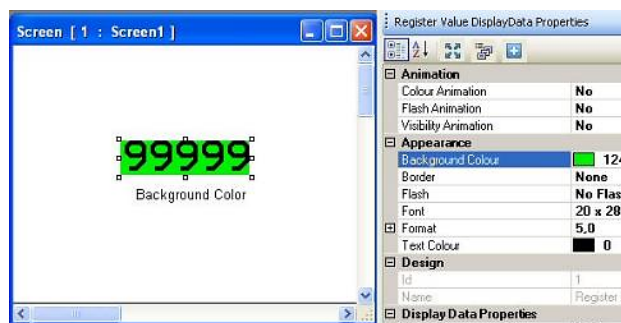
E. Line Color:

This determines the color of the perimeter line of a simple shape (i.e. line, rectangle, ellipse, etc.). Use the  button to display the color palette to select the color:



F. Background Color:

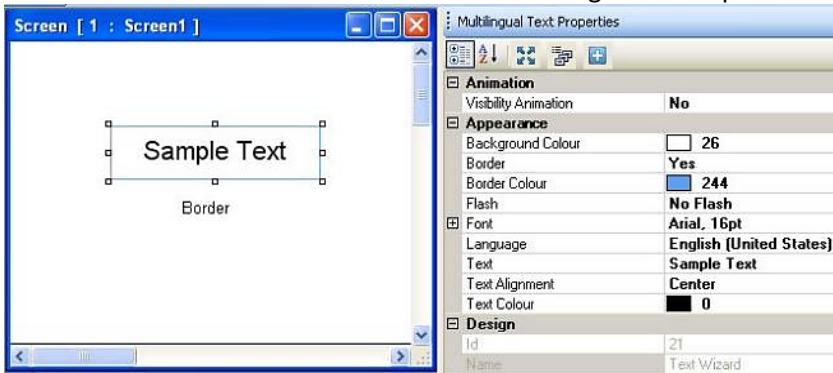
You can select a background color to simple shapes or many of the other objects that display data. Click the  button to use the color palette to select a background color:



G. Border:

Add a line around the perimeter of the object.


- Border Color – select the color of the border using the color palette.

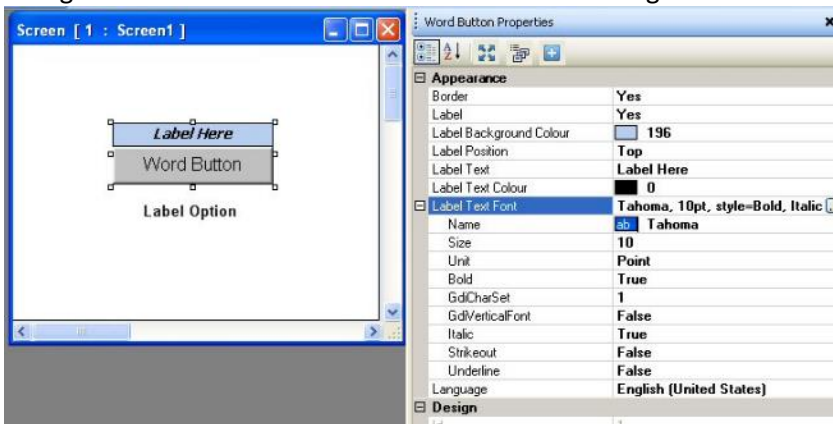



Example of border applied to a text object

H. Label:

A label identifies the object placed on the top or bottom of the object. Options are:

- Background Color – click the  button to select background color using the color palette.



- Position – options are top or bottom of the object.
- Text – enter the text that you wish to appear in the label.
- Text Color – this is the color of the text. Click  to display the color palette.
- Text Font – select the font attributes:

Name: Windows type font

Size: font size

Unit: reserved for future use – not applicable at this time

Bold: highlight with bold type

GdiCharSet: reserved for future use – not applicable at this time

GdiVerticalFont: reserved for future use – not applicable at this time


Italic: highlight with italics

Strikeout: highlight with strikeout

Underline: highlight with underline

I. Font:

Use this to configure the text displayed in the text objects as well as many of the other objects that use text.

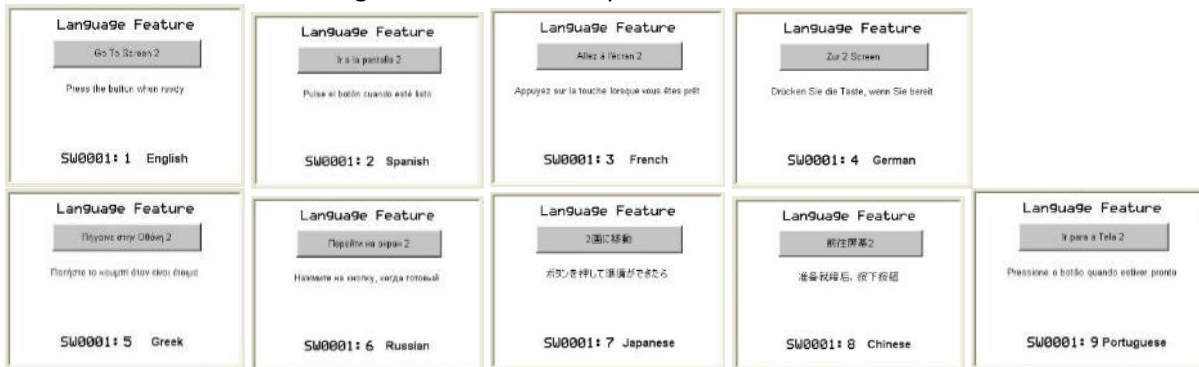
 Note that some of the objects use a simple predefined font that is not a Windows true type font. This

simplified font does not offer as many options listed below as is available for Windows true type fonts. The simplified font does have four options for size: 5x7 pixels, 10x14, 20x28 and 7x14. True type fonts have the following options:

- Name: Windows type font
- Size: font size
- Unit: reserved for future use – not applicable at this time
- Bold: highlight with bold type
- GdiCharSet: reserved for future use – not applicable at this time
- GdiVerticalFont: reserved for future use – not applicable at this time
- Italic: highlight with italics
- Strikeout: highlight with strikeout
- Underline: highlight with underline

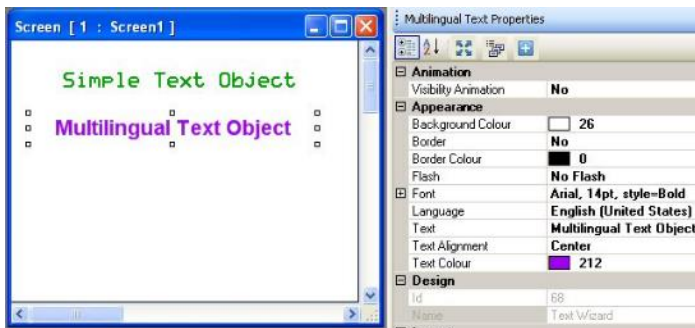
J. Language:


This feature is the Language feature described later in this chapter. This provides the ability to configure each object with a text label for up to nine languages. When the object displays, the HMC selects the language label to show based upon the current value in a particular internal HMC register (SW0001). Many objects employ the language feature but to use this feature, you must first decide which languages you need then add them to the Languages section. Once completed, you click the pull-down box in this option, select a language, and then configure the text for the object using that language. During normal operation, you can set up buttons on the HMC that will instantly change the ‘language’ (i.e. English, Spanish, German, etc.) of the HMC without the need to download a new project. Below are snapshots of HMC screens (using simulation mode) in which a ‘Jump to Screen’ button and Text change as new values are placed into SW0001:



K. Text:

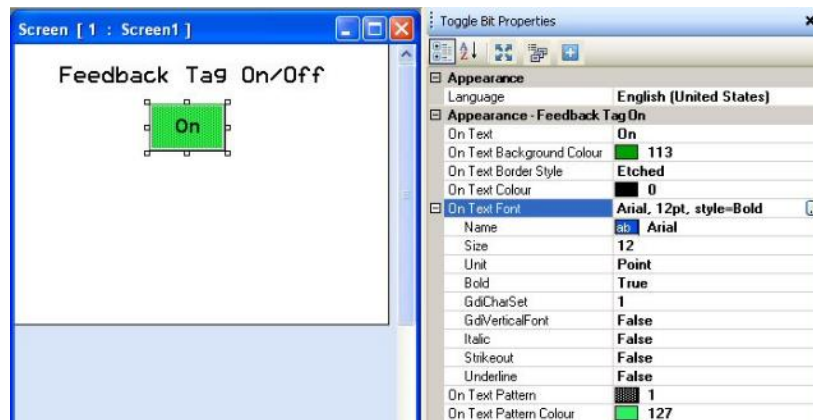
This is the entry location where the programmer enters text that will appear in a text object. The size of the display screen and the font size determine the total number of characters permissible. Multiple lines are not allowed.



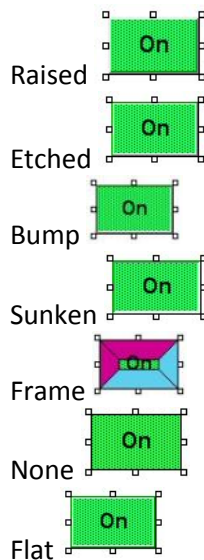
- Text Alignment – Only available when using the Multilingual Text object, this option determines alignment of the text in relation to the size of the text box. Options are Left (justified), Right (justified), and Center (justified).
- Text Color – Determines the color of the text. Click  to display the color palette.


L. Feedback Tag On/Off Text:

This option is available on most of the screen button objects. It provides the ability to customize the label that appears on the button.











- On/Off Text: entry field for the text that is to appear on the button.
- On/Off Text Background Color: fill color of the button.
- On/Off Text Border Style: there are seven options for the border.



- On/Off Text Color: this is the color of the text. Click  to display the color palette.
- On/Off Text Font: these are the particular font size settings for the TrueType font selected.
- On/Off Text Pattern: option to have a two-color pattern for the background.
- On/Off Text Pattern Color: select the secondary color for the patterned background.

M. Button Style:

As with the Feedback On/Off Text described above, this option is available on most button-type objects. Options are:

- Generic Square 
- Circle 
- Rounded Rectangle 
- Invisible 
 - ☞ Note: the object is active but not seen by the operator
- User defined Images 
 - ☞ Note: use any *.bmp, *.jpg, or *.gif image
 - On/Off State Image: Click  to locate target graphics image file.
- From Picture Library 
 - ☞ Note: from predefined libraries included in software
 - On/Off State Picture Library: Click  to display predefined library images.

N. Feedback Tag:

This feature is optional on most button-type objects (i.e. bit control, change screens, write values, alarm buttons, etc.). If disabled, there is no visual ‘feedback’ that the button, when pressed, has performed its intended function (see Toggle button #1 in illustrations). Therefore, the Appearance – Feedback Tag On section determines what displays on the button.

Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look). Configure unique labels using the Appearance-Feedback Tag Off/On sections (see Toggle button #2 in illustrations).

Alternatively, select a different feedback tag address to verify that some action has taken place in the controller. The controller is then responsible for setting the feedback tag bit, which will then cause the label on the button object to change states (see Toggle button #3 in illustrations).



In the illustrations above, the three buttons along the bottom set bit B0 when pressed. A lamp that represents the current state (On or Off) of B0 is directly above these buttons. To the right of this lamp is the status of another bit, B1.

Button #1 is configured with no feedback. Notice that there is no change to how the button looks regardless of whether or not B0 is On or Off.


Button #2 has feedback and both the target and feedback addresses are B0. This button changes ‘state’ to reflect the current state of B0.

Button #3 has feedback as well but is using B1 for the feedback address. As a result, it does not change state depending upon the value in B0. Rather, the look of this button changes according to the value in B1, although the button controls B0.

- Feedback Tag Address: the address read to determine which label state to display.
- Feedback Tag Name: Tag name assigned to the targeted tag address.
- Simulation: this option simply shows how the 'On' state and 'Off' state look for the particular object selected, when changed during programming. This option has no effect on operation of the button during online or simulation.


O. Task(s):

This option is for button-type objects (i.e. Multi-Task Single-State button) that can be configured for more than one task. If the Task is grayed out, this means that the object can do only that one defined task.

A task is some action(s) that the button is programmed to do (see **Chapter 6 – Task Management** for more information). Click  to locate display the Touch Screen Task List dialog box to add/modify the tasks.

P. Value or Data Properties:

This section configures how the selected object interprets (i.e. signed/unsigned, leading zeroes, ranges, etc.) the number it is to display or write.

- Value Data Type: options vary according to the tag address selected (bit, 1 byte, 2 bytes, or 4 bytes). Options are unsigned, signed, hexadecimal, BCD, binary, Float, ASCII, or ASCII Numeric.
 - Unsigned – represents number in target address as an unsigned decimal number.
 - Signed – represents a signed decimal number. Range is – 2,147,483,648 to 2,147,483,647 for 4-byte registers, -32768 to 32767 for 2-byte, and 28 to 127 for 1-byte.
 - Hexadecimal – represents a hexadecimal (base 16) number. Range is – 0 to FFFFFFFF for 4-byte registers, 0 to FFFF for 2-byte, and 0 to FF for 1-byte.
 - BCD – represents as a BCD (binary coded decimal) number. Range is – 0 to 99999999 for 4-byte registers, 0 to 9999 for 2-byte, and 0 to 99 for 1-byte.
 - Binary – represents as a binary (base 2) number. Range is limited to 16 bits (LSW) for 4-byte registers, 16 bits for 2-byte, and 8 bits for 1-byte.
 - Float – represents a floating-point number using the IEEE 754 single precision format. Any number with no more than nine digits can be displayed. If necessary, the number is rounded. Only supported with a 4-byte register tag address.
 - ASCII – represents the data in a 16 bit number as two ASCII printable characters. Hex values 0-9 display as numbers 0-9, 0AF is displayed as small case decimal numbers, 20-FF is shown as printable ASCII characters. The HMC reads consecutive registers according to the Length field (ex: if Length=10, then HMC will read five consecutive registers, starting with the designated Tag Address.
 - ASCII Numbers – same as ASCII (see above) except that all non-printable values display as zeroes.
- Display Leading Zeroes: when enabled, data is presented with leading zeroes to the left of the value, if required to fill in the number of digits specified.
- Hide Data: if enabled, data will be represented with asterisks '***'. This feature is for security password entry.
- Keypad (for data entry objects): enable or disable popup keypad input.
 Note: if popup keypad input is disabled, entry is still available if a static keypad is placed onto the same screen as this object or on a popup screen. For more information on how to do this, see On Screen Keypads later in this chapter.

Screen Name: determines which popup keypad is used.

Screen Number: screen number of the popup keypad used.

Ranges (for data entry objects): these are the limits allowed when entering a new number.

Maximum Value (List P) – enter the maximum value that the HMC operator can enter into the target register.

Minimum Value (List P) – enter the minimum value that the HMC operator can enter into the target register.

Q. Tag Properties:

Defines the properties of the tag attached to the object.

- Tag Address: this is the address of the target register monitored.
- Tag Name: this is the name given to the target register in the Tag Database.

R. Tag A/B:

For objects that perform a mathematical operation on two addresses (ex. Add Tag B to Tag A) or copy from one address to another (i.e. recipes).

Tag A Address: Address assigned to Tag A in the Tag database.

Tag B Address: Address assigned to Tag B in the Tag database.

S. Design:

The programming software uses this section to identify each object. For this reason, the user cannot edit this section.

Id: this is an identification number assigned to the object.

Name: this is the name given to the object.

T. Layout:

This section provides the coordinates for the selected object.

- Bottom Right (or End Pt.): coordinates (pixel location) of the end point of the object
- Size: The total size (in pixels) of the selected object. The first value is the width, and second value is height.
- Top Left (or Start Pt.): location of the start point of the object
- Refer to the above section often when working with screen objects. The next section covers all objects that are placed onto a screen.

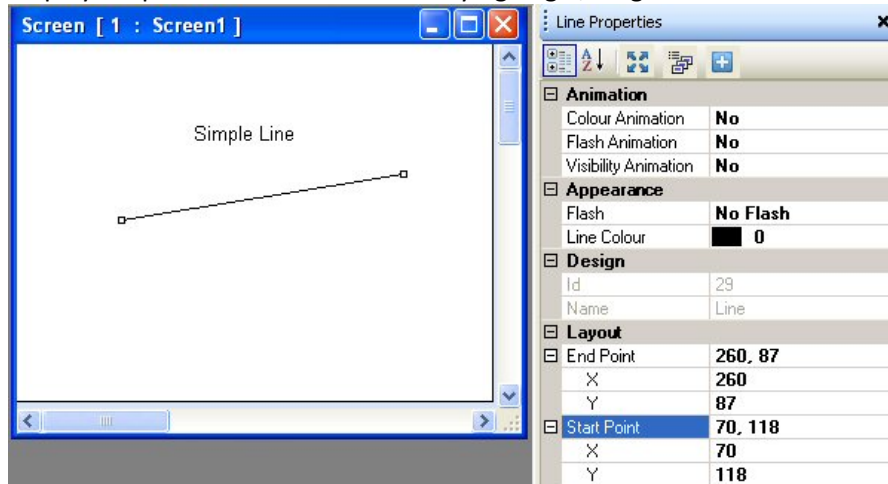
Simple Drawing Tools and Static Objects

The MAPware software provides many drawing tools used to create simple graphics on a screen. Sophisticated static objects are also available to display graphics or text. Static objects (as opposed to dynamic objects) are screen objects that do not change what displays on screen. Dynamic objects (such as lamps or numeric input registers) change according to the value of a coil or register in a PLC or internal memory of the HMC. This section provides descriptions of the simple drawing tools and static objects available in the MAPware software.

Line Object



Display simple lines on a screen of varying angle, length and color.



Place a line on screen

- Use one of the following:
 - Click **Draw > Graphical Objects > Line** from the standard menu
 - Click **Drawing Tools > Line** from the Draw toolbar
 - Click the Line icon from the Draw toolbar
- Move cursor to a start point for the line. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the line and release. The line appears on screen and the Line Properties box displays.

Line Properties options

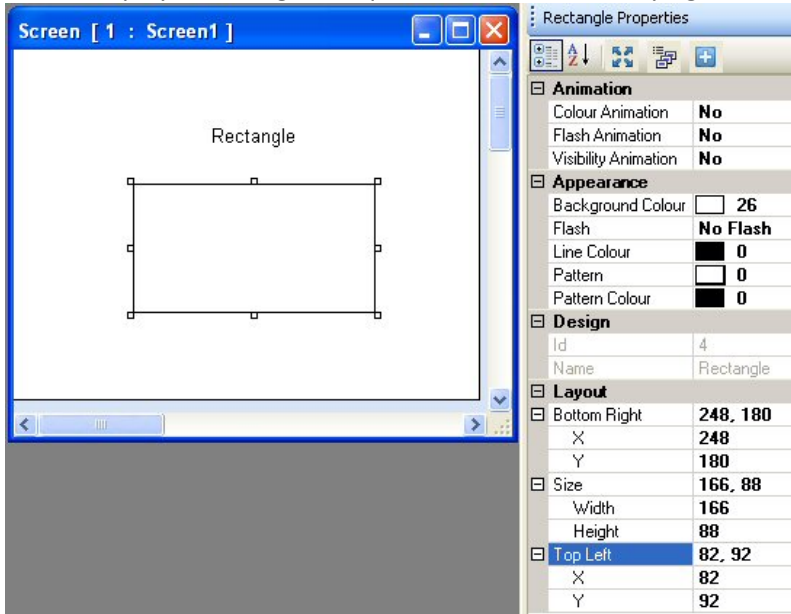
- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Flash (List D) – continuously ‘flashes’ the object.
- Line Color (List E) – sets color of the perimeter line.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a Line

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Rectangle Object



Use to display a rectangle or square on a screen of varying size and color.



Place a rectangle on screen

- Use one of the following:
 - Click **Draw > Graphical Objects > Rectangle** from the standard menu
 - Click **Drawing Tools > Rectangle** from the Objects toolbar
 - Click the Rectangle icon from the Draw toolbar
- Move cursor to a starting corner endpoint for the rectangle. Click and hold mouse cursor.
- Drag mouse cursor diagonally to the opposite endpoint for the rectangle and release. The rectangle appears on screen and the Rectangle Properties toolbox displays.

Rectangle Properties Options

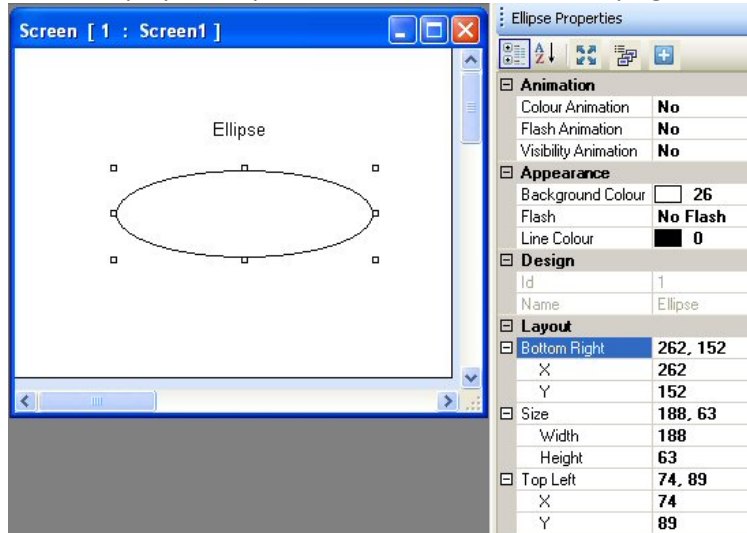
- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Line Color (List E) – sets color of the perimeter line.
- Pattern: this is an option to use two colors for the background. The pattern determines how the two colors display. Eight patterns are available. Click  to display the pattern options.
- Pattern Color: Select the second background color when using the pattern option above. Click  to display the color palette.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a rectangle

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Ellipse Object

Use to display an ellipse or circle on a screen of varying size and color.



Place an ellipse on a screen

- Use one of the following:
 - Click **Draw > Graphical Objects > Ellipse** from the standard menu
 - Click **Drawing Tools > Ellipse** from the Objects toolbar
 - Click the Ellipse icon from the Draw toolbar
- Move cursor to a starting corner endpoint for the ellipse. Click and hold mouse cursor.
- Drag mouse cursor diagonally to the opposite endpoint for the ellipse and release. The ellipse appears on screen and the Ellipse Properties toolbox displays.

Ellipse Properties Options

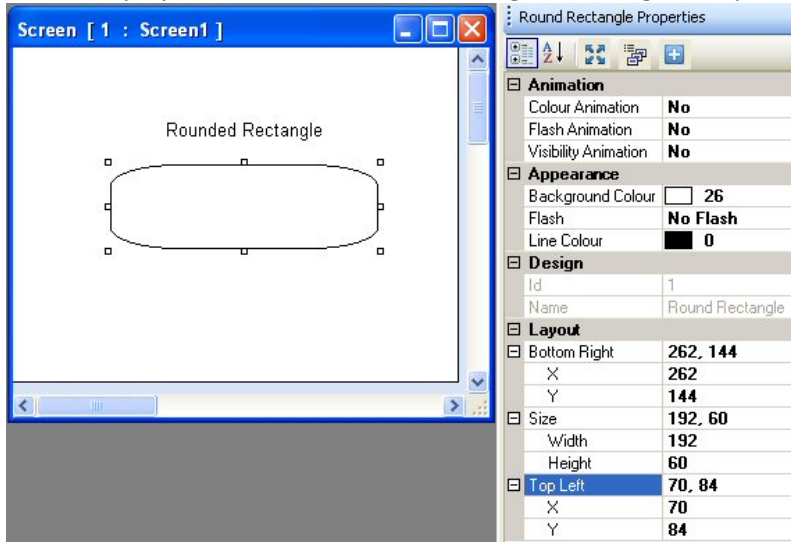
- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Line Color (List E) – sets color of the perimeter line.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize an ellipse

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Round Rectangle Object

Use to display a rounded (with beveled edges) rectangle or square on a screen of varying size and color.



Place a rounded rectangle on screen

- Use one of the following:
 - Click **Draw > Graphical Objects > Rounded Rectangle** from the standard menu
 - Click **Drawing Tools > Rounded Rectangle** from the Objects toolbar
- Move cursor to a starting corner endpoint for the rounded rectangle. Click and hold mouse cursor.
- Drag mouse cursor diagonally to the opposite endpoint for the rounded rectangle and release. The rectangle appears on screen and the Round Rectangle Properties toolbox displays.

Round Rectangle Properties Options

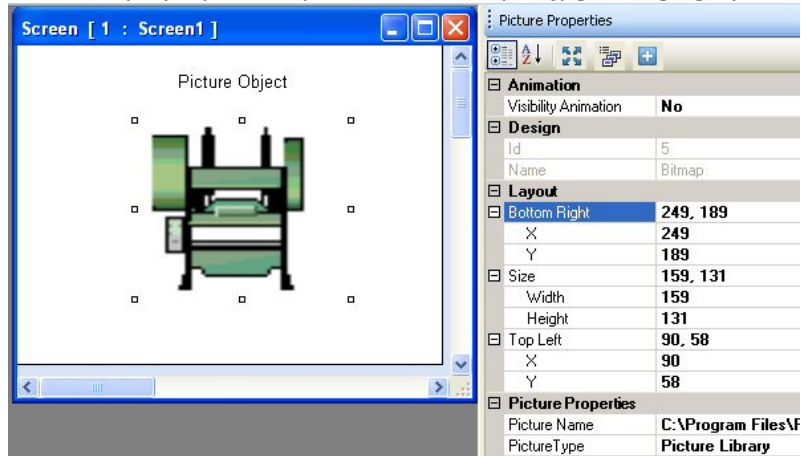
- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Line Color (List E) – sets color of the perimeter line.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a round rectangle

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Pictures Object

Use to display a picture (predefined *.bmp, *.jpg, or *.gif graphic image file) on a screen of varying size.




Place a picture on screen

- Use one of the following:
 - Click **Drawing Tools > Picture** from the Objects toolbar
 - Click the Picture icon from the Draw toolbar
- Move cursor to a starting corner endpoint for the picture. Click and hold mouse cursor.
- Drag mouse cursor diagonally to the opposite endpoint for the picture and release. The picture appears on screen and the Picture Properties toolbox displays.

Picture Properties Options

- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Picture Properties: use to assign a graphic image to the picture object.

Picture Name: this is the file name of the image that is displayed in the picture. To select an image, click the directory button , then locate and select the image in the Picture Library or use the browser window.

Picture Type: options are Picture Browser or Picture Library.

Picture Browser: this option allows you to search your hard drive for imported images using the Picture Name field. The image can be *.bmp, *.gif, or *.jpg format.

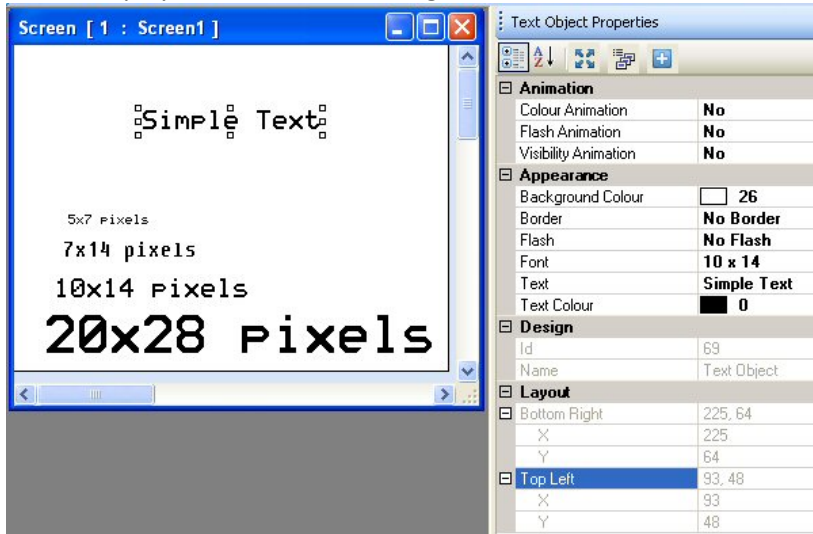
Picture Library: choose from a large selection of predefined images in the Picture library included with the MAPware software.

Resize a picture

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Simple Text Object **T**


Use to display text on a screen using one of four font sizes and selectable color.



Place simple text object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Text** from the standard menu
 - Click **Drawing Tools > Text** from the Objects toolbar
 - Click the Text icon from the Draw toolbar
- Move precision cursor + to the desired location for the text and click to place.
- The Text object (with 'Text') appears on screen and the Text Properties toolbox displays.

Simple Text Object Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically 'flash' object.
- Visibility Animation (List C) – make the object disappear or become 'invisible'.
- Background Color (List F) – option to select a color as a 'backdrop' to the object.
- Border (List G) – add a line around the perimeter of the object.
- Flash (List D) – continuously 'flashes' the object.
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Text (List K): The text that appears in the box. Screen size of the display and the font used determine the maximum number of characters.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

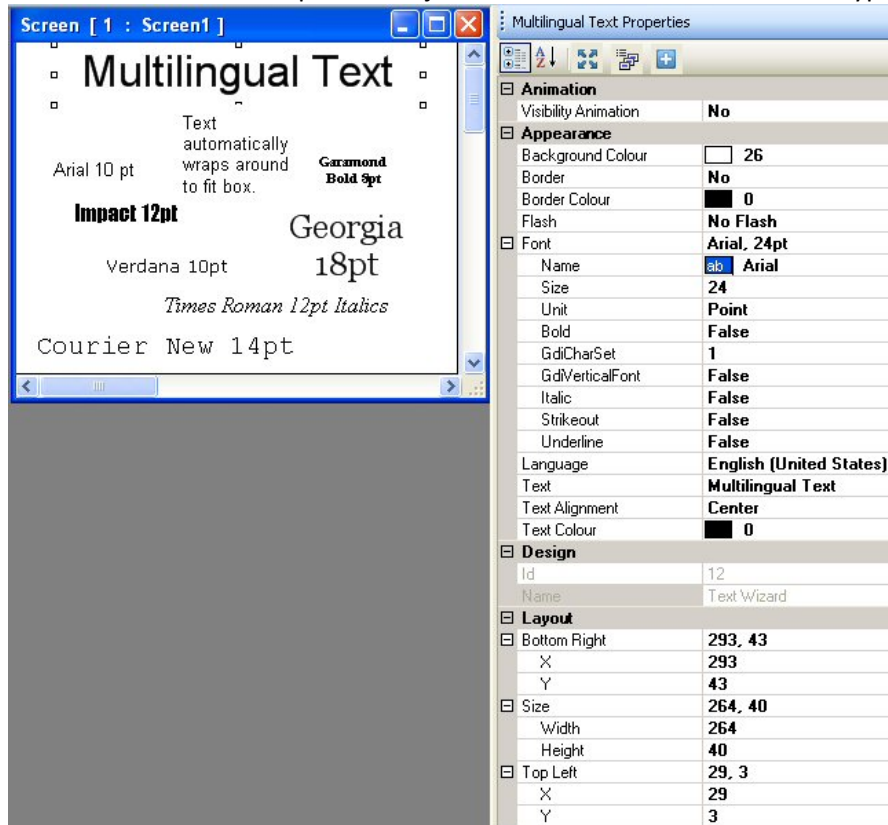
Resize a simple text object

Text objects are not resizable – the number of characters and font size determines the size. To move the text object, simply click and drag using the mouse to the target location on screen.


Multilingual Text Object



Use to display multilingual text on a screen using Windows True Type fonts. The term ‘multilingual’ refers to the ability to use the Multilanguage feature with this object. This is the ability to configure up to nine text labels per object. The current value in the Language tag (SW0001) determines the particular text label shown during operation. For more information on this feature, see Languages later in this chapter. The multilingual text object also differs from the simple text object because it uses Windows True type fonts.




Place multilingual text on screen

- Use one of the following:
 - Click **Draw > Graphical Objects > Multilingual Text** from the standard menu
 - Click **Drawing Tools > Multilingual Text** from the Objects toolbar
 - Click the Multilingual Text icon from the Draw toolbar
- Move precision cursor  to the desired location for the text and click to place.
- The Multilingual Text object (with ‘Sample Text’) appears on screen and the Multilingual Text Properties toolbox displays.

Multilingual Text Properties Options

- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
 - Border Color – select a color for the border.
- Flash (List D) – continuously ‘flashes’ the object.

- Font (List I) – configure how you wish the text to appear.
- Language (List J) – highlight the language that must be selected to display the entered text.
- Text (List K) – the text that appears in the box. Screen size of the display and the font determined the maximum number of characters.
- Text Alignment (List Ka) – determines how text on multiple lines aligns: Left, Right, or Center justified.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

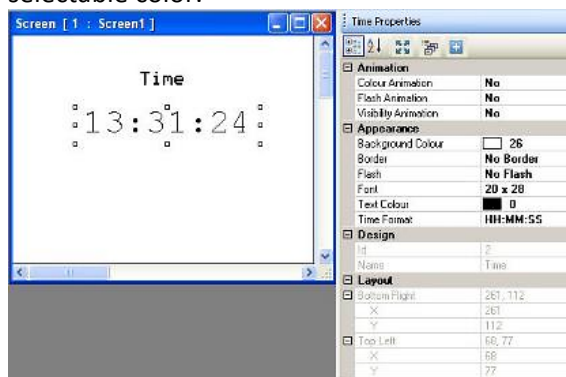
Resize a multilingual text object

The Multilingual text object is resizable and has the advantage that the text wraps around to the next line if the width of the text box is too small.


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Time Object

Use to display time (all HMCs have a built-in real time clock RTC) on a screen using one of four font sizes and selectable color.




Place a time object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Time** from the standard menu
 - Click **Clock Objects > Time** from the Objects toolbar
- Move precision cursor  to the desired location for the Time and click to place.
- The Time object (with current computer time) appears on screen and the Time Properties toolbox displays.

Time Object Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.

- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Time Format: options are HH:MM:SS (hours, minutes, seconds) or HH:MM (hours, minutes)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

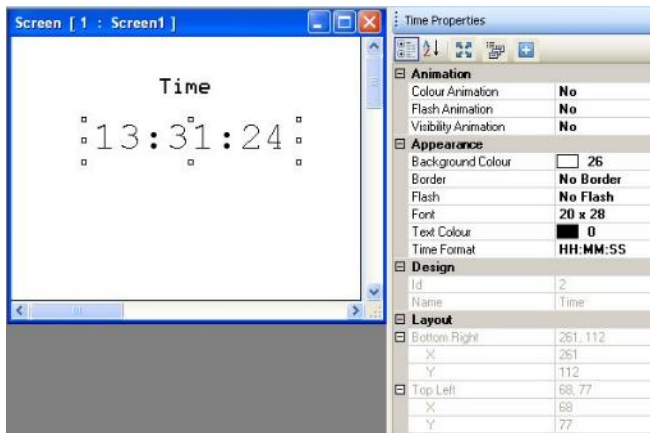
Resize a time object

Time objects are not resizable – the size is fixed by the number of characters and font size. To move the time object, simply click and drag using the mouse to the target location on screen.


Date Object




Use to display date (all HMCs have a built-in real time clock RTC) on a screen using one of four font sizes and selectable color.



Place a date object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Date** from the standard menu
 - Click **Clock Objects > Date** from the Objects toolbar
- Move precision cursor  to the desired location for the Date and click to place.
- The Date object (with current computer date) appears on screen and the Date Properties toolbox displays.

Date Object Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Date Format: several options are available. See the dropdown menu in MAPware for these options.
- Display Day: option to display the day of the week to the left of the Date.
- Flash (List D) – continuously ‘flashes’ the object.
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a date object

Date objects are sized according to the number of characters and font size. To move the date object, simply click and drag using the mouse to the target location on screen.

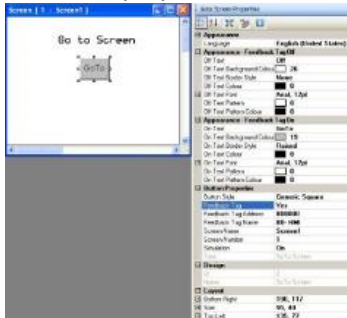
Screen Buttons

The MAPware software provides four button objects that change screens. When the operator presses one of these buttons, a new screen displays or a popup screen appears.

Go to Screen Object



Use to display a button on screen that, when pressed, displays a new screen.



Place a Go to Screen button on screen

- Use one of the following:
 - Click **Draw > Buttons > Navigation Buttons > Go to Screen** from the standard menu
 - Click **Quick Buttons > Go to Screen** from the Draw toolbar
- Move \oplus cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Go to Screen Properties box displays.

Go to Screen Properties Options

- Language (List J) – configure a text label for up to nine languages per object.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or 'look' to the button.
- Feedback Tag (List N): Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an 'off' or untouched look to an 'on' or touched look).
- Screen Name: select from the pull-down list box, the screen that you wish to display when the button is pressed.
 - Screen Number: this is the number assigned to the selected screen.
- Simulation (List Nc) – select 'On/Off' to see how button looks in that state (only available if Feedback Tag is set to 'Yes').
- Task (List O) – Go to Screen (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

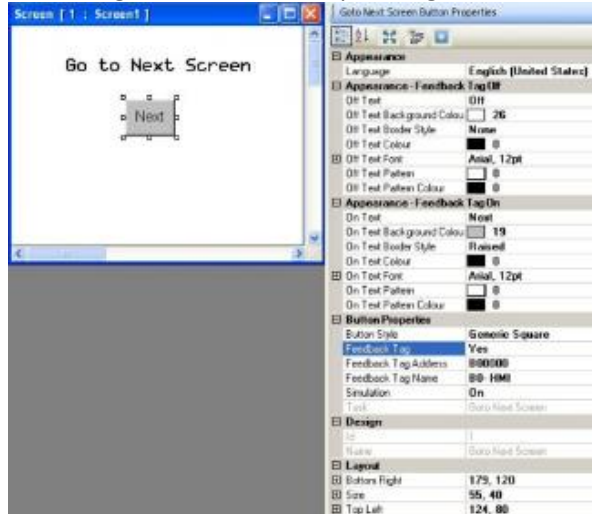
Resize a Go to Screen button

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.


Go to Next Screen Object



Use to display a button on screen that, when pressed, displays the next screen in numerical sequence. If there are no higher screens, then pressing this button has no effect.



Place a Go to Next Screen button on screen

- Use one of the following:
 - Click **Draw > Buttons > Navigation Buttons > Go to Next Screen** from the standard menu
 - Click **Quick Buttons > Go to Next Screen** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Go to Next Screen Properties box displays.

Go to Next Screen Properties Options

- Language (List J) – configure a text label for up to 9 languages per object.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N): Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Task (List O) – Go to Next Screen (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

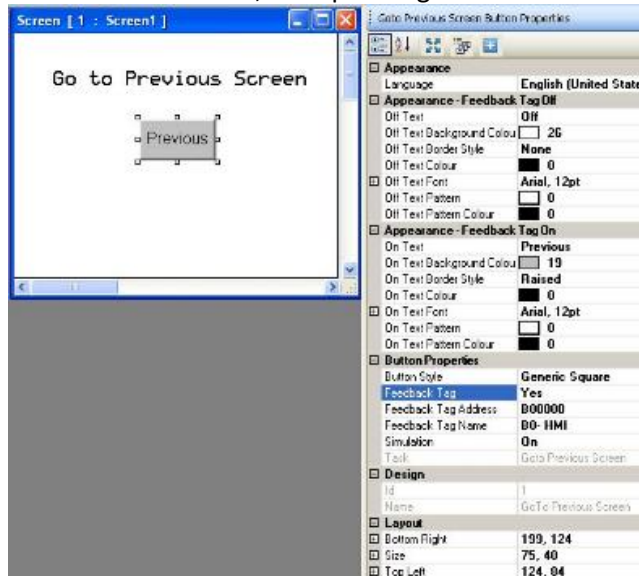
Resize a Go to Next Screen button

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Go to Previous Screen Object



Use to display a button on screen that, when pressed, displays the prior screen in numerical sequence. If there are no lower screens, then pressing this button has no effect.



Place a Go to Previous Screen button on screen

- Use one of the following:
 - Click **Draw > Buttons > Navigation Buttons > Go to Previous Screen** from the standard menu
 - Click **Quick Buttons > Go to Previous Screen** from the Draw toolbar
- Move \oplus cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Go to Previous Screen Properties box displays.

Go to Previous Screen Properties Options

- Language (List J) – configure a text label for up to 9 languages per object.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N): Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Task (List O) – Go to Previous Screen (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

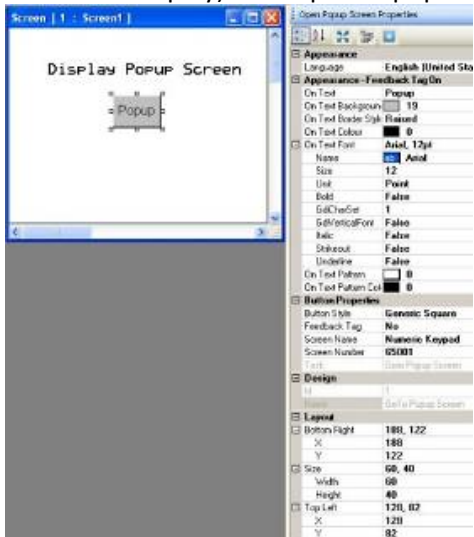
Resize a Go to Previous Screen button

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.


Open Popup Screen Object



Use to display a button on screen that, when pressed, displays a popup screen (a screen that is smaller than the size of the display). The Open Popup Screen button cannot be placed and used on popup screens.



Place Open Popup Screen button on screen

- Use one of the following:
 - Click **Draw > Buttons > Navigation Buttons > Open Popup Screen** from the standard menu
 - Click **Quick Buttons > Open Popup Screen** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Open Popup Screen Properties box displays.

Open Popup Screen Properties Options

- Language (List J) – configure a text label for up to 9 languages per object.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N): Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Screen Name: select from the pull-down list box, the popup screen that you wish to display when the button is pressed.
 - Screen Number: this is the number assigned to the selected screen.
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Task (List O) – Go to Popup Screen (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize an Open Popup Screen button

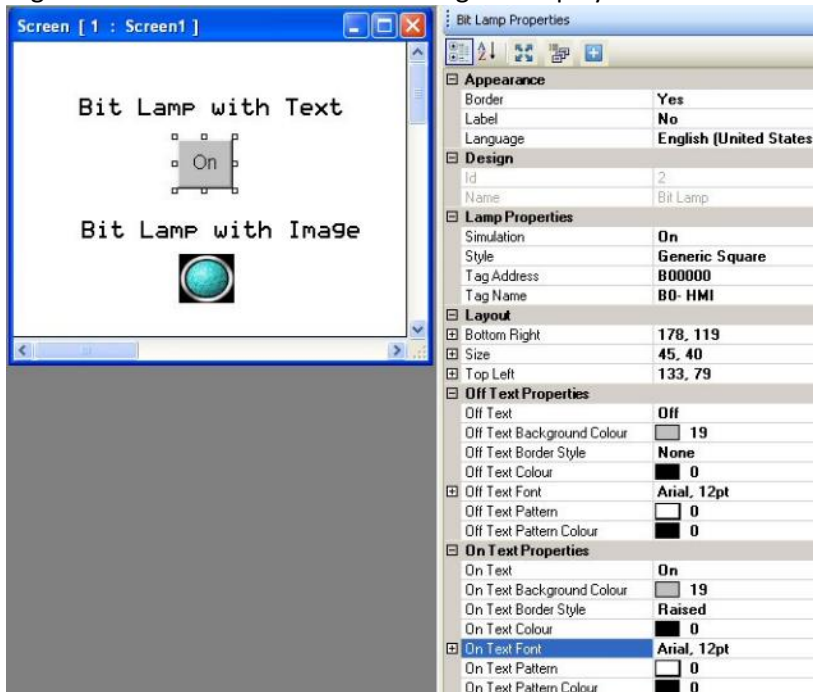
Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Bit-based Objects


The MAPware software provides many options for displaying and writing to bit/coil registers. Bit/coil registers are two state registers that are used to represent an 'On[1]' and 'Off[0]' condition. Bit registers often display lamps or buttons that control a target bit.

Bit Lamp

Bit lamps indicate the current state of a bit register using a graphic image (i.e. lamp) or text (i.e. ON/OFF). When a bit lamp is on a screen that is currently displayed on the HMC, the HMC continuously polls the target bit register to determine which state image to display.



Place a Bit Lamp object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Bit Lamp** from the standard menu
 - Click **Advanced Objects > Bit Lamp** from the Draw toolbar
 - Click the Bit Lamp Display icon in the Objects toolbar.
- Move  cursor to a start point for the object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the object and release. The object appears on screen and the Bit Lamp Properties box displays.

Bit Lamp Properties Options

- Border (List G) – add a line around the perimeter of the object.
- Label (List H) – option to have a label appear on the top/bottom of the object.
- Language (List J) – configure displayed text for up to 9 languages per object.
- Design (List S) – identifies object.
- Lamp Properties – selects the 'style' and target address.

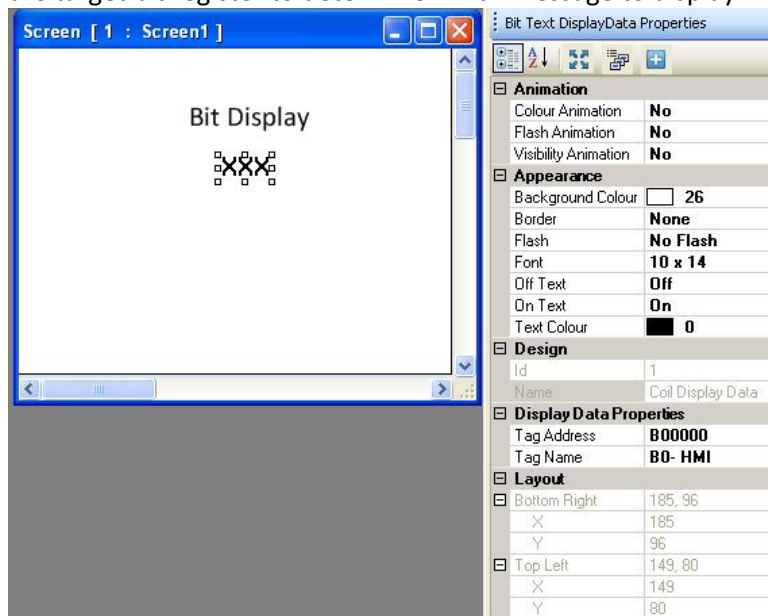
- Simulation (List Nc) – select 'On/Off' to see how button looks in that state (only available if Feedback Tag is set to 'Yes').
- Style (List M) – select a style or 'look' to the button.
- Tag Address (List Qa) – this is the address of the target bit/coil that is monitored.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- On/Off Text Properties (List L) – select the On and Off labels that appear when using the Generic Square, Circle, or Rounded Rectangle button style.

Resize a Bit Lamp object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Bit Display

Bit Display indicates the current state of a bit register using two predefined messages (i.e. ON/OFF). The current value read in the targeted bit/coil message determines what message displays. Messages can be of varying length (maximum of 40 characters). When a bit data display is on an HMC screen, the HMC continuously polls the target bit register to determine which message to display.




Place a Bit Display object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Data Display > Bit Data** from the standard menu
 - Click **Show Data > Bit Data** from the Draw toolbar
 - Click the Bit Display icon in the Objects toolbar.
- Move  cursor to a start point for the button object. Click to place the object on screen.
- The object appears on screen and the Bit Text Display Data Properties box displays.

Bit Display Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object.

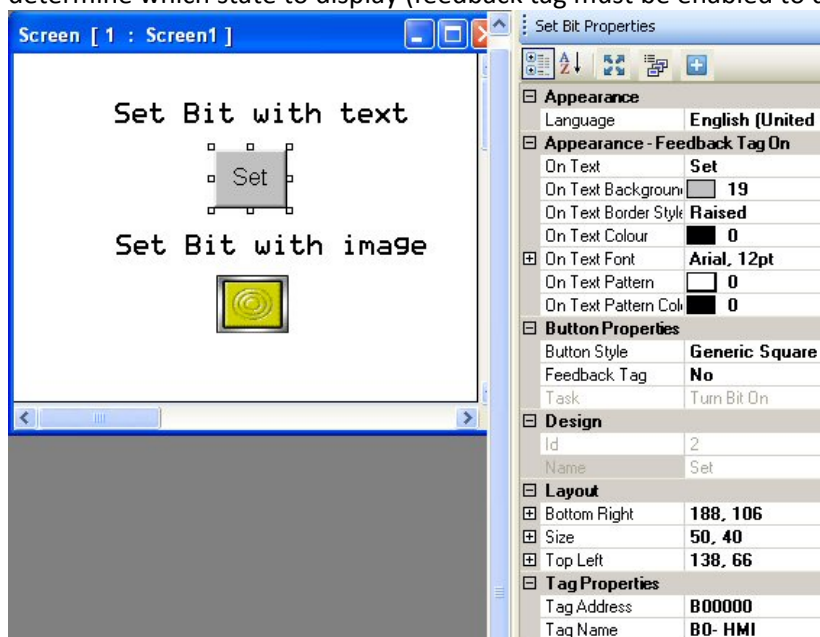
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Off/On Text – message text displayed according to the current value in the target address. Maximum number of characters is 40.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object.
- Display Data Properties – address of target.
- Tag Address (List Qa) – this is the address of the target bit/coil that is monitored.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a Bit Display object

The Bit Data object cannot resize (unless you change the Font attribute) but can move.

Set Bit

The Set Bit button sets a targeted bit/coil. The button displays with either text labels or a graphic image to represent two states. When a set bit button is on screen, the HMC continuously polls the target bit register to determine which state to display (feedback tag must be enabled to display two states).



Place a Set Bit button object on screen

- Use one of the following:
 - click **Draw > Buttons > Bit Action > Set Bit** from the standard menu
 - click **Quick Buttons > Set Bit** from the Draw toolbar
 - click the Set Bit icon in the Objects toolbar

- Move $+$ cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Set Bit Properties box displays.

Set Bit Properties Options

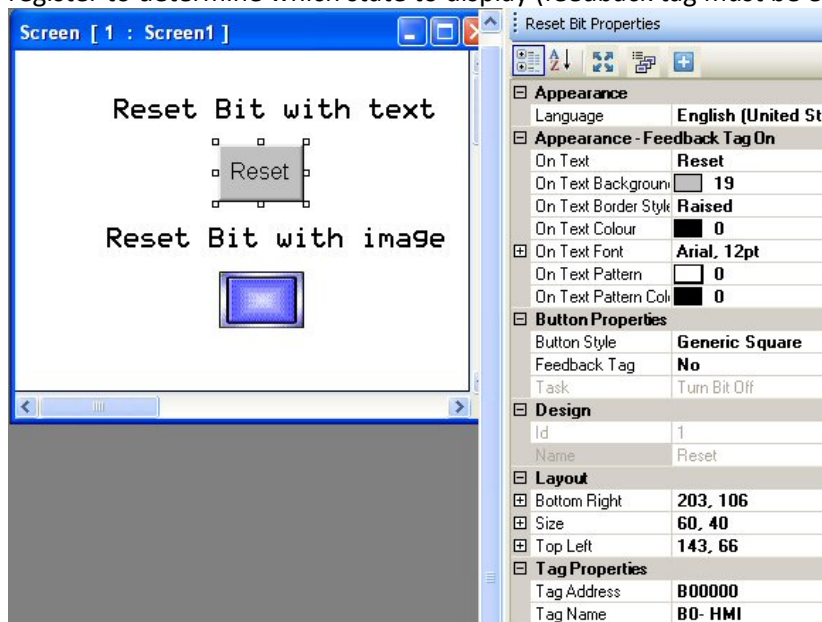
- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is ‘Yes’).
- Task (List O) – turn Bit On (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Tag Properties (List Q) – address of target to use.
- Tag Address (List Qa) – this is the address of the target bit/coil that is set.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.

Resize a Set Bit button object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Reset Bit

The Reset Bit button resets (clears) a targeted bit/coil. The button displays with either text labels or a graphic image to represent two states. When a reset bit button is on screen, the HMC continuously polls the target bit register to determine which state to display (feedback tag must be enabled to display two states).



Place a Reset Bit button object on screen

- Use one of the following:
 - click **Draw > Buttons > Bit Action > Reset Bit** from the standard menu
 - click **Quick Buttons > Reset Bit** from the Draw toolbar
 - click the Reset Bit icon in the Objects toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Reset Bit Properties box displays.

Reset Bit Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels
- Button Style (List M) – selects a style or ‘look’ to the button
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look)
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’)
- Task (List O) – turn Bit Off (cannot be modified)
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Tag Properties (List Q) – address of target to use
- Tag Address (List Qa) – this is the address of the target bit/coil that is reset
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil

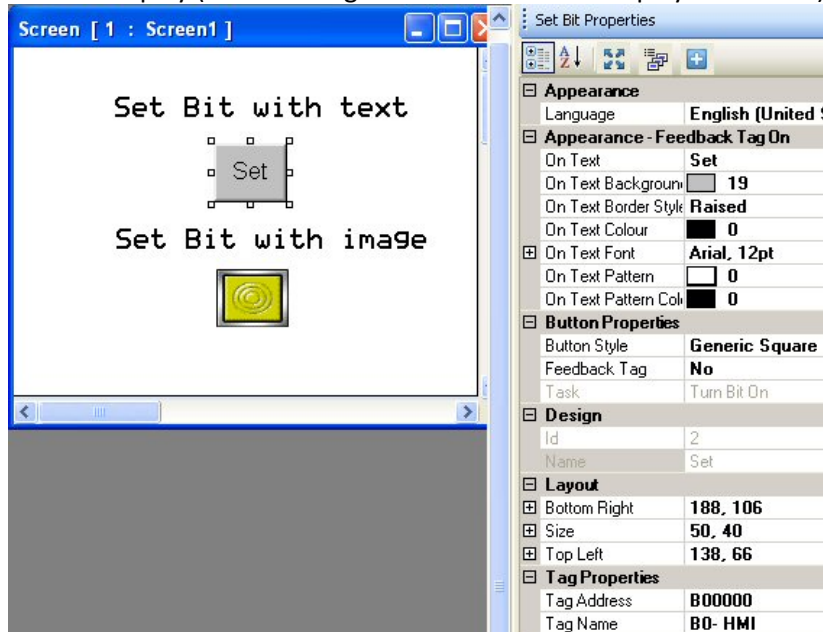
Resize a Reset Bit button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Momentary Bit

The Set Bit button sets a targeted bit/coil on while the button is being pressed and resets the bit/coil when the button is released. The button displays with either text labels or a graphic image to represent two states. When a momentary bit button is on screen, the HMC continuously polls the target bit register to determine which

state to display (feedback tag must be enabled to display two states).



Place a Momentary Bit button object on screen

- Use one of the following:
 - click **Draw > Buttons > Bit Action > Momentary Bit** from the standard menu
 - click **Quick Buttons > Momentary Bit** from the Draw toolbar
 - click the Momentary Bit icon in the Objects toolbar
- Move + cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Set Bit Properties box displays.

Set Momentary Properties Options

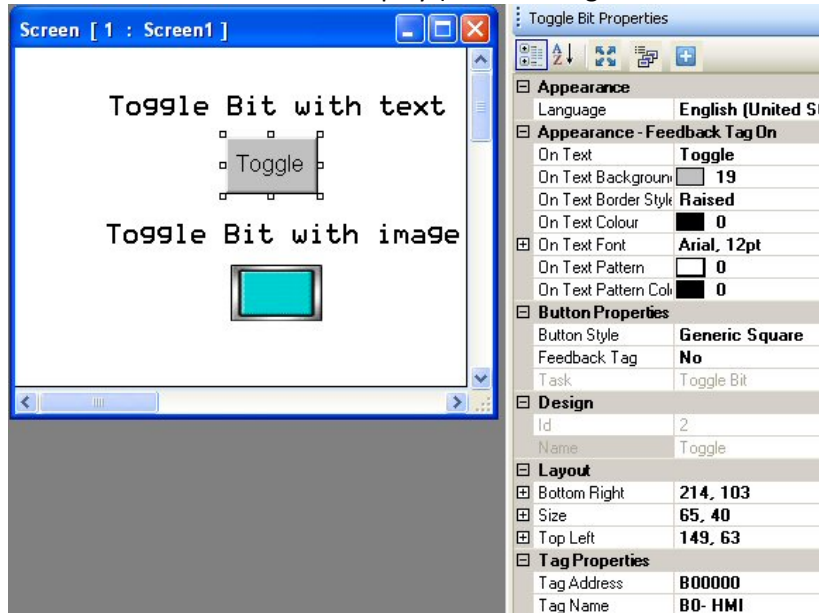
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is ‘Yes’).
- Task (List O) – turn Bit On (cannot be modified)
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Tag Properties (List Q) – address of target to use.
- Tag Address (List Qa) – this is the address of the target bit/coil that is set.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.

Resize a Momentary Bit button object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Toggle Bit

The Toggle Bit button alternates setting and clearing a targeted coil each time the button is pressed. When pressed by the operator, the HMC reads the current value of the coil, and then sends a command to set or reset the coil depending upon the value read. The button shows text labels or a graphic image that is used to represent two states. When a toggle bit button is on screen, the HMC continuously polls the target bit register to determine which state to display (feedback tag must be enabled to display two states).



Place a Toggle Bit button object on screen

- Use one of the following:
 - click **Draw > Buttons > Bit Action > Toggle Bit** from the standard menu
 - click **Quick Buttons > Toggle Bit** from the Draw toolbar
 - click the Toggle Bit icon in the Objects toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Toggle Bit Properties box displays.

Toggle Bit Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels
- Button Style (List M) – selects a style or 'look' to the button
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an 'off' or untouched look to an 'on' or touched look)
- Simulation (List Nc) – select 'On/Off' to see how button looks in that state (only available if Feedback Tag is 'Yes')
- Task (List O) – toggle Bit (cannot be modified)
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Tag Properties (List Q) – address of target to use

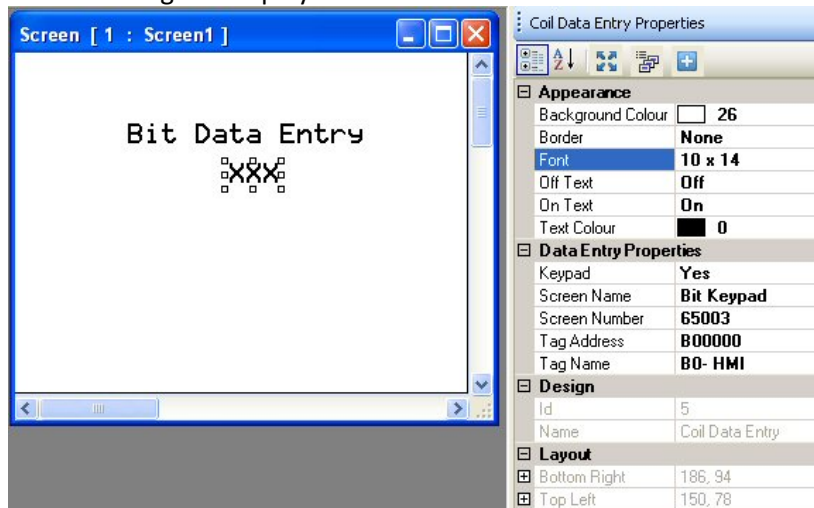
- Tag Address (List Qa) – this is the address of the target bit/coil that is toggled
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil

Resize a Toggle Bit button object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Bit Entry


Bit Entry is used to set/clear a targeted bit/coil. Two predefined messages display according to the current value read in the targeted bit/coil. Messages can be of varying length (maximum of 40 characters). When a bit entry is on a screen that is currently shown on the HMC, the HMC continuously polls the target bit register to determine which message to display.




Place a Bit Entry object on screen

- Use one of the following:
 - click **Draw > Input Objects > Data Entry > Bit Entry** from the standard menu
 - click **Edit Data > Bit Entry** from the Draw toolbar
 - click the Bit Entry Display icon in the Objects toolbar
- Move  cursor to a start point for the button object. Click to place the object on screen.
- The object appears on screen and the Coil Data Entry Properties box displays.

Bit Entry Properties Options

- Background Color (List F) – option to select a color as a ‘backdrop’ to the object
- Border (List G) – add a line around the perimeter of the object
- Flash (List D) – continuously ‘flashes’ the object
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels
- Off/On Text – message text that appears according to the current value in the target address. Maximum number of characters is 40.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Data Entry Properties (List P) – address of target and keypad to use
- Keypad – enable or disable popup keypad input.

 Note: if popup keypad input is disabled, entry is still available if a static keypad is placed onto the

same screen as this object or on a popup screen. For more information on how to do this, see On Screen Keypads later in this chapter.

- Screen Name – if a popup keypad is enabled, select which popup keypad to use.
- Screen Number – popup screen assigned to the keypad above.
- Tag Address (List Qa) – this is the address of the target bit/coil that is monitored.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a Bit Entry object

The Bit Entry object cannot resize (unless you change the Font attribute) but can move.

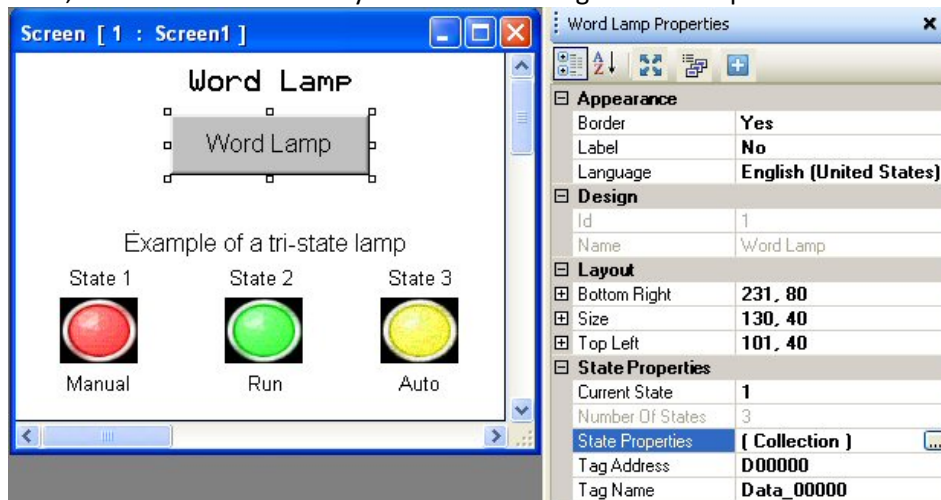
Bit Entry object and Popup Screens

The Bit Entry object cannot be placed onto a popup screen – only base and template screens.


Register-based Objects There are many options for displaying and writing to 16/32-bit registers. Register-based objects display the value in an internal or PLC register and allow the operator to write new values. Register-based objects can also display predefined messages or images depending upon the 'state' or range of values in the register.

Word Lamp

Word lamps display predefined text labels or images shown according to the 'state' of the target address. Each state represents a single value or range of values tied to a particular text label or image. The HMC continuously polls the target register to determine which state image to display. A maximum of 32 states are supported. Word lamps are used where more than two choices are required. For example, a tri-state condition with Run, Auto, and Manual modes may be indicated using a word lamp.



Place a Word Lamp object on screen

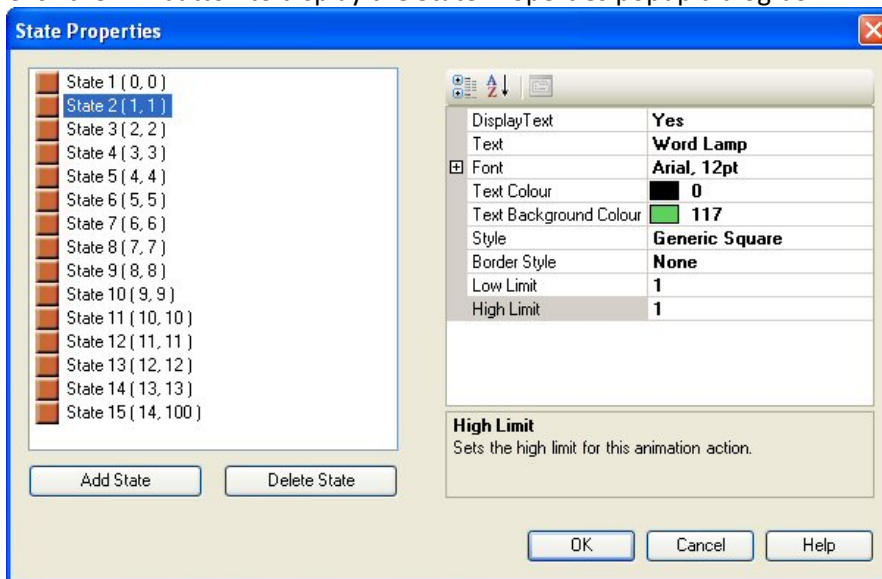
- Use one of the following:
 - click **Draw > Display Objects > Word Lamp** from the standard menu
 - click **Advanced Objects > Word Lamp** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.

- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Word Lamp Properties box displays.

Word Lamp Properties Options

- Border (List G) – add a line around the perimeter of the object.
- Label (List H) – option to have a label appear on the top/bottom of the object.
- Language (List J) – configure displayed text for up to 9 languages per object.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- State Properties – this section configures the number of states and the target tag address that the word lamp monitors.
- Current State – shows the current state displayed on the Word Lamp for editing.
- Number of States – indicates the total number of states configured for this particular word lamp. This attribute cannot be modified here. Use State Properties to add/delete states.
- State Properties (Collection) – use to create the states and assign attributes for each particular state.


Click the  button to display the State Properties popup dialog box:



The left side of the State Properties box shows all of the States currently configured. There are a maximum of 32 states per Word Lamp.

Add State – click this button to add a new state (always appended to the bottom of the list).

Delete State – click one of the States in the list box to highlight and then click this button to delete it.

 Note: when deleting a state that is in-sequence, all states, listed after the selected state, are renumbered.

The right side of the State Properties box shows the configuration for the highlighted state:

Display Text – option to display what is written in the Text field on the button for that state.

Text – label applied to that particular state. Default text is ‘Word Button’.

Font – the text attributes


Name – Type font used


Size – select font size

Bold – select ‘True’ to enable

Italic – select ‘True’ to enable

Underline – select 'True' to enable

Text Color – determines the text color. Click the  button to display the color palette and select a color.

Text Background Color – determines the fill or background color of the state. Click the  button to display the color palette and select a color.

Style – options are Generic Square, Circle, Rounded Rectangle, User defined Images, or From Picture Library.

Border Style – the style or appearance of the button. Options are Raised, Etched, Bump, Sunken, Frame, Flat and None.

Low Limit – enter the minimum value associated with this particular state. Any value read from the target PLC address that is within the Low Limit and High Limit will display this state.

High Limit – enter the maximum value associated with this particular state.

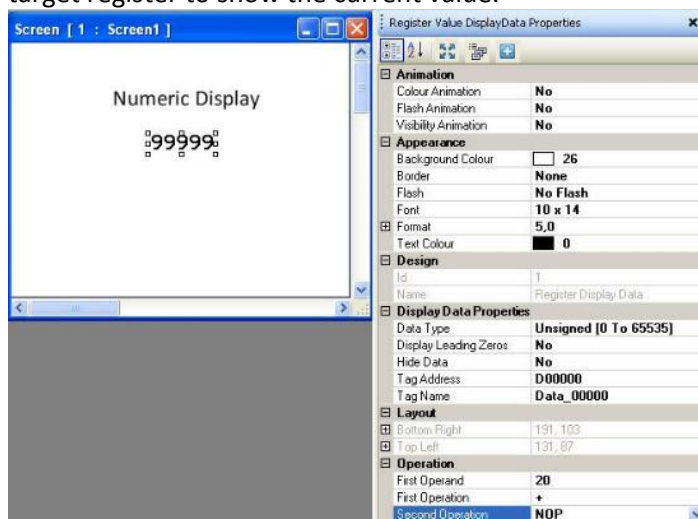
- Tag Address (List Qa) – this is the address of the target bit/coil that is monitored.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.

Resize a Word Lamp object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.


Numeric Display

Numeric Display shows the current value of an 8/16/32-bit register. The value can be displayed using a number of formats (i.e. signed, unsigned, floating point), and special effects (ex. flash, color, visibility). The numeric display object supports linear scaling (engineering units) with the ability to scale the read value based upon two mathematical operations. When a numeric display is on a screen of the HMC, the HMC continuously polls the target register to show the current value.




Place a Numeric Display object on screen

- Use one of the following:
 - click **Draw > Display Objects > Data Display > Numeric Display** from the standard menu
 - click **Show Data > Numeric Display** from the Draw toolbar
 - click the Numeric Display icon in the Objects toolbar

- Move  cursor to a start point for the button object. Click to place the object on screen.
- The object appears on screen and the Register Value Display Data Properties box displays.

Register Value Display Data Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object.
- Flash Animation (List B) – dynamically ‘flash’ object.
- Visibility Animation (List C) – make the object disappear or become ‘invisible’.
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Flash (List D) – continuously ‘flashes’ the object.
- Font – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Format – select optional decimal point display and total number of digits to show.
 - Digits after Decimal Point – used to display the value in the target register with a decimal point. Maximum of 10 digits.
 - Number of Digits – represents the total number of digits before and after the decimal point (if used). Maximum of 10 digits.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object.
- Display Data Properties – Address of target and special features.
 - Byte Order – determines how HMC interprets the order of data (word order) when Data Type is ASCII or ASCII Numeric.
 - Data Type – options are:

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Binary	16 bits	16 bits
Floating Point2	NA	Maximum of 9 digits
ASCII3	Max length is 255 chars	Max length is 255 chars
ASCII Numeric4	Max length is 10 chars	Max length is 10 chars

If the value in the monitored target register is not a valid BCD number, a dollar sign ‘\$’ is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits After Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6). ASCII format interprets the data value in each 16-bit register as two ASCII printable characters. Hex values 0-9 are displayed as numbers 0-9, 0AF is displayed as small case decimal numbers, 20-FF are printable ASCII characters. The HMC reads consecutive registers according to the Length field (ex: if Length=10, then HMC will read five consecutive registers, starting with the designated Tag Address).

ASCII Numeric is the same as ASCII except that all non-printable values are displayed as zeroes.

Display Leading Zeroes – when enabled, data has leading zeroes to the left of the value.

Hide Data – if enabled, data will be represented with asterisks ‘***’. This feature is for security password entry.

Tag Address (List Qa) – this is the address of target register that is monitored.

Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.

- Layout (List T) – coordinates (i.e. size and position) for the object.
- Operation – use this feature to perform a mathematical calculation on the object data.

First Operation – this is the first mathematical operation performed on the data object. Options are NOP (no operation), addition (+), subtraction (-), multiplication (*), and division (/).

First Operand – this constant value applies to the value in the targeted data object according to the mathematical operand listed under First Operation.

Second Operation – this is the second mathematical operation performed on the data object.

Second Operand – this constant value applies to the computed value of the First Operation according to the mathematical operand listed under Second Operation.


Resize a Numeric Display object

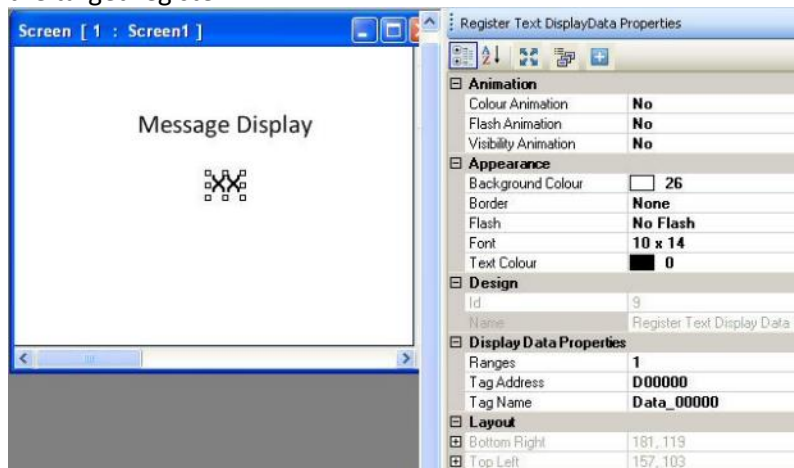
Resize the Numeric Display object by changing the Font attribute. You can also move this object.

Message Display


Message Display shows a predefined set of messages depending upon the value read in a targeted register.

Messages can be of varying length (max of 40 characters). Maximum number of messages is 255.

 Note: if the value read from the targeted register is not within any of the predefined ranges, then the message displayed is blank. When a message data display is on a screen of the HMC, the HMC continuously polls the target register.





Place a Message Display object on screen

- Use one of the following:
 - click **Draw > Display Objects > Data Display > Message Data** from the standard menu
 - click **Show Data > Message Data** from the Draw toolbar
 - click the Message Display icon in the Objects toolbar
- Move  cursor to a start point for the button object. Click to place the object on screen.

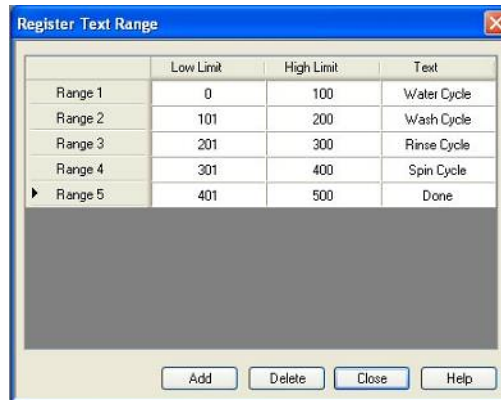
- The object appears on screen and the Register Text Display Data Properties box displays.

Register Text Display Data Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object
- Flash Animation (List B) – dynamically ‘flash’ object
- Visibility Animation (List C) – make the object disappear or become ‘invisible’
- Background Color (List F) – option to select a color as a ‘backdrop’ to the object
- Border (List G) – add a line around the perimeter of the object
- Flash (List D) – continuously ‘flashes’ the object
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Design (List S) – identifies object
- Display Data Properties – address of target
- Ranges – click the directory button  to display the Register Text Range popup window

Register Text Range – Maximum of 255 ranges allowed. Enter the Low Limit and High Limit values (0 to 65535) and the text to display when the value read from the targeted register is within range.

Each text message has a maximum of 40 characters.



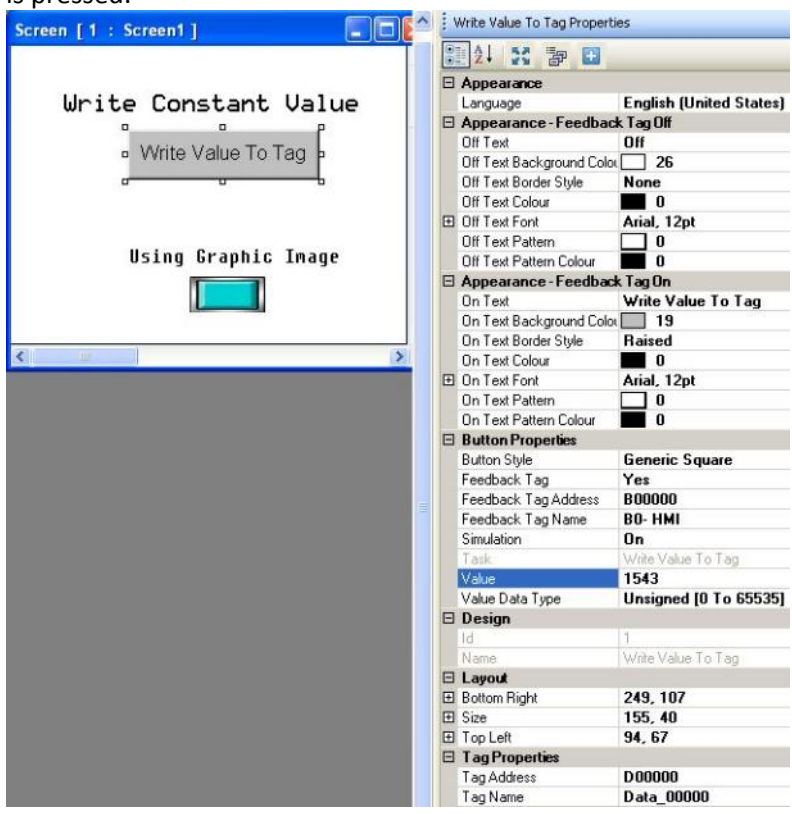
- Tag Address (List Qa) – this is the address of target register that is monitored
- Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database
- Layout (List T) – coordinates (i.e. size and position) for the object

Resize a Message Display object


Resize the Message Display object by changing the Font attribute. You can also move this object.

Write Value to Tag

The Write Value to Tag button writes a predefined constant value to the target tag register each time the button is pressed.



Place a Write Value to Tag button object on screen

- Use one of the following:
 - click **Draw > Buttons > Word Action > Write Value to Tag** from the standard menu
 - click **Quick Buttons > Write Value to Tag** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Write Value to Tag Properties box displays.

Write Value to Tag Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is ‘Yes’).
- Task (List O) – write Value to Tag (cannot be modified)
- Value (List P) – this is the constant value that is written to the Tag Address.

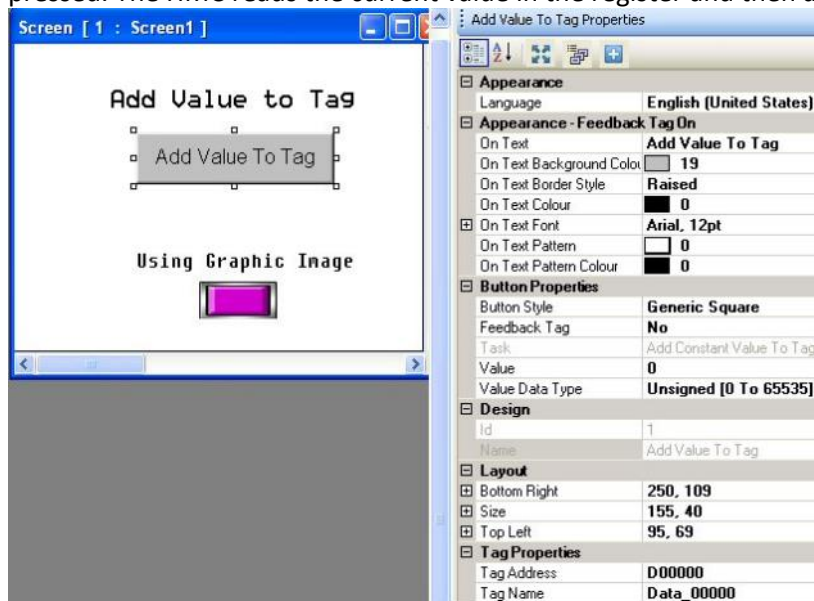
- Value Data Type (List Pa) – select the data format used to write the value to the target register. Options are unsigned, signed, hexadecimal, BCD, and binary.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Tag Properties (List Q) – address of target to use.
- Tag Address (List Qa) – this is the address of the target bit/coil that is toggled.
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil.

Resize a Write Value to Tag button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Add Value to Tag

The Add Value to Tag button adds a predefined constant value to the target tag register each time the button is pressed. The HMC reads the current value in the register and then adds to this value the predefined constant.



How to place an Add Value to Tag button object on a screen

- Use one of the following:
 - click **Draw > Buttons > Word Action > Add Value to Tag** from the standard menu
 - click **Quick Buttons > Add Value to Tag** from the Draw toolbar
- Move $+$ cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Add Value to Tag Properties box displays.

Options available using the Add Value to Tag Properties dialog box

- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or 'look' to the button.

- Feedback Tag (List N) – Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’)
- Task (List O) – Add Constant Value to Tag (cannot be modified)
- Value (List P) – this is the constant value that is added to the Tag Address
- Value Data Type (List Pa) – select the data format used to add the value to the target register. Options are unsigned, signed, hexadecimal, BCD, and binary.
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Tag Properties (List Q) – Address of target to use
- Tag Address (List Qa) – this is the address of the target bit/coil that is toggled
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil

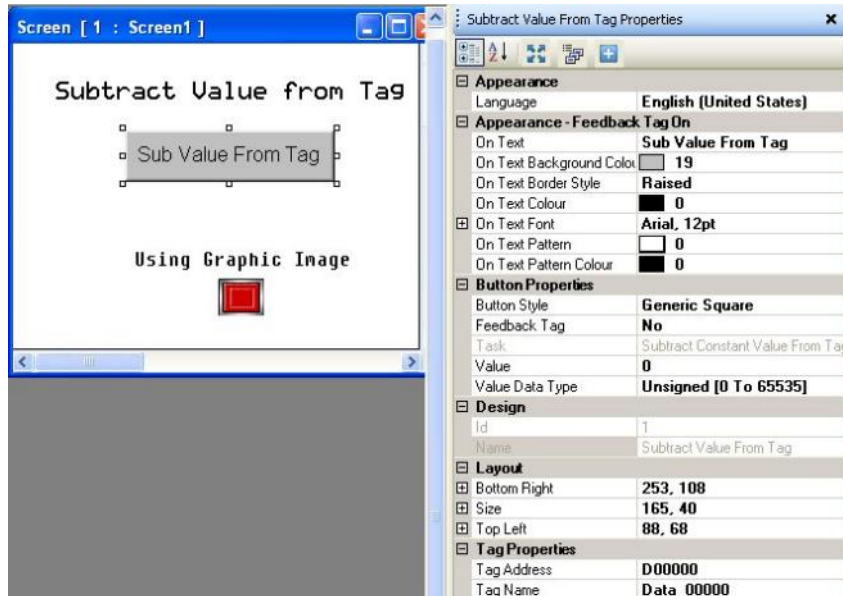
Resize an Add Value to Tag button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.


Subtract Value from Tag



The Subtract Value to Tag button subtracts a predefined constant value from the target tag register each time the button is pressed. The HMC reads the current value in the register and then subtracts the predefined constant from this value.



How to place a Subtract Value from Tag button object on a screen

- Use one of the following:
 - click **Draw > Buttons > Word Action > Subtract Value from Tag** from the standard menu
 - click **Quick Buttons > Subtract Value from Tag** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.

- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Subtract Value from Tag Properties box displays.

Options available using the Subtract Value from Tag Properties dialog box

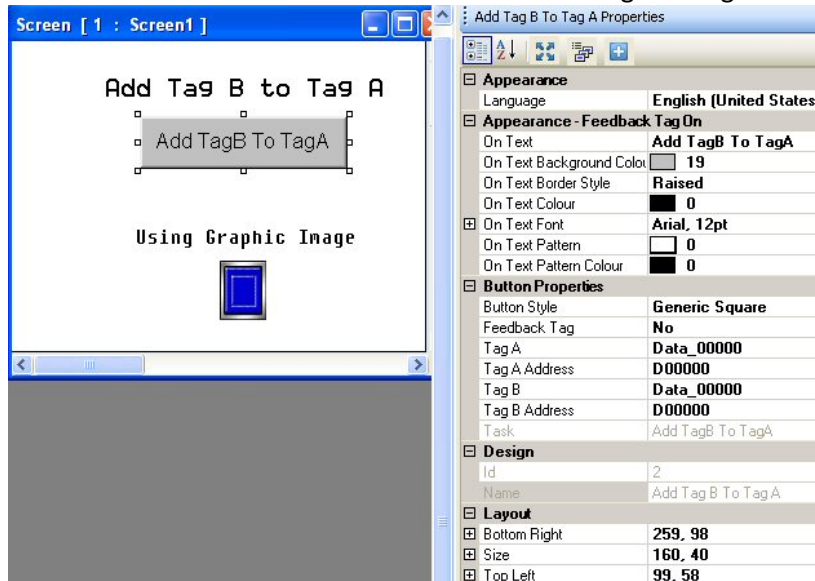
- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is ‘Yes’).
- Task (List O) – subtract Constant Value from Tag (cannot be modified)
- Value (List P) – this is the constant value that is subtracted from the Tag Address
- Value Data Type (List Pa) – select the data format used to add the value to the target register. Options are unsigned, signed, hexadecimal, BCD, and binary.
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Tag Properties (List Q) – address of target to use
- Tag Address (List Qa) – this is the address of the target bit/coil that is toggled
- Tag Name (List Qb) – name assigned in the tag database to the target bit/coil

Resize a Subtract Value from Tag button object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Add Tag B to Tag A 

When pressed by the operator, causes HMC to read the current value in a defined register designated as Tag B and then add this value to the current value in a targeted register designated as Tag A.



Place an Add Tag B to Tag A button object on screen

- Use one of the following:
 - click **Draw > Buttons > Word Action > Add Tag B to Tag A** from the standard menu
 - click **Quick Buttons > Add Tag B to Tag A** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Add Tag B to Tag A Properties box displays.

Add Tag B to Tag A Properties Options

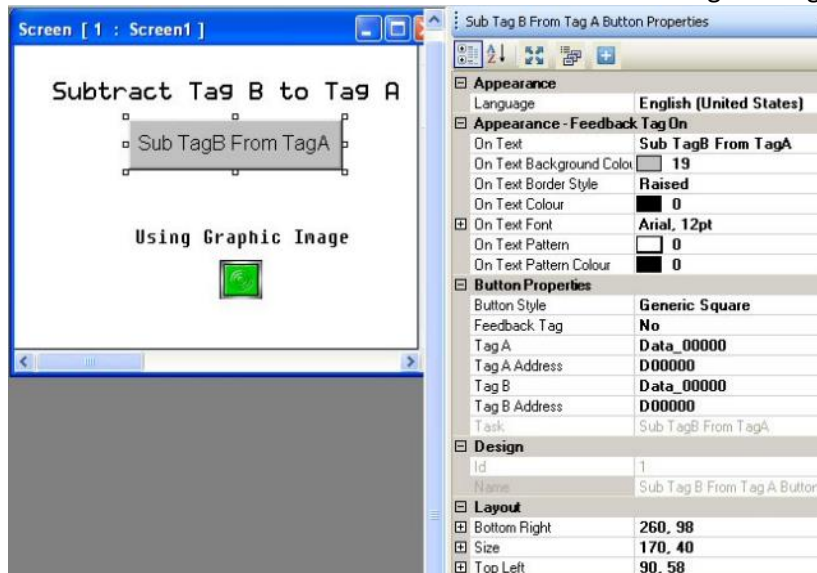
- Language (List J) – highlight the language that must be selected to display the entered text
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels
- Button Style (List M) – selects a style or ‘look’ to the button
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Tag A/B (List R) – the two target addresses used to add values
- Task (List O) – add Tag A to Tag B (cannot be modified)
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object

Resize an Add Tag A to Tag B button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Subtract Tag B from Tag A


When pressed by the operator, causes HMC to read the current value in a defined register designated as Tag B and then subtract this value from the current value in a targeted register designated as Tag A.



The screenshot displays the HMC software interface. On the left, a window titled "Screen [1 : Screen1]" shows a button object with the text "Sub TagB From TagA" and a green square icon below it labeled "Using Graphic Image". On the right, the "Sub Tag B From Tag A Button Properties" panel is open, showing various configuration options:

Category	Property	Value
Appearance	Language	English (United States)
	On Text	Sub TagB From TagA
	On Text Background Color	19
	On Text Border Style	Raised
Appearance - Feedback Tag On	On Text Colour	0
	On Text Font	Arial, 12pt
	On Text Pattern	0
	On Text Pattern Colour	0
Button Properties	Button Style	Generic Square
	Feedback Tag	No
	Tag A	Data_00000
	Tag A Address	D00000
	Tag B	Data_00000
	Tag B Address	D00000
Task	Sub TagB From TagA	
Design	Id	1
	Name	Sub Tag B From Tag A Button
Layout	Bottom Right	260, 98
	Size	170, 40
	Top Left	90, 58

Place a Subtract Tag B from Tag A button object on screen

- Use one of the following:
 - click **Draw > Buttons > Word Action > Subtract Tag B from Tag A** from the standard menu
 - click **Quick Buttons > Subtract Tag B from Tag A** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Subtract Tag B from Tag A Properties box displays.

Subtract Tag B from Tag A Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels
- Button Style (List M) – selects a style or ‘look’ to the button
- Feedback Tag (List N) – enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Tag A/B (List R) – the two target addresses used to subtract values
- Task (List O) – subtract Tag B from Tag A (cannot be modified)
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object

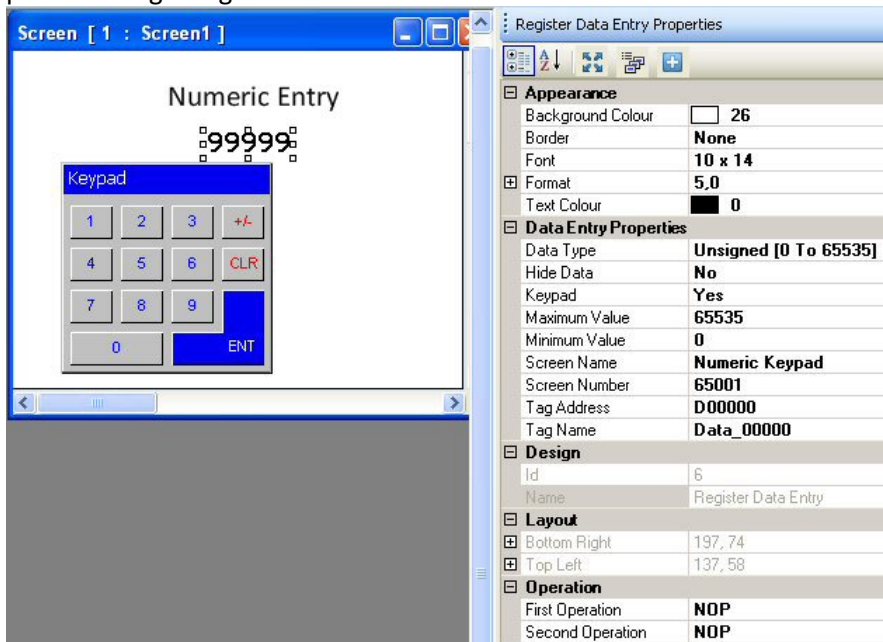
Resize a Subtract Tag B from Tag A button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Numeric Entry

Numeric Entry shows the current value of an 8/16/32-bit register and allows the operator the ability to write a new value. The value displays using a number of formats (i.e. signed, unsigned, floating point, and ASCII). The numeric entry object supports linear scaling (engineering units) with the ability to scale the read value based upon two mathematical operations. When a numeric entry is on a screen of the HMC, the HMC continuously


polls the target register to show the current value.



Place a Numeric Entry object on screen

- Use one of the following:
 - click **Draw > Input Objects > Data Entry > Numeric Entry** from the standard menu
 - click **Edit Data > Numeric Entry** from the Draw toolbar
 - click the Numeric Entry Display icon in the Objects toolbar
- Move \oplus cursor to a start point for the button object. Click to place the object on screen.
- The object appears on screen and the Register Data Entry Properties box displays.

Register Data Entry Properties Options

- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Font (List I) – select from one of four options – 5x7, 7x14, 10x14, and 20x28 pixels.
- Format: select optional decimal point display and total number of digits to show.
 - Digits after Decimal Point – used to display the value in the target register with a decimal point. Maximum of 10 digits.
 - Number of Digits – represents the total number of digits before and after the decimal point (if used). Maximum of 10 digits.
- Text Color (List Kb) – Determines the color of the text. Click  to display the color palette.
- Data Entry Properties (List P) – address of target and special features
 - Byte Order – determines how HMC interprets the order of data (word order) when Data Type is ASCII or ASCII Numeric

Data Type – options are:

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Binary	16 bits	16 bits
Floating Point2	NA	Maximum of 9 digits
ASCII3	Max length is 255 chars	Max length is 255 chars
ASCII Numeric4	Max length is 10 chars	Max length is 10 chars

If the value in the monitored target register is not a valid BCD number, a dollar sign '\$' is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits after Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6).

ASCII format interprets the data value in each 16-bit register as two ASCII printable characters. Hex values 0-9 are displayed as numbers 0-9, 0AF is displayed as small case decimal numbers, 20-FF is printable ASCII characters. The HMC reads consecutive registers according to the Length field (ex: if Length=10, then HMC will read five consecutive registers, starting with the designated Tag Address). ASCII Numeric is the same as ASCII except that all non-printable values are displayed as zeroes.

Enable Control Bit – if enabled, the HMC monitors the selected bit tag address. '0' prevents a new entry, '1' allows normal editing by the operator.

Hide Data – if enabled, data will be represented with asterisks '***'. This feature used for security password entry.

Keypad (List Pd) – selects using a popup keypad (Yes) or use a keypad on located on the same screen (No)

Maximum/Minimum Value (List Pe) – select the limits that the operator enters as a valid number

Screen Name/Number (List Pd) – determines which popup keypad to use

Tag Address (List Qa) – this is the address of target register that is monitored

Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.

- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Operation – use this feature to perform a mathematical calculation on the object data.

First Operation – this is the first mathematical operation performed on the data object. Options are NOP (no operation), addition (+), subtraction (-), multiplication (*), and division (/).

First Operand – this constant value applies to the value in the targeted data object according to the mathematical operand listed under First Operation.

Second Operation – this is the second mathematical operation performed on the data object.

Second Operand – this constant value applies to the computed value of the First Operation according to the mathematical operand listed under Second Operation.

Resize a Numeric Entry object

Resize the Numeric Entry object by changing the Font attribute. You can also move this object.

Numeric Entry object and Popup Screens

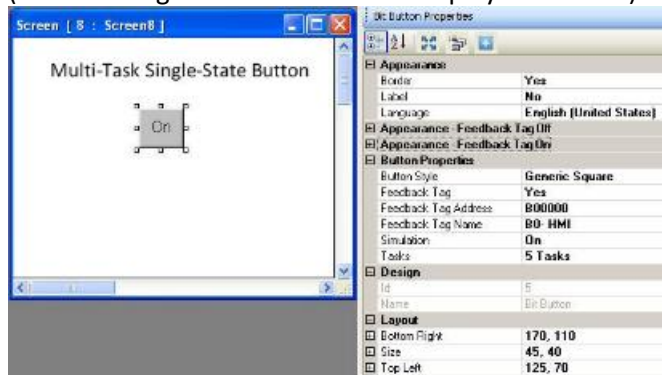
The Numeric Entry object is not permitted on a popup screen – only base and template screens.

Advanced Objects


Several objects are available in the MAPware software that have advanced features such as executing multiple tasks (Multi-Task buttons), downloading/uploading recipes, and representing data using easy-to-read graphs or meters.

Multi-Task Single-State Button

The Multi-Task Single-State button performs a set of predefined tasks whenever the button is pressed. The button displays with text labels or a graphic image that represents two states. When a Multi-Task Single-State button is on screen, the HMC continuously polls the target bit register to determine which state to display (feedback tag must be enabled to display two states).




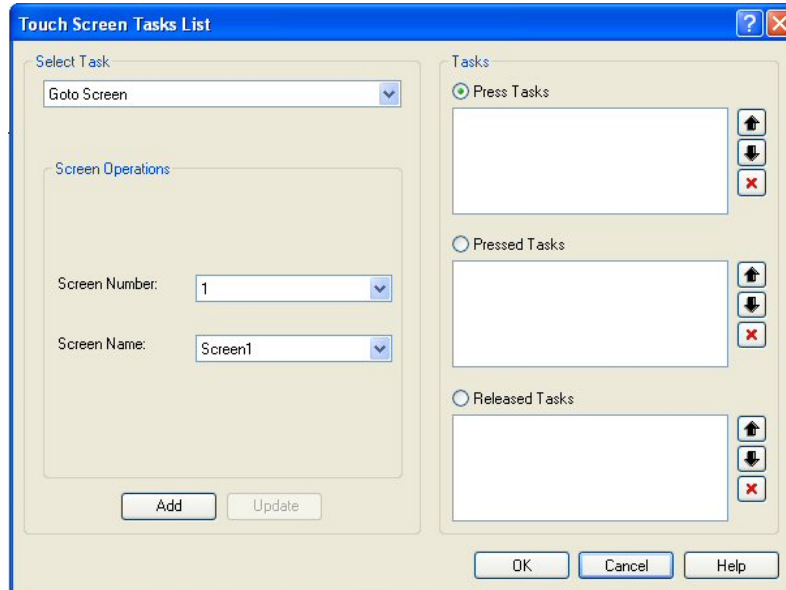
Place a Multi-Task Single-State button on screen

- Use one of the following:
 - click **Draw > Buttons > Multi-Task Single-State Button** from the standard menu
 - click **Advanced Objects > Multi-Task Single-State Button** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Bit Button Properties box displays.

Multi-Task Single-State Button Properties Options

- Border (List G) – add a line around the perimeter of the object.
- Label (List H) – option to have a label appear on the top/bottom of the object.
- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – selects a style or ‘look’ to the button.
- Feedback Tag (List N) – Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).

- Simulation (List Nc) – select 'On/Off' to see how button looks in that state (only available if Feedback Tag is 'Yes').
- Tasks – this is the number of tasks performed whenever the button is pressed. Click  to display the Touch Screen Tasks List.



To add tasks, perform the following steps:

In the Tasks section, select which touchscreen action you wish to use for the task by clicking the appropriate option. Options are Press Tasks, Pressed Tasks, and Released Tasks.

Press Tasks – tasks activate as soon as the touchscreen object is touched or pressed. Tasks execute only once.


Pressed Tasks – these tasks continuously execute as long as the touchscreen button is pressed and held down by the operator.

Released Tasks – these tasks execute after the operator *releases* the touched button object.

Select from the pull-down list box under Select Task and click the task you wish to perform (see **Chapter 6 – Task Management** for a detailed description of what each task does).

If there are any additional parameters required for the task selected, enter the appropriate information.

Click the Add button. This will add the selected task to the Tasks section.

 Note: to delete a task listed in the Tasks section, simply highlight the task and click the Delete button on your computer keyboard. To modify a task listed in the Tasks section, highlight the task, modify the parameters, and then click the Update button.

Click **OK**.

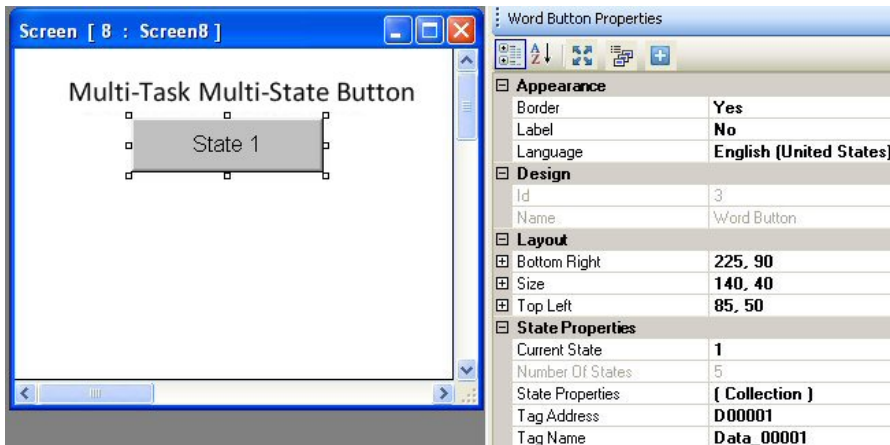
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.

Resize a Multi-Task Single-State button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Multi-Task Multi-State Button


The Multi-Task Multi-State button performs a set of predefined tasks whenever the button is pressed. The tasks performed depend upon which 'state' the button is in when pressed. This button is very similar in operation to the Multi-Task Single-State button described above except that instead of a single state that performs a task(s), you have the option of creating multiple states, each with a unique set of tasks. The button displays with text labels or a graphic image to represent the states. Whenever the button is pressed, the object performs the programmed tasks for that state. The HMC continuously monitors a target tag address to determine which state the button is in.




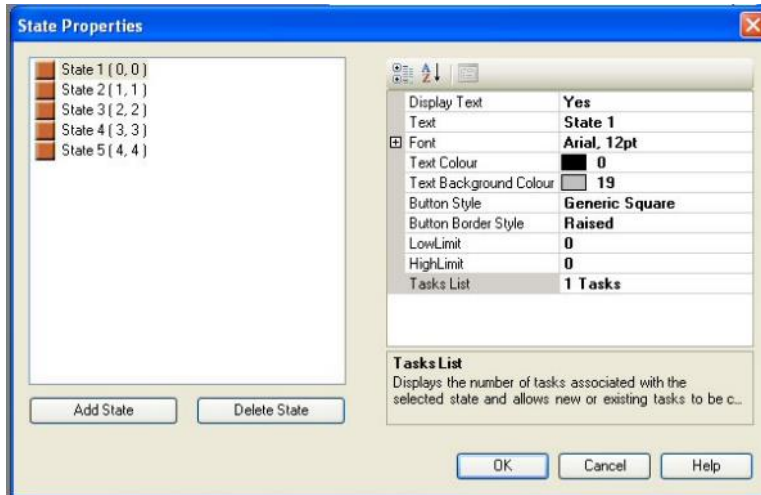
Place a Multi-Task Multi-State button object on screen

- Use one of the following:
 - click **Draw > Buttons > Multi-Task Multi-State Button** from the standard menu
 - click **Advanced Objects > Multi-Task Multi-State Button** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Word Button Properties box displays.

Multi-Task Multi-State Button Properties Options


- Border (List G) – add a line around the perimeter of the object
- Label (List H) – option to have a label appear on the top/bottom of the object
- Language (List J) – highlight the language that must be selected to display the entered text.
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- State Properties section – this section configures the tasks and number of states
- Current State – shows how the button looks for the currently selected state. Use the pull-down list box (after you have configured the states using the State Properties attribute below) to change the state.
- Number Of States – shows the total number of states configured for this object.
 Note: this field cannot change (see State Properties below to add/delete states).

- State Properties – this field configures the states for this object. Click  to display the State Properties List.



The left side of the State Properties box shows all of the States currently configured. Each word button has a maximum of 32 states.

Add State – click this button to add a new state (always appended to the bottom of the list)
Delete State – click one of the States in the list box to highlight and then click this button to delete it.

 Note: when deleting a state that is in-sequence, all states listed after the selected states renumber.

The right side of the State Properties box shows the configuration for the highlighted state.

Display Text – option to display text on the button for that state.

Text – label applied to that particular state. Default text is ‘Word Button’.

Font – the text attributes


Name – Type font used


Size: select font size

Bold: select ‘True’ to enable

Italic: select ‘True’ to enable

Underline: select ‘True’ to enable

Text Color – determines the text color. Click the  button to display the color palette and select a color.


Text Background Color – determines the fill or background color of the state. Click the  button to display the color palette and select a color.

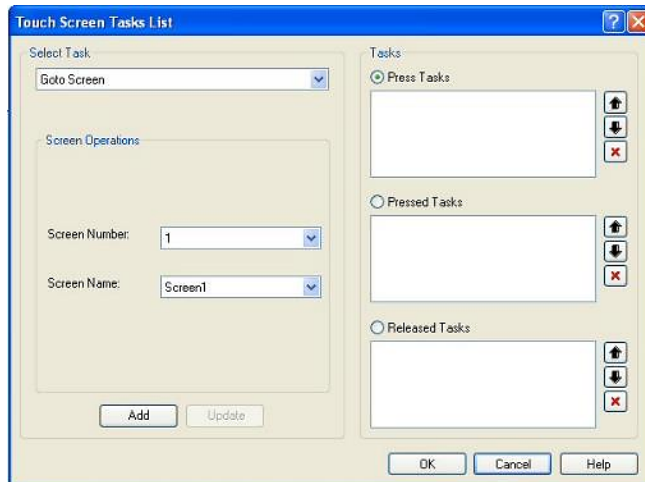
Button Style – options are Generic Square, Circle, Rounded Rectangle, Invisible, User defined Images, or From Picture Library.

Button Border Style – the style or appearance of the button. Options are Raised, Etched, Bump, Sunken, Frame, Flat and None.

Low Limit – enter the minimum value associated with this particular state. Any value read from the target PLC address that is within the Low Limit and High Limit will display this state.

High Limit – enter the maximum value associated with this particular state

Tasks – this is the number of tasks performed whenever the button is pressed. Click  to display the Touch Screen Tasks List.



To add tasks, perform the following steps:

In the Tasks section, select which touchscreen action you wish to use for the task by clicking the appropriate option. Options are Press Tasks, Pressed Tasks, and Released Tasks.


Press Tasks – tasks activate as soon as the touchscreen object is touched or pressed. Tasks execute only once.

Pressed Tasks – tasks continuously execute as long as the touchscreen button is pressed and held down by the operator.

Released Tasks – these tasks execute after the operator releases the touched button object.

Select from the pull-down list box under Select Task and click the task you wish to perform (see **Chapter 6 – Task Management** for a detailed description of what each task does). If there are any additional parameters required for the task selected, enter the appropriate information.

Click the Add button. This will add the selected task to the Tasks section.

 Note: to delete a task listed in the Tasks section, highlight the task and click the Delete button on your computer keyboard. To modify a task listed in the Tasks section, highlight the task, modify the parameters, and then click the Update button.

Click **OK**.

Click **OK** again to exit the State Properties dialog box and record changes.

- Tag Address (List Qa) – this is the address of the target register that is monitored by the HMC to determine which state the object is in.
- Tag Name (List Qb) – name assigned in the tag database to the target register.

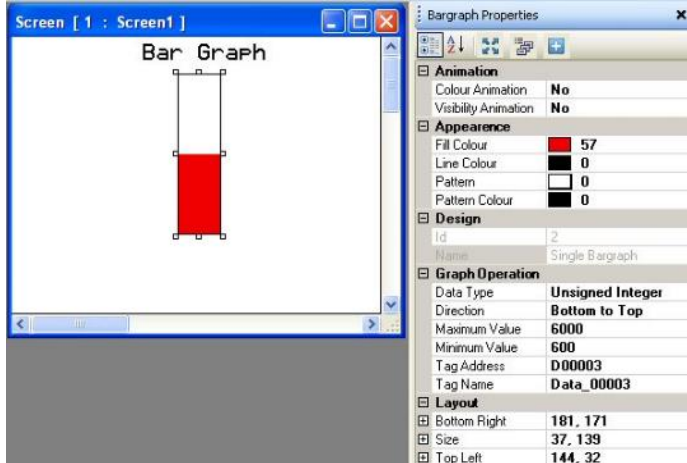
Resize a Multi-Task Multi-State button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Bar Graph

The Bar Graph object represents values in an 8/16/32-bit register as a single bar chart whose proportional length corresponds to the quantity in the register. A bar graph can be configured to move in any direction (i.e. left to right, bottom to top, etc.) and monitor the target register as a signed/unsigned integer, BCD, or floating-



point value. You can also employ special effects such as dynamic fill color or visibility.



Place a Bar Graph object on screen

- Use one of the following:
 - click **Draw > Display Objects > Bar Graph** from the standard menu
 - click **Advanced Objects > Bar Graph** from the Draw toolbar
 - click the Bar Graph icon in the Objects toolbar
- Move \oplus cursor to a start point for the bar graph object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the bar graph object and release. The object appears on screen and the Bar Graph Properties box displays.

Bar Graph Properties Options

- Color Animation (see Feature List A) – dynamically change the color of the object
- Visibility Animation (List C) – make the object disappear or become ‘invisible’
- Fill Color – select the color that represents relative value in target register
- Line Color (List E) – sets color of the perimeter line
- Pattern – this is an option to use two colors for the fill color. The pattern determines how the two colors show. Eight patterns are available. Click  to display the pattern options.
- Pattern Color – Select the second fill color when using the pattern option above. Click  to display the color palette.
- Design (List S) – identifies object
- Graph Operation – settings for the graph object
- Data Type – options are:

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Binary	16 bits	16 bits
Floating Point2	NA	Maximum of 9 digits

If the value in the monitored target register is not a valid BCD number, a dollar sign '\$' is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits after Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6).

- Direction – determines in which direction the graph moves as it tracks the target value. Options are Left to Right, Right to Left, Bottom to Top, and Top to Bottom.
- Maximum/Minimum Value (List Pe) – select the limits the bar graph uses to determine the relative level of the graph. The maximum value is a completely filled bar graph. The minimum value is a bar graph with no fill color shown.
- Tag Address (List Qa) – this is the address of target register that is monitored
- Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database
- Layout (List T) – coordinates (i.e. size and position) for the object
- Maximum Value – the type selector allows the choice between number (constant) and tag to provide the maximum value of the bar graph
- Minimum Value – the type selector allows the choice between number (constant) and tag to provide the minimum value of the bar graph

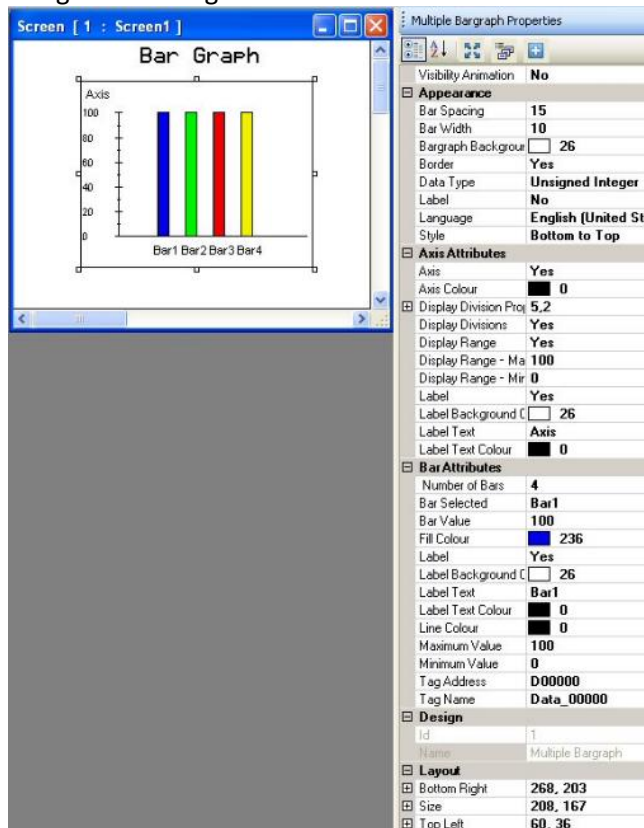
Resize a Bar Graph object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Multiple Bar Graphs

The Multiple Bar Graph object represents up to four consecutive 8/16/32-bit registers as a bar chart whose proportional lengths correspond to the quantity in each register. A multiple bar graph can move in any direction (i.e. left to right, bottom to top, etc.) and monitor the target registers as signed/unsigned integer, BCD, or floating point values. The Multiple Bar Graph object supports title bars, selectable colors, and number


designators along the Y-axis.



Place a Multiple Bar Graph object on screen

- Use one of the following:
 - click **Draw > Display Objects > Multiple Bar Graphs** from the standard menu
 - click **Advanced Objects > Multiple Bar Graphs** from the Draw toolbar
- Move + cursor to a start point for the Multiple Bar Graphs object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the Multiple Bar Graphs object and release. The object appears on screen and the Multiple Bar Graphs Properties box displays.

Multiple Bar Graph Properties Options


- Visibility Animation (List C) – make the object disappear or become ‘invisible’
- Appearance section – these attributes determine the general look of the bar graph
- Bar Spacing – determines the number of pixels between each bar graph
- Bar Width – determines the pixel width of each bar graph.
 ☞ Note: the bar width and bar spacing for each bar graph cannot exceed 68 pixels.
- Bar Graph Background Color – determines the background color of the graph. Click the  button to display the color palette and select a color.
- Border – optional line around the periphery of the bar chart

- Data Type – options are:

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Floating Point2	NA	Maximum of 9 digits

If the value in the monitored target register is not a valid BCD number, a dollar sign '\$' is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits After Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6) shows the current state displayed on the Multiple Bar Graphs for editing

- Label – option to have a text label appear on the top/bottom of the bar graph chart. Click 'Yes' to enable.

Label Background Color – determines the fill or background color of the label. Click the  button to display the color palette and select a color.

Label Text Font – determines the font type, size, etc.

Name – Type font used

Size – select font size


Bold – select 'True' to enable




Italic – select 'True' to enable







Underline – select 'True' to enable

Label Position – select top or bottom.

Label Text – enter the text to appear in the label

Label Text Color – determines the text color of the label. Click the  button to display the color palette and select a color

- Language (List J) – highlight the language that must be selected to display the entered text.
- Style – determines in which direction the graph moves as it tracks the target values. Options are Left to Right, Right to Left, Bottom to Top, and Top to Bottom.
- Axis Attributes section – select the options that affect how the Y (vertical) axis displays
- Axis – option to enable/disable the display of a Y-axis
- Axis Color – Select the color used for the Y-axis and number titles. Click  to display the color palette.
- Display Division Properties – configure the major/minor division scale points of the axis.
 - Major Division – these are the number of major 'ticks'.
 -  Note: does not include the baseline (0 axis), minimum value must be 1.
 - Minor Division – these are the number of minor 'ticks' per major division.
 -  Note: if minor divisions are not required, select 1
- Display Divisions – option to display the major/minor division scales
- Display Range – option to display a number scale along the Y-axis

- Display Range –
 - Maximum – sets the maximum value that appears at the top of the scale
 -  Note: the range allowed depends upon the Data Type selected in the Appearance section (for negative numbers, you must select Signed or Float)
 - Minimum – sets the minimum value that appears at the bottom of the scale
- Label – option to display a heading at the top of the Y-axis
 - Label Background Color – determines the fill or background color of the Y-axis label. Click the  button to display the color palette and select a color.
 - Label Text – enter the text to appear in the Y-axis label
 - Label Text Color – determines the text color of the label. Click the  button to display the color palette and select a color.
- Bar Attributes – select number of bars, colors, etc.
- Number of Bars – range is 1 to 4 bars. Each bar will correspond to a particular tag register as determined by the Tag Address field below.
- Bar Selected – select the bar you wish to modify/edit using the pull-down box
- Bar Value – this is the height of the selected bar with respect to the other bars in the bar graph (i.e. 100 = 100%, 50 = 50%, etc.). This value shows only when displaying the graph in MAPware; it has no affect during runtime.
- Fill Color – the fill color of the selected bar. Click the  button to display the color palette and select a color.
- Label – option to display a text label underneath the selected bar
- Label Text Color – the text color of the label for the selected bar. Click the  button to display the color palette and select a color.
- Line Color – the color of the line that encloses the selected bar. Click the  button to display the color palette and select a color.
- Maximum Value – the maximum value read from the target register that indicates the selected bar is completely full
- Minimum Value – the minimum value that indicates the selected bar is empty
- Maximum/Minimum Value (List Pe) – select the limits the bar graph uses to determine the relative level of the graph. The maximum value completely fills bar graph. The minimum value represents no fill color.
- Tag Address (List Qa) – this is the address of target register monitored
- Tag Name (List Qb) – name given to the tagged register in the tag database
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object

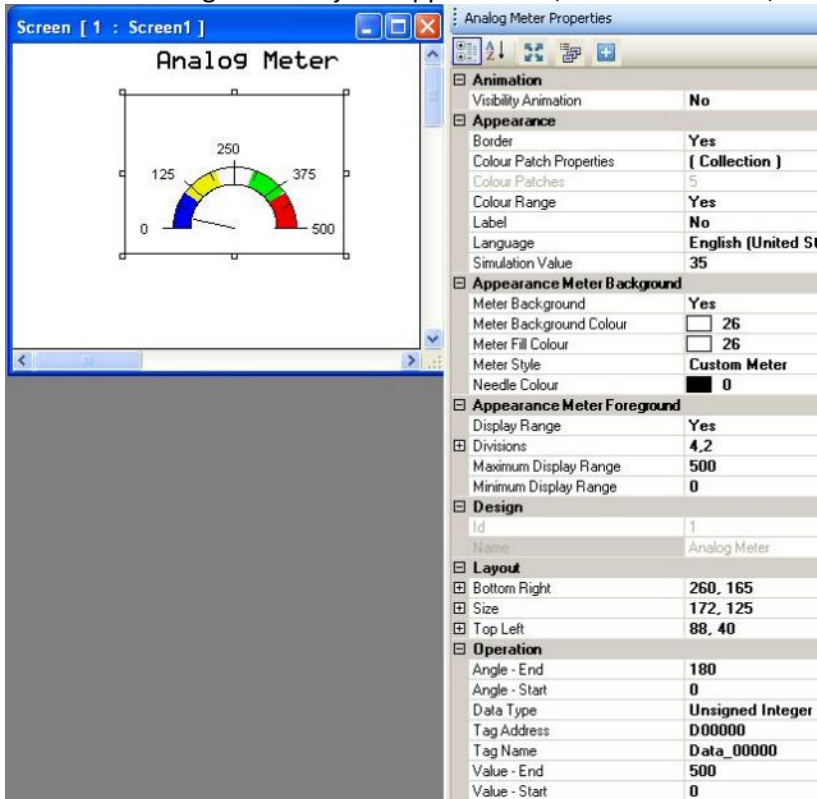
Resize a Multiple Bar Graph object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Analog Meter

The Analog Meter object represents an 8/16/32-bit register as an analog meter whose angle corresponds to the quantity in a register. The analog meter object supports configurable start/stop angles, scaling label, and multiple color segments. The target register is monitored as a signed/unsigned integer, BCD, or floating-point


value. The Analog Meter object supports titles, selectable colors, and number designators.




Place an Analog Meter object on screen

- Use one of the following:
 - click **Draw > Display Objects > Meter** from the standard menu
 - click **Advanced Objects > Analog Meter** from the Draw toolbar
- Move \oplus cursor to a start point for the Analog Meter object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the Analog Meter object and release. The object appears on screen and the Analog Meter Properties box displays.

Options available using the Analog Meter Properties dialog box

- Visibility Animation (List C) – make the object disappear or become ‘invisible’
- Appearance section – these attributes determine the general look of the meter
- Color Patch Properties – use this attribute to determine the colors of each section “patch” of the meter and the high/low limit for each patch. The meter may have as few as one color or as many as five. Color is used to indicate ‘safe’ zones, ‘danger’ zones, or other designators.
- Color Patches – indicates number of color patch segments. To change the total number, edit the Color Patch Properties (see above).
- Label – option to have a text label appear on the top/bottom of the analog meter.
 - Label Background Color – determines the fill or background color of the label. Click the  button to display the color palette and select a color.
 - Label Position – select top or bottom.
 - Label Text – enter the text to appear in the label.

Label Text Color – determines the text color of the label. Click the  button to display the color palette and select a color.

Label Text Font – determines the font type, size, etc.







Name – Type font used

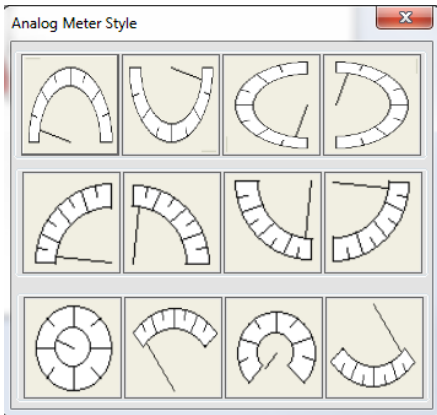
Size: select font size

Bold: select 'True' to enable

Italic: select 'True' to enable

Underline: select 'True' to enable.

- Language (List J) – highlight the language that must be selected to display the entered text.
- Simulation Value – this positions the location of the needle during simulation. Value entered should be between the Minimum/Maximum Display Range set.
- Appearance – Meter Background
 - Meter Background – disable if you wish to display no background (i.e. arc line, color segments, and number axis), only the needle indicator.
 - Meter Background Color – select the background color of the meter.
 - Meter Fill Color – this is the small 'pie-shaped' section directly below the arc line. Select the fill color using the color palette chart.
 - Meter Style – options are Advanced, Custom Meter and D-Meter.
 Note: the D Meter is the same as the Custom Meter with the Start Angle set to 0° and the End Angle set to 180°. Select custom meter option to change the starting and ending angles. In the advanced option the meter fills more of the space used by the object and the Angle Style property (see below) can be used to configure the appearance.
 - Needle Color – click the  button to display the color palette and select a color for the needle.
- Appearance – Meter Foreground
 - Display Range – option to display the number axis
 - Divisions – configure the major/minor division scale points of the axis.
 - Major Division – these are the number of major 'ticks'.
 -  Note: does not include the baseline (0 axis), minimum value must be 1.
 - Minor Division – these are the number of minor 'ticks' per major division.
 -  Note: if minor divisions are not required, select 1.
 - Maximum Display Range – sets the maximum value that will appear at the right of the number scale.
 Note: the range allowed depends upon the Data Type selected in the Operation section (for negative numbers, you must select Signed or Float)
 - Minimum Display Range – sets the minimum value that will appear at the left of the scale.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Operation – these are the parameters for the start/end angles of the meter and the target tag address.
- Angle – End – This is the relative location of the maximum angle on the analog meter. Number is in degrees with reference to 0° located at the leftmost position on the analog meter.
- Angle – Start – This is the relative location of the minimum angle on the meter. Number is in degrees with reference to 0° location.
- Angle – Style – This provides a window of preconfigured Start and End angles to use with a meter in the Advance Meter style. Click the ellipse  button to get a popup window and select from the various options:



Click the desired style to select it, the **Angle – End** and **Angle – Start** properties are automatically updated when the selection is made.

- Data Type – options are:

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Floating Point2	NA	Maximum of 9 digits

If the value in the monitored target register is not a valid BCD number, a dollar sign '\$' is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits After Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6) shows the current state displayed on the Multiple Bar Graphs for editing.

- Tag Address (List Qa) – this is the address of target register that is continuously read by the HMC to determine the analog meter needle position.
- Tag Name (List Qb) – this is the name given to the tagged register in the tag database
- Value Start/End (List Pe) – select the limits that are used by the analog meter to show the relative level of the meter. The maximum value has the needle indicator in the maximum position. The minimum value has the needle in the minimum position.

Resize an Analog Meter object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

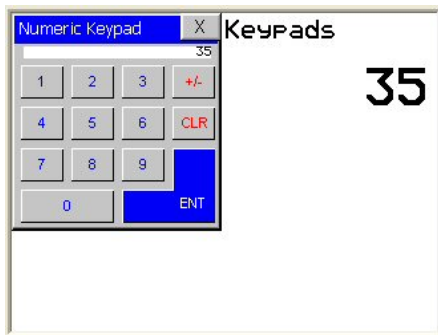
Keypads


Popup Keypads

A popup keypad is any keypad that appears automatically when you click into a Numeric Entry Object. To get the popup keypad to appear, you must enable the Keypad option in the Data Entry Properties section of the Numeric Entry object.



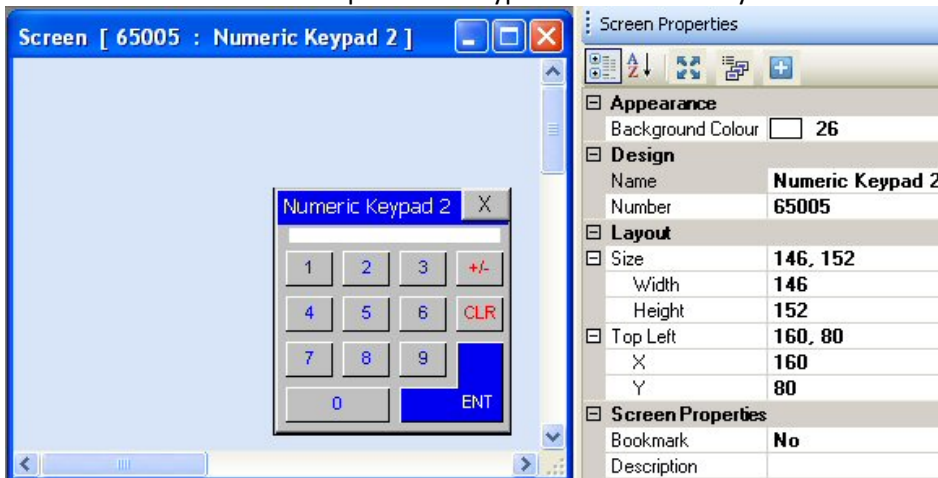
During operation, simply touch the Numeric Entry object. This will cause your popup keypad to display immediately in the upper left corner of the display. The current value of the target register shows in the entry area.



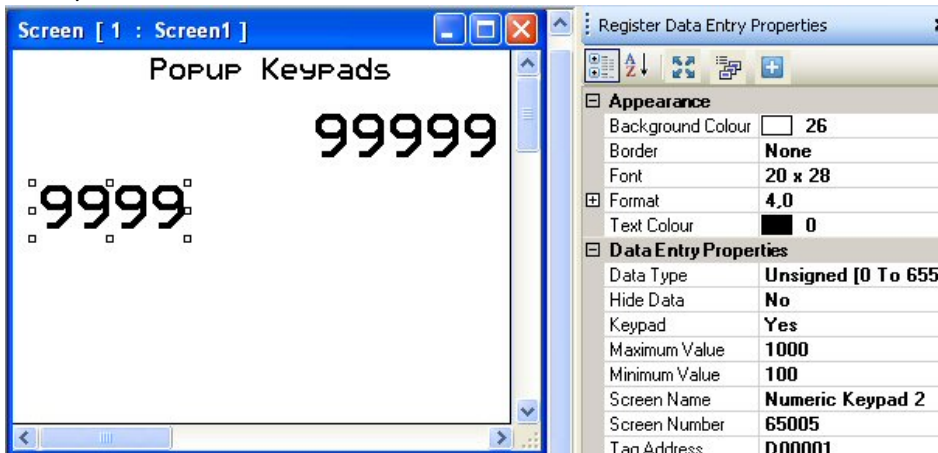
Use the keypad to enter a new number, then press the ENTER key. The new value writes to the target register and the popup keypad disappears. Pressing the close window icon  on the keypad removes the keypad without making any changes to the value.

Note: there is no way to move the popup keypad to a new location on the screen once displayed. Therefore, if you wish to have the keypad appear in a different location when called, create a new keypad and use the X, Y

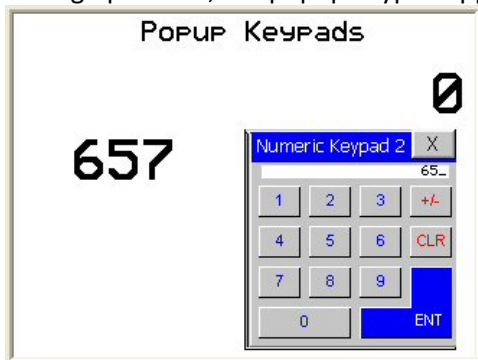
coordinates of the screen to place the keypad at the location you desire.



Then reference this keypad in the Register Data Entry Properties dialog box of the target register in the Screen Name/Number attribute fields.



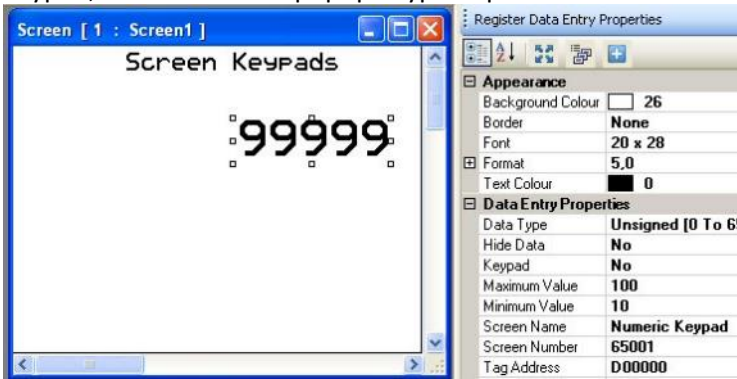
During operation, the popup keypad appears in the desired location:



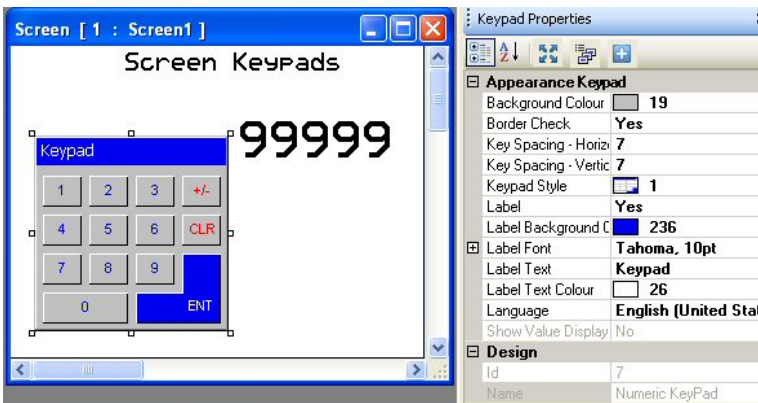
On Screen Keypads

Rather than use the popup keypad feature, there may be an instance where you would prefer to have the keypad always shown (perhaps to make it obvious to the operator that entry is allowed). To use an on-screen

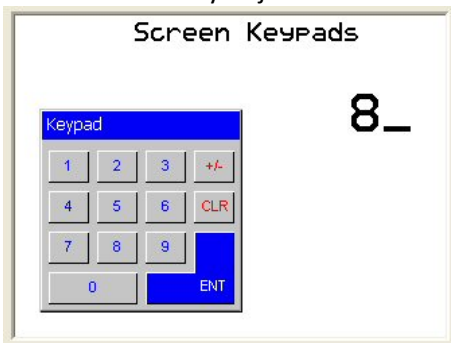
keypad, first disable the popup keypad option in the Numeric Entry object by selecting No in the Keypad field.



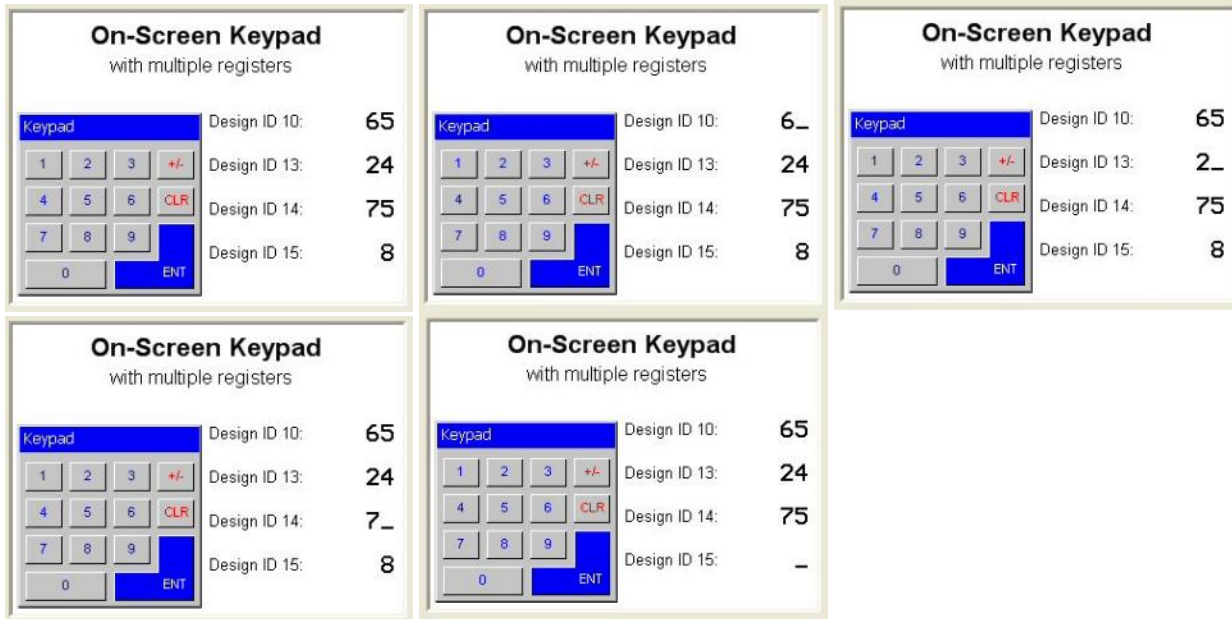
Next, place one of the predefined keypads (see sections below) or a custom keypad of your own design on the screen.



During operation, using an on-screen keypad differs slightly from using a popup keypad. To initiate entering a new number simply click anywhere on the keypad not on the Numeric Entry Object. This causes the last digit of the Numeric Entry object to blink with an underline, indicating that you are now in 'entry' mode.




Use the keypad to enter the new number, then press the ENTER button to send the new value to the target register. If you wish to cancel the entry, you must first click the Clear (CLR) button, then press the ENTER button. If you have multiple Numeric Entry objects on the same screen, and you are using an on-screen keypad, the keypad will target each object in sequence, starting with the object that has the lowest Design ID number assigned during project configuration.





Predefined Numeric Keypads

The MAPware software offers many predefined numeric keypads that popup when using a Numeric Entry or Bit Entry object or can also display on screen. These keypads offer various styles to customize for the particular needs of the project.

How to place a Numeric Keypad object on a screen

- Use one of the following:
 - click **Draw > Input Objects > Keypad** from the standard menu
 - click **Advanced Objects > Keypad** from the Draw toolbar
- Move  cursor to a start point for the upper left corner of the keypad object. Click the mouse cursor to place the object onto the screen.
- The keypad appears on screen and the Keypad Properties box displays.

Options available using the Keypad Properties dialog box

- Background Color (List F) – option to select a color as a ‘backdrop’ to the object
- Border (List G) – add a line around the perimeter of the object
- Key Spacing Horizontal – this attribute determines the number of pixels between each key along the horizontal axis. Range is 6 to 43 pixels.
 -  Note: the overall width of the keypad determines the width of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Key Spacing Vertical – this attribute determines the number of pixels between each key along the vertical axis. Range is 6 to 49 pixels.
 -  Note: the overall height of the keypad determines the height of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Keypad Style – there are eight options to the arrangement of the numeric keys:

Standard 10-key entry pad with negative entry key (default)



Standard 10-key entry pad



Hexadecimal entry pad with negative entry key



Hexadecimal entry pad with digit entry keys



Increment/Decrement entry pad



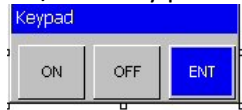
Simple increment/decrement by digit entry pad with Clear key



Simple increment/decrement by digit entry pad



On/Off entry pad



- Label (List H) – option to have a label appear on the top/bottom of the object
- Label Background Color – select the background color. Click to display the color palette.
- Label Font (List I) – configure how you wish the label text to appear
- Label Text – the text that appears in the label. Maximum of 21 characters allowed.
- Label Text Color – select the label text color. Click to display the color palette.
- Language (List J) – configure displayed text for up to 9 languages per object.
- Show Value Display – this option is set to 'No' and cannot change.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Keys Properties – select the 'style' and function of selected key.
- Back Color – select the background color of the button. Click to display the color palette.
- Display Text – option to display text on the button.
- Keypad Key Task – select from the pull-down list box which function (i.e. display a number, control key, etc.) the selected button has:

Numeric Key 0-9, A-F – used to enter decimal and/or hexadecimal numbers.

Shift Value to Left – essentially this multiplies the value by 10 each time this key is pressed.

Move Cursor to Left, Move Cursor to Right keys – use these keys to move the focus cursor to the left or right by one digit. This allows you to change each digit of a number during entry without the need to clear the entry and start over.

Increase Digit by 1, Decrease Digit by 1 keys – these keys will increment or decrement the digit that is currently highlighted by the focus cursor.

Note: if digit 0 is displayed, pressing the Decrease by 1 key will change this digit to 9. Similarly, if digit 9 is displayed, pressing the Increase Digit by 1 key will change the digit from 9 to 0.

Increase Value by 1, Decrease Value by 1 keys – these keys will increment or decrement the value or number that is currently entered by one.

Sign Key (+/-) and Sign Key (+/-) and 0 keys – use these keys to change the sign (positive or negative) of the number entered. The Sign Key with 0 adds a little twist – if the key is pressed more than once, it will add 0s to the right of the number entered.

Note: for these keys to work, you must use configure the target Numeric Entry register with Data Type of Signed.

Clear Data Entry – when pressed, this key clears the entire entry and starts over.

Cancel Data Entry – this key exits data entry mode without making any changes to the value of the target register.

Accept Data Entry – this key writes the entered keypad value to the target register.

Switch to Next Data Entry – if you have multiple Numeric/Coil Entry registers on the screen, this key will move the focus of the keypad between registers.

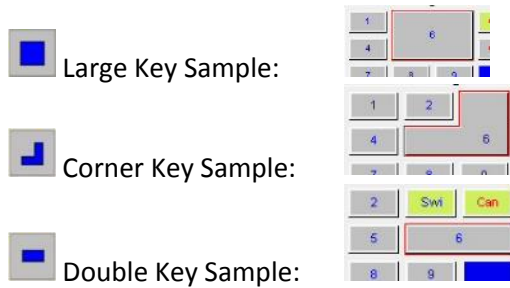
Turn Bit On, Turn Bit Off keys – use these keys to set (1) or clear (0) a Bit Data register.


- Style (List M) – select a style or 'look' to the button.



Standard Key Sample:






- Text (List K) – the text that appears in the button. The overall size of the keypad and the font used determines the maximum number of characters.
- Text Color (List Kb) – determines the color of the text. Click  to display the color palette.

Resize a Keypad object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

 Note that if you resize the keypad to a point at which the buttons are too small, then an error message displays.



Predefined ASCII Keypads (Alphanumeric)

The MAPware software offers two predefined ASCII keypads that popup when using a Numeric Entry or Bit Entry object or can display on screen. These keypads offer various styles to customize for the particular needs of the project.

How to place an ASCII Keypad object on a screen

- Use one of the following:
 - click **Draw > Input Objects > ASCII Keypad** from the standard menu
 - click **Advanced Objects > ASCII Keypad** from the Draw toolbar
- Move  cursor to a start point for the upper left corner of the keypad object. Click the mouse cursor to place the object onto the screen.
- The keypad appears on screen and the ASCII Keypad Properties box displays.

Options available using the ASCII Keypad Properties dialog box

- Background Color (List F) – option to select a color as a ‘backdrop’ to the object.
- Border (List G) – add a line around the perimeter of the object.
- Key Spacing Horizontal – this attribute determines the number of pixels between each key along the horizontal axis. Value is set to 2 and cannot be changed.
 -  Note: the overall width of the keypad determines the width of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Key Spacing Vertical – this attribute determines the number of pixels between each key along the vertical axis. Value is set to 2 and cannot be changed.
 -  Note: the overall height of the keypad determines the height of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Keypad Style – there are two options to the arrangement of the numeric keys:

Standard 7x8 (56 keys) with upper/lower case (default)



10-key entry pad



- Label (List H) – option to have a label appear on the top/bottom of the object.
- Label Background Color – select the background color. Click to display the color palette.
- Label Font (List I) – configure how you wish the label text to appear
- Label Text – the text that appears in the label. Maximum of 21 characters allowed.
- Label Text Color – select the label text color. Click to display the color palette.
- Language (List J) – configure displayed text for up to 9 languages per object.
- Show Value Display – this option is set to 'No' and cannot change.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Keys Properties – select the 'style' and function of selected key.
- Key Background Color – select the background color of the button. Click to display the color palette.
- Key Text Color: determines the color of the text. Click to display the color palette.

Resize an ASCII Keypad object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Creating a Custom Keypad







In addition to the predefined keypads, the custom keypad object allows you to create a keypad specific to your needs.

How to place a Custom Keypad object on a screen

- Use one of the following:
 - click **Draw > Input Objects > Custom Keypad** from the standard menu
 - click **Advanced Objects > Custom Keypad** from the Draw toolbar
- Move cursor to a start point for the upper left corner of the keypad object. Click the mouse cursor to place the object onto the screen.
- The keypad appears on screen and the Custom Keypad Properties box displays.

Options available using the Custom Keypad Properties dialog box

- Design (List S) – identifies object
- Keypad Properties – these are the general properties of the keypad as a whole

- Background Color (List F) – option to select a color as a ‘backdrop’ to the object
- Key Spacing Horizontal – this attribute determines the number of pixels between each key along the horizontal axis. Range is 6 to 49 pixels.
 Note: the overall width of the keypad determines the width of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Key Spacing Vertical – this attribute determines the number of pixels between each key along the vertical axis. Range is 6 to 49 pixels.
 Note: the overall height of the keypad determines the height of each key. Therefore, to adjust the size of the keys, you must change the size of the overall keypad.
- Keypad Type – there are two options to the type of keypad used. Numeric is for data entry and ASCII is for entering alphanumeric characters.
- Label (List H) – option to have a label appear on the top/bottom of the object
- Label Background Color – select the background color. Click  to display the color palette.
- Label Font Color – configure the color of the label text. Click  to display the color palette.
- Label Text – the text that appears in the label. Maximum of 21 characters allowed.
- Language (List J) – configure displayed text for up to 9 languages per object
- No. of Columns – select the number of key button columns. Range is 1 to 10.
- No. of Rows – select the number of key button rows. Range is 1 to 10.
- Show Value Display – this option is set to ‘No’ and cannot change
- Keys Properties – select the ‘style’ and function of selected key
- Key Background Color – select the background color of the button. Click  to display the color palette.
- Key Text – option to display text on the button
- Key Text Color – configure the color of the button text. Click  to display the color palette.
- Keypad Numeric Key Task – select from the pull-down list box which function (i.e. display a number, control key, etc.) the selected button has (see Numeric and ASCII section for more details).
- Merge Keys – combine two keys together to form one function. This ensures that there is no space between the two keys which, when pressed, does not do anything.
- Show Key – option to make key invisible and inactive
- Show Key Text – option to display the configured Key Text on the button. With this option, you can use the Key Text field to create a description of the button without having the description displayed.
- Layout (List T) – coordinates (i.e. size and position) for the object

Resize a Custom Keypad object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

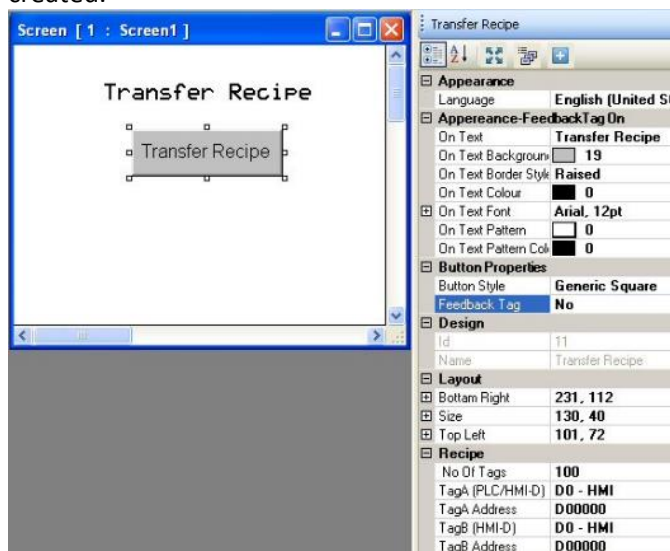
Recipes

Recipes are preconfigured values that are either uploaded from the PLC into the HMC or downloaded from the HMC into the PLC. The advantage of using recipes is in batch processing applications in which a series of unique values or set points are required to produce or perform an operation. If there are several different batches or recipes, then the recipe features makes it easier for the plant floor operator to select which recipe they need for the current job, downloaded the preset values to the PLC from the HMC with the press of a button, and start the job.


- 34 ► There are several steps required to set up a recipe using the MAPware software:
1. Configure the tag registers that will be used for the source registers (registers that are used to store the preset values) and the target registers (register that receive the preset values when the operator presses a button on the HMC screen). Use the Tag Database to configure these registers.
 2. Configure a screen that is used to enter the preset values into the source registers. Preferably, the source registers should be registers that reside in non-volatile memory (i.e. R registers in HMC memory).
 3. Create a Transfer/Upload Recipe button and configure the target and source tag addresses and how many consecutive register to transfer/upload.

Transfer Recipe

The Transfer Recipe button is used to copy predefined constant values from a consecutive set of internal HMC memory tag addresses to a set of PLC memory tag addresses. Up to 100 values can be transferred per button created.



Place a Transfer Recipe button object on screen

- Use one of the following:
 - Click **Draw > Buttons > Recipe > Transfer Recipe** from the standard menu
 - Click **Advanced Objects > Buttons > Recipe > Transfer Recipe** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Transfer Recipe Properties box displays.

Transfer Recipe Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels
- Button Style (List M) – selects a style or 'look' to the button
- Feedback Tag (List N) – Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an 'off' or untouched look to an 'on' or touched look).

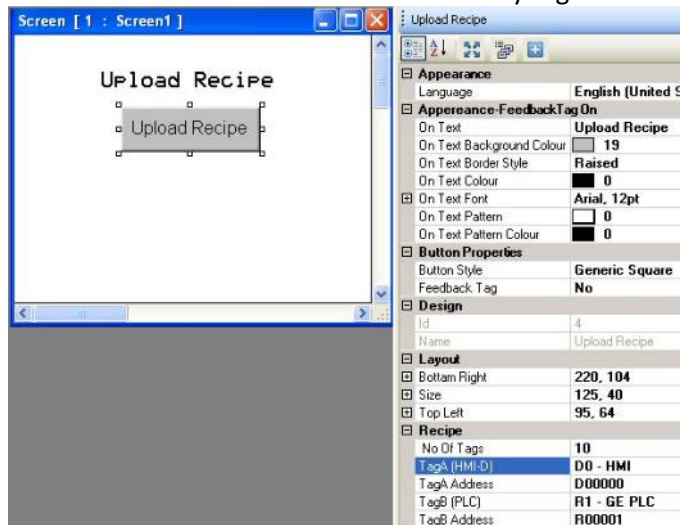
- Simulation (List Nc) – select 'On/Off' to see how button looks in that state (only available if Feedback Tag is set to 'Yes').
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Recipe – Address of source and target registers to use.
- No of Tags – enter the number of preset constant values (registers) that are transferred from the source address to the target address. Range is 1 to 100.
- Tag A (PLC/HMC-D) – name assigned in the tag database to the target register. This is the address of the target register(s) that the recipe preset values are transferred to.
 ☞ Note: if the value in No of Tags is greater than 1, you must make sure that there are an equivalent number of consecutive tag registers available for the transfer.
- Tag A (PLC/HMC-D) Address – this is the address of the target register(s).
- Tag B (HMC-D) – name assigned in the tag database to the source register. This is the address of the source register(s) that the recipe preset values transfer from.
 ☞ Note: if the value in No of Tags is greater than 1, you must make sure that there are an equivalent number of consecutive tag registers available for the transfer.
- Tag B (PLC/HMC-D) Address – this is the address of the source register(s).

Resize a Transfer Recipe button object


Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Upload Recipe

The Upload Recipe button copies predefined constant values from a consecutive set of PLC memory tag addresses to a set of internal HMC memory tag addresses. Up to 100 values can transfer per button created.





Place an Upload Recipe button object on screen

- Use one of the following:
 - Click **Draw > Buttons > Recipe > Upload Recipe** from the standard menu
 - Click **Advanced Objects > Buttons > Recipe > Upload Recipe** from the Draw toolbar
- Move  cursor to a start point for the button object. Click and hold mouse cursor.

- Drag mouse cursor to an end point for the button object and release. The button appears on screen and the Upload Recipe Properties box displays.

Upload Recipe Properties Options

- Language (List J) – highlight the language that must be selected to display the entered text.
- Appearance Feedback Tag On/Off (List L) – select the On and/or Off labels.
- Button Style (List M) – select a style or ‘look’ to the button.
- Feedback Tag (List N) – Enable this feature and select the same tag for both the target address and the feedback tag address, if you wish to see the button change state (i.e. go from an ‘off’ or untouched look to an ‘on’ or touched look).
- Simulation (List Nc) – select ‘On/Off’ to see how button looks in that state (only available if Feedback Tag is set to ‘Yes’).
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Recipe – Address of source and target registers to use.
- No of Tags – enter the number of preset constant values (registers) that are uploaded from the source address to the target address. Range is 1 to 100.
- Tag A (HMC-D) – name assigned in the tag database to the target register. This is the address of the target register(s) in the HMC that the recipe preset values are uploaded to.
 Note: if the value in No of Tags is greater than 1, you must make sure that there are an equivalent number of consecutive tag registers available for the upload.
- Tag A (HMC-D) Address – this is the address of the target register(s).
- Tag B (PLC) – name assigned in the tag database to the source register. This is the address of the source register(s) in the PLC that the recipe preset values are uploaded from.
 Note: if the value in No of Tags is greater than 1, you must make sure that there are an equivalent number of consecutive tag registers available for the upload.
- Tag B (PLC) Address – this is the address of the source register(s).

Resize an Upload Recipe button object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Recipe Database

The Recipe Database is a feature supported on the HMC2000, HMC3000 (Only IEC) and HMC4000 series and is available in MAPware-7000 v2.36 and newer. It is not available on the HMC7000. This feature allows a recipe database to be configured so that recipe data can be stored locally on the HMC.

Configuring the Recipe Database

Navigate to Define > Recipe Configuration... to open the Recipe Configuration window. In the Recipe Configuration window, select “Enable Recipe” and “Set default tags” to assign the Display/Edit, Search and Load/Save fields to the default tags that currently reside in the Tag Database.

Recipe Configuration

Enable Recipe Set default tags

No of groups: 1 [Max 16] Group Number: 1 Group Name: Group1

Number of Recipes: 3 [Max 256] Number of Elements: 3 [Max 256]

Display/Edit
 Recipe No Display Tag: Recipe_No_Display
 Recipe Name Display/Edit Tag: Recipe_Name_Display_Edit
 Recipe Status Tag: Recipe_Status
 Group Number Display Tag: GroupNumber_Display
 Group Name Display/Edit Tag: GroupName_Display_Edit

Search
 Search group by Number/Name Tag: Recipe_SearchGrp_By
 Search recipe by Number/Name Tag: Recipe_SearchRecipe_By
 Group Number Tag: Recipe_Grp_Number
 Group Name Tag: Recipe_Grp_Name
 Recipe Number Tag: Recipe_Number
 Recipe Name Tag: Recipe_Name

Load/Save
 Recipe Load Tag: Recipe_Load
 Recipe Save Tag: Recipe_Save
 Display/Edit Save Tag: Recipe_Edit_Save

	Recipe Number	Recipe Name	Element 1	Element 2	Element 3
▶	1	Recipe 1	1	2	3
	2	Recipe 2	4	5	6
	3	Recipe 3	7	8	9
		Display/Edit Tag	Item1_display	Item2_display	Item3_display
		Recipe Tag	Item1	Item2	Item3
		Data Type	Unsigned	Unsigned	Unsigned

Note: Recipe functionality supports files in .csv format only. Import Export OK Cancel

Recipe Groups

A recipe group is like a table of recipes. A maximum of 16 groups can be configured in the Recipe Database, each with their own set of recipes. Groups can be identified by their name and/or number. The number of recipes and elements can vary between groups. Add or remove groups by changing the “No of groups” value. Switch between groups by selecting a different number in the “Group Number” dropdown.

Recipes

Recipes are like the rows within a table or group. Elements are the columns or attributes that define the table. Up to 256 recipes can be defined per group, with a maximum of 256 elements per recipe. Recipes can be identified and searched for by their name or number. In the Recipe table, assign Display/Edit tags and Recipe tags as well as the datatype for each element:

	Recipe Number	Recipe Name	Element 1	Element 2	Element 3
▶	1	Recipe 1	1	2	3
	2	Recipe 2	4	5	6
	3	Recipe 3	7	8	9
		Display/Edit Tag	Item1_display	Item2_display	Item3_display
		Recipe Tag	Item1	Item2	Item3
		Data Type	Unsigned	Unsigned	Unsigned

Display/Edit tags: These are the tags through which the recipe element value should be modified at runtime.

Recipe Tags: These are the tags for the tags for the current recipe being used in a process.

Display/Edit Tags

The Display/Edit tags are the tags through which the recipe values should be modified, while the Recipe Tags are the tags that contain the values of the recipe currently being used in a process. The Display/Edit tags allow recipes to be modified without interfering with the current recipe that is being referenced by some process.

Search		
Search group by Number/Name Tag	Recipe_SearchGrp_By	...
Search recipe by Number/Name Tag	Recipe_SearchRecipe_By	...
Group Number Tag	Recipe_Grp_Number	...
Group Name Tag	Recipe_Grp_Name	...
Recipe Number Tag	Recipe_Number	...
Recipe Name Tag	Recipe_Name	...

Recipe No Display Tag

This tag contains the number of the recipe that currently resides in the Display/Edit Tags.

Recipe Name Display/Edit Tag

This tag contains the name of the recipe that currently resides in the Display/Edit Tags.

Group No Display Tag

This tag contains the number of the group that currently resides in the Display/Edit Tags.

Group Name Display/Edit Tag

This tag contains the name of the group that currently resides in the Display/Edit Tags.

Recipe Status Tag

This tag contains a numeric value representing the status of changes made to a recipe:

Recipe Status Codes

0 : Idle

1 : Group Not Found

2 : Recipe Not Found

3 : Recipe Found

4 : Load Success

5 : Display/Edit Save Success

6 : Load Fail

7 : Display/Edit Save Fail

8 : Recipe Save Success

9 : Recipe Save Fail

10 : Recipe Name Duplicate

11 : Group Name Duplicate

How to Search for a Recipe

Recipe feature comes with two search options

1. Search by Number
2. Search by Name

Set the binary state of the “Search Group by Number/Name Tag” to search for a recipe group by Number or Name at runtime.

- 0 : Group Search By Number
- 1 : Group Search By Name

Set the binary state of the “Search Recipe by Number/Name Tag” for searching recipe by Number or Name at runtime.

- 0 : Recipe Search By Number
- 1 : Recipe Search By Name

Now use “Group Number Tag” or “Group Name Tag” and “Recipe Number Tag” or “Recipe Name Tag” for searching particular recipe.

Once the user updates the Recipe Search tags, the respective recipe is searched for and if it is valid, the element values are updated into the Display/Edit tags.

How to Modify and Save a Recipe

Recipe values can be modified through the “Display/Edit tags” and saved back to the Recipe table by setting the “Display/Edit Save Tag” to high.

Data in the “Recipe Tags” can also be saved to the Recipe Table by setting the “Recipe Save Tag” to high.

Recipe Name Edit at Runtime

After searching for a recipe from particular group, it is possible to edit the Recipe Name in the “Recipe Name Display/Edit Tag” and can save the name by setting “Display/Edit Save Tag” or “Recipe Save Tag” to High.

Validation for duplication of a Recipe Name in a Group is implemented. If a recipe with same name is present in a group then the “Recipe Status Tag” value will be updated to “10” to indicate a recipe name duplication.

If Recipe with same name is not present in a group then a normal save operation will happen as per the saving event selected (Display/Edit Save - 5 and Recipe Save - 8).

Group Name Edit at Runtime

After searching for a particular group, it is possible to edit the Group Name in the “Group Name Display/Edit Tag” and can save the name by setting “Display/Edit Save Tag” or “Recipe Save Tag” to High.

Validation for Duplication of Group Name in Groups is implemented. If a Group with same name is present in the Recipe Database then the “Recipe Status Tag” value will be updated to “11” to indicate a group name duplication.

If Group with same name is not present in groups then normal save operation will happen as per saving event selected (Display / Edit Save- 5 and Recipe Save- 8).

Add or Remove a Recipe/Group at Runtime

Currently it is not possible to add or remove a recipe or group at runtime, only modify the values of existing recipes and groups.

Import/Export the Recipe Database

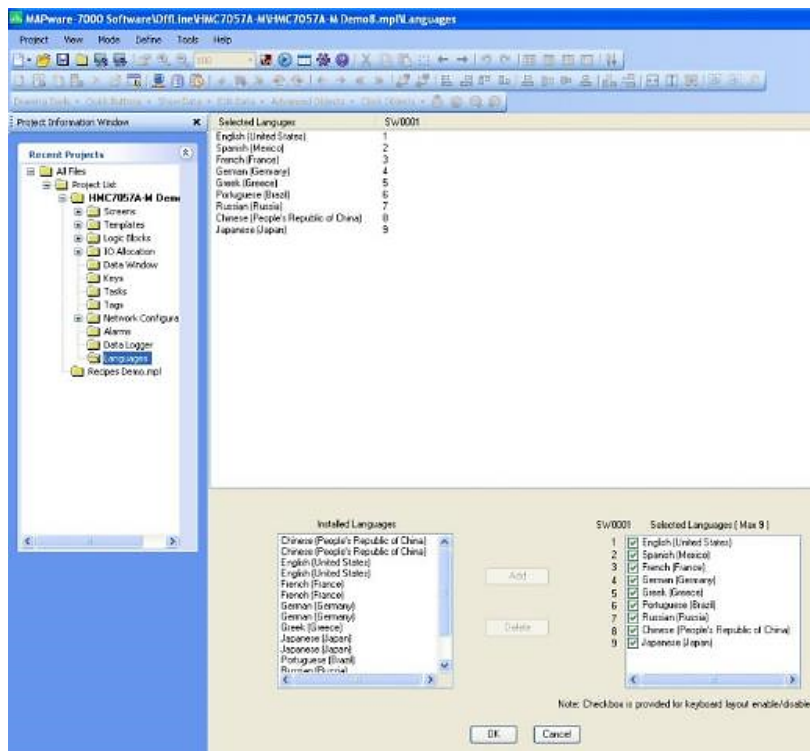
The Recipe Database can be exported or imported as a .CSV file. If you need to make significant changes to the database, you may want to export it and make the changes in Excel, then re-import the database.


Multi-Language Feature

The multi-Language feature enables the programmer to configure the project for use in many countries around the world that may use a different language. You can configure each object or text box with multiple labels, each designed for a unique language. During operation of the HMC, display a screen that allows the operator to select which language he prefers to use. Once selected, all of the objects and text boxes immediately depict the appropriate label. Up to nine separate languages are available per project.

How to Configure Languages

To use the multi-Language feature in MAPware, you must first configure which languages are available for your project. To do this, open your project and click the Languages folder located in the **Project Information Window** (or click **Define > Languages** from the Standard menu):



35  Note: if you do not see any language options in the Installed Languages options box, you must first make additional languages available using the appropriate settings in your Windows operating system. For Windows 10, follow these steps:

1. Click the Start program button on the Windows Task Bar
2. Click the Settings button
3. Click Time & Language

4. Click Region & Language or just Language
5. Choose a language from the Windows display language menu or under Preferred languages.
6. Select Add a language to install the one you want if it isn't listed.
7. Select the Input Languages you wish to use and configure which Keyboard Layout you wish to assign to each language
8. When done, you should now see these languages listed in MAPware.


If you see several languages listed in the Installed Languages options box in the Languages folder, simply click a language and click the Add button to add the language to the Selected Languages (Max 9) options box in the right column.

Check the box associated with each language to use the keyboard layout assigned to the language in the Windows Language Options settings in Control Panel. Notice that the number assigned to the left of each language is the number to enter into control register SW0001 to make all objects use the label created for the selected language. A maximum of nine languages can be assigned. Click the **OK** button when you have finished creating the list of languages you wish to have supported in your project.

Displaying Multiple Languages in Unit



Once you have created your list of languages using the steps described in the last section, you can now assign/create a label for each available language for your selected object(s). The example below illustrates using the multi-Language feature on a Multilingual Text object.

36 ► How to assign language labels to a Multilingual Text object on a screen


1. Place a Multilingual Text object on a screen.
2. In the Multilingual Text Properties box, click the Language attribute box.
3. Click the pull-down box  and select which language you wish to edit.
4. Click the Text attribute box and enter the text for the selected language.

Repeat steps 3 and 4 until you have entered the required text for each language.


In addition to creating objects that use multiple language labels (see above), you also need to create an object on an HMC screen that displays the correct language. Do this by writing a constant value (1-9) to an internal memory register (SW0001) in the HMC. This is done in two ways:

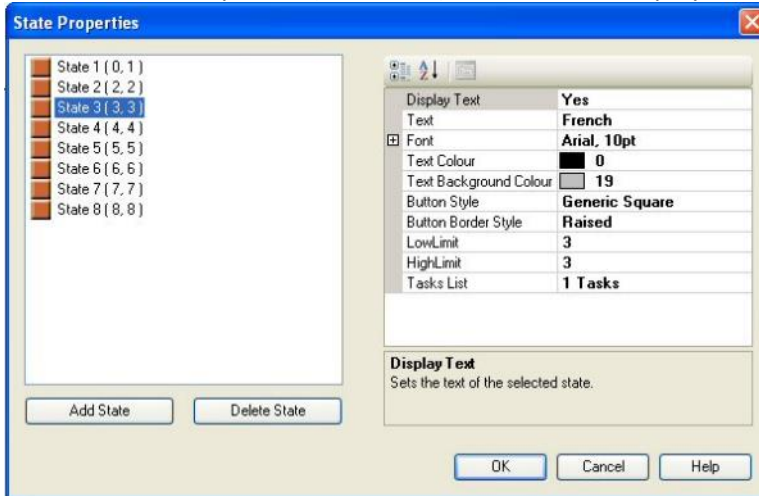
- Use a series of Write Value to Tag button  objects, each configured to change to a specific state (i.e. English, Spanish, etc.)
- Use a single Word button  object that steps through each language each time it is pressed.

37 ► How to display each language label during runtime (using Write Value to Tag button)

1. Configure the languages you wish to use in the Languages folder.
2. Configure the objects that you wish to display the various language labels.
3. Create a screen that changes the language.
4. Add a Write Value to Tag button on the screen.
5. Select Tag Address SW0001 as the target.
6. Enter the value as 1 to 9, depending upon the language you wish to display (see Languages folder for listing).
7. Option: create On Text label that identifies which language displays if button is pressed.
 Note: Remember to copy this label for each Language state so that it displays no matter which language is currently active.
8. Repeat steps 4-6 for each language that you wish to display.

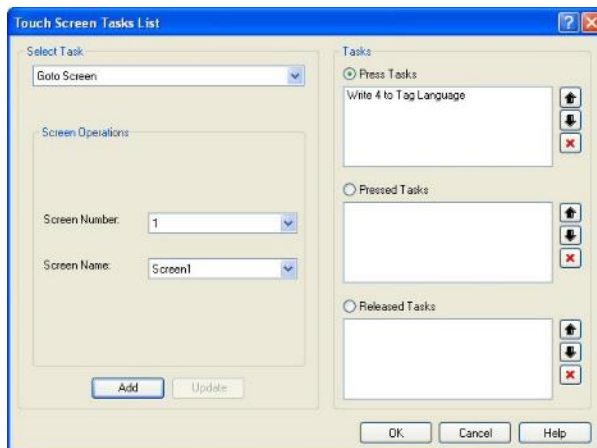
38 ► How to display each language label during runtime (using Word button)

1. Configure the languages you wish to use in the Languages folder.
2. Configure the objects that you wish to display the various language labels.
3. Create a screen that changes the language.
4. Add a Word button on the screen and go to the Word Button Properties dialog box.
5. Select Tag Address SW0001 as the target.
6. Click the State Properties (Collection)  button to display the State Properties dialog box.



7. For each state:

- Put the name of the language that is represented for that state (ex. State 3 language is French)
- Set the Low Limit and High Limit to equal the State number.
- Click the Tasks List to create a task:




Click Press Tasks

Under Select Task, click Write Value to Tag.

For Tag, select SW0001 (Language)

Under Number, enter the next number in sequence. For example, if the current State you are configuring were State 3, then you would enter 4.

 Note: for the last state, you would enter 1 to cycle back to the beginning language.

Click the Add button to assign the selected task to Press Tasks. Then click **OK**.

8. Create enough states to represent the total number of languages (max of 9) that you wish to support. Then click **OK** to return to the Word button.

List of Text Objects which use Multiple Languages

MAPware software supports the Multi-Language feature in the following objects:

- Multilingual Text
- Go To Screen, Go To Next Screen, Go To Previous Screen, and Open Popup Screen buttons
- Set Bit, Reset Bit, and Toggle Bit buttons
- Write Value to Tag, Add Value to Tag, Subtract Value from Tag, Add Tag A to Tag B, and Subtract Tag B from Tag A buttons
- Transfer and Upload Recipe buttons
- Advanced objects such as Advanced Bit, Word, Bit Lamp, Word Lamp, Multiple Bar graphs, Analog Meter, Trend Graph, and Historical Trend
- Alarm buttons – Alarm Acknowledge, Alarm Acknowledge All, Next Alarm, and Previous Alarm

Using the Import/Export Text Objects Feature

The Import Text Objects and Export Text Objects features allow you to export a listing of all objects that are capable of displaying Multilingual (Windows fonts) text. For a complete listing of all such objects, see the section above. This is particularly handy when using the Multiple Language feature. Instead of entering each language object-by-object in MAPware, you can export to a CSV (comma-separated value) file, and then edit the file using another application such as Microsoft Excel. This might save time.

Exporting Text Objects

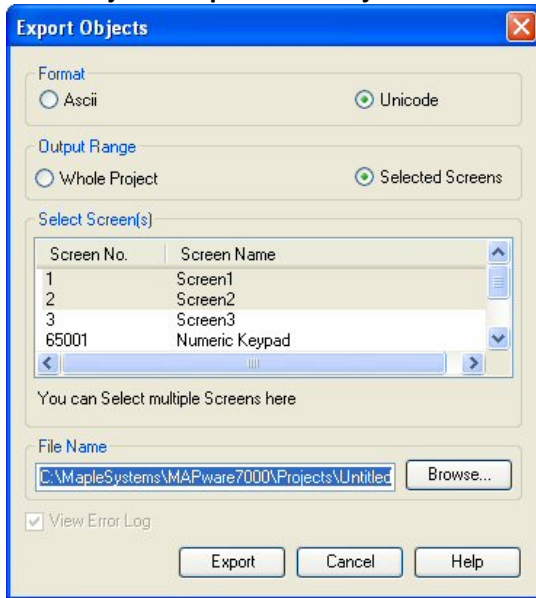
39 ► To Export Text Objects:

1. Open a project in MAPware that has multiple text objects.
2. Configure the languages you wish to use.

Ex:

Selected Languages	SW0001
English (United States)	1
Greek (Greece)	2
German (Germany)	3
French (France)	4
Spanish (Mexico)	5
Russian (Russia)	6
Chinese (People's Republic of China)	7
Japanese (Japan)	8

3. Click **Project > Export Text Objects:**



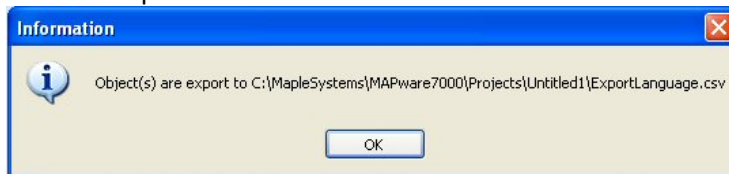
Format – Use Unicode if you wish to display international characters such as characters with diacritical marks (i.e. ç, é, ñ) or other alphabets (i.e. δ, ω, β, κ, й, 薩, さ) that are not represented in the standard ASCII character table.

Output Range – check Selected Screens, if you do not wish to export the entire project. Then click the screens listed, (hold down the CTRL key which clicking each screen you want).

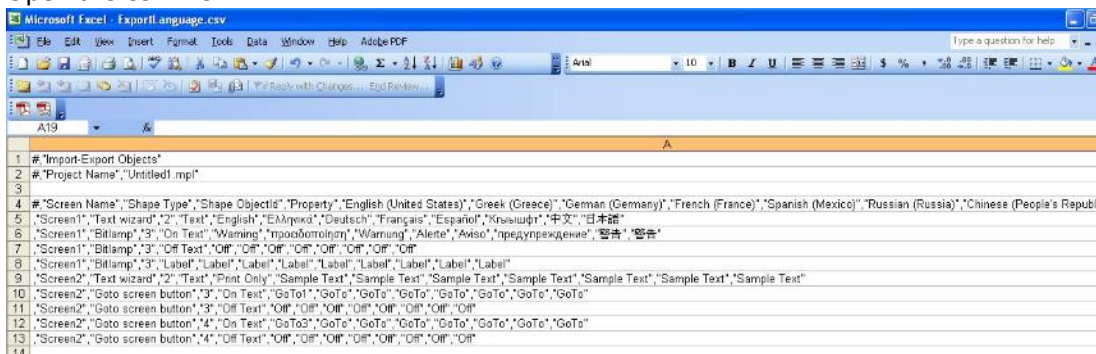
File Name – select the target file name that you wish to create.

View Error Log – not available when exporting.

4. Click the Export button.



5. Open the CSV file:



6. Edit the file. Make sure that all commas and quotation marks are left in their proper places. Save the file using the same format.

In this example, we will edit the text label that signifies the Off position of a Bit Lamp object that is located on Screen #1:

Before Edit:

A7	f&	,"Screen1","Bitlamp","3","Off Text","Off","Off","Off","Off","Off","Off","Off","Off"
1	#,"Import-Export Objects"	
2	#,"Project Name","Untitled1.mpl"	
3		
4	#,"Screen Name","Shape Type","Shape Objectld","Property","English (United States)","Greek (Greece)","German (Germany)"	
5	,"Screen1","Text wizard","2","Text","English","Ελληνικά","Deutsch","Français","Español","Кгышфт","中文","日本語"	
6	,"Screen1","Bitlamp","3","On Text","Warning","προειδοποίηση","Warnung","Alerte","Aviso","предупреждение","警告","警告"	
7	,"Screen1","Bitlamp","3","Off Text","Off","Off","Off","Off","Off","Off","Off","Off"	

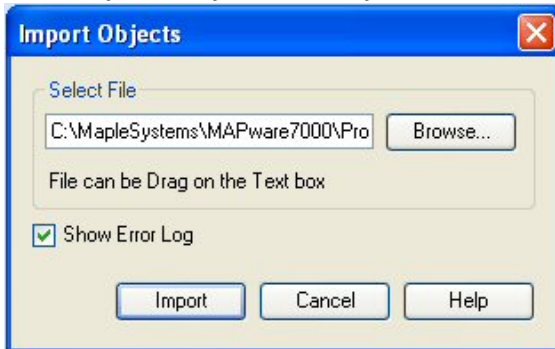
After Edit:

A	X	✓	f&	,"Screen1","Bitlamp","3","Off Text","Normal","κονονικός","Ublich","Ordinaire","normalidad","нормаль","标准","ノーマル"
				A
	#,"Import-Export Objects"			
	#,"Project Name","Untitled1.mpl"			
	#,"Screen Name","Shape Type","Shape Objectld","Property","English (United States)","Greek (Greece)","German (Germany)","French (France)"			
	,"Screen1","Text wizard","2","Text","English","Ελληνικά","Deutsch","Français","Español","Кгышфт","中文","日本語"			
	,"Screen1","Bitlamp","3","On Text","Warning","προειδοποίηση","Warnung","Alerte","Aviso","предупреждение","警告","警告"			
	,"Screen1","Bitlamp","3","Off Text","Normal","κονονικός","Ublich","Ordinaire","normalidad","нормаль","标准","ノーマル"			

Importing Text Objects

40 After editing an exported text file (see steps above), you can import the file back into your project:

1. Open the target project in MAPware that has multiple text objects.
2. Click **Project > Import Text Objects:**

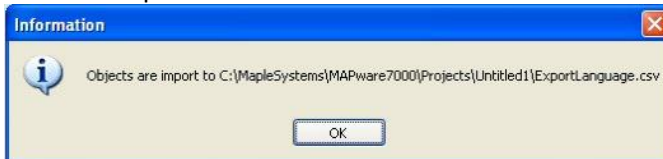


Select File – Use the file that you exported from MAPware.

Note: make sure that the text (including commas and quotation marks) follows the same format as was used in the export file.

Show Error Log – if checked, a text file is created by MAPware that lists any errors encountered during the import.

3. Click the Import button.



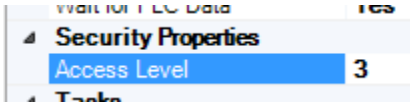
4. If all went well, you should now be able to see the changes you made by reviewing each text object.

Chapter 8 – Security

The HMC3000 and HMC7000 touchscreen models offer varying levels of screen security, from the simplest password protected screen, to sophisticated user accounts and password access. In addition, the entire MAPware project can be password protected to protect the programmers intellectual property.

Users and Access Levels

Access Levels and Users can be used to control access to Base Screens and Popup Screens. When a screen's **Access Level** property is something other than zero, the operator must be logged in to a user account that has been granted access to that Access Level to view the screen.

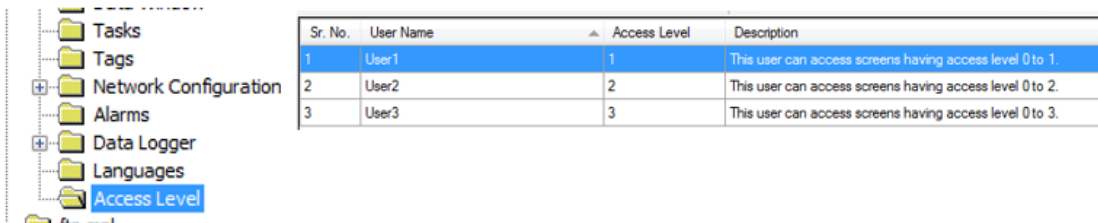


If the user does not have the required Access Level a **Screen Access Denied** message is displayed and the screen is not opened.

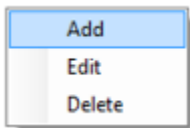
- 41 There are four steps to set up the Access Level feature in the MAPware project:
 1. Create User Accounts, assigning a *Username*, *Password* and *Access Level* to each user.
 2. Assign access levels to screens (see *Editing a Base Screen* or *Editing a Popup Screen* sections above).
 3. Configure a button to allow the user to log in.
 4. Configure a way for the user to logout.

Creating Users

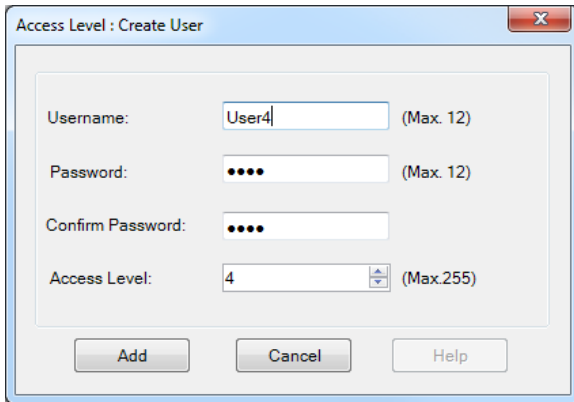
Users and Passwords are configured using the **Define > Access Level** menu option. Current Users are listed in the Access Level folder in the **Project Information Window**.



This screen can also be used to Add, Edit and Delete users. Right-click in the editor window and select the desired option from the context menu.



The **Access Level: Create User** window has fields to assign *Username*, *Password*, and *Access Level*.



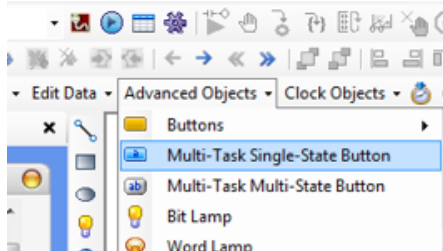
Users have access to screens assigned access levels less than or equal to the Access Level assigned to their user account. So **User4** with **Access Level 4**, could open screens with Access Level 0 to 4, but not 5 and above.

Logging In

For the user to gain access to protected screens they must be able to log in to their account. This is done with a button that runs a task to display a login screen. The login button should be placed on a screen that all users have access to.

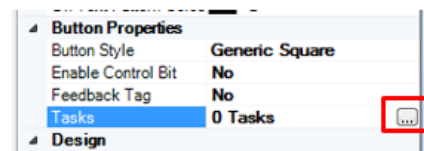
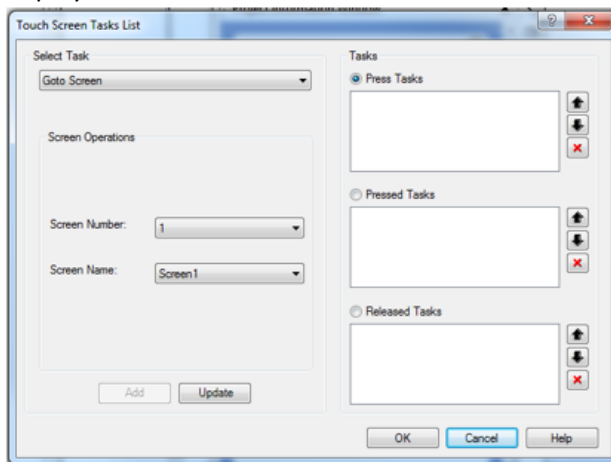
42 ► Follow these steps to provide access to the login screen:

1. From the Draw Toolbar select **Advanced Objects > Multi-Task Single-State Button**.

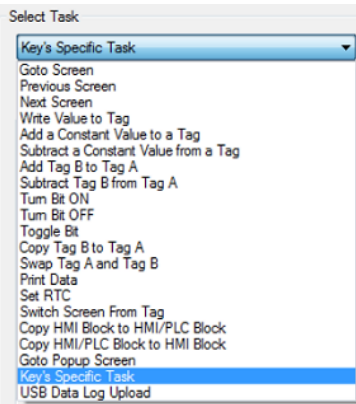


2. Click the screen to place the button.

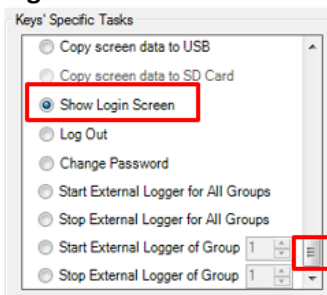
3. In the property grid for the new button click the **Tasks** property field then click the ellipsis button  to display the **Touch Screen Tasks List**



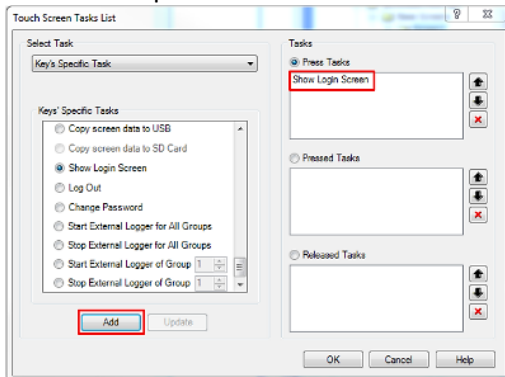
- With the **Press Tasks** radio button checked, Select **Key's Specific Task** in the **Select Task** dropdown list



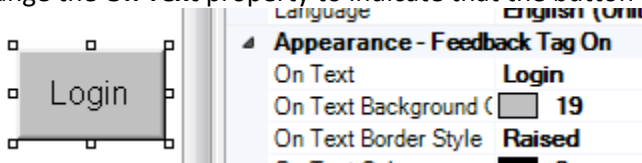
- Scroll down to the bottom of the **Key's Specific Tasks** selection box and check the radio button for **Show Login Screen**



- Click **Add** to place the task in the **Press Tasks** section:



- Click **OK** to save the task and close the popup window.
- Change the **On Text** property to indicate that the button is used to login



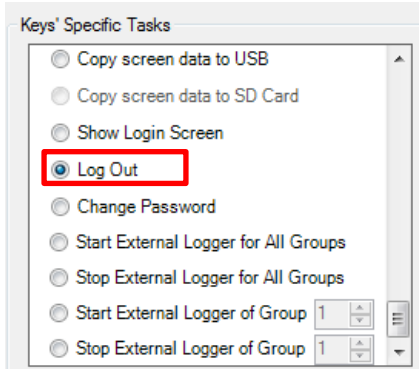
When the operator presses this button they will be prompted for a Username and Password.

Logging Out

There are two ways for a user to be logged out:

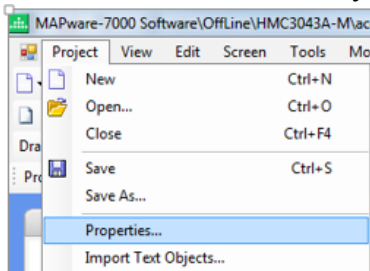
- Create a logout button
- Automatically logout the current user after a set timeout period

To create a logout button, follow the steps in the **Logging In** section above, only select the **Log Out** radio button in the **Key's Specific Tasks** selection box.

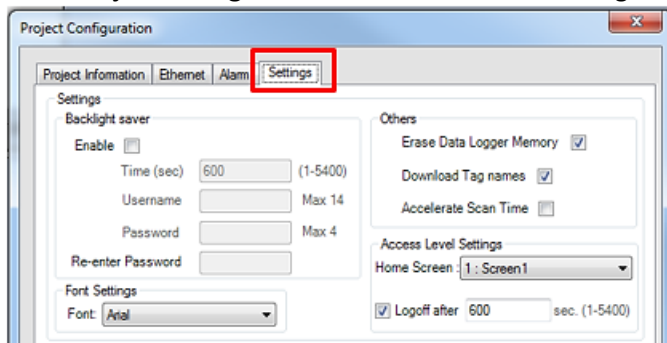


43 ► To set up a project to automatically logout the current user after a set timeout period:

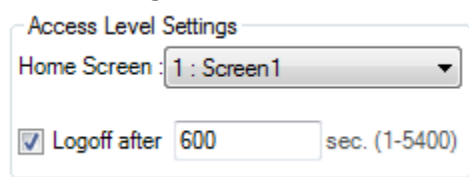
1. From the Menu Bar select **Project > Properties**.



2. In the **Project Configuration** window click the Settings tab

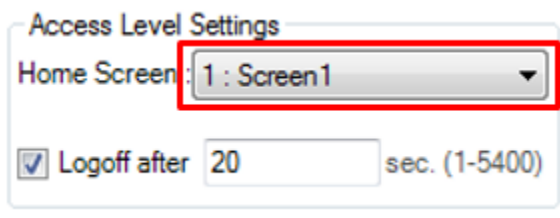


3. Check the **Logoff after** checkbox and enter the time in seconds after which the user will be logged out.



☞ The time set in the **Logoff After** field is the period of screen inactivity. If the user is actively using the touchscreen they will not be logged off.

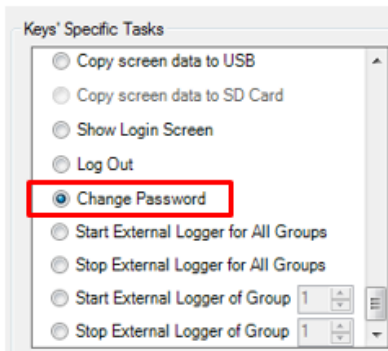
4. Select a screen to use as the **Home Screen**.



5. If a protected screen is displayed when a user is logged out the display will automatically switch to the **Home Screen** selected here. Any screen with an Access Level of 0 can be used as a home screen.
6. Click **OK** to save the settings and close the **Project Configuration Window**.

Updating a Password

A user's password can be updated from the HMC touchscreen. To provide this functionality follow the steps in the **Logging In** section above, except select **Change Password** as the **Key's Specific Task**.



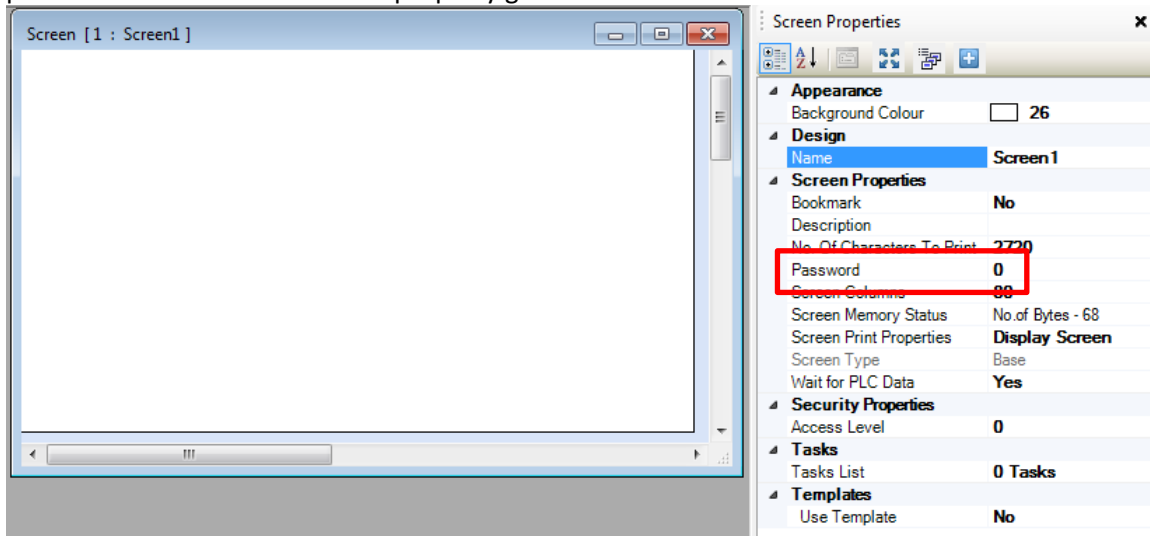
- 44 This will create a button that opens a change password dialog. The operator will be prompted to:
 1. Enter their current password
 2. Enter the new password
 3. Confirm the new password

A user must be logged in before using this function.

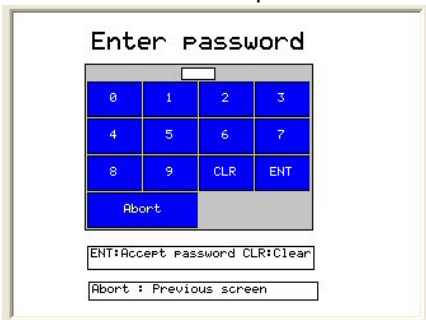
 Note: the new password will not be retained when power is cycled on the unit.

Basic Screen Level Security

Each individual screen can also be assigned a numeric password, separate from the Access Level feature. The password is added in the screen property grid.



The acceptable password range is 0 to 9999 (0 is no password assigned) and no username is required for this feature. When password-protected, a request to display the target screen causes a dialog box to appear, asking user to enter correct password:



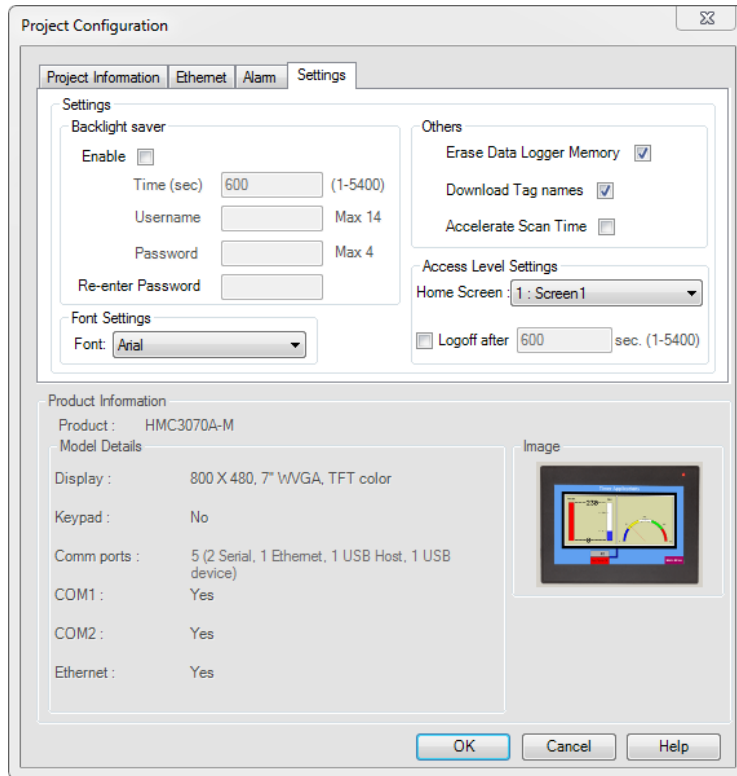
If correct, the screen will then display.

Backlight/Screen Saver Password Security

The HMC can be configured to go into a backlight/screen saver mode after a predefined length of time, up to 90 minutes, without any operator input. The operator reactivates the screen by touching it, but a username and password can be configured before normal operation is restored. This can be used as an auto-logout type feature at the end of shifts, ensuring that only authorized personnel can reactivate the HMC to begin the next shift.



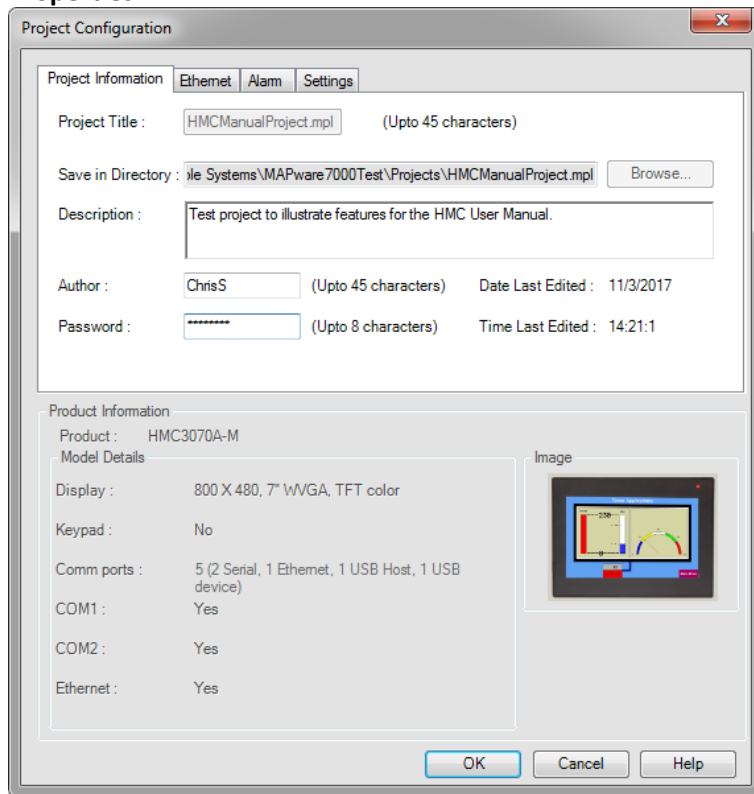
The **Backlight saver** is enabled in the **Settings** tab of the **Project Configuration** window, accessed from **Project > Properties**. *This is not available for the HMC4000 series*



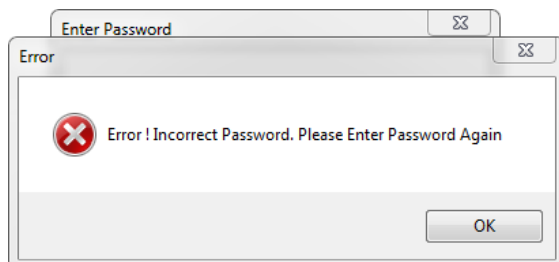
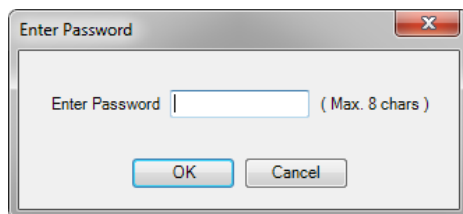
- Backlight saver Enable:** Checkbox to enable the backlight saver. If enabled, a blank screen is displayed on the HMC after the specified time-out. The operator can reactivate the screen by touching it.
 - Time (sec):** Enter the amount of time in seconds (of touchscreen inactivity) that must elapse before the backlight saver is engaged.
 - Username:** Optional. If used, a screen is displayed that requires the operator to enter a username and password to reactivate the screen. Maximum of 14 alphanumeric characters allowed.
 - Password:** Optional. If used, maximum of 4 alphanumeric characters allowed.
 - Re-enter Password:** Re-enter the desired password to set it.

Intellectual Property Protection

The ability to password protect your project is available in the **Project Configuration** window, **Project > Properties**.



Creating an optional project password is a way to protect your project (and intellectual property) from unauthorized modification. The password can be up to 8 alphanumeric characters in length. If a password is entered in the **Project Information** tab of the **Project Configuration** window, the programmer will be required to enter the password whenever project is opened or uploaded from the HMC. Care must be taken to remember the project password, as it is not recoverable if forgotten. **Maple Systems does not have a backdoor into password protected projects.** If the password is not available, the project must be recreated from scratch.



Chapter 9 – Alarms

What are Alarms?

At the most basic level, alarms are simply predefined messages that display on the HMC screen when a bit attached to each message triggers. This is used in circumstances in which the HMC operator must be notified immediately of a problem or event that is occurring in the system.

Alarm features:

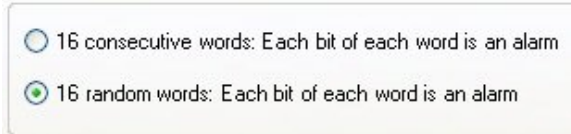
- Configure up to 256 unique alarm messages for each project
- Auto acknowledge feature allows one key press to acknowledge each particular alarm or all active alarms at once
- Option when alarm memory is full, to erase the previous alarms and log new alarms from the beginning or simply to stop logging any new alarms that occur.
- Alarm messages trigger by bits that are part of ‘word’ registers. Option to select random 16-bit word registers (more versatility but slower response time) or 16 consecutive word registers (less versatile but quick response time)
- Log feature: captures event to non-volatile memory to view at a later date
- Severity (range 0 to 9) – determines priority of alarms
- Alarm Print Notification: if selected, alarm message is sent to serial printer that is connected to the HMC.

Constructing an Alarm Database

Configure the alarm global parameters

First, you must select three parameters that determine how your HMC unit works with alarms. These settings are configured either in the **Project Configuration** dialog box (select Project menu, then Properties, then click the Alarm tab) or go directly to the Alarm **Project Configuration** Properties dialog box (click the Alarms folder in the **Project Information Window**) and then click the Change Properties button.

Parameter 1 – 16 random or consecutive registers (HMC7000, HMC3000, and HMC2000 only)



The image shows a configuration dialog box with two radio button options. The first option is '16 consecutive words: Each bit of each word is an alarm' and is currently unselected. The second option is '16 random words: Each bit of each word is an alarm' and is currently selected.

Each alarm message must tag to a bit. When the bit is set, it will trigger the display of the alarm message. The HMC monitors bits in word registers to ensure a fast response time. Therefore, each group of 16 alarm messages requires one 16-bit word register. Therefore, for 256 alarm messages, the HMC must monitor 16 word registers. The MAPware software provides two options for the HMC to read word registers allocated for alarms:

- 16 consecutive words: this option reserves sixteen word registers in consecutive order.
- 16 random words: this option allows you to randomly select word registers. They do not have to be in consecutive order and you do not have to allocate 16 registers.

Select **16 consecutive words** if you:

- Plan to configure all or most of the 256 alarm messages available in each project.
- Wish to ensure maximum speed and minimize any delays in displaying alarm messages.

Select **16 random words** if you:

- Do not need 256 alarms and, therefore, do not wish to ‘tie up’ so many registers in the PLC for alarm messages.
- Do not have 16 consecutive registers available or would rather separate the registers into random groups.

Parameter 2 – Auto acknowledge

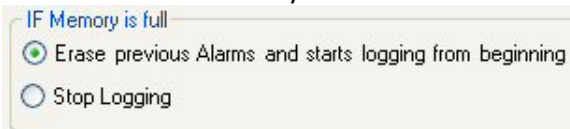


The acknowledge feature is used to indicate that the plant floor operator has seen an alarm message. Do this by:

- Changing the color of the displayed message for an active alarm or
- Removing the displayed message from the screen if the alarm is no longer active

This parameter provides the option of configuring one bit/coil to acknowledge all alarms (Acknowledge All) or select unique bit/coils for each alarm message that displays (Selectable).

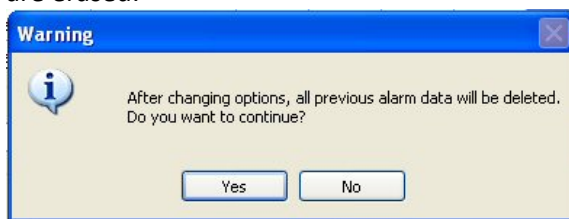
Parameter 3 – If memory is full



This option determines how the HMC unit behaves when the memory allocated to historical alarms is full. Two options are:

- Erase previous alarms and log from the beginning – this option will erase the oldest alarms recorded, making room for new alarms that occur.
- Stop logging – use this option to make sure no prior alarms are lost. However, when the alarm memory is full, then no new alarms display.

Note: Make sure you perform the above steps first before you start creating alarm messages; you can always return to this menu to change the global alarm settings but if you do, all alarm messages created are erased:



Create the alarm tags using the Tag Database

Before you can start creating your alarm messages, you must open the tag database (Tags folder in the **Project Information Window**) and assign word registers for the alarm messages. The word registers can be internal HMC memory or registers located in a connected PLC. Calculate how many alarm tags you need based upon the number of alarm messages that you wish to display. Use register memory, not bit/coil memory since alarms tag to bits in word registers (16 messages/bits per register). Also, determine how many Acknowledge bit/coils you require and create these as well.

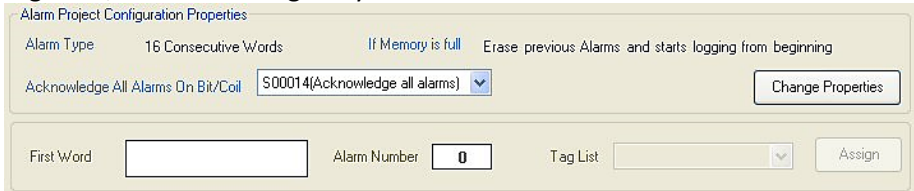
Note: if you selected ‘16 consecutive words’ option above, then you must create 16 consecutive data registers for alarms before you continue to the next step.

Generate the alarm messages

Click the Alarms folder in the **Project Information Window**. If you have selected the Auto Acknowledge – Acknowledge All alarms option (see Step 1. Parameter 2 above), then you must select a tagged coil/bit using the

pull-down box next to Acknowledge All Alarms On Bit/Coil. If you do not enter this first, the following error message displays on the Alarm dialog box “Please select Acknowledge All Alarms field first.”

- If 16 random words is chosen in Step 1a 16-bit word register, select the bank of messages (i.e. 00 (000-015)) that you wish to configure under Alarm Section. Under Tag List, click the word register that you wish to tag to this bank, then click Assign.
- If 16 consecutive words are selected, go directly to the Tag List and click a group of 16 consecutive registers, then click Assign. If you see this:



The Assign button is unavailable. This means that MAPware does not see 16 consecutive registers in the tag database. Go back into the tag database and verify that 16 consecutive data registers are available for the 256 alarms.

HMC4000 Series Alarm Database Parameters

Alarm Number	Group Name	Alarm Tag	Alarm Condition	Email No	Group No	History	Print	Severity	Ack	AckEmailN
1	Group1	ALARM_00000	Alarm tag coil on			With Ack	No	0	ACK_...	
2	Group1	ALARM_00001	Alarm tag coil on			With Ack	No	0	ACK_...	
3	Group1	ALARM_WORD	Alarm tag > tag ALARM_WO...	AlarmStat	Group 1	With Ack	No	0	ACK_...	

Alarm Tag

Tag: ALARM_WORD

Type: Register

Condition: Constant 0 Tag ALARM_WORD_LIMIT

Email: When alarm occurs (AlarmStat, Group 1)

When alarm ack

When alarm clear

Alarm Attributes

History Without Acknowledge With Acknowledge

Alarm Notification: Print

Alarm Severity: Severity 0

Acknowledge: Acknowledge Bit/Coil Tag: ACK_ALARM_00002

Clear Bit: Alarm Clear Bit/Coil Tag: CLR_ALARM_00002

Auto Acknowledge: Acknowledge All Selectable

If Memory is full: Erase previous Alarms and strat from beginning Stop Logging

Add New Alarm

Update

Delete

Delete All

Export

Import

In the Project Information Window of your HMC4000 Series project, select the **Alarms** folder to access the **Alarm Database**.

Alarm Tag

Tag

Select the **Tag** that the alarm will respond to from existing tags in the Tag Database or create a new tag.

Type

The Type can be either a Coil or a Register (or Register Bit).

If using a coil or register bit for the alarm, the option is given to trigger the alarm if the state is ON or OFF. Additionally if using a register bit the Bit Number needs to be specified.

Alarm Attributes

History

Selecting the **History** option will allow the alarm to be displayed in a Historical Alarm List object on the screen. Optionally, Acknowledgement data can be displayed in this object as well.

Alarm Notification

In previous models, selecting the “Print” option would send a notification of the alarm to a serial printer. This option is not available for the HMC4000 Series. Use **Email** instead to push alarm notifications.

Alarm Severity

Set a Severity ranking from 0-9. Alarm Lists can be configured to display only alarms of a certain severity.

Edit Alarm Ack Text

This option allows changes to be made to the text that is displayed regarding an alarm’s Acknowledge status in the **Real Time Alarm Display** Object.

Acknowledge/Clear Bit Tag

Alarms can be assigned a bit tag to acknowledge or clear them from logic if necessary. Alarms can be cleared from the screen using the buttons on the **Alarm List** object.

Auto Acknowledge

Select whether the alarm will respond to the “Ack All” button or task or must be acknowledged individually.

If Memory Is Full

The response to full memory can either be to erase all alarms from the beginning or stop logging alarms.

Email

The Alarm can generate an email when it occurs, when it is acknowledged, and when it is cleared. Select the Email Screen and the group to which it will be sent.

Email	Email No.	Email Group
<input checked="" type="checkbox"/> When alarm occurs	AlarmStat	Group 1
<input type="checkbox"/> When alarm ack		
<input type="checkbox"/> When alarm clear		

Add New Alarm

To create an alarm, configure the settings for the alarm then click **Add New Alarm**.

Update

To update an alarm, select an existing alarm from the table, modify the configuration and then click **Update**.

Export/Import

The alarm table can be exported/imported as a .csv file. This allows quick changes to be made to large numbers of alarms in a spreadsheet editor or share alarms between HMC4000 projects.

Configuring Alarm Messages

Now that you have determined the global settings for your alarms and created the tags to use (see above section), you are now ready to configure each alarm message, along with the particular attributes assigned to each message.

To do this, you must go back to the Alarm **Project Configuration** Properties dialog box (click the Alarms folder in the **Project Information Window**):

The screenshot shows the 'Alarm Project Configuration Properties' dialog box. At the top, it displays 'Alarm Type' as '16 Random Words' and 'If Memory is full' as 'Erase previous Alarms and starts logging from beginning'. Below this is a 'Change Properties' button. The middle section shows 'Alarm Section' as '00[000-015]', 'Alarm Number' as '0', and 'Tag List' as 'R00005[Alarm Group 0]'. Below this is a table with columns: Alarm Assign, Alarm Number, Tag_Bit, Alarm Text, Log, Severity, Print, and Ack. Tag. The table contains 8 rows of data. Below the table is the 'Alarm Description' section, which includes 'Alarm Text' (Alarm Text0), 'Language' (English (United States)), 'Alarm Notification' (Print checkbox), 'Alarm Severity' (0), 'History Description' (History checkbox), and 'Acknowledge' (checked) with 'Bit/Coil Tag' (M00005[Acknowledge All]). On the right side of the dialog are buttons for Update, Delete, Reset All Alarms, Export, and Import.

Alarm Assign	Alarm Number	Tag_Bit	Alarm Text	Log	Severity	Print	Ack. Tag
Yes	0	Alarm Group 0_0	Alarm Text0	No	0	No	Yes
Yes	1	Alarm Group 0_1	Alarm Text1	No	0	No	Yes
Yes	2	Alarm Group 0_2	Alarm Text2	No	0	No	Yes
Yes	3	Alarm Group 0_3	Alarm Text3	No	0	No	Yes
Yes	4	Alarm Group 0_4	Alarm Text4	No	0	No	Yes
Yes	5	Alarm Group 0_5	Alarm Text5	No	0	No	Yes
Yes	6	Alarm Group 0_6	Alarm Text6	No	0	No	Yes
Yes	7	Alarm Group 0_7	Alarm Text7	No	0	No	Yes

Step 1: Select the alarm you wish to edit/modify.

To enter or modify a particular alarm message, you must click the Alarm Number of the alarm you wish to edit – a forward page symbol appears in the first column to indicate the selected alarm. The table indicates the current settings for each alarm and cannot be directly edited.

Below is a brief description of each column:

- Alarm Assign – indicates if this particular alarm is active (assigned).
- Alarm Number – designated number assigned to each alarm. Range is 0 to 255.
- Tag Bit – this is the particular bit (005) of the word register (see Tag List above) monitored by the HMC for this alarm. When this bit is set (1), the predefined alarm text for this alarm displays in the Alarm List object.
- Alarm Text – the text that is shown in the Alarm List object when this alarm is activated.
- Log – option to capture the alarm to internal HMC memory so that it can be viewed at a later date (see History section)
- Severity – indicates the severity level (0-9) of each alarm (see Alarm Severity below).

- Print – option to send alarm text to a serial printer attached to the HMC
- Ack Tag – determines if an acknowledge bit is assigned to this message.
 ⚠ Note: if the Acknowledge All Alarm global feature is used, then this option is preset to Yes and cannot be changed.

Step 2: Enter the alarm text.

In the Alarm Description section, under Alarm Text, enter the text that will appear when this alarm triggers. A maximum of 40 characters is permitted. If you are using more than one language (see **Multi-Language Feature** in **Chapter 7 – Data & Display Objects**), click the Language pull-down box to configure a unique alarm message per language selected.

Step 3: Alarm Notification

Check the Print box to send a copy of the alarm text message to a connected serial printer when an alarm activates.

Step 4: Alarm Severity

Alarms display in the Alarm List object according to the severity level assigned to each alarm. This is a useful feature if you wish to prioritize alarms. For example, if an Alarm List object is set to Severity Level 2, then it will only display active alarms whose severity level is 2, 3, 4, on up to and including 9. Any alarm that is configured with a Severity level of 0 or 1 will not be displayed. With this feature, you could set up an Alarm List object that only shows alarms of the ‘highest’ priority. To do this, you might set the severity level to 9, then it would only show alarms with a Severity Level of 9. Assign a severity level to each alarm (default is 0).


Step 5: Acknowledge

This option is available if the global setting (see last section) for Auto Acknowledge has been set to Selectable. Then configure each alarm with a unique bit/coil tag address used to acknowledge the alarm. When the acknowledge bit is set (for example by using an Advanced Bit Button object) by the plant floor operator, the Alarm List object indicates that the alarm is acknowledged. This is accomplished by changing the color of the alarm text message, recording the Date/Time of acknowledgement on screen, and/or simply using ‘Yes/No’ text in the Alarm List object (see Alarm List object for more information):



In the example above, Alarm0 (green) activates, and then is acknowledged by the plant floor operator. Alarm1 (red) is also activate but has not been acknowledged. Finally, Alarm2 (yellow) was activate but became inactive before the operator acknowledged the occurrence of the alarm.

When an alarm is configured with the Acknowledge option, the alarm message remains on display after the operator has acknowledged the alarm (as shown above). However, when the alarm is no longer active, then the alarm message is removed. In the scenario above, when Alarm0 is no longer active, the message is removed (since the operator has already acknowledged the message). In addition, if the operator presses the Alarm2 Acknowledge Alarm button, then the Alarm2 message is removed (since this alarm has since become inactive).


 Note: if the Acknowledge option is not used, then the alarm message remains on the display regardless of whether or not the alarm is active.

Step 6: History Description

The Alarm History option records the alarm message into non-volatile historical alarm memory (65536 bytes reserved) of the HMC. Alarm messages stored in the historical alarm memory are viewed using the Alarm List object with the Alarm Type attribute set to Historical.

There are two options:

- History Without Acknowledge – Alarms are recorded into historical alarm memory regardless of whether or not the operator has acknowledged the alarm.
- History With Acknowledge – Any alarm configured with this option must be acknowledged by the HMC operator by setting the assigned Acknowledge Bit. If this is not done, then the next time the alarm is active, it will not be added to historical alarm memory (although it will display as an active alarm in the Alarm List).

 Note: if the history option is checked, the alarm message displays on any Alarm List object configured as Real-Time alarm type when it becomes active.


To finish, you must click the Accept (Update) button. This will record the settings for the particular alarm you have highlighted. Once this has been done, you will see the Alarm Assign attribute change from No to Yes for the selected alarm. **You must click the Accept button for every alarm you create.**

Other buttons in the alarm database

Accept/Update: Alarm text and other attributes can be changed at any time during the creation of a project (see above). Simply go back into the alarm database, highlight the particular alarm message you wish to edit, make the changes, and then click the Update button.

Delete: this button will delete that highlighted alarm and return it back to default settings.

Reset All Alarms: completely clears all of the alarms and returns them back to default.

 Note: you must reassign the Alarm Acknowledge coil and the tag registers before you can start creating alarm messages again.

Export: save the alarm database as a CSV file that can be modified and imported back into the project.

Import: use this button to import an alarm database CSV file. Before you can import, make sure the following parameters are met in your project:

- The global setting for alarm 16 consecutive/random word registers must match the alarm type used in the imported CSV file. If not, you will see the message, “Current project Alarm Type is not the same as in import alarm database”. Click the Change Properties button in the alarm database to correct this setting.
- The tags used in the imported file must exactly match tags already created in your tag database.
- The imported CSV file should not contain any negative numbers.
- Do not change any of the Alarm Numbers assigned in the imported CSV file.
- The Number of Languages in the current project should match the import file.

Alarm List Display Objects

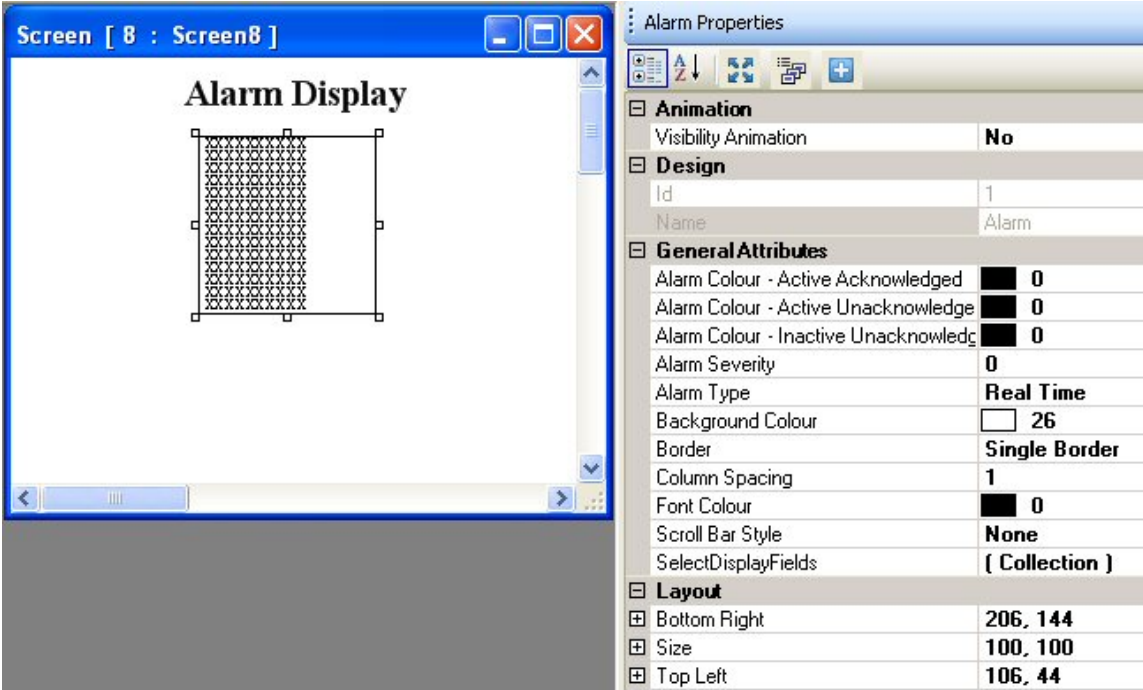
To display any alarm messages, you must place an Alarm List object on a screen. There are two basic types of Alarm List objects:

- Real Time Alarms – use this type when you wish to display actively occurring alarms.
- Historical Alarms – use this type to display a history of alarms that have occurred in the past. Alarms are saved to non-volatile memory so that they can be viewed even after power has been removed from the HMC for a period of time.

There are many features and options that are available to you when displaying alarms:

- The Alarm List object can be any size on screen. Optional scroll bars allow you to display information that might not completely fit in the alarm display that you have created.
- The Alarm Severity feature allows you to display a subset of active alarms so that you can display alarms in groups of increasing importance.
- In addition to displaying alarm text messages, you can also record the time and date that the alarm took place, when it was acknowledged, and when conditions went back to normal.
- The Real Time Alarms have the option of displaying the alarm messages in color according to state or condition of the alarm (active, inactive, acknowledged).


The Alarm List object is used to display alarm messages that have been configured using the Alarm database (see *Constructing an Alarm Database* section earlier in this chapter). Alarm messages appear in the configured Alarm List object when the bit that they are associated with is set.



Alarm Properties	
Animation	
Visibility Animation	No
Design	
Id	1
Name	Alarm
General Attributes	
Alarm Colour - Active Acknowledged	0
Alarm Colour - Active Unacknowledge	0
Alarm Colour - Inactive Unacknowledg	0
Alarm Severity	0
Alarm Type	Real Time
Background Colour	26
Border	Single Border
Column Spacing	1
Font Colour	0
Scroll Bar Style	None
SelectDisplayFields	{ Collection }
Layout	
Bottom Right	206, 144
Size	100, 100
Top Left	106, 44

To place an Alarm on a screen:

- Use one of the following:
 - Click **Draw > Display Objects > Alarm** from the standard menu
 - Click **Advanced Objects > Alarm** from the Draw toolbar
 - Click the Alarm icon in the Objects toolbar.


- Move  cursor to a start point for the Alarm List object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the Alarm object and release. The object appears on screen and the Alarm Properties box displays.

To configure/edit properties of the object:


Click the object on screen to display the Alarm Properties box on the right side of the screen.

- Animation (see General Properties section in **Chapter 7 – Data & Display Objects**)
 - Visibility Animation: (see General Properties in **Chapter 7 – Data & Display Objects**)
- Design (see General Properties in **Chapter 7 – Data & Display Objects**)
- General Attributes


Alarm Color – Active Acknowledged – sets the color that is displayed when the active alarm is acknowledged by the operator.

 Note: not available for Historical Alarm Type.

Alarm Color – Active Unacknowledged – sets the color displayed when an alarm is active but has not been acknowledged yet by the operator.

 Note: not available for Historical Alarm Type.


Alarm Color – Inactive Unacknowledged – the color used for text that is displayed when the alarm is no longer active but did not get acknowledged by the HMC operator.

 Note: not available for Historical Alarm Type.

Alarm Header – Adds a header to the Alarm Display object. Header text is configured in the Select Display Fields dialog.

Alarm Severity – ten levels (0-9) used to represent which alarms should be displayed. For example, if alarm severity level is set to 3, then only alarm messages in the Alarm Database with Severity levels of 3, 4 ... 9 will be displayed.


Alarm Type – select Real Time to display alarms as they occur. Select Historical to display alarms captured using the History feature in the Alarm database.

Background Color – determines the background color of the Alarm list. Click the  button to display the color palette and select a color.

Border – optional line around the periphery of the alarm list.

Column Spacing – number of pixels between the columns of data displayed (see Select Display Fields).

Font Color – color of the columns of data displayed.

 Note: this setting only applies if Alarm Type is set to Historical. For Real Time Alarm Types, the Alarm Colors (see above) take precedent over Font Color.

Scroll Bar Style – Use the scroll bar feature if the data to be displayed is larger than the Alarm list. The vertical scroll bar is used to easily scroll through the list of alarm messages that are displayed. The horizontal scroll bar is used to scroll through the columns of data (i.e. time, date, message, acknowledge time/date, etc.)

Select Display Fields – determines what data is to be displayed when an alarm occurs. If Alarm Header is enabled, the header text is configured in this dialog for each column. No spaces or special characters are allowed in the header text.

Alarm Text – maximum of 52 characters is allowed.

Alarm Number – whenever an alarm occurs, a number is assigned to it. This is useful if there might be more alarms than can be shown in the area allocated. Then the operator knows what section of the total alarm list he is viewing.

On-Time – this is the time at which an alarm became active. Options are: HH:MM:SS, MM:SS, and HH:MM. (H=hour, M=minute, S= second).

Off-Time – this is the time at which an alarm became inactive.

On-Date – this is the date at which an alarm became active. Format is DD/MM/YY. (D=day of the month, M=month, Y=year).

Off-Date – this is the date at which an alarm became inactive.

Active – this simply indicates if an alarm is currently active or not. Options are: Y/N or Yes/No. Not available for historical alarms.

Ack-Time – this is the time at which an alarm was acknowledged by the HMC operator.

Ack-Date – this is the date at which an alarm was acknowledged by the HMC operator.


Acknowledge – indicates if alarm is acknowledged. Not available for historical alarms.

Severity – the severity level assigned to each alarm message, (0-9).

- Layout (see General Properties)

Resize an Alarm List object


You can change the overall height and width of the Alarm List object by holding the mouse cursor over one of the white demarcation boxes along the perimeter of the object, then hold down the left mouse button to drag to a new position. You can limit the viewable messages to one or expand the Alarm List object to cover the entire screen.

 Note: The font size of each message is fixed (to 5x7 pixels) and cannot be changed.

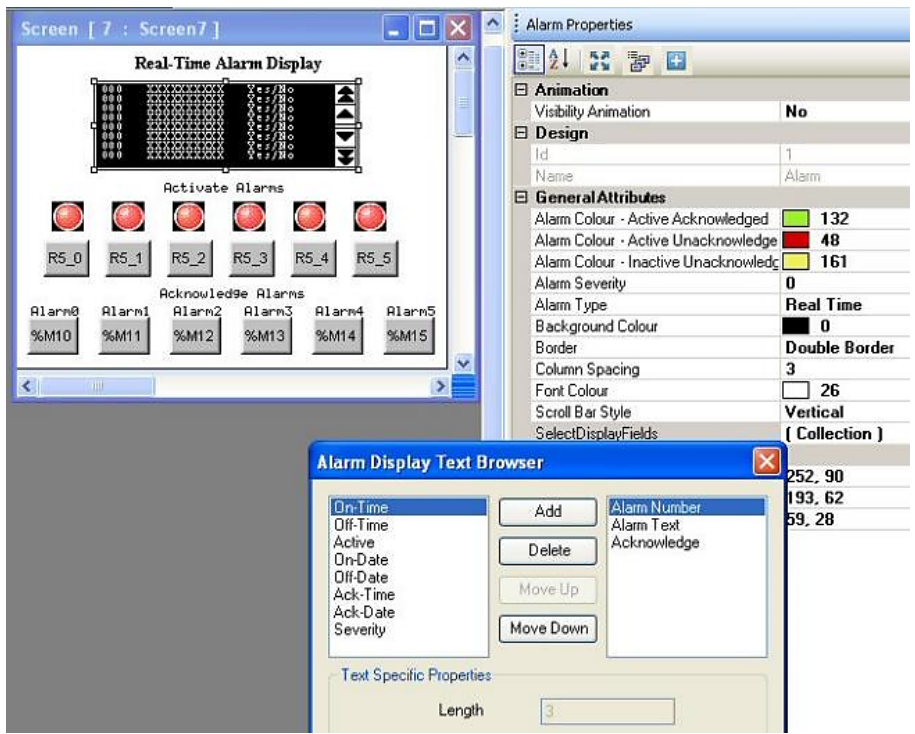
Real-Time Alarm Display

The real-time alarm type option in the Alarm List object immediately displays any alarm message in which the assigned bit has been set (i.e. current alarm). The message remains on display until:

- The operator has acknowledged the alarm by setting the configured acknowledge bit and
- The alarm message is no longer active (the assigned bit is reset)

 Note: if the Acknowledge format is set to Selectable and no Acknowledge tag is configured for a particular alarm message in the Alarms folder, then during operation, the alarm message will remain on display even when the alarm becomes inactive.

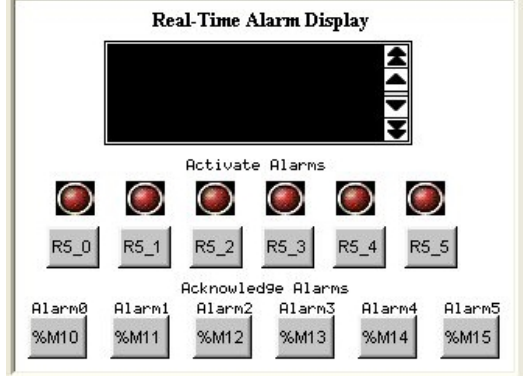
Below is an example of a simple real-time alarm:



Note: the buttons/lamps under 'Activate Alarms' are used in this example to activate and deactivate an alarm by controlling the target alarm bit. The buttons under 'Acknowledge Alarms' are used to acknowledge each alarm by controlling the acknowledgement bit for each alarm.

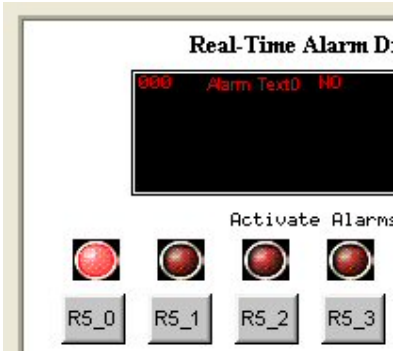
We have configured this alarm display with a black background and text colors of green, red, and yellow to indicate the active acknowledged, active not acknowledged, and inactive states respectively. We will display the alarm text, an alarm number, and acknowledge indicator for each alarm message displayed. Notice that on the Alarm Display Text Browser, you can rearrange the fields displayed by highlighting a field (in the right-hand column) and clicking the Move Up/Move Down buttons.

When using the run time simulator in MAPware, the following screen is displayed:



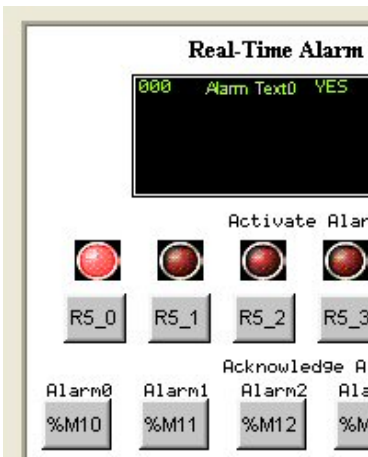
No alarms are currently active; therefore, the alarm display is blank.

We will activate Alarm#1 by pressing the R5_0 button:



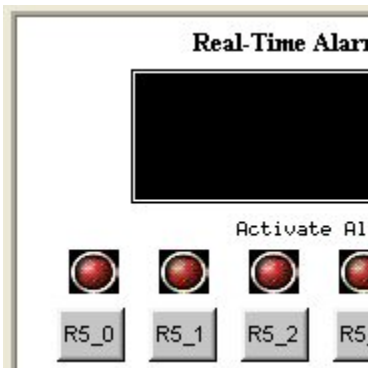
The message appears on the display (in red) along with an assigned alarm number (000) and text indicating that this alarm has not been acknowledged yet (NO).

The operator presses the %M10 button which has been configured to acknowledge the alarm:



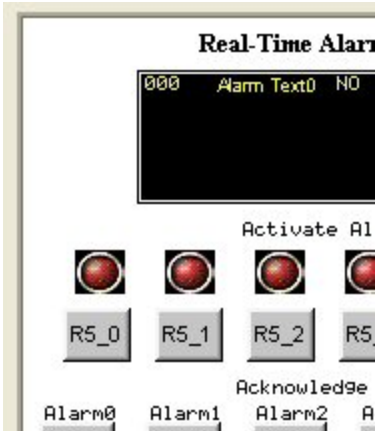
Note that the color of the alarm has changed to green and the acknowledgement indicator is 'YES'. However, the alarm is still active so the message remains on display.

Let's press the R5_0 button again, to clear the alarm condition:



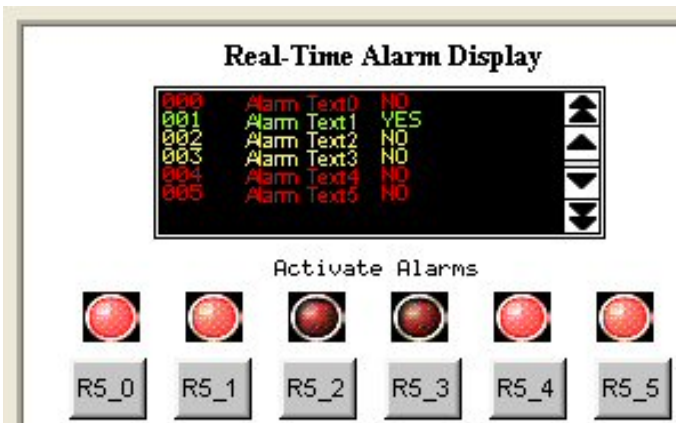
The alarm message has been acknowledged and cleared (become inactive) so the message is removed from the Alarm List object.

How does the alarm look if we activate the alarm, and then clear the alarm without pressing the acknowledgement key?



In this case, the alarm remains on screen but the color is yellow (indicating alarm is no longer active). Also note that the alarm acknowledgement indicator is 'NO'. The alarm remains on screen until the operator presses the acknowledgement key (%M10).

Alarms are displayed on the list in the order that they occur, with the first occurrence on top:



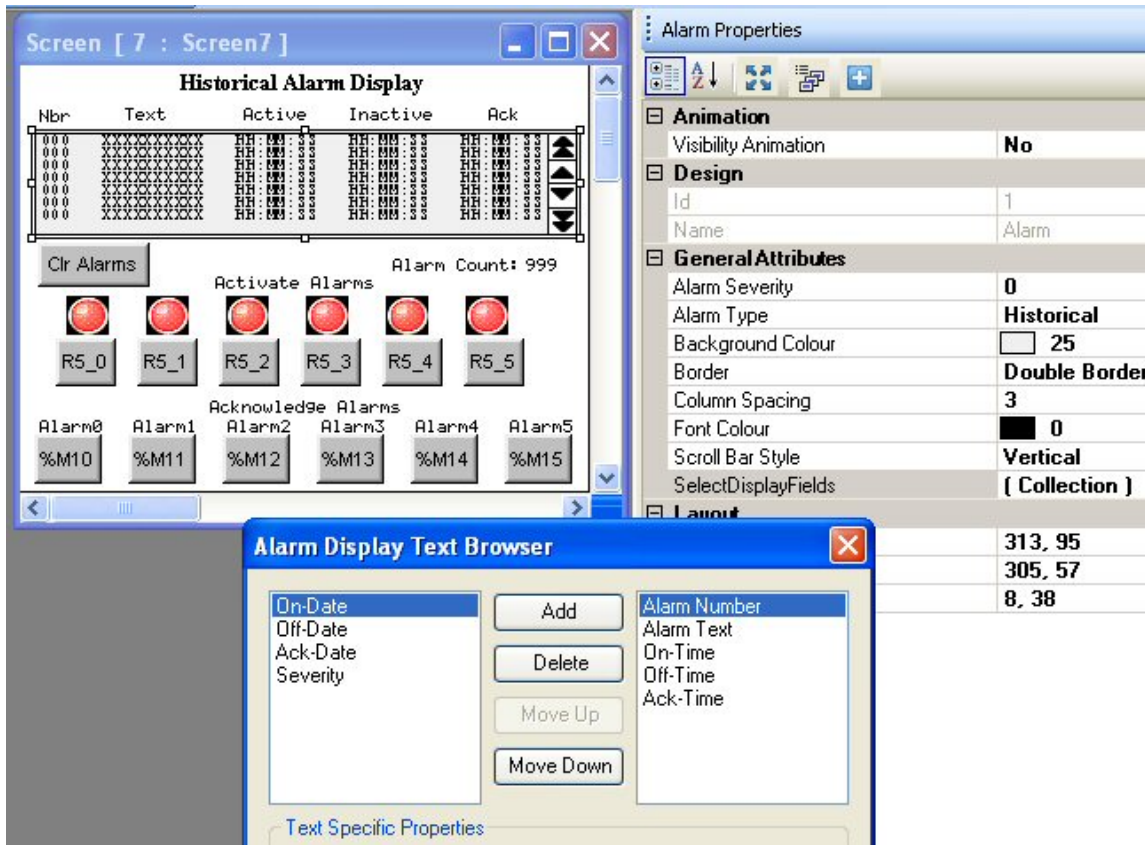
Use the optional scroll bar feature if there is a possibility of having more active alarms occurring than there is room to display.

Historical Alarm Display

The historical alarm type option in the Alarm List object displays only alarm messages in the Alarm Database that have the Log field (History) enabled. Unlike the Real-Time option, alarm messages remain on the list, even after the alarm has become inactive and/or the operator has acknowledged the alarm.

Alarm messages in the Historical Alarm List are retained even when power is removed from the HMC, and then reapplied. For this reason, the Historical Alarm List is primarily used to provide a record of alarms that have occurred in the past.

Below is an example of a historical alarm:



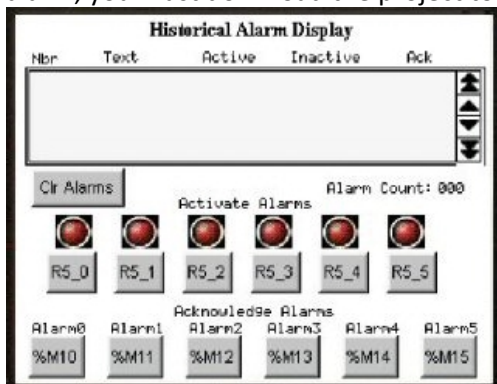
Note that the three alarm color options are not available for historical alarms; use the background and text font color options. In this example, the following fields are shown; alarm number, alarm text, on-time, off-time, and ack-time. For clarity, we have placed titles on the top of the alarm list to help identify each field.

For this example, there is also an Advanced Bit button (Clr Alarms) that is configured with a Key Specific Task to Clear Historical Alarm Memory. This button can be used to clear the alarm memory and blank the display.

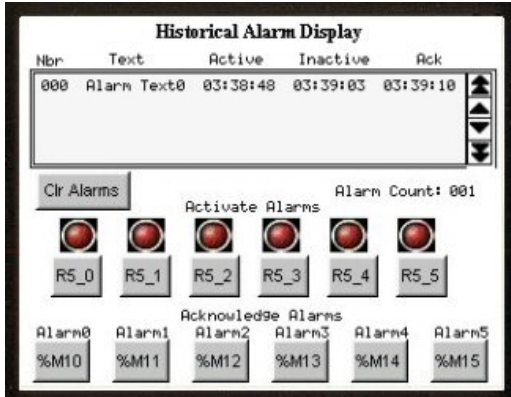
There is also a Numeric Display object (Alarm Count – SW0004) which shows how many alarm messages are in memory. The other objects perform the same function as in our example of using a real-time Alarm List above.

Historical alarms display only alarm messages that have been stored in non-volatile memory of the HMC.

Therefore, you cannot use the MAPware run time simulator to display a historical alarm. To see a historical alarm, you must download the project to the HMC unit:

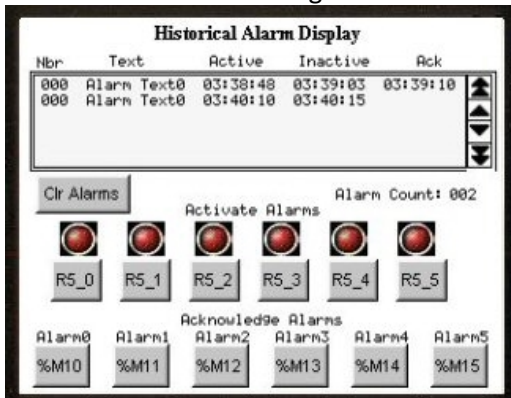


Let's activate Alarm#1 by pressing the R5_0 button. Then we acknowledge this alarm by pressing the %M10 button and press the R5_0 button again to deactivate the alarm:

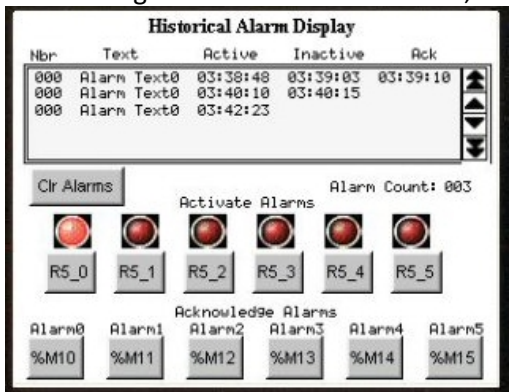


The text appears on display, along with the time at which the alarm became active, acknowledged, and then inactive.

Let's press R5_0 again to activate the same alarm, but instead of acknowledging the alarm, let's deactivate the alarm without acknowledgement:

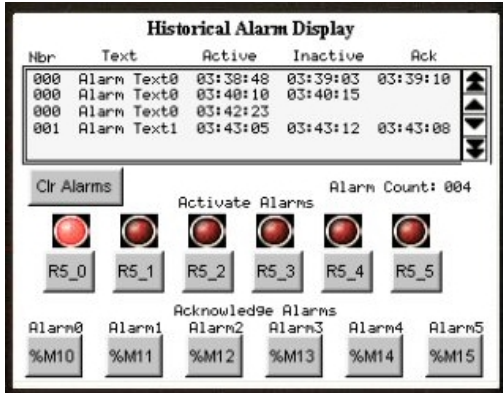


In the Alarm Database, this alarm is configured with the 'History Without Acknowledge' attribute. New instances of this alarm will be recorded into the Alarm History memory of the HMC even though the operator did not acknowledge the last alarm. Therefore, if we activate this alarm again without acknowledging, it will display:

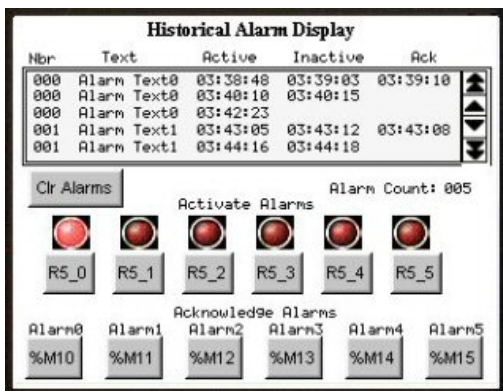


Use the 'History Without Acknowledge' attribute if you want a record of each alarm occurrence, regardless of whether or not the alarm was acknowledged by the operator.

The alarm that is triggered by pressing R5_1 is configured with the 'History With Acknowledge' attribute. Let's activate this alarm, press the %M11 acknowledge button, then press R5_1 button again to deactivate:



So far, nothing different; this alarm behaves the same as the prior alarm. Let's now activate the same alarm again, but instead of acknowledging, we will deactivate the alarm:



If this alarm is activated again, it is not placed into the Alarm Memory. Therefore, it does not appear on screen. *When using the 'History With Acknowledge' attribute, all new instances of this alarm (other alarms are not affected) will not be displayed until the alarm is acknowledged by the plant floor operator.* Use this setting if you wish to conserve alarm memory space in the HMC or if operator acknowledgement of the alarm is a requirement.

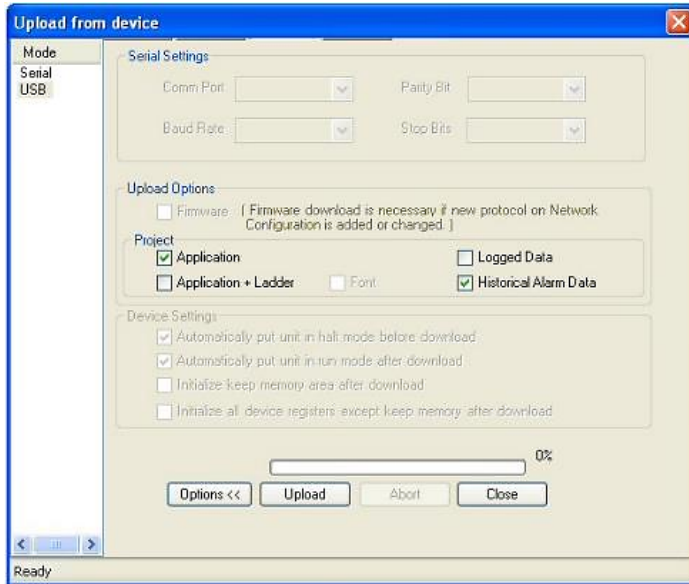
Finally, the alarm history is in non-volatile memory of the HMC so you can always see prior alarms that have occurred even when power is removed from the HMC for a period of time. The MAPware software allocates 65536 bytes for alarm messages and can retain up to 6000 historical alarm messages. If you wish to clear the alarm memory, simply use a Function Key or Advanced Bit Button that is configured as a Key Specific Task – Clear Historical Alarm Memory. Otherwise, the memory is cleared based upon the global setting (see *Constructing an Alarm Database* at the beginning of this chapter) in the **Project Configuration** dialog box (in the Alarms folder, click Change Properties).

Uploading Historical Alarms

In addition to viewing historical alarms using the Historical Alarm object above, you can also upload the alarms to the MAPware software. This allows you to export the alarms to a CSV file and to see how much memory has been used.

- Connect the HMC unit to your computer.
- Close any open projects in MAPware.

- Click **Project > Transfer > Upload** to display the Upload/Download dialog box:





- Select Application and/or Ladder. Also select Historical Alarm Data. Click Upload.
- After the upload has finished, a new file (HistAlarmData.bin) is created and placed in the MAPware directory (default location is C:\Program Files\Maple Systems\MAPware7000). To create a CSV file, click **Tools > Display Historical Alarm Data**. A CSV file is automatically created (HistAlarm.csv) and displayed using Microsoft Excel.

Other Alarm Controls

Predefined Alarm Tags Tags

In the tag database, there are several tags (bit and register) that can be used for alarm purposes:

- Acknowledge All Alarms (S00014 bit, Read Only): indicates if-
 - 0: All alarms are acknowledged
 - 1: All alarms are not acknowledged
 -  Note: applies to both Historical and Real Time alarms
- Real and Historical Alarm Control (S00035 bit, Read/Write): if bit is set to-
 - 0: online operation, all alarms are monitored.
 - 1: offline operation, all occurring alarms are ignored (not displayed or entered into the historical alarm memory area) until control is reset back to 0.
 -  Note: any alarms that occurred while offline are displayed after control is reset back to 0.
- Historical Alarm Count (SW0004 register, Read Only): represents the total number of alarms currently listed in the Historical Alarm Memory.

Touchscreen Tasks

- Alarm Acknowledge button: use this button to acknowledge the topmost alarm currently displayed in the Alarm List. This button will only work if the following conditions are met:


The Acknowledge All feature (see **Project Configuration** dialog box under the Alarm tab, Auto Acknowledge option) is not set.

The selectable Acknowledge bit is not enabled for each alarm.


- Acknowledge All button: same as above except that, when pressed, this button acknowledges all of the currently active alarms.

 Note: Same conditions as above apply.

- Next Alarm button: when pressed, this button advances (move all alarms up one line) the list of alarms displayed. This is similar to pressing the Down Arrow on the Vertical Scroll bar when enabled.






 Note: only works with Alarm List object that is configured as Alarm Type – Real.

- Previous Alarm button: when pressed, this button recedes (move all alarms down one line) the list of alarms displayed. This is similar to pressing the Up Arrow on the Vertical Scroll bar when enabled.


 Note: only works with Alarm List object that is configured as Alarm Type – Real.

Key Specific Tasks



- Key Specific Task – Acknowledge Alarm: performs same function as the Acknowledge Alarm touchscreen button (see above).
- Key Specific Task – Acknowledge All Alarms: performs same function as the Acknowledge All alarms touchscreen button (see above).
- Key Specific Task – Previous Alarm: performs same function as the Previous Alarm touchscreen button (see above).
- Key Specific Task – Next Alarm: performs same function as the Next Alarm touchscreen button (see above).
- Key Specific Task – Previous Historical Alarm: when pressed, this button detracts (move all alarms down one line) the list of alarms displayed. This is similar to pressing the Up Arrow on the Vertical Scroll bar when enabled.
 Note: only works with Alarm List object that is configured as Alarm Type – Historical.
- Key Specific Task – Next Historical Alarm: when pressed, this button advances (move all alarms up one line) the list of alarms displayed. This is similar to pressing the Down Arrow on the Vertical Scroll bar when enabled.
 Note: only works with Alarm List object that is configured as Alarm Type – Historical.
- Key Specific Task – Move to Latest Historical Alarm: this button moves to the last (bottom) line of the list of alarms displayed, thereby showing the most recent (latest) historical alarm. This is similar to pressing the Double Down Arrow on the Vertical Scroll bar when enabled.
 Note: only works with Alarm List object that is configured as Alarm Type – Historical.
- Key Specific Task – Move to Oldest Historical Alarm: this button moves to the first (top) line of the list of alarms displayed, thereby showing the oldest historical alarm. This is similar to pressing the Double Up Arrow on the Vertical Scroll bar when enabled.
 Note: only works with Alarm List object that is configured as Alarm Type – Historical.
- Key Specific Task – Move to Latest Alarm: this button moves to the last (bottom) line of the list of alarms displayed, thereby showing the most recent (latest) alarm. This is similar to pressing the Double Down Arrow on the Vertical Scroll bar when enabled.
 Note: only works with Alarm List object that is configured as Alarm Type – Real Time.
- Key Specific Task – Move to Oldest Alarm: this button moves to the first (top) line of the list of alarms displayed, thereby showing the oldest alarm. This is similar to pressing the Double Up Arrow on the

Vertical Scroll bar when enabled.

 Note: only works with Alarm List object that is configured as Alarm Type – Real Time.

- Key Specific Task – Clear Historical Alarm Memory: when pressed, this clears the Historical Alarm memory of all past alarms entered.

Chapter 10 – Data Logger and Trending

The Data Logger is used to record the values of tags over time. The collected data is stored in non-volatile memory inside the HMC or, for HMC3000 models with a SD card slot, can be saved directly to an SD card. This data can be displayed in graphic format on the HMC using the Historical Trend Object. You can also upload the collected data to a computer (using MAPware) or to an attached USB Flash drive as a CSV file. The HMC3000 series allows data to be sent from the SD card directly to a file transfer protocol (ftp) server. On the HMC4000, data log files can be accessed directly from the unit via a self-hosted FTP server on an attached SD card/USB drive. The Data Logging feature is most often used for data acquisition. The HMC gathers and saves valuable information about the industrial system it is connected to. This information can then be reviewed at any time to increase knowledge of what is happening in the system. Real time data can be monitored with the Real Time Trend and XY Plot objects.

Factors to Consider

Before you begin configuring the Data Logger function, you need to determine the following:

- How much internal HMC memory will you need? During data logger setup, you can select the amount of reserved memory to be allocated for the data you are collecting. To compute the amount of memory required, consider:

- Data Type used (i.e. 2 byte Integer or 4 byte Integer/Float)
- Number of Tags that you will be recording
- How often you will be recording (time interval)
- Total length of time that you wish to capture

For example, I want to capture data from five registers in my PLC. I want to read these registers every 5 seconds over a period of one 24 hour period. The registers are 16 bit data type.

Therefore, my calculations for memory requirements are:

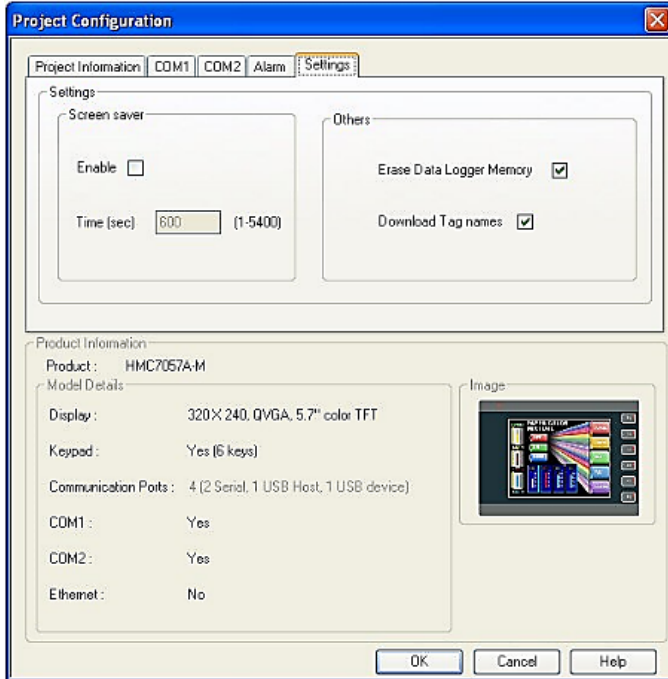
$2 \text{ (bytes per 16 bit register)} * 5 \text{ (no of registers)} = 10 \text{ bytes} + 8 \text{ bytes overhead for capturing the date and time of each data read. Total is 18 bytes.}$

I will be reading 12 times per minute which means 720 times per hour which means 17280 times per 24 hour period.

Therefore, I will need $18 \text{ (bytes per reading)} * 17280 = 311040 \text{ bytes or } 311\text{KB}$.

- Do you want the option to erase the Data Logger Memory during project download? If so, check the 'Erase Data Logger Memory' option located in the Settings tab of the **Project Configuration** dialog box.

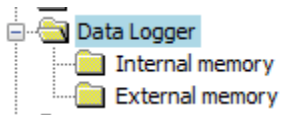
This dialog appears whenever you start a new project, or click **Project > Properties**:



- Determine which HMC or PLC data registers you wish to monitor and add these to the tag database.
- Determine how you wish to capture the data (Logging Mode):
 - Power up – continuously captures data at a predefined frequency while power is applied to HMC.
 - Start/Stop Time – captures data at a predefined time period and frequency during each 24 hour cycle.
 - Key Task – captures data at a predefined frequency but the time period is determined by manually starting/stopping the data collection via the membrane function keys or the Advanced Bit Button.
 - Logging with Run Time Frequency – similar to the Power Up option above except that the frequency of capturing data is determined by the current value in a 16 bit internal memory register. This feature allows you to vary the capture frequency during operation.
 - Bit Task – similar to the Key Task option but the data collection begins when an internal predefined bit (S00028-S00031) is set and continues at the predefined frequency until the bit is reset. This provides the ability to vary the start/stop times using ladder instructions in a logic block.
 - Event Based – Data is captured each time an assigned bit is triggered.

Internal Data Logger

Click the Data Logger folder in the Project Information directory, or click **Define > Data Logger** from the standard menu. The HMC3000 series has an option for logging data to **Internal memory** or **External memory** while the HMC7000 series will only show the **Internal memory** option.



The external memory option allows the logger to write directly to an SD card inserted in the SD card slot. The external memory option also allows the HMC to act as an ftp client and send from the data log to an ftp server. See the [External Data Logger](#) and the [FTP client](#) section below for more information.

Internal Memory Logging Configuration

Select the Internal memory option to display the Data Logger configuration window:

The screenshot shows the 'Internal Memory Logging Configuration' dialog box. It has three tabs: 'Group Information', 'Start / End Time', and 'Tags for Printing'. The 'Group Information' tab is selected. The dialog is divided into several sections:

- General:** Includes 'No. Of Groups' (set to 0), 'Memory Full' (radio buttons for 'Stop Logging' and 'FIFO', with 'Stop Logging' selected), 'Memory Size' (dropdown menu set to 256 KB), and 'Data Type' (dropdown menu set to 'Unsigned (2-Byte)').
- Select Group:** An empty box for selecting a group.
- Logging Mode:** Includes a dropdown menu set to 'Power up', and radio buttons for 'Normal Logging' (selected) and 'Fast Logging'.
- Frequency Tag:** A dropdown menu set to 'SW0001(Language)', followed by a button and 'Log at Every' (00:00:10) (hh:mm:ss).
- Logger Start Time:** 00:00:00 (hh:mm:ss) and **Logger Stop Time:** 00:00:00 (hh:mm:ss).
- Defined Tags:** A list box containing tags such as SW0001(Language), SW0002(Logger memory % usage), SW0004(Historical alarm count), SW0005(Screen trigger register), SW0006(Screen saver time), SW0010(RTC day of month), SW0011(RTC month), and SW0012(RTC year). Below the list are 'Add' and 'Delete' buttons.
- Tags to be Logged (Max 30):** An empty box for selecting tags to be logged.

At the bottom right, there are 'OK' and 'Cancel' buttons.

Configuration Settings

Click the Group Information tab:

- **No. of Groups:** Data Logging is configured according to “groups”. A “group” is a collection of registers that the HMC will poll and record data according to the “logging mode” selected. Each group can have a maximum of 30 registers. Up to four groups can be created. Use this box to enter how many data groups you need.
- **Memory Full:** options are Stop Logging or FIFO.
 - Stop Logging: the HMC will stop logging data once the memory reserved has been used. You must clear the memory by using the Clear Memory option in the Key Specific Task for function keys or the Advanced Bit button. Or you can clear the memory by enabling the ‘Erase Data Logger Memory’ option under the Settings tab in the **Project Configuration** dialog box (see **Project > Properties**) and downloading a project into the HMC.
 - FIFO: Once the data logger is full, the oldest data sample will be overwritten, and new data will continue to be logged.
- **Memory Size:** options available depend on the model being used. This is the amount of memory allocated for all of the groups combined. Select the most appropriate setting for your needs but remember that any memory allocated to the data logger reduces the amount of memory available for the rest of your project (click **Tools > Application Memory Status** for a breakdown of memory usage).
- **Data Type:** only selectable once a data logging group is selected. Options are 2 Byte (Signed or Unsigned), 4 Byte (Signed or Unsigned), and 4 Byte (Float). This option applies to all tags in a given group and determines how the data logger will interpret the data collected. Only tags that are configured with the appropriate byte length (i.e. 2 bytes {1 word} for Data Type: 2 Byte {Int}, and 4 bytes {2 words} for Data Type: 4 Byte {Int or Float}) in the tag database will show in the Defined Tags box.
- **Select Group:** Once you have selected how many data groups you need in the No. of Groups box, the data groups will be listed (ex. Group1, Group2, etc.). Click each Group to edit that group’s attributes.


- Logging mode: this setting determines how and when the HMC collects data. Each group can have a different logging mode. There are six options for the logging mode:

Power up – collects data immediately after the HMC has initialized, according to the time value entered into ‘Log at Every’ field. Therefore, if the value entered into this field is 00:00:10, then the HMC records the data every ten seconds after initial power-up.

Start/Stop Time – this option is used if you wish to collect data during a specific time period every day. The starting time is entered in the Logger Start Time field and end time in the Logger Stop Time field. Between these time periods, the HMC collects data continuously according to the frequency specified in the Log at Every field.

Key Task – the Start and Stop time are controlled by membrane function keys, the Multi-Task Single-State button, or the Multi-Task Multi-State button (using the Key Specific Task option). The frequency of data collection is specified using the Log at Every field.

Logging with Run Time Frequency – the frequency of capturing data is determined by the current value in a 16 bit memory register (can be internal or a PLC register). This feature allows you to vary the capture frequency during operation. The HMC interprets the value in the Frequency Tag as minutes (this value must be ≥ 30 minutes).

 Note: This mode is only available for Group1.

Frequency Tag (Logging with Run Time Frequency mode): This is the tag register (internal or PLC) used to determine how often to capture the data.

Bit Task – the Start and Stop time is controlled by one of four predefined system bits (S0028-S0031) located in the tag database. The frequency of data collection is specified using the Log at Every field.

Event Based – data logging is controlled using a ‘logging bit’ which is any HMC internal memory bit (external PLC bits not allowed) configured in the task database. The data is captured based upon the logging bit changing state according to one of the following three options: Positive Edge (transition from 0 to 1), Negative Edge (transition from 1 to 0), and Both Edges.

Logging Bit (Event Based mode): this is the tag bit (internal only) that determines when data is captured.

Logging Event (Event Based mode): this is the ‘event’ that triggers the Data Logger to capture data. Options are Positive Edge (capture when bit transitions from Off to On), Negative Edge (when bit transitions from On to Off), and Both.

Logging Speed (Event Based mode):


Normal logging: Data will be displayed as HH:MM:SS is generated .CSV files

Fast logging: Data will be displayed as HH:MM:SS:mS in generated .CSV files

- Log at Every: this is the time interval or frequency of data capture used by Power Up, Start/Stop Time, Key Task, and Bit Task modes.
- Logger Start Time (Start/Stop mode): this is the set time at which the Data Logger starts capturing data (frequency based upon the Log at Every setting).
- Logger Stop Time (Start/Stop mode): same as Start Time above, except this is when the Data Logger stops capturing the data.
- Defined Tags: this list displays all of the tags available in the tag database which are the same size (ex 2 Byte Signed or Unsigned) as the Data Type selected in the General section. Scroll through the tags until you find the one you wish to use. Click the tag to highlight it, and then click the Add button to move the selected tag over to the Tags to be Logged list.
- Tags to be logged: this is the list of tags that the selected data group uses to capture and record data. A maximum of 30 tags is allowed per group.

 Note: to remove a tag from this list, simply click the tag to highlight it, and then click the Delete

button. The highlighted tag is removed from this list and placed back into the Defined Tags list.

 Note: deleting a tag from this list does not delete the tag from the tag database.

Printing Internal Memory Data Logs

In addition to capturing and storing data into memory, the HMC can also send internal memory Data Logger records to a connected serial printer. To print you must:

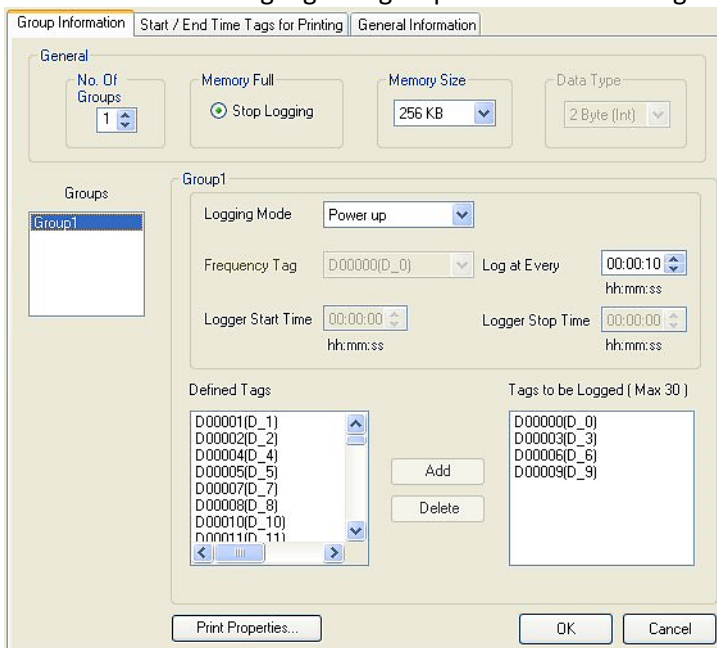
- Connect a serial printer to COM1 or COM2 of the HMC
- Configure the serial printer protocol driver in the Network Configuration folder.
- Create a Data Log group in internal memory using the Data Logger folder.
- Click the Print Properties button in the Data Logger to configure what is to be printed (see Formatting Data Logger Printouts)
- Click the Start/End Time Tags for Printing tab in the Data Logger. This tab is used to configure what section of the captured Data Log memory (based upon the Start and Stop Times) is to be sent to the serial printer (see Configuring Print Time for the Data Logger below).
- Create a Function Key (or Multi-Task Single-State Button) with the Key's Specific Task: Start Printing of Group # Port #. This key initiates the printing sequence.
- Create a Function Key (or Multi-Task Single-State Button) with the Key's Specific Task: Stop Printing of Group # Port #. This key ends the printing sequence.

Formatting Data Logger Printouts

You can define the data that you wish to be sent to a serial printer and even configure how you want this data to be formatted. This is done by clicking the Print Properties button in the Group Information tab of the Data Logger.

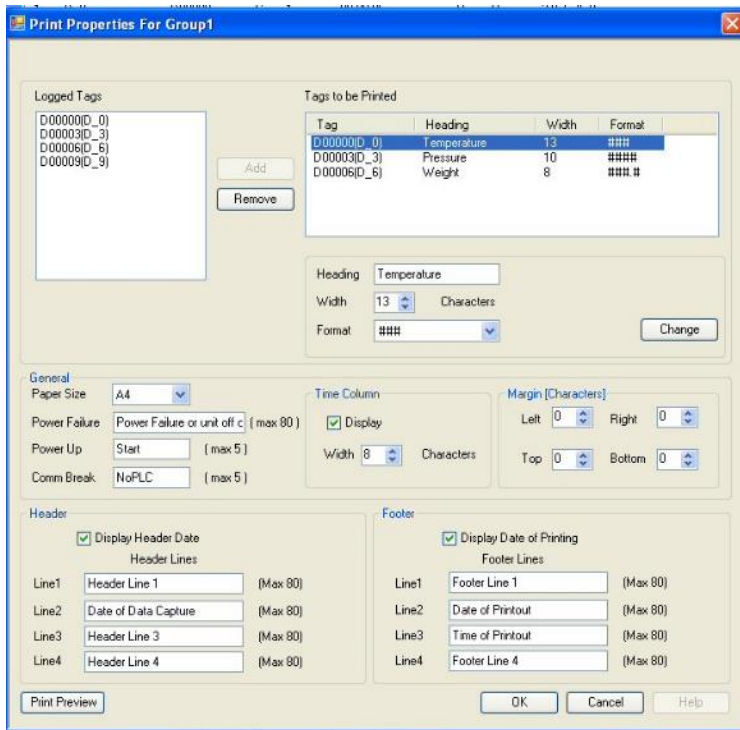
 Note: To display the Print Properties button you must:

- Highlight a group in the Groups box
- Make sure that the highlighted group has at least one tag in the 'Tags to be Logged' list



Print Format when using Logging with Run Time Frequency mode:

When using this logging mode, you can format the printout to display a header and/or footer. You can also adjust the margins and insert an optional column which shows the time of each data capture:

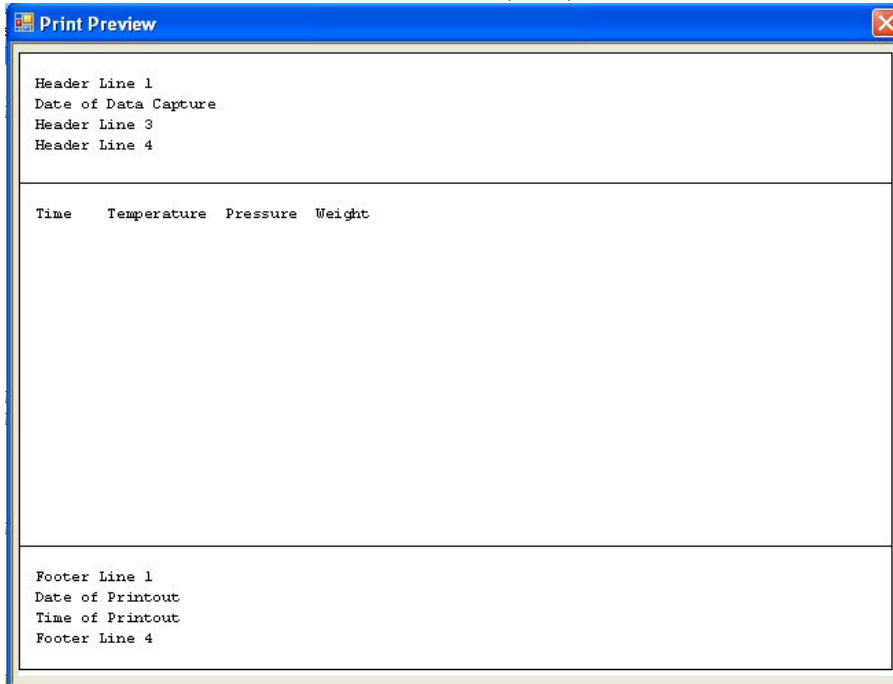


Definition of Terms:

- **Logged Tags:** this is a list of all of the tags that are to be logged for the selected Group. To print a tag, highlight (click) the tag, then click the Add button. This will add the tag to the 'Tags to be Printed' list on the right.
- **Tags to be Printed:** this is the list of tags that will be printed. A separate column is allocated for each tag with the option to create a heading, adjust the width of the column, select the number of digits (including decimal notation), and specify the data type. To edit these parameters, highlight each tag, adjust the parameters in the appropriate fields below, and then click the Change button. A tag can be removed from the list by highlighting the tag, then clicking the Remove button.
- **Paper Size:** at the time of this printing, only A4 paper size (8.3" x 11.7") is available.
- **Power Failure:** This feature allows you to print a message (up to 80 characters) that indicates a power failure. When using the Logging with Run Time Frequency mode, during normal operation, the Data Logger will capture data according to the time interval set in the Frequency Tag. If there are periods of time in which power is removed from the HMC, it will not be able to capture data. To indicate periods of power loss on the print out, you can create a message that will print instead of the expected data.
- **Power Up:** This feature allows you to print a brief (5 character) label indicating when the HMC's power was restored. This label will print just above the first data capture.
- **Comm Break:** If some of the tags to be printed are assigned to PLC registers, this feature allows you to print a brief (5 character) label if communications with the PLC are temporarily lost. If such a circumstance occurs, the printout will show the last valid data value read from the PLC register and this label.
- **Time Column:** Use this option to display the time of each reading. Make sure that you allocate enough characters to display the time in HH:MM:SS format.

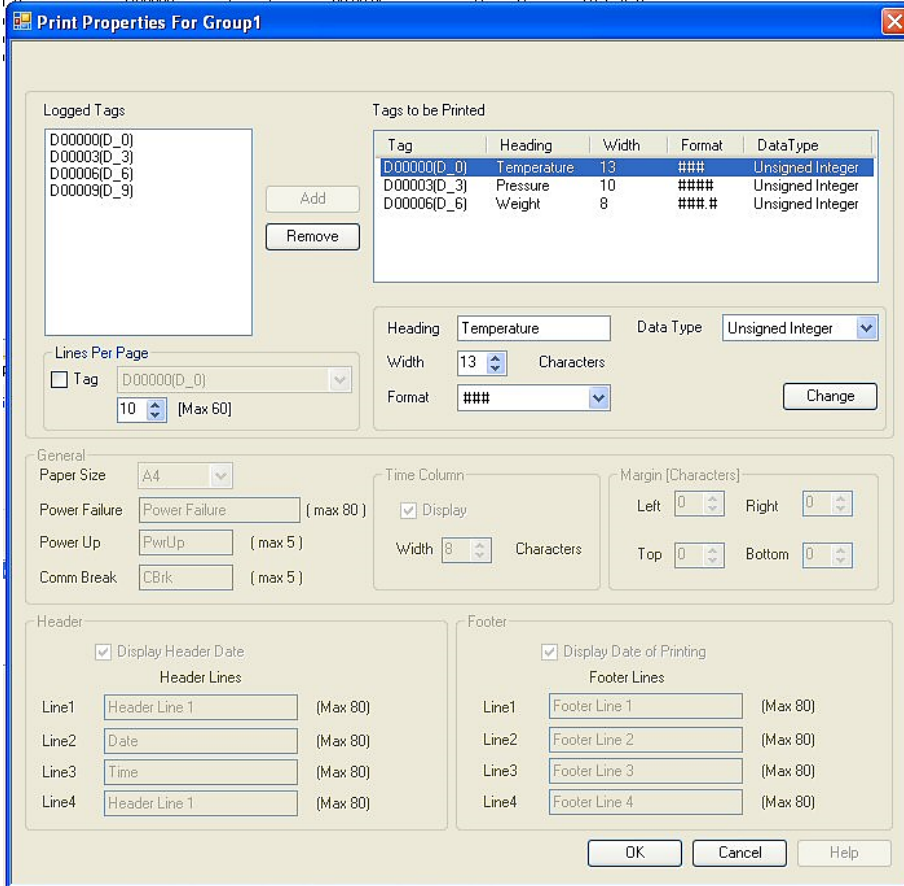
- **Margin:** use these settings to reserve margins on the printout.
- **Header:** this option will print a header at the top of each page printed. Up to 4 lines (80 characters each) can be configured.
- **Footer:** this option will print a header at the bottom of each page printed. Up to 4 lines (80 characters each) can be configured.

Click the Print Preview button to see how your printout will look:



Print Format when using all other logging modes except *Logging with Run Time Frequency*:

The print feature is available for all other modes of Data Logging (i.e. Power Up, Start/Stop Time, etc.) but has fewer options when formatting the printout:



You can still select which tags you wish to print and create headings, change the width, display format, and data type.

You also have the option of setting the number of lines printed per page (up to 60) or you can use a targeted tag address if you wish to dynamically change the lines per page during runtime operation.

Start/End Print Time for the Data Logger

After you have configured the format of the printouts (using the Print Properties button), you need to determine the period of time that is to be printed. This is done by clicking the Start/End Time Tags for Printing tab in the

Data Logger:

The screenshot shows a configuration window for a Data Logger. It has three tabs: 'Group Information', 'Start / End Time Tags for Printing', and 'General Information'. The 'Start / End Time Tags for Printing' tab is active. Under 'Printing Duration', there are two radio buttons: 'Single Day' (unselected) and 'More Than 1 Day' (selected). Below this are two sections: 'Start' and 'End'. Each section has three rows of dropdown menus for date and time components: DD (Day of Month), MM (Month), and YY (Year) for the date; and hh (Hour), mm (Minute), and ss (Second) for the time. Each dropdown menu contains a placeholder value and the text '(Start/Stop R_...)'.


The Start/End date and time settings do not determine when the HMC will start printing to the serial printer. That is determined by configuring two Function Keys (or Advanced Bit Buttons) which, when pressed, will start and stop the Data Logger output to the serial printer. Rather these settings determine what part of the collected data is to be sent to the printer based upon the Date and Time recorded. For example, my Data Logger may have recorded data from three registers over a period of several days. But I only want to print a *portion* of this data, beginning on the specified Start Date/Time on this tab and ending on the specified End Date/Time settings. Or I may have a Data Group configured that gathers data over a 24 hour period every day but I only want to print the data collected between the hours of 7am and 8am. These settings are used for this purpose.

Printing Duration: this determines the number of days that the printing occurs.

- Single Day – this option is available only when ‘Logging with Runtime Frequency’ is selected as the logging mode. Enter the tag registers that determine the particular day (day of month, month, and year) of data that is to be printed. During operation, the HMC will print a report of all data collected within the 24 hour period of the day selected, when the Key Specific Task – Start Printing of Group# with Port# is pressed.
- More than 1 Day – this option is used to print all data collected for the selected data group during a specified time period. Rather than a single day’s worth of data, this option allows you to select multiple days based upon the values read from the tag registers assigned to the Start and End dates. During operation, the HMC will print a report of all data collected within the period selected, when the Key Specific Task – Start Printing of Group# with Port# is pressed.

Start/End Entries: these are the tag registers that the HMC reads to determine what the Start/End Date and Time (if More than 1 Day is selected) periods are. The HMC will read these registers whenever the operator presses the Key Specific Task – Start Print of Group# with Port# function key to initiate printing. Both 16-bit and 32-bit tags can be assigned to each register but only 16-bit is necessary. Data is interpreted by the HMC as unsigned integers with the following ranges:

Tag	Description	Range
Start/End – DD	Day of month	1-31 (1st day of month =1, ...)
Start/End – MM	Month	1-12 (Jan=1, ..., Dec=12)
Start/End – YY	Year	0-99 (last two digits of year)
Start/End – hh	Hour	0-23 (24 hour format)
Start/End – mm	Minute	0-59
Start/End – ss	Seconds	0-59

 Note: once you have initially configured the Start/End Time Tags for Printing, if you wish to edit/change these settings at a later time, you must first click the Group# in the Groups box on the Group Information tab of the Data Logger, and then you must click the Print Properties button to review the printout settings. If you do not perform these steps first, then all selections in the Start/End Time Tags for Printing tab will be greyed out and cannot be edited.

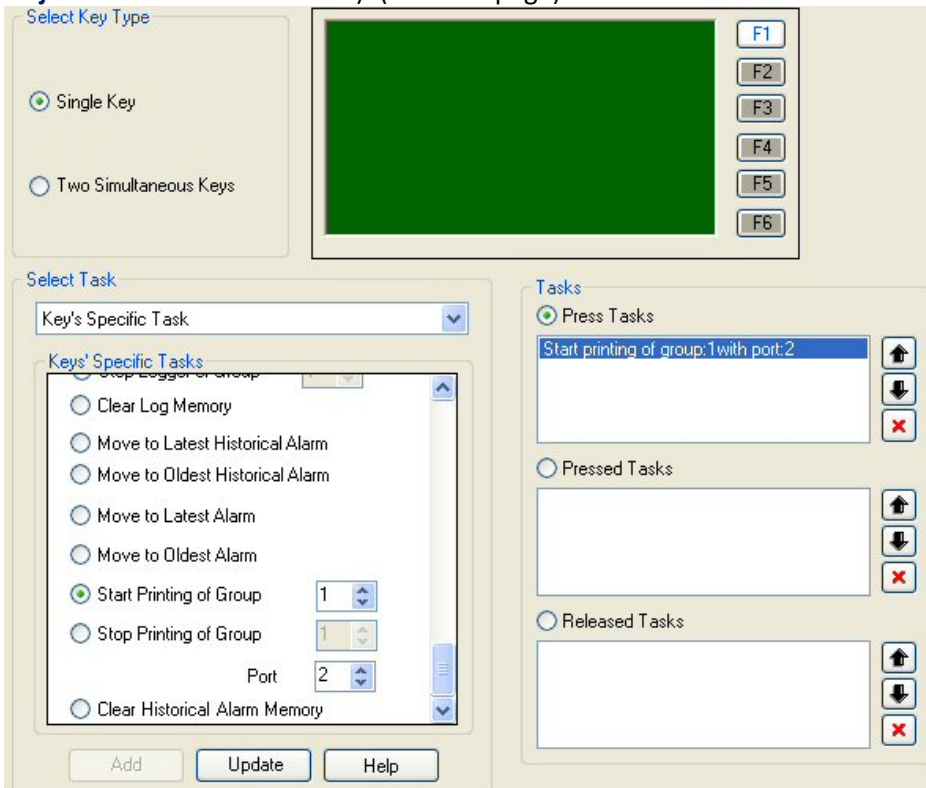
Creating the Print Data Logger activation keys:

After you have configured how you wish the printout to look (see Formatting Data Logger Printouts), and what portion of the captured data to print (see Configuring Print Time for the Data Logger), the final step in setting up a serial printer to print Data Logger data is to configure activation keys. These activation keys are used to start/stop printing. The keys can be function keys (either global or screen-dependent) or touchscreen buttons (using the Multi-Task Single-State or Multi-Task Multi-State Button).

To create a Start/Stop Printing Data Logger key:

Go to the configuration menu for a global or screen-dependent function key or the Multi-Task Button (see **Chapter 6 – Task Management** or the Advanced Objects section of **Chapter 7 – Data & Display**

Objects for more information): (see next page)



- Click single key option, then highlight the Function key (F1, F2 ...) that you wish to use.
- Under Tasks, click Press Tasks.
- From the Select Task menu, select Key's Specific Task.
- Click Start or Stop Printing of Group. Enter the Group # (1-4).
- Under Port #, enter the com port that the serial printer is attached to (Com1 or Com2).
- Click the Add button. Should appear in the Press Tasks section as shown above.
- Click the **OK** button (for Multi-Task buttons).

View Logged Data from the Internal Memory

There are several methods that you can use to see the data collected by the Data Logger for each group configured. The methods below apply only to the internal data log. For external data logs, configured to log data directly to an SD card (HMC3000 series), refer to the [External Data Logger](#) and the [FTP Client](#) section below.

- Historical Trend Graph – this method records values read from the Data Logger over the specified date/time. It then displays the data as a line graph. A maximum of four data points (channels) are represented on each graph. The Historical Trend Graph is the only option available to see data from the Data Logger on the HMC unit.
- Upload to a USB Flash drive – this method allows you to capture data in a CSV (Comma-Separated-Value) format as a data table which is stored on an attached USB Flash Drive to the HMC.
- Upload with the MAPware software – this method allows you to upload the collected data directly into the MAPware configuration software as a CSV file. This CSV file can then be viewed using the **Tools > Display Logged Data** option from the standard menu.

Using the Historical Trend Graph :

- Steps to create a Historical Trend Graph are covered in **Historical Trends** in the section on Trending Objects so they will not be repeated here. However, keep in mind that the Historical Trend Graph does not show real-time data – only data as recorded in the Data Logger.
- Use a global or screen-dependent function key or Multi-Task Bit/Word button configured as Key's Specific Task – Refresh All Trends to 'refresh' or update the Historical Trend Graph after it is initially displayed on the HMC screen.

Use this object to display a historical trend graph that represents up to four tag registers. The Historical Trend differs from the Real Time Trend object in that the Historical Trend receives data from the Data Logger- it does not display real-time values taken from the PLC.

Uploading to a Flash Drive:


A standard USB Flash Drive can be connected to the USB Host port on the HMC.

- Make sure that the USB Flash Drive has been formatted as FAT or FAT32.
- Although most USB Flash Drives should be acceptable, we have tested 1GB to 8GB memory from the following manufacturers:

Transcend
SanDisk
Kingston
PNY
Sony

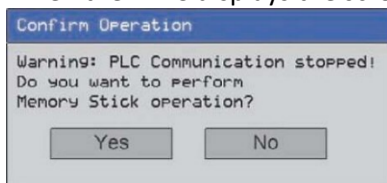
- Make sure you make a backup of all critical data on the USB Flash Drive before attempting to use it on the HMC

Insert the USB Flash drive into the USB Host port of the HMC. It makes no difference if the HMC is powered up when you insert the drive.

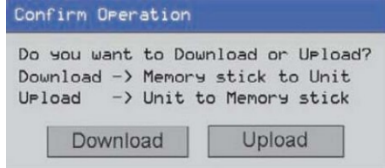
 Note: whenever you start the download process to the USB Flash Drive, the HMC will temporarily not respond to touchscreen key presses until it has completed the download process. Screen data updates will also be affected. This is normal but we do recommend taking your HMC 'offline' while performing this operation. The time required to download varies depending upon the total size of the Data Log file but may take several minutes to complete.

45 ► Method 1:

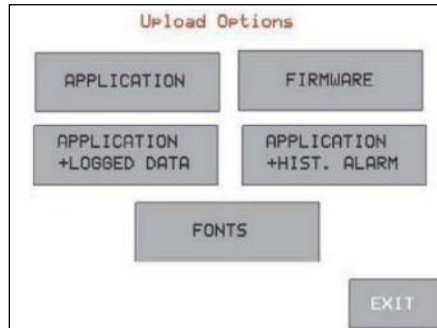
1. Configure a quick button (Set Bit) to turn on internal memory bit S00037 (USB host menu trigger).
2. When the HMC displays the screen with this button, press it to see:



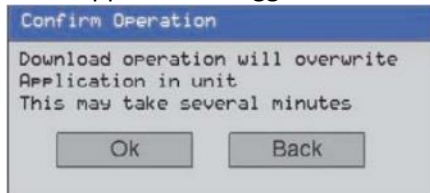
- Press 'Yes' and a number of messages will display as the HMC attempts to read the USB Flash Drive. Eventually, the following message should appear:



- Click 'Upload' to see:



- Click 'Application+Logged Data' to see:



- Click **OK**. The message 'Uploading Application file' should appear along with a System Load Bar. After some time, another message 'Uploading Logged Data file' should appear. The entire Data Log file (size is 256KB, 512KB, 1024KB, or 2048KB depending upon memory allocated) is uploaded into the Flash Drive. When done, a message appears indicating that the Upload was completed successfully – Press **OK** to continue.
- Click **OK**. The Upload Option screen reappears. Click 'Exit' to leave this menu. The HMC will now reboot and run the project.
- Remove the Flash Drive from the HMC and examine the files using your computer. Two files should be present:

HMCModel.mpl – this is the project application file that you can select and configure using the MAPware configuration software.

Logger_Data.bin – this is the Data Log file that the HMC uses internally to record all data collected using the Data Logger feature. To view the data, you must rename this file to Logger.bin and then copy this file into the main directory of MAPware (ex. C:\MapleSystems\MAPware7000).

- In MAPware, click **Tools > Display Logged Data**.
The data is converted into a CSV file (Logg.csv) and displayed using Microsoft Excel.

46 ► Method 2: Configure the USB Data Log Upload task to download a particular data group (1-4) to the USB Flash Drive.

- The USB Data Log Upload task can be initiated in several ways:

Using a global or screen-dependent function key with the Press Task or Released Task.

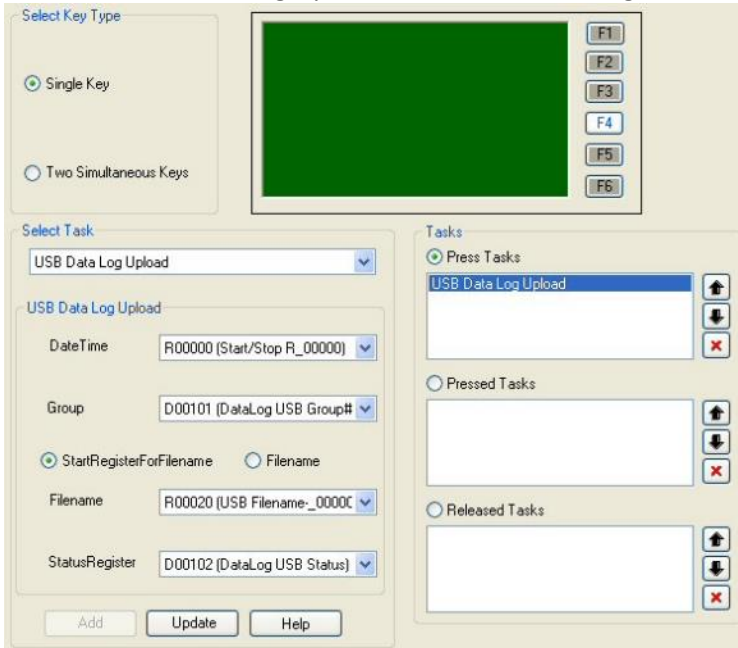
Using a Multi-State Single/Multiple Task touchscreen button with the Press Task or Released Task.

Use the Power-On or Global Task option.

Use any of the screen-dependent tasks.

Use the USB Data Log Upload instruction (see Functions when Logic Block selected)

- When the USB Data Log Upload task is selected using a Function key, the following screen appears:



Before you Add the selected task to the Press Task field, you must select several registers that are used by the HMC during upload. All referenced tags must be internal memory of the HMC and must be 16-bit registers.

- DateTime: this is the Start/End Date/Time tag registers that determine what portion of the Data Log file is uploaded to the USB Flash Drive. The HMC will read twelve consecutive registers beginning with the tag address referenced.

Register	Description	Value Range
Referenced Tag+0	Start Date: Day	1-31
+1	Start Date: Month	12
+2	Start Date: Year	0-99
+3	Start Date: Hour	0-23
+4	Start Date: Minute	0-59
+5	Start Date: Seconds	0-59
+6	End Date: Day	1-31
+7	End Date: Month	12
+8	End Date: Year	0-99
+9	End Date: Hour	0-23
+10	End Date: Minute	0-59
+11	End Date: Seconds	0-59

- Group: this is the tag register that the HMC reads to determine which Data Group to upload. Valid number: 1-4
- Start Register For Filename or Filename:

Select 'Start Register for Filename' to reference four consecutive registers. These registers are interpreted by the HMC as ASCII characters (two characters per 16-bit register) to create a filename that is used by the HMC when uploading.

Select 'Filename' to manually enter the name for the upload file.

6. StatusRegister: the HMC will use this register to enter a status code number which can be used to communicate any errors during upload or status:

Status Code Number	Description
3	Error: Logger Group Invalid
5	Error: The File Output Device code is invalid
6	Error: The Start/End Data/Time is invalid
51	Error: The USB Flash Drive not detected
52	Error: Get Descriptor Error
53	Error: Set Address Error
54	Error: Get Configuration Error
55	Error: Set Configuration Error
56	Error: Can't read USB Flash Drive
57	Error: Host MS Inquiry Bad
58	Error: Host Request Sense Bad
59	Error: Host Read Capacity Error
60	Error: Host Test Unit Ready Error
61	Error: Host MS Read Error #10
62	Error: Host MS Write Error #10
81	USB Data Read Complete
82	Host MS Task Complete
85	Folder Created
86	Folder Found
87	File Search Complete
88	File with same name found and deleted, created new file and begin download
89	New file created; begin download
90	Data Log uploaded successfully
255	Task and Instruction values read

7. After you have selected appropriate tag addresses to use, click the 'Add' button to add the USB Data Log Upload task to the task list. Make sure you create a project screen that can be used to enter the correct values for each register used (see example below):

USB Data Upload Settings

Start Date/Time DD: 5 MM: 11 YY: 10
hh: 10 mm: 0 ss: 0

Stop Date/Time DD: 5 MM: 11 YY: 10
hh: 14 mm: 0 ss: 0

Grp#, D101: 1
Enter USB Datalog Filename (max 8 chars):
Filename: **Group 1**

USB Status: 90
Message: DataLog Upload Successful!

F1

F2

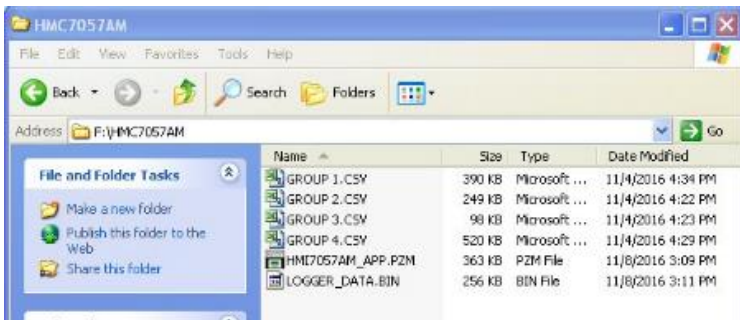
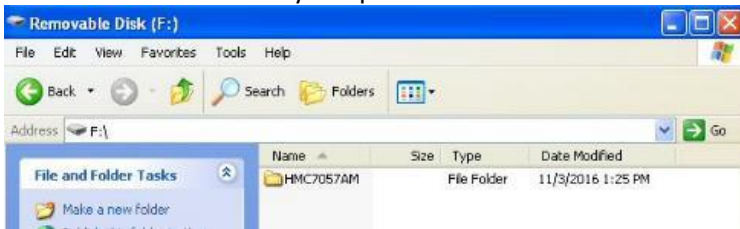
F3

F4

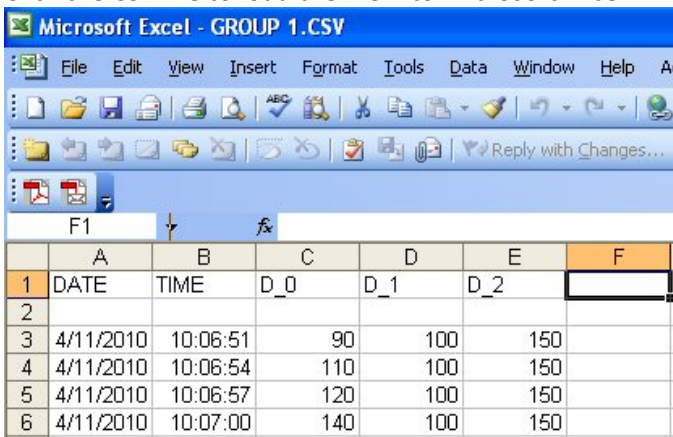
F5

F6

8. During operation, go to the project screen that you created to enter the Start/Stop Date/Time. Remember that this is the portion of the Data Log that you wish to capture to the USB Flash Drive.
9. Enter the Group# that you wish to capture.
10. Enter the name of the file (not required if you are using a predefined filename) for the USB Flash Drive upload. Up to 8 characters are allowed.
11. Next, activate download to the USB Flash Drive using the function key or task you created. Use the USB Status code register to provide status of the download.
Tip: Create a Message Data object to display a message for each status code.
12. After the download is complete, you can remove the USB Flash Drive from the HMC and connect it to your computer. You should see a folder with the model name of the HMC you are using. Click the folder to see the CSV files that you uploaded:



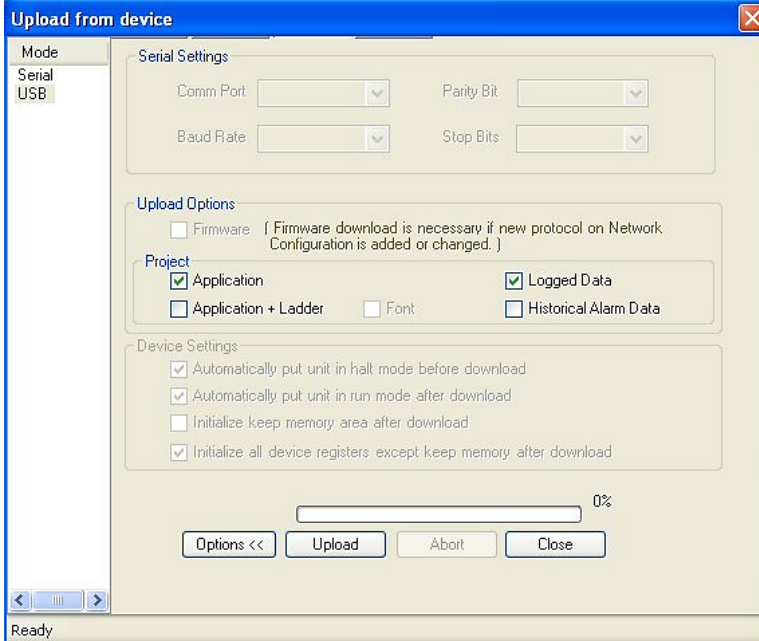
13. Click the CSV file to load the file into Microsoft Excel:



Upload with the MAPware software:

- 47 The last method of uploading Data Log files from the HMC is to use the MAPware software and simply upload the Data Log file. To do this, connect the HMC to your computer, and then perform the following steps:
 1. Start MAPware, and then close out any project that is automatically loaded.

2. Click **Project > Transfer > Upload** from the standard menu. The **Upload From Device** dialog box is displayed:



3. Click 'Logged Data' in the Project section, and then click the Upload button.
4. Click **OK** to begin the upload process. Once completed, click the Close button. The Data Log file is automatically stored onto your computer in the same directory that the MAPware software is located (default is C:\Maple Systems\MAPware7000) as "Logg.csv". To view this file, click **Tools > Display Logged Data** from the MAPware standard menus. The file will display using Microsoft Excel:

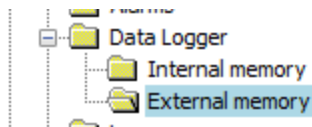
	A	B	C	D	E
1	Date	Time	D00000	D00001	D00002
2					
3	5/11/2010	10:02:07	0	0	0
4	5/11/2010	10:02:24	50	100	150
5	5/11/2010	10:02:27	70	100	150

External Data Logger

External Data Logging Configuration

The HMC3000 series has the option to log data to an external micro SDHC card. 4-32GB Capacity, supported speeds include Classes 2, 4, 6, 10, and UHS Class 1. Data can also be periodically sent to an ftp server through the Ethernet port.

To configure an external Data Logger click the **External memory** folder in the **Data Logger** folder of the **Project Information Window**.



This will display the external data logger configuration window.

Configuring an external data log is essentially the same as configuring an internal data log (see above). The differences are:

- There are three required tags used for the external data logger:

Memory Used (In KB) (32-bit Unsigned Integer) displays the size of the data log files on the SD card in kilobytes. This is the total size for all groups.

Log Data Clear Bit (Boolean) – Set on to erase the data log. Erases log files for all groups.

Safe Remove Bit (Boolean) – It is safe to remove the SD card when this bit is off. Indicates that the logger is not actively writing to the SD card.

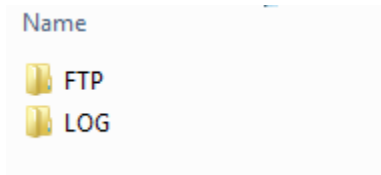
- Up to 50 groups can be configured in an external data log.
- File Name – this field is required to specify the name of the *.csv file for each group:

- The maximum sample rate is five seconds:

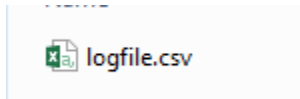
Configure the data log using the instructions detailed above. Once at least one Group is configured the FTP option will be enabled.

Reading Data from the SD Card

The external data log is not uploaded using the upload option (**Project > Tools > Upload**) in MAPware. To view the data, you must remove the SD Card and load it into a PC. The SD card contains two folders; FTP, and LOG.



The FTP folder contains a list of files that were sent to the ftp server for each group. The LOG folder contains the *.csv files with data log data for each group. The file name corresponds to the File Name configured for the group, as shown in the previous section.



Simply open the file using a text editor or spreadsheet application capable of displaying csv data. The format of the data is a date and time stamp column followed by a column for each tag in the group. The Date stamp is in dd/mm/yy format. The time stamp is in hh:mm:ss format. The first line of the file is a header that specify the column as the date, time or tag name being logged.

```
DATE,TIME,ScaledInput,
17/10/17,22:24:58,.860685110
17/10/17,22:25:03,.860685110
17/10/17,22:25:08,.860456228
17/10/17,22:25:13,.860456228
17/10/17,22:25:18,.860685110
17/10/17,22:25:23,.860456228
17/10/17,22:25:28,.860685110
17/10/17,22:25:33,.860685110
17/10/17,22:25:38,.860837697
```

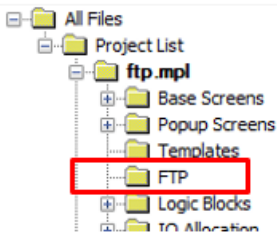
Text Editor

	A	B	C
1	DATE	TIME	ScaledInput
2	17/10/17	22:24:58	0.86068511
3	17/10/17	22:25:03	0.86068511
4	17/10/17	22:25:08	0.860456228
5	17/10/17	22:25:13	0.860456228
6	17/10/17	22:25:18	0.86068511
7	17/10/17	22:25:23	0.860456228
8	17/10/17	22:25:28	0.86068511
9	17/10/17	22:25:33	0.86068511
10	17/10/17	22:25:38	0.860837697
11	17/10/17	22:25:43	0.860837697

Spreadsheet

Configuring the FTP Client

To configure the FTP client click the **FTP** folder in the **Project Information Window**:



When at least one Group is configured in the external data log, the Configure FTP Client option is enabled. The HMC4000 does not require an external data log in order to use this feature, as long as an internal data log is

configured. Check this box to enable the fields below:

Configure FTP Client (Configure External Datalogger to enable this option)

FTP Enable Bit: X01000 (Slot01-IN_Coil_0) ...

File Resend Bit: X01000 (Slot01-IN_Coil_0) ...

Source Media
 SD Card (1)

Group Number
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...

Destination Media
 Fixed Value
 Tag Based
 COM1 (1)
 (Need to define FTP on selected port)
 XW0100 (Slot01-IN_Reg_0) ...

APN
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...

User Name
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...

Password
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...
 Show Password

Server Address
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...

Destination Path
 Fixed Value
 Tag Based
 XW0100 (Slot01-IN_Reg_0) ...

Send File at Every
 Fixed Value
 Tag Based
 00:00:05 (hh:mm:ss)
 XW0100 (Slot01-IN_Reg_0) ...

Status

Media: XW0100 (Slot01-IN_Reg_000C) ...

Net Connection: XW0100 (Slot01-IN_Reg_000C) ...

FTP: XW0100 (Slot01-IN_Reg_000C) ...

File Send: XW0100 (Slot01-IN_Reg_000C) ...

Communication: XW0100 (Slot01-IN_Reg_000C) ...

OK Cancel

Configuration Settings

The fields in this window function as follows:

- **FTP Enable Bit:** When the bit is ON files will be sent to the ftp server. When OFF, nothing will be sent.
- **File Resend Bit:** When the bit is ON files are resent in the event that the server address or credentials are changed.
- **Group Number:** This corresponds to the group configured in the data logger.
- **Source Media:** This is the device that contains the data log that will be sent to the FTP server. Currently the only option is SC Card.
- **Destination Media:** This is the port on which the file is to be sent. Select Ethernet (3). Serial com ports are not supported at this time.
- **APN:** Is Access Point Name and is only required when using a com port as the destination media. This field is not applicable to Ethernet connection.
- **User Name:** This is the user name used to log into the ftp server
- **Password:** Password used to log into the ftp server
- **Server Address:** The IPv4 address of the ftp server
- **Destination Path:** Path to the folder on the ftp server where the data log is to be saved.
- **Send at Every:** Interval at which data will be sent to the ftp server. The HMC will create a new log file every time it writes to the ftp server. Each file contains only the data for the current interval. The date and time for the interval is appended to the file name that is written to the server. See using the ftp feature section below from details.

Status Registers

The ftp feature provides the status registers detailed below to aid in trouble shooting any issues logging data to the ftp server. All status registers are 16-bit unsigned integers.

- **Media:** This status register contains error codes for issues related to connection with the SD Card where the data is saved.

Code	Meaning
0	No Error
1	Data Log in Progress
2	Media OK
41	SD Card Not Connected
42	USB Not Connected
43	File Systems Not Mounted
44	FTP Status File Does Not Exist
45	Upload File Does Not Exist
46	Unable to Open File
47	FTP Driver Not Defined
48	FTP Destination Media Not Supported
49	Source Media Not Supported

- **Net Connection:** This status register contains error codes associated with network connection issues.

Code	Meaning
0	No Error
1	Connecting to Network
2	Connected to Network
Is	Net Connect Error
56	APN Error

- **FTP:** This status register contains error codes associated with connection to the ftp server.

Code	Meaning
0	No Error
1	Authentication in Progress
2	Authentication Complete
59	User Name Length Error
60	Password Length Error
61	Server Length Error
62	Group Number Error
63	Connection Error
64	Timeout Error
65	Server Error
66	Operation Not Allowed
71	User Name Error
72	User or Password Error
77	Operation Error
78	Upload Error
79	Error Creating File
80	Unknown FTP Error

- **FTP Send:** This register indicates the progress in sending the log file to the ftp server. Progress is indicated as a percent of total file size; i.e., a number from 0 to 100.
- **Communication:** This status register contains errors related to connection status.

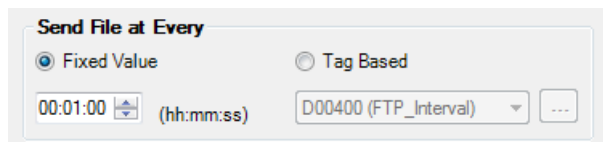
Code	Meaning
0	No Error
1	FTP Busy
2	Healthy Communication
81	Communication Lost
82	Communication Error

Using the FTP Client feature

To use the ftp feature there must be an ftp server accessible at the configured IP address. The ftp server must be configured with the user and password specified and must permit write access for that user. The SD card must be present and contain a log file to send.

Provided the above conditions are met, the HMC will periodically upload a *.csv file to the ftp server. A new file is created each time the HMC transmits data logger data to the ftp server. Each file will contain only the data recorded since the last file was sent.

The name of each *.csv file consists of the file name specified for the group number, appended with the date and time information for when the file was sent. The period contained in each log file is determined by the **Send File at Every** field in the FTP Client Configuration window.



For example, consider an external data logger group (**Data Logger > External memory**) configured with:

- File Name set to *logfile*:

File Name

- Logging Mode set to **Power Up**

Logging Mode

- Log at Every set to 5 seconds

Log at Every (hh:mm:ss)

- Logging a tag called *ScaledInput*

Tags to be Logged (Max 30)

While the FTP Client is configured with **Send File at Every** set to 1 minute:

Send File at Every

Fixed Value Tag Based

00:01:00 (hh:mm:ss) D00400 (FTP_Interval)

If the FTP client began sending files at 10:25:58 PM on October 17, 2017 the first file would be named: *logfile_17_10_17_22_24_58.csv*

Up to higher level directory

Name	Size
logfile_17_10_17_22_24_58.csv	1 KB

This file will contain 12 data samples, one taken every five seconds, between 22:24:58 and 22:25:58.

	A	B	C	D
1	DATE	TIME	ScaledInput	
2	17/10/17	22:24:58	0.86068511	
3	17/10/17	22:25:03	0.86068511	
4	17/10/17	22:25:08	0.860456228	
5	17/10/17	22:25:13	0.860456228	
6	17/10/17	22:25:18	0.86068511	
7	17/10/17	22:25:23	0.860456228	
8	17/10/17	22:25:28	0.86068511	
9	17/10/17	22:25:33	0.86068511	
10	17/10/17	22:25:38	0.860837697	
11	17/10/17	22:25:43	0.860837697	
12	17/10/17	22:25:48	0.860837697	
13	17/10/17	22:25:53	0.860837697	

After 10 minutes there will be ten *.csv files:

Up to higher level directory

Name	Size
logfile_17_10_17_22_24_58.csv	1 KB
logfile_17_10_17_22_25_58.csv	1 KB
logfile_17_10_17_22_26_58.csv	1 KB
logfile_17_10_17_22_27_58.csv	1 KB
logfile_17_10_17_22_28_58.csv	1 KB
logfile_17_10_17_22_29_58.csv	1 KB
logfile_17_10_17_22_30_58.csv	1 KB
logfile_17_10_17_22_31_58.csv	1 KB
logfile_17_10_17_22_32_58.csv	1 KB
logfile_17_10_17_22_33_58.csv	1 KB

Each one containing 12 data samples.

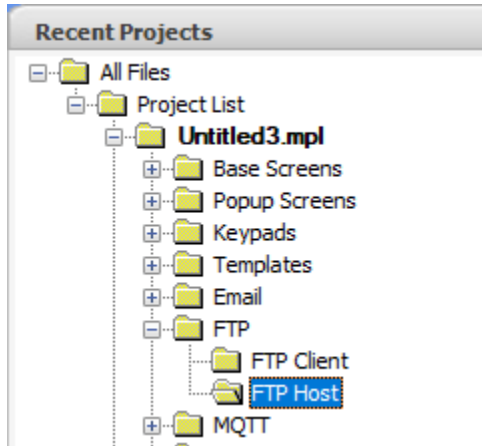
FTP Host

The HMC4000 Series models can be configured as an FTP Host or server. The FTP host function allows files such as data log files stored on a USB or SD card on the HMC to be accessed from a PC on the local network or the internet.

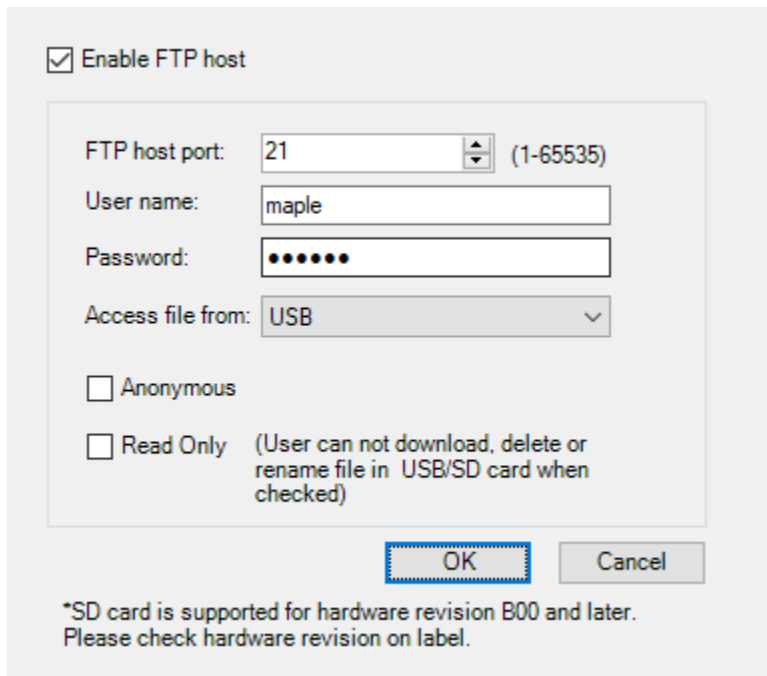
All Ethernet-capable HMC4000 series models support the FTP Host feature.

Configuring the FTP Host

Find the “FTP Host” folder in the Project Information Window.



Click to open the FTP Host configuration window:



Check “Enable FTP Host” to enable the server.

The FTP host port can be set, and a username and password can be set to restrict access. Users can also be allowed to access the server anonymously.

FTP Host Port

The port should be left default (21), unless you have changed the ports used for an FTP connection in your PC.

User Name

The user name must be alphanumeric, no special characters and 50 characters max.

Password

The password must be alphanumeric, no special characters and up to 6 characters are allowed.

Access File From

USB by default. SD card is only supported on hardware revision B00 and later, check the label for the hardware revision.

Anonymous

If this checkbox is selected then no need for any account password validation when attempting to log into the server.

Read Only

If read only is checked,

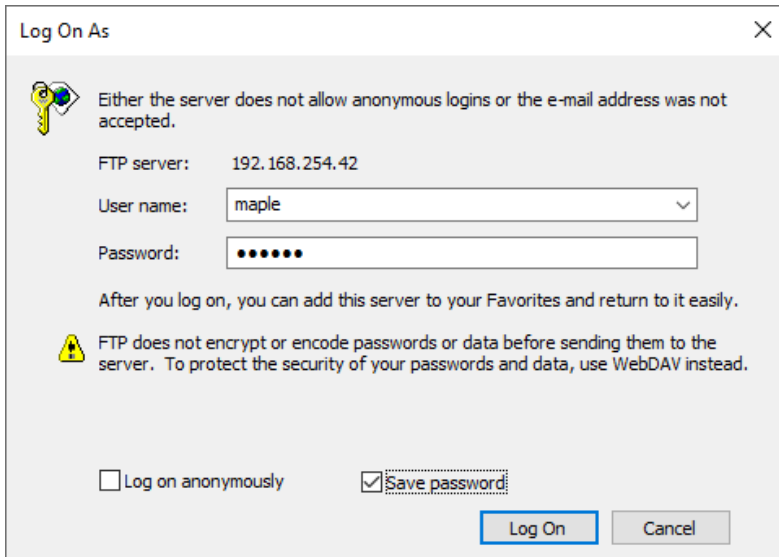
1. Users cannot add content to the directory.
2. Users can upload files from the server to their PC.
3. Users cannot download files from the PC to the FTP server.
4. Users cannot delete files.
5. Users cannot change the file names.

Accessing the FTP Host

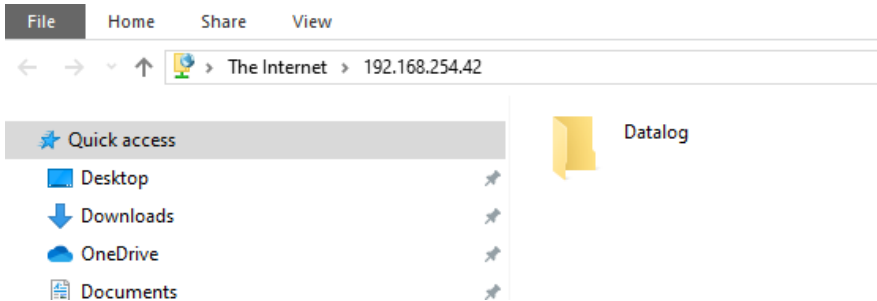
The FTP server hosted on the HMC4000 can be accessed from a PC that shares a network connection with the HMC using software such as WinSCP or even Windows File Explorer.

On a Windows PC that shares a network connection with the HMC4000, open File Explorer and enter the HMC IP “ftp://” followed by the IP address of the HMC. For example, **ftp://192.168.0.254**.

If a username and password has been configured for the server, a prompt will appear asking for credentials:



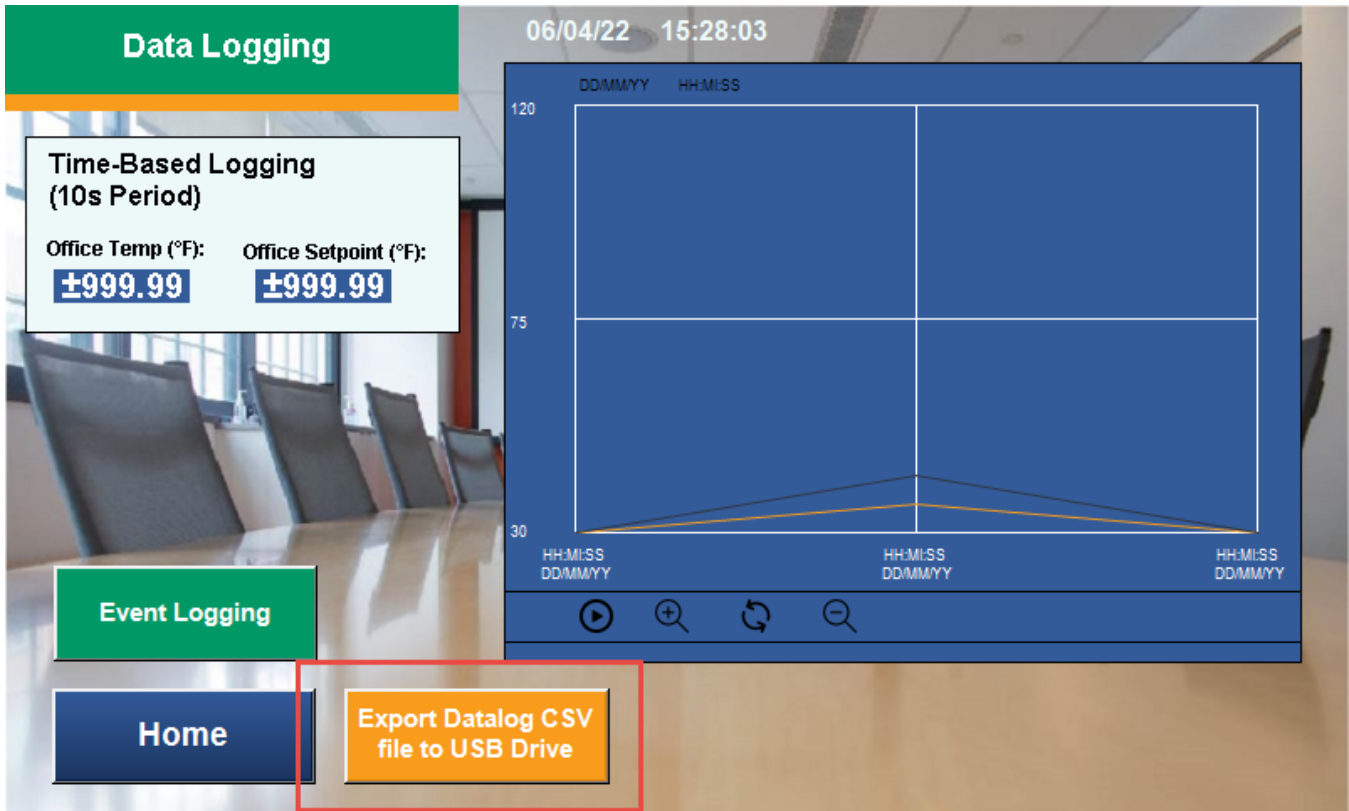
Once server access has been granted, any content residing on the USB drive connected to the HMC will be visible.



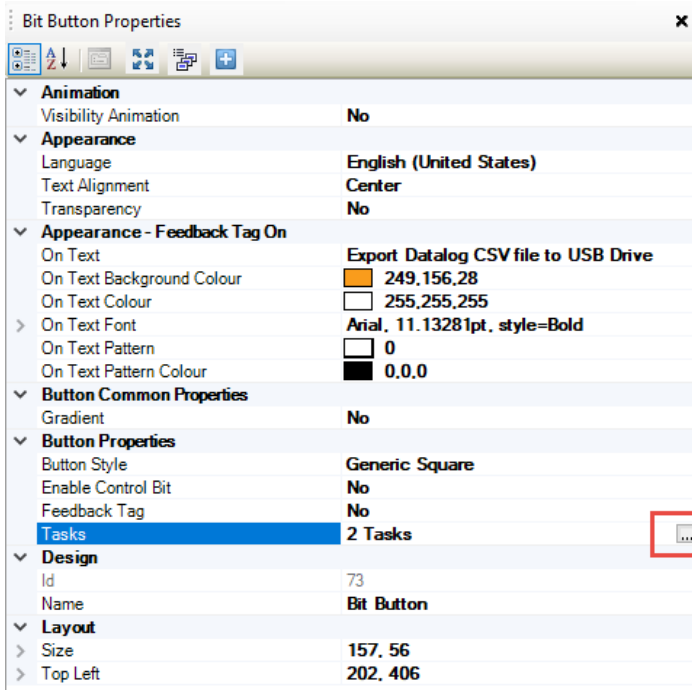
View Data on the FTP Host

If an internal datalog has been configured, the records will not be automatically available on the FTP host, since they reside in internal HMC memory and not on the external memory drive. (An external data log logs directly to external memory.) In this case, a task button can be used to copy the data records to the USB drive.

Select a task button from Advanced Objects > Single State Multi Task Button and place on screen.



In the button properties, open the Tasks menu



Select the task "Export Data Log to CSV Group" to export the data log file as a csv to the USB drive.

Touch Screen Tasks List

Select Task
Export Data Log CSV Group

Select Group
Group : 1

Add Update

Tasks

Press Tasks

Export Data Log CSV Group 1
Export Data Log CSV Group 2

Pressed Tasks

Released Tasks



OK Cancel Help

Other Data Logger tools

The MAPware configuration software provides some additional features for Data Logging that make this feature easier to use.

Reserved Memory in Tag Database for Data Logging

There are a number of system bits and registers in the tag database reserved specifically for Data Logger functions. Some of these have already been described in the sections above but here is the complete list:

Register/Coil	Tag Name	Bytes	R/W	Recommended Object
S00012	Refresh Historical Trend	Bit	Read/Write	Set Bit
Description:	Use this bit to update or 'refresh' the historical trend graph.  Note: the historical trend graph is only updated when you initially call up the screen with the graph. Therefore, use this bit to refresh the graph without changing screens.			
S00028 thru S00031	DataLog Group # Log Control	Bit	Read/Write	Toggle Bit
Description:	Use these bits to Start/Stop data logging for the specified group when using Logging Mode: Bit Task. 0= Stop Logging, 1= Start Logging See How to configure the Data Logger section for more information.			
S00037	USB Host Menu Trigger	Bit	Read/Write	Set Bit
Description:	Use this bit to display a menu that allows you to download the Data Log file to a USB Flash Drive. See Viewing Data from the Data Logger section for more information.			
SW0002	Logger Memory % Usage	16-bit Register	Read Only	Numeric Display
Description:	This register shows a percentage of the allocated Data Log memory that has already been used by the Data Logger.			
SW0003_00	Logger Memory Full Status	Bit 0 of 16-bit Register	Read Only	Bit Lamp
Description:	This bit indicates when the Data Logger memory is full and has stopped logging.  Note: this bit can also be tagged to an alarm message using the Alarm feature. See Chapter 9 – Alarms for more information.			
SW0003_01	Logger Memory Clear Status	Bit 1 of 16-bit Register	Read Only	Bit Lamp
Description:	This bit indicates when the HMC is clearing the Data Logger memory. When this bit is 1, clearing memory is in process. When this bit is 0, process is completed.			

Tasks related to Data Logging

There are a number of tasks that are specifically used for Data Logging. Some of these have already been described in the sections above but here is the complete list:

Task Name	Where Available	Parameters
USB Data Log Upload	Power-On Tasks Global Tasks Screen Tasks- Before Showing Screen While Showing Screen After Hiding Screen Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Pressed task Released task	DateTime: 12 consecutive registers used for the Start/Stop Date/Time values Group: 1 register for recording the Group #. Filename: 4 consecutive registers used to create filename used in USB Flash Drive. Status Register: 1 register to provide status of download.
Description:	This task is used to download a Data Log file to an attached USB Flash Drive. See 'Uploading to a Flash Drive' section earlier in this chapter.	
Key's Specific Task: Refresh All Trends	Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Released task	NA
Description:	This task is used to refresh the Historical Trend. See 'Viewing Data from the Data Logger' section earlier in this chapter.	
Key's Specific Task: Start/Stop Logger for All Groups	Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Released task	NA
Description:	Use this task to begin or stop logging data for all data groups configured as Logging Mode: Key Task in the Data Logger	
Key's Specific Task: Start/Stop Logger of Group #	Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Released task	# = 1-4
Description:	Use this task to begin or stop logging data for a specific data group configured as Logging Mode: Key Task in the Data Logger	
Key's Specific Task: Clear Log Memory	Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Released task	NA
Description:	Use this task to clear all internal memory of the HMC which is allocated for the Data Logger.	

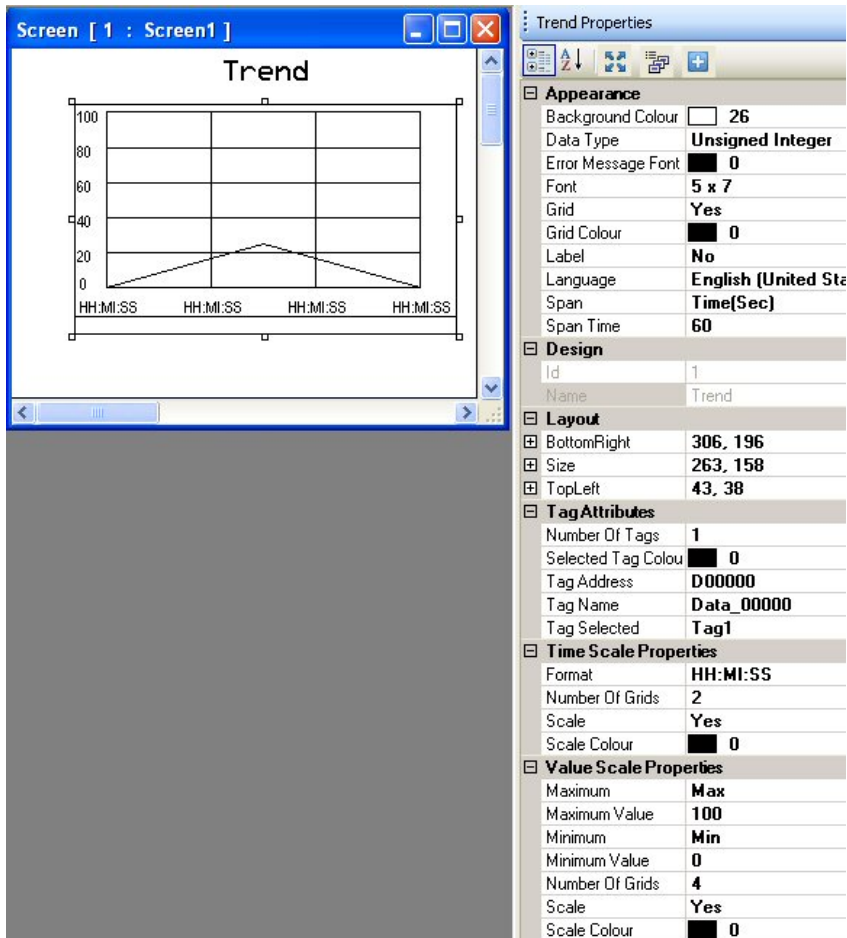
Task Name	Where Available	Parameters
Key's Specific Task: Start/Stop Printing of Group A with Port B	Key Tasks (Global or Screen-Dependent) And Multi-Task Buttons Press task Released task	A = 1-4 (data group) B = 1-2 (serial com port)
Description:	Use this task to begin or stop printing data for a specific data group to a connected serial printer	

Trending Objects

There are several screen objects that allow you to view either historical logged data or real-time information.

Real Time Trend


The Trend object represents up to four target tag registers on an X/Y plot with values recorded versus time. Registers can be consecutive or chosen individually. Values plot according to a predefined time interval or using a time interval as specified by a PLC register. Values can be read from 8/16/32 bit registers in signed/unsigned, BCD, or floating-point format.




Trend Properties

- Appearance**
 - Background Colour: 26
 - Data Type: **Unsigned Integer**
 - Error Message Font: 0
 - Font: **5 x 7**
 - Grid: **Yes**
 - Grid Colour: 0
 - Label: **No**
 - Language: **English (United States)**
 - Span: **Time(Sec)**
 - Span Time: **60**
- Design**
 - Id: 1
 - Name: Trend
- Layout**
 - BottomRight: **306, 196**
 - Size: **263, 158**
 - TopLeft: **43, 38**
- TagAttributes**
 - Number Of Tags: **1**
 - Selected Tag Colour: 0
 - Tag Address: **D00000**
 - Tag Name: **Data_00000**
 - Tag Selected: **Tag1**
- Time Scale Properties**
 - Format: **HH:MM:SS**
 - Number Of Grids: **2**
 - Scale: **Yes**
 - Scale Colour: 0
- Value Scale Properties**
 - Maximum: **Max**
 - Maximum Value: **100**
 - Minimum: **Min**
 - Minimum Value: **0**
 - Number Of Grids: **4**
 - Scale: **Yes**
 - Scale Colour: 0




Place a Trend object on screen

- Use one of the following:
 - click **Draw > Display Objects > Real Time Trend** from the standard menu
 - click **Advanced Objects > Trend** from the Draw toolbar
- Move  cursor to a start point for the Trend Graph object. Click and hold mouse cursor.
- Drag mouse cursor to an end point for the Trend Graph object and release. The object appears on screen and the Trend Properties box displays.

Trend Properties Options

- Appearance section – these attributes determine the general look of the trend.
- Background Color – determines the fill or background color of the trend graph. Click the  button to display the color palette and select a color
- Data Type – options are:


Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Floating Point2	NA	Maximum of 9 digits



- If the value in the monitored target register is not a valid BCD number, a dollar sign '\$' is displayed.
- Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits After Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6) shows the current state displayed on the Multiple Bar Graphs for editing
- Error Message Font Color – determines the color of any error messages that may appear during the execution of the trend graph. Click the  button to display the color palette and select a color.
- Font – used to configure the pixel size (WxH) of the error message. Options are 5x7 and 7x14 pixels.  Note: error messages that do appear display along the bottom of the trend graph.
- Grid – option to display grid lines on the trend graph
- Grid Color – determines the color of the grid lines. Click the  button to display the color palette and select a color.
- Label – option to have a text label appear on the top of the trend.


Label Font – determines the font type, size, etc.

- Name – Type font used
- Size – select font size
- Bold** – select 'True' to enable
- Italic* – select 'True' to enable
- Underline – select 'True' to enable

Label Text – enter the text to appear in the label. Maximum of 12 characters in length.

Label Text Color – determines the text color of the label. Click the  button to display the color palette and select a color.

- Language – highlight the language that must be selected to display the entered text.
- Span – options are Time (sec) or Tag Selected. Select Time (sec) to configure a pre-defined length of time (in seconds) for the values plotted on the trend graph. Use Tag Selected to configure a PLC target address continuously read by the HMC to determine the length of time used by the trend graph.
- Span Time – if Time (sec) is selected above, enter the pre-defined length of time (range is 0 to 65536) in seconds.
- Span Time Tag Address (List Qa) if Tag Selected is chosen for Span above, this is the address of target register continuously read by the HMC to determine the time span. Time period is seconds and the value read must be in the range of 0 to 65535.
- Span Time Tag Name – this is the name given to the span time tagged register in the Tag Database.
- Design (List S) – identifies object.
- Layout (List T) – coordinates (i.e. size and position) for the object.
- Tag Attributes section – use this section to configure the number of trend lines (target tag addresses) and colors.
- Number of Tags – this is the total number of tags or channels represented on the trend graph. A channel is a line on the graph that represents the value of a target register at a particular point in time. Range is 1 to 4 tags.
- Selected Tag Color – this is the color of the channel line for the selected tag (see Tag Selected below). Click the  button to display the color palette and select a color.
- Tag Address (List Qa) – this is the address of target register that is continuously read by the HMC to determine the trend graph level.
- Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
- Tag Selected – After Number of Tags is specified above, select each Tag from the pull-down list box to configure the target Tag Address and color of the trend line.
- Time Scale Properties section – determines the layout of the X time axis.
- Format – select hours, minutes, seconds (HH:MM:SS) or hour, minutes (HH:MM).
- Number of Grids – indicate the total number of grids that indicate time intervals (along the x-axis) on the trend graph. Range is 1 to 10.
- Scale – enable to display the time scale.
- Scale Color – Click the  button to display the color palette and select a color to display the time scale.
- Value Scale Properties – sets the attributes for the Y-axis.
- Maximum – options are Max or Tag. Select Max to configure a pre-defined maximum value range on the trend graph. Use Tag to configure a PLC target address continuously read by the HMC to determine the maximum range used by the trend graph.
- Maximum Value – enter the maximum value when read from the target register indicates the highest point on the trend graph.
- Maximum Tag Address (List Qa) this is the address of target register continuously read by the HMC to determine the maximum range.
- Maximum Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
- Minimum – options are Min or Tag. Select Min to configure a pre-defined minimum value range on the trend graph. Use Tag to configure a PLC target address continuously read by the HMC to determine the minimum range used by the trend graph.
- Minimum Value – enter the minimum value when read from the target register indicates the lowest point on the trend graph.
- Minimum Tag Address (List Qa) this is the address of target register continuously read by the HMC to determine the minimum range.

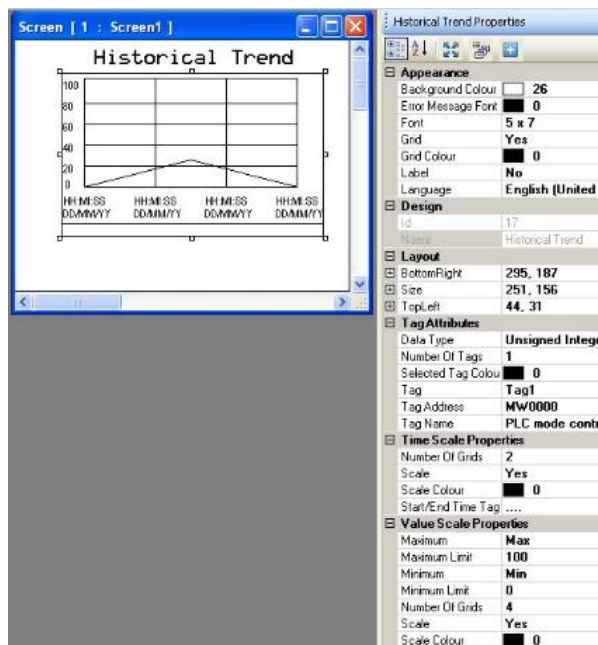
- Minimum Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
- Number of Grids – indicate the total number of grids that indicate the values (along the y-axis) recorded on the trend graph. Range is 1 to 10.
- Scale – enable to display the value scale.
- Scale Color – Click the  button to display the color palette and select a color to display the value scale

Resize a Trend object



Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Historical Trend





The Historical Trend object represents up to four target tag registers on an X/Y plot with values recorded versus time. Registers can be consecutive or chosen individually. Values plot according to a time interval specified in the target Start/End Time Tag registers. Values are read from 8/16/32 bit registers in signed/unsigned, BCD, or floating-point format. The Historical Trend graph differs from the Real-Time Trend graph listed above in that the Historical Trend receives data from the Data Logger instead of real-time values taken from the PLC. Therefore, you must configure a group of DataLog registers in the Data Logger before you configure a Historical Trend graph (see **Chapter 10 – Data Logger and Trending** for more information).



Place a Historical Trend object on screen

- Use one of the following:
 - Click **Draw > Display Objects > Historical Trend** from the standard menu
 - Click **Advanced Objects > Historical Trend** from the Draw toolbar
 - Move  cursor to a start point for the Historical Trend Graph object. Click and hold mouse cursor.
 - Drag mouse cursor to an end point for the Historical Trend Graph object and release. The object appears on screen and the Historical Trend Properties box displays.
-  Note: Before you can place a historical trend graph on the screen, you must first configure the Data Logger (see **Chapter 10 – Data Logger and Trending**)

Historical Trend Properties Options

- Appearance section – these attributes determine the general look of the historical trend graph.
- Background Color – determines the fill or background color of the historical trend graph. Click the  button to display the color palette and select a color.
- Error Message Font Color – determines the color of any error messages that may appear during the execution of the historical trend graph. Click the  button to display the color palette and select a color.
- Font – used to configure the pixel size (WxH) of the error message. Options are 5x7 and 7x14 pixels.  Note: error messages that do appear display along the bottom of the trend graph.
- Grid – option to display gridlines on the historical trend graph
- Grid Color – determines the color of the gridlines. Click the  button to display the color palette and select a color.
- Label – option to have a text label appear on the top of the historical trend.

Label Font – determines the font type, size, etc.

Name – Type font used


Size – select font size

Bold – select ‘True’ to enable

Italic – select ‘True’ to enable

Underline – select ‘True’ to enable





Label Text – enter the text to appear in the label


Label Text Color – determines the text color of the label. Click the  button to display the color palette and select a color.

- Language – highlight the language that must be selected to display the entered text
- Design (List S) – identifies object
- Layout (List T) – coordinates (i.e. size and position) for the object
- Tag Attributes section – use this section to configure the number of trend lines (target tag addresses) and colors.
- Data Type – options are

Data Type	Range	
	Target Address (2 bytes)	Target Address (4 bytes)
Unsigned	0 to 65535	0 to 4294967295
Signed	-32768 to 32767	-2147483648 to 2147483647
Hexadecimal	0000 to FFFF	0000 to FFFFFFFF
BCD1	0 to 9999	0 to 99999999
Floating Point2	NA	Maximum of 9 digits

If the value in the monitored target register is not a valid BCD number, a dollar sign ‘\$’ is displayed. Floating Point format is based upon the IEEE 754 standard for 32-bit single precision numbers. A maximum of nine digits is supported. Values are rounded to the nearest decimal point (ex: if Format: Digits After Decimal Point is set to 1 digit, then floating point number 1.52 would be displayed as 1.5 and 1.56 would be displayed as 1.6) shows the current state displayed on the Multiple Bar Graphs for editing.

- Number of Tags – this is the total number of tags or channels that are represented on the historical trend graph. A channel is a line on the graph that represents the value of a target register at a particular point in time. Range is 1 to 4 tags.
 - Selected Tag Color – this is the color of the channel line for the selected tag (see Tag below). Click the  button to display the color palette and select a color.
 - Tag – After Number of Tags is specified above, select each Tag from the pull-down list box to configure the target Tag Address and color of the trend line.
 - Tag Address (List Qa) – this is the address of target register that is read by the HMC to determine the historical trend graph level.
-  Note: Only tag addresses that have been configured in the Data Logger are displayed as options. Also note that the Historical Trend Graph does not read the current value in the tag address – to do that you need to use a Real-time Historical Trend Graph. Rather, upon displaying the screen with the Historical Trend Graph, the HMC will read the recorded data values for the selected tag address in the Data Log memory according to the Start/End Time Tag Settings below. If the Data Logger has no data recorded for the specified tag address during the Start/End Times selected, than no trend line is drawn. The Historical Trend Graph is updated only when the screen is ‘refreshed’ using a function key or Multi-State button configured as Key’s Specific Task-Refresh All Trends or when the screen is initially displayed.
- Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
 - Time Scale Properties section – determines the layout of the X time axis.
 - Number of Grids – indicate the total number of grids that indicate time intervals (along the x-axis) on the trend graph. Range is 1 to 10.
 - Scale – enable to display the time scale.
 - Scale Color – Click the  button to display the color palette and select a color to display the time scale.
 - Start/End Time Tags settings – configure the target registers that the HMC monitors to determine the Start and End time scales (both Date and Time) that are represented on the Historical Trend graph. Click the  button to display the Start/End Time Tag Settings dialog box. Each Start and End time requires the following:
 - DD – a 16-bit register that is read to determine the day of the month (range: 1-31)
 - MM – a 16-bit register that is read to determine the month of the year (range: 12)
 - YY – a 16-bit register that is read to determine the year (range: 00-99)
 - hh – a 16-bit register that is read to determine the hour (range: 0-23)
 - mm – a 16-bit register that is read to determine the minute (range: 0-59)
 - ss – a 16-bit register that is read to determine the second (range: 0-59)
 - Value Scale Properties – sets the attributes for the Y-axis
 - Maximum – options are Max or Tag. Select Max to configure a pre-defined maximum value range on the trend graph. Use Tag to configure a PLC target address continuously read by the HMC to determine the maximum range used by the trend graph.
 - Maximum Limit – enter the maximum value when read from the target register indicates the highest point on the trend graph.
 - Maximum Tag Address (List Qa) – this is the address of target register continuously read by the HMC to determine the maximum range.
 - Maximum Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
 - Minimum – options are Min or Tag. Select Min to configure a pre-defined minimum value range on the trend graph. Use Tag to configure a PLC target address that will be continuously read by the HMC to determine the minimum range used by the historical trend graph.

- Minimum Limit – enter the minimum value when read from the target register indicates the lowest point on the historical trend graph.
- Minimum Tag Address (List Qa) this is the address of target register that is continuously read by the HMC to determine the minimum range.
- Minimum Tag Name (List Qb) – this is the name given to the tagged register in the Tag Database.
- Number of Grids – indicate the total number of grids which are used to indicate the values (along the y-axis) recorded on the historical trend graph. Range is 1 to 10.
- Scale – enable to display the value scale.
- Scale Color – Click the  button to display the color palette and select a color to display the value scale

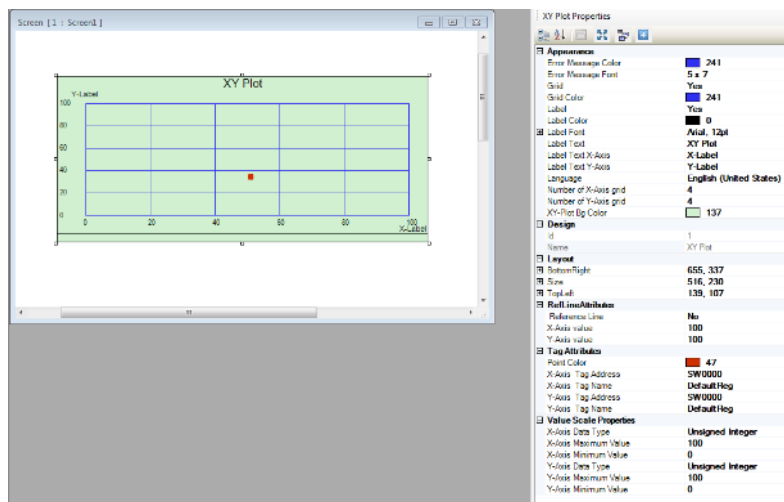
Resize a Historical Trend object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.


XY Plot (single and multi-point)

XY Plot (single point): Plot the value in one register against the value in another register. A single point is displayed on the plot, the position of the point changes as the values in the registers change over time. Reference lines can be added to the grid to help determine if the data points are within an acceptable range. An error message will display along the bottom of the plot when values are read that are outside the specified grid range.

XY Plot (multipoint – IEC programming mode only): In this mode, data points (historic) previously recorded are not erased when new data points (current) are read. Up to 100 historic data points can be displayed. Data can be retentive so that it is maintained even if power is removed from the HMC. When the Data Point with Line and Line Only features are used, a line is drawn between each data point.



Place an XY Plot object on screen

- Use one of the following:
 - Click **Draw > Display Objects > XY Plot** from the standard menu
 - Click **Advanced Objects > XY Plot** from the Draw toolbar
- Move  cursor to a start point for the XY Plot object. Click and hold mouse cursor.

- Drag mouse cursor to an end point for the XY Plot object and release. The object appears on screen and the XY Plot Properties box displays.

XY Plot Properties Options

- Appearance section – these attributes determine the general look of the trend.
 - Error Message Color – Color of error message displayed when X and Y values are invalid
 - Error Message Font – Font of error message displayed when X and Y values are invalid
 - Grid – display horizontal and or vertical lines on the plot area
 - Grid – Color of grid lines
 - Label (list H) – Select whether or not the XY Plot will have a label
 - Language (list J) – Select language to for each label
 - Number of X-Axis grid – Number of vertical grid lines to display on the plot area
 - Number of Y-Axis grid – Number of horizontal grid lines to display on the plot area
 - XY-Plot Bg Color – Color of XY Plot area background
- Layout (list T) – coordinates (i.e. size and position) for the object
- RefLineAttributes (single point only) – Configure up to 3 reference lines to display over the top of the XY Plot area

Reference Line – Enable (Yes) or disable (No) the reference line feature

Number of Ref. Lines – Indicate the number of reference lines to be displayed on the Plot. Range is 1 to 3.

Ref. Line Selected – Select which reference line’s properties are currently displayed for editing

Ref. Line Crossover Detection – When this property is enabled, for the selected Reference line, a bit is set or cleared depending on which side of the reference line the point is on. The bit will be true when the point is to the left of the reference line, and off when the bit is to the right of the line.

Note: If 3 non-linear points are used for the reference line, unexpected behavior of crossover detection may occur.

Ref. Line TagAddress of Crossover Detection – Address of the Boolean tag that is set when the selected reference line is crossed. This property is only available when Show Crossover Detection is enabled.

Ref. Line TagName of Crossover Detection – Tag name of the Boolean tag that is set when the selected reference line is crossed. This property is only available when Show Crossover Detection is enabled.

Ref. Line Type – Select appearance of the Reference line. Options: Continuous, Dashed

Ref. Line Color – Select the color for the reference line

Ref. Line Label – Display a label corresponding to the selected reference line

Ref. Line Number of Points – Number of points used to define the slope and offset of the reference line. Range is 2 to 3. The slope of the reference line is determined by specifying a number of points along the line. Points can be specified by entering the X and Y coordinates for each point or by designating tags that contain the coordinates.

Ref. Line Selected Point – Select the point to configure. Each point will be given an X and Y coordinates using the properties that follow.

X-Axis Maximum of Reference Line – Select whether to enter a value for the X-Axis coordinate of this point (Max) or select a tag that will contain the value of the X coordinate (Tag)

X-Axis value – If Max is selected above, enter the X coordinate for this point

X-Axis Tag Address – If Tag is selected in the property above, specify the address of the tag that will contain the X Axis coordinate of this point

X-Axis Tag Name – If Tag is selected in the property above specify the name of the tag that will contain the X-Axis coordinate of this point

Y-Axis Maximum of Reference Line – Select whether to enter a value for the Y-Axis coordinate of this point (Max) or select a tag that will contain the value of the Y coordinate (Tag)

Y-Axis value – If Max is selected above enter the Y coordinate for this point

Y-Axis Tag Address – If Tag is selected in the property above specify the address of the tag that will contain the Y Axis coordinate of this point

Y-Axis Tag Name – If Tag is selected in the property above specify the name of the tag that will contain the Y-Axis coordinate of this point

- Tag Attributes – Configure the tags that will contain the values being plotted

Retain Data (multipoint only) – Retain data after a power cycle. Tags created to hold the multipoint data will be assigned as retentive if selected.

Action after memory is full (multipoint only) – Options are FIFO (first in, first out, as data is read, the oldest data is discarded after the number of points is exceeded) and Stop Logging (once the number of data points specified has been read, the plot will stop logging new data points).

Line color (multipoint only) – Set the line color.

Line Width (multipoint only) – Sets line width.

Number of points (multipoint only) – Sets the number of points to be plotted. Maximum of 100 points allowed. Tags are automatically created in the HMC to hold the past data points when using multipoint.

Plot Style (multipoint only) – Choices include Data Point Only, Data Point with Line, and Line Only.

Point Color – Select a color for the point that will appear on the Plot

X-Axis Tag Address – Specify the address of the Tag containing the X coordinate of the point.

X-Axis Tag Name – Specify the name of the tag containing the X coordinate of the point.

Y-Axis Tag Address – Specify the address of the Tag containing the Y coordinate of the point.

Y-Axis Tag Name – Specify the name of the tag containing the Y coordinate of the point.

- Value Scale Properties – Specify the data type and range for the X and Y axis of the plot

X-Axis Data Type

X-Axis Minimum Value – Specify the starting point of the X axis

X-Axis Maximum Value – Specify the ending point of the X axis

Y-Axis Data Type

Y-Axis Minimum Value – Specify the starting point of the Y axis

Y-Axis Maximum Value – Specify the ending point of the Y axis

Resize an XY Plot object

Move the mouse pointer over one of the resize handles. When the pointer changes to a double-headed arrow, simply click and drag to a new location.

Chapter 11 – Miscellaneous Features

This chapter reviews some features available in the MAPware software and the HMC Series that are important but do not easily fit in other chapters of this manual.

The features described include:

- Membrane Function Keys
- Data Monitor feature
- Application Memory Status
- Keep Memory Area
- Real Time Clock
- Internal Battery

Membrane Function Keys

The HMC7030 models have six function keys plus a numeric keypad for a total of 18 membrane style keys. This chapter explains how to configure these keys.



Each function key can be configured to perform a task (or action) such as displaying screens, setting bits or writing constant values to registers, or a myriad of other tasks. Besides simply performing a task, each key can be programmed to do the following:

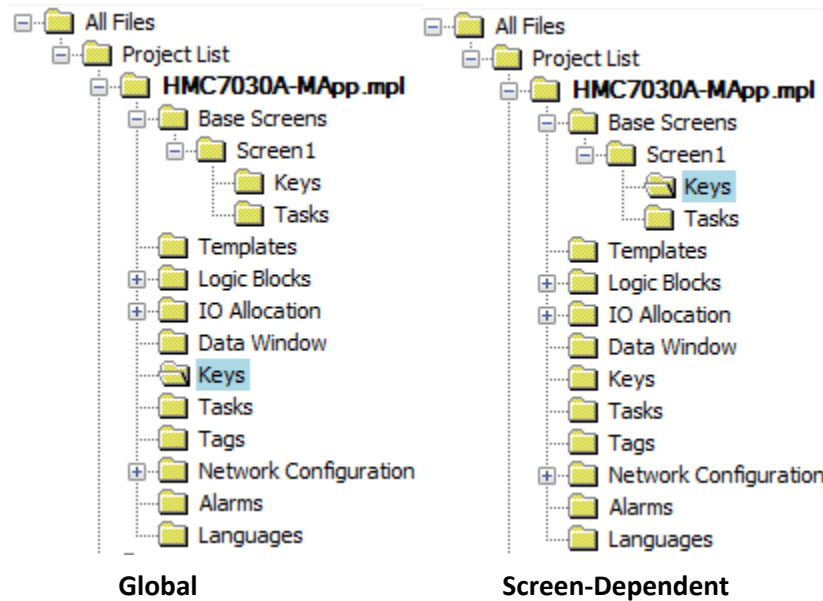
- Execute one or multiple tasks with a single key press (see **Chapter 6 – Task Management**)
- Tasks execute based upon pressing the key, press and holding the key, and/or releasing the key
- Option to execute tasks only when two keys are pressed simultaneously (can be used as safety feature)
- Keypad keys are predefined to specific number tasks, but can be reassigned to any combination of tasks needed
- Keys can be global (task is executed regardless of the screen displayed) or screen-dependent (task executed only when a specific screen is on display)

These features combine to make the function keys on the HMC7030 models very versatile and powerful.

Global vs Screen-Dependent Function Keys

A Global Function Key executes a task no matter what screen is on display on the HMC.

A Screen-Dependent Function Key executes a task only when the particular screen it is tagged to is currently displayed on the HMC:

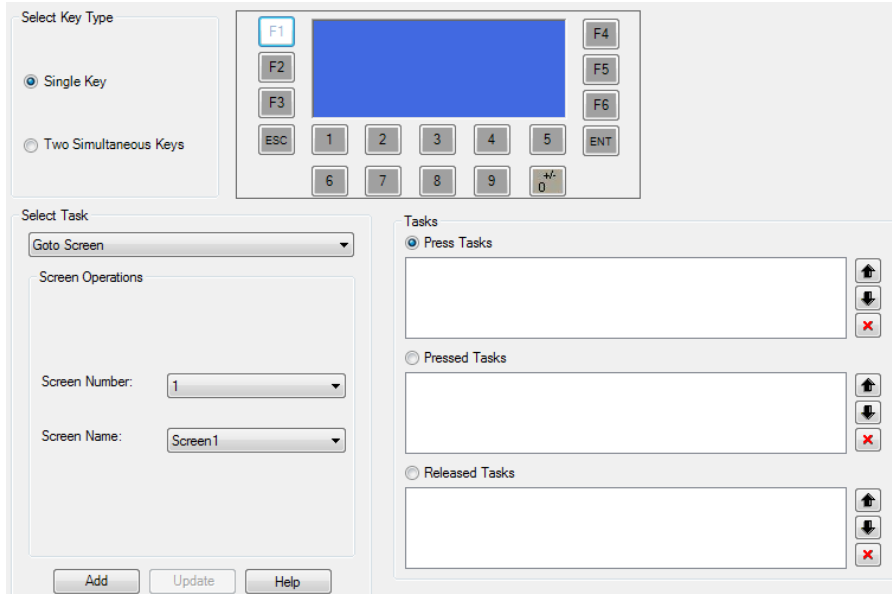


The exception to this rule is when you have the same function key configured as both a global and a screen-dependent key. For example, suppose F1 is configured as a Global key with the task of 'GoTo Screen'. On Screen #1, the F1 key is also configured to 'Write a Value'. During operation, if Screen #1 is displayed and F1 is pressed, the task 'Write a Value' is executed, because Screen Dependent function keys have priority over Global function keys. The global task assigned to the F1 key is not performed when Screen #1 is active. If F1 is pressed any time Screen #1 is not displayed, it will execute its global 'GoTo Screen' task.

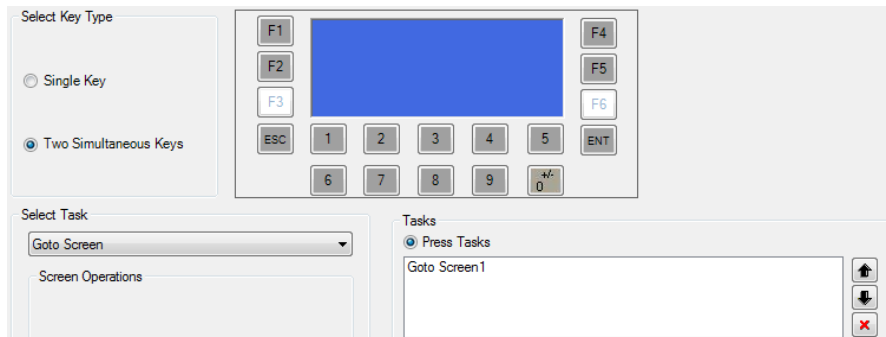
Configuring a Function Key

- For global keys, click the Keys folder (or **Define > Global Keys**) in the **Project Information Window**. For screen-dependent keys, click the Keys sub folder located in each Screen folder of the **Project Information Window**.


- Click the function key that you wish to configure. This key will be highlighted like the F1 key in the picture below.



- Under Select Key Type: choose the Single Key option or Two Simultaneous Keys.
 - Single Key – this option configures only one key to perform the assigned task
 - Two Simultaneous Keys – this option allows you to select two keys (by highlighting two of the function or keypad keys) which during operation, must both be pressed to perform the assigned tasks.



- Tasks: Before you select which task you want (see Select Task below), you must decide what key action activates the task. There are three options:
 - Press tasks: task(s) execute each time the target key is pressed by the operator. It does not matter if the key is pressed and released or pressed and held down, the associated task(s) will execute only once per key press.
 - Pressed tasks: task(s) continuously execute while the associated key is held down. With this option, the HMC will repeatedly send the command(s) until the key is released.
 - Released tasks: task(s) execute when the operator releases the pressed key.

 Note that the associated task only executes once per key release.

Click the radio button of the key action you prefer for that task. Multiple tasks can be added to each option for a single key.

- Select Task: click the scroll-down menu to select one of the tasks available (see [Chapter 6 – Task Management](#) for more information on what each task does). If additional parameters are required for

the selected task, they will appear in the area below (as shown for Screen Number and Screen Name for the GoTo Screen task above). Enter the required additional parameters. Then click the Add button. The task is entered into the selected key action.

Updating/modifying the operation of a function key

To change the tasks assigned to each function key, highlight the particular function key, then highlight the task you wish to modify:

The screenshot shows a configuration window for function keys. It is divided into several sections:


- Select Key Type:** Contains two radio buttons: Single Key and Two Simultaneous Keys.
- Keyboard Layout:** A grid of function keys (F1-F6, ESC, ENT) and numeric keys (1-0). The F2 key is highlighted in blue.
- Select Task:** A dropdown menu showing 'Goto Screen'. Below it, 'Screen Operations' are defined: 'Screen Number: 1' and 'Screen Name: Screen1'.
- Tasks:** A list of tasks assigned to the selected key. The 'Press Tasks' section is active and contains one task: 'Goto Screen1'. The 'Pressed Tasks' and 'Released Tasks' sections are currently empty.

At the bottom of the window are three buttons: 'Add', 'Update', and 'Help'.

You will then be able to modify any assigned tasks as normal.

Data Monitor

The Data Monitor feature is a window available in the MAPware software that displays data values in HMC internal memory. The entire internal memory of the HMC is accessible using the Data Monitor but you select what areas of memory you wish to monitor. In addition to reading values, you can modify data online or create a table of preset values to download to the registers. With this feature, you can quickly view data in table format or to initialize areas of memory in the HMC.

To access the Data Monitor window, click **View > Data Monitor Window** from the standard menu, or click the Data Monitor icon  in the standard toolbar or click the Data Monitor folder in the **Project Information Window**:

Address	Value	Binary Value	Data Type	Data Size
T00000	000000	0000000000000000	Unsigned	2 bytes
T00001	000000	0000000000000000	Unsigned	2 bytes
T00002	000000	0000000000000000	Unsigned	2 bytes
T00003	000000	0000000000000000	Unsigned	2 bytes
T00004	000000	0000000000000000	Unsigned	2 bytes
T00005	000000	0000000000000000	Unsigned	2 bytes
T00006	000000	0000000000000000	Unsigned	2 bytes
T00007	000000	0000000000000000	Unsigned	2 bytes
T00008	000000	0000000000000000	Unsigned	2 bytes
T00009	000000	0000000000000000	Unsigned	2 bytes

By default, the monitor shows a block of ten registers in the Timer (T) memory. To create or edit additional blocks of memory, right click anywhere on the Data Monitor window to display a popup dialog box:

Address	Value	Binary Value	Data Type
T00000	000000	0000000000000000	Unsigned
T00001	000000	0000000000000000	Unsigned
T00002	000000	0000000000000000	Unsigned
T00003	000000	0000000000000000	Unsigned
T00004	000000	0000000000000000	Unsigned
T00005	000000	0000000000000000	Unsigned
T00006	000000	0000000000000000	Unsigned
T00007	000000	0000000000000000	Unsigned
T00008	000000	0000000000000000	Unsigned
T00009	000000	0000000000000000	Unsigned

New Block
Delete Block
Edit Block
Import Data
Export Data

Create a New Block

By clicking the New Block option in the dialog box above, the following is displayed:

Define Block

Block

Address: (0 To 255)

Size:

Data Type:

Data Size:

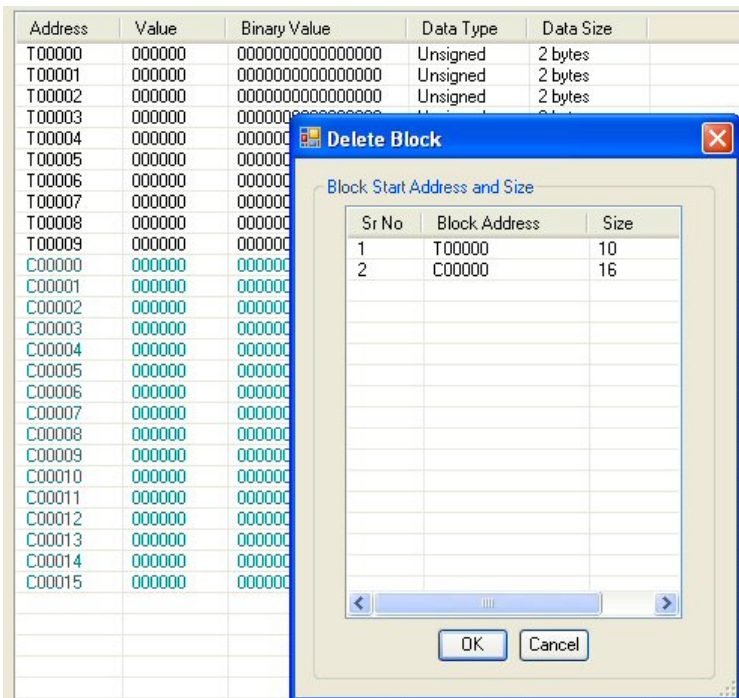
Color:

OK Cancel

- *Appendix A – Internal Memory* for more information on internal memory). In the numeric entry box, enter the starting address of the memory selected.
- **Size:** this number represents the block of memory (registers) monitored. For example, if D0 is entered into the Address section and 16 is entered in Size, the Data Monitor will show a range of addresses from D0 to D15.
- **Data Type:** this option varies according to the memory area selected. When available, select how the data is interpreted and displayed in the Data Monitor window. Options are Signed, Unsigned, and Hexadecimal.
- **Data Size:** each register monitored can be a bit, (i.e. B memory), 2 bytes, or 4 bytes.
- **Color:** you can display the block of memory using a particular color.
- Click **OK** to add the block.

Delete a Block

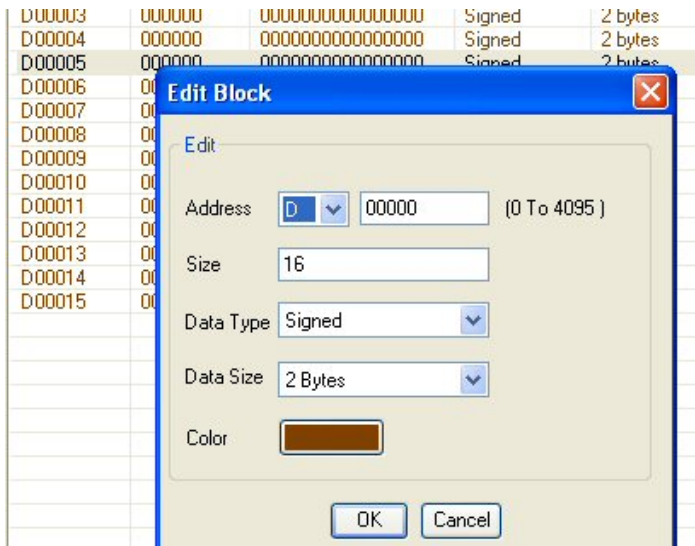
Click Delete Block to display the following:



The Delete Block dialog box displays all of the blocks currently configured, along with the size of each block. To delete a particular block, simply highlight (click) the block you wish to delete and click the **OK** button.

Editing a Block

To modify a block listed in the Data Monitor window, right click any of the addresses listed within the block to display the popup dialog box. Then click the Edit Block option:



See 'Creating a Block' for information on what each field does.

Importing/Exporting Data

The Data Monitor table can be exported as a CSV (comma-separated value) file to be used by another project or edited outside of the MAPware software. Then import the file into an existing project.

To export:

- Click Export Data from the popup dialog box
- In the Save As box, enter the name you wish to give to the CSV file. Then click **OK**.

To import:

- Right click anywhere in the Data Monitor window to display the popup dialog box
- Click Import Data
- In the Open box, locate the CSV file that you wish to import, and then click to highlight it.
- Click **OK**. A popup dialog box appears asking if you wish to overwrite any of the values in existing memory registers. When editing the CSV file, you can change the address, value in each address, data format and/or byte length. By clicking 'Yes', changes are made to memory addresses that already exist. Clicking 'No' prevents the imported data from altering any addresses that already exist in the file – only new addresses are added.

Using Data Monitor to Download Preset Values

After you have created the data registers that you wish to monitor, you may wish to preload these registers with values. This is easily done by configuring a value for each register, then downloading the values into the HMC unit.

- Open the project you wish to download to the HMC.


- Configure the registers in the Data Monitor window (see steps in the first section of this chapter). Below is an example:

Address	Value	Binary Value	Data Type	Data Size
B00000	000000	0000000000000000	-	-
B00001	000000	0000000000000000	-	-
B00002	000000	0000000000000000	-	-
B00003	000000	0000000000000000	-	-
B00004	000000	0000000000000000	-	-
B00005	000000	0000000000000000	-	-
D00000	000000	0000000000000000	Signed	2 bytes
D00001	000000	0000000000000000	Signed	2 bytes
D00002	000000	0000000000000000	Signed	2 bytes
D00003	000000	0000000000000000	Signed	2 bytes
D00004	000000	0000000000000000	Signed	2 bytes
D00005	000000	0000000000000000	Signed	2 bytes

- Double-click each register to set a value:

Note that for bit registers (i.e. B memory), although the data is represented under the Binary Value column with 16 bits, it is really a single bit register. Therefore, when entering a value, you have two options: 0 or 1. Continue clicking each register until you have entered all of your preset values.


Address	Value	Binary Value	Data Type	Data Size
B00000	000001	0000000000000001	-	-
B00001	000000	0000000000000000	-	-
B00002	000001	0000000000000001	-	-
B00003	000000	0000000000000000	-	-
B00004	000001	0000000000000001	-	-
B00005	000000	0000000000000000	-	-
D00000	000050	0000000000110010	Signed	2 bytes
D00001	000100	0000000001100100	Signed	2 bytes
D00002	000150	0000000010010110	Signed	2 bytes
D00003	000200	0000000011001000	Signed	2 bytes
D00004	000250	0000000011111010	Signed	2 bytes
D00005	000300	0000000100101100	Signed	2 bytes

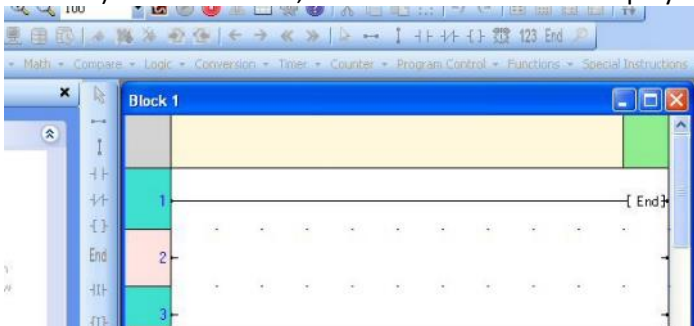
- Next, save and compile your project, then click the Download icon  to display the Download screen:


- Under Project, make sure that Data is checked. This will download the preset values in the Data Monitor window to the HMC. Click Download to begin.

Monitoring Data using the Data Monitor

Once you have created your Data Monitor window and downloaded your preset values (this is an optional step), you are ready to monitor the HMC.

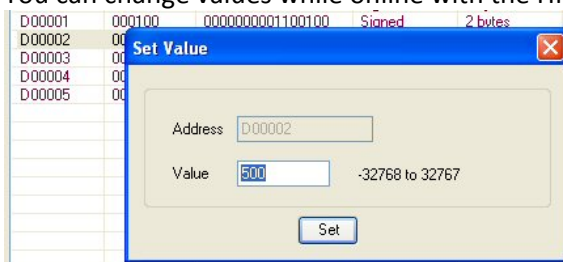
- Start MAPware (it is not necessary to open a project).
- Connect your computer to the HMC, you wish to monitor.
- Click the Go Online  button in the standard toolbar. When clicked, MAPware will go online with the PLC using the currently open application.
- Presently, MAPware displays a message stating that it is loading data from the HMC (this takes a few minutes). When finished, the MAPware software displays the main Logic block:



- Click the Data Monitor  icon or press F10 on your keyboard to display the Data Monitor window:

Address	Value	Binary Value	Data Type	Data Size
B00000	000001	0000000000000001	-	-
B00001	000000	0000000000000000	-	-
B00002	000001	0000000000000001	-	-
B00003	000000	0000000000000000	-	-
B00004	000001	0000000000000001	-	-
B00005	000000	0000000000000000	-	-
D00000	000050	000000000110010	Signed	2 bytes
D00001	000100	000000001100100	Signed	2 bytes
D00002	000150	000000010010110	Signed	2 bytes
D00003	000200	000000011001000	Signed	2 bytes
D00004	000250	000000011111010	Signed	2 bytes
D00005	000300	000000100101100	Signed	2 bytes



- You can change values while online with the HMC simply by double-clicking a register:





- The new value is sent to the HMC immediately after you press the Set button.
- You can also place the HMC in Halt mode. In Halt mode, the HMC discontinues running the project and displays a screen:



Halt mode is useful if you wish to change values in the Data Monitor window but not while the HMC is running the project you downloaded into it. However, the HMC will clear all internal memory registers (except the retentive memory) when you place the HMC in Run mode again.

To place the unit in Halt mode, click the Halt  icon in the standard toolbar. To resume, click the Run  icon.

- When you are finished using the Data Monitor mode, click the Go Online  button again to go offline.

 Note: you can add or edit the blocks listed in the Data Monitor window when online with the HMC.

Application Memory Status

The Application Memory Status feature is a tool available in the MAPware software that is used to display memory used by the current project. This tool can be used to determine how much memory is still available for new screens, ladder logic, etc.:

Over all Memory Details				Logger Memory Details		Ladder Memory Details			
Memory	Bytes	KB	Percentage	Memory Allocated :		Memory	KB	Steps	Percentage
Available	5767168	5632	100	512 KB		Available	960	163840	100
Used	3863036	3772.496	66.98			Used	0.02	4	0.00
Free	1904132	1859.504	33.01			Free	959.97	163836	99.99

Application Details		
Definition Type	Total	Bytes
Nodes	1	15036
Screens	19	98093
Keys	1	27
Alarms	16	1235
Power on Tasks	6	271
Global Tasks	1	16
Data Logger	1	216
Blocks to be Read	0	0
Tag Names	593	8302
Historical Alarm Memory	1	65536
Other Bytes	-	3739840

* Please save project to get current memory status

It also provides details on how the screen memory is currently allocated. The memory is divided into three main areas:

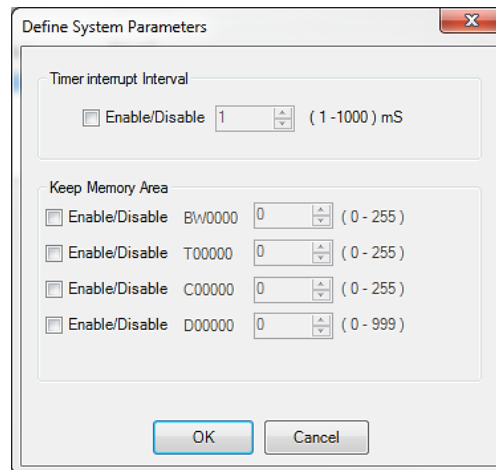
- Application Memory – this is the memory used for screens, global tasks, alarms, and tags.
- Data Logger Memory – indicates how much memory has been allocated for the data logger feature.

- Ladder Logic Memory – shows how much memory has been consumed for the ladder logic diagrams.


This tool is accessible is by clicking **Tools > Application Memory Status** from the menu bar.

Keep Memory Area and Retentive Tags

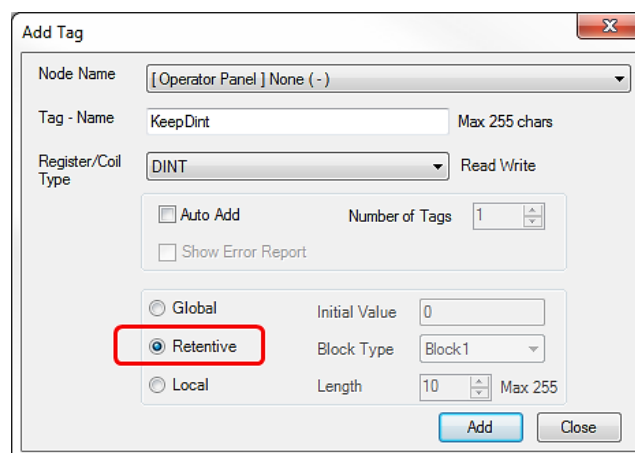
For projects created in Native Ladder programming mode, the Keep Memory Area feature provides the ability to retain values in designated internal memory after removing power from the HMC. Click **Define > System Parameters** from the menu bar:



To enable, click the Enable/Disable checkbox next to the memory that you wish to use (BW, T, C, or D). Enter the number of registers (starting with 0) that you want as retentive memory. For BW, T and C registers up to 256 registers (0 to 255) can be used as keep memory. Up to 1000 D registers (0 to 999) can be used as keep memory. The total number of keep memory registers cannot exceed 1000.

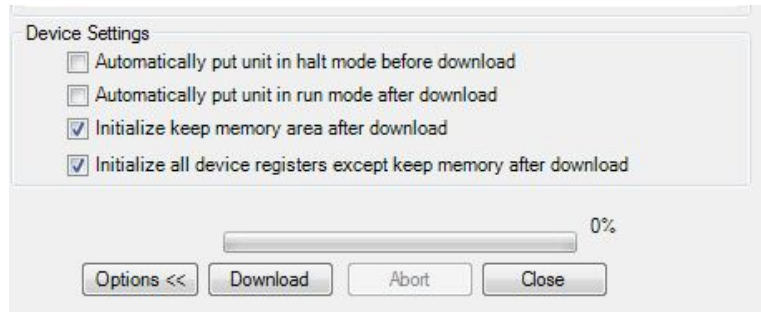
 To use these registers, you must initialize them in the Tag Database.

For projects created in IEC 61131-3 programming mode, tags do not have specified addresses so the option to specify a range of addresses as keep memory described above is disabled. Instead there is an option to designate a tag as **Retentive** when the tag is created in the tag database:




A tag created with this option will behave exactly as a tag created in the Keep Memory area of a Native Ladder project. A maximum of 2,000 bytes can be used to define Retentive tags (i.e., 500 DINTs, 1,000 INTs, 16,000 BOOLS etc., or some combination thereof). Tags created as Global can be changed to Retentive during project development and vice versa.

When you download your project into the HMC unit, there are two options listed in the Download to Device window of MAPware in the Device Settings section:



- Initialize keep memory area after download – if checked, the designated Keep Memory Areas are set to 0 after download is completed. If not checked, the values in the Keep Memory Areas are retained. Similarly, in IEC 61131-3 mode projects Retentive tag values are set to 0 if this box is checked and retained through the download if it is unchecked.
- Initialize all device registers except keep memory after download – if checked, the entire internal tag registers (i.e. D, X, XW, C, T, etc.) memory of the HMC are set to 0 after download *except for any registers designated as Keep Memory*.

 Note: this memory area is automatically set to 0 if power is removed from the HMC unit. If not checked, values in these areas are retained, unless power is removed. This option is not available in IEC 61131 projects; instead non-Retentive tags are set to the value specified in the initial value field in the Add Tag or Edit Tag windows in the tag database.

Real Time Clock

The internal battery powers the real-time clock (RTC) when the HMC is not powered by external 24VDC. Normally, the internal battery should be able to provide power to the RTC for approximately 20 years (@25°C).

Reading the Date/Time

The Clock objects (Time and Date) are used to display the date and time on an HMC screen. Each field of the RTC data can also be read and individually displayed on screen by using the designated system word registers (SW10 thru SW16) in the tag database.

40	Screen trigger register	-	SW0005	2	Operator Panel	Default Tag
41	Screen saver time	-	SW0006	2	Operator Panel	Default Tag
42	RTC day of month	-	SW0010	2	Operator Panel	Default Tag
43	RTC month	-	SW0011	2	Operator Panel	Default Tag
44	RTC year	-	SW0012	2	Operator Panel	Default Tag
45	RTC hour	-	SW0013	2	Operator Panel	Default Tag
46	RTC min	-	SW0014	2	Operator Panel	Default Tag
47	RTC sec	-	SW0015	2	Operator Panel	Default Tag
48	RTC day of week	-	SW0016	2	Operator Panel	Default Tag
49	Scan time register	-	SW0017	2	Operator Panel	Default Tag
50	COM1: failed node reconnect time (sec)	-	SW0018	2	Operator Panel	Default Tag

Other reserved registers that pertain to the clock are:

Tag No.	Tag Name	Tag Address	Description	Access
42	RTC day of month	SW0010	Ex: 1-31, Unsigned format	Read Only
43	RTC month	SW0011	Ex: 12, Unsigned format	Read Only
44	RTC year	SW0012	Ex: 0-99, Unsigned format	Read Only
45	RTC hour	SW0013	Ex: 0-23, Unsigned format	Read Only
46	RTC min	SW0014	Ex: 0-59, Unsigned format	Read Only
47	RTC sec	SW0015	Ex: 0-59, Unsigned format	Read Only
48	RTC day of week	SW0016	Ex: 1-7, Unsigned format With 1=Sun...7=Sat	Read Only
5	Minute Change Status	S00003	Momentarily sets whenever the minute value in SW14 changes	Read Only
6	Hour Change Status	S00004	Momentarily sets when the hour value in SW13 changes	Read Only
7	Date Change Status	S00005	Momentarily sets when the date value in SW10 changes	Read Only
8	Month Change Status	S00006	Momentarily sets when the month value in SW11 changes	Read Only
9	Year Change Status	S00007	Momentarily sets when the year value in SW12 changes	Read Only
12	RTC battery status	S00010	Sets when battery is dead	Read Only
17	Invalid RTC date entry	S00019	Sets while an invalid value is in one of the RTC registers	Read Only
36	RTC Status	SW0003_02	Sets if the RTC is not working	Read Only

Writing the Date/Time

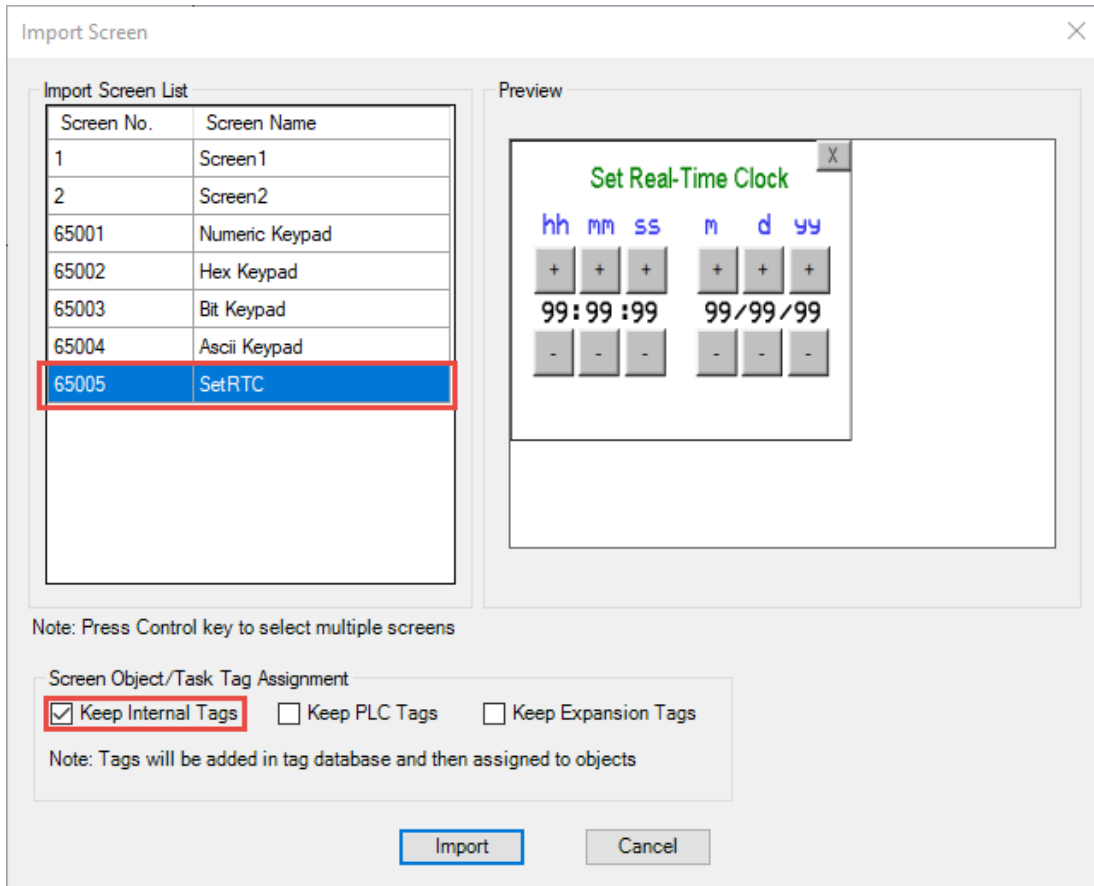
You can set or change the internal RTC using several means:

- By using the Set RTC task for a function key or one of the multi-task buttons (see **Chapter 6 – Task Management**)
- By using the Set Calendar (CLND) instruction in the ladder logic commands (see *The HMC Series Ladder Logic Instructions Manual*)
- By importing the SetRTC popup screen from an HMC sample project with the same screen size (see below)

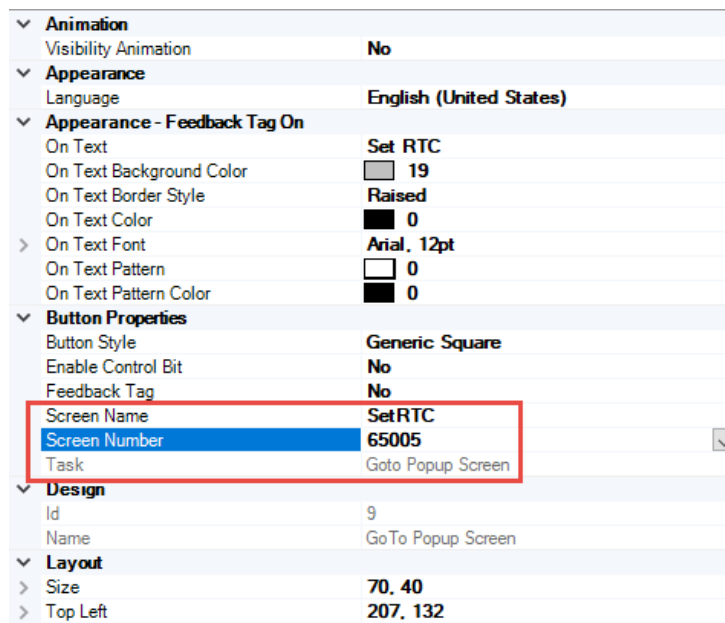
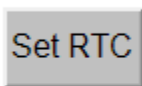
You cannot directly write to the clock using the SW106 internal system registers. However, if you wish to write directly, simply use the Numeric Entry object with data registers that are referenced in the Set Calendar instruction in a ladder logic program.

To import the SetRTC popup screen into your project, select [Screen] > [Import Screen] find the HMC##### STARTUP.mpl project file for the same HMC model that you are using. These projects are downloaded along with MAPware7000 and can be found in the directory <C:\MapleSystems\MAPware7000\Projects>

Import the screen no. 65005 and select the option “Keep Internal Tags”.



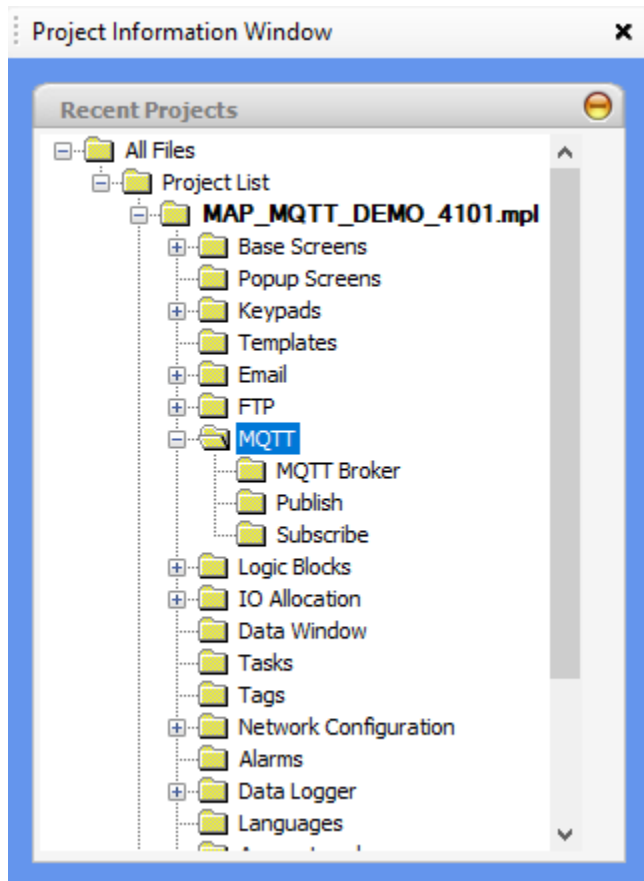
On a screen in your project, place a “Open Popup Screen” button and set it to open Screen Number 65005.



MQTT

MQTT Stands for “Message Queueing Telemetry Transport”. It is an extremely simple and lightweight messaging protocol (subscribe and publish) designed for limited devices and networks with high latency, low bandwidth or unreliable networks. Devices configured as clients can publish and subscribe to topics. Data published to a topic is sent to a centralized Broker, which can reside on a local device or on a cloud server. The Broker then forwards this data to all clients that are subscribed to that topic.

Any HMC4000 Series model is configurable as an MQTT client. Click on the **MQTT** folder in the Project Information Window



MQTT Broker

Click **MQTT Broker** to define the parameters of the broker that your HMC will be publishing to.

MQTT Cloud

Select **External**.

MQTT Protocol

If your broker is configured for a specific version of the MQTT protocol, select that one.

Broker/Server Address

Enter the URL or IP address of the broker that the HMC4000 will be publishing to.

Port

Currently, the port setting is fixed at the default MQTT port 1883.

User Name/Password

If your broker requires authentication, enter those credentials here. Otherwise leave blank for anonymous connection.

Keep Alive Time

MQTT uses a TCP/IP connection.

This connection is normally left open by the client so that it can send and receive data at any time.

If no data flows over an open connection for a certain time period then the client will generate a PINGREQ and expect to receive a PINGRESP from the broker.

This time period is known as the **Keep Alive Time** and is measured in seconds.

Registration ID

This is the value that will identify the MQTT client on the network. Often a Registration ID is not provided, so any value will work. It should be unique and uncommon, especially if using a public open source broker.

Publish

Topic Name: (Max 256 characters)

Description: (Max 256 characters)

QoS:

Current Topics:

	Id	Description	Topic Name	QoS
▶	1	Bool	Pub_1	0
	2	Word	Pub_2	0
	3	Float	Pub_3	0

Topic Name/Description

In MQTT, the word topic refers to an UTF-8 string that the broker uses to filter messages for each connected client. The topic consists of one or more topic levels. Each topic level is separated by a forward slash (topic level separator).

Refer to <https://www.hivemq.com/blog/mqtt-essentials-part-5-mqtt-topics-best-practices/> for information and best practices regarding topics.

Enter the topic name that the client will publish to and a short description for your reference (up to 256 characters in length). Click Add to add the topic to the Current Topics list.

QoS

The Quality of Service (QoS) level is an agreement between the sender of a message and the receiver of a message that defines the guarantee of delivery for a specific message. There are 3 QoS levels in MQTT.

QoS 0: This service level guarantees a best-effort delivery. There is no guarantee of delivery. The recipient does not acknowledge receipt of the message and the message is not stored and re-transmitted by the sender.

QoS 1: This service level guarantees that a message is delivered at least one time to the receiver. The sender stores the message until it gets a PUBACK packet from the receiver that acknowledges receipt of the message. The message can be sent or delivered multiple times.

QoS 2: This service level guarantees that each message is received only once by the intended recipients. QoS 2 is the safest and slowest service level. The guarantee requires at least two request/response flows (a four-part handshake) between the sender and the receiver.

Subscribe

Topic Name: (Max 256 characters)

Description: (Max 256 characters)

QoS:

Current Topics:

	Id	Description	Topic Name	QoS
▶	1	Bool	Pub_1	0
	2	Word	Pub_2	0
	3	Float	Pub_3	0
	4	String	Pub_4	0

Enter the topic name that the client will subscribe to and a short description for your reference. Click Add to add the topic to the Current Topics list.

Tags

After configuring the MQTT broker, publish and subscribe topics, tags must be individually assigned to a topic, and whether their data will be published to or subscribed from the selected topic.

This can be done by navigating to the [Tag Database](#)  and adding a new tag or editing an existing tag. Multiple tags can be assigned to the same topic.

Only local tags can be configured for MQTT. For networked node tags, transfer their data to a local tag using a task.

Add Tag [X]

Node Name: [HMC4101A-M] None (-) [v]

Tag - Name: [] Max 255 chars

Register/Coil Type: BOOL [v] Read Write

Auto Add Number of Tags: 1 [v]

Show Error Report

Global Initial Value: 0 [v] [v]

Retentive Block Type: Block 1 [v]

Local Length: 10 [v] Max 255

Dimension: 0 [v] (1024,255,255)

MQTT

Publish Topic Name: [v]

Subscribe [None] [v]

Note: In order to reflect initial value change, please download ladder in unit.

[Add] [Close]

MQTT Default Tags

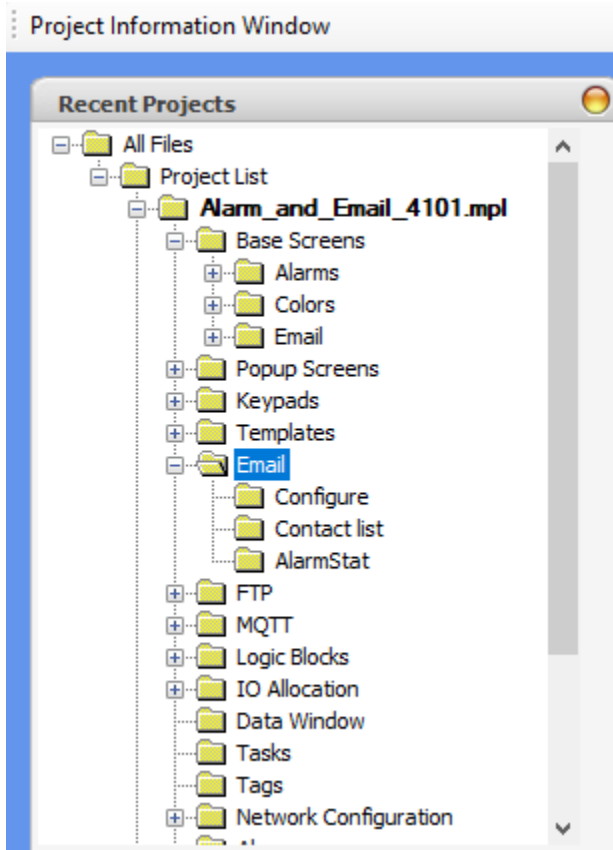
The following system tags can be used to control and provide information on the connection to the broker.

Tag Name	Type	Address	Description
MQTT_Status	WORD	SW0276	The value of this register is a code for the current status of the MQTT connection. (READ ONLY) 0 – Disconnected 1 – Connected to MQTT broker
MQTT_Error	WORD	SW0277	Contains an error code value for the connection. (READ ONLY) 0 – No error 1 – Connection Refused 2 – Remote Host closed 3 – Host Not Found 4 – Socket Access Error 5 – Socket Resource Error 6 – Socket Timeout Error 7 – Socket Error

Tag Name	Type	Address	Description
MQTT_Run_Stop	WORD	SW0278	Used to manually start the connection to the broker. It can be used like a toggle switch. (READ/WRITE) 0 – Stop (Stop the connection) 1 – Run (Attempt to connect)

Email

Email is a feature unique to the HMC4000 series. The email function works by sending a screenshot of a specific **Email Screen** that is either attached or embedded in the email. This screen can contain basic shapes, text, register display objects and bit display objects. To configure Email server settings, create contact lists and screens, click on the **Email** option in the Project Information Window.



Configure

Click on **Email > Configure** to open the following window:

You will need the password of an email account, as well as the server and port number.

Below are some common Email Servers and ports:

Server	Port for SSL	Port for TLS
smtp.gmail.com	465	587
smtp.yahoo.com	465	587

Gmail Server (smtp.gmail.com)

Gmail uses OAuth2.0 protocol to authenticate a Google account, so there are two ways to enable the use of your Gmail account for the HMC4000.

The first option is to enable less secure app access to your Gmail account. Log in to your Gmail account and visit the following link:

<https://support.google.com/accounts/answer/6010255?hl=en>

Second option is to turn on two step authentication and create an application specific password, Use this app password to login to the account

<https://support.google.com/accounts/answer/185839?co=GENIE.Platform%3DDesktop&hl=en>

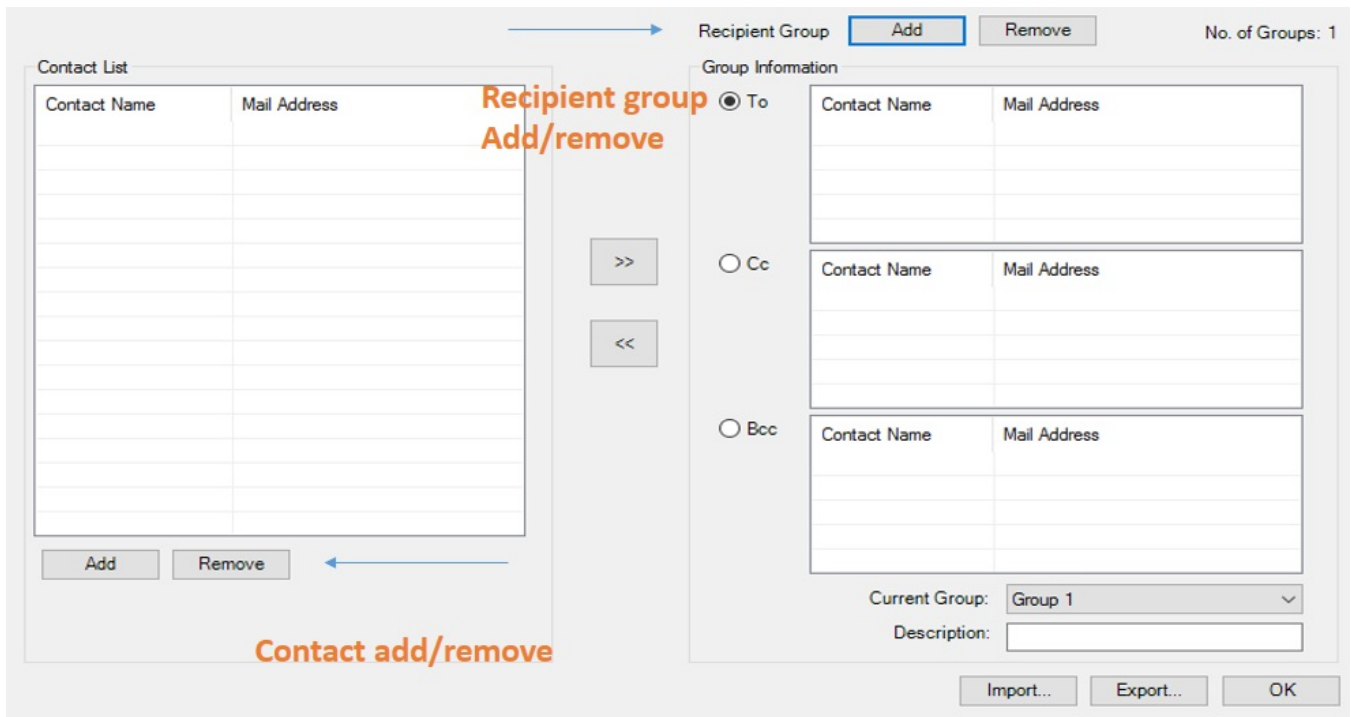
Yahoo Server (smtp.yahoo.com)

Similar to Gmail account, the first option is to enable less secure app to access your Yahoo account
<https://support.context.io/hc/en-us/articles/212087606-Yahoo-s-Less-Secure-App-Setting>

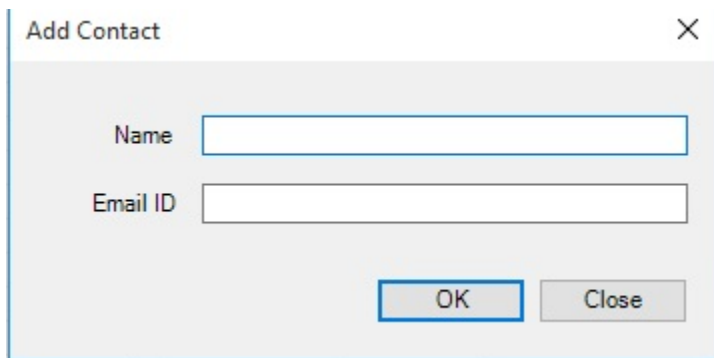
Second option is to create application specific password. Use this app password to login to your account
<https://help.yahoo.com/kb/SLN15241.html>

Contact List

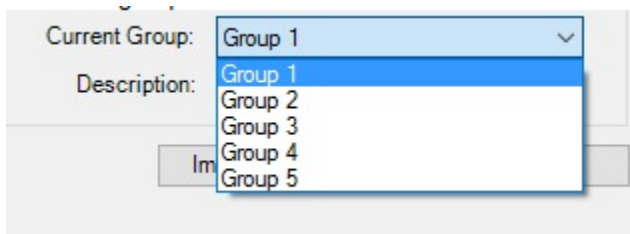
Click on **Email > Contact List** to add recipients and organize them into groups.



Add or remove email addresses by clicking the Add button.



In a similar fashion, groups can be added and selected. Up to 16 groups are supported.



Click the >> << buttons to add or remove a contact from the selected category for the selected group.

Email Screens

Right-click on **Email** in the **Project Information Window** > Click **New Email Screen**.

Email screens are similar to Base Screens. Place basic shapes, text and numeric and bit displays to show data on the Email screen. Bit Status and tag values will be recorded in the screenshot when an email is sent.

In the screen properties for the email screen, configure **Attachment** to be yes if the screenshot will be sent as an attachment or no if the screenshot is to be embedded in the email body. Configure the **Subject** property to be the subject for the email.

Sending Email

Email can be sent in various ways:

By Logic

The following System Tags can be used to trigger an email to be sent from logic.

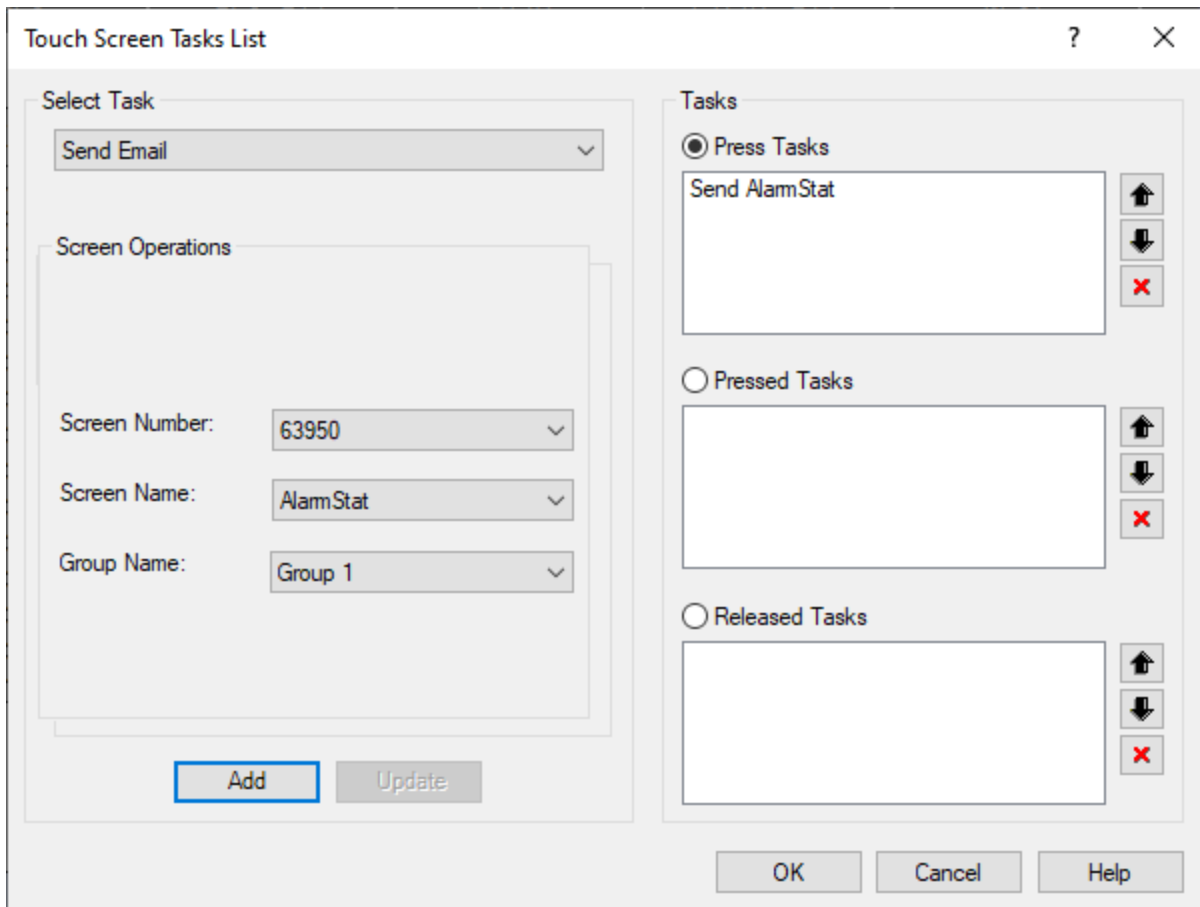
Tag Name	Tag Type	System Address	Description
Email_control_bit	BOOL	S00060	Triggers an email of the screen in the email screen number register to be sent to the group in the email group number register.
Email_screen_number	WORD	SW0251	Set the number of the email screen that will be sent
Email_group_number	WORD	SW0252	Set the group number of the group to which the email will be sent
Email_status_reg	WORD	SW0253	Contains a number code of the status of the email sent

Email Status Register Code Table:

255	Initial State
0	Server connection timeout
1	Response timeout
2	Send data timeout
3	Authentication failed
4	Server error
5	Client error
6	Invalid screen number
7	Invalid group number
8	Mail Sent Successfully

By Task

Email can be sent directly by task using a **task button**.



Single state or multistate task buttons can be found in the Advanced objects menu in the Base Screen editor.

By Alarm

Refer to [Email \(Alarms\)](#).

Email on Fly

The Email on Fly task can be assigned to a task button. Pressing the button at runtime will open the Email GUI. The recipient email addresses, subject and message of the email must be entered from the screen using the on screen keyboard.

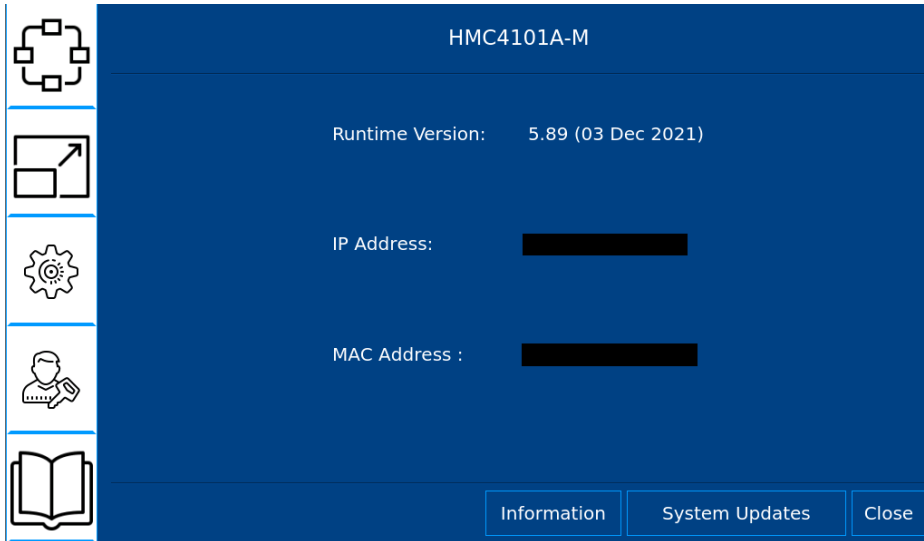


System Settings Menu

The System Settings Menu can be accessed on any HMC4000 model by pressing (or clicking) and holding the top left corner of the screen for 5 seconds.

About

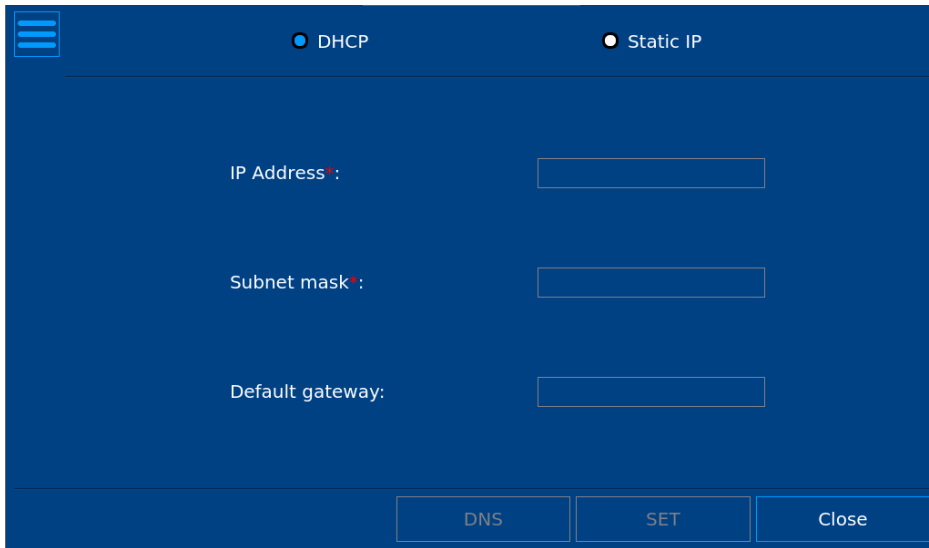
A screen will appear that will display info such as Runtime Version (the firmware), the IP address and MAC address of the unit. The **System Updates** feature allows a version of firmware to be uploaded to the device from a USB flash drive.



Network Settings

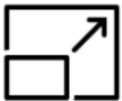


Provides the option of obtaining the IP address using DHCP or setting a Static IP.

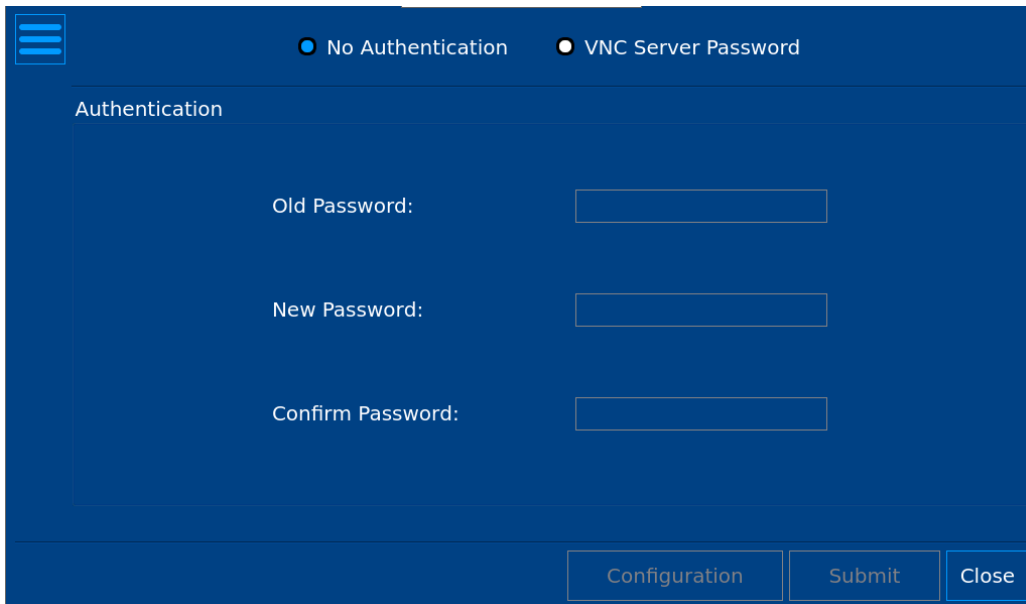


A configuration window with a dark blue background. At the top left is a hamburger menu icon. To its right are two radio buttons: "DHCP" (unselected) and "Static IP" (selected). Below this are three input fields: "IP Address:", "Subnet mask:", and "Default gateway:". At the bottom are three buttons: "DNS", "SET", and "Close".

VNC Server



See the following section on how to configure the [VNC Server](#).

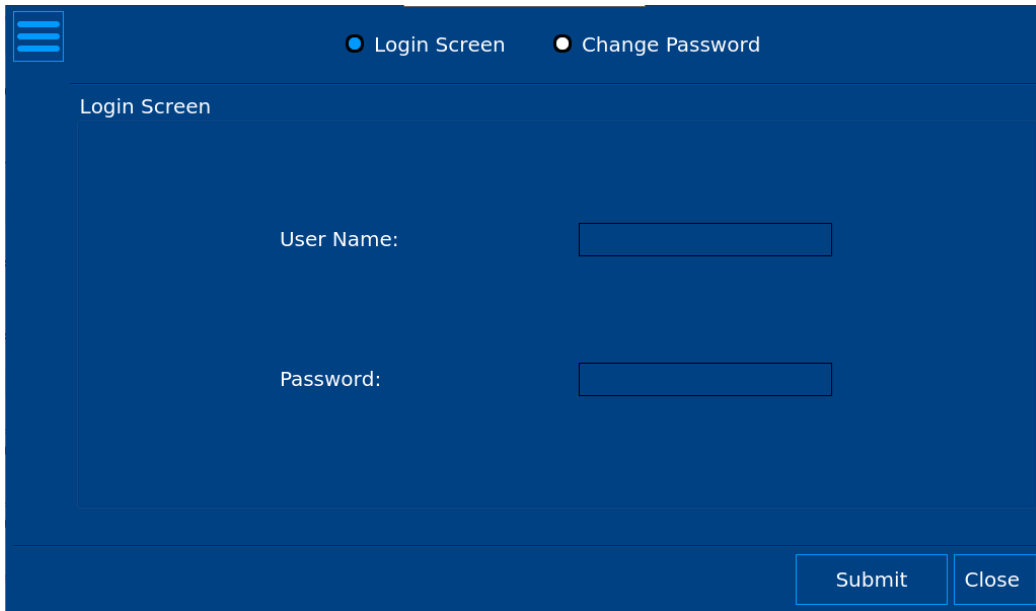


A configuration window with a dark blue background. At the top left is a hamburger menu icon. To its right are two radio buttons: "No Authentication" (unselected) and "VNC Server Password" (selected). Below this is a section titled "Authentication" containing three input fields: "Old Password:", "New Password:", and "Confirm Password:". At the bottom are three buttons: "Configuration", "Submit", and "Close".

Access



This is the screen from which the operator can log into a user account or change the password for that account.



Login Screen Change Password

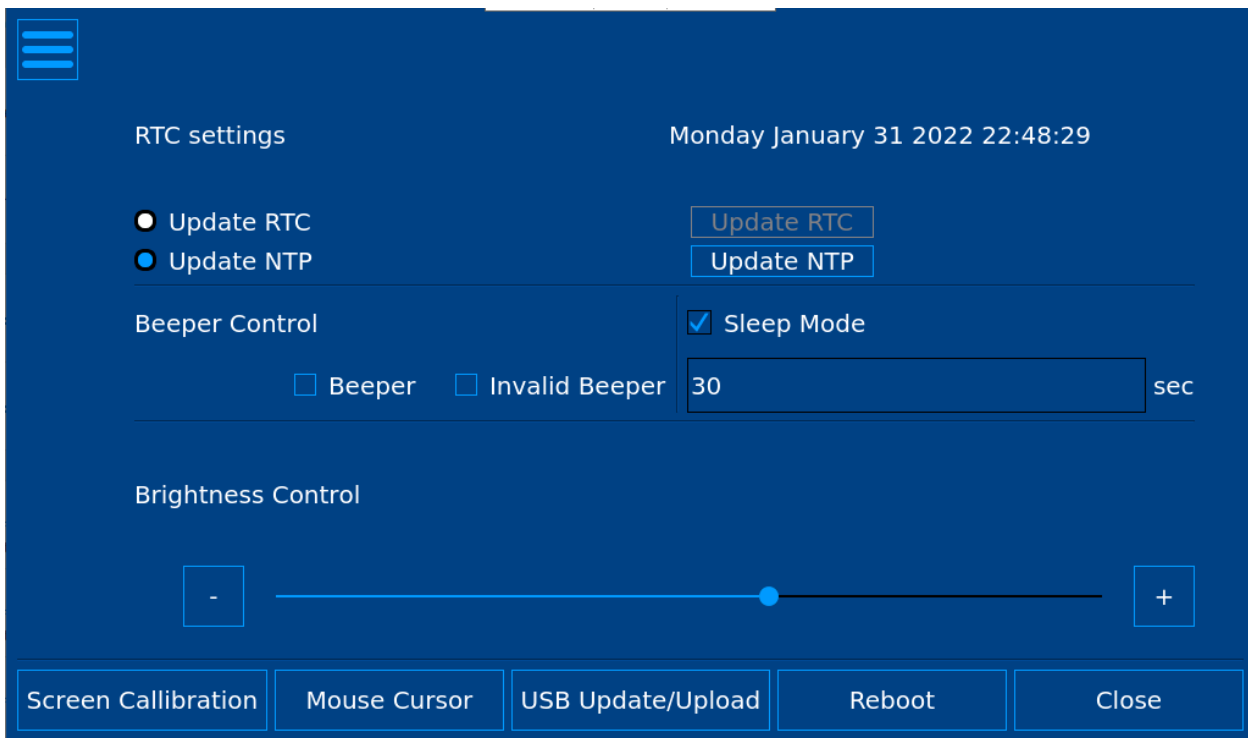
Login Screen

User Name:

Password:

Submit Close

Other Settings

Update RTC Update RTC
 Update NTP Update NTP

Beeper Control Sleep Mode

Beeper Invalid Beeper 30 sec

Brightness Control

- +

Screen Callibration Mouse Cursor USB Update/Upload Reboot Close

RTC Settings

Set the date and time for the Real Time Clock. There is also the option to sync the HMC with an external NTP server.

Beeper Control

Enable or disable the beep sound when an action is completed.

Brightness

The backlight brightness can be adjusted between 6 settings, ranging between full brightness and completely off.

Screen Calibration

Selecting this button causes the HMC to reboot and enter screen calibration mode.

USB Update/Upload

Allows a project to be uploaded from a USB flash drive.

Reboot

Selecting this option will cause the HMC to reboot.

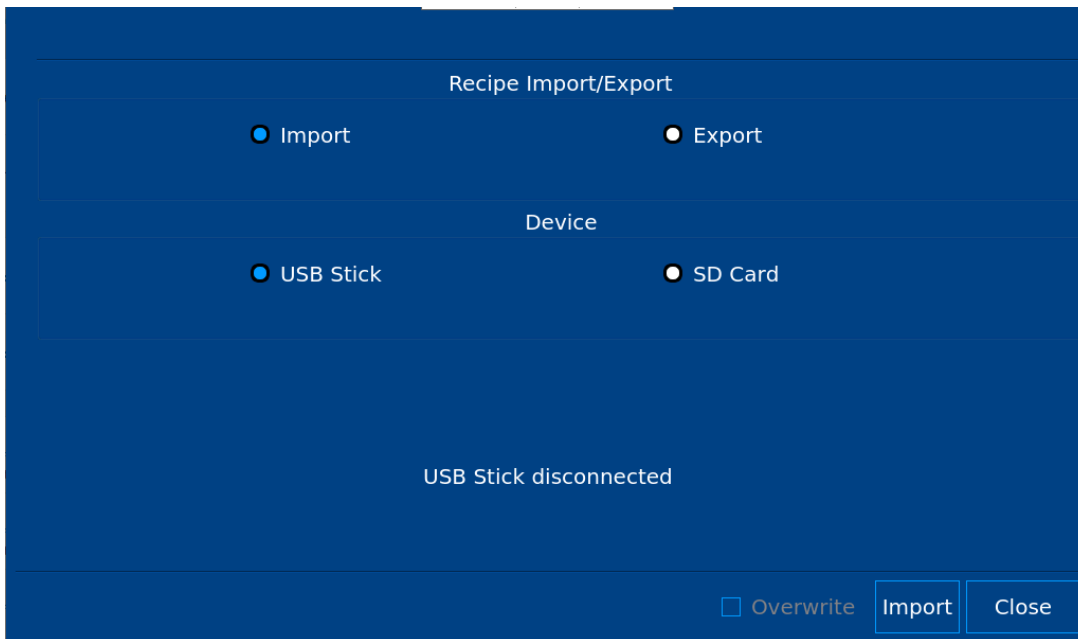
Mouse Cursor

Selecting this option allows a mouse cursor to appear on screen, so that a USB mouse can be used to navigate the HMC screen. Forces a reboot of the HMC.

Recipe Import/Export



From this screen, recipe data can be imported or exported in .csv format from a USB drive inserted into the HMC Host port.



VNC Server

The HMC4000 series support a VNC server functionality that can allow connection from a VNC client running on a PC or mobile device such as Android or iOS.

VNC client software must be installed on the PC or mobile device in order to connect to the VNC server on the HMC. One such option is VNC Viewer.

VNC requires that the client and server be on the same network (local or virtual) otherwise port forwarding must be used. The VNC connection is not encrypted. Only one client can connect to a VNC server at a time.

There are two options for authentication; either using a VNC server password or no authentication.

Authentication and Connection

To configure authentication, enter the system settings menu by pressing (or left-click-hold) the top left corner of the screen for 5 seconds.

Navigate to the VNC Server tab. By default, Not Authentication will be selected. To set a password, select the VNC Server Password option.

If a server password is set, the client will be prompted to enter this password when attempting a connection. Otherwise anonymous connections will be allowed.

Return to the **About** tab of the System Settings and take note of the IP address.

Open the VNC client software on your PC and enter the IP address of the HMC4000 and attempt a connection.

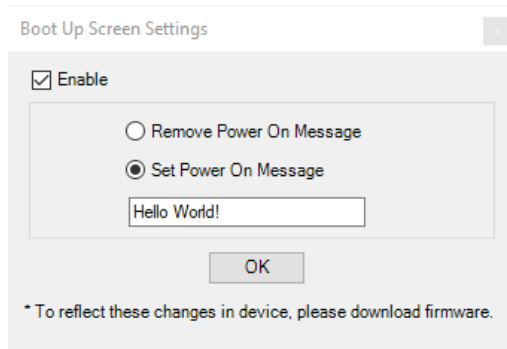
The HMC4000 screen will appear on the VNC client exactly as it does on the device itself. The HMC4000 can still be operated directly from the screen as well as from the client.

Boot Up Screen

In MAPware V2.36 and newer, a custom boot up screen (HMC4000) or message (HMC2000, HMC3000) can be configured to display after the HMC has powered on and before the project has loaded. If no custom boot up screen is configured, the default “Maple Systems” boot up screen will display.

For HMC7000, HMC3000, and HMC2000:

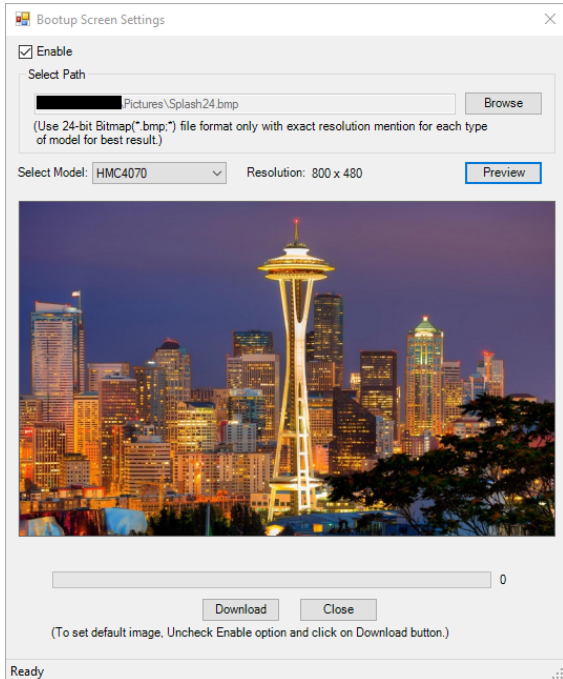
To configure the boot up screen, go to **Define > Bootup Screen Settings**.



Click OK and download the firmware to the HMC to make the change.

For HMC4000:

Go to **Tools > Bootup Screen Setting** and select “Enable”.



The image file must be a bitmap (.bmp) and be the exact resolution of the screen. Select the model of your HMC from the menu to determine the resolution. Click Download to download the splash screen.

Barcode Scanner

In MAPware-7000 V2.36+, the HMC4000 Series HMCs can be configured to display a string of ASCII data received from a USB barcode scanner connected to the USB Host port.

To do so, open a base screen in your project and select the Edit Data > Barcode object and place it on the screen. Create a String type tag in the Tag Database to assign to the Barcode object.

Barcode Properties

In the Object Properties window for the Barcode object, the Mode property can be set to “Manual” or “Auto”.

Manual

Barcode Properties	
Mode	Manual
Tag Show Keypad	Barcode_Auto_Enable
Tag Trigger After Scan	Barcode_Trigger_After_Scan

When the mode is set to Manual the Barcode object must be selected on the screen before the code can be scanned. The scanner is ready to use when the Barcode object begins to flash. After the code is scanned, the ASCII string will appear in the

In this mode, the value displayed in the Barcode object can be edited from the screen. This can be done when the “Tag Show Keypad” tag is set high and the keyboard appears on the screen.

Auto

Barcode Properties	
Mode	Auto
Tag Auto Mode Enable	Barcode_Auto_Enable
Tag Trigger After Scan	Barcode_Trigger_After_Scan

When the mode is set to Auto the Barcode object is ready to receive data from the scanner as long as the “Tag Auto Mode Enable” tag is set high. The “Tag Trigger After Scan” tag will be set high after the scan is complete.




Appendix A – Internal Memory

Each HMC unit has internal memory which can be used for operations. The amount of memory available depends upon which HMC model you have selected. Part of this memory is reserved for specific uses (see [Appendix B – System Tag Memory](#)) while the rest of the memory is openly available for your application.

Native Ladder Memory Addresses

In Native Ladder mode, tags created in the tag database are given explicit addresses which are grouped together into various address types according data format and function. The address type is selected in the Register/Coil Type dropdown box in the Add Tag window (for directions on adding tags to a project refer to [Chapter 4 – Tags](#))

Below is a table that defines the internal memory addresses available in Native Ladder projects. More detail on the function of each type is given in the sections that follow.

Type	Name	Range	Type	Access	Description
Index Register (I)	I00000	0	Register Only (2 bytes)	Read/Write	Index Register
Index Register (J)	J00000	0	Register Only (2 bytes)	Read/Write	Index Register
Index Register (K)	K00000	0	Register Only (2 bytes)	Read/Write	Index Register
Counter Coils	C.0000	0-255 ¹	Bit Only	Read/Write	Counter Coils
Counter Registers	C0000	0-255	Register Only (2 bytes)	Read/Write	Counter Registers
Timer Coils	T.0000	0-255	Bit Only	Read/Write	Timer Coils
Timer Registers	T00000	0-255	Register Only (2 bytes)	Read/Write	Timer Registers
Input Coils	X00000 ³	0-31015	Bit Only	Read Only	Physical Input Coils
Input Registers	XW0000 ³	0-3100	Register Only (2 bytes)	Read Only	Physical Input Registers  Note: Input Coils and Registers share same memory
Output Coils	Y00000 ³	0-31015	Bit Only	Read/Write	Physical Output Coils
Output Registers	YW0000 ³	0-3100	Register Only (2 bytes)	Read/Write	Physical Output Registers  Note: Output Coils and Registers share same memory
I/O Configuration Coils	M00000 ³	0-31015	Bit Only	Read/Write	Physical I/O Configuration coils
I/O Configuration Registers	MW0000 ³ or MW0000_00 ³	0-3100, 0-15	Bit or Register (2 bytes)	Read/Write	Physical I/O Configuration registers  Note: I/O Coils and I/O Registers share same memory

Type	Name	Range	Type	Access	Description
System Coils	S00000	0-99	Bit Only	Read/Write	Status and control bits for HMC
System Registers	SW0000 or SW0000_00	0-255, 0-15	Bit or Register (2 bytes)	Read/Write	Status and control registers for HMC
Internal Coils	B00000	0-4095	Bit Only	Read/Write	General Purpose Internal Coils
Internal Registers	BW0000	0-255	Register Only (2 bytes)	Read/Write	General Purpose Internal Registers ⚠ Note: Internal Coils and Internal Registers share same memory
Data Registers	D00000 or D00000_00	0-4095, 0-15	Bit or Register (1, 2 or 4 bytes)	Read/Write	General Purpose Registers
Retentive Registers	R00000	0-22527 ²	Register Only (1, 2 or 4 bytes)	Read/Write	Non-volatile memory registers

¹ – The HMC7030 supports C.0000-C.0099

² – The HMC7030 supports R0-R299, and the HMC7043 and HMC7070 support R0-R1399.

³ – The first two digits of X, XW, Y, YW, M, and MW I/O addresses refer to the slot number of the I/O module. Built in I/O will have an address of 00, while slot 1 would have a prefix of 01.

⚠ Note: Memory areas are accessible in the Tag Database under Node Name: [HMC Model] None (-)

Generally speaking, the entire memory area of the HMC can be used for any purpose. However, the memory is split into several classifications so that they can be used for special purposes.

Index Registers (I, J, K)


The HMC Series has three 16-bit index registers (I, J, and K) that perform a specific purpose. As the name implies, these registers are used to 'index' or act as pointers to multiple registers. This method is called 'indirect addressing' because the HMC does not read/write to the specified address directly. Instead, the target address is determined indirectly by referencing the base address and the value read from the index register.

For example, if the MOV WORD instruction is used in a Ladder Logic Block, you can assign an index register to one of the operands:

The screenshot shows a ladder logic block with the following components:

- Block 1:** A blue header bar.
- Rungs:** Four rungs are visible, numbered 1 to 4 on the left.
- Rung 1:** Contains a coil (B00001) in series with a normally open contact (50) leading to another coil (B00002).
- Instruction:** The instruction is MOV.W D00000 + K50. The 'Data' field is highlighted in cyan.
- Instruction Properties Window:**
 - Design:** Name: Move Word; Description: Transfers data of A to B; Execution Time: 1.9 μs; Execution Time Retentive: 1.1 ms.
 - Operand A (Source):** Type: Constant; Comment: (A); Constant: 50.
 - Operand B (Destination):** Address: D00000; Comment: (B); Name: Data_00000; Tag Index Type: K.

In this example, we use the K index register along with an internal register (D0). When this ladder rung is executed, the HMC reads the value in the K register. It then adds this value to the D0 register (as an offset) to determine the true register that the constant value 50 is written to. If the value in the K register is 1, then the constant value 50 is written to internal memory register D1. If the K value is 2, then 50 is written to internal memory register D2, and so on.

 Note: Care should be taken that the value in the index register does not cause the HMC to read/write to a register that does not exist (the address range is not checked by the HMC).

Many of the ladder logic instructions have tag indexing capability. To find out which instructions support this feature, see *The HMC Series Ladder Logic Instructions Manual*. In each section that defines a particular instruction, you will see an Operand table with a column marked Index. This column is checked for each operand that supports indexing.

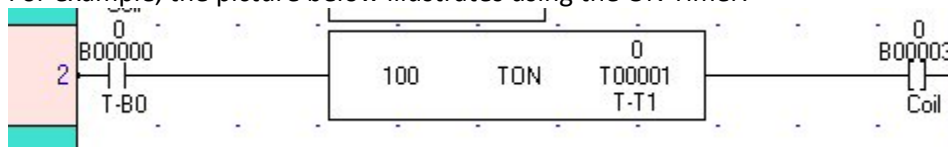
Counter and Timer Registers/Coils (C, C., T, T.)

The HMC Series has four memory registers which are specifically used with the Counter and Timer instructions:

- Counter (C) registers
- Counter (C.) coils
- Timer (T) registers
- Timer (T.) coils

Each Timer or Counter register is 'connected' to a corresponding Timer or Counter coil. In a Timer or Counter instruction, when the Timer or Counter reaches its set value, the corresponding Timer or Counter coil is set.

For example, the picture below illustrates using the ON Timer:



The timer T00001 register is used to count up to 1 sec (10msec timer). When the preset count (100) has been reached, timer coil T.0001 is set.

See *The HMC Series Ladder Logic Instructions Manual* #75-79 for instructions that use counters and timers.

Input Registers/Coils (X, XW)

These registers and coils are designed for use by the physical inputs (digital or analog) from an attached or built-in (HMC7030A-L) input expansion module. These are the only internal memory addresses of the HMC which are read only. Therefore, the value read from these registers/coils always represents the current state of the physical input of the expansion module assigned to it. When you start a new project and assign I/O expansion modules to each expansion slot of the HMC, the MAPware will automatically assign the appropriate memory addresses according to slot location. For example, the twelve built-in digital inputs of the HMC7030A-L are assigned to coils X00000-X00011 and register XW0000. For a HMC unit that has eight digital inputs in expansion slot #1, the MAPware software automatically assigns coil addresses X01000-X01007 and register XW0100 to the inputs. If sixteen digital inputs are located in slot#4, the software assigns coil addresses X04000-X04015 and register XW0400 to the inputs. If an analog module with four analog inputs is installed into slot#2, then no coil addresses would be assigned (since these are analog inputs) and registers XW0200-XW0203 are assigned.

The X and XW registers are mapped to the same memory area in the HMC with sixteen X coils per XW register. To determine the register and bit location of an X coil memory area use the following equation: Xnnn = XW(nnn/16 quotient), bit (nnn/16 remainder).

For example, X00161 corresponds to the second least significant bit (bit 1) of XW0010 ($161/16 = 10r1$).

Output Registers/Coils (Y, YW)

These registers and coils are designed for use by the physical outputs (digital or analog) from an attached or built-in (HMC7030A-L) output expansion module. The value read from these internal registers/coils is used to determine and set the current state of the physical output of the expansion module assigned to it. When you start a new project and assign I/O expansion modules to each expansion slot of the HMC, the MAPware will automatically assign the appropriate memory addresses according to slot location. For example, the eight built-in digital outputs of the HMC7030A-L are assigned to coils **Y00000-Y00007** and register **YW0000**. For an HMC unit that has eight digital outputs in expansion slot #1, the MAPware software automatically assigns coil addresses **Y01000-Y01007** and register **YW0100** to the outputs. If twelve digital outputs are located in slot#3, the software assigns coil addresses **Y03000-Y03011** and register **YW0300** to the outputs. If an analog module with two analog outputs is installed into slot#5, then no coil addresses would be assigned (since these are analog outputs) and registers **YW0500-YW0501** are assigned.

The Y and YW registers are mapped to the same memory area in the HMC with sixteen Y coils per YW register. To determine the register and bit location of an Y coil memory area use the following equation: $Y_{nnn} = YW(nnn/16 \text{ quotient}), \text{ bit } (nnn/16 \text{ remainder})$.

For example, Y00161 corresponds to the second least significant bit (bit 1) of YW0010, ($161/16 = 10r1$).

Configuration Registers/Coils (M, MW)

These registers and coils are reserved to perform special functions when the HMC has built-in or attached expansion modules. For example, the HMC7030A-L has the following I/O Register/Coil memory allocated for the twelve digital inputs and eight digital outputs built into the unit:

- M00240 HSC Enable Bit (ch1)
- M00241 HSC Reset Bit (ch1)
- M00400 HSC Enable Bit (ch2)
- M00401 HSC Reset Bit (ch2)
- MW0000 PLC mode control
- MW0003 Run/Stop Switch
- MW0010 HSC Configuration Register (ch1)
- MW0011 HSC Current Register (ch1)
- MW0013 HSC Preset Register (ch1)
- MW0020 HSC Configuration Register (ch2)
- MW0021 HSC Current Register (ch2)
- MW0023 HSC Preset Register (ch2)

These registers are used when the built-in I/O of the HMC7030A-L is configured as high speed counters.

The MAPware automatically allocates the necessary I/O registers to each expansion module according to slot location and type of module. For example, a HMC unit that has eight digital inputs and eight digital outputs in expansion slot #1 has coil addresses **M01080**, **M01081**, **M01176**, and **M01177** and registers **MW0100-MW0109** assigned for two high-speed counters. If slot#2 contains an analog 2 input/2 output module, the software assigns no coil addresses and registers **MW0200-MS0203** to read/write to the analog registers. When slot#4 contains a 12 point relay output module, MAPware assigns the **MW0400** register for relay outputs.

The M and MW registers are mapped to the same memory area in the HMC with sixteen M coils per MW register. To determine the register and bit location of a M coil memory area use the following equation: $M_{nnn} = MW(nnn/16 \text{ quotient}), \text{ bit } (nnn/16 \text{ remainder})$.

For example, M00161 corresponds to the second least significant bit (bit 1) of MW0010, $(161/16 = 10r1)$. Individual bits of the MW registers can be accessed with using the MW0000_00 notation, so the previous example would be written as MW0010_01.

System Registers/Coils (S, SW)

These registers and coils are reserved by the HMC for specific purposes. A total of 100 system coils and 256 system registers are reserved. Although undefined system registers and coils could be used by the HMC programmer, this area of memory may be used in the future for predefined uses. Therefore, use of this area of memory should be limited to the predefined coils and registers. For a list of these memory areas, see [Appendix B – System Tag Memory](#).

Internal Registers/Coils (B, BW)

These are general purpose registers and coils which can be used at the discretion of the HMC programmer. This area of memory is non-retentive so any data stored in these registers is lost once power has been removed from the HMC.

The B coil memory and the BW register memory are mapped to the same memory area in the HMC with sixteen B coils per BW register. Therefore, the least significant bit in register BW0 corresponds to the B0 coil. Likewise, the B18 coil shares the same memory area as bit 2 of BW1. To determine the register and bit location of a B coil memory area use the following equation: $B_{nnn} = BW(nnn/16 \text{ quotient}), \text{ bit } (nnn/16 \text{ remainder})$.

Therefore B00050 coil corresponds to BW0003, bit 2 $(50/16 = 3r2)$.


Data Registers (D)

These are general purpose registers which can be used at the discretion of the HMC programmer. This area of memory is non-retentive so any data stored in these registers is lost once power has been removed from the HMC.

Note that these registers can be configured as bits with the D00000_00 notation.

Retentive Registers (R)

These are general registers which can be used at the discretion of the HMC programmer. This area of memory is retentive so any data stored in these registers remains once power has been removed from the HMC.

 Note that reading/writing to these registers requires more processing time than does using any of the other registers in memory due to their retentive nature. Therefore, be aware that using these registers in ladder logic blocks require more processing time.

IEC 61131-3 Tags

In projects created using the IEC 61131-3 programming mode, tags are not, necessarily, assigned an explicit memory address. Instead they are created with a data type that determines the tags format and function. The data type is selected in the **Register/Coil Type** dropdown list in the Add Tag window of the tag database. For detailed instructions on creating tags refer to [Chapter 4 – Tags](#).

Below is a table displaying the tag data types available in IEC 61131-3 projects.

Data Type	Description	Bits	Value Range
BOOL	Boolean value can have one of two values: 1 (ON / True) or 0 (OFF / False)	1	0 or 1
BYTE	Unsigned Short (same as USINT)	8	0 to 255
DINT	Signed Double Integer	32	-2,147,483,648 to 2,147,483,647
DWORD	Unsigned Double Integer (same as UDINT)	32	0 to 4,294,967,295
INT	Signed Integer	16	-32,768 to 32,767
LREAL	IEEE 754 format, double precision floating point	64	
REAL	IEEE 754 format, single precision floating point	32	$\pm 3.403 \times 10^{38}$
SINT	Signed Short Integer	8	-128 to 127
STRING	Variable length string of ASCII characters	1 to 255 bytes	N/A
TIME	Time of day	32	N/A
UDINT	Unsigned Double Integer (same as DWORD)	32	0 to 4,294,967,295
UINT	Unsigned Integer	16	0 to 65,535
USINT	Unsigned Short Integer (Same as BYTE)	8	0 to 255
WORD	Unsigned Integer (Same as UINT)	16	0 to 65,535

In addition to these data types, IEC 61131-3 projects share some of the data types available in Native Ladder projects. In these cases the tags are given an explicit address which is visible in the tag database. These registers are; Retentive Registers (R), System Coils / Registers (S, SW), Input Registers (X, XW), Output Registers (Y, YW), and I/O Configuration Coils / Registers (M, MW). Refer to the previous section of this Appendix for information on available addresses and using these registers.

Appendix B – System Tag Memory

The following tables list all of the internal memory of the HMC which is reserved for specific purposes.

S memory (System bits)

Tag Address	Tag Name	Type	Access	Models Supported	Description
S00000	Carry bit	Coil (1 bit)	Read/Write	All HMC models	Overflow indication in math operations of ladder and also used in rotate with carry instruction.
S00001	High speed timer control bit	Coil (1 bit)	Read/Write	All HMC models	Enable bit to start high speed timer
S00003	Minute Change status	Coil (1 bit)	Read Only	All HMC models	1 for every change in minute for one scan cycle
S00004	Hour Change status	Coil (1 bit)	Read Only	All HMC models	1 for every change in hour for one scan cycle
S00005	Date Change status	Coil (1 bit)	Read Only	All HMC models	1 for every change in date for one scan cycle
S00006	Month Change status	Coil (1 bit)	Read Only	All HMC models	1 for every change in month for one scan cycle
S00007	Year Change status	Coil (1 bit)	Read Only	All HMC models	1 for every change in year for one scan cycle
S00008	Screen saver Control	Coil (1 bit)	Read/Write	Touchscreen models	0: Disable screen saver; 1: Enable screen saver. Can be changed during runtime.
S00009	Beeper Control	Coil (1 bit)	Read/Write	Touchscreen models	1: Enable Beeper; 0: Disable Beeper. Can be changed during runtime.
S00010	RTC Battery status	Coil (1 bit)	Read Only	All HMC models	0: Battery voltage is OK (i.e. above 2.2 V); 1: Low battery (i.e. below 2.2 V)
S00011	Default Coil	Coil (1 bit)	Read Write	All HMC models	New objects added to the project will default to this address. Does not perform any function.

Tag Address	Tag Name	Type	Access	Models Supported	Description
S00012	Refresh historical trend	Coil (1 bit)	Read/Write	Touchscreen models	Refresh historical trend window when set to 1
S00014	Acknowledge all alarms	Coil (1 bit)	Read Only	All HMC models	0: All alarms are acknowledged; 1: All alarms are not acknowledged in the Real and Historical alarm windows
S00016	Valid key beeper Control	Coil (1 bit)	Read/Write	Touchscreen models	1: Enable valid beeper; 0: Disable valid beeper. Can be changed during runtime
S00017	Invalid key beeper Control	Coil (1 bit)	Read/Write	Touchscreen models	1: Enable Invalid beeper; 0: Disable Invalid beeper. Run time you can change this bit
S00019	Invalid RTC date entry	Coil (1 bit)	Read Only	All HMC models	0=valid date; 1= Invalid date
S00020	Popup Screen trigger	Coil (1 bit)	Read/Write	Touchscreen models	This bit triggers the popup screen number stored in SW23
S00021	COM1 failed node reconnect control	Coil (1 bit)	Read/Write	All HMC models	If this bit is set communication with the failed nodes is detected after scan time SW0018 for port1. By default : ON
S00022	COM2 failed node reconnect control	Coil (1 bit)	Read/Write	Touchscreen models	If this bit is set communication with the failed nodes is detected after scan time SW0019 for port2. By default : ON
S00023	COM3 failed node reconnect control	Coil (1 bit)	Read/Write	Ethernet models	If this bit is set communication with the failed nodes is detected after scan time SW0022 for port3. By default : ON
S00027	Static Data Entry Focus Control	Coil (1 bit)	Read/Write	HMC7030A-M only	User can enable focus for static data entry using this bit.
S00028	Datlog Group1 log Control	Coil (1 bit)	Read/Write	Touchscreen models	User can Start/Stop logging in Bit Task mode for Group1 by using this bit

Tag Address	Tag Name	Type	Access	Models Supported	Description
S00029	Datlog Group2 log Control	Coil (1 bit)	Read/Write	Touchscreen models	User can Start/Stop logging in Bit Task mode for Group2 by using this bit
S00030	Datlog Group3 log Control	Coil (1 bit)	Read/Write	Touchscreen models	User can Start/Stop logging in Bit Task mode for Group3 by using this bit
S00031	Datlog Group4 log Control	Coil (1 bit)	Read/Write	Touchscreen models	User can Start/Stop logging in Bit Task mode for Group4 by using this bit
S00032	Data Entry Lock Control	Coil (1 bit)	Read/Write	All HMC models	User can Lock / Unlock the data entry. 1= Data_Entry Lock, 0= Data_Entry unlock.
S00033	Data Entry Key Selection	Coil (1 bit)	Read/Write	All HMC models	Mode of data entry 1= Start data entry only through 'Enter' key. 0= Start data entry through 'Enter' key or Numeric key.
S00034	Ladder Instruction Error Status	Coil (1 bit)	Read Only	All HMC models	Set if Division by zero operation is performed in the ladder instruction and for invalid conditions or operands in case of conversion instructions.
S00035	Real and Historical Alarm Control	Coil (1 bit)	Read/Write	All HMC models	1: Alarm bits are not monitored. 0: Alarms bits are monitored
S00036	RUN LED Control	Coil (1 bit)	Read/Write	All HMC models	0: LED functionality works for upload/ RUN/ Communication status 1: LED OFF
S00037	USB Host Menu Trigger	Coil (1 bit)	Read/Write	Touchscreen models	System tag to allow USB host operation to user
S00039	Backlight Color Control-Red (Retentive)	Coil (1 bit)	Read/Write	HMC7030 models	Controls the RED Color backlight operation
S00040	Backlight Color Control-Green (Retentive)	Coil (1 bit)	Read/Write	HMC7030 models	Controls the GREEN Color backlight operation

Tag Address	Tag Name	Type	Access	Models Supported	Description
S00041	Backlight Color Control-Blue (Retentive)	Coil (1 bit)	Read/Write	HMC7030 models	Controls the BLUE Color backlight operation
S00042	Unit DHCP Enable/Disable	Coil (1 bit)	Read Only	Ethernet models	1: DHCP Enabled. 0: DHCP Disabled
S00043	Logged Data Clear Bit	Coil (1 bit)	Read/Write	Touchscreen models	Set this bit to 1 to erase the Logged Data on the HMC
S00047	I/O Expansion 1 Communication Status	Coil (1 bit)	Read Only	HMC models w/ Expansion I/O Modules	1: Communication established with correct I/O card, 0: Error or no I/O card present
S00048	I/O Expansion 2 Communication Status	Coil (1 bit)	Read Only	HMC models w/ Expansion I/O Modules	1: Communication established with correct I/O card, 0: Error or no I/O card present
S00049	I/O Expansion 3 Communication Status	Coil (1 bit)	Read Only	HMC models w/ Expansion I/O Modules	1: Communication established with correct I/O card, 0: Error or no I/O card present
S00050	I/O Expansion 4 Communication Status	Coil (1 bit)	Read Only	HMC models w/ Expansion I/O Modules	1: Communication established with correct I/O card, 0: Error or no I/O card present
S00051	I/O Expansion 5 Communication Status	Coil (1 bit)	Read Only	HMC models w/ Expansion I/O Modules	1: Communication established with correct I/O card, 0: Error or no I/O card present
S00057	Forced Buzzer Control	Coil (1 bit)	Read/Write	Touchscreen models	HMC Beep sounds continuously if bit is true
S00058	DHCP Enable/Disable reconfigurable	Coil (1 bit)	Read/Write	Ethernet models	Turn DHCP on or off during runtime.
S00059	SD_Card_Menu_Trigger	Coil (1 bit)	Read/Write	HMC3000 models	

Tag Address	Tag Name	Type	Access	Models Supported	Description
S00088	Screen_Login_Logout_Status_Coil	Coil (1 bit)	Read Only	Touchscreen models	
S00089	DHCP_Status	Coil (1 bit)	Read Only	Ethernet models	DHCP active or not.
S00090	Change_Password_Status_Coil	Coil (1 bit)	Read Only	Touchscreen models	
S00091	Bar graph Min-Max limit error bit	Coil (1 bit)	Read Only	All HMC models	
S00092	Initialize__Port_Com1	Coil (1 bit)	Read/Write	Touchscreen models	Update Com1 Port settings (SW239-243) during runtime.
S00093	Initialize__Port_Com2	Coil (1 bit)	Read/Write	Touchscreen models	Update Com2 Port settings (SW244-248) during runtime.
S00094	Initialize_EthernetSettings	Coil (1 bit)	Read/Write	Ethernet models	Update Ethernet settings (SW141-146, S58) during runtime.

SW memory (System registers)

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0000	DefaultReg	Register (2 bytes)	Read/Write	All HMC models	Newly added objects will default to using this register, does not perform any function
SW0001	Language	Register (2 bytes)	Read/Write	All HMC models	Value in this register controls what language is displayed in objects
SW0002	Logger Memory % Usage	Register (2 bytes)	Read Only	Touchscreen models	Shows percentage use of logger memory.(0 to 100)
SW0003_00	Logger Memory full Status	Bit	Read Only	Touchscreen models	1 = Memory full
SW0003_01	Logger Memory clear Status	Bit	Read Only	Touchscreen models	1 = Memory clear being executed
SW0003_02	RTC Status	Bit	Read Only	All HMC models	1 = RTC fail
SW0003_13	COM3 Status	Bit	Read Only	Touchscreen models	0 = Communication Error; 1= Communicating with PLC

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0003_14	COM1 Status	Bit	Read Only	All HMC models	0 = Communication Error; 1= Communicating with PLC
SW0003_15	COM2 Status	Bit	Read Only	Touchscreen models	0 = Communication Error; 1= Communicating with PLC
SW0004	Historical Alarm count	Register (2 bytes)	Read Only	All HMC models	Shows no. of alarms stored in history
SW0005	Screen Trigger Register	Register (2 bytes)	Read/Write	All HMC models	Shows active screen no. You can change screen by writing any valid screen no. in this register
SW0006	Screen saver time	Register (2 bytes)	Read/Write	Touchscreen models	Time of inactivity, in minutes, before screen saver is triggered. Can be changed in runtime.
SW0008	IP conflict Status Register	Register (2 bytes)	Read Only	Ethernet models	1: IP conflict exists. 0: No IP conflict
SW0009	Driver Scan time register for port 3	Register (2 bytes)	Read Only	Touchscreen models	Shows time required to communicate with port 3 in milliseconds. Use #####.# format for display
SW0010	RTC Day of Month	Register (2 bytes)	Read Only	All HMC models	RTC day in integer format (00-31)
SW0011	RTC Month	Register (2 bytes)	Read Only	All HMC models	RTC month in integer format (012)
SW0012	RTC Year	Register (2 bytes)	Read Only	All HMC models	RTC year in integer format (00-99)
SW0013	RTC Hour	Register (2 bytes)	Read Only	All HMC models	RTC hour in integer format (00-23)
SW0014	RTC Min	Register (2 bytes)	Read Only	All HMC models	RTC minute in integer format (00-59)
SW0015	RTC Sec	Register (2 bytes)	Read Only	All HMC models	RTC sec in integer format (00-59)
SW0016	RTC Day of Week	Register (2 bytes)	Read Only	All HMC models	RTC day of week in integer format (00-06) with 0=Sunday, ..., Saturday=6
SW0017	Scan time register	Register (2 bytes)	Read Only	All HMC models	Shows time required to execute Screen, Screen task and global task in millisecond. Use #####.# format for display

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0018	COM1 failed node reconnect time (Sec)	Register (2 bytes)	Read/Write	All HMC models	Shows time in sec to recover the communication with failed nodes for port1. The default value is 60Sec
SW0019	COM2 failed node reconnect time (Sec)	Register (2 bytes)	Read/Write	Touchscreen models	Shows time in sec to recover the communication with failed nodes for port2. The default value is 60Sec
SW0020	Driver Scan time register for port1	Register (2 bytes)	Read Only	All HMC models	Shows time required to communicate with port1 in milliseconds. Use ####.# format for display
SW0021	Driver Scan time register for port2	Register (2 bytes)	Read Only	All HMC models	Shows time required to communicate with port2 in milliseconds. Use ####.# format for display
SW0022	COM3 failed node reconnect time (Sec)	Register (2 bytes)	Read/Write	Ethernet models	Shows time in sec to recover the communication with failed nodes for port3. The default value is 60 Sec
SW0023	Popup Screen number	Register (2 bytes)	Read/Write	Touchscreen models	Value stored in this register controls the popup screen shown when S00020 is set ON
SW0028	HMC IP Address [LS Byte]	Low byte of register	Read Only	Ethernet models	Least Significant byte of HMC's IP Address i.e. 254 in 192.168.0. 254
SW0028	HMC IP Address [2nd Byte]	High byte of register	Read Only	Ethernet models	Second byte of HMC's IP Address i.e. 0 in 192.168. 0 .254
SW0029	HMC IP Address [3rd Byte]	Low byte of register	Read Only	Ethernet models	Third byte of HMC's IP Address i.e. 168 in 192. 168 .0.254
SW0029	HMC IP Address [MS Byte]	High byte of register	Read Only	Ethernet models	Most significant byte of HMC's IP Address i.e. 192 in 192 .168.0.254
SW0030	HMC Subnet Mask [LS Byte]	Low byte of register	Read Only	Ethernet models	Least Significant byte of HMC's Subnet Mask i.e. 0 in 255.255.255. 0
SW0030	HMC Subnet Mask [2nd Byte]	High byte of register	Read Only	Ethernet models	2nd byte of HMC's Subnet Mask i.e. 255 in 255.255. 255 .0
SW0031	HMC Subnet Mask [3rd Byte]	Low byte of register	Read Only	Ethernet models	3rd byte of HMC's Subnet Mask i.e. 255 in 255. 255 .255.0

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0031	HMC Subnet Mask [MS Byte]	High byte of register	Read Only	Ethernet models	Most significant byte of HMC's Subnet Mask i.e. 255 in 255.255.255.0
SW0032	HMC Default Gateway [LS Byte]	Low byte of register	Read Only	Ethernet models	Least significant byte of HMC's IP Address i.e. 255 in 192.168.0. 255
SW0032	HMC Default Gateway [2nd Byte]	High byte of register	Read Only	Ethernet models	2nd byte of HMC's IP Address i.e. 0 in 192.168. 0 .255
SW0033	HMC Default Gateway [3rd Byte]	Low byte of register	Read Only	Ethernet models	3rd byte of HMC's IP Address i.e. 168 in 192. 168 .0.255
SW0033	HMC Default Gateway [MS Byte]	High byte of register	Read Only	Ethernet models	Most significant byte of HMC's IP Address i.e. 192 in 192 .168.0.255
SW0034	Unit Download Port	Register (2 bytes)	Read Only	Ethernet models	TCP port used to upload /download projects etc. to / from the HMC
SW0038	Copy Screen Data to USB Status Register	Register (2 bytes)	Read Only	Touchscreen models	
SW0046	Ladder Scan Time	Register (2 bytes)	Read Only	All HMC models	Value is multiple of 0.1 mSec
SW0047	Timer Interrupt Ladder Execution Time	Register (2 bytes)	Read Only		
SW0064_00- SW0079_15	Node Status Registers for COM1	1 bit per node	Read Only	All HMC models	1: Node Present 0: Not Present. Total of 16 words are mapped for 256 nodes (0 – 255). Automatically added to database when the node is configured.
SW0080_00- SW0095_15	Node Status Registers for COM2	1 bit per node	Read Only	Touchscreen models	1: Node Present 0: Not Present. Total of 16 words are mapped for 256 nodes (0 – 255). Automatically added to database when the node is configured.
SW0096_00 – SW0111_15	Node Status Registers for COM3	1 bit per node	Read Only	Ethernet models	1: Node Present 0: Not Present. Total of 16 words are mapped for 256 nodes (0 – 255). Automatically added to database when the node is configured.

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW113	Datalog Upload Media Select Register	Register (2 bytes)	Read/Write		
SW0116	Factory Application 1	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0117	Factory Application 2	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0118	Factory Application 3	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0119	Factory Application 4	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0120	Factory Application 5	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0122	Brightness set register (retentive)	Register (2 bytes)	Read/Write	All HMC models	Set the screen brightness. Range: 0 to 100. 0 = backlight off, 100 = full brightness
SW0123	Factory Application 6	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0124	Factory Application 7	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0125	Factory Application 8	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0126	Factory Application 9	Register (2 bytes)	Read/Write	All HMC models	Reserved for factory application
SW0127	Failed Expansion reconnect time (sec)	Register (2 bytes)	Read/Write	HMC Except: HMC7030A-L	Set the time to re-establish coms with an expansion port. The default value is 60Sec
SW0128	Screen Saver tag1	Register (2 bytes)	Read/Write		
SW0129	Screen Saver tag 2	Register (2 bytes)	Read/Write		

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0137	Screen Saver tag 10	Register (2 bytes)	Read/Write		
SW0139	Number of users logged in	Register (2 bytes)	Read Only	Touchscreen models	Number of users logged in to the Web Server. Maximum is 10.
SW0140	RTC milliseconds	Register (2 bytes)	Read Only	All HMC models	Milliseconds from real time clock. (0 to 999)
SW0141	HMC IP Address Reconfigurable [LS Byte]	Low byte of register	Read Write	Ethernet models	Least Significant byte of HMC's IP Address i.e. 254 in 192.168.0. 254
SW0141	HMC IP Address Reconfigurable [2nd Byte]	High byte of register	Read Write	Ethernet models	Second byte of HMC's IP Address i.e. 0 in 192.168. 0 .254
SW0142	HMC IP Address Reconfigurable [3rd Byte]	Low byte of register	Read Write	Ethernet models	Third byte of HMC's IP Address i.e. 168 in 192. 168 .0.254
SW0142	HMC IP Address Reconfigurable [MS Byte]	High byte of register	Read Write	Ethernet models	Most significant byte of HMC's IP Address i.e. 192 in 192 .168.0.254
SW0143	HMC Subnet Mask Reconfigurable [LS Byte]	Low byte of register	Read Write	Ethernet models	Least Significant byte of HMC's Subnet Mask i.e. 0 in 255.255.255. 0
SW0143	HMC Subnet Mask Reconfigurable [2nd Byte]	High byte of register	Read Write	Ethernet models	2nd byte of HMC's Subnet Mask i.e. 255 in 255.255. 255 .0
SW0144	HMC Subnet Mask Reconfigurable [3rd Byte]	Low byte of register	Read Write	Ethernet models	3rd byte of HMC's Subnet Mask i.e. 255 in 255. 255 .255.0
SW0144	HMC Subnet Mask Reconfigurable [MS Byte]	High byte of register	Read Write	Ethernet models	Most significant byte of HMC's Subnet Mask i.e. 255 in 255 .255.255.0
SW0145	HMC Default Gateway Reconfigurable [LS Byte]	Low byte of register	Read Write	Ethernet models	Least Significant byte of HMC's IP Address i.e. 255 in 192.168.0. 255
SW0145	HMC Default Gateway Reconfigurable [2nd Byte]	High byte of register	Read Write	Ethernet models	2nd byte of HMC's IP Address i.e. 0 in 192.168. 0 .255
SW0146	HMC Default Gateway Reconfigurable [3rd Byte]	Low byte of register	Read Write	Ethernet models	3rd byte of HMC's IP Address i.e. 168 in 192. 168 .0.255

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0146	HMC Default Gateway Reconfigurable [MS Byte]	High byte of register	Read Write	Ethernet models	Most Significant byte of HMC's IP Address i.e. 192 in 192.168.0.255
SW0147	Monitor Port Reconfigurable	Register (2 bytes)	Read Write	Ethernet models	TCP port used connect to the HMC for online monitoring
SW0148	Download Port Reconfigurable	Register (2 bytes)	Read Write	Ethernet models	TCP port used to upload /download projects etc. to / from the HMC
SW0149	Display Ethernet Messages	Register (2 bytes)	Read/Write	Ethernet models	
SW0201-SW0206	Screen Login User Name	6 Words	Read/Write	Touchscreen models	
SW0207-SW0212	Screen Login User Password	6 Words	Read/Write	Touchscreen models	
SW0214	Screen Login Start Hour	Register (2 bytes)	Read Only	Touchscreen models	
SW0215	Screen Login Start Minute	Register (2 bytes)	Read Only	Touchscreen models	
SW0216	Screen Login Start Second	Register (2 bytes)	Read Only	Touchscreen models	
SW0217	Screen Login Start Date	Register (2 bytes)	Read Only	Touchscreen models	
SW0218	Screen Login Start Month	Register (2 bytes)	Read Only	Touchscreen models	
SW0219	Screen Login Start Year	Register (2 bytes)	Read Only	Touchscreen models	
SW0220	Logging Error Message	Register (2 bytes)	Read Only	Touchscreen models	
SW0221-SW0226	Old Password	6 Words	Read/Write	Touchscreen models	
SW0227-SW0232	New Password	6 Words	Read/Write	Touchscreen models	
SW0233-SW0238	Confirm Password	6 Words	Read/Write	Touchscreen models	

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0239	Baud Rate Com1	Register (2 bytes)	Read/Write	Touchscreen models	0: 4800 Baud 1: 9600 Baud 2: 19200 Baud 3: 38400 Baud 4: 57600 Baud 5: 115200 Baud 6: 187500 Baud Set bit S92 to update runtime setting.
SW0240	Parity Com1	Register (2 bytes)	Read/Write	Touchscreen models	0: No Parity 1: Even Parity 2: Odd Parity Set bit S92 to update runtime setting.
SW0241	Data Bits Com1	Register (2 bytes)	Read/Write	Touchscreen models	0: 7 Data Bits 1: 8 Data Bits Set bit S92 to update runtime setting.
SW0242	Stop Bits Com1	Register (2 bytes)	Read/Write	Touchscreen models	0: 1 Stop Bit 1: 2 Stop Bits Set bit S92 to update runtime setting.
SW0243	Node Address Com1	Register (2 bytes)	Read/Write	Touchscreen models	1 to 32. Set bit S92 to update runtime setting.
SW0244	Baud Rate Com2	Register (2 bytes)	Read/Write	Touchscreen models	0: 4800 Baud 1: 9600 Baud 2: 19200 Baud 3: 38400 Baud 4: 57600 Baud 5: 115200 Baud 6: 187500 Baud Set bit S93 to update runtime setting.
SW0245	Parity Com2	Register (2 bytes)	Read/Write	Touchscreen models	0: No Parity 1: Even Parity 2: Odd Parity Set bit S93 to update runtime setting.
SW0246	Data Bits Com2	Register (2 bytes)	Read/Write	Touchscreen models	0: 7 Data Bits 1: 8 Data Bits Set bit S93 to update runtime setting.

Tag Address	Tag Name	Type	Access	Models Supported	Description
SW0247	Stop Bits Com2	Register (2 bytes)	Read/Write	Touchscreen models	0: 1 Stop Bit 1: 2 Stop Bits Set bit S93 to update runtime setting.
SW0248	Node Address Com2	Register (2 bytes)	Read/Write	Touchscreen models	1 to 32. Set bit S93 to update runtime setting.



M memory (I/O configuration Coils)

In addition to the tags listed here, M addressed tags are assigned when an I/O module is added to the project and are used to control the I/O module. For a list of MW tags available for each module and detailed information on how to use them, refer to the appropriate product line *I/O Module Guide*

Tag Address	Tag Name	Type	Access	Models Supported	Description
M00480	System timer coil for 0.1 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00481	System timer coil for 0.2 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00482	System timer coil for 0.4 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00483	System timer coil for 0.8 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00484	System timer coil for 1 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00485	System timer coil for 2 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00486	System timer coil for 4 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00487	System timer coil for 8 sec interval	Coil (1 bit)	Read Only	Touchscreen Models	
M00512	Always On	Coil (1 bit)	Read Only	Touchscreen Models	Always on bit
M00513	Always Off	Coil (1 bit)	Read Only	Touchscreen Models	Always off bit

MW memory (I/O configuration registers)

In addition to the tags listed here, MW addressed tags are assigned when an I/O module is added to the project and are used to control the I/O module. For a list of MW tags available for each module and detailed information on how to use them, refer to the refer to the appropriate product line *I/O Module Guide*.

Tag Address	Tag Name	Type	Access	Models Supported	Description
MW0000	PLC Operation Mode	Register (2bytes)	Read/Write	All HMC models	0 = Initialization 1 = Halt mode 2 = Run mode 3 = Run in Forced mode 4 = Hold mode 6 = Fault mode  Note: If an invalid number is entered into this register, then previous value will be retained.
MW0003	Run/Stop Switch Control	Register (2 bytes)	Read/Write	All HMC models	0= Run 1 = Halt  Note: this value is stored in retentive memory
MW0031	User Interrupt program Status Flags	Register (2 bytes)	Read/Write	HMC7000 models	Status of I/O interrupt routines 0 = Running 1 = Not Running
MW0032	Always ON, OFF Bits	Register (2 bytes)	Read/Write	Touchscreen models	

Appendix C – Maintenance Modes

The HMC Series has a built in set of maintenance screens that can be used to interact with the HMC hardware outside of a MAPware project and perform maintenance tasks such as setting the HMC back to a factory default condition or recalibrating the touchscreen. Although these modes are described in detail in this chapter, we recommend that they be conducted only by qualified personnel as some of these tests require that internal memory of the HMC be erased.

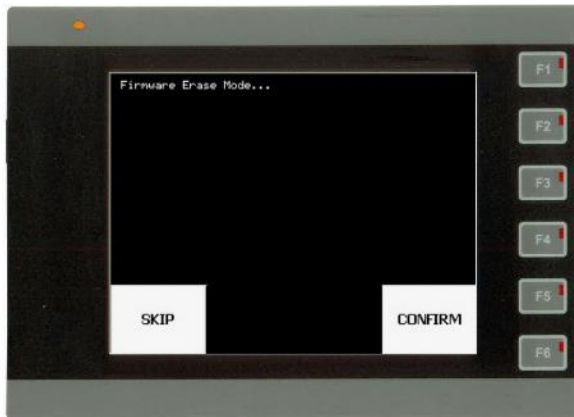
Entering Maintenance Modes

The following screens can be displayed during the initialization of the HMC. To display these screens, you must touch a specific section of the touchscreen within two seconds of applying power to the HMC.

Firmware Erase Mode (Does not apply for HMC4000 and 2000 series)

Normally, there is no reason to erase the firmware. Firmware upgrades are easily done using the MAPware software without erasing the existing firmware. However, if something unusual happens, causing the firmware to become corrupted, this step allows you to erase the firmware. To continue to operate the HMC, you must then download the latest firmware to the unit.

Enter Firmware Erase Mode by pressing the upper left corner of the touchscreen during power up:

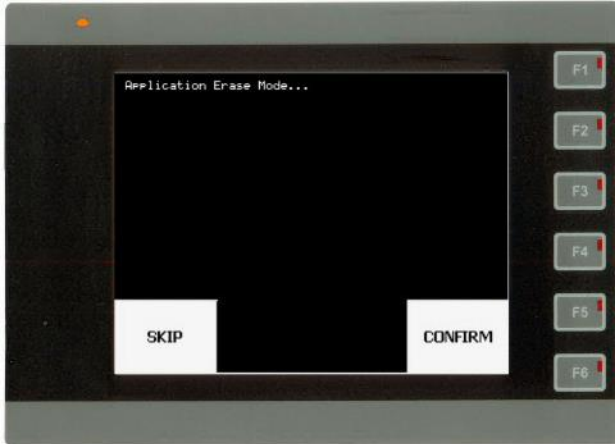


Options:

- SKIP – press this button to skip this step and proceed with the normal boot sequence.
- CONFIRM – press this button to erase the firmware. Once the operation is completed a screen will be displayed indicating that the firmware is not preset. The firmware can now be re-downloaded using MAPware.

Application Erase Mode

Enter by pressing the upper right corner of the touchscreen during power up:



Options:

- SKIP – press this button to skip this step and proceed with the normal boot sequence.
- CONFIRM – press this button to erase the application (project). Once the operation is complete a message indicating that there is no project loaded is displayed and a new project can be down loaded.

Firmware Information Mode

This is entered by pressing the lower right corner of the touchscreen during power up:

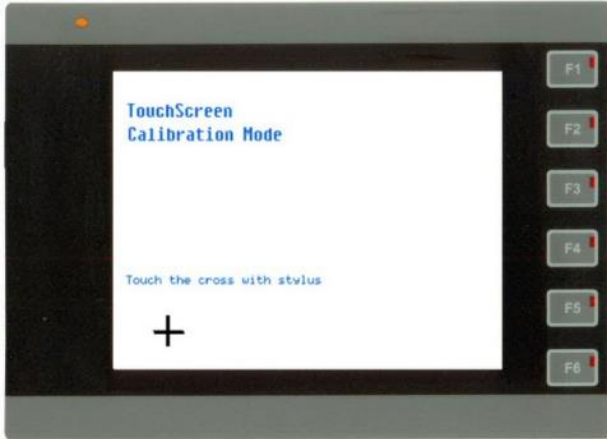


Options:

- EXIT – after reviewing the information, press this button to proceed with the normal boot sequence.

Touchscreen Calibration Screen

This is entered by pressing any area of the touchscreen (other than the points mentioned above) during power up:



Touch the crosshair symbol. The symbol will then move to the upper right corner; touch it again. Unit will calibrate and continue with the normal boot sequence.

HMC HALT mode screen

This screen is displayed when the HMC is in HALT mode. In HALT mode the HMC does not run the application. When the application is running the HMC is in RUN mode. In order to download a project the HMC must be in HALT mode.



48 There are several ways the HMC can enter halt mode:

1. When the HMC powers on it initializes, runs a power on diagnostic test. If the power on test should fail for any reason the HMC will enter HALT mode.
2. In the Download window, there is a checkbox labeled **Automatically put unit in run mode after download**. If this box is unchecked the HMC will remain in halt mode after the download is complete.
3. In the Download window, there is a checkbox labeled **Automatically put unit in halt mode before download**. If this box is checked MAPware will put the unit in HALT mode and immediately begin downloading a project. If this box is not checked, and the unit is not placed in halt mode some other way, the download will not start and an error message is displayed in the download window.
4. The HMC can be forced into HALT mode by writing a 1 to the **PLC Execution Mode** tag (MW0000), or setting the Run/Stop Switch Control tag (MW0003) to 1.

When the HALT mode screen is displayed, the F1 function key, or a soft key labeled F1 on models without function keys, toggles between the Run mode and Halt mode. The current operation mode is specified in the first line below the screen divider:

- RUN/HALT Switch position: RUN (HALT)

When this is set to RUN, the operator can press the F2 function key, or a soft key labeled F2 on models without function keys, to cause the HMC to begin executing the installed application. Pressing the F1 function key changes the operation mode to HALT.

When this is set to HALT, the F2 function key is disabled. Pressing the F1 key causes the HMC to change to RUN mode and begin executing the installed application. If you do not press the F1 key when the HMC is in HALT mode, then it will continue to display this screen after power-up.

HMC HOLD mode screen

The HMC can be placed into HOLD mode by setting the **PLC mode control** tag (MW0000) to 4. This mode suspends HMC operation and displays the HOLD mode screen:

From the HOLD mode screen the operator can toggle the Run/Stop switch control (F1), change the execution mode to HALT (F2), exit HOLD mode and resume executing the project (F3).

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