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Manual Number: DMD-GSG-M

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- 2 Quick Start**  

- 3 Troubleshooting**  

- 4 Architecture**  

- 5 Helpful Hints**  

- Video Search & Download Utility**  




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## **Do-more! Designer Software Getting Started Guide**

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**Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication.**

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**Issue:** 1st Edition, Rev. B  
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# DO-MORE! DESIGNER GETTING STARTED

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## Forward

This getting started guide is designed to assist the first time user of Do-more! Designer with getting the PLC connected and a simple program written. While this guide is written for the Do-more! BRX series of PLC, the steps herein are basically the same for any Do-more! Series PLC, including H2-DM1(E) and T1H-DM1(E).

If at any time you find yourself with questions, our technical support team is available to help. Please see the resource guide in the Appendices for more information on the available help resources.

We hope you enjoy programming your new Do-more! PLC. The Do-more! engine is an incredibly powerful processor, we think you will find it capable of nearly any task that you can attempt with it.

Good luck on your programming journey. If after you have spent some time with the system you want to tell us about your experience, please feel free to tell us in a product review or on our forums! We love to hear customer feedback.

## Overview

The BRX Platform is a Micro PLC system that uses the Do-more! Designer Software version 2.0 or newer (ADC part number DM-PGMSW). The Do-more! Designer programming software package (downloadable for free) was developed as a powerful, flexible and easy to use controls design tool.



The programming GUI features a user-friendly fill-in-the-blank design for editing ladder logic, making complex operations such as PID and motion control easy to setup while minimizing programming time. A built-in simulator allows testing of a program design concept without requiring any external hardware. This will help to reduce programming errors during the development phase of your application.

Easy to use troubleshooting tools allow you to actually see what is going on in your logic, from single stepping through the program one scan at a time to monitoring multiple elements during verification of correct program execution.

For the DirectLOGIC users that want to use the BRX Do-more! Micro PLC Unit (MPU) for projects originally written in DirectSOFT, Do-more! Designer software has a built-in DirectLOGIC migration tool that will greatly reduce the time to migrate a DirectSOFT program into Do-more! Designer.

This guide focuses on installing the Do-more! Designer software, establishing a connection to a BRX MPU, writing a simple ladder logic program and downloading it to the MPU. This should help get you familiarized with the software and get started utilizing one of the most powerful PLC's on the market.

## Before You Begin...

### Wiring Tools and Hardware

The tools and hardware shown below may be required to make connections to the BRX MPU system.



Screwdriver  
TW-SD-MSL-3



Wire Strippers  
DN-WS



Electrical and  
Signal Wire



AC Power Cord  
(Not available from  
Automationdirect.com)

## Programming Connection Options

The BRX MPU allows several built-in programming interface options. Choose from one of the following suggested communication methods for this short step-by-step introduction to the BRX platform. You should have at least one of these programming options ready and available.

- Ethernet port: A standard Ethernet patch cable



**Ethernet Cable**  
C5E-STPxx-xx

- Serial port: Using the 3-pin serial connection on the MPU



**Serial Cable**  
ZL-DB9F-CBL-2P

- POM Slot Programming Options
  - USB POM and cable assembly



**Programming Cable Assembly**  
BX-PGM-CBL

- Ethernet POM and cable



**Ethernet POM Module with Cable**  
BX-P-ECOMLT, C5E-STPxx-xx

- RS-232 serial POM (RJ12 or 3-pin)



**RS-232 Serial POM (RJ12) Module with Cable**  
BX-P-SER2-RJ12, D2-DSCBL



**RS-232 Serial POM (3-pin) Module with Cable**  
BX-P-SER2-TERM, ZL-D89F-CBL-2P



**NOTE:** Ethernet POMs, USB and Serial Cables are sold separately. USB or Ethernet cable is also required for communications between PC and CPU.

## BRX Do-more! Designer System Requirements

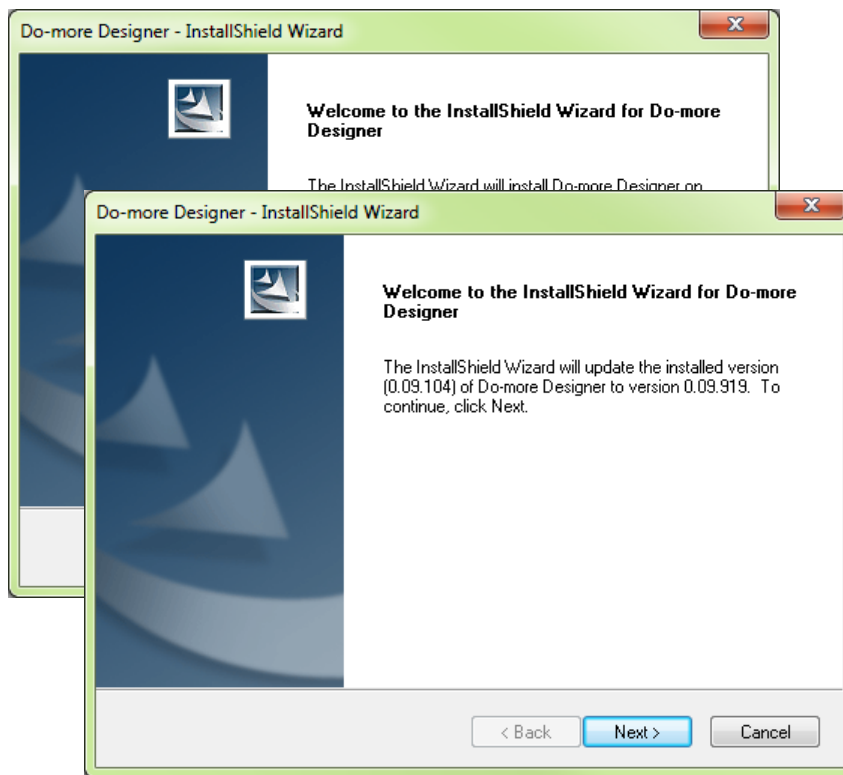
Do-more! Designer Windows-based programming software is available on CD-ROM or as a FREE download at <https://support.automationdirect.com/downloads>. Please check our website for this product's current operating systems requirements.



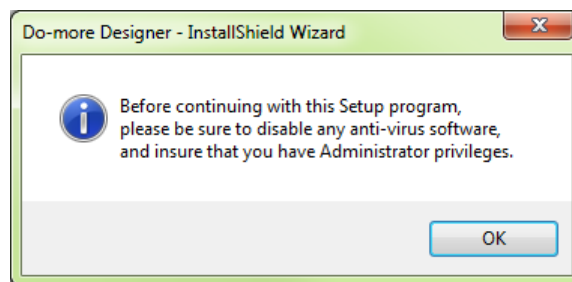
## Step 1: Install Do-more! Designer Software

Download the Do-more! Designer programming software (DM-PGMSW) from our website at <http://support.automationdirect.com/products/domore.html>, and launch the install procedure. If you already have Do-more! Designer installed, you can just update to version 2.0 or newer to get BRX MPU support.

The first window that opens displays the *Welcome* screen seen here. If there are previous versions of the software already installed, this screen will show the version number of the software being replaced as well as the one being installed. Click **Next** to continue.



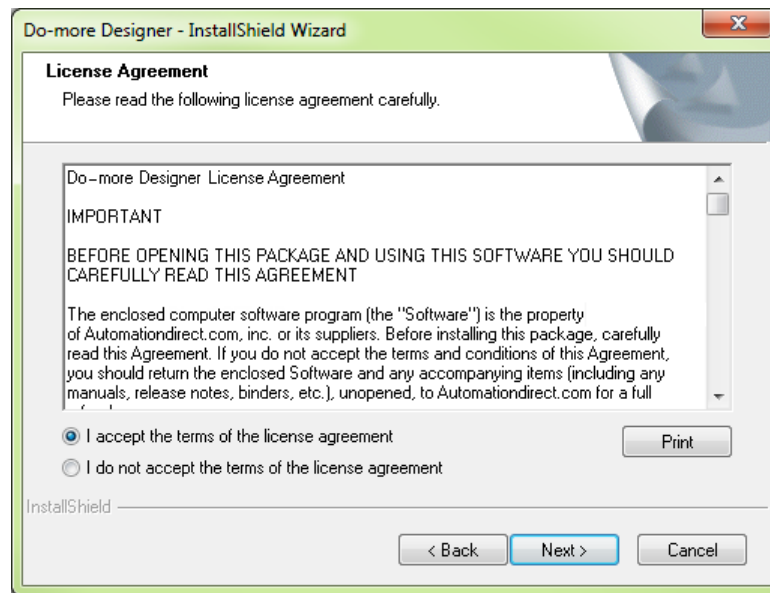
An alert window will appear requesting that all anti-virus software be disabled and also reminding the user that administrative restrictions may exist.



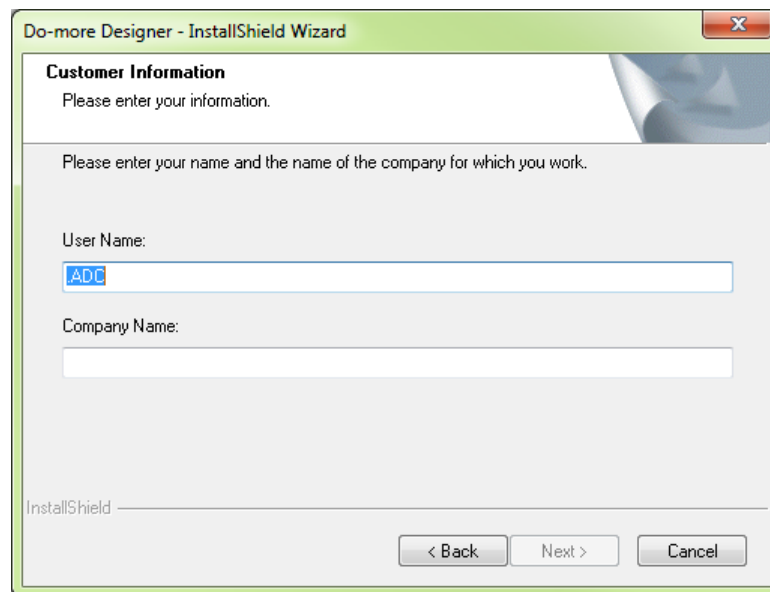


The *License Agreement* window will be displayed next. Read over the agreement, select **I accept the terms of the license agreement** and click the **Next** button to continue.

The license agreement may be printed if desired. The **Print** function will print a pdf of the *License Agreement* document to your default printer.

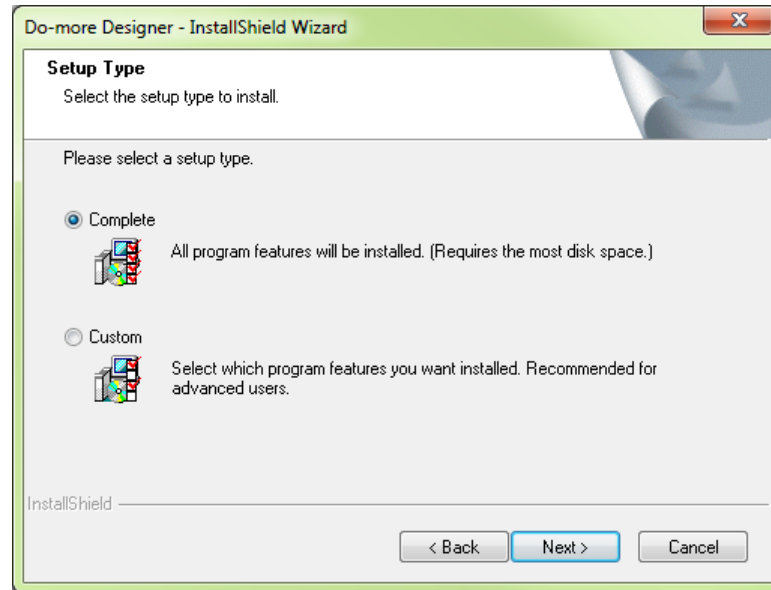


At this point the software will ask a little about you. Please fill in the user information requested on the *Customer Information* screen and click **Next** to continue.



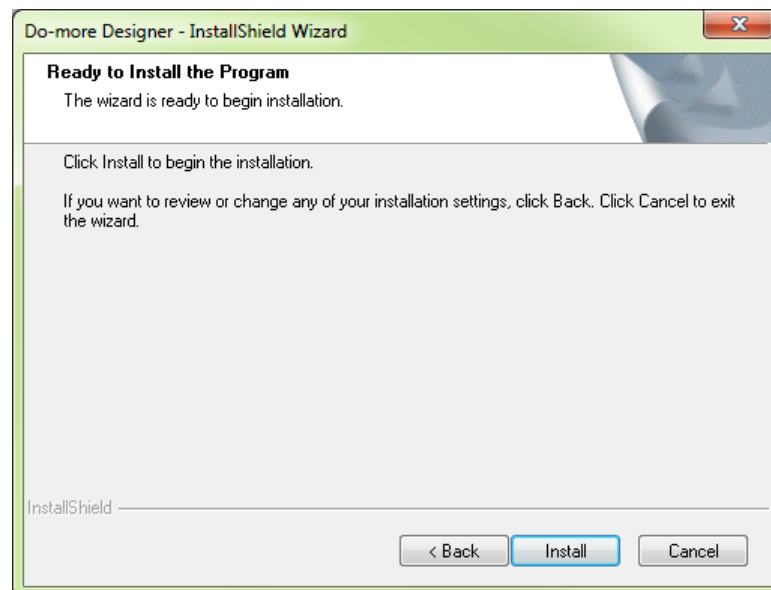
At this stage, the software will ask which type of install you would like to perform. The *Setup Type* window seen below gives two options for installation type: **Complete** and **Custom**.

**Custom** installation allows you to choose which program features to install, whereas **Complete** installation installs all of the program features available. The **Complete** installation is selected by default and is recommended for first-time users. Leave **Complete** selected (default) and click **Next** to continue.

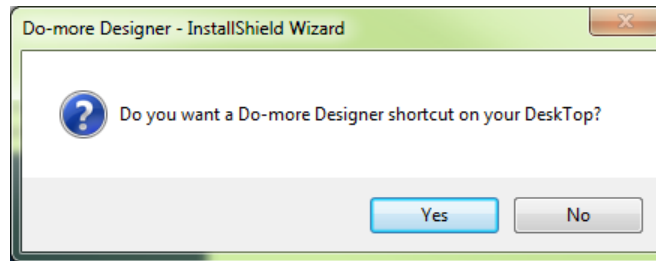


The next window to appear is the *Ready to Install the Program* window. This window is an alert window, cautioning you that the program is about to be installed. If there are any changes that need to be made to the install settings do them now before continuing.

To review or change any of the previous installation selections, click **Back** to return to the appropriate window and make the change. If no changes are necessary click **Install** to begin the installation.

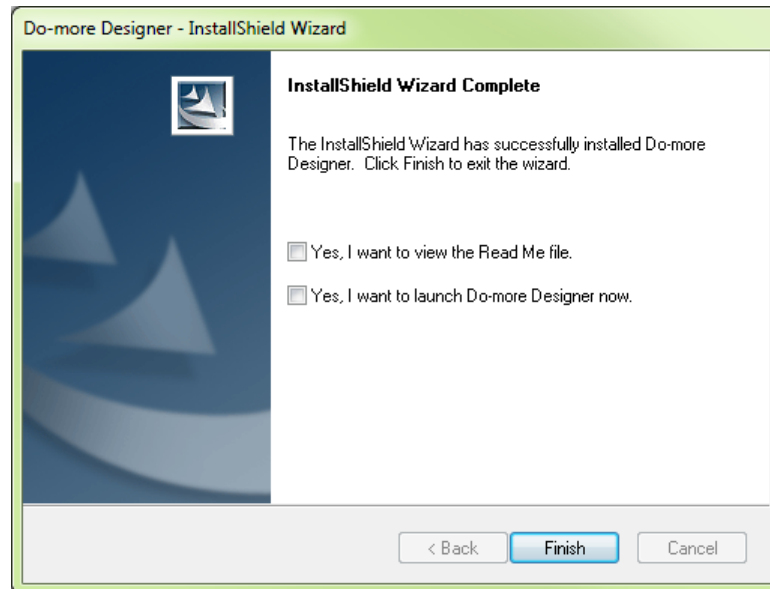


The pop-up shown here will allow you to choose to install a Do-more! Designer software desktop shortcut on your PC. Click **Yes** or **No** and continue with the installation.



The software will now install the needed folders and files while the *Setup Status* window displays the installation progress status.

Once the installation has been successfully completed, the *InstallShield Wizard Complete* window below will open.



Your software is now installed and ready to use. The installation wizard can now be closed by clicking **Finish**.



**NOTE:** By default the **Read Me File** and **Launch Do-more! Designer now** boxes are checked. Un-check either box should you choose not to view the Read Me file and not launch the software at this time.

## Step 2: Launch the Do-more! Designer Software



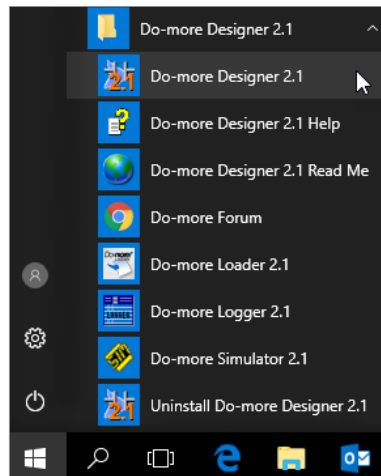
**NOTE:** For this step, ensure the BRX MPU is not powered up. Connection to your PC is in Step 3.



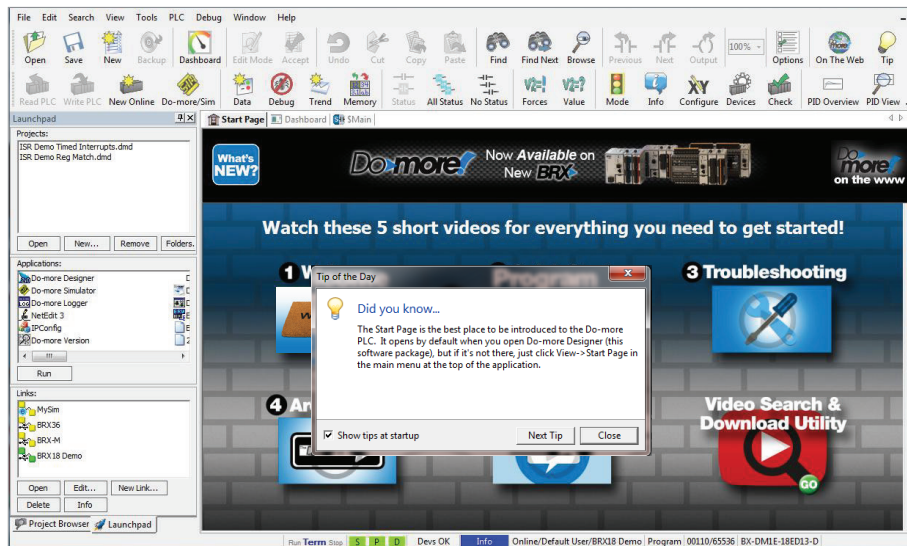
**NOTE:** There are many keyboard shortcuts available in the Do-more! Designer software. For a list of available short cuts (hot keys), view Help topic DMD0361 within Do-more! Designer, or Appendix B of this guide.

After installing the Do-more! Designer software, launch the software by double clicking the desktop Do-more! Designer icon.

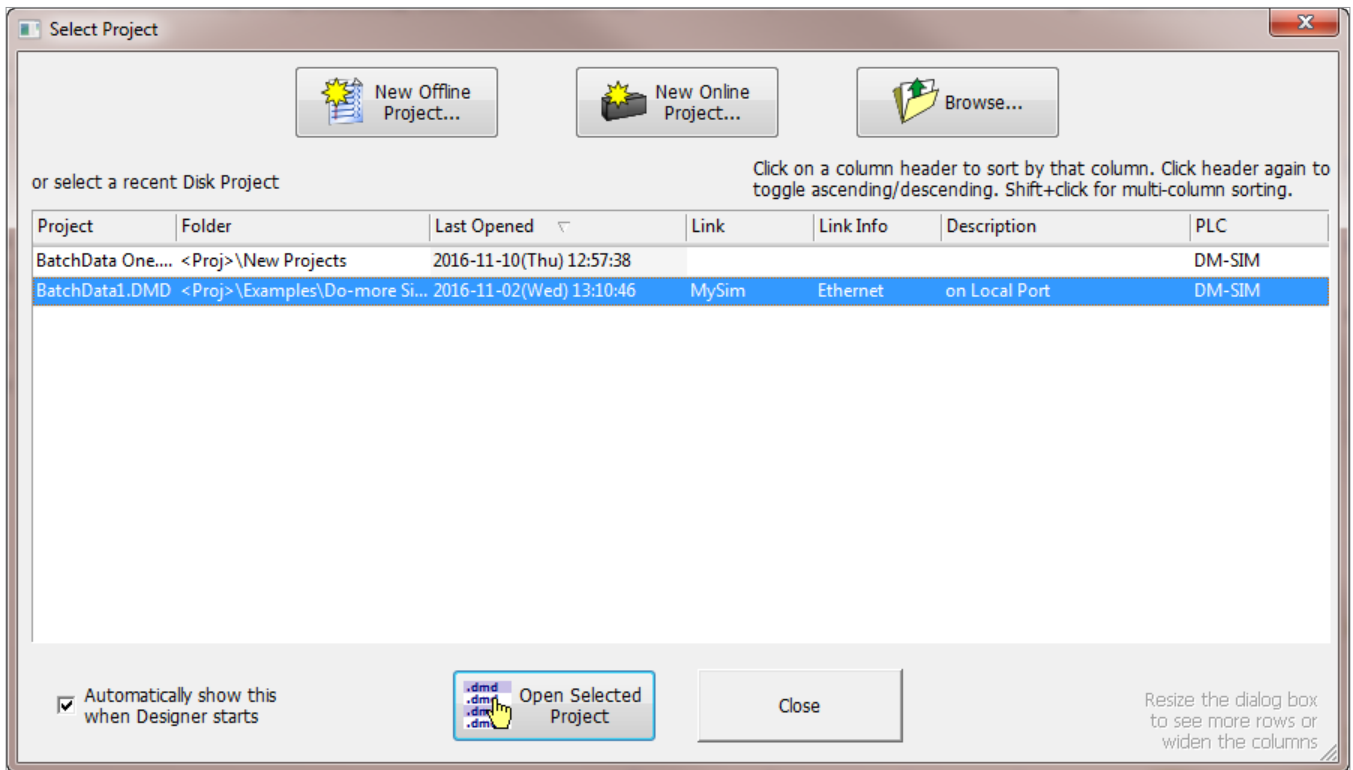
You can also launch the software from your PC *Start* menu or *All Programs* menu. If the software link is not embedded in the *Start* menu, use the path: **Start > All Programs > Do-more > Designer x.x > Do-more! Designer x.x** to launch the software.



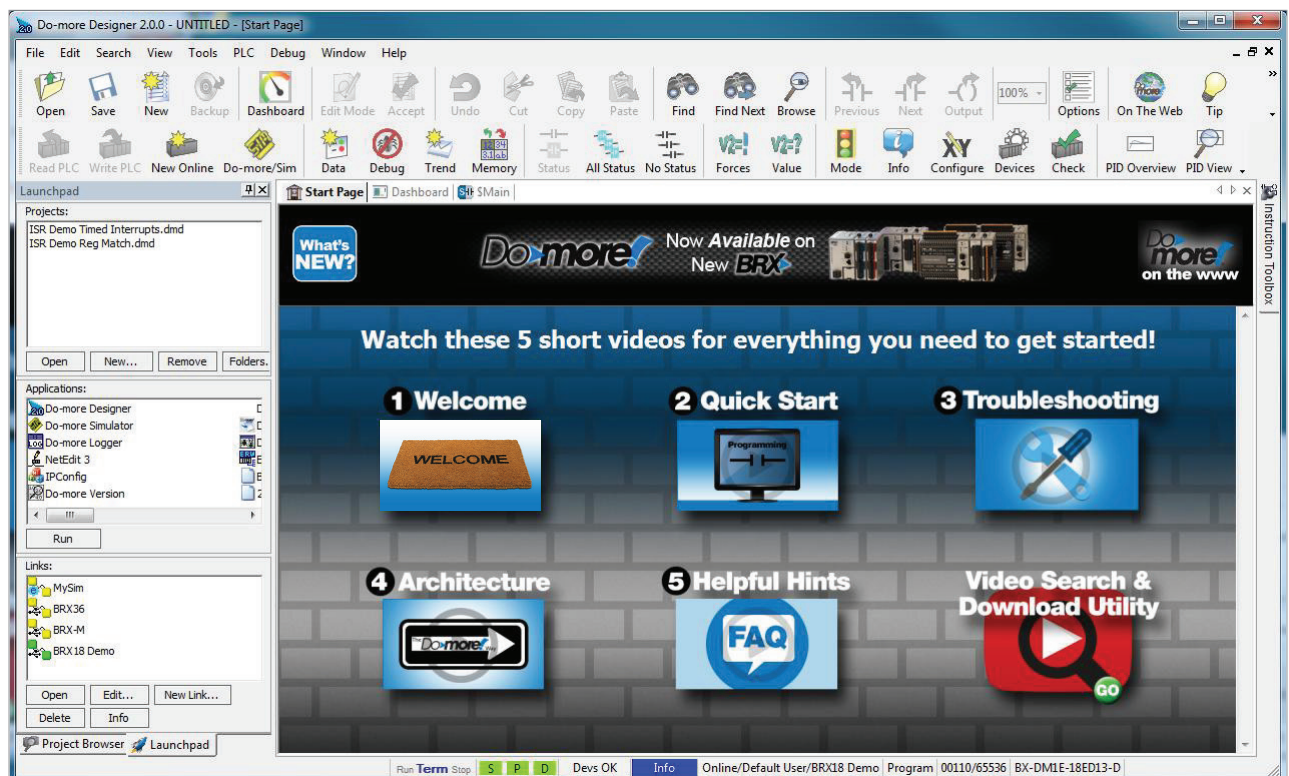
When Do-more! Designer runs for the first time it goes to the *Start Page* (area with ‘brick’ wallpaper) and the *Tip of the Day* pop-up comes up by default. This feature can be disabled by un-checking the **Show tips at startup** box in the lower left corner. Select **Close** on the *Tip of the Day* pop-up when you are finished viewing the tips.



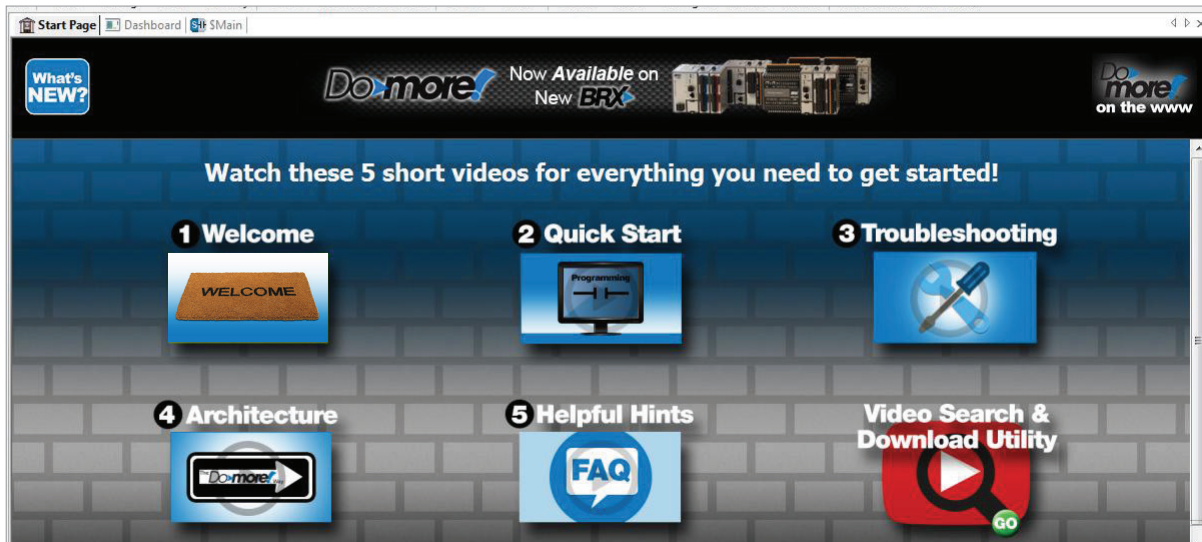
When the **Close** button on the *Tip of the Day* pop-up is pressed, the *Select Project* window comes up after a slight pause. Here you will select which project to work with - New Offline Project, New Online Project, or Browse (for a project not listed). If you have worked on current projects, they will appear below in the *Recent Project* list. As this is your initial install your window will be empty.



Press the **Close** button. The *Launchpad* area (on left side of window) is displayed with the *Startup Page* selected.



From the *Start Page*, you can select from any of 5 short videos that demonstrate how to use the software and explain how the Do-more! technology works.



**Video 1: “Welcome”**, welcomes you to the Do-more! Designer Software. This video familiarizes you with the BRX environment showing you how to connect to a BRX MPU, open a project, etc.

**Video 2: “Quick Start”**, walks you through writing and documenting a simple program and downloading it to the BRX MPU.

**Video 3: “Troubleshooting”**, introduces you to and shows you how to use the troubleshooting and debugging tools built in to the Do-more! Designer software.

**Video 4: “Architecture”**, explains how the Do-more! Technology works. Understanding the Do-more! Technology allows you to take advantage of the built-in features allowing you to create projects easier and decreasing the amount of programming time needed.

**Video 5: “Helpful Hints”**, covers some of the most common BRX MPU programming challenges and explains how easily Do-more! Designer can help with these challenges.

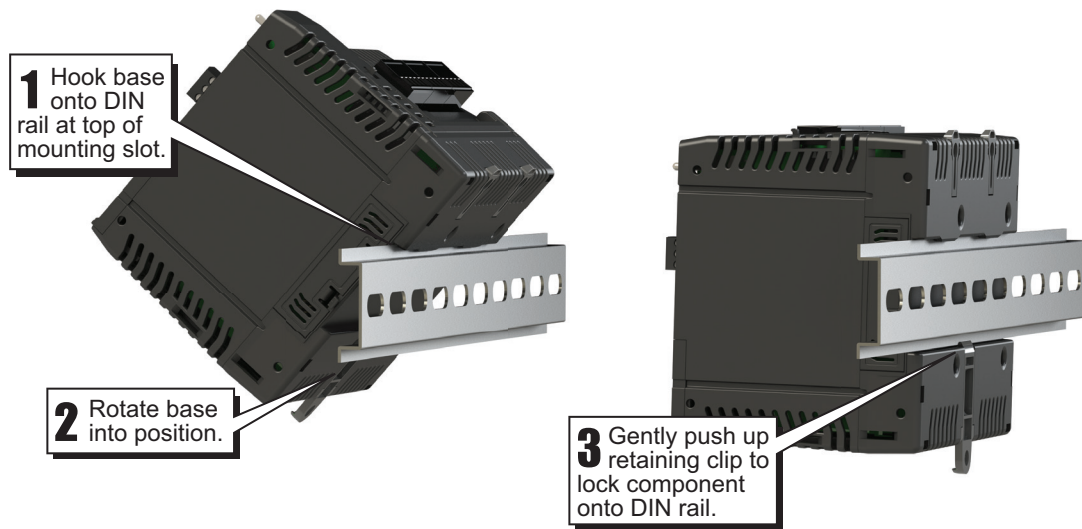
The **Video Search & Download Utility** opens a search window and download screen.

## Step 3: Prepare the Hardware

The “Installation and Wiring” chapter of the BRX User Manual (BX-USER-M) contains detailed information for your specific model.

The following summary explains the basic steps needed to get the BRX MPU ready to establish a link so you can program and run a project.

1. Installing the BRX MPU on DIN rail:
  - a. Hook rear upper tabs over flange of DIN rail.
  - b. Rotate the unit down toward the DIN rail, pressing firmly until the BRX MPU snaps securely to the DIN rail.



2. There are three ways to connect to the BRX MPU for programming:
  - a. Using the USB POM with a USB programming cable.
  - b. Using Ethernet cable with built-in Ethernet port.
  - c. Using RJ12 Serial POM module and RJ12 programming cable or via the built-in 3-pin serial port connector with user supplied cabling.

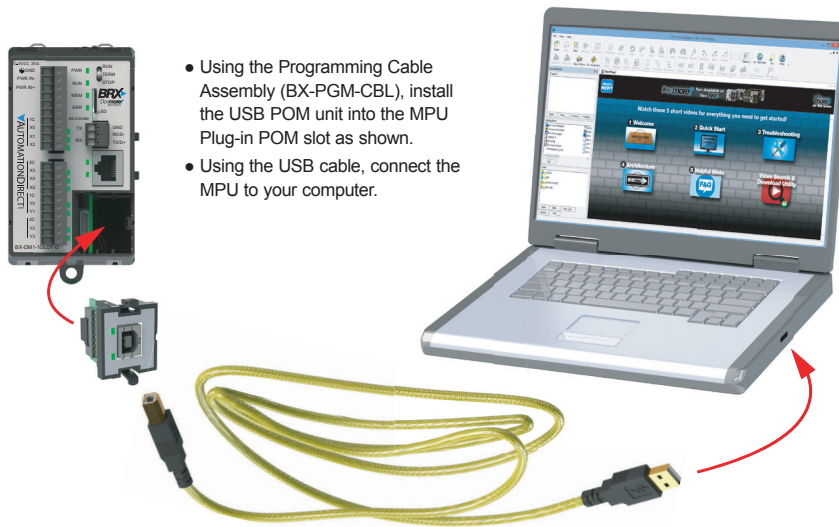
Examples of each connection type are shown on the following pages.



**NOTE:** All communication connections between the BRX MPU and PC should be completed prior to launching Do-more! Designer software.

## A. Connect BRX USB to Computer Using Programming Cable

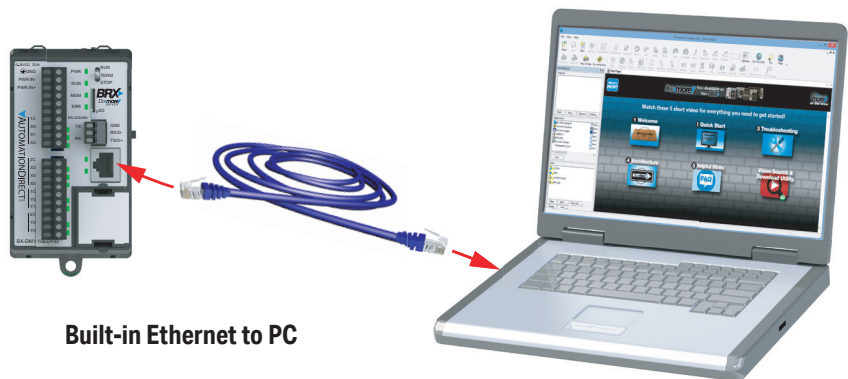
For USB connectivity the BX-PGM-CBL assembly is required. This assembly includes one USB POM module (BX-P-USB-B) and one 6ft USB-A to USB-B cable (USB-CBL-AB6).



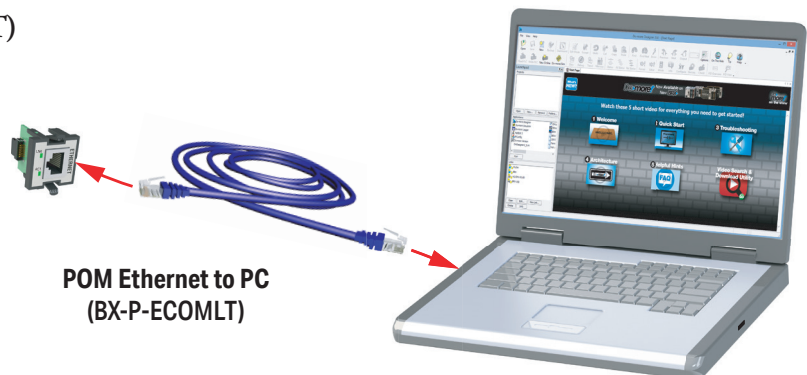
## B. Connect BRX Ethernet to Computer Ethernet

There are two options for connecting the BRX via Ethernet to a PC. One option is to use the built-in Ethernet port and connect to the PC via a Cat5 Ethernet cable. An alternate connection is available by using the optional Ethernet POM (BX-P-ECOMLT) module that plugs into the POM slot on the MPU. Both Ethernet options support 10/100Base-T via the RJ45 port. The Ethernet port supports Auto-Crossover, which allows the use of a Cat5 patch or crossover cable.

### Built-in Ethernet Port



### BRX POM Ethernet (BX-P-ECOMLT)



**NOTE:** When connecting to a BRX MPU via Ethernet for the first time, you will need to use the NetEdit 3 tool. Please see your device's user manual for NetEdit instructions.



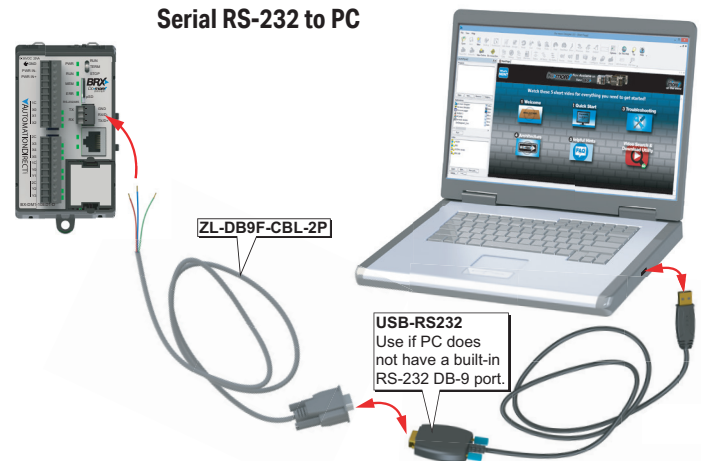
## C. Connect BRX Built-in Serial Port BRX POM serial port to Computer Serial or USB Port

It is possible to connect to the BRX using the CPU's built-in serial port or by installing the BRX POM serial port, BX-P-SER2-RJ12.

### BRX Built-in Serial Port.

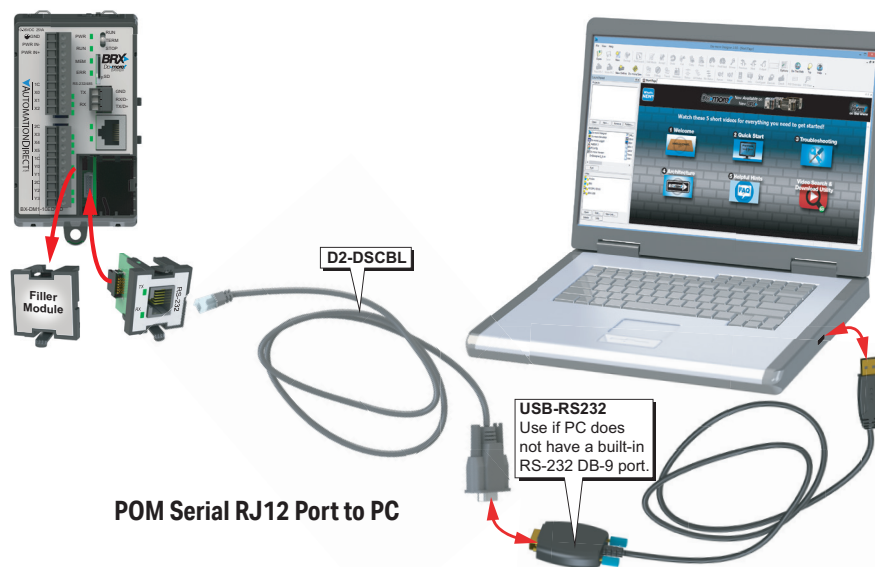
There are two options to consider for connecting the BRX built-in serial port to a PC. The first option uses a ZL-DB9F-CBL-2P to a PC USB port using a USB to Serial adapter (USB-RS232, as shown below). If the PC has a 9-pin serial port connection, you don't need to use the USB to Serial adapter. The second option (not shown) is to use a user built cable to connect the built-in 3-pin serial port to the PC serial port or USB to Serial adapter.

| BRX 3-Pin Serial Port |      |        |        |                |
|-----------------------|------|--------|--------|----------------|
| ZL-DB9F-CBL-2P        |      |        | To     | 3-pin Terminal |
| Pin #                 | Term | Color  |        |                |
| 2                     | RXD  | Brown  | .....  | TXD            |
| 3                     | TXD  | Red    | .....  | RXD            |
| 5                     | GND  | Yellow | .....  | GND            |
| 7                     | RTS  | Blue   | Jumper |                |
| 8                     | CTS  | Violet |        |                |



### BRX POM Serial Port

The BRX Serial POM (BX-P-SER2-RJ12) can connect to a PC by using the D2-DSCBL programming cable. The 9-pin connection of the D2-DSCBL cable can be connected to a serial port on a PC or to a USB to Serial adapter (USB-RS232, as shown below).

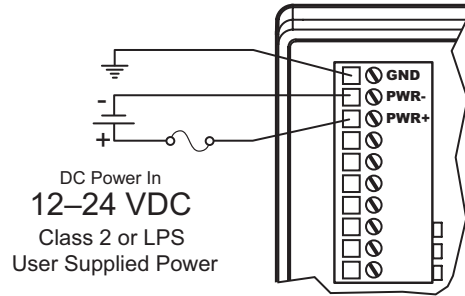


## Step 4: Apply Power to the PLC



**WARNING:** Minimize the risk of electrical shock, personal injury, or equipment damage. Always disconnect the system power before installing or removing any system component.

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Once all of the power wiring has been completed and verified, connect the appropriate voltage source to the power supply and power up the system. The BRX MPU will perform a self-evaluation once power is applied.

The following summary explains the basic steps needed to get the BRX MPU ready to establish a link for programming and running a project.



**NOTE:** Please see Chapter 1 of the BRX User Manual for the power wiring diagram corresponding to your specific BRX MPU.

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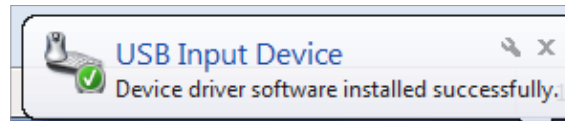
## Step 5: Establish PC to BRX MPU Communications

The BRX MPU should now be powered up and the programming cable connected.

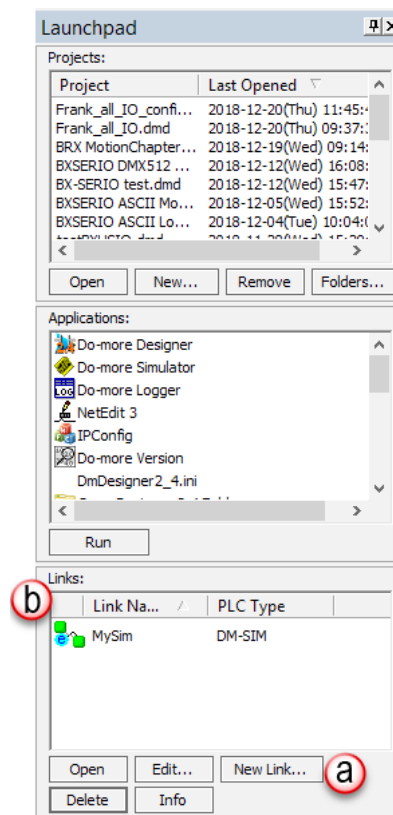


**NOTE:** The following example assumes that you are using the USB POM.

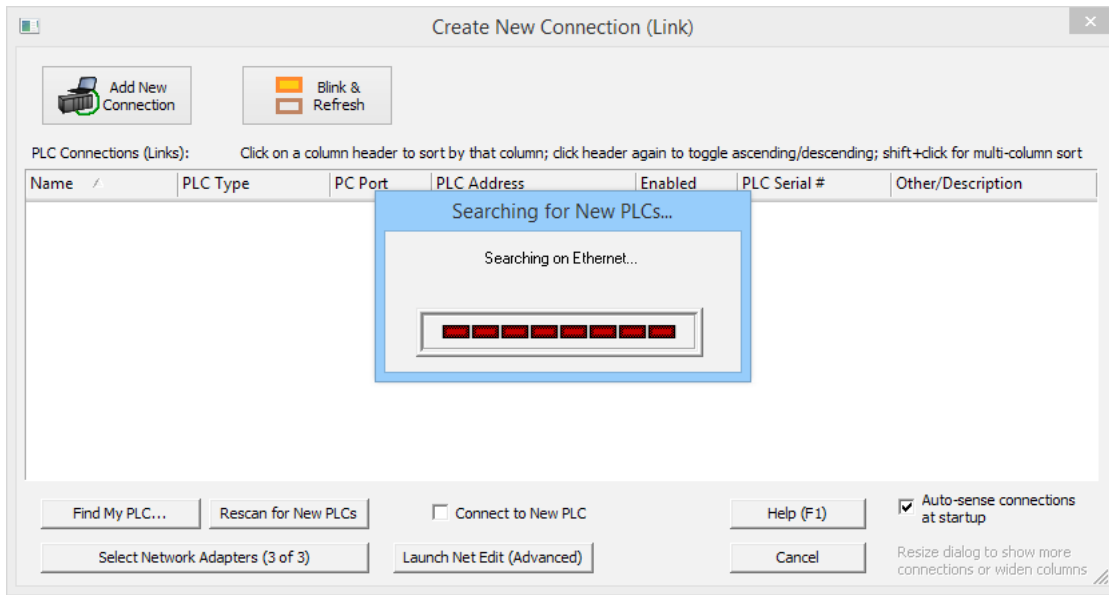
The first time the BRX USB POM is connected to your PC, you should see a message on your PC indicating that the driver for the USB device was successfully loaded:



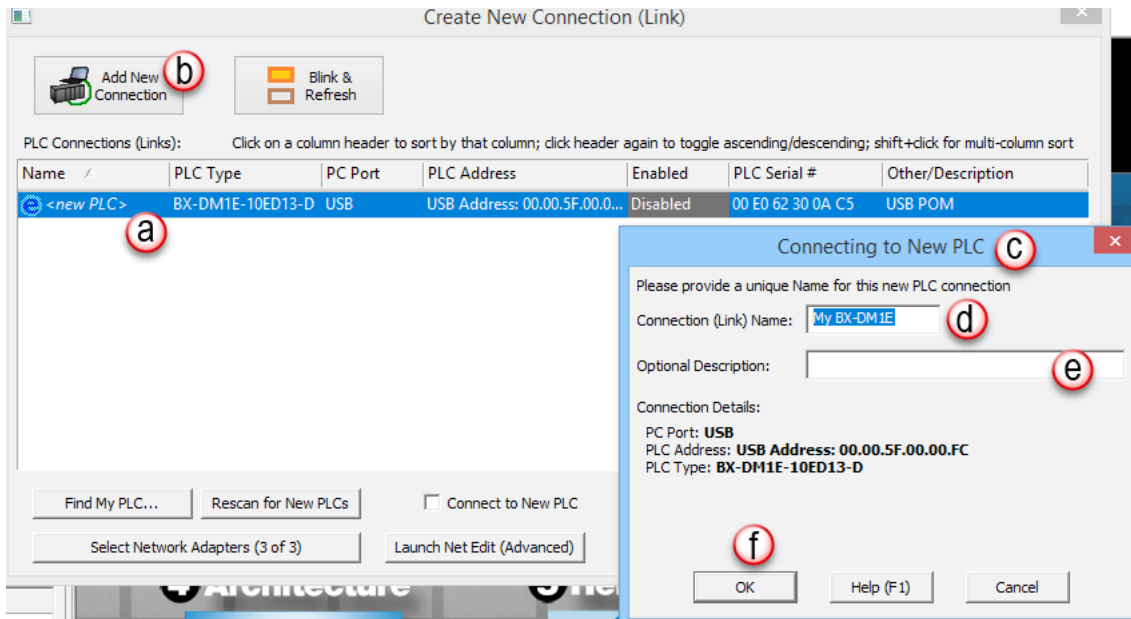
After connecting the USB cable between the MPU and the PC, click the (a) **New Link...** button in the (b) *Links* windows of the *Launchpad* area.



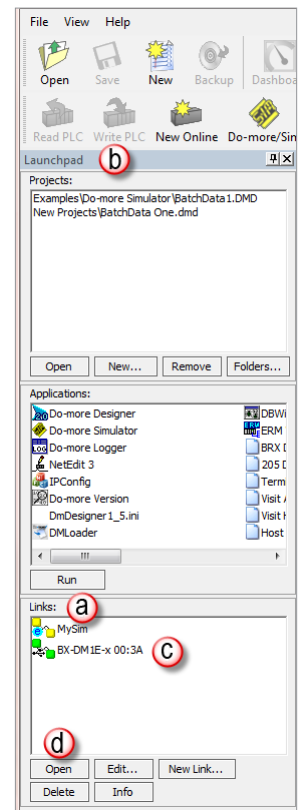
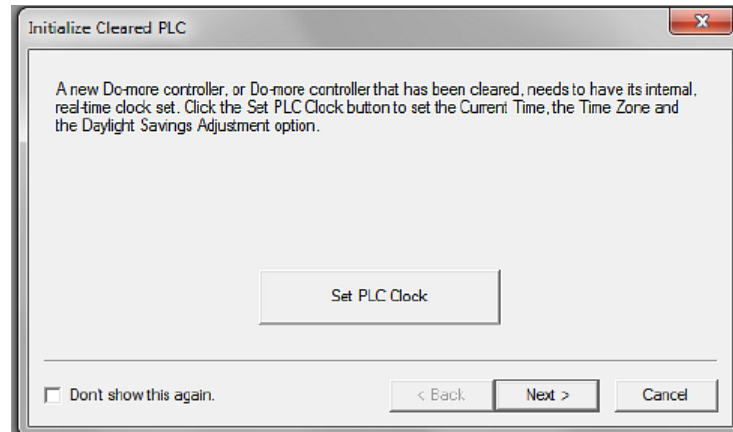
This brings up the *Create New Connection (Link)* dialog page and it begins to search for devices on the Ethernet, Serial and USB ports.



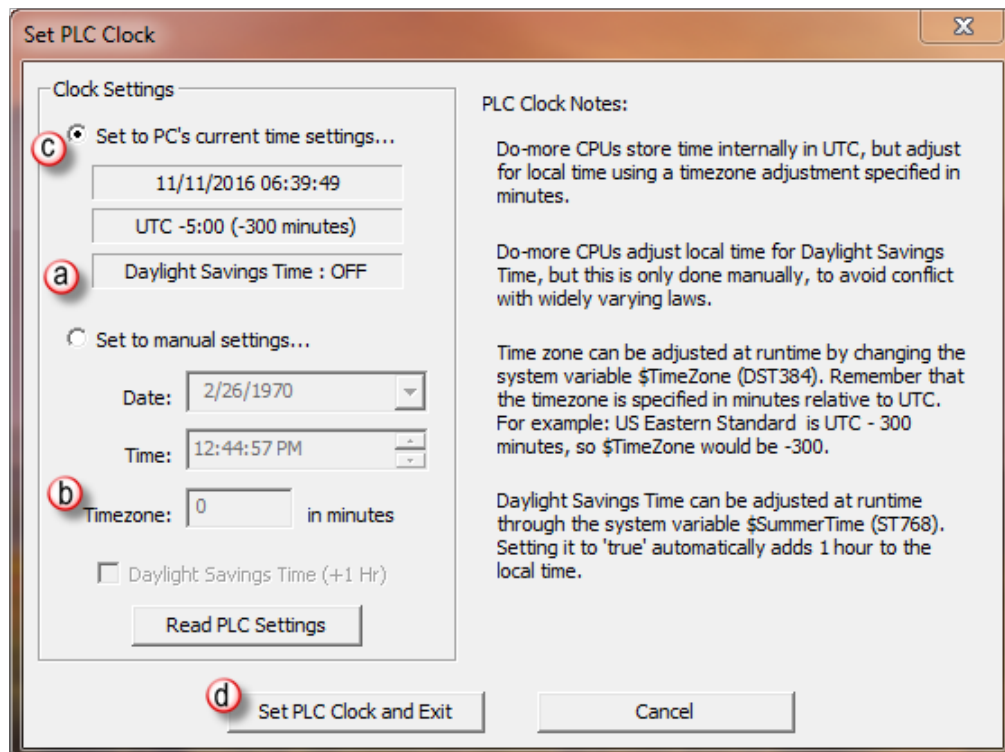
When the search is complete, the (a) MPU with the USB POM we are connected to will be displayed on the list. With this MPU highlighted on the list, click on (b) Add New Connection button. This brings up the (c) Connecting to New PLC dialog. Here you can enter a new (d) Connection (Link) Name, or use the default name, My BX-DM1E, and you can enter (e) an Optional Description. When finished press the (f) OK button.



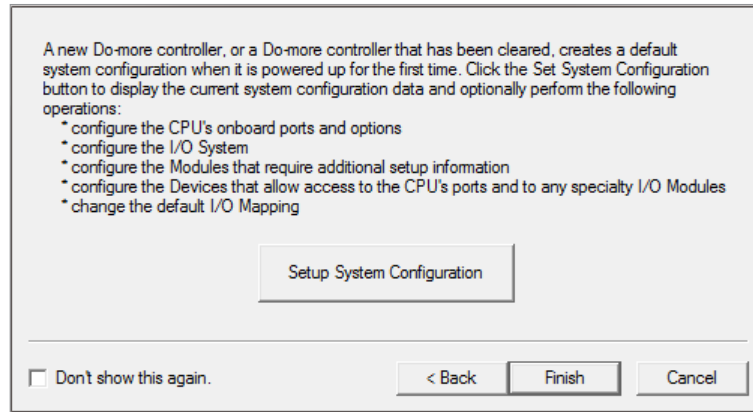
1. We are now ready to go online with the MPU. In the (a) *Links* section of the (b) *Launchpad*, select the (c) USB link; in this example it is called BX-DM1E-X 00:3A. Click on (d) **Open** button.
2. Once connected to the MPU, you may encounter the initialization screen shown below. This will appear on first initialization of a new MPU. Select **Set PLC Clock** to set the clock in the new MPU to be synchronized with your PC clock.
3. The *Set PLC Clock* option allows you to set the internal, real-time clock of the BRX MPU.



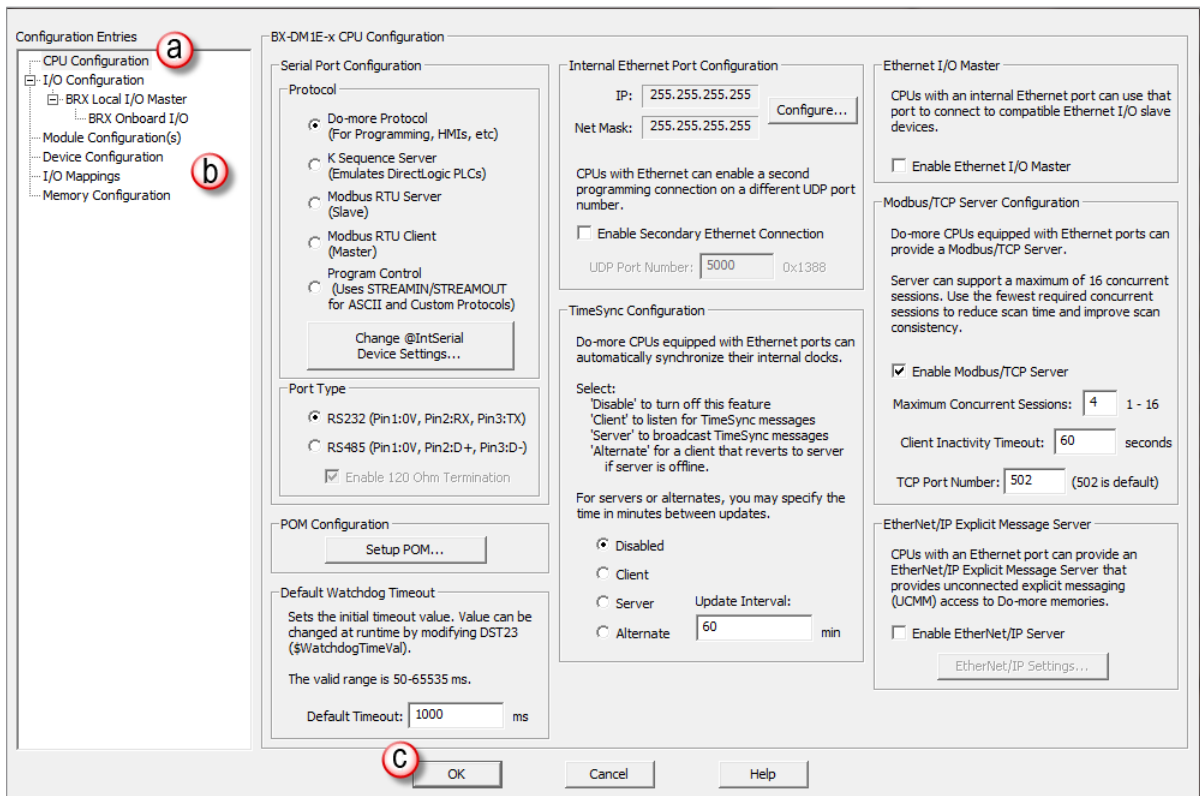
The *Set PLC Clock* window has options for (b) *Timezone* and (a) *Daylight Saving Time* adjustments. Select (c) **Set to PC's current time settings** then select (d) **Set PLC Clock and Exit**.



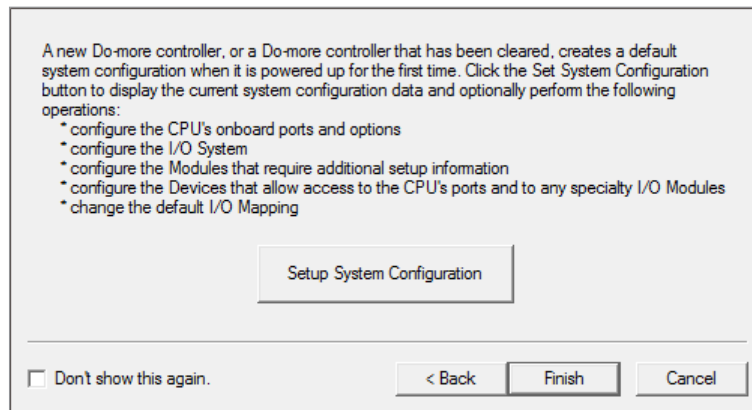
- The option for *Setup System Configuration* appears next (below). This allows you to configure parameters of the BRX MPU, such as onboard communication port configuration, I/O configuration (i.e. high-speed), and mapping. Select **Setup System Configuration**.



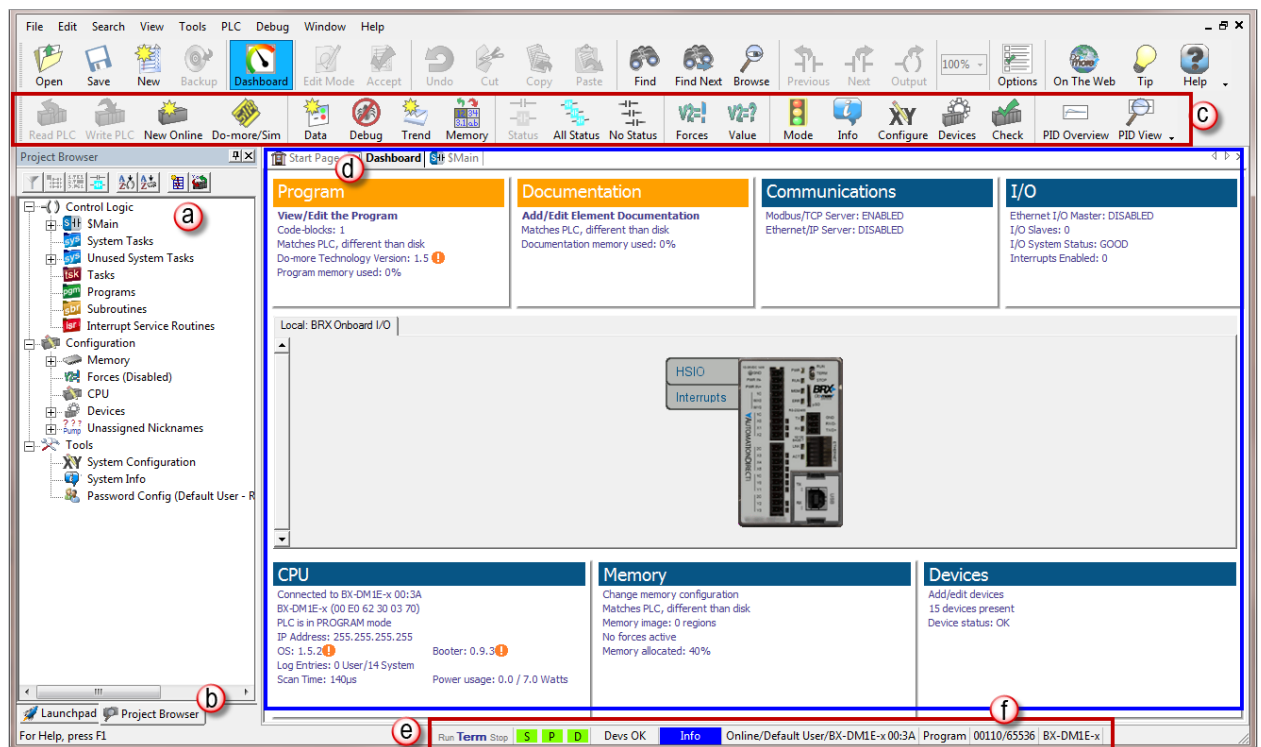
- The *System Configuration* window appears next with the (a) *CPU Configuration* selected by default. This window and those indexed in the (b) *Configuration Entries* tree on left, expose many of the system operating parameters for your MPU. For purposes of this introduction we will accept the default settings. Click (c) **OK**.



The *Setup System Configuration* box reappears. Select **Finish** button to move to next step.



6. The *Project Browser* (a, b), including the *Dashboard* (d), will open with the online toolbar (c) active. Notice the status bar indications (e, bottom of window) show the MPU type, memory usage, communication status, errors, and mode, etc. Hovering your mouse over the status bar (e) will highlight the items that are selectable.



If you select one of the items, a new window will open with real-time data and available options. For example, the *System Information* window seen in the next figure, opens after selecting the memory usage values (f) in the status bar. This information and much more can be accessed by way of the *Dashboard*.

General Information | System Status | Event Logs

Type  
PLC Type: BX-DM1E-x  
Serial Number: 00 E0 62 30 03 70

Mode  
Keyswitch: TERM  
PLC Mode: Program

Scan Times  
Min: 140 us [Reset]  
Avg: 140 us  
Max: 496 us [Reset]

System Clock  
Date: 11/11/2016 Time: 08:49:08  
Time Zone: UTC -5:00 DST: OFF  
[Set]

Node and IP Configuration  
Module ID: 0 IP Address: 255.255.255.255  
Name: H1-DM1x Subnet Mask: 255.255.255.255  
Description: Do-more PLC! Gateway: 0.0.0.0  
[Set Node and IP Configuration]

Memory Usage  
Max Program: 65536  
Program Used: 0  
Max Documentation: 1048576  
Documentation Used: 0

CPU Version Information  
Do-more: 1.5.0 [Update]  
OS: 1.5.2\* [Update]  
Booter: 0.9.3\* [Update]  
FPGA: 1.3  
Hardware: 1B  
[Use Live Update to get Firmware]

Program Version Information  
Do-more: 1.0.0  
[Show Do-more Technology Versions]

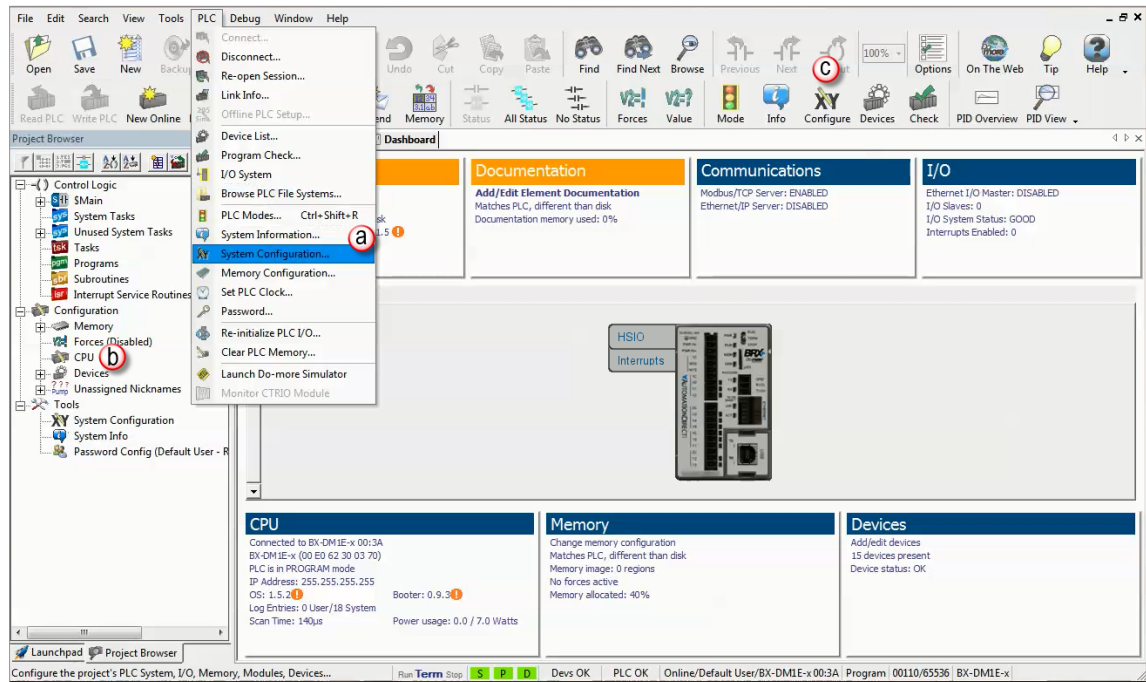
[OK] [Help]



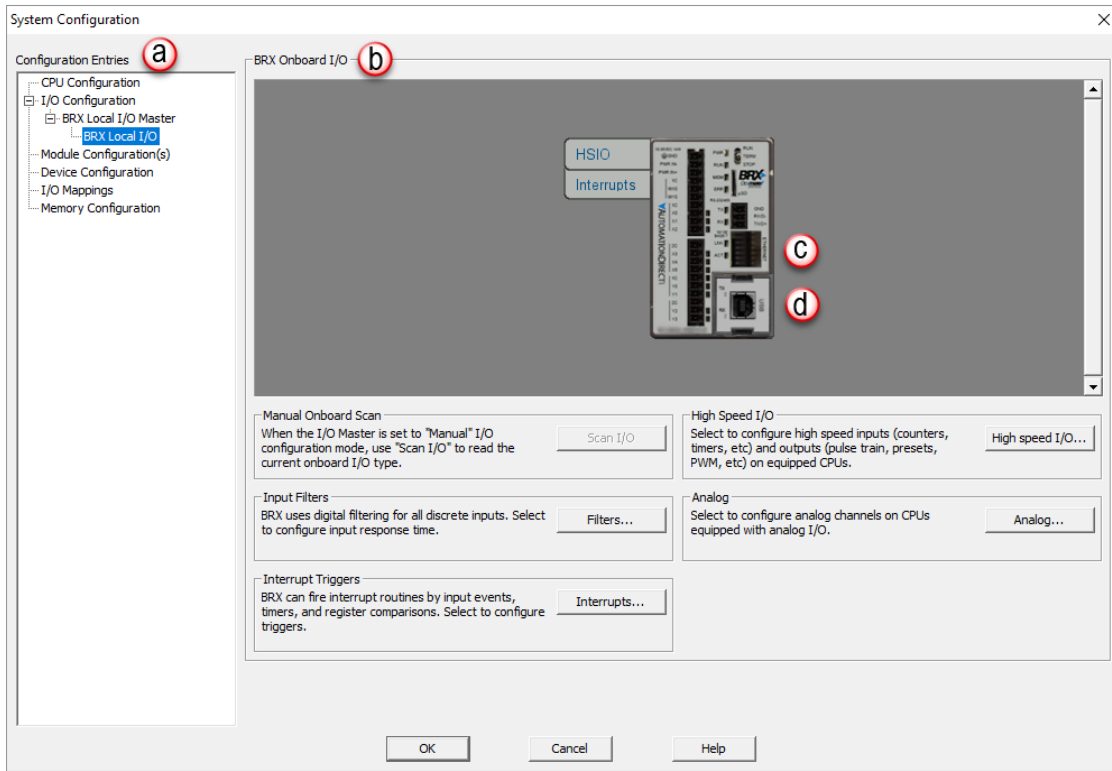
## Step 6: Verify Hardware Configuration

Next we will verify the hardware configuration. The BRX series has an auto discover feature that will automatically detect installed I/O modules. You can access the System Configuration in three ways:

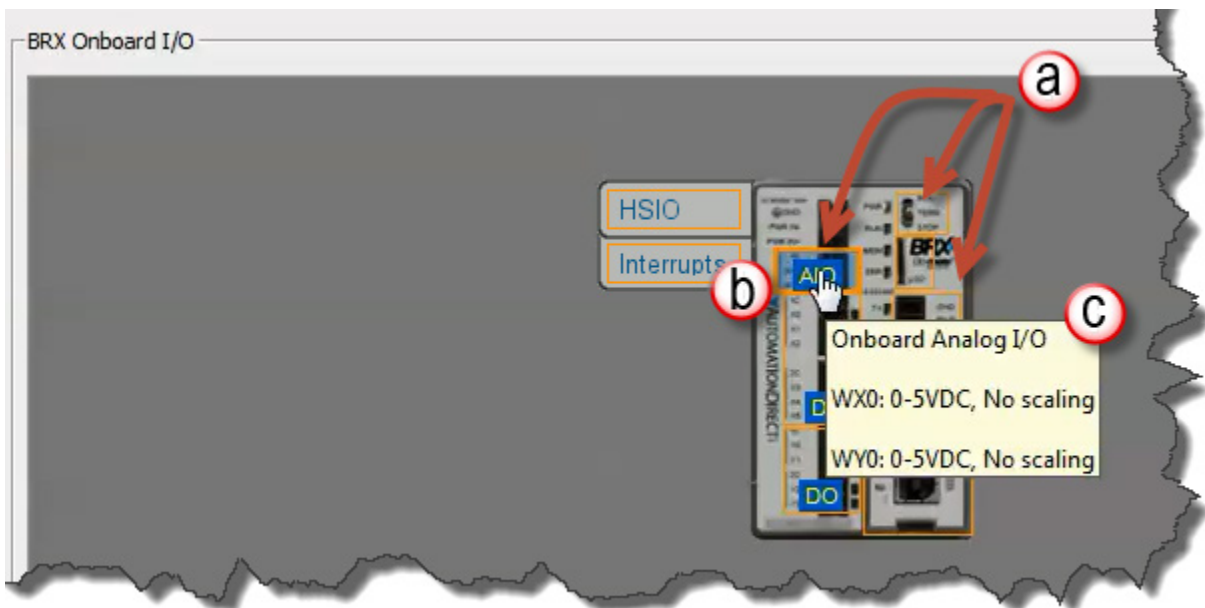
1. By selecting (a) **PLC > System Configuration**
2. By double clicking on the (b) **CPU** link under the *Configuration* tab in the *Project Browser*
3. By clicking the (c) **X/Y Configure** icon on the project toolbar.



On the left side of the System Configuration window is an index of topics titled (a) *Configuration Entries*. The (b) *BRX Local I/O* allows you to view the modules the software has detected. For this example, we are working with a BX-DM1E-10ER3 MPU and no expansion I/O. This unit has a built-in (c) Ethernet port and a (d) USB POM plugged in which show up in the overview graphic.

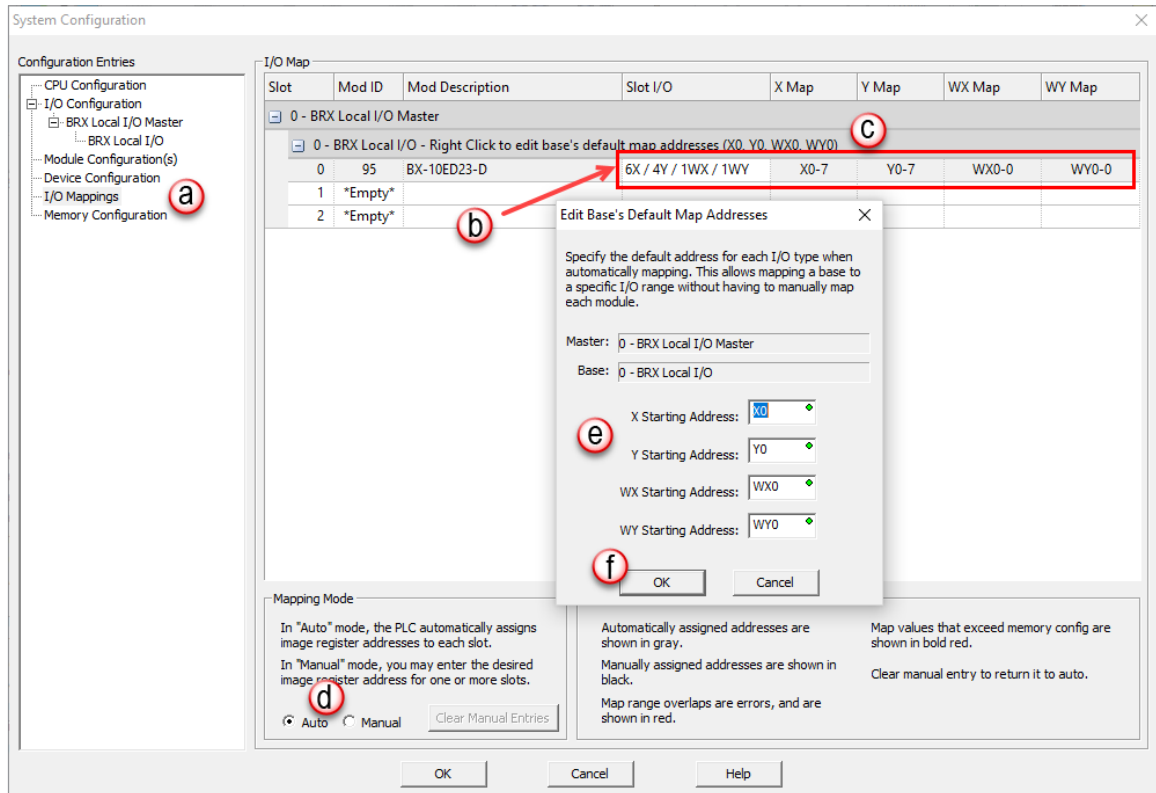


The (a) BRX Local I/O graphic area is interactive, like the system *Dashboard*, and as you hover and move across the image (b) “orange” boxes will appear and display information about the highlighted section.



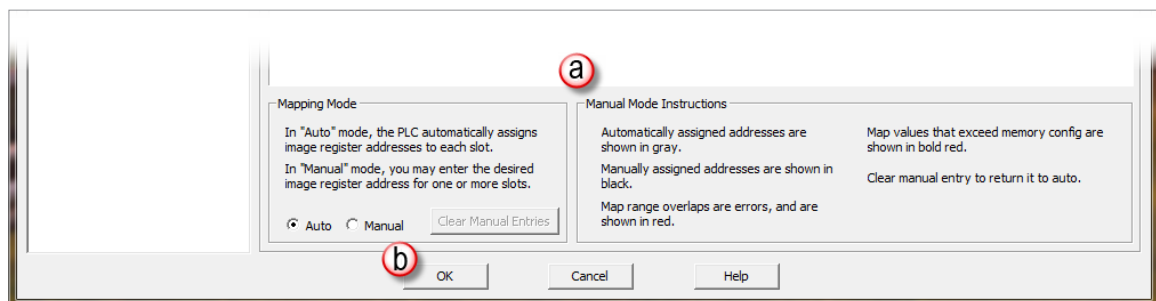
Also if the highlighted section can be configured you can click in the highlighted area and a configuration screen will pop up. For example hovering over (b) the built-in analog I/O hot spot, a pop up will display information on how the analog I/O is configured.

After the hardware configuration is verified, select (a) the *I/O Mappings* option in the *Configuration Entries* index. This option will display (b) the assigned addresses for the available I/O, as seen below.



These (c) X (discrete input), Y (discrete output), WX (analog input) and WY (analog output) addresses are automatically assigned by Do-more! Designer. You have the option to manually configure these addresses by selecting (d) **Manual** in the Mapping Mode section at the bottom of the window or by right clicking (g) **BRX Local I/O**. Change default starting address in (e) *Edit Base's Default Map Addresses* dialog box. Click (f) **OK** when completed to close *Edit Base's Default Map Addresses* dialog box.

The (a) *Manual Mode Instructions* section, also found at the bottom of the window, details the various color indications associated with this mode.



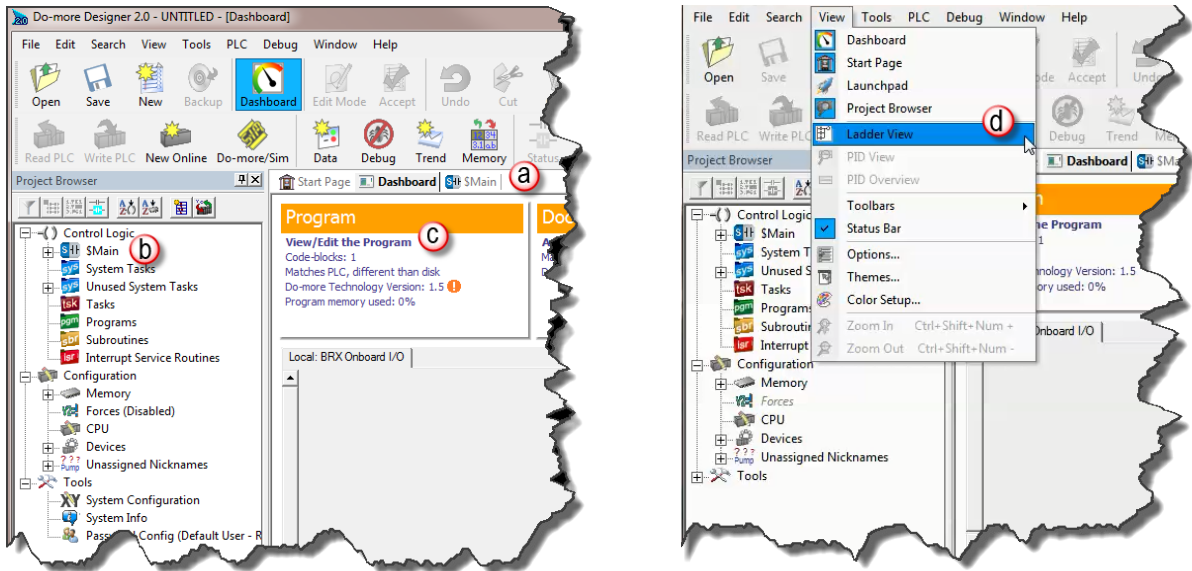
Once the hardware and mapping is configured and verified, click (b) **OK** to return to the main screen, displaying the *Dashboard* and the *Project Browser*.

## Step 7: Create a Ladder Logic Program

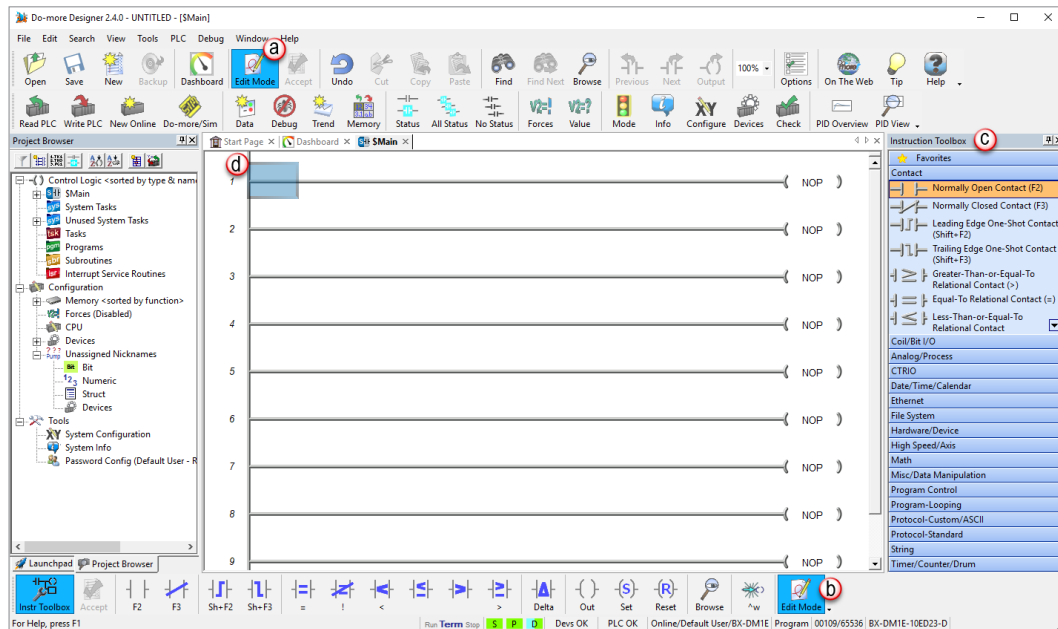
In order to create a ladder logic program, you will need to be in Edit Mode. All programs start with a default *\$Main* code block. We will be adding our ladder logic to this code block.

We can get to the *\$Main* code block four different ways:

1. By selecting the (a) *\$Main* navigation tab.
2. By double clicking on the (b) *\$Main* option under the *Control Logic* section of the *Project Browser*.
3. By selecting (c) **View/Edit the Program** under the Program section of the *Dashboard*.
4. By using the drop-down menu (d) **View > Ladder View**, as seen below.

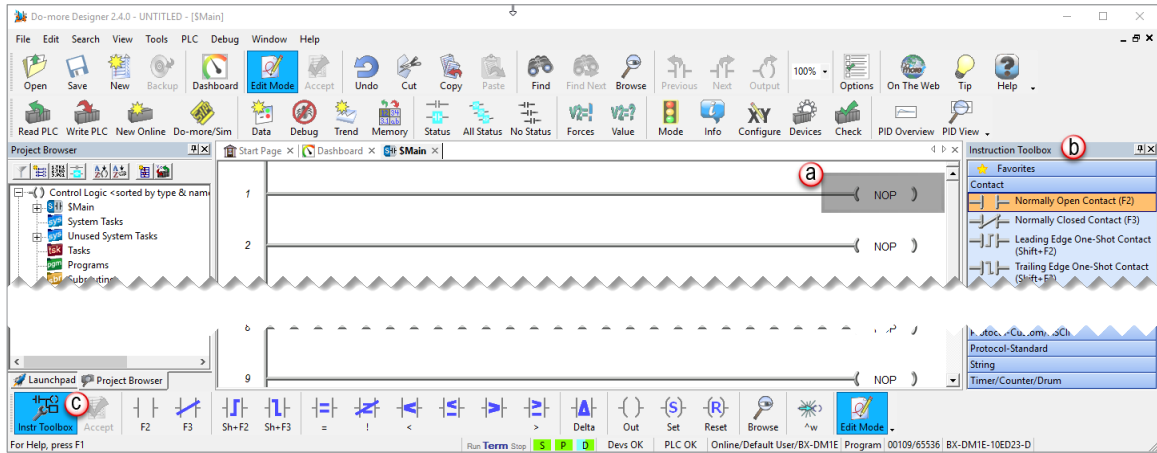


When in (a, b) *Edit Mode*, (c) *Instruction Toolbox* options will become active. The cursor will be positioned on (d) Rung #1 and highlighted.



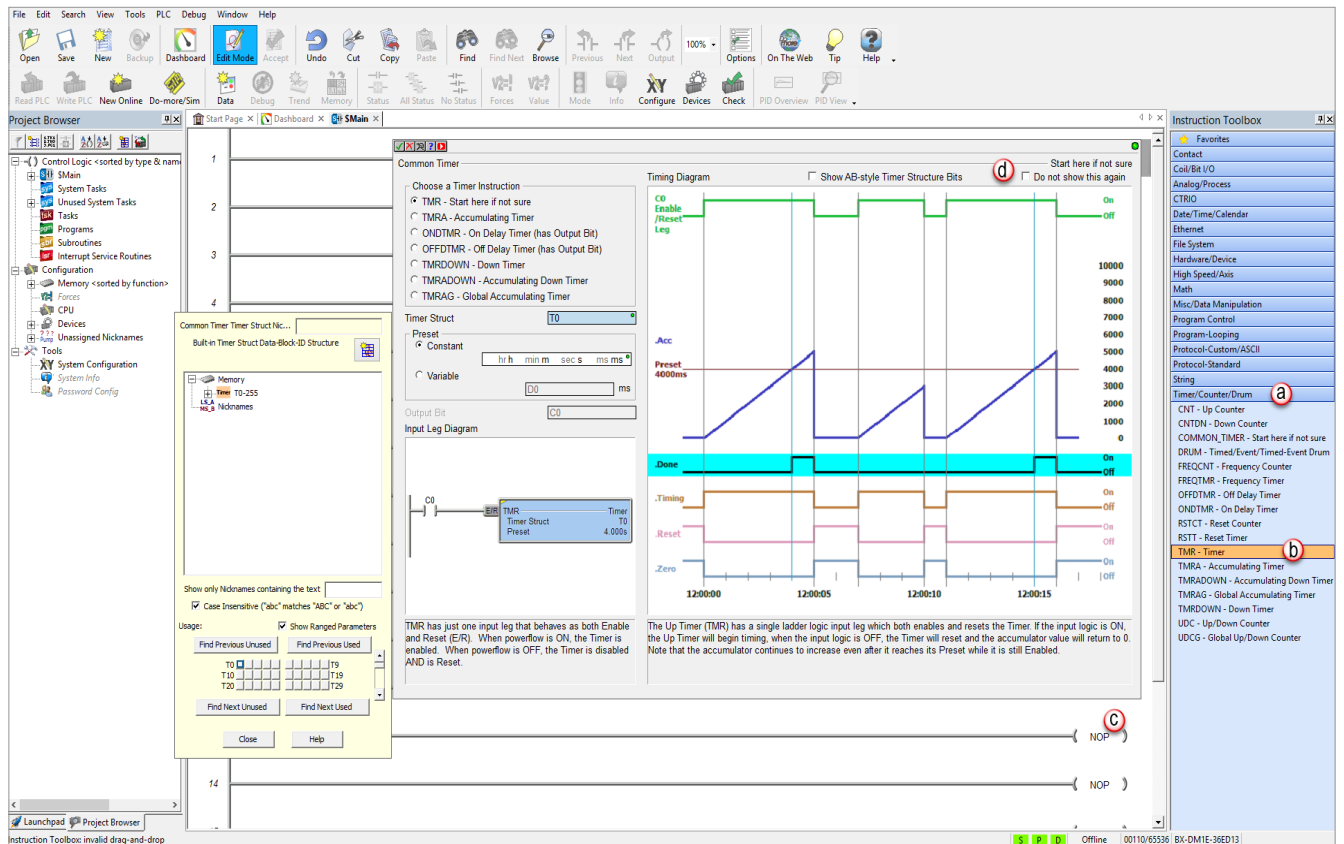
## Rung #1

Place the cursor box in the (a) NOP position on Rung #1. If the (b) *Instruction Toolbox* is not open, click **Edit** on the menu and select (c) **Instruction Toolbox** from the drop-down menu.

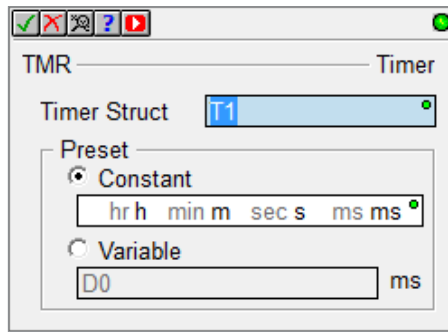


Now, you are ready to begin entering the example ladder logic.

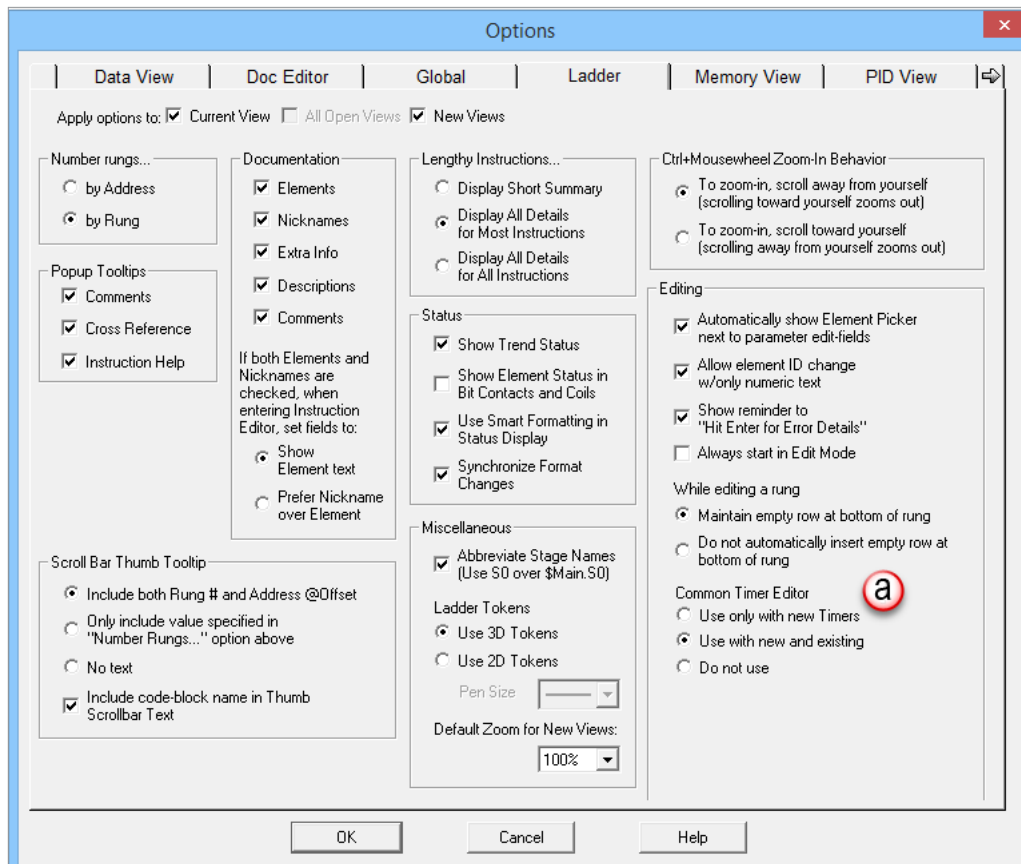
Click on the section heading (a) **Timers/Counters/Drums** and (b) double click or drag/drop the **TMR** instruction.



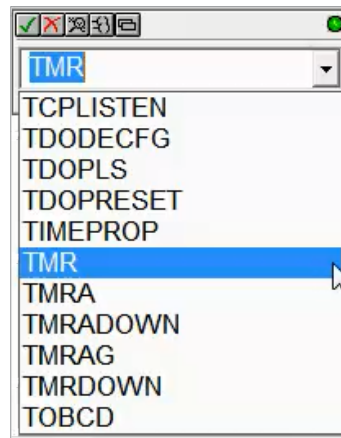
Checking (d) **Do not show this again** will cause a more concise timer dialog to open on subsequent access to the TMR dialog.



Access to the more detailed *Common Timer Editor* dialog can also be controlled from the Editing section (a) of the *Options* dialog accessible from the main Do-more! Designer toolbar.



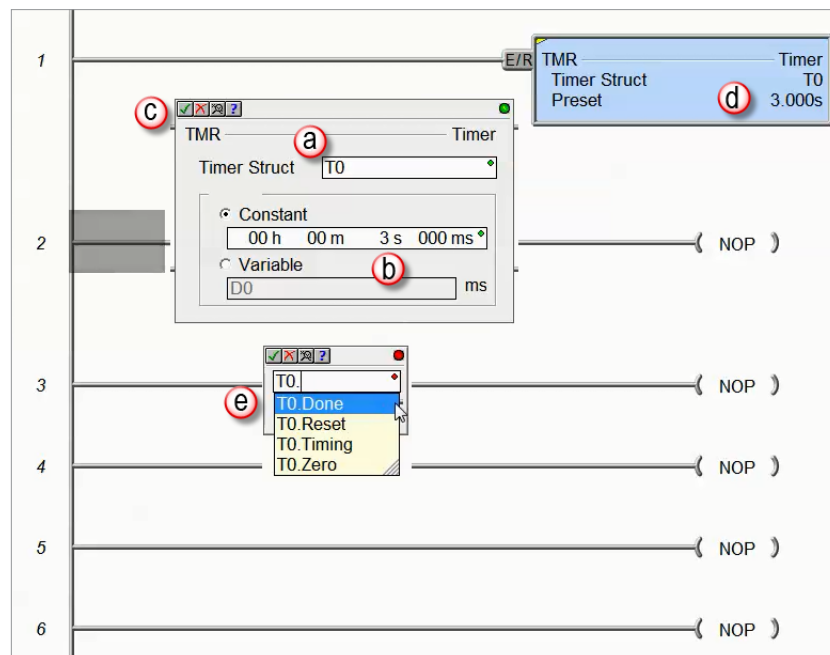
Alternatively, you can type “T” while the cursor is on the NOP position and select **TMR** from the drop down menu, then press **Enter**.



Once the TMR is selected, a Timer dialog box appears.

1. Set the (a) *Timer Struct* to T0
2. Enter 03 into the (b) Preset Constant Value for the seconds (s) preset.
3. Click on the (c) green checkmark in the upper left corner to accept.

After clicking the checkmark, Rung #1 should show the (d) T0 timer (TMR) instruction with a Preset of 3.000 seconds. A user variable can be assigned to the Preset value if needed, to allow the timer preset to be set from an external source.



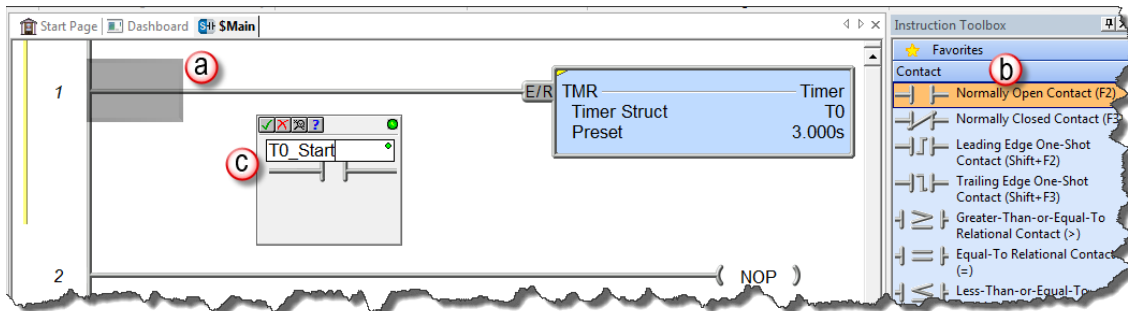
Since a Timer is a structure, it has predefined elements associated with it, such as “Tx.Acc” (accumulated time), “Tx.Done” (the completion bit) and “Tx.Timing” (the timer is enabled and timing).

Therefore, if T0. (the “period” must be used to open drop-down list) is entered into any contact name, the Auto-Complete feature of Do-more! Designer will display all applicable bit (Boolean) selections available for

that structure. Selecting (e) the T0.Done element, as seen above, will assign this element to the contact and the contact name will be T0.Done.

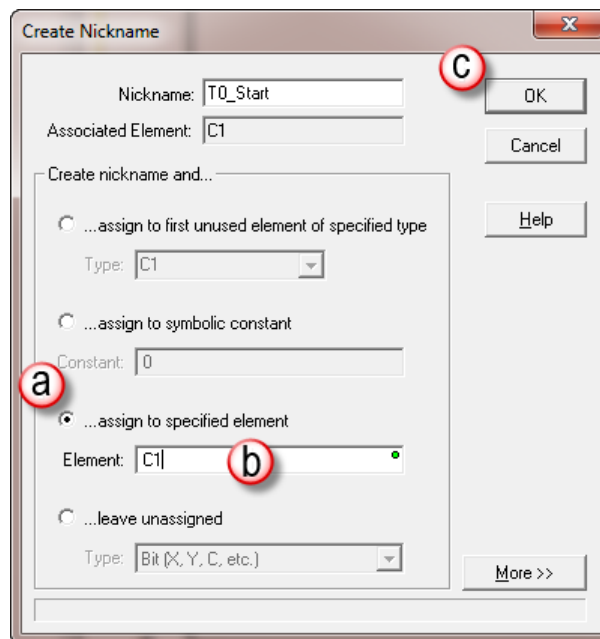
This feature works for all structures including: timers, counters, PID loops and strings, to name a few. Many system data types such as, \$Main and \$FirstScan, as well as those associated with user-created devices like ECOM, CTRIO, or SERIO modules also use the Auto-Complete feature. See the Do-more! Designer Help file topic DMD0327 for more information on structure members.

Place the cursor in the (a) leftmost column of rung #1. Type the nickname *T0\_Start* at the (a) cursor position. The (c) Normally Open contact instruction (b) will be used by default as the nickname is entered. Press Enter.



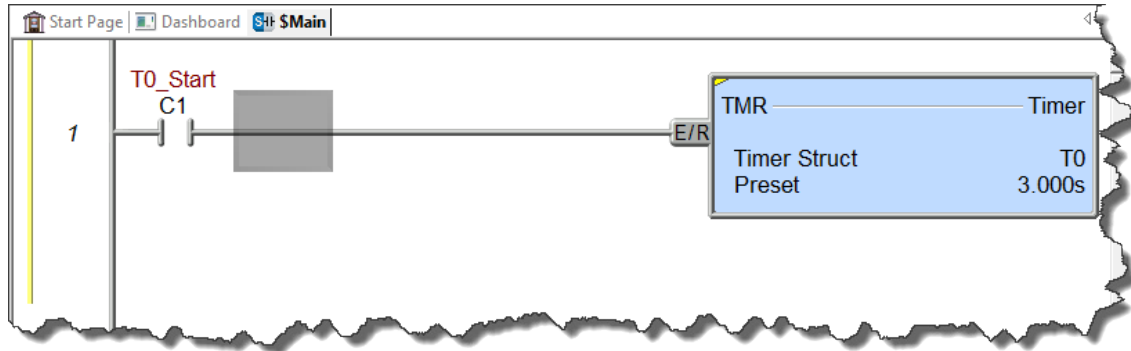
Another option is to (b) click or drag/drop from the Instruction Toolbox (F2 hot key), enter *T0\_Start* for the name, and click the (c) green checkmark in the upper left corner.

This will open the Create Nickname dialog seen here. Select (a) the option **...assign to specified element**, (b) type the desired memory bit for this contact (C1), and select (c) **OK** to accept.

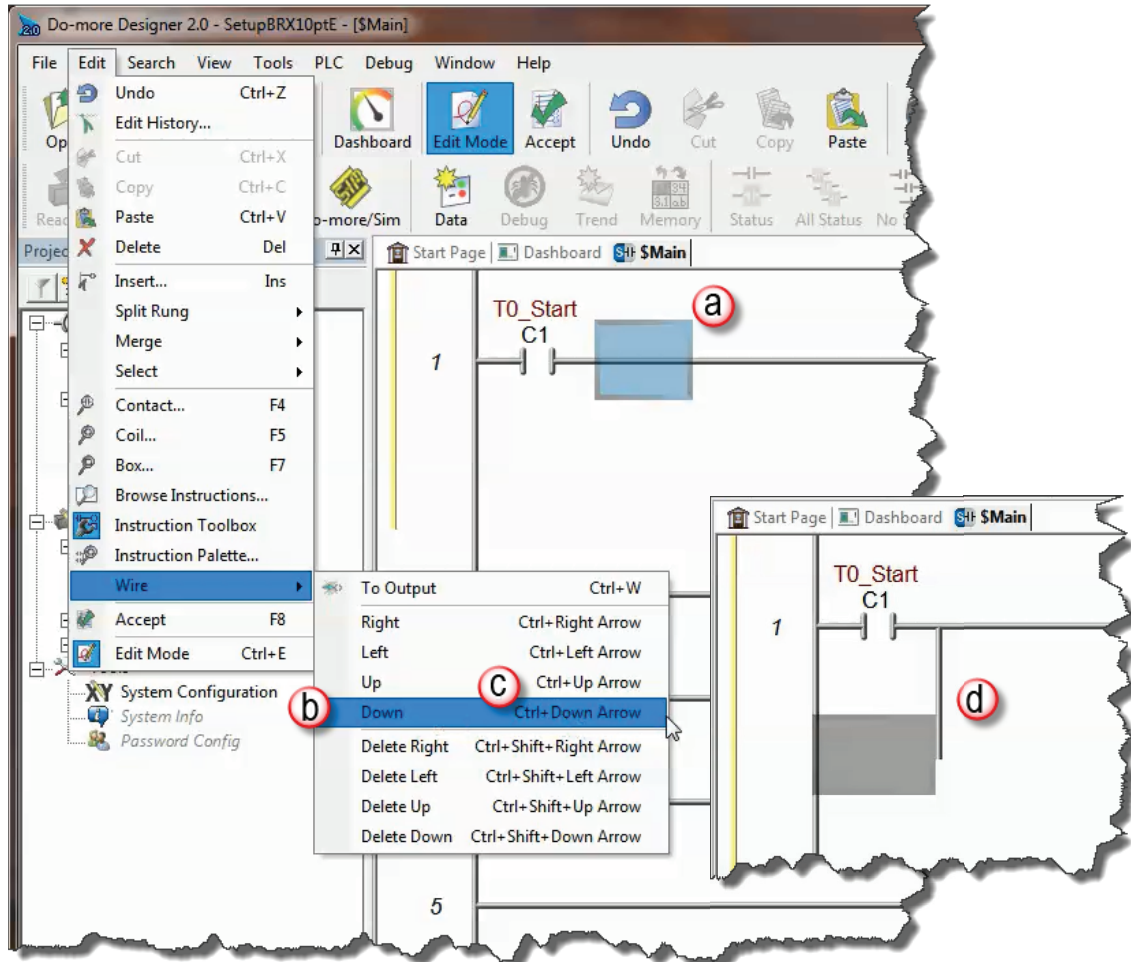




Rung #1 should appear as shown below.

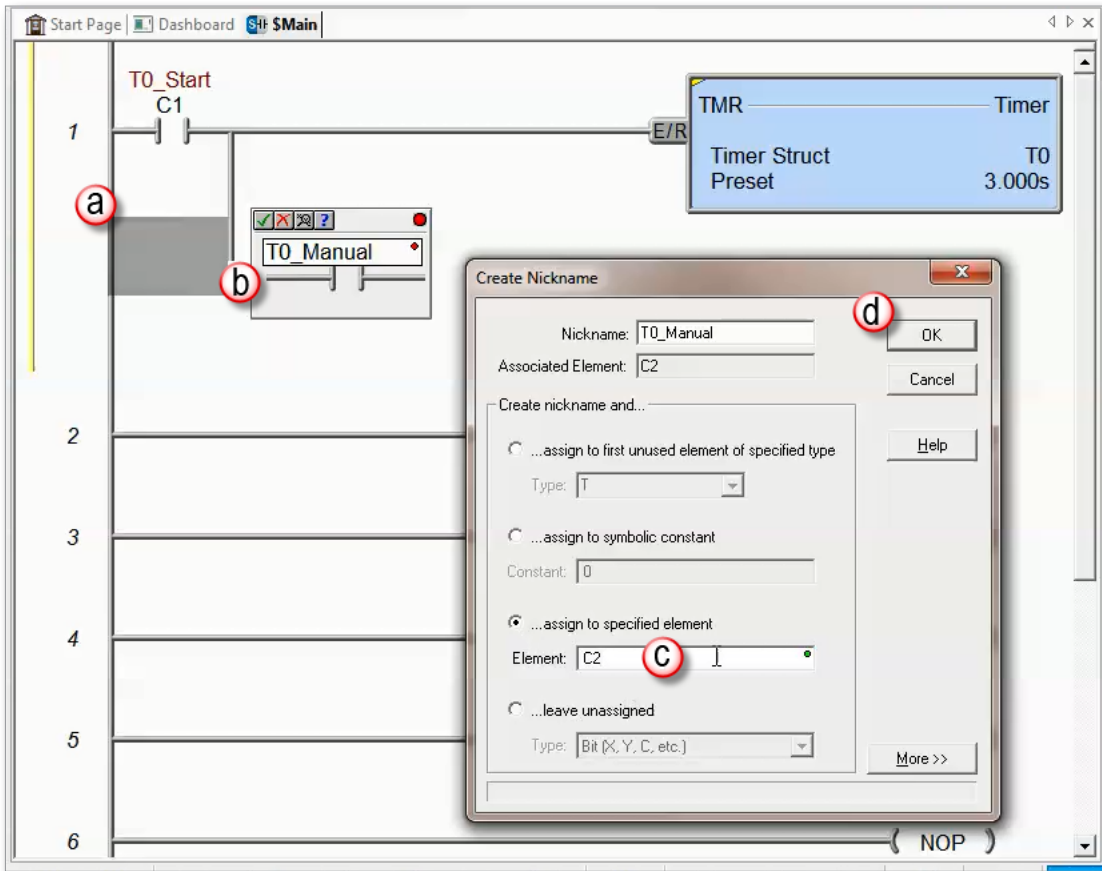


With the cursor in the position to the (a) right of contact *TO\_Start*, begin drawing a branch circuit. Under the *Edit* drop-down menu, select **Wire**, then select (b) **Down**. Notice the shortcuts that are available for wire drawing. The wire could also be drawn using the shortcut: (c) **Ctrl+Down Arrow**. The (d) wire should now appear in your ladder.

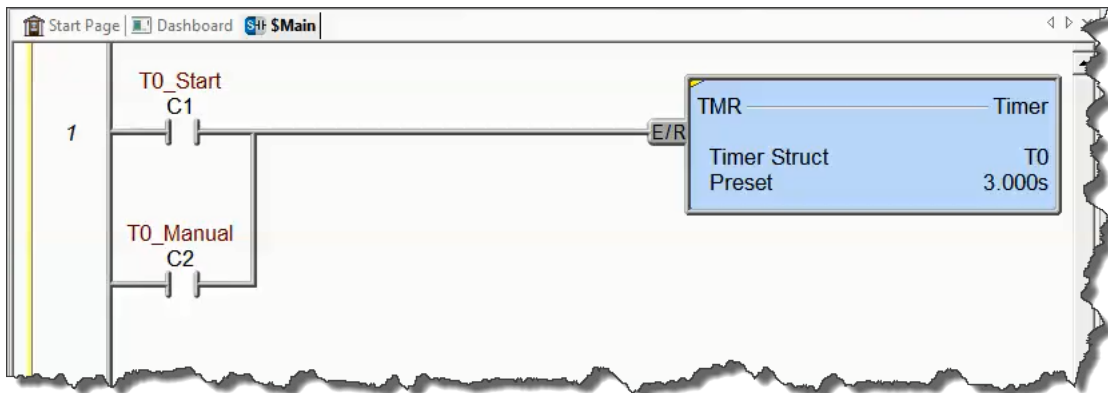


**NOTE:** There are also Delete Wire options in the Edit drop down menu that are used to erase any wires not needed.

Place the (a) cursor in the space to the left of the new line and select another normally open contact. Type in the nickname (b) *T0\_Manual* and (c) assign bit *C2*. Select (d) **OK** to accept.

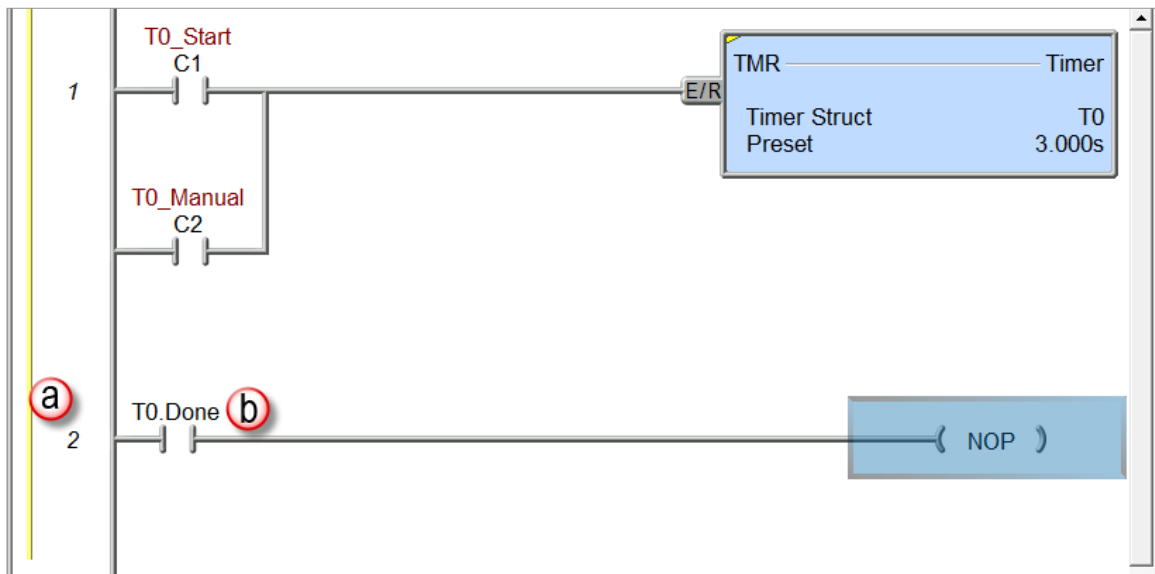


Rung #1 should look like this:



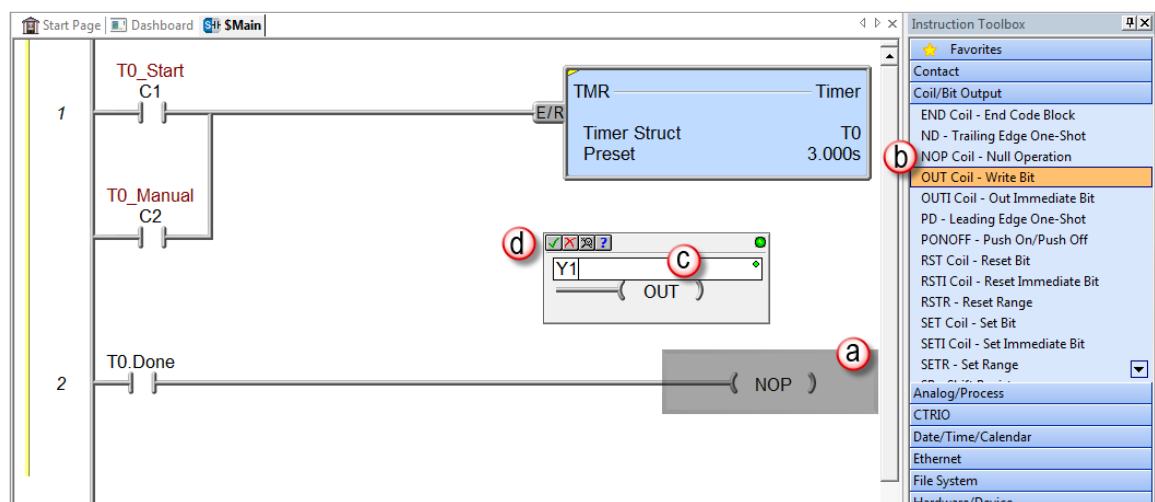
## Rung #2

Place a normally open contact in the first position of (a) Rung #2. This contact will be tied to the Done bit of timer T0. Therefore, the name for this (b) contact should be entered as “T0.Done”. There should be no Create Nickname dialog box as seen with the earlier normally open contacts.

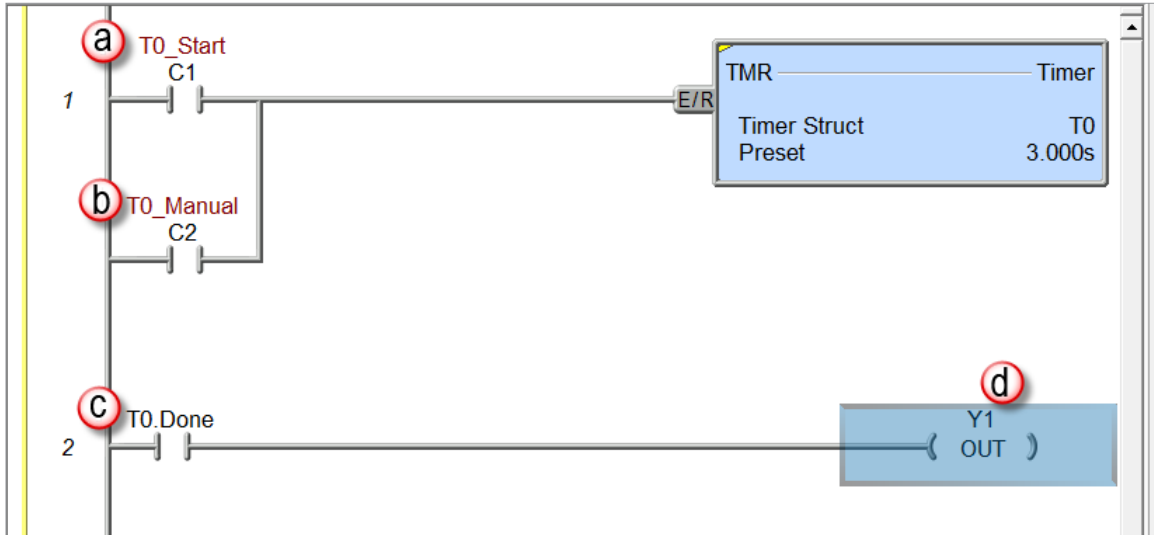


Lastly, you will need to add an Out coil to the end of Rung #2. Place the (a) cursor at the end of the rung highlighting NOP and type “OUT” and select the OUT instruction from the drop down menu. Another option is to (b) select the OUT instruction from the Instruction Toolbox under the Coil/Bit Output section.

Next, choose which bit will be tied to this coil. Tie this (c) coil to the physical output Y1 by typing “Y1” and clicking the (d) green checkmark in the upper left corner.

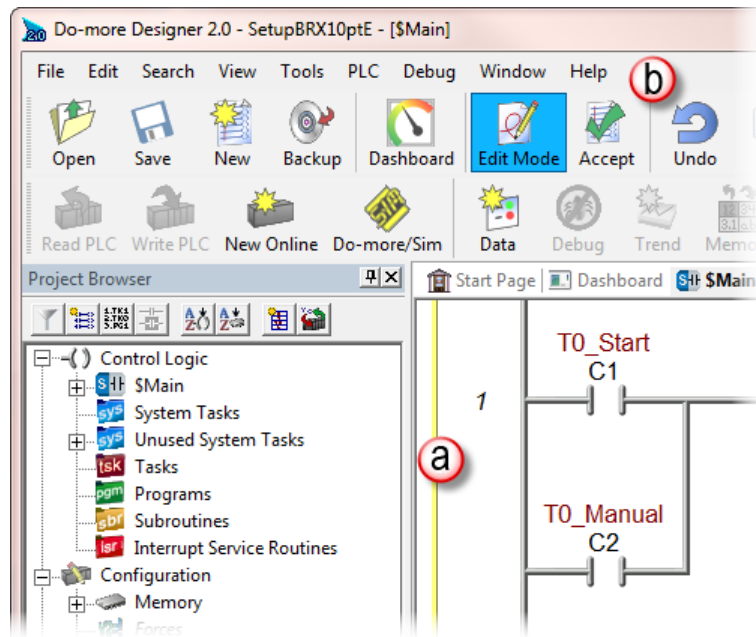


The ladder program should now look like this:

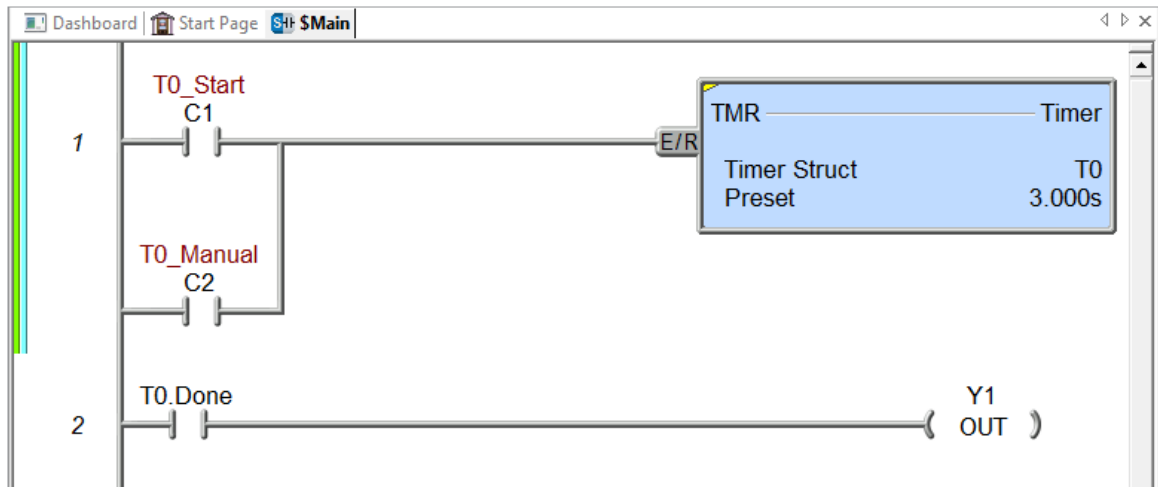


When either the (a) T0\_Start or (b) T0\_Manual contact is energized, the timer will begin timing. When it times out, contact (c) T0\_Done will energize and the (d) output coil Y1 will turn on. Note that an END instruction is not required.

The (a) yellow bar in the left margin signifies logic that has not been accepted. So once you have verified your logic, click the (b) **Accept** button in the *Project Toolbar* to accept the changes.



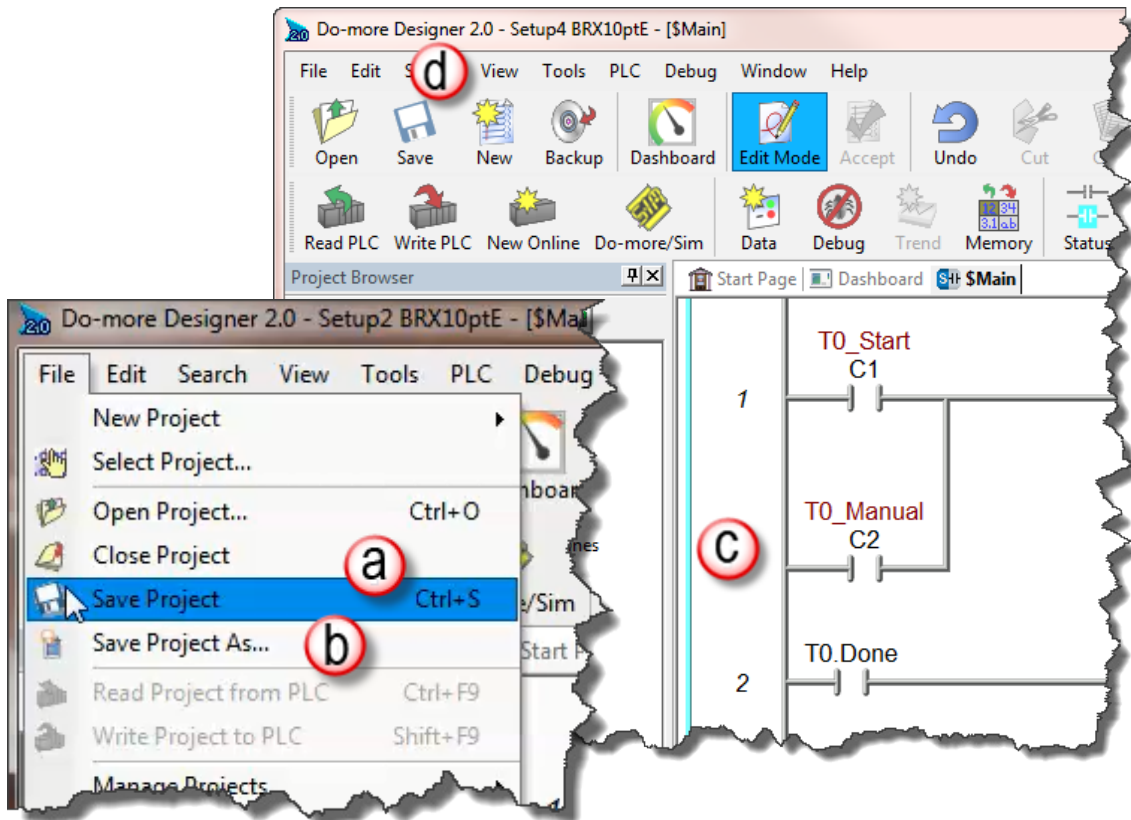
After selecting “Accept”, the yellow bar should be replaced by green and cyan bars (left margin). The green bar means the project has been accepted but not saved to disk. The cyan bar (only appears when online) means the project has been accepted, but not yet downloaded to the MPU.



## Step 8: Save Project

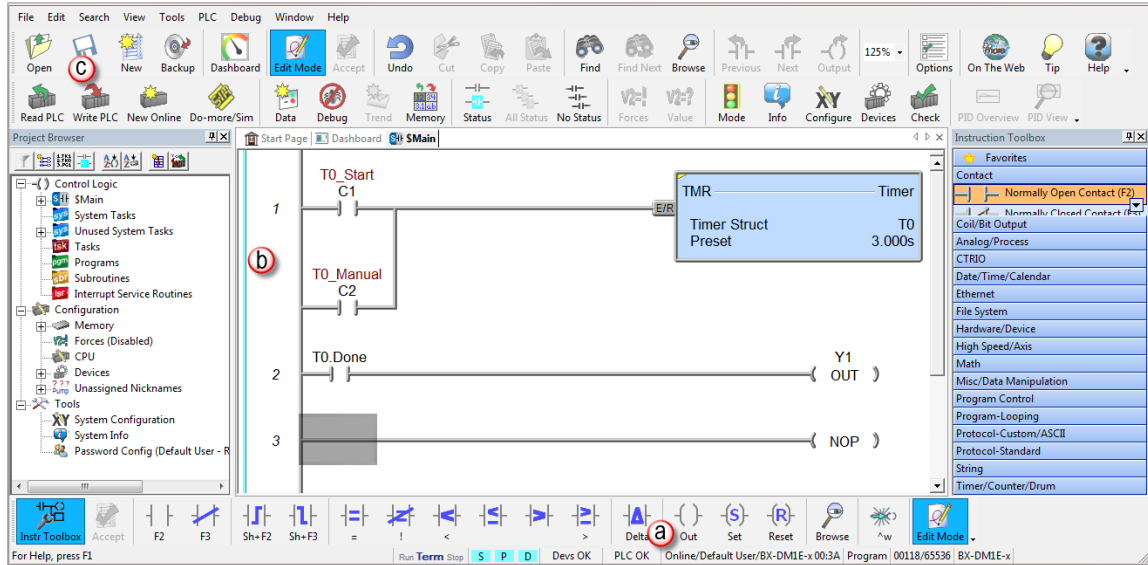
Save the project by selecting (a) **Save Project** from the *File* drop down menu (**Ctrl+S**), or save the file under a different name or in a different location by selecting the (b) **Save Project As** option. You can also save the project by selecting the (d) **SAVE** icon on the *Project Toolbar*.

Once you save the project, the green bar on the left side of the ladder will disappear and the cyan bar (c) will remain, meaning you have successfully saved the project to disk, but not yet downloaded to the MPU.

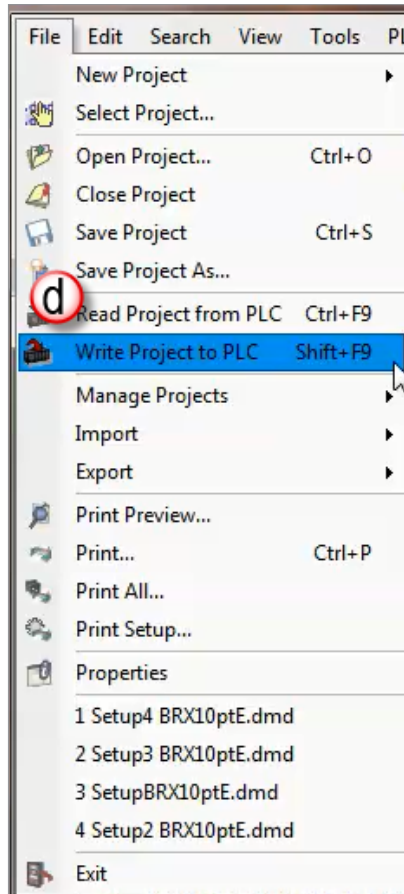


## Step 9: Write Project to the BRX MPU

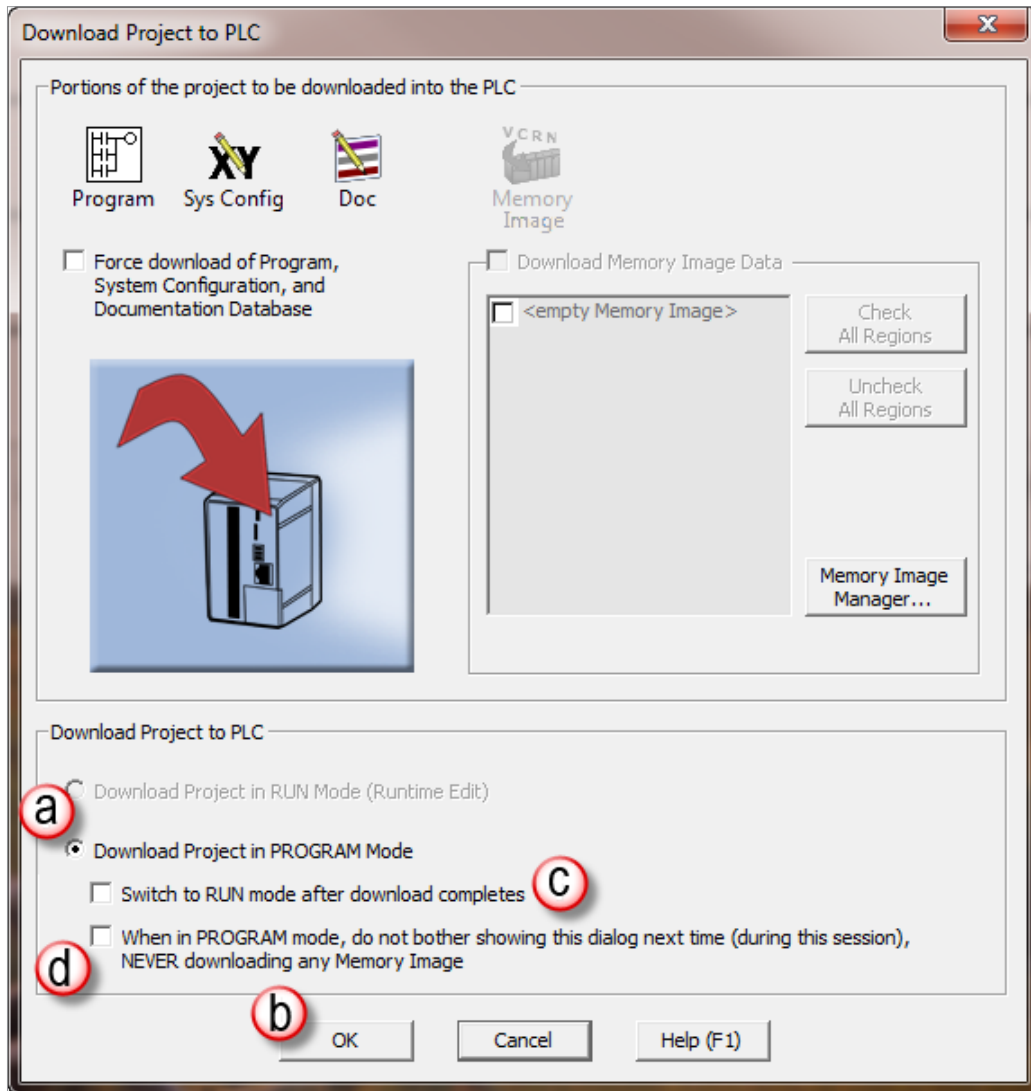
Now that you have created the example ladder logic program, you can write the program to the MPU. As a quick review, (a) check the status bar at the bottom of \$Main window to verify you are Online with the MPU. Also notice the (b) cyan bar to the left of the ladder logic program signifying that your project has been accepted, but not downloaded/written to the MPU.



There are several ways to write the project to the MPU. You can chose (c) **Write PLC** button from the Project Toolbar or select (d) **Write to PLC** from the *File* drop down menu (**Shift+F9**).



When the **Write PLC** button is selected and the MPU is in program mode, the *Download Project to PLC* pop-up window seen here appears.



When the BRX MPU is in (a) Program mode and you click on the (b) **OK** button, the project is written to the MPU. When the download is complete, the MPU remains in program mode. In this window, you can select (c) to switch the MPU to **RUN** mode after the download is complete.

You can also select (d) not to display the *Download Project to PLC* window if the MPU is in program mode, keeping in mind that selecting this option will not download any Memory Image. Please view the Do-more! Designer HELP topics for details on the features available in the *Download Project to PLC* window.

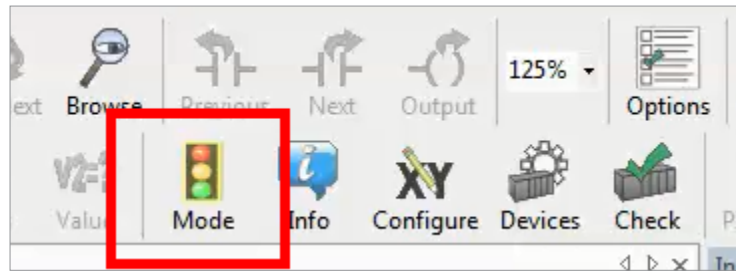


**NOTE:** It is good practice to verify that the process you are controlling can be interrupted before downloading a project to the MPU.

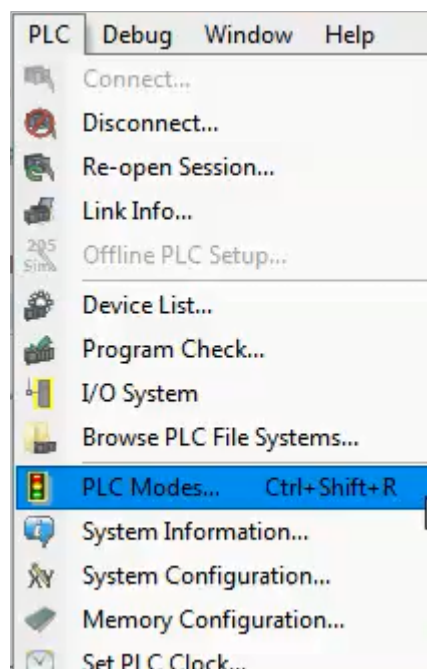


If you do not select the option to *Switch to RUN mode after the download completes*, you can switch to RUN mode manually several ways:

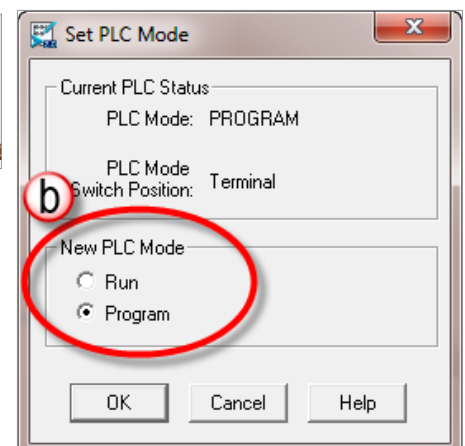
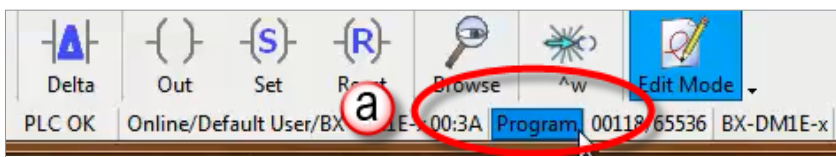
Click on the **MODE** icon on the Project Toolbar



Select PLC Modes from the PLC drop down menu or use the shortcut, **Ctrl+Shift+R**.



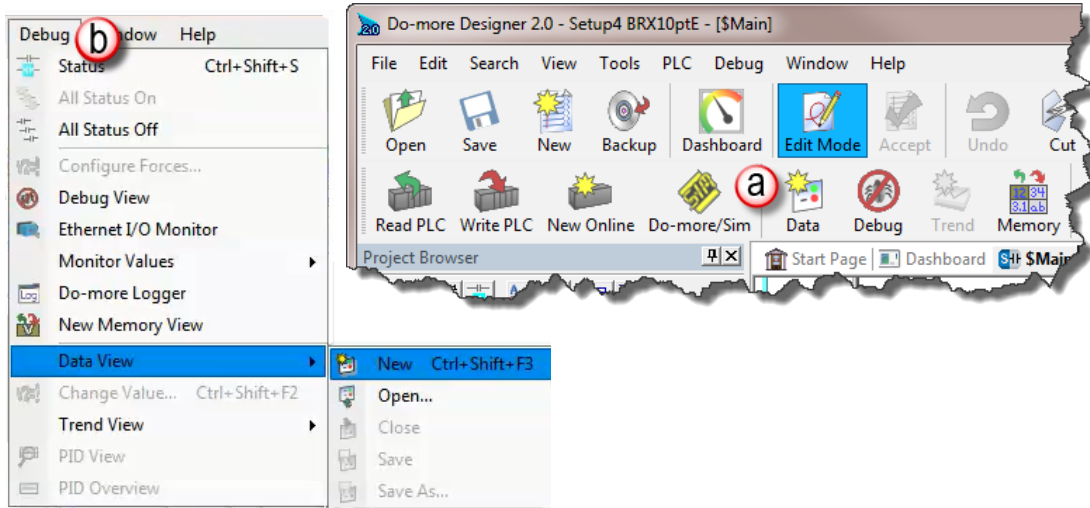
Click on (a) *Program* in the Status bar. This will bring up the *Select PLC Mode* pop-up where you can change the PLC mode by selecting the (b) **Run** radio button.



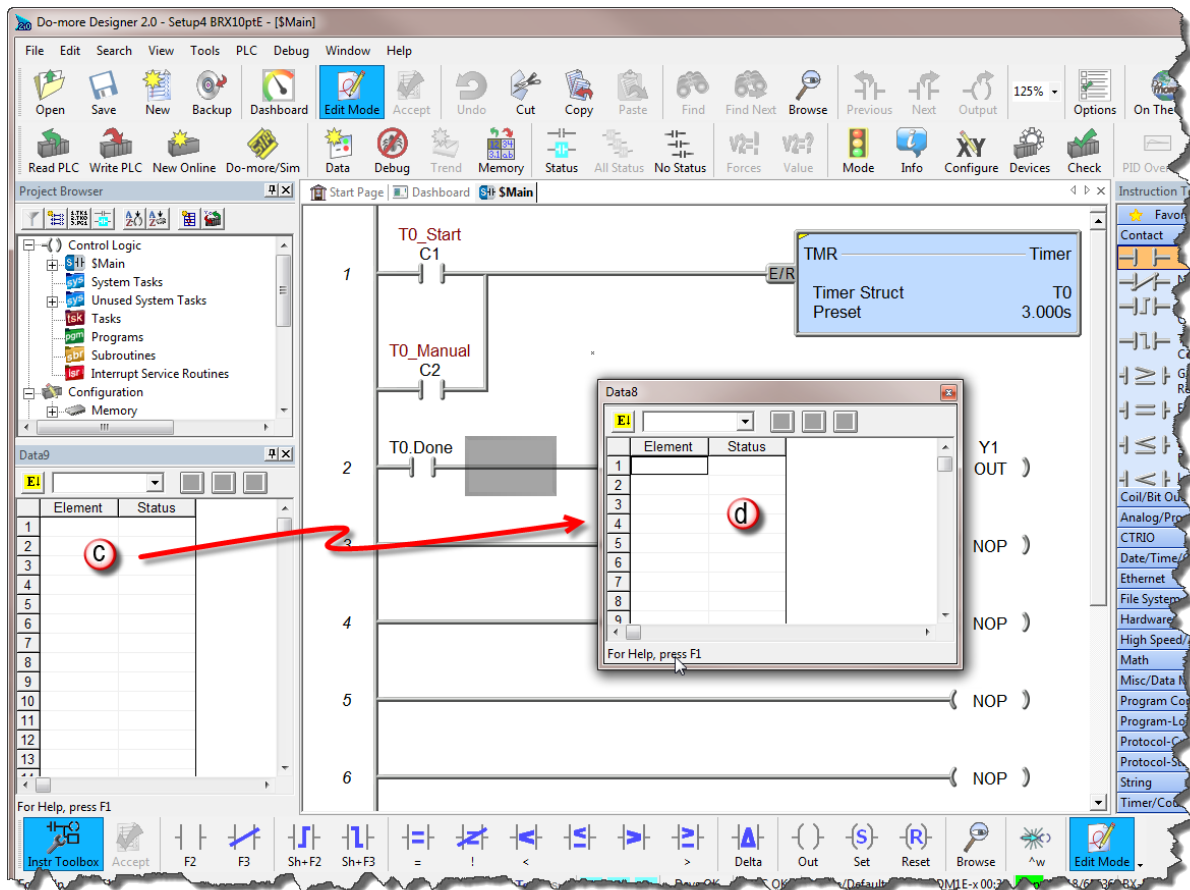
## Step 10: Testing Project Using Data View

With the project successfully downloaded to the MPU and the unit in RUN mode, you can now test the function of the ladder program using the Data View tool.

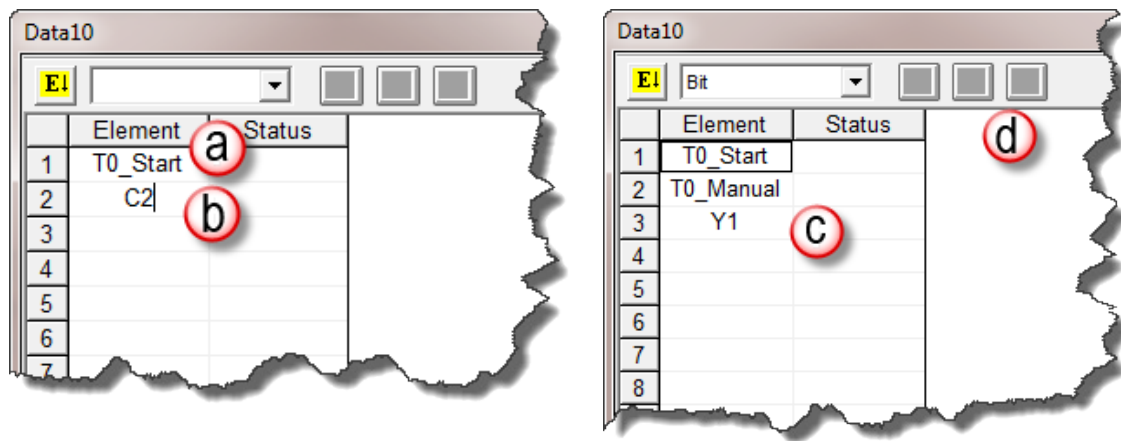
Start by opening a new *Data* window. To do this, click on the (a) **Data** icon on the Project Toolbar, or (b) select menu item **Debug > Data View > New (Ctrl+Shift+F3)**.



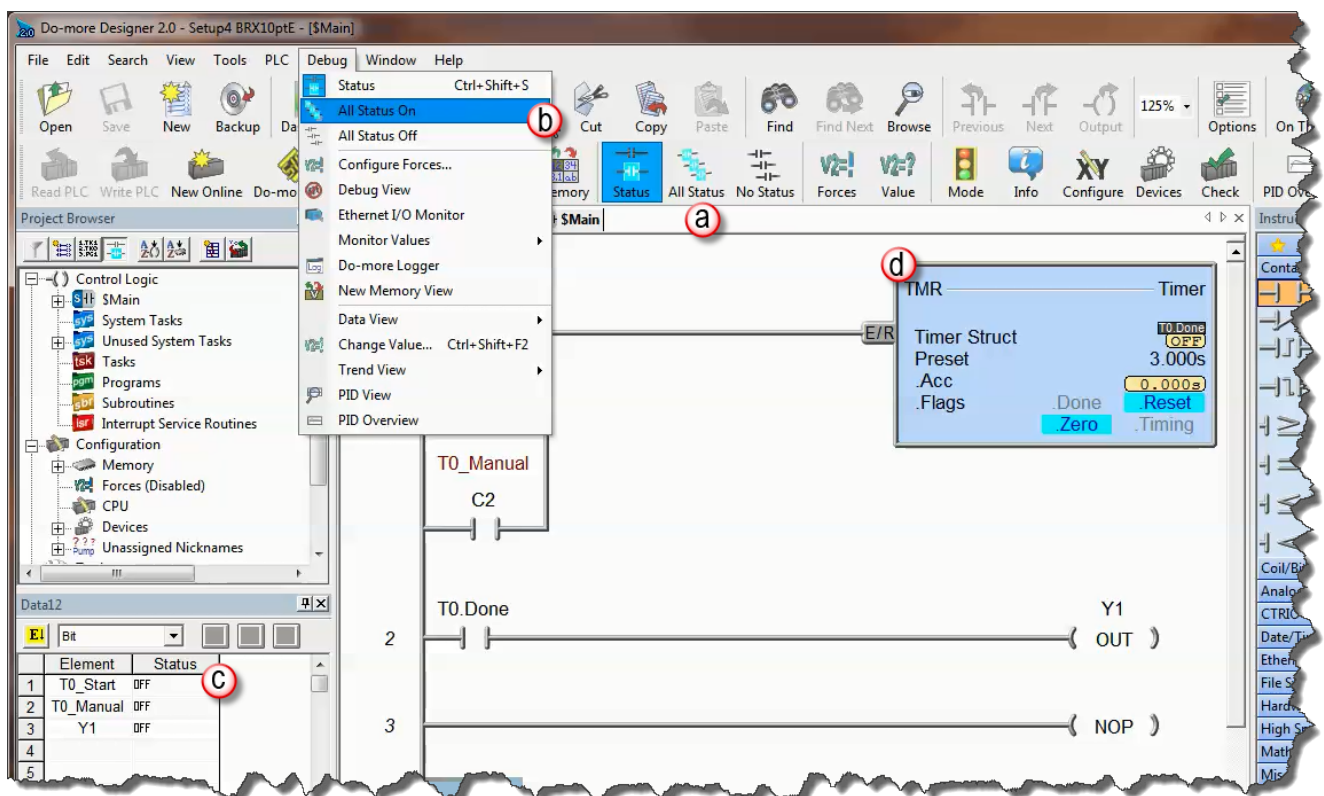
The *Data View* window shown below (c) will open. This window will open in the project browser section of the programming window but it can be (d) relocated anywhere on the screen by clicking the title bar and dragging it to a new location.



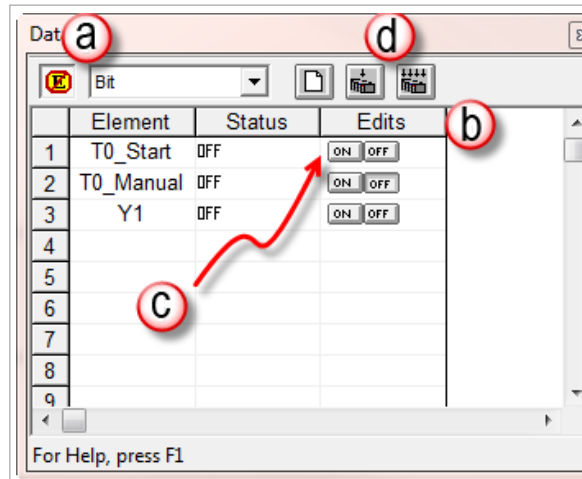
Now enter the elements that you wish to monitor. On line one type “C1” under the Element column and press Enter. You will see the C1 change to the (a) nickname associated with it, T0\_Start. On line two (b) type the element “C2” (T0\_Manual) and on line three (c) type “Y1”. Notice the three icons (d) at the top right in the data window are grayed out. This will change in the next step.



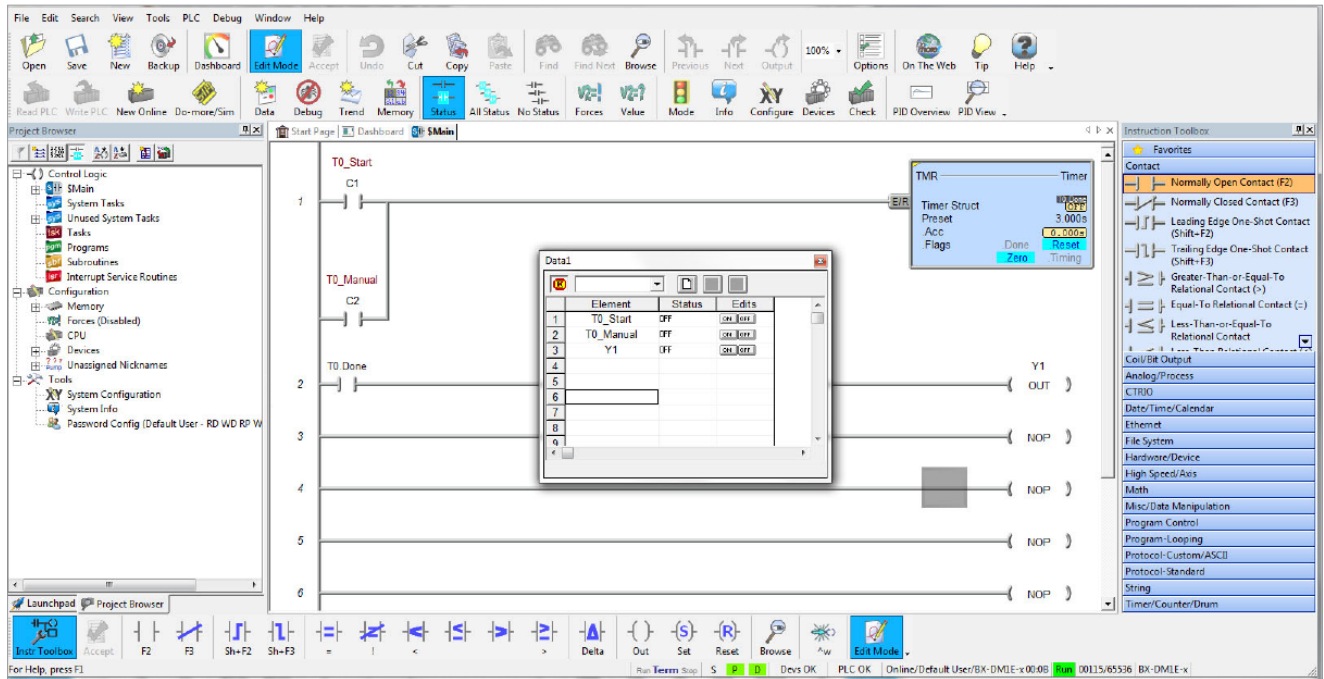
With the ladder elements entered into the Data View window, you now need to activate their status. To do so, (a) click the **All Status** icon on the Project Toolbar, or (b) select **Debug > All Status On**. The **All Status On** option will not only activate (c) the *Status* of the *Data View* window but also the status of the (d) ladder program as seen below. The timer structure now shows the status of its structure elements, including the accumulated value.



The next step is to enable edits within the Data View window. To do this, click the (a) yellow box with the E found in the top left corner of the *Data View* window. The (b) Edits column is now added to the *Data View* window.

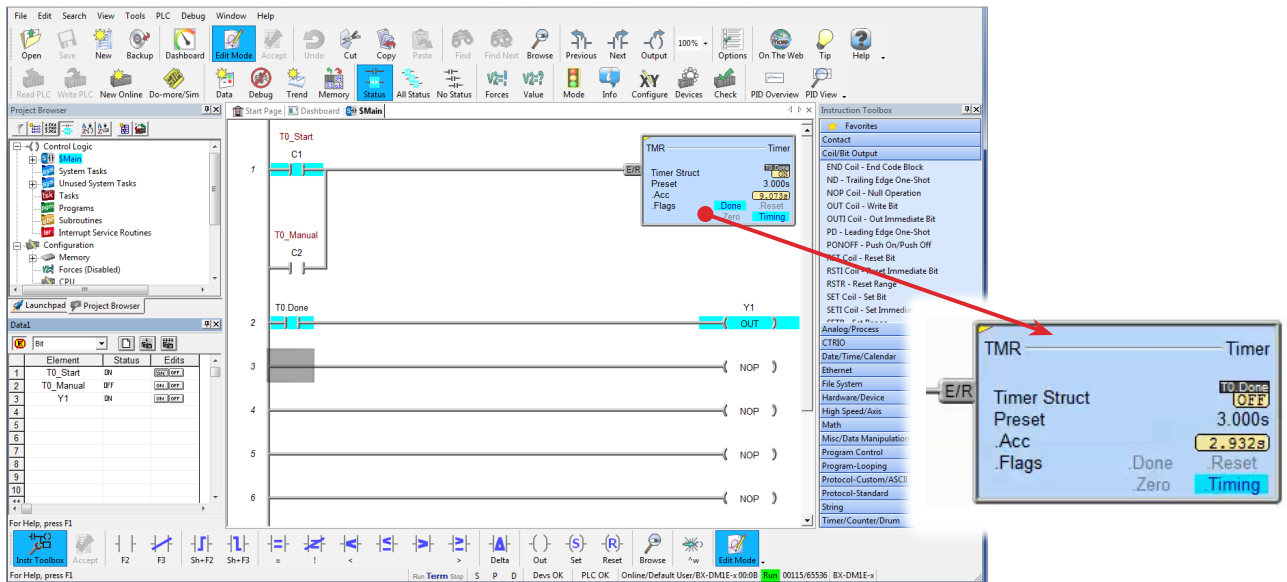


The Edits column allows you to make changes to the current values of the elements listed. T0\_Start's current value is OFF. Double-click the (c) ON button under the Edits column. The (d) **Write Current Edit** and the **Writes All Edits** buttons will appear at the top of the window. The buttons will write individual or all edits, respectively, made in the *Data View* window to the MPU.



Click the **Write Current Edit** to PLC button and confirm it. This will write the new value to T0\_Start. Once T0\_Start changes to an ON state, the timer (T0) will begin to time and quickly reach the preset. As soon as the preset has been met the done bit, T0.Done, will turn ON causing output Y1 to also turn ON, as seen on the following page. Now write an OFF to T0\_Start and watch as the timer and Y1 reset.

With *All Status* ON, you can view instruction information in the ladder view (below). For example, on the TMR instruction you can see the actual accumulated time while the timer is on, and when the timer is done, to mention a few.



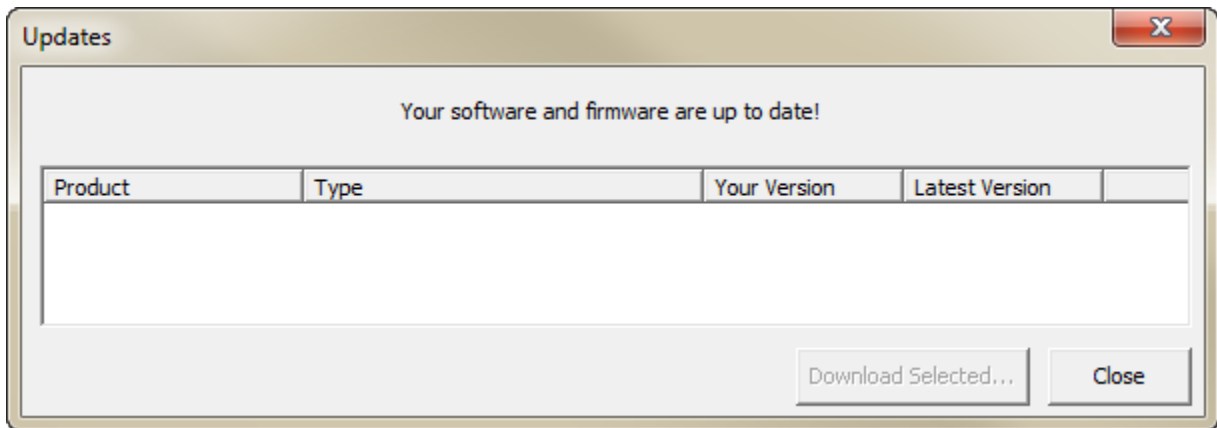
Congratulations, you have now programmed, downloaded, and tested a ladder logic program for the BRX Do-more! MPU. Feel free to experiment with a program of your own and please remember that the software Help file is an essential tool to use when programming your controller.

## Do-more! Designer Software and Firmware Updates

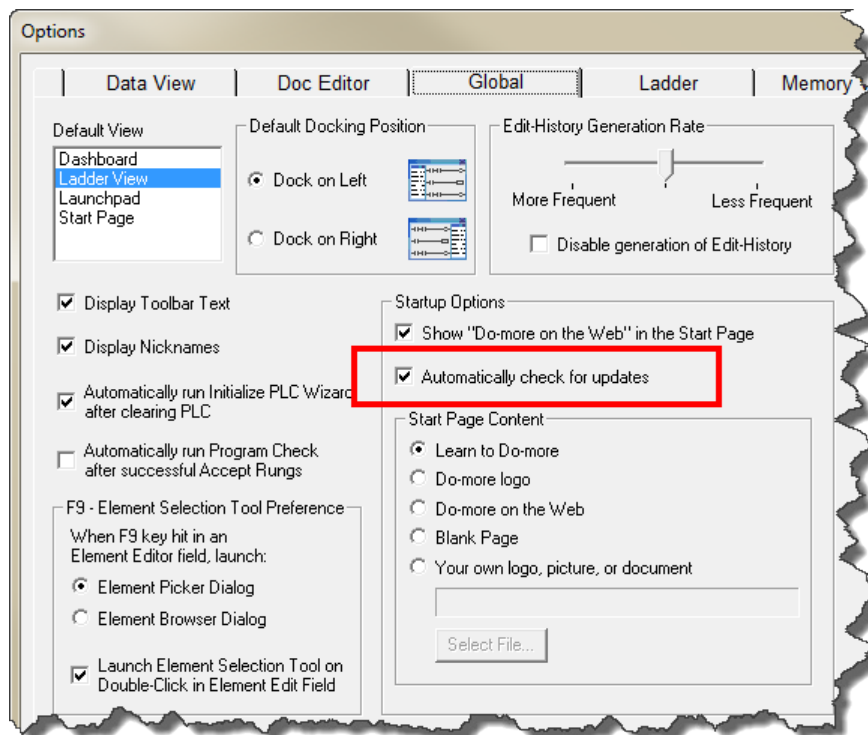
There will be times when an update is available for the BRX firmware or the Do-more! Designer programming software. The Do-more! Designer software makes it very easy to download the updated files.

By default, checking for updates is done automatically each time Do-more! Designer is started. Do-more! Designer will check for updates to the programming software, the Help file content, Start Page content, new firmware for BRX Do-more! and Do-more! controllers and new firmware for CTRIO(2) modules. An Internet connection is required to perform the check and to download the updates.

When updates are available, the user is notified through this dialog:

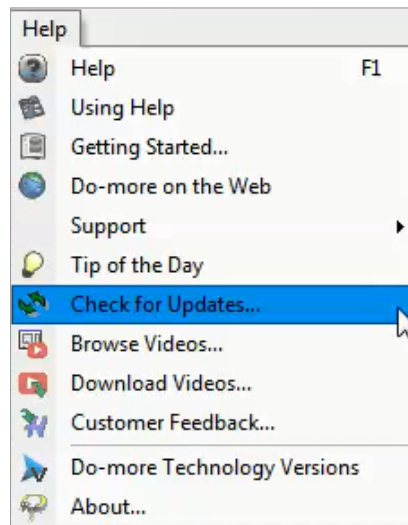


The automatic check can be disabled by opening the **View -> Options** menu, select the Global tab and uncheck the **Automatically Check for Updates on Startup** selection.



To manually check for software or firmware updates, go to **HELP -> Check for Updates**.

Do-more! Designer Help Topic DMD0310 provides detailed information on downloading the programming software updates, firmware updates, Do-more! Designer Help System updates, and HTML/Documentation updates.



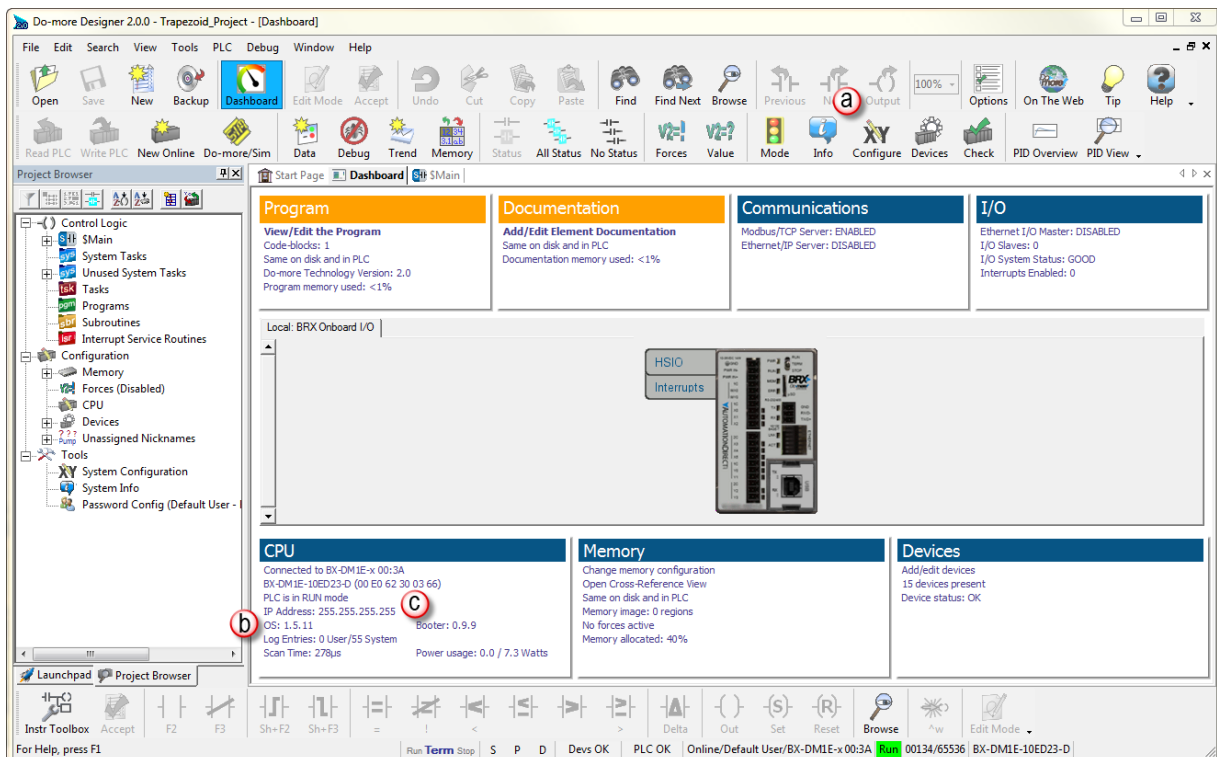
## Updating the Firmware



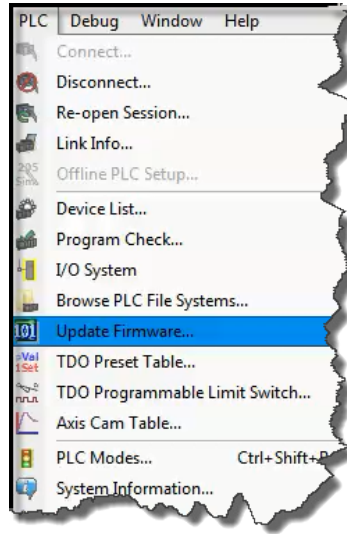
**NOTE:** Downloading the firmware files does not automatically update the firmware of the connected BRX PLC. You must use the available tools to update the Operating System and the Gate Array and Loader. The available tools will indicate when the firmware is not up to date in the controller.

There are three ways to access the dialogs needed to update the Operating System and the Booter/Loader.

The first method is by using the (a) Info icon on the online toolbar. A second method is by selecting the (b) OS or (c) Booter links under the CPU section of the Dashboard.

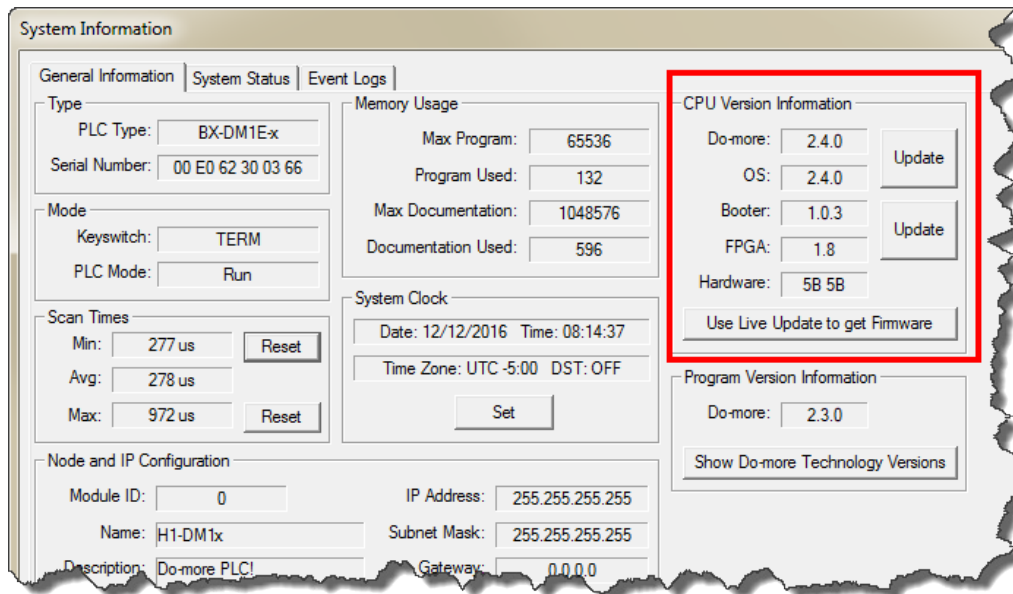


The third method is through the menu, PLC -> Update Firmware.



When you select the Info icon on the online toolbar, the System Information utility (below) comes up. To update the controller firmware, use the section under CPU Version Information.

The CPU section displays the following information:

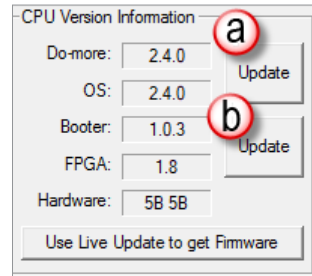


- Do-more!: The current version of the instruction set in the controller.
- OS: The current version of the operation system in the controller.
- Booter: The current version of boot loader in the controller.
- FPGA: The current version of the Gate Array code in the controller.
- Hardware: The current revision of the controller hardware.

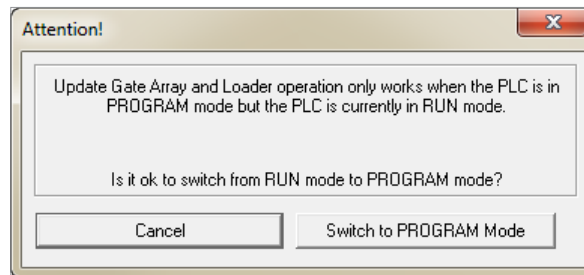


**NOTE:** An Asterisk (\*) next to any of the numbers means that there is an update available for that particular portion of the firmware.

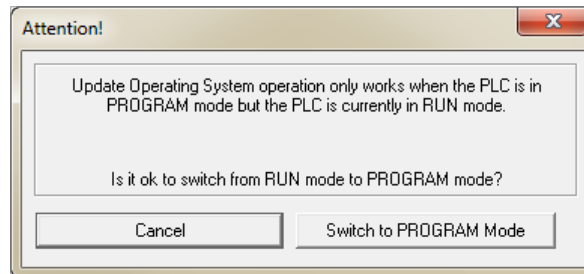




Click the **Update** button (a) adjacent to the *Do-more & OS* display to open the *Update Operating System* dialog.



Click the **Update** button (b) adjacent to the *Booter & FPGA* display to open the *Update Gate Array and Loader* dialog.

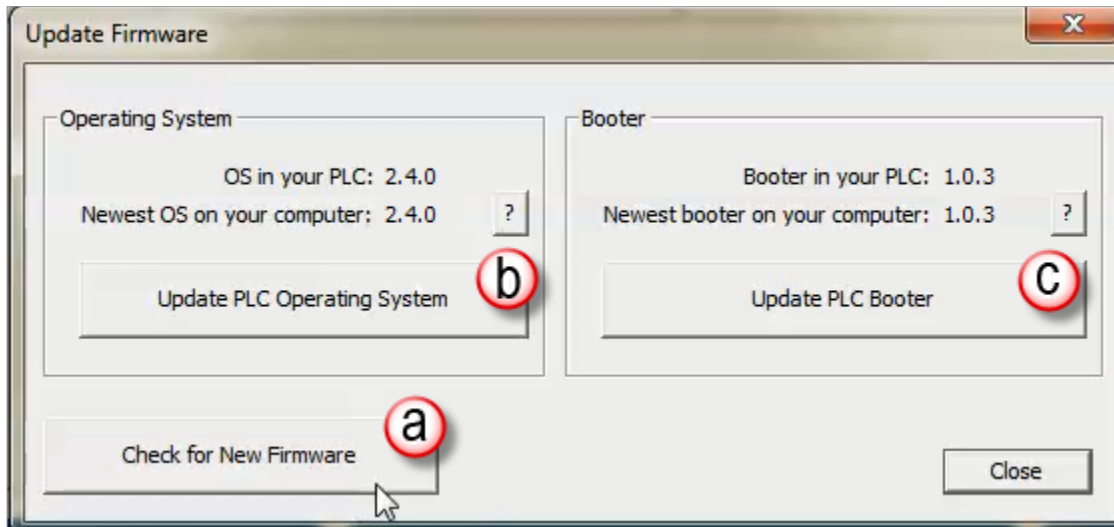


**NOTE:** If both the *Booter* and *OS* need updating, it is recommended to do both updates, starting with the *OS*.



**NOTE:** DIP switch #3 (on MPU) is used to Enable/Disable the ability to update the firmware in the controller. This DIP switch must be OFF to allow Do-more! Designer to update the operating system or the gate array. Please review Do-more! Designer Help topic DMD0266 for information on the on-board dipswitches.

The dialog shown below is displayed when you use the OS or Booter link under the CPU section of the Dashboard or you use the menu **PLC -> Update Firmware**.



The *Update Firmware* dialog has the necessary tools to download new firmware files from the Web and update the connected Do-more! CPU.

The *Operating System* and *Booter* sections show the version currently running in the attached Do-more! CPU and the latest versions of the firmware and boot loader files that have been downloaded to this PC.

Click (a) **Check for New Firmware**. The *Live Update* tool comes up, which allows you to see if there is a newer firmware available, and if so to download the updated files. The *Live Update* tool is discussed later in this chapter.

Clicking (b) **Update PLC Operating System** opens the *Update Operating System* dialog that shows detailed information about the attached CPU's operating system and Do-more! Technology versions and selects the latest Operating System firmware file based on the connected Do-more! CPU. The *Update Operating System* dialog is discussed later in this chapter.

Clicking (c) **Update PLC Booter** opens the *Update Gate Array and Loader* dialog that shows detailed information about the attached CPU's Gate Array and Boot Loader versions and selects the latest Boot Loader firmware file based on the connected Do-more! CPU. The *Update Gate Array and Loader* dialog is discussed later in this chapter.



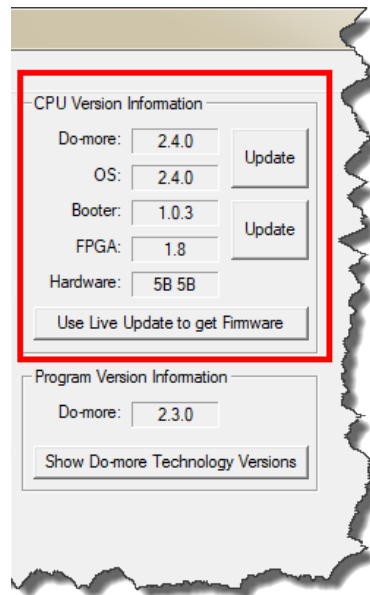
**NOTE:** If both the Booter and OS need updating, it is recommended to do both updates, starting with the OS.

## Live Update

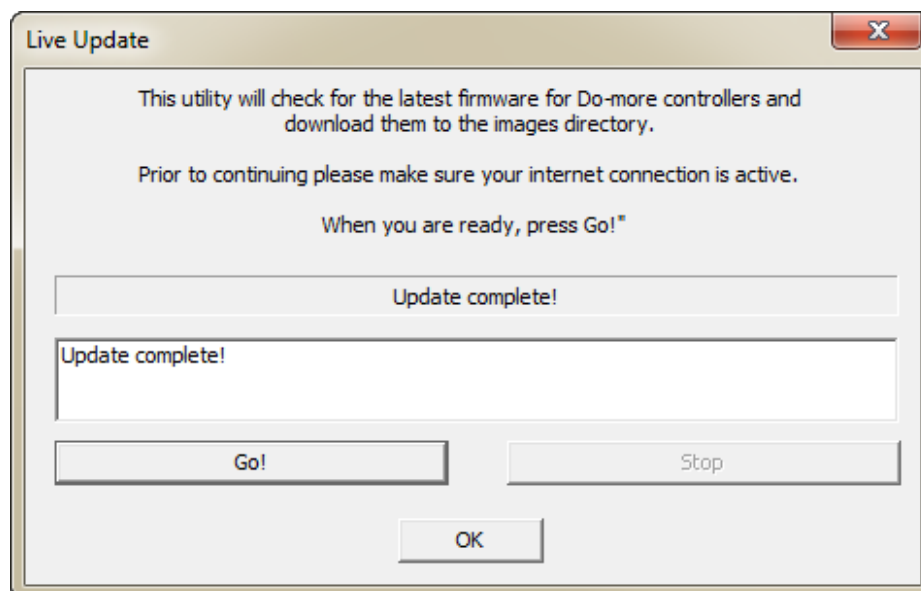


**NOTE:** DIP switch #3 (on MPU) is used to Enable/Disable the ability to update the firmware in the controller. This DIP switch must be OFF to allow Do-more! Designer to update the operating system or the gate array. Please review Do-more! Designer Help topic DMD0266 for information on the on-board dipswitches.

Click the **Use Live Update to get Firmware** button to open the *Live Update* dialog. Live Update will utilize the Internet connection to check for new firmware files for the Do-more! controllers and the CTRIO modules, then download any new files to the appropriate Bin\Images\< Device > folders.



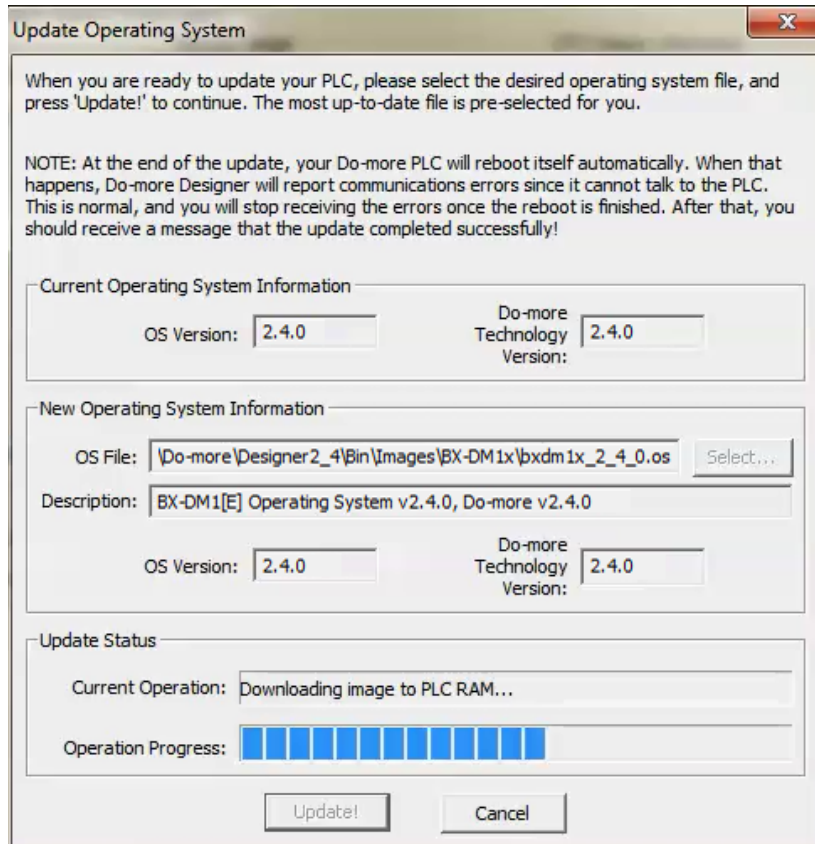
Click the **Go!** button to check for updated firmware files. Click the **OK** button to close the *Live Update* dialog.



**NOTE:** Live Update requires a functional Internet connection to work. Make sure the Internet connection is active before running Live Update.

## Update Operating System

When the dialog opens it will read the OS Version and Do-more! versions from the currently connected controller, and from the latest operating system firmware file.



### Current Operating System Information

*OS Version* - the current version of the operation system in the controller

*Do-more Technology Version* - the current version of the instruction set in the controller

### New Operating System Information

*OS File* - the most up-to-date operating system firmware file in the default firmware folder

**Select** - opens a File Open dialog to select an operating system firmware file. Operating System firmware files typically have the following form: “H2DM1x\_<major>\_<minor>\_<build>.os”

*Description* - the current version information from the selected file

*OS Version* - the current version of the operation system in the selected file

*Do-more Technology Version* - the current version of the instruction set in the selected file

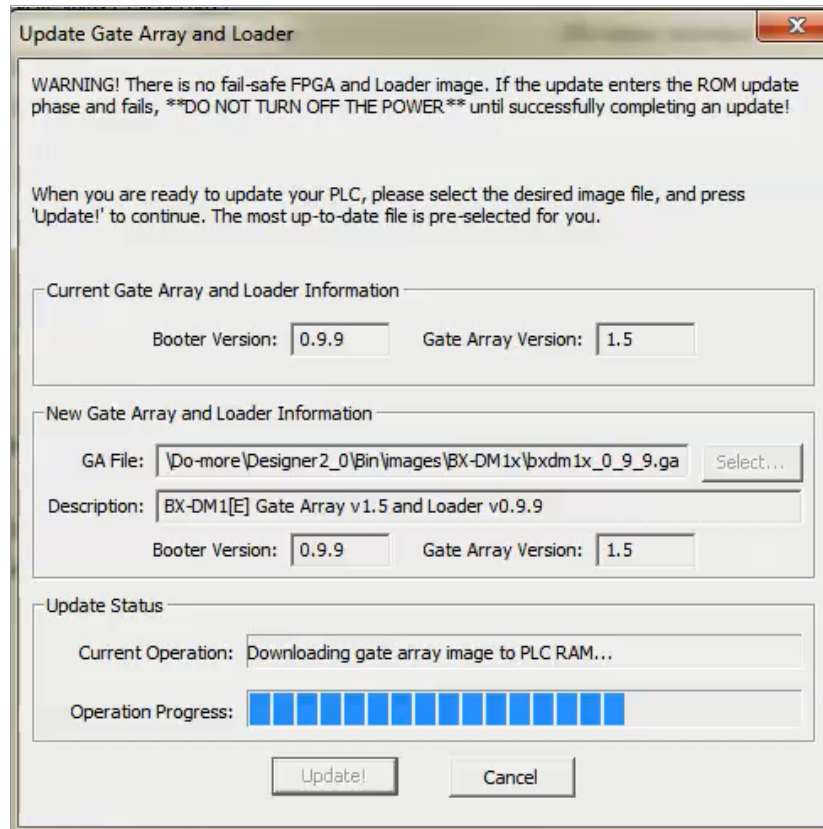
Click the **Update!** button to begin the update progress. The last phase of updating the operating system is a reboot of the Do-more! controller. While the controller is rebooting, the normal communication updates will fail, and the Link indicator on the Status bar will turn red. Once the controller has successfully rebooted, normal communication updates will automatically resume, and the Link indicator will return to normal.

Click the **Cancel** button to exit without updating the operating system.

## Update Gate Array and Loader



**WARNING:** There is no fail-safe for the Gate Array and Loader update, which means, if the update process begins and then fails, **\*\* DO NOT TURN OFF THE POWER\*\***, keep trying the update process until it is successful. If you turn off the power without a successful update the controller must be sent back to the factory for repair (use the 'H/W Repair (RMA)' link at [www.hosteng.com](http://www.hosteng.com) to request an RMA number for a Do-more! CPU that fails to update the Gate Array and Loader).



When the dialog opens it will read the Gate Array Version and Boot Loader version from the currently connected controller and from the latest Gate Array firmware file.

### Current Gate Array and Loader Information

*Booter Version* - the current version of Boot Loader in the controller

*Gate Array Version* - the current version of the Gate Array code in the controller

### New Gate Array and Loader Information

*GA File* - the most up-to-date Gate Array firmware file in the default firmware folder

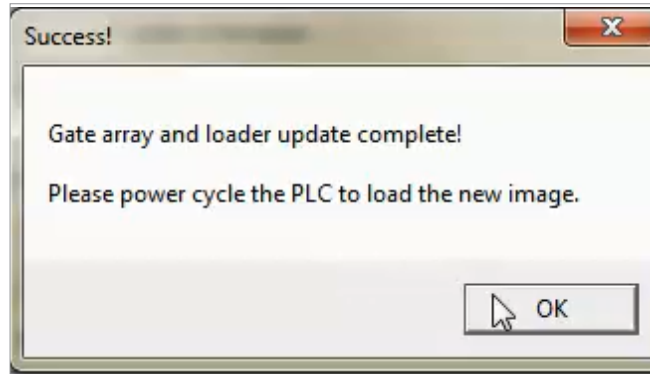
**Select** - opens a File Open dialog to select a Gate Array firmware file. Gate Array files firmware file typically have the following form: “H2DM1x\_<major>\_<minor>\_<build>.ga”

*Description* - the current version information from the selected file

*Booter Version* - the current version of Boot Loader in the selected file

*Gate Array Version* - the current version of the Gate Array code in the selected file

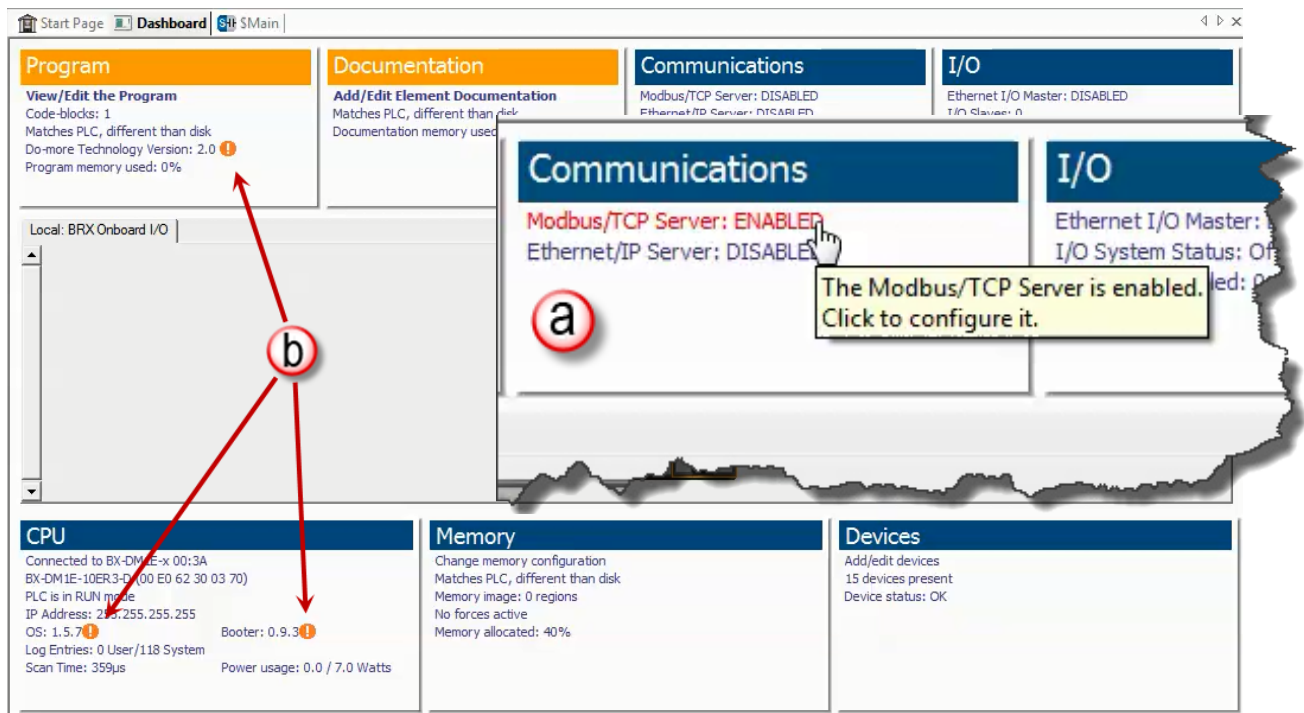
Click the **Update!** button to begin the update progress. When the Gate Array and Loader update is complete, you will see the following window with instructions to power cycle the PLC.



Click the **Cancel** (previous graphic) button to exit without updating the Gate Array and Loader.

## Dashboard

The Do-more! Designer Dashboard is a graphical representation of the PLC system. It is used to assist in the configuration of the various components of the system as well as for monitoring and troubleshooting after it is up and running. The following pages will be a quick overview on how to use the Dashboard. Please reference Do-more! Designer Help topic DMD0415 for more detailed information.



The dashboard is divided horizontally into three sections, top, center and bottom sections. The top and bottom sections consist of distinct panes each of which contain related items with current status of each. These entries (a) are also mouse-over links; as you move your mouse over an entry it will highlight in red and a pop-up text box will appear with more detailed information. Left click a link to open a dialog that addresses the configuration of that entry, or opens a monitor tool for that entry.

Entries (b) that have an orange (!) next to them indicate items that need your attention. For example, an orange (!) adjacent to the “OS: x.y.z” item in the CPU section indicates the firmware in the CPU is older than the firmware you have downloaded to this PC. Click the link to open the firmware update tool.

Some entries will have their text displayed with a yellow background to indicate the item is generating a warning message that may need your attention. For example, if you have Forces enabled and one or more items are currently being Forced to a value, the Memory section will display the “x forces active” text with a yellow background. Click this link to open the Configure Forces dialog to see what elements are being forced.

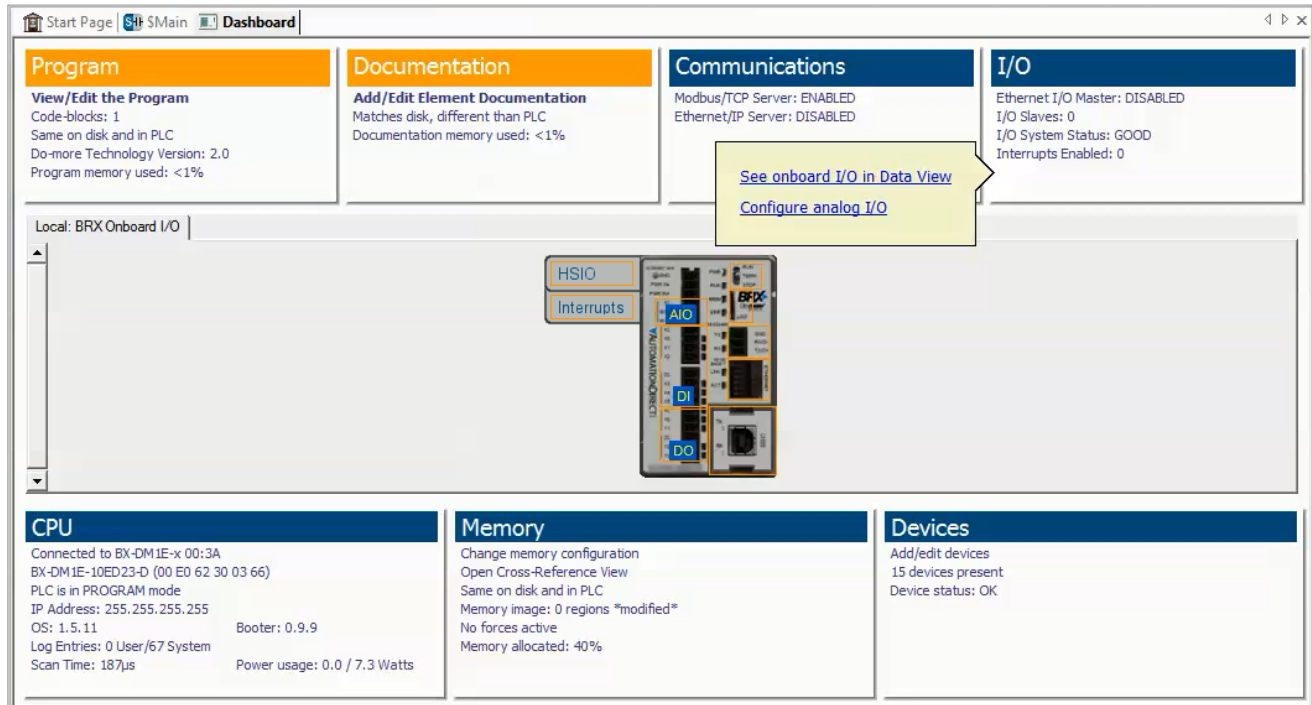
Some entries will have their text displayed with a red background to indicate the item is generating a warning message that may need your attention. For example, if an I/O module is reporting an error, the I/O section will display the “I/O System Status” text with a red background. Click this link to open the I/O System View to see an overview of the entire I/O system and locate the module that is reporting an error.

The center section contains a series of tabbed (a) graphical representations of the PLC system components. The leftmost (top) selection is the local CPU. There is an additional tab created for each Ethernet Remote I/O Slave. Any time the mouse cursor is in the center section (b) orange outlines (known as hotspots) will appear on the sections of the PLC system to indicate there is status information available for that area or configuration that can be performed.

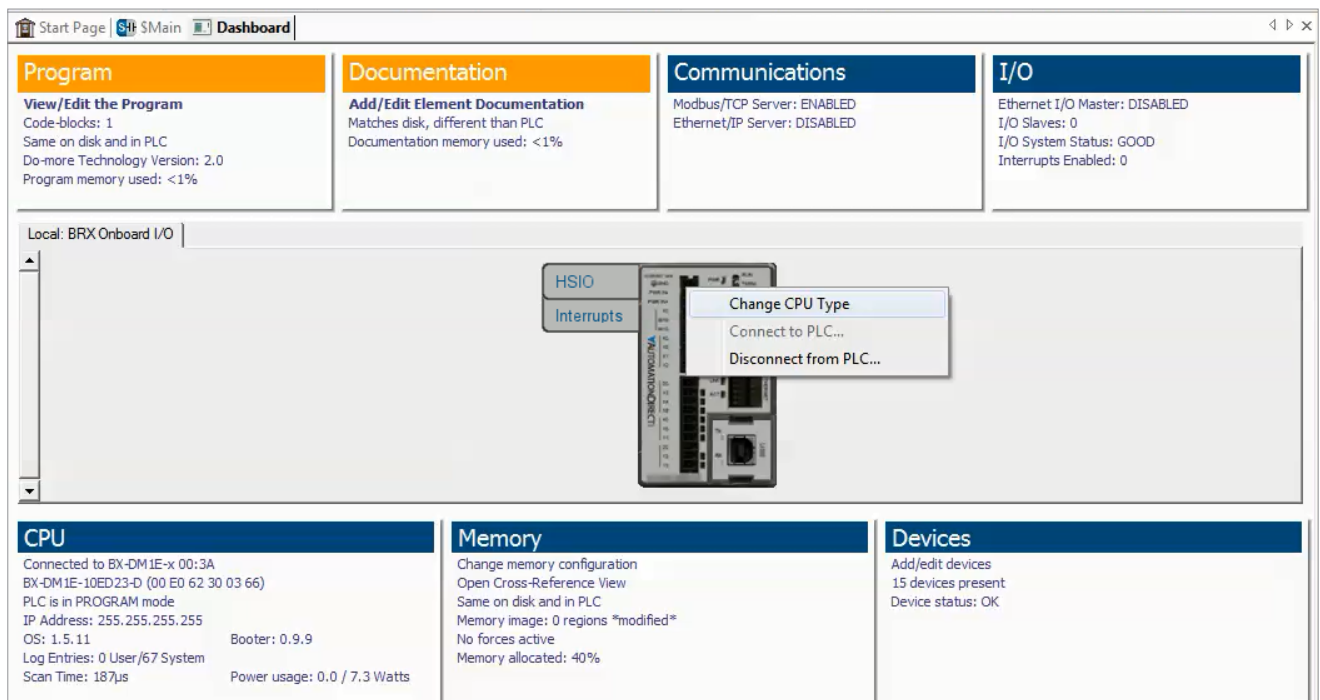
Hovering the mouse cursor over any of the hot spots will display a popup that shows the current status of the item in that hotspot. For example, hovering over the DI hotspot (c) will display information on the response times configured for the discrete inputs and, if the unit supports high speed inputs, it will display how the high speed Counter/Timer functions are configured.

The screenshot displays the Do-more! Designer software interface. At the top, there are navigation tabs for 'Start Page', 'Main', and 'Dashboard'. Below this, there are four main panels: 'Program', 'Documentation', 'Communications', and 'I/O'. The 'Program' panel shows 'View/Edit the Program' with details like 'Code-blocks: 1' and 'Program memory used: <1%'. The 'Documentation' panel shows 'Add/Edit Element Documentation' with 'Documentation memory used: <1%'. The 'Communications' panel shows 'Modbus/TCP Server: ENABLED' and 'Ethernet/IP Server: DISABLED'. The 'I/O' panel shows 'Ethernet I/O Master: DISABLED', 'I/O Slaves: 0', and 'I/O System Status: GOOD'. Below these panels is a central graphical representation of the PLC system components, labeled 'Local: BRX Onboard I/O'. This representation includes a 'CPU' section, a 'Memory' section, and an 'I/O' section. The 'CPU' section shows 'Connected to BX-DM1E-x 00:3A', 'BX-DM1E-10ED23-D (00 E0 62 30 03 66)', 'PLC is in PROGRAM mode', 'IP Address: 255.255.255.255', 'OS: 1.5.11', 'Booter: 0.9.9', 'Log Entries: 0 User/67 System', 'Scan Time: 187µs', and 'Power usage: 0.0 / 7.3 Watts'. The 'Memory' section shows 'Change memory configuration', 'Open Cross-Reference View', 'Same on disk and in PLC', 'Memory image: 0 regions \*modified', 'No forces active', and 'Memory allocated: 40%'. The 'I/O' section shows 'Discrete Inputs' with 'Response times: Input 0 (X0): 0 Hz (disabled)', 'Input 1 (X1): 0 Hz (disabled)', 'Input 2 (X2): 0 Hz (disabled)', 'Input 3 (X3): 0 Hz (disabled)', 'Input 4 (X4): 0 Hz (disabled)', and 'Input 5 (X5): 0 Hz (disabled)'. It also shows 'High-Speed Counter/Timer Functions: Function 1: Disabled', 'Function 2: Disabled', and 'Function 3: Disabled'. A 'Services' section is partially visible at the bottom right, showing 'edit devices', 'devices present', and 'device status: OK'. A red circle (a) is placed over the 'Local: BRX Onboard I/O' label. A red circle (b) is placed over the 'I/O' section of the graphical representation. A red circle (c) is placed over the 'Discrete Inputs' popup window.

Left-clicking on the hot spot will display a popup menu that contains links specific to the configuration tools and information displays for that item. For example, left clicking on the AIO (analog I/O) hotspot, displays links to view onboard analog I/O values in Data View and a link to configure the analog I/O, as shown below.



Right-clicking on the MPU or an expansion module will display a list of operations that can be performed on that module. For example, right-clicking on the MPU (below) gives the option to Change CPU Type, Connect to PLC, or Disconnect from PLC. The options will vary depending on the MPU family and module type.





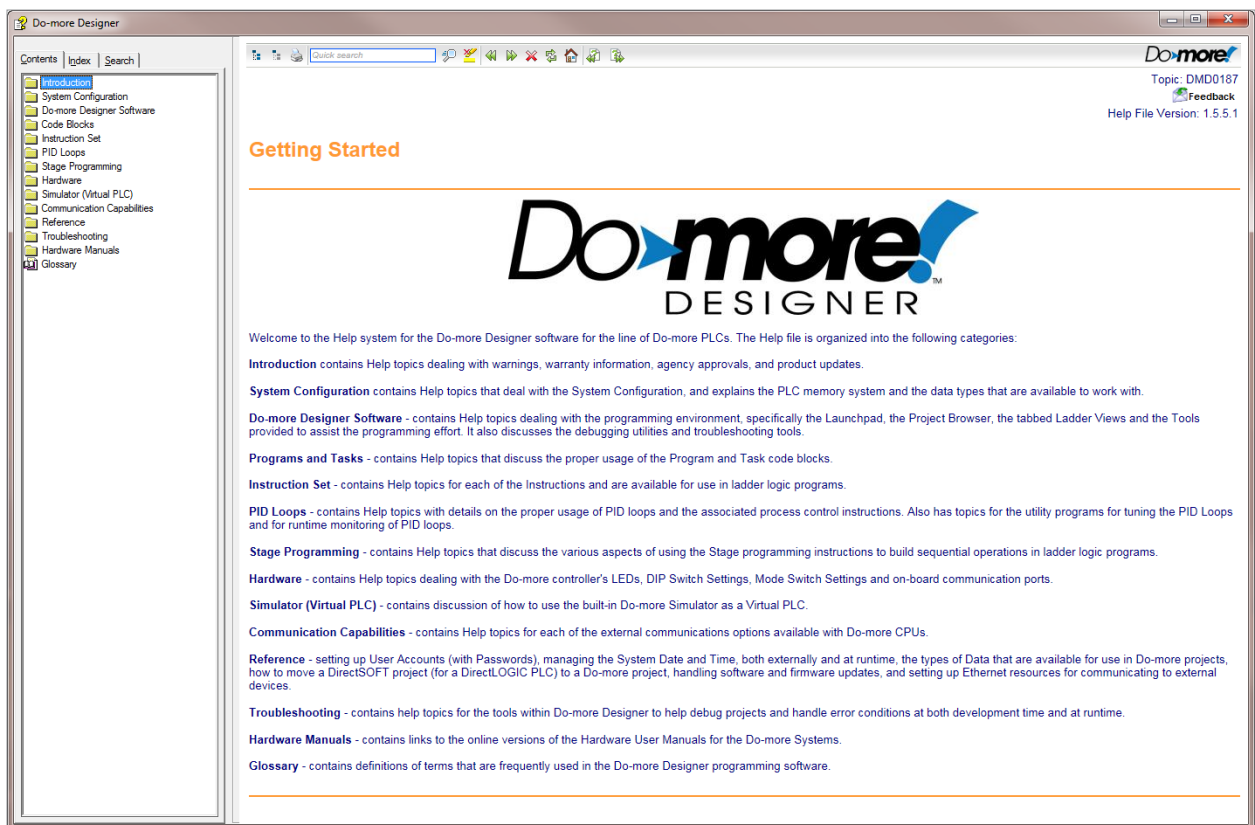
# Help File

## Accessing the Help File

The software Help file is available as a quick reference or detailed guide to the many features and capabilities of the Do-more! Designer software. This provides comprehensive support for you as a user of not only the BRX Platform but also the whole Do-more! product family.

There are three ways to access the Help File:

1. Select the Help File icon from the Project Toolbar.
2. Choose Help from the Help menu drop down.
3. Use the shortcut **F1** or press the(?) button or the Help button on the dialog that you need help with.



Notes:

# DO-MORE! INSTRUCTION SET

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




## In This Appendix...

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| Coil / Bit Outputs .....      | A-2 |
| Analog / Process .....        | A-2 |
| CTRIO.....                    | A-3 |
| Date / Time / Calendar .....  | A-3 |
| Ethernet .....                | A-3 |
| File System.....              | A-3 |
| Hardware / Device.....        | A-4 |
| High Speed / Axis.....        | A-4 |
| Math .....                    | A-4 |
| Math Functions .....          | A-4 |
| Misc / Data Manipulation..... | A-5 |
| Program Control .....         | A-6 |
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| String .....                  | A-7 |
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## Instruction Set

The following table lists the Do-more! instruction set. (See Help topic DMD0186 for more on the Do-more! instruction set.)

| Do-more! Instruction Set  |                                      |
|---|--------------------------------------|
| Instruction   | Name                                 |
| <b>Contacts</b>   |                                      |
|  | Normally Open                        |
|  | Normally Closed                      |
|  | Leading Edge One-Shot                |
|  | Trailing Edge One-Shot               |
|  | Greater-Than-or-Equal-To             |
|  | Equal-To                             |
|  | Less-Than-or-Equal-To                |
|  | Less-Than                            |
|  | Not-Equal-To                         |
|  | Greater-Than                         |
|  | Delta                                |
|  | Leading Edge One-Shot on Power Flow  |
|  | Trailing Edge One-Shot on Power Flow |
|  | Invert Power Flow                    |
| <b>Coil / Bit Outputs</b>   |                                      |
| DEBOUNCE  | Reduce Discrete Input Chatter        |
| END   | End Code Block                       |
| FLASHER   | Cycle Output ON/OFF                  |
| INI   | Immediate Discrete Input             |
| ND  | Trailing Edge One-Shot               |
| NOP   | Null Operation                       |
| OUT   | Coil Write Bit                       |
| OUTI  | Coil Out Immediate Bit               |
| PD  | Leading Edge One-Shot                |
| PONOFF  | Push On/Push Off                     |
| RST   | Reset Bit                            |
| RSTI  | Reset Immediate Bit                  |
| RSTR  | Reset Range                          |
| SET   | Coil Set Bit                         |
| SETI  | Coil Set Immediate Bit               |
| SETR  | Set Range                            |
| SR  | Shift Register                       |
| TIMEDOUT  | Timed Output                         |
| <b>Analog / Process</b>   |                                      |
| ALDEV   | Deviation Alarm                      |
| ALHILO  | High/Low Alarm                       |
| ALRATE  | Rate of Change Alarm                 |
| CLAMP   | Limit Range                          |
| DEADBAND  | Set Outside Deadband                 |
| FILTER  | First Order Filter                   |
| <i>Table continued on next page</i>   |                                      |

| <b>Do-more! Instruction Set (continued)</b> |                                       |
|---|---------------------------------------|
| <b>Class</b>                                | <b>Description</b>                    |
| INTEGRAT                                    | Integrate Over Time                   |
| PID   | Closed Loop Controller                |
| PIDINT                                      | Set PID Tuning Constants              |
| RAMPSOAK                                    | Ramp Soak Profile                     |
| SCALE                                       | Scale Value                           |
| SLOPE                                       | Calculate Slope                       |
| TIMEPROP                                    | Time Proportional Control             |
| <b>CTRIO</b>                                |                                       |
| CTAXCFG                                     | CTRIO2 Axis Configuration             |
| CTAXDYNP                                    | CTRIO2 Axis Run Dynamic Position Mode |
| CTAXDYNV                                    | CTRIO2 Axis Run Dynamic Velocity Mode |
| CTAXJOG                                     | CTRIO2 Axis Jog Mode                  |
| CTAXLIMT                                    | CTRIO2 Axis Run Trapezoid w/ Limits   |
| CTAXTRAP                                    | CTRIO2 Axis Run Trapezoid             |
| CTDYNPOS                                    | CTRIO Run Dynamic Position Mode       |
| CTDYNVEL                                    | CTRIO Run Dynamic Velocity Mode       |
| CTPLSADD                                    | CTRIO Add Entry to PLS                |
| CTPLSEDT                                    | CTRIO Edit PLS Entry                  |
| CTREGRD                                     | CTRIO Read Register                   |
| CTREGWR                                     | CTRIO Write Register                  |
| CTRUNPOS                                    | CTRIO Run Position Mode               |
| CTRUNVEL                                    | CTRIO Run Velocity Mode               |
| CTTBLADD                                    | CTRIO Add Entry to Preset Table       |
| CTTBLCLR                                    | CTRIO Clear Table                     |
| CTTBLEDT                                    | CTRIO Edit Preset Table Entry         |
| CTTBLLD                                     | CTRIO Load Table                      |
| CTUPDLVL                                    | CTRIO Update Level                    |
| <b>Date / Time / Calendar</b>               |                                       |
| DT2EPOCH                                    | Convert Date/Time to Epoch            |
| DTCMP                                       | Compare Date/Time                     |
| DTDIF                                       | Difference Between Two Dates/Times    |
| DTOFFSET                                    | Add Offset to Date/Time               |
| EPOCH2DT                                    | Convert Epoch to Date/Time            |
| NETTIME                                     | SNTP Client                           |
| SETTIME                                     | Set PLC Date/Time                     |
| <b>Ethernet</b>                             |                                       |
| DNSLOOKUP                                   | Name to IP Address                    |
| EMAIL                                       | Send Email                            |
| PING  | Ping Ethernet Device                  |
| SETUPIP                                     | Setup TCP/IP Parameters               |
| SETUPNOD                                    | Setup Ethernet Node Parameters        |
| <b>File System</b>                          |                                       |
| BACKUP                                      | Create PLC Image File                 |
| FILECLOSE                                   | Close File                            |
| FILECOPY                                    | Copy File                             |
| FILEDEL                                     | Delete File                           |
| <i>Table continued on next page</i>         |                                       |

| <b>Do-more! Instruction Set (continued)</b> |   |
|---|---|
| <b>Class</b>                                | <b>Description</b>                        |
| FILELOG                                     | Log to File                               |
| FILENEWFLDR                                 | Make a New Folder                         |
| FILEOPEN                                    | Open File                                 |
| FILEQUERY                                   | Query File or Folder Information          |
| FILEREAD                                    | Read from File                            |
| FILESEEK                                    | Seek to Position in File                  |
| FILESYSCMD                                  | Perform File System Command               |
| FILETRUNC                                   | Truncate File                             |
| FILEWRITE                                   | Write to File                             |
| <b>Hardware / Device</b>                    |   |
| CLOSE                                       | Close Device                              |
| DEVCLEAR                                    | Clear Device                              |
| DEVREAD                                     | Read to Device Register                   |
| DEVWRITE                                    | Write to Device Register                  |
| HWINFO                                      | Get Hardware Information                  |
| OPENDEV                                     | Open Device                               |
| RD  | Read from Intelligent Module              |
| SETUPSER                                    | Setup Serial Port                         |
| WT  | Write to Intelligent Module               |
| <b>High Speed / Axis</b>                    |   |
| AXCAM                                       | Axis Electronic Camming                   |
| AXCONFIG                                    | Axis Configuration                        |
| AXFOLLOW                                    | Axis Position Following with Offset       |
| AXGEAR                                      | Axis Electronic Gearing                   |
| AXHOME                                      | Axis Perform Home Search                  |
| AXJOG                                       | Axis Jog Mode                             |
| AXPOSSCRV                                   | Axis Move to Position Using S-Curve       |
| AXPOSTRAP                                   | Axis Move to Position Using Trapezoid     |
| AXRSTFAULT                                  | Reset Axis Limit Fault                    |
| AXSCRIPT                                    | Run a Sequence of Axis Commands           |
| AXSETPROP                                   | Set Axis Properties                       |
| AXVEL                                       | Axis Set Velocity Mode                    |
| PWMOUT                                      | Pulse Width Modulated Output              |
| TDODECFG                                    | Deconfigure Table Driven Output           |
| TDOPLS                                      | Load Programmable Limit Switch Table      |
| TDOPRESET                                   | Load Preset Table for Table Driven Output |
| <b>Math</b>                                 |   |
| DEC   | Decrement                                 |
| INC   | Increment                                 |
| LERP  | Linear Interpolation                      |
| MATH  | Calculate Expression                      |
| RANDSEED                                    | Random Number Seed                        |
| <b>Math Functions</b>                       |   |
| COS   | Cosine of Radian Angle                    |
| ACOS  | Arccosine in Radians                      |
| SIN   | Sine of Radian Angle                      |
| <b>Table continued on next page</b>         |   |

| <b>Do-more! Instruction Set (continued)</b> |   |
|---|---|
| <b>Class</b>                                | <b>Description</b>                        |
| ASIN  | Arcsine in Radians                        |
| TAN   | Tangent of Radian Angle                   |
| ATAN  | Arctangent in Radians                     |
| DEG   | Convert Radians to Degrees                |
| RAD   | Convert Degrees to Radians                |
| FRAC  | Fractional Portion of a Real Number       |
| TRUNC                                       | Truncate Real to Whole Number             |
| ROUND                                       | Round Real to Nearest Whole Number        |
| LN  | Natural Log                               |
| LOG   | Log Base 10                               |
| PI  | Return PI                                 |
| RANDINT                                     | Random Integer                            |
| RANDREAL                                    | Random Real Number                        |
| REF   | Read Value Indirectly                     |
| ABS   | Absolute Value                            |
| SQRT  | Square Root                               |
| AVGR  | Average of a Range of Values              |
| SUMR  | Sum of a Range of Values                  |
| MAXR-                                       | Maximum Value Across a Range of Values    |
| MINR  | Minimum Value Across a Range of Values    |
| STDEVPR                                     | Population Standard Deviation of a Range  |
| STDEVR                                      | Sample Standard Deviation of a Range      |
| MIN   | Minimum Between Two Expressions           |
| MAX   | Maximum Between Two Expressions           |
| TICKus                                      | Get Microsecond System Timer Value        |
| TICKms                                      | Get Millisecond System Timer Value        |
| NOW   | Get Date / Time Stamp as a 32-bit Integer |
| TOINT                                       | Convert to Integer                        |
| TOREAL                                      | Convert to Real                           |
| IF  | If / Else Expression                      |
| COUNTIF (EQ, GE, GT, LE, LT, NE)            | Count If                                  |
| SUMIF (EQ, GE, GT, LE, LT, NE)              | Sum If                                    |
| <b>Misc / Data Manipulation</b>             |   |
| BCDTO                                       | BCD to Integer/Real                       |
| COPY  | Copy Data                                 |
| DATAINFO                                    | Query Information about Data Memory       |
| DECO  | Decode to Set Bit                         |
| ENCO  | Encode Bit Position                       |
| GRAY  | Gray Code to Integer                      |
| INIT  | Initialize Data                           |
| ISCLEAR                                     | Is Structure Cleared                      |
| MAPIO                                       | Map Inputs/Outputs                        |
| MEMCLEAR                                    | Clear Memory                              |
| MEMCOPY                                     | Copy Memory Range                         |
| MOVE  | Move Value                                |
| MOVEBIT                                     | Move Single Bit                           |
| MOVER                                       | Move Range of Values                      |
| <i>Table continued on next page</i>         |   |

| <b>Do-more! Instruction Set (continued)</b> |                                    |
|---|------------------------------------|
| <b>Class</b>                                | <b>Description</b>                 |
| PUBLISH                                     | Translate from Do-more!            |
| REFWRITE                                    | Write Value Indirectly             |
| ROTL  | Rotate Left                        |
| ROTR  | Rotate Right                       |
| SEG   | Hex/BCD to 7 Segment Display       |
| SETNUMBER                                   | Set Numeric Range                  |
| SUBSCRIB                                    | Translate to Do-more!              |
| SUMBITS                                     | Sum Bits                           |
| SWAPB                                       | Swap Bytes                         |
| TOBCD                                       | Integer/Real to BCD                |
| <b>Program Control</b>                      |                                    |
| CALL  | Call Subroutine                    |
| ENDC  | Conditional End of Code-Block      |
| ENTASK                                      | Enable Task                        |
| EXIT  | Exit this program                  |
| GOTO  | Go to Label                        |
| HALT  | Halt program or Task               |
| INTCONFIG                                   | Configure Interrupts               |
| INTDECONFIG                                 | Deconfigure Interrupts             |
| INTRESUME                                   | Resume Interrupts                  |
| INTSUSPEND                                  | Suspend Interrupts                 |
| JMP   | Jump to Stage                      |
| JMPI  | Indexed Jump                       |
| LABEL                                       | Program Label                      |
| REBOOT                                      | Reboot PLC                         |
| RESTART                                     | Restart Program or Task            |
| RET   | Return Back to CALL                |
| RETC  | Conditional Return Back to CALL    |
| RUN   | Run Program                        |
| SG  | Stage                              |
| SGCONVRG                                    | Converge Multiple Stages to SG     |
| SGDIVRG                                     | Jump to Multiple Stages            |
| SGRST                                       | Disable Stage                      |
| SGRSTR                                      | Disable Range of Stages            |
| SGSET                                       | Enable Stage                       |
| STOP  | Switch to Program Mode             |
| SUSPEND                                     | Suspend Program or Task            |
| WATCHDOG                                    | Force Watchdog Error               |
| YIELD                                       | Yield Program or Task              |
| <b>Program-Looping</b>                      |                                    |
| BREAK                                       | Exit Loop                          |
| CONTINUE                                    | Skip to Loop End                   |
| FOR   | Index Loop                         |
| NEXT  | Index by Step                      |
| REPEAT                                      | Loop Until Condition is Non-Zero   |
| UNTIL                                       | Repeat Until Condition is Non-Zero |
| <b>Table continued on next page</b>         |                                    |



| <b>Do-more! Instruction Set (continued)</b> |                                       |
|---|---------------------------------------|
| <b>Class</b>                                | <b>Description</b>                    |
| WEND  | While End                             |
| WHILE                                       | Loop with While Condition is Non-Zero |
| <b>Protocol-Custom/Ascii</b>                |                                       |
| CHECKSUM                                    | Checksum Algorithm                    |
| OPENTCP                                     | Open TCP Connection                   |
| PACKETIN                                    | Input Data from Packet Device         |
| PACKETOUT                                   | Output Data from Packet Device        |
| STREAMIN                                    | Stream in Data from Device            |
| STREAMOUT                                   | Stream Out Data to Device             |
| TCPLISTEN                                   | Start Listening on TCP port           |
| <b>Protocol Standard</b>                    |                                       |
| DLRX  | DirectLOGIC Network Read              |
| DLWX  | DirectLOGIC Network Write             |
| EIPMSG                                      | Send EtherNet/IP Message              |
| GSREGRD                                     | GS E-Drive Register Read              |
| GSREGWR                                     | GS E-Drive Register Write             |
| HTTPCMD                                     | Execute HTTP Command                  |
| JSONBUILD                                   | Build JSON Record                     |
| JSONPARSE                                   | Parse JSON Record                     |
| MQTTPUB                                     | IoT Publish MQTT Topics               |
| MQTTSUB                                     | IoT Subscribe to MQTT Topics          |
| MRX   | Modbus Network Read                   |
| MWX   | Modbus Network Write                  |
| PEERLINK                                    | Share Data w/PLCs                     |
| RX  | Do-more! Network Read                 |
| WX  | Do-more! Network Write                |
| <b>String</b>                               |                                       |
| STR2INT                                     | Convert String to Integer             |
| STR2REAL                                    | Convert String to Real                |
| STRCASE                                     | Covert String to Upper/Lower Case     |
| STRCLEAR                                    | Clear Strings                         |
| STRCMP                                      | String Compare                        |
| STRDELETE                                   | Delete Substring                      |
| STRFIND                                     | Find within a String                  |
| STRGETB                                     | Get Bytes out of String               |
| STRINSERT                                   | Insert Substring                      |
| STRPRINT                                    | Print a String                        |
| STRPUTB                                     | Put Bytes into a String               |
| STRSUB                                      | Get Sub-String                        |
| STRTRIM                                     | Trim Whitespace                       |
| STRTRUNC                                    | Set String Length                     |
| <b>Timer / Counter / Drum</b>               |                                       |
| CNT   | Up Counter                            |
| CNTDN                                       | Down Counter                          |
| COMMON_TIMER                                | Common Timer                          |
| DRUM  | Timed/Event/Timed-Event Drum          |
| <b>Table continued on next page</b>         |                                       |

| Do-more! Instruction Set (continued) |                           |
|--------------------------------------|---------------------------|
| Class                                | Description               |
| FREQCNT                              | Frequency Counter         |
| FREQTMR                              | Frequency Timer           |
| OFFDTMR                              | Off Delay Timer           |
| ONDTMR                               | On Delay Timer            |
| RSTCT                                | Reset Counter             |
| RSTT                                 | Reset Timer               |
| TMR                                  | Timer                     |
| TMRA                                 | Accumulating Timer        |
| TMRADOWN                             | Accumulating Down Timer   |
| TMRAG                                | Global Accumulating Timer |
| TMRDOWN                              | Down Timer                |
| UDC                                  | Up/Down Counter           |
| UDCG                                 | Global Up/Down Counter    |

# KEYBOARD SHORTCUTS

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## In This Appendix...

|  |     |
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| Do-more! Designer Keyboard Shortcuts ..... | B-2 |
|--|-----|

## Do-more! Designer Keyboard Shortcuts

The following table lists the keystrokes (also known as Hot Keys or Accelerator Keys) available in the various views of Do-more! Designer that can greatly enhance the usability of each view.

| Keyboard Shortcuts                  |  |
|-------------------------------------|--|
| Shortcut                            | Action   |
| <i>Ladder View</i>                  |  |
| !                                   | Edit Not-Equal-To Contact  |
| <                                   | Edit Less-Than Contact   |
| =                                   | Edit Equal-To Contact  |
| >                                   | Edit Great-Than-Or-Equal-To Contact                                      |
| Ctrl+A                              | Select All   |
| Ctrl+C                              | Copy into Clipboard  |
| Ctrl+E                              | Toggle Edit Mode   |
| Ctrl+F                              | Open Find Dialog   |
| Ctrl+Shift+F                        | Find Next  |
| Ctrl+K                              | Open Rung Comment Editor   |
| Ctrl+P                              | Print Current View   |
| Ctrl+R                              | Open Replace dialog  |
| Ctrl+V                              | Paste Clipboard into View  |
| Ctrl+W                              | Connect Wire to Output   |
| Ctrl+X                              | Cut into Clipboard   |
| Ctrl+Z                              | Open Edit History  |
| Backspace                           | Delete Instruction to Left then move Edit cursor to Left                 |
| Ctrl+Comma                          | Goto Previous Instruction  |
| Ctrl+Delete                         | Cut into Clipboard   |
| Delete                              | Delete   |
| Ctrl+Down Arrow                     | Draw Wire Down   |
| Ctrl+Shift+Down Arrow               | Delete Wire Down   |
| Ctrl+End                            | Goto Last Rung in Code Block   |
| Ctrl+Shift+End                      | Add from Current Location to End to Selection                            |
| Shift+End                           | Add Next Rung to Selection   |
| Enter                               | Insert Row After Block Cursor, or Before Block Cursor if in First Column |
| F12                                 | Goto Element's Output Reference  |
| Ctrl+F2                             | Edit Positive Differential Powerflow Modifier                            |
| Shift+F2                            | Edit Positive Differential Contact                                       |
| F2                                  | Edit Normally Open Contact   |
| Ctrl+F3                             | Edit Negative Differential Powerflow Modifier                            |
| Shift+F3                            | Edit Negative Differential Contact                                       |
| F3                                  | Edit Normally Closed Contact   |
| F4                                  | Open Contact Instruction Browser   |
| F5                                  | Open Coil Instruction Browser  |
| F7                                  | Open Box Instruction Browser   |
| F8                                  | Accept Modified Rungs  |
| Ctrl+Home                           | Goto First Rung in Code-Block  |
| Ctrl+Shift+Home                     | Add from Current Location to Beginning to Selection                      |
| <i>Table continued on next page</i> |  |

| <b>Keyboard Shortcuts (continued)</b> |   |
|---------------------------------------|---|
| <b>Class</b>                          | <b>Description</b>  |
| Shft+Home                             | Add Previous Rung to Selection  |
| Ctrl+Insert                           | Copy into Clipboard   |
| Shft+Insert                           | Paste Clipboard into View   |
| Insert                                | Open Insert Rung, Row, Column dialog  |
| Ctrl+Left                             | Draw Wire to Left   |
| Ctrl+Shft+Left                        | Delete Wire to Left   |
| Ctrl-Minus                            | Goto Element's Previous Reference   |
| Ctrl+Shft+Minus                       | Zoom Out  |
| Ctrl+Page Down                        | Goto Next Modified Rung   |
| Page Down                             | Goto Next Rung  |
| Ctrl+Page Up                          | Goto Previous Modified Rung   |
| Page Up                               | Goto Previous Rung  |
| Ctrl+Period                           | Goto Next Instruction   |
| Ctrl+Plus                             | Goto Element's Previous Reference   |
| Ctrl+Shft+Plus                        | Zoom In   |
| Ctrl+Right                            | Draw Wire to Right  |
| Ctrl+Shft+Right                       | Delete Wire to Right  |
| Ctrl+Up                               | Draw Wire Up  |
| Ctrl+Shft+Up                          | Delete Wire Up  |
| <b>Main Programming Window</b>        |   |
| Ctrl+D                                | Open Documentation Editor   |
| Ctrl+L                                | Open Ladder View  |
| Ctrl+Shft+L                           | Restore Default Window Layout   |
| Ctrl+N                                | Create New Project  |
| Ctrl+O                                | Open Project  |
| Ctrl+Shft+R                           | Open Set PLC Mode dialog  |
| Ctrl+S                                | Save Project to Disk  |
| Ctrl+Shft+S                           | Toggle View's Status On/Off   |
| Ctrl+T                                | Edit Title Page   |
| Ctrl+Y                                | Open Cross Reference View   |
| F1                                    | Launch Contextual Help  |
| Ctrl+Shft+F2                          | Open Change Value dialog  |
| Ctrl+Shft+F3                          | New Data View   |
| Ctrl+F9                               | Read Project from PLC   |
| Shft+F9                               | Write Project to PLC  |
| F9                                    | Open Element Selection Tool   |
| <b>Data View</b>                      |   |
| Ctrl+Shft+A                           | Sort Elements Ascending   |
| Ctrl+C                                | Copy into Clipboard   |
| Ctrl+ShftD                            | Sort Elements Descending  |
| Ctrl+V                                | Copy Clipboard into View  |
| Ctrl+X                                | Cut into Clipboard  |
| Ctrl+Delete                           | Cut into Clipboard  |
| Delete                                | Delete  |
| Ctrl+Enter                            | Insert Element with Next ID   |
| Ctrl+Shft+Enter                       | Structure Field: Insert Element with Next Field<br>Structure: Insert Structure Fields |
| <b>Table continued on next page</b>   |   |

| <b>Keyboard Shortcuts (continued)</b> |                                   |
|---------------------------------------|-----------------------------------|
| <b>Class</b>                          | <b>Description</b>                |
| Ctrl+F2                               | Modify Element or Edit Cell       |
| F2                                    | Modify Element or Edit Cell       |
| Shft+F6                               | Move to Format Selections         |
| F6                                    | Move to Format Selections         |
| Shft+F9                               | Write Value to PLC                |
| Ctrl+Insert                           | Copy into Clipboard               |
| Shft+Insert                           | Paste Clipboard into View         |
| Insert                                | Insert Row                        |
| <b>Project Browser</b>                |                                   |
| Ctrl+C                                | Copy into Clipboard               |
| Ctrl+V                                | Copy Clipboard into View          |
| Ctrl+X                                | Cut into Clipboard                |
| Ctrl+Delete                           | Cut into Clipboard                |
| Delete                                | Delete                            |
| Ctrl+Insert                           | Copy into Clipboard               |
| Shft+Insert                           | Paste Clipboard into View         |
| Insert                                | Open Create New Code-Block dialog |
| <b>Rung Comment Editor</b>            |                                   |
| Ctrl+A                                | Select All                        |
| Ctrl+F                                | Goto Comment for Rung             |
| Ctrl+G                                | Goto Comment for Rung             |
| Ctrl+End                              | Goto Last Rung in Code Block      |
| Ctrl+Home                             | Goto First Rung in Code-Block     |
| Ctrl+Page Down                        | Go 5 Rungs Forward                |
| Ctrl+Page Up                          | Go 5 Rungs Back                   |
| <b>Cross Reference View</b>           |                                   |
| Ctrl+F                                | Open Find Dialog                  |
| Ctrl+Shft+F                           | Find Next                         |
| Ctrl+P                                | Print Current View                |
| <b>Trend View</b>                     |                                   |
| F2                                    | Open Add / Remove Elements dialog |
| <b>Element Documentation Editor</b>   |                                   |
| Ctrl+C                                | Copy into Clipboard               |
| Ctrl+F                                | Open Find Dialog                  |
| Ctrl+Shft+F                           | Find Next                         |
| Ctrl+P                                | Print Current View                |
| Ctrl+V                                | Copy Clipboard into View          |
| Ctrl+X                                | Cut into Clipboard                |
| Ctrl+Delete                           | Cut into Clipboard                |
| Delete                                | Delete                            |
| Ctrl+Insert                           | Copy into Clipboard               |
| Shft+Insert                           | Paste Clipboard into View         |
| <b>Change Value Dialog</b>            |                                   |
| Ctrl+F9                               | Read Value from PLC               |
| Shft+F9                               | Write Value to PLC                |
| <i>Table continued on next page</i>   |                                   |

| <b>Keyboard Shortcuts (continued)</b> |                    |
|---------------------------------------|--------------------|
| <b>Class</b>                          | <b>Description</b> |
| <i>Print Preview</i>                  |                    |
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Notes:



# TIPS AND TRICKS

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## Tips and Tricks

### C-more tag import

To easily get your tags from a Do-more! Designer Project into a C-more HMI, in Do-more! Designer go to File → Export → Element Documentation. Pick C-more Do-more! Driver Format WITH Structure Fields.

The most common issue with importing tags into a C-more HMI is that you have not given all of your memory elements Nicknames. Without Nicknames C-more cannot make a proper tag out of your memory fields.

### Pointers, Indexing and Arrays

In order to utilize a memory element as an array, it must be a Memory Block. Heap Items are singletons and cannot be utilized as an array. To see what elements can be used as an array or to create a custom item, go to System Configuration → Memory Configuration → Memory blocks tab.

Addressing a Memory Block as an array is simple. Place brackets [ ] after the Memory Block name and use a V-memory element such as V0 as the index. IE D[V0], N[V5], UDT[V0], etc.

A handy trick for knowing how large the array is without hardcoding values is to use the DATAINFO instruction.

### Bit of Word, Data type conversion and Casting

Getting bits out of a word in Do-more! Designer is done with a method called Casting. More information on Casting can be found in Do-more! Designer Help Topic DMD0309.

The basics of Casting a memory element are to use a “:” and an identifier or for Bit of Word, a number. IE D0:1 is bit 1 of memory element D0. All Bits start at zero.

To simplify Casting, you can use the Cast Builder. When on a field that supports a memory element, press the F9 key. Type your Source Element in the appropriate field and then in the bottom right corner, press the “Show Cast Builder” button. Click the appropriate radio buttons and then press “Select”. It is that easy to cast a memory element.

Other methods for doing memory type conversion is by using the ladder commands PUBLISH and SUBSCRIBE. These will allow you to convert large areas of memory at once which is useful when you are talking to a Modbus or DirectLogic device that utilizes untyped memory.

### Formatting Date and Time on an HMI with String Scripting

If you want your date and time to look nice on your HMI, put the data into a string using STRPRINT and the string scripting language. See Do-more! Designer Help Topic DMD0168 for a list of all string scripting commands.

### MATH, Logical Operations & statistical functions

The Do-more! MATH instruction is a very powerful feature. Do-more! Designer Help Topic DMD0085 covers the lists of functions that are available.

In addition to doing Arithmetic and Trigonometry, it can also do Logical and Bitwise operations. A few minutes perusing this help topic can save you a lot of time.

The most common issue when doing Math with a Do-more! processor is knowing that you must promote the equation to Real (Floating Point) if you are using integers with a Real result. If the equation is integers, but you wish to have a result that is a Real number you must use TOREAL() or add a decimal point to one of the numbers; IE 2.0. See Help topic DMD0085 for more information on promoting numbers to Real format.

## Simulation and PID Simulation

Do-more! Designer software comes with a separate Do-more! simulator application that runs the same Do-more! control engine that is in the Do-more! CPUs. You can connect/disconnect and upload/download to the simulator as you would with a Do-more! CPU. There is even a Run/Term/Stop mode switch and LED indicators for power, Run and communication activity. This is a great tool to test your code before you ever load it into your system.

The Simulator also has the ability to do simple PID simulation to learn how PID works!

See Do-more! Designer Help Topic DMD0234 for more information.

## Symbolic Constants

Do-more! Designer supports the use of Symbolic Constants. A Symbolic Constant is where you assign a nickname to a hard coded value. IE Sunday = 0, Monday = 1, Tuesday = 3, etc. Do-more! Designer Help topic DMD0276 has more information on symbolic constants.

To assign a Symbolic Constant, go to Tools -> Documentation Editor and then press the “Symb” in the toolbar of the Documentation Editor tab. This can help make your program much easier to read and navigate.

You can add a nickname to a memory location that has a cast. For example you have a double word signed number in D100 nicknamed “Dancer” for your dancer position. If you wanted to know that it was a negative, you could use D100:31 which is the sign bit for D100. If you were to nickname D100:31 “Dancer\_Neg” you could use this nickname throughout your program and it would always refer to D100:31.

## Start Page replacement

You can attach documents to your project to replace the content of the Start Page on a project-by-project basis. This can be a PDF, Excel spreadsheet, JPG, etc. A good example of this is the PID1.dmd example project found in the Examples folder in Do-more! Designer.

## Moving Communications links to another PC

You can move your communications links from one PC to another by copying the DmDComm.RST file that is located in the Do-more\Designerx\_x\Bin\ folder.

## Troubleshooting email with DMLogger

In your Do-more! Designer ladder project, turn \$EnableMsgDump bit ON & start Do-more! Logger from Applications window in the Launchpad to troubleshoot email. This will send the server messages to your PC so that you can see exactly where it is getting stuck at.

The DMLogger utility can also be useful for troubleshooting by placing STREAMOUT instructions in your ladder code to send messages to the utility to let you know what is happening at various times.

## Importing Program segments

Use the #import mechanism in your Import Program text file so you can modularly create projects from different source files. So MyProject.TXT could contain just 4 lines:

```
#include "SysConfigXYZZY.txt"  
#include "MachineControl.txt"  
#include "Library\NonLinearControlLibrary.txt"  
#include "Library\CalendarLibrary.txt"
```



# ONLINE RESOURCES

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## Online Resources

AutomationDirect provides extensive FREE online services and rich resources from free online tech support to training and how to videos as well as online forums. The following are the contact URLs for each of these resources. Thank you for choosing AutomationDirect for your automation needs.

### AutomationDirect Technical Support

<http://support.automationdirect.com/techcontact.html>

### AutomationDirect BRX & Do-more! Videos

<https://www.automationdirect.com/do-more/brx/Support/index>

### Interconnecting Automation Online BRX Training

<http://www.interconnectingautomation.com/onlinecourses/course/index.php?categoryid=17>

### AutomationDirect Forum

<https://forum.automationdirect.com/>

### Do-more! Designer Software

<http://support.automationdirect.com/products/domore.html>

### BRX, H2 & T1H Do-more! Manuals and Inserts

<https://cdn.automationdirect.com/static/manuals/index.html#domore>

### BRX 2D CAD drawings

<http://ftp.automationdirect.com/support/drawings/brx.zip>

NOTE: 3D Drawings can be found by browsing to the Product on the AutomationDirect website and selecting the STEP file download link.

### H2 & T1H Do-more! Autocad drawings

<http://ftp.automationdirect.com/support/drawings/domore.zip>

**HOST Engineering Main Website**

<http://www.hosteng.com/>

**HOST Engineering BRX FAQ's**

<http://www.hosteng.com/FAQFiles/Do-more.htm>

**HOST Engineering Forum**

<http://forum.hosteng.com/>

**HOST Engineering Do-more! Designer Revision History**

<http://www.hosteng.com/SW-Products/Domore%20Designer/DmDesigner.htm>

**HOST Engineering BRX Firmware Revision History**

[http://www.hosteng.com/HW-Products/DM1/BX-DM1\\_RevHistory.htm](http://www.hosteng.com/HW-Products/DM1/BX-DM1_RevHistory.htm)

**HOST Engineering H2 Firmware Revision History**

[http://www.hosteng.com/HW-Products/DM1/H2-DM1\\_RevHistory.htm](http://www.hosteng.com/HW-Products/DM1/H2-DM1_RevHistory.htm)

**HOST Engineering T1H Firmware Revision History**

[http://www.hosteng.com/HW-Products/DM1/T1H-DM1\\_RevHistory.htm](http://www.hosteng.com/HW-Products/DM1/T1H-DM1_RevHistory.htm)

**HOST Engineering Do-more! Training Slides**

<http://www.hosteng.com/FAQFiles/TechSlides/TechTrainingSlides01.html>

**HOST Engineering BRX Specific Training Slides**

<http://www.hosteng.com/FAQFiles/BRXTraining/BRXTechTrainingSlides.html>

Notes:



# DMLOADER

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## Generate DMLoader Image

The Generate DMLoader Image utility is intended to be used by OEMs to help them handle updating the Do-more! PLC in machines that they have built. To that end, this utility is used to build a single file that contains any mix of the System Configuration, the Ladder Logic, the Documentation, the PLC's memory contents, and the PLC firmware of a Do-more! CPU. This file will then be used by DMLoader to update one or more Do-more! PLCs without having to use the Do-more! Designer PLC programming software.



**NOTE:** To generate a DMLoader image, you must be connected to a Do-more! PLC. The utility cannot generate an image from just the program file.

Generate DMLoader Image
✕

This utility creates an image file for use with DMLoader, the Do-more PLC update utility. DMLoader can update virtually everything in a Do-more controller for production environments or field upgrades, without requiring the use of Do-more Designer.

Choose what you wish to include in the image, generate the image, and use DMLoader.exe to apply the selected updates.

**DMLoader Image Password**

Password  Confirm  Optionally password protect this DMLoader image file. Leave blank if not required.

**Comm Session Password**

Password  Required to establish a comm session if the PLC has a password configured.

**\$ProductID**

Off  Set  Require  \$ProductID is a retentive register (DST387) that DMLoader can validate prior to downloading. It is useful for ensuring the image is correct or authorized for the target CPU. Enter as an 8 digit hex value.

**\$ProductVersion**

Off  Set  Check  \$ProductVersion is a retentive register (DST388) containing a version number that DMLoader will check prior to downloading. Enter as an 8 digit hex value in the form of MMmmBBBB, where MM is major version, mm is minor version, and BBBB is the build number.

**PLC Operating System**

Update PLC OS Update the PLC's Operating System to this file.

**Program, System Configuration, and Documentation**

Download Program/SysConfig/Docs

**Retentive Memory Image**

Download Image

**Password Configuration**

Download Passwords

**User Provided Banner Bitmap**

Use Banner This file will replace the banner bitmap displayed at the top of DMLoader. The preferred size is 690x65.

**User Provided Instruction File**

Use Instruction File This file will replace the instructions displayed in the Welcome page of DMLoader.

After opening the Do-more! Designer project and establishing the online communication session with the Do-more! CPU, use the **File-> Export-> Generate DMLoader Image** menu selection to begin.

As you progress through the various selections, this utility will gather the required information from the currently open Do-more! Designer project and from the Do-more! CPU in the current online session. As you enable a selection you will be prompted for any additional information that is required by that selection.

## DMLoader Image Passwords

|                         |                      |  |
|-------------------------|----------------------|--|
| DMLoader Image Password |                      | Optionally password protect this DMLoader image file. Leave blank if not required. |
| Password                | <input type="text"/> | Confirm <input type="text"/>   |
| Comm Session Password   |                      | Required to establish a comm session if the PLC has a password configured.         |
| Password                | <input type="text"/> |  |

The Generate DMLoader Image utility will maintain password protection to protect intellectual property in the image file and/or the CPU itself.

The **DMLoader Image Password** allows a password to be used on the image file that will be generated. DMLoader Image Passwords must be 4 to 8 characters in length with no embedded white-space characters. Passwords are also case sensitive. Leave this field blank if you DO NOT wish to include a password on the image file itself.

The **Comm Session Password** allows DMLoader to correctly handle CPUs with password protection enabled by requiring the destination CPU's password be included in the image file so that it can establish a communication session with the destination CPU. The password is encrypted when saved as part of the image file. Comm Session Passwords must be 4 to 8 characters in length with no embedded white-space characters. Passwords are also case sensitive.

## Vendor Codes

|                                      |                           |   |
|--------------------------------------|---------------------------|---|
| \$ProductID                          |                           | \$ProductID is a retentive register (DST387) that DMLoader can validate prior to downloading. It is useful for ensuring the image is correct or authorized for the target CPU. Enter as an 8 digit hex value.   |
| <input checked="" type="radio"/> Off | <input type="radio"/> Set |   |
|                                      |                           | <input type="text" value="0"/>  |
| \$ProductVersion                     |                           | \$ProductVersion is a retentive register (DST388) containing a version number that DMLoader will check prior to downloading. Enter as an 8 digit hex value in the form of MMmmBBBB, where MM is major version, mm is minor version, and BBBB is the build number. |
| <input checked="" type="radio"/> Off | <input type="radio"/> Set |   |
|                                      |                           | <input type="text" value="0"/>  |

The Generate DMLoader Image utility provides a way to use Vendor-supplied values to make sure that the updates are being downloaded to the correct destination CPU.

The **\$ProductID** field contains an 8 digit Hex value. It can be set to operate in one of the following three ways:

- **Off** – download the image value regardless of the values in DST387 in the destination CPU.
- **Set** – overwrite the value in DST387 with the specified value regardless of the current value in that register location.
- **Require** – read the value is DST387 from the destination CPU and require that the value read from the CPU match the value specified before the image can be downloaded.



**NOTE:** When you click Generate Image, a Warning message will be displayed if the value specified in this field does not match the value currently in DST387 of the source CPU. You should consider adding a rung of ladder logic to \$tFirstScan that sets the \$ProductID value so that this value is always in the expected location.

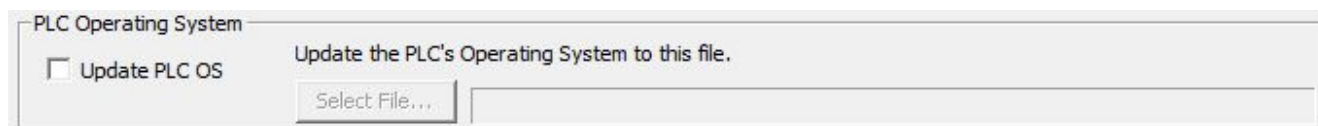
The **\$ProductVersion** field also contains an 8 digit Hex value in the form of MMmmBBBB where MM is the major version, mm is minor version and BBBB is the build number. This field can be set to operate in one of the following three ways:

- **Off** – disregard this field.
- **Set** – set the value in DST388 to the specified value regardless of the current value in that register location.
- **Check** – read the value in DST388 from the destination PLC and compare that value to the value specified. These values are NOT required to match to allow the image to be downloaded. If the values do not match a message to that effect will be displayed.



**NOTE:** When you click *Generate Image*, a *Warning* message will be displayed if the value specified in this field does not match the value currently in DST388 of the source CPU. You should consider adding a rung of ladder logic to *\$tFirstScan* that sets the *\$ProductID* value so that this value is always in the expected location.

## PLC Operating System

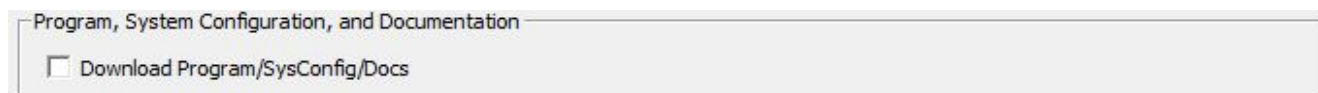


The Generate DMLoader Image utility can include a copy of the firmware that is currently running in the connected Do-more CPU so that DMLoader can update the destination CPU's firmware as part of the image download process.

At the time the **Update PLC OS** selection is enabled, the utility will read the current firmware version from the connected Do-more CPU and it will then search the Do-more Designer's firmware folders for the operating system firmware file that best matches the firmware version read from the CPU. The full pathname of the file that best matches will be displayed.

If no matching firmware file is found, or if you want to use a different operating system firmware file, click the **Select File** button to open a File Open dialog that will allow you to browse for a different operating system firmware file.

## Program System Configuration, and Documentation



When the **Program System Configuration, and Documentation** selection is enabled the following parts of the currently open project will be included in the image:

- All of the Project's code-blocks, which include the System Programs and Tasks and all User Programs and Tasks.
- The System Configuration, which includes the following:
  - CPU Configuration (the TCP/IP configuration of the on-board port will NOT be included, the Destination's CPU's TCP/IP configuration can be done by DMLoader).
  - I/O Configuration

- Module Configuration
- Device Configuration
- I/O Mapping
- Memory Configuration
- All of the Project's Documentation, which includes the Element Documentation and the Rung Comments.

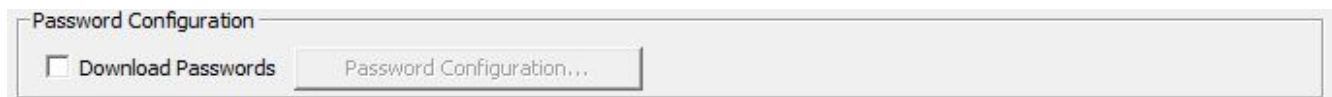
If this selection is NOT enabled, the Program, System Configuration and Documentation in the destination PLC will NOT be changed when DMLoader downloads this image file.

## Retentive Memory Image

When the **Download Retentive Memory Image** selection is enabled a check is made to see if a retentive memory Image already exists for the project. If one exists its contents will be included in the DMLoader image.

If none is found you will be prompted to run the Memory Image Manager to create one. Upon returning to this utility you will be prompted to include contents of the just-created retentive memory image in the DMLoader image file.

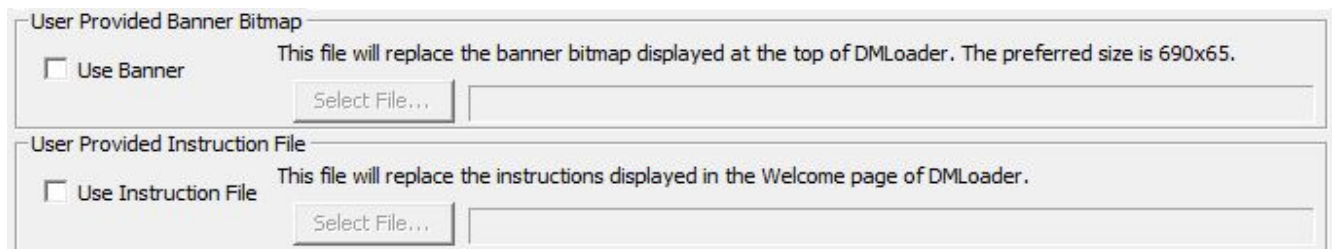
## Password Configuration



When the **Download Passwords** selection is enabled all of the User Account information will be included in the DMLoader image file.

If this selection is NOT enabled, the User Account information in the destination PLC will NOT be changed when DMLoader downloads this image file.

## Vendor Banner and Update Instructions



These two fields allow the user to supply a vendor-specific banner graphic and/or vendor-specific system update instructions that will be displayed in DMLoader when it opens this image file.

The banner is a 690 x 65 pixel BMP image that is centered in the top section of DMLoader when it opens this image file. When the **Use Banner** selection is made the **Select File** button is enabled which will open a dialog where the user can browse for the BMP file that will replace the default graphic. The selected file will be added to the image file at the time it is selected.

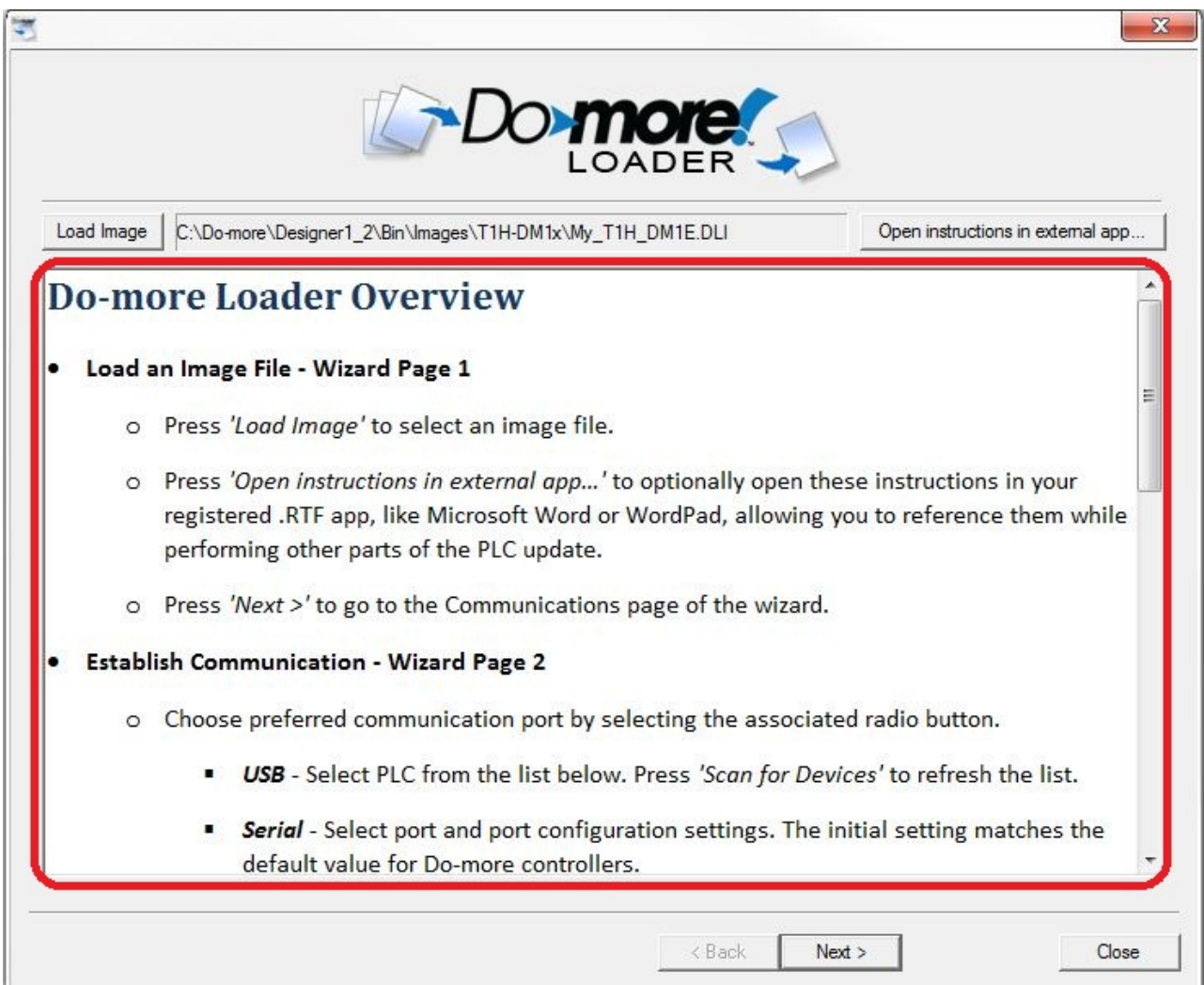
The area circled in red in the image below is the banner area of DMLoader. The user-supplied banner will be centered in that area. If the user-supplied banner is too large for the area it will be clipped, it will NOT be resized to fit.



The instruction file is a text file that will be displayed in the bottom section of the initial screen of DMLoader when it processes this image file. This instruction file can contain written instruction that the operator will use when using DMLoader to update a CPU.

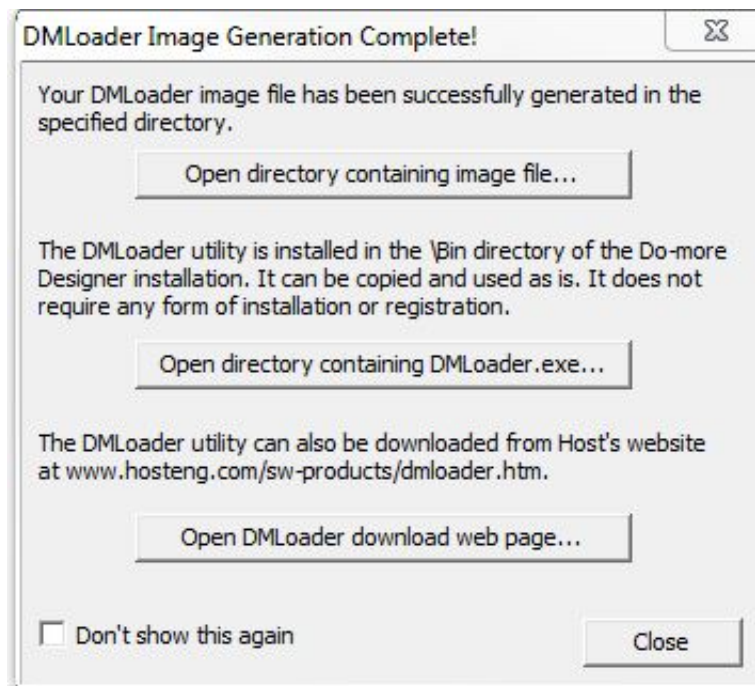
When the **Use Instruction File** selection is made the **Select File** button is enabled which will open a dialog where the user can browse for a TXT or RTF file that will replace the default instruction file.

The area circled in red in the image below is the instruction text area of DMLoader.



## Generate the Image File

Click the **Generate Image** button when all of the desired selections are made to specify the file name for the DMLoader image file. When the file generation is complete the following dialog is displayed which gives you the following options:



**Open directory containing image file** – will open a Windows Explorer instance of the directory where the newly generated image is stored and the image file itself will be highlighted. This useful if you need to access this image file at this point to distribute it.

**Open directory containing DMLoader.exe** – will open a Windows Explorer instance of the directory where the DMLoader.exe is installed with DMLoader.exe highlighted. This useful if you need to access this utility to distribute it.

**Open DMLoader download web page** – will open a web browser instance pointing to the location on the Host Engineering website where an installable version of DMLoader is located. The URL is [www.hosteng.com/sw-products/dmloder.html](http://www.hosteng.com/sw-products/dmloder.html).

**Close** – if you are done with this utility.

Click the **Don't show this again** option to prevent this dialog from appearing the next time you run the Generate DMLoader Image utility.

## DMLoader—Do-more! Loader

The DMLoader utility will use an image file built by **Generate Do-more! Loader Image** in the Do-more! Designer software to update a Do-more! CPU with the contents of that image file. DMLoader can use a USB, Serial, or Ethernet connection to the destination Do-more! CPU to perform the update.

DMLoader has its own website that you can use to download the utility: [www.dmloader.com](http://www.dmloader.com).

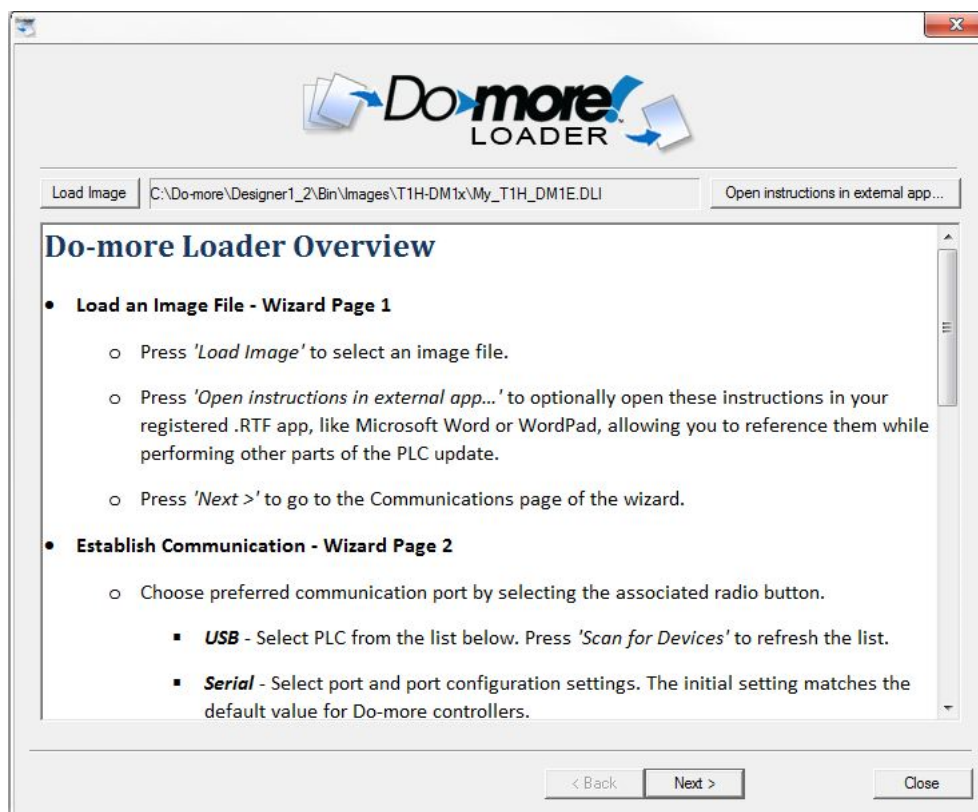
When DMLoader opens, you will be prompted for the DMLoader image file to open. If the image file was created with a password, you will be prompted to enter that password before the file can be opened.

After an image file is selected and successfully opened, the main DMLoader dialog will be displayed. The image below has the default Do-more! Loader banner at the top and the default instructions in the bottom section. If the image was created with custom banner and/or instructions these would be displayed instead.

Click the **Load Image** button to open a different DMLoader image file.

Click the **Open Instructions in external app** button to open the instructions in the computer's default application for .RTF files; this could be Notepad, Wordpad, Microsoft Word, etc. This allows you to have the instructions available on-screen when you move to the next section of the DMLoader process.

Once the correct image file is open, and the instructions are where you want them, click the **Next** button move to the next section.

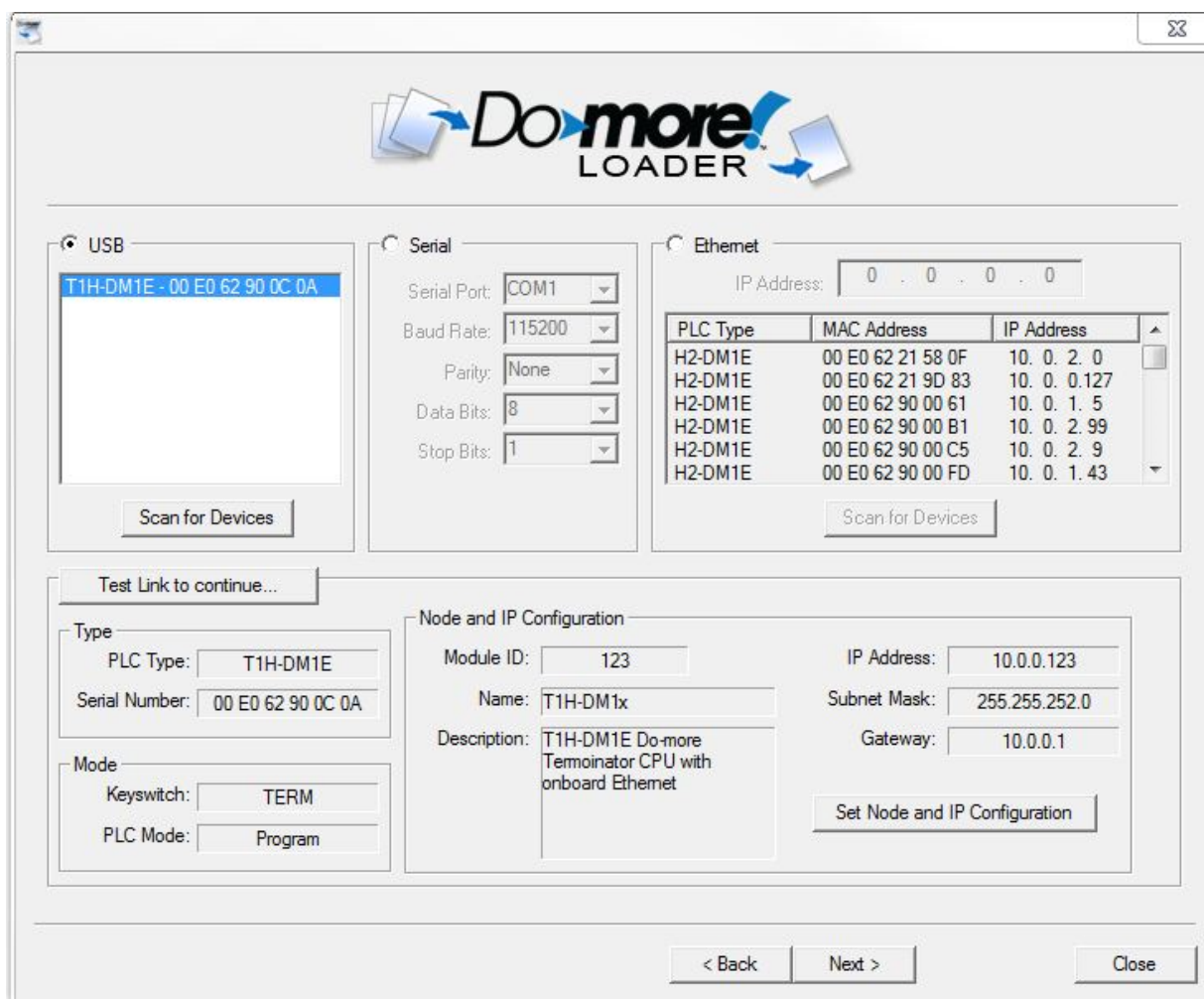


### Establish Communication Link to the Destination CPU

This section of the dialog will establish the required communication link to the destination CPU. You can elect to use the USB or Serial or the Ethernet port (if available) on the destination CPU to establish the communication link. Once the connection port is selected and configured (if necessary) then click the



**Test Link to Continue** button to verify that the link is functional before you can continue to the next section where the update will be performed.



### Step 1: Select the communication port to use

**USB** – select this option to use the USB port to perform the update operation. If the USB cable was connected when DMLoader was started, the destination CPU's USB address will already be in the list of USB devices found. If multiple Do-more! CPUs are displayed highlight the one you want in the list.

**Scan for Devices** – click this to re-scan the USB port to find a newly connected Do-more! CPU.



**NOTE:** If the connected Do-more! CPU is NOT in the list of USB devices after a re-scan operation make sure that no other application, such as Do-more! Designer, is currently using that USB connection to the CPU.

**Serial** – select this option then provide the following:

**Serial Port** – will list the serial ports that are configured on this computer, for example: COM1, COM2, etc.

**Baud Rate** – 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 300

**Parity** – None, Odd, Even

**Data Bits** – 5, 6, 7, 8

**Stop Bits** – 1, 1.5, 2

**Ethernet** – when this option is selected, DMLoader will query the network for Do-more! CPUs that are currently connected to the network. If the destination CPU is new (and does not have a TCP/IP configuration) or has an incorrect TCP/IP configuration, this can be addressed in the next step.

Select the desired destination CPU from the list and its currently configured IP address will be displayed in the **IP Address** field.

**Scan for Devices** – to perform the network query to scan for Do-more! CPUs.

## Step 2: Test the communication link to verify connectivity

After the port has been selected, click **Test Link to Continue** to validate the communication link. If the validation process is successful DMLoader will read the following information from the attached Do-more! CPU:

**Type** – displays the type of controller hardware and identification

|                |                   |
|----------------|-------------------|
| Type           |                   |
| PLC Type:      | H2-DM1E           |
| Serial Number: | 00 E0 62 90 00 FA |

**PLC Type** – displays the type of controller hardware

**H2-DM1** – DL205 Series Do-more! controller

**H2-DM1E** – DL205 Series Do-more! controller with on-board Ethernet

**T1H-DM1** – Terminator I/O Series Do-more! controller

**T1H-DM1E** – Terminator I/O Series Do-more! controller with on-board Ethernet

**DM-SIM** – Do-more! Simulator

**Serial Number** – the 12 digit serial number of the controller

**Do-more! controllers without on-board Ethernet** – this is a serialized number assigned at the factory

**Do-more! controllers with on-board Ethernet** – this is the MAC address of the Ethernet port

**DM-SIM** – this is the MAC address of the primary Ethernet adapter in the PC running the Do-more! Simulator

**Mode** – displays the current PLC mode information

**Keyswitch** – the current position of the front panel keyswitch

**RUN** – the keyswitch is in the RUN position

**TERM** – the keyswitch is in the TERM position

**STOP** – the keyswitch is in the STOP position

**PLC Mode** – displays the current PLC mode

**Run** – the controller is running the project

**Program** – the controller is not running the project

### Optional Step 3: Setting up the TCP/IP configuration for a Do-more! CPU that has an on-board Ethernet port

Node and IP Configuration

|              |                      |              |               |
|--------------|----------------------|--------------|---------------|
| Module ID:   | 109                  | IP Address:  | 10.0.0.109    |
| Name:        | BX-DM1E-10ED23-D     | Subnet Mask: | 255.255.252.0 |
| Description: | MLS BRX Do-more PLC! | Gateway:     | 10.0.0.1      |
|              |                      | DNS:         | 10.0.0.3      |

Set Node and IP Configuration

**Node and IP Configuration** – displays the current Node configuration and the setup of the on-board Ethernet port (on models that have them). These values are initially configured by the NetEdit utility. The values of the fields are also stored in the controller’s memory in these locations: \$IPAddress (DST18), \$NetMask (DST19), \$Gateway (DST20).

Click the **Set Node and IP Configuration** button to open a dialog that will allow you to change these entries.



**NOTE:** The ability to change the TCP/IP configuration of a Do-more! CPU through its USB or Serial port is a convenient way to set the TCP/IP configuration of a controller that is not configured to be part of the local network.

Setup Node and IP Address

|              |                  |              |                     |
|--------------|------------------|--------------|---------------------|
| Module ID:   | 109              | IP Address:  | 10 . 0 . 0 . 109    |
| Name:        | BX-DM1E-10ED23-D | Subnet Mask: | 255 . 255 . 252 . 0 |
| Description: | BRX Do-more PLC! | Gateway:     | 10 . 0 . 0 . 1      |
|              |                  | DNS:         | 10 . 0 . 0 . 3      |

Get PC's DNS Server Address

NOTE: For CPUs without an Ethernet port, these fields aren't used for configuration, but are still available as variables in status memory and can be used for identification.

OK Cancel

**Module ID** – the ID can be any positive constant number

**Name** – the Name can be any 255 character combination of alphanumeric and punctuation characters. The Module ID and Names entered must be unique on the network where the controller will be connected.

**Description** – the Description can be any 255 character combination of alphanumeric and punctuation characters.

The TCP/IP Address information entered in the following three fields must be valid for the network where the controller will be connected. For Do-more! controllers that do not have an on-board Ethernet port these fields are not used for configuration purposes, but the data in these fields can still

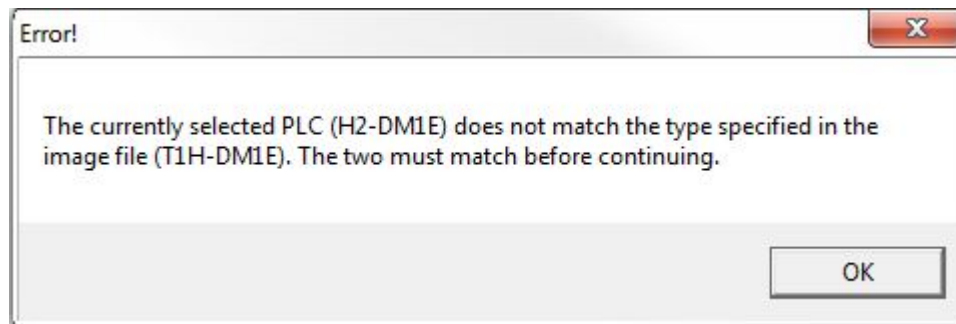
be used for identification by storing values in their associated status memory locations: \$IPAddress (DST18), \$NetMask (DST19), \$Gateway (DST20).

**IP Address** – can be any valid TCP/IP Address The IP Address entered must be unique on the network where the controller will be connected

**Subnet Mask** – can be any valid TCP/IP Subnet Mask

**Gateway** – can be any valid TCP/IP address of a network Gateway

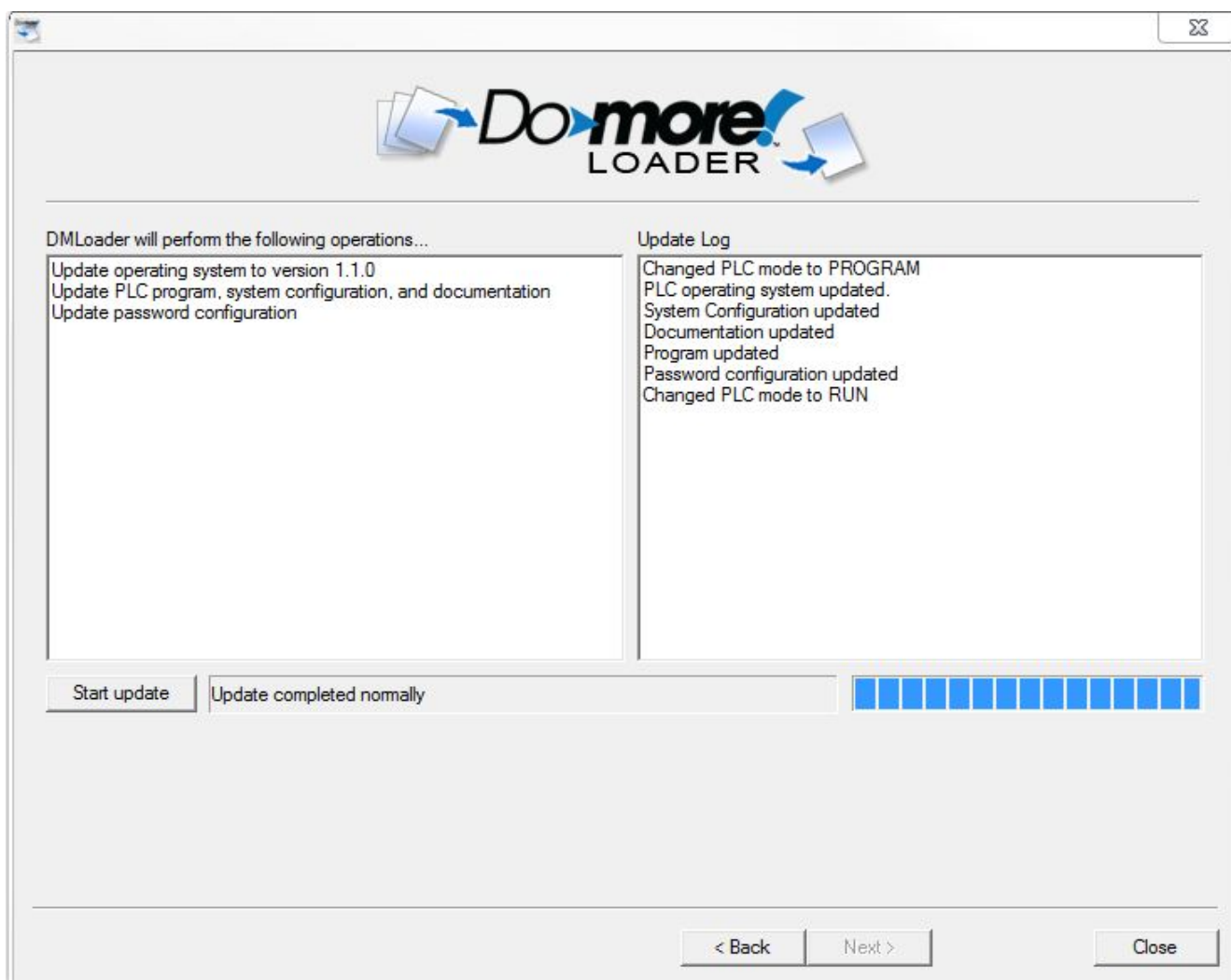
After the communication link is established click the Next button to move to the final section where the update is performed. At this point a final check is made of the communication link to make sure that the on-screen selections still are still valid for the Do-more! CPU that is physically connected. If at this point the connected CPU does not match the on-screen selections an error message similar to the following is displayed:



### Perform the Update

The final step is the actual downloading of the image contents to the destination CPU. The left-side control will display a list of the operations that will be performed based on the contents of the image file that was opened. The right-hand control will display the log entries generated by each step of the update process.

Click the **Start Update** button to begin the update process, the current step in the process and a progress indicator for that step are displayed to the right of the button.



Once the update process concludes, you can use the **Back** button to return to the previous step and select a different Do-more! CPU to update, or click **Close** to exit DMLoader.