

Power Xpert *inControl*

User Manual

Effective August 2015
Supersedes June 2014



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Cover Photo: Power Xpert *in*Control.

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Chapter 1—Safety

Definitions and Symbols

WARNING

This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operating this equipment. Read the message and follow the instructions carefully.



This symbol is the “Safety Alert Symbol.” It occurs with either of two signal words: CAUTION or WARNING, as described below.

Note: Indicates a functionality or usability detail which, if not avoided, can result in software or hardware malfunctions or the inability to properly use the PC tool.

WARNING

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the product. The situation described in the CAUTION may, if not avoided, lead to serious results. Important safety measures are described in CAUTION (as well as WARNING).

Hazardous High Voltage

WARNING

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic controllers or rotating machinery.

Power Xpert Safety

The following section of this manual outlines the safety precautions that must be observed to insure safe and proper usage of the Power Xpert *inControl* remote configuration and control PC Tool.

Before Using the Software Tool

Prior to installation and usage of the Power Xpert *inControl* remote configuration and control PC Tool, users must contact local safety management and network administrators to insure proper procedures and protocols are followed in accordance with the end users standards in safety, network security, or any other related fields. Any violation of these policies is strictly on the user and in no way voices the procedures laid out herein as these are guidelines of how to use the tool itself.

Warnings and Cautions

This manual contains clearly marked cautions and warnings which are intended for your personal safety and to avoid any unintentional damage to the product or connected appliances.

Please read the information included in cautions and warnings carefully.

Throughout this manual specific symbols have been added to cue the reader that important safety or functionality information is being covered. Please refer to “Definitions and Symbols” on this page.

Personnel Safety

With the use of any remote configuration and control software, users must take appropriate caution as unintentional device activation can occur which increases the risk of personnel and equipment safety issues. All systems should be tested in a controlled environment prior to usage in an active production or service environment as to make the user aware of the tools functionality and control abilities. User roles have been defined within this tool and can be activated to restrict certain user’s configuration and control abilities, reducing the risk of those users unintentionally activating devices through the PC Tool.

Chapter 2—Introduction

Using This Manual

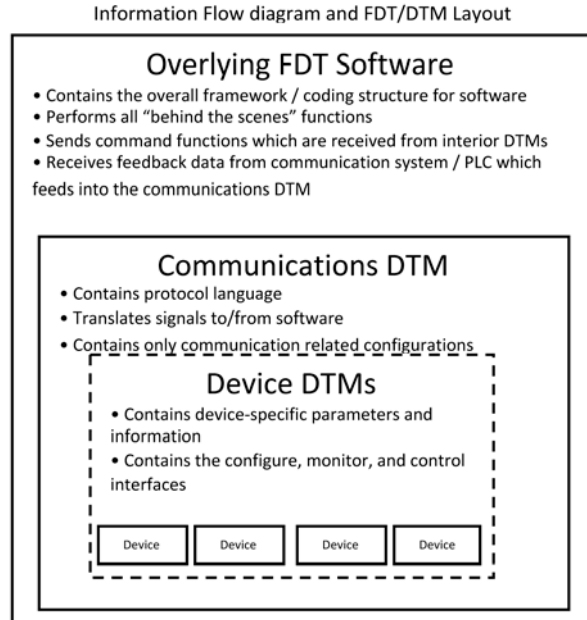
The purpose of this manual is to provide users with information regarding installation, configuration, and execution of Eaton’s Power Xpert *inControl* network configuration software. To assure correct usage of the software tool, follow the instructions, guidelines, warnings, and caution presented in this manual.

The Eaton Power Xpert *inControl* manual is specific for Eaton PowerXL devices, it does not reflect the general FDT framework abilities. Please refer to the FDT Help menu for framework explanations.

Power Xpert *inControl* System Overview

Power Xpert *inControl* device configuration and control software is a FDT/DTM based software tool used for configuration of networked systems. This tool has been developed to provide a processor-generic, simple interface for configuration, monitoring, troubleshooting, firmware gradation, and logic editing functionality using communication protocols. The software consists of two major parts—the exterior Field Device Tool (FDT) software, which is also known as the “frame application,” and the interior Device-Type Managers (DTM). The interior DTM portion is further classified into two categories: Device DTMs which connect to the field devices configuration components, and Communications DTMs (gateway DTMs included for simplicity), which connect to the communications components of the device.

Figure 1. Information Flow Diagram and FDT/DTM Layout



FDT/DTM Explanations

The Frame Device Tool (FDT) contains the run-time environment for field devices to be manipulated by a central open framework independent of host systems. The main function of this frame is to provide a common software environment for accessing device features through independent communications bus in the form of DTMs and. It allows connecting to any device through any host with any protocol.

Device-Type Managers (DTM) contains the application software and a GUI for the associated field device for a manufacturer of devices, similar to printer drivers. All device-specific information is accessed and configured through its associated DTM in an online, offline, data monitor, and diagnostic function. Each Eaton DTM is unique to the device type which it is associated to but general device DTMs could be used for some devices. Similar devices will share the same DTM file, but must be individually added to the network topology and individually configured with its only addressing through the tool.

Communication DTMs contains the application software for the specific communications hardware being used through a communication channel. It contains the language needed to communicate to the active communications protocol in the device and works as a translator between the frame application (which includes the device DTM) and the devices communication related components.

Gateway DTMs are specific to particular devices within a network, and serve as an additional protocol language translator both up and down stream of the nodes location within the network topology. These function similar to communication DTMs but have unique functions specific to a gateway such as translating multiple protocols from multiple devices.

Benefits of FDT/DTM Systems

One unique feature of FDT/DTM based configuration tools is the ability to use DTMs across any common FDT framework. This provides network administrators and system integrators flexibility to use a variety of manufacturer's products within their system while using a common configuration tool. A non-Eaton device DTM, for example, can be integrated into a new or existing Power Xpert *inControl* project file. Conversely, an Eaton PowerXL DG1 drive DTM, can be integrated into CoDeSys 3 rather than Power Xpert *inControl* or another users FDT framework. This provides the user with a new level of flexibility in regards to using new DTMs in their existing FDT systems, or incorporating previously used DTMs into the Power Xpert *inControl* FDT system. Additional benefits of using FDT/DTM based configuration software include:

- Standardized configuration interface for streamlined network commissioning or services
- Parameter download and upload abilities allow greater remote control of devices
- Network configuration centralized to single computer or database, allowing quick access to device parameters
- Ability to create customized software for specific application which can interface with the FDT/DTM system
- Remote storage of device configurations serve as backups in case of emergency
- Standard industry technology allows end users to build off of familiar concepts from previous FDT/DTM software

For more information on integration of DTMs into other FDT frameworks, please see the "Device-Specific Application" section of this manual.

Chapter 3—Installation Instructions

Please follow the instructions and requirements provided within this section to properly install the Power Xpert *inControl* remote configuration and control tool and parent FDT framework application.

System Requirements

The following items are the minimum system requirements for installing Power Xpert *inControl*:

- 500 MB minimum hard drive space (for 32 bit and 64 bit)
- Operating System Requirements: Must operate on one of the following:
 - Windows 7 (x32/x64)
 - Windows 8 (x32/x64)
- Recommended 512 MB RAM memory or greater
- 1024 x 786 pixel resolution display or greater
- Open PC interface for communication with the device (e.g. USB, Ethernet, RS-485)

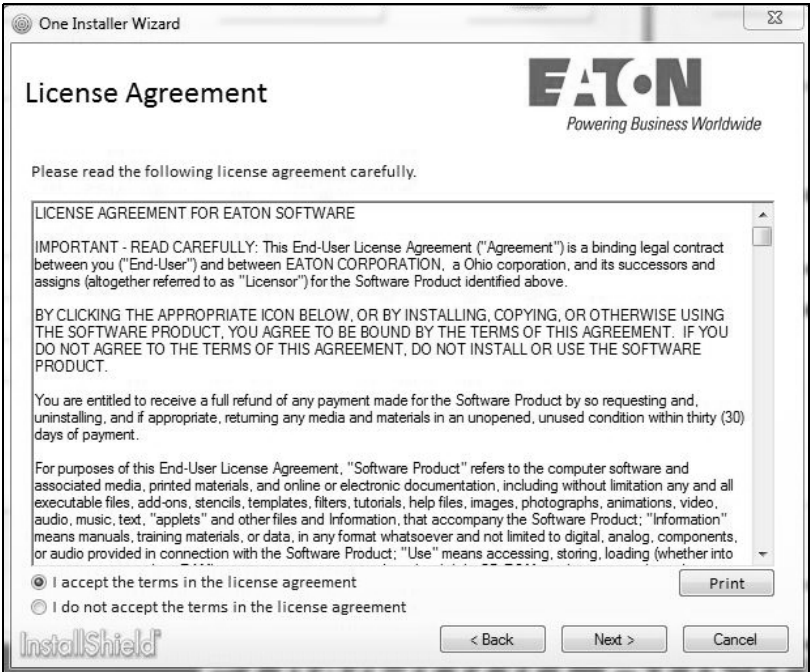
Installation Procedure

The Power Xpert *inControl* framework along with Device and Communication DTMs are available via a CD-ROM shipped with the product or on our website www.eaton.com/ software. To install the Power Xpert *inControl* configuration program and associated Device-Type Managers, double-click the setup file for the software and DTMs. A simple installation walkthrough will appear on screen. Follow the prompted directions to complete installation of the programs.

1. Open the setup file provided on the CD or from the www.eaton.com/software website.
2. Once the tool opens it will give you a welcome screen to install the Power Xpert *InControl* PC Tool along with the communication and device DTMs. Click "Next" button to advance.



- 3. Read through License agreement and upon completion, accept the terms and click "Next": "Back" will bring you back to the previous window. "Cancel" will close the installation.

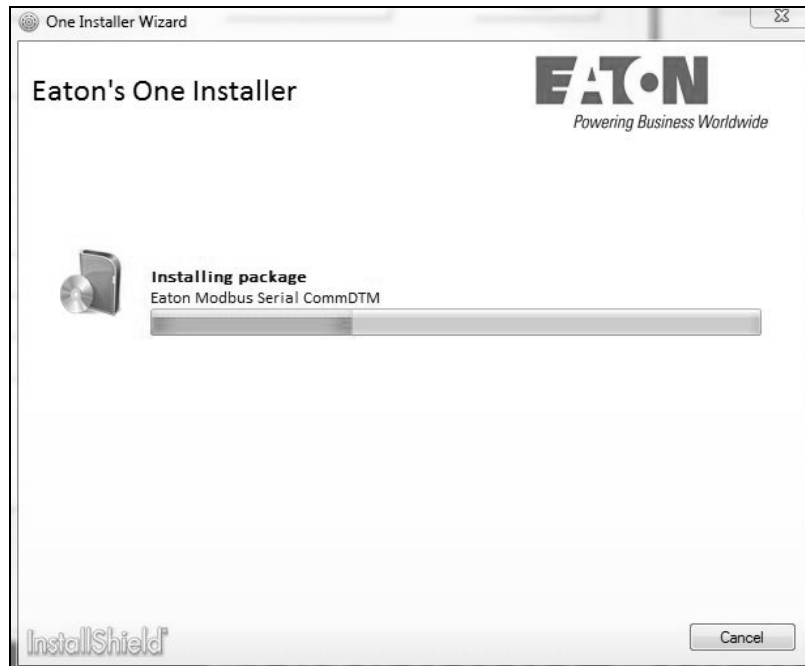


- 4. Next screen will give the option to do a "Complete" installation or a "Custom" installation. If this is the first time install, it is suggested to perform the complete installation.

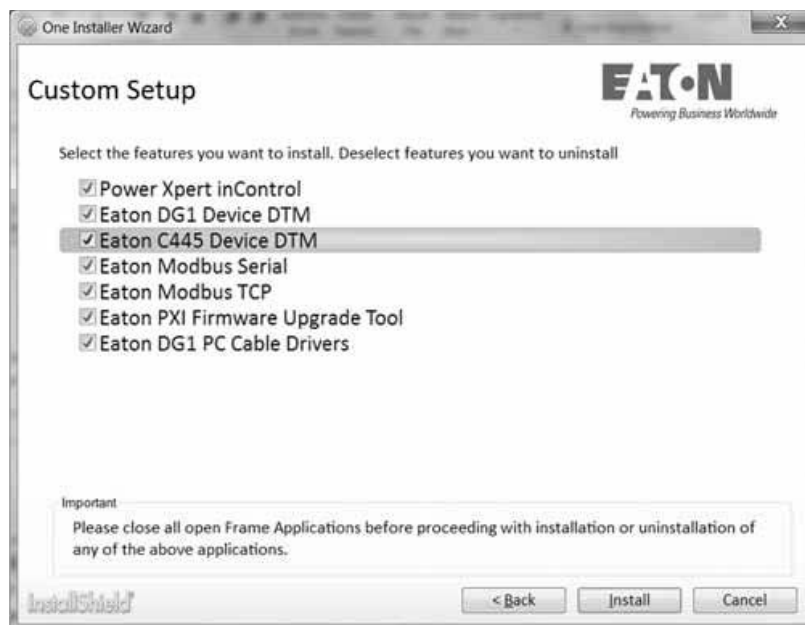


- Once the “Complete” installation is pressed, the tool will go through and install the PC Tool and DTMs available. Accept the window popup to advance through installation. If “Custom” installation was selected, it gives the ability to select which files to install.

Complete



Custom



- 6. After the installation is complete, select the "Finish" button to complete the setup.



Uninstall Procedure

The Power Xpert *inControl* framework and DTMs can be uninstalled through the Windows Control Panel or by using the installation setup file.

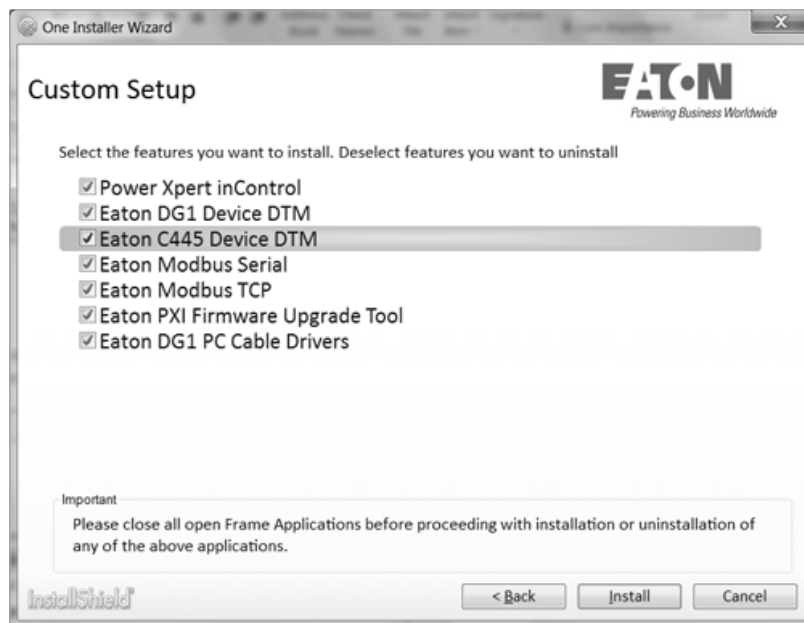
Select **Settings** → **Control Panel** from the **Start** menu.

Double-click **Add or Remove Programs**.

Select **Power Xpert *inControl*** and Eaton Device or Comm DTMs.

Click Uninstall and follow the prompts.

When using the setup tool to modify installations, it will provide a list of installed tools and give the ability to deselect the tools to uninstall.



Software Update Procedure

The current software updating procedure for Eaton-provided DTMs requires the user to uninstall the previous software files as to avoid potential coding conflicts. Please note that you do NOT need to uninstall all DTMs or the FDT program. Only the files which require a software update need to be uninstalled for the update to take effect. For uninstalling the software the user should use the Control panels add/remove program option. Once uninstalled, users must reboot their computer to insure all associated files are cleared before re-installing the new software version. The below general procedure can be used as a guideline for the software update procedure:

1. (If applicable) Save the currently opened project file and close the Power Xpert *inControl* software.
2. Navigate to the Add/Remove programs section of the control panel (note: will dependent on windows version)

Start → Control Panel → Programs and features → Click desired DTM to uninstall and click "uninstall" button
3. Follow procedures outline in the uninstallation
4. Restart the computer once uninstallation of all desired DTMs is complete
5. Activated the executable file provided with the Power Xpert *inControl* DTM update file and follow the procedures outlined in the installation.

Updates will be available via our website www.eaton.com/software. The Power Xpert *inControl* tool will provide you with information regarding any updates that have been posted to the site.

Eaton Communication DTMs

Eaton has created two Modbus® communication DTM protocols for use in the Power Xpert *inControl* system: Modbus Serial and Modbus TCP. These DTMs are used to connect to the Eaton devices through the FDT container, other communication DTMs will be added as device scopes change.

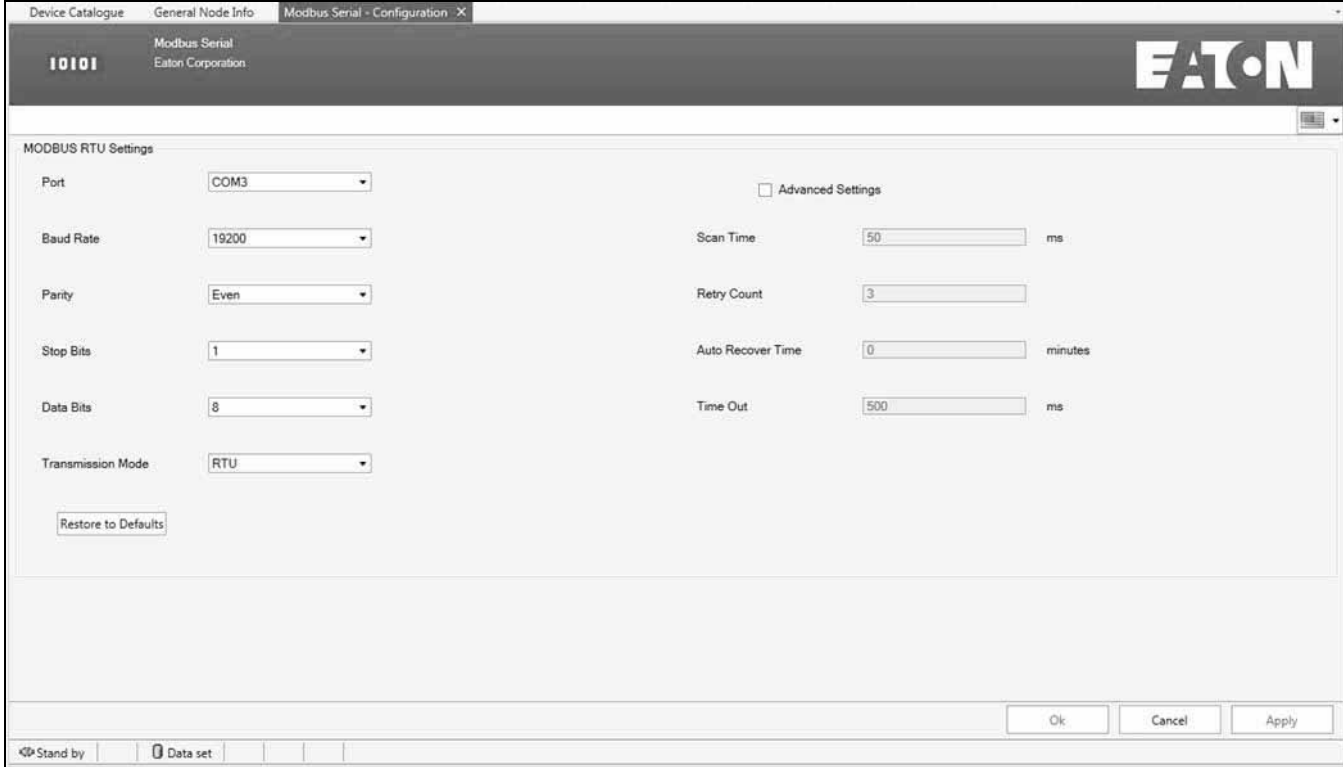
Configuration: Modbus TCP

The Modbus TCP configuration screen can be accessed through the context menu of the device. Double click the node under “Network View” which needs to be configured, or right-click the Modbus TCP DTM node and select the “Configure” option. This will open the configuration window for the Modbus node. Change the default values as needed. Checking the “Advanced Settings” checkbox will unlock the Scan Time, Retry Count, Auto Recover Time, and Time out options, allowing users to set the values as needed. To make changes to the settings it is required to be in an offline mode with the communication DTMs.

The screenshot displays the Modbus TCP Configuration window. The window title is "Modbus TCP - Configuration". The main content area is titled "MODBUS TCP Settings". It features a "Port" field with the value "502". To the right, there is an unchecked checkbox labeled "Advanced Settings". Below this checkbox, there are four configuration fields: "Scan Time" (50 ms), "Retry Count" (3), "Auto Recover Time" (0 minutes), and "Time Out" (500 ms). A "Restore to Defaults" button is located at the bottom left of the settings area. At the bottom right, there are three buttons: "Ok", "Cancel", and "Apply". The status bar at the bottom of the window shows "Stand by" and "Data set".

Configuration: Modbus Serial

The Modbus Serial configuration screen can be accessed through the context menu of the device. Double click the node under “Network View” which needs to be configured, or right-click the Modbus Serial DTM node and select the “Configure” option. This will open the configuration window for the Modbus node. Change the default values as needed. Checking the “Advanced Settings” checkbox will unlock the Scan Time, Retry Count, Auto Recover Time, and Time out input fields, allowing users to set the values as needed. Press “OK” or “Apply” to save the new values for the DMT, to make changes DTMs have to be in the offline mode.



Chapter 3—Installation Instructions

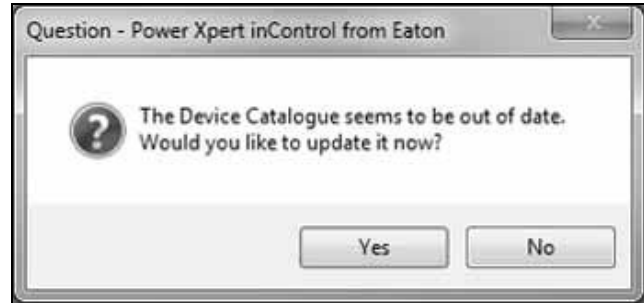
The following sections will cover basic startup and configuration setups for use with the Power Xpert *inControl* configuration and control tool.

Program Start

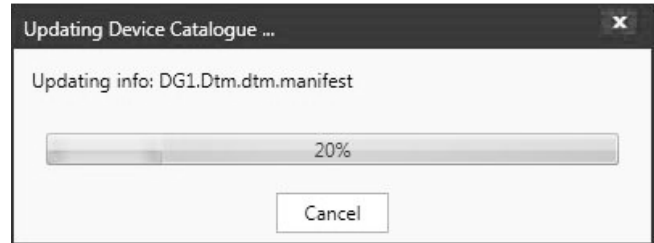
There are multiple ways to open the software, either by clicking the desktop icon or going through the start menu, Programs, under the Eaton folder.



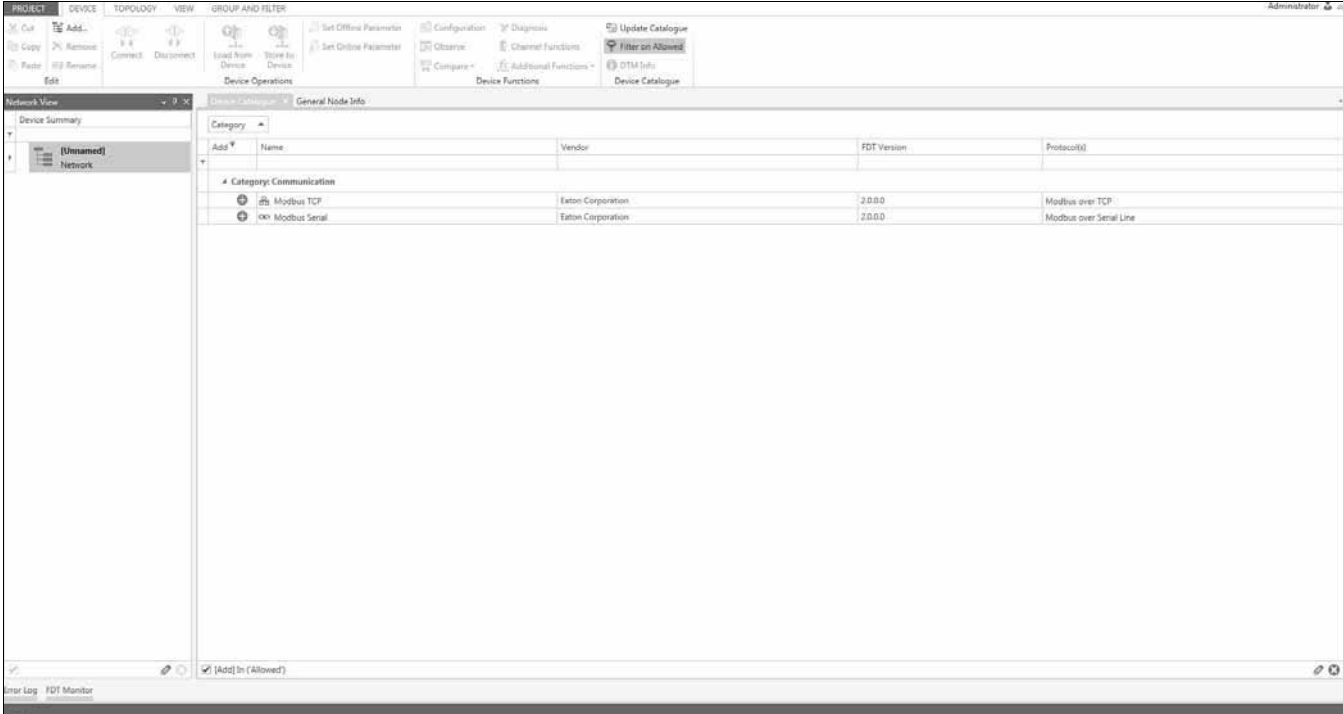
When you run the program for the first time it will ask to upgrade the device Catalog with any updated DTMs that was installed.



Click Yes to update the list of DTMs.



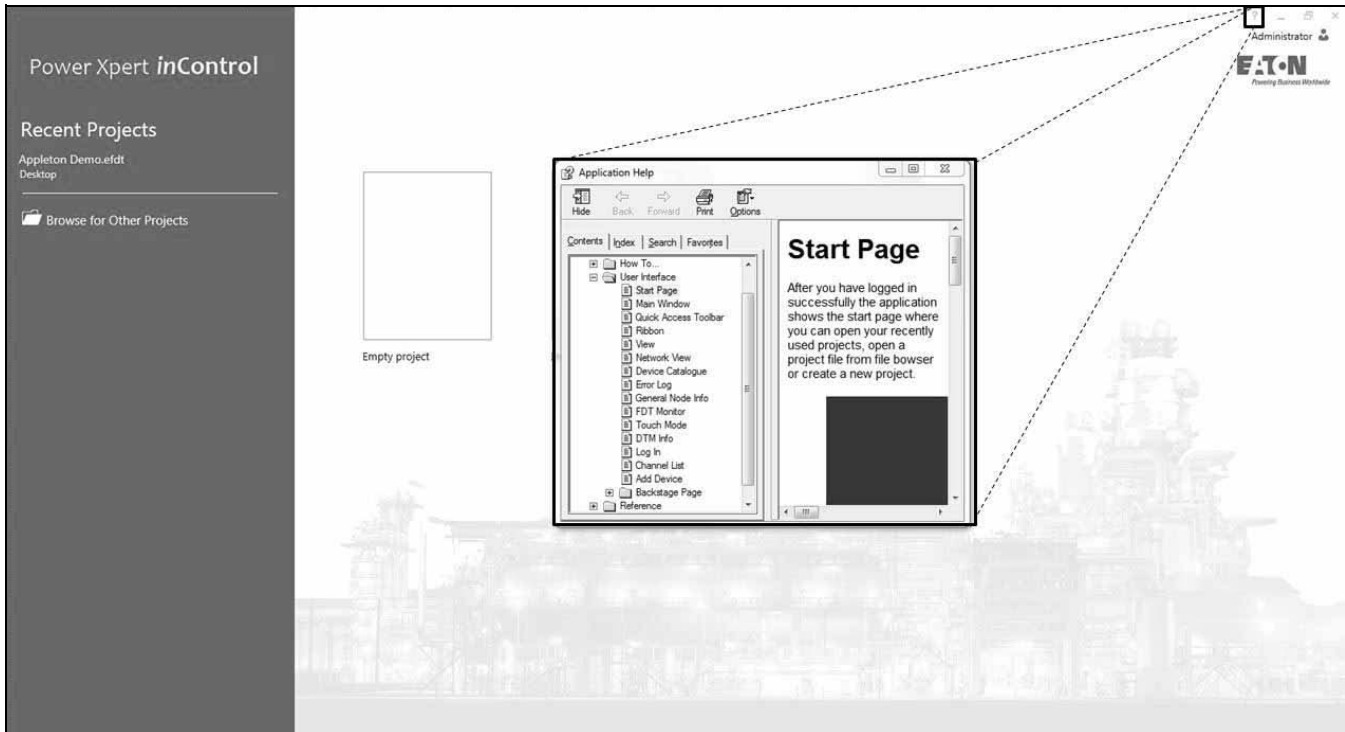
Once the updating is completed the framework will be open showing all the added devices in the Device Catalog.



Chapter 4—Framework

Framework Description

The framework help can be found by selecting the Help option in the main window. This will provide a detailed instruction on functions inside the Framework. Some of the Framework functions are not available due to the individual Device DTMs handling these functions.



Chapter 5—PowerXL DG1

Section 1—PowerXL DG1 Connection Process

To set up a network it will require a communication DTM supported by the device DTM being connected to. Determine the communication network being used in your system; Eaton currently supports Modbus Serial and Modbus TCP communication protocols for connecting to its devices.

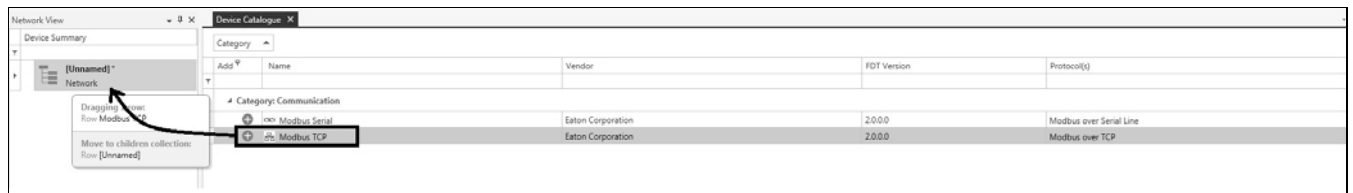
Creating a Network


The framework will show the installed communication modules that are installed along with the saved Network name.



Determine what network is being used to connect to the device. To add that network DTM shown in the device catalog there are a few options

Drag the communication DTM from the Device Catalog to the Network name.



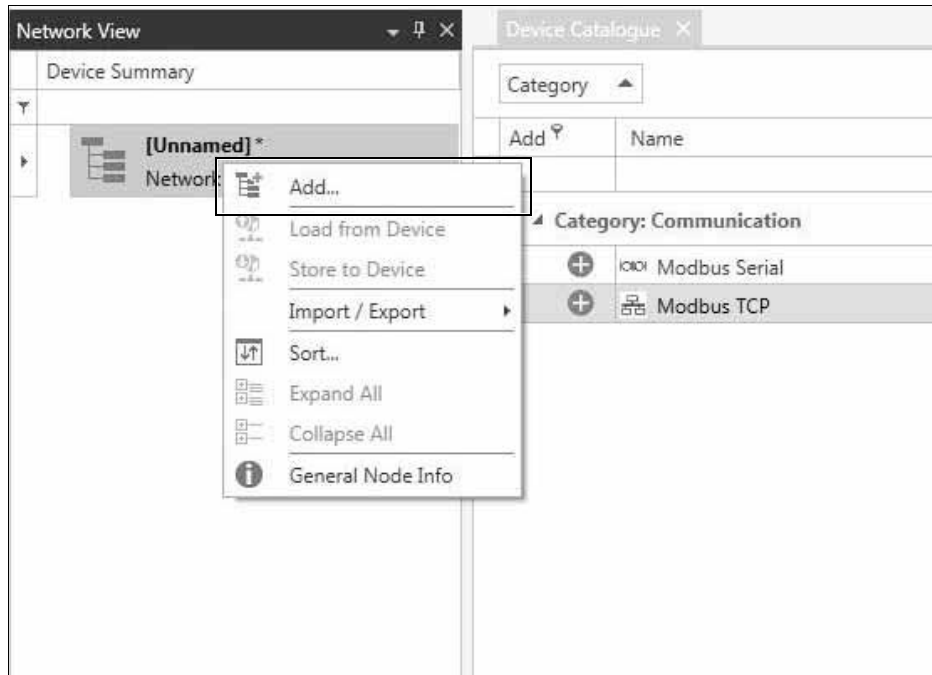
Press the  sign in the device catalog

Connection Options

Table 1. Connection Options

Connection Method	Port	Upgrade Firmware	Connects to PC Tool	Communication Settings
RS-485	Modbus Serial Terminals			<p>RS-485 Comm Set: Settable in RS-485 Communication parameter group (P20.2.1) (Default Modbus RTU)</p> <p>Note: If set to BACnet MS/TP, PC Tool will not communicate.</p> <p>Slave Address: Settable in RS-485 Communication parameter group (P20.2.2) (Default 1)</p> <p>Baud Rate: Settable in RS-485 Communication parameter group (P20.2.3) (Default 19200)</p> <p>Parity: Settable in RS-485 Communication parameter group (P20.2.4) (Default Even)</p> <p>Data Bits: Not settable, 8 Data Bit</p> <p>Stop Bits: Not settable, 1 Stop Bit</p>
	Keypad Port			<p>Slave Address: Not settable, set to Modbus ID 18.</p> <p>Baud Rate: Not settable, set to 38400 Kbaud</p> <p>Parity: Not settable, set to Even</p> <p>Data Bits: Not settable, 8 Data Bit</p> <p>Stop Bits: Not settable, 1 Stop Bit</p>
Ethernet	Ethernet Port	—		<p>IP Address Mode: Settable in Ethernet Communication parameter group (P20.3.1) (Default DHCP with AutoIP)</p> <p>Note: Most facilities require a Static IP. Change the Static IP address before changing. After changing this parameter, a reset or power cycle is required.</p> <p>Active IP Address: Set depending on IP address assigned Static or DHCP</p> <p>Active Subnet Mask: Set depending on IP address assigned Static or DHCP</p> <p>Active Default Gateway: Set depending on IP address assigned Static or DHCP</p> <p>Static IP Address: Settable in Ethernet Communication parameters group (P20.3.6) (Default 192.168.1.254)</p> <p>Static Subnet Mask: Settable in Ethernet Communication parameters group (P20.3.7) (Default 255.255.255.0)</p> <p>Static Default Gateway: Settable in Ethernet Communication parameters group (P20.3.8) (Default 192.168.1.1)</p>

Click on the green “+” next to the communication protocol or right click on the Network Name and select Add. Follow the steps to add the desired Network.



Note: If the Modbus Serial DTM is added an additional window will pop up to set communication protocol settings for the communication adapter.

Connecting to the Drive

The PowerXL Series DG1 drive can be connected to the Power Xpert *inControl* configuration tool through either the RS-485 communication terminals A(25) and B(26) or through the keypad port with Eaton's designed USB to RJ45 cable or with the Ethernet port located next to the real-time clock battery. Once the drive has physically been connected to the network, both the drives communication parameter and the PC Tool parameters must be configured. Please refer to the PowerXL DG1 communication manual for configuring the Modbus MS/TP or Modbus TCP communication parameters.

 **WARNING**

Please note that not all communication information for the PowerXL series DG1 drive will be covered in this manual. For additional information regarding the PowerXL DG1 communication abilities please reference the Communications Manual (MN040010EN).

 **WARNING**

DO NOT attempt to connect through the keypad port with Ethernet Communication; it is not for Ethernet use. It can be used to connect up via RS-485 with Eaton's communication cable.

Quick Connection

Modbus TCP On-Board Communication Details

To connect the PowerXL DG1 drive to the Power Xpert *inControl* PC Tool using an Ethernet connection, please follow the below procedure:

1. The DG1 drive's default IP address mode is set to "DHCP with AutoIP" addressing. Change the IP address mode by changing Parameter P20.3.1 to "Static IP". For users using DHCP auto addressing, please skip to step 3.
2. The static IP address for the DG1 drive defaults to 192.168.001.254. Change the static IP address as needed to follow the site network topology. Example address: 192.168.001.**050**.
3. Power cycle the drive to activate the new IP address on the drive. If the drive is not power cycled it will remain on the previous IP address mode settings.
4. The Ethernet port on the host computer must also be changed as to match the Subnet mask IP requirements of the drive (default set to 255.255.255.000). Find the Ethernet port which is connected to the network through the computers Network control panel menu (administrative rights to computer are required). Change the IP address as the match first (3) octets of the drives IP address, with a unique address in the last IP octet. Example: 192.168.001.**001**.
Note: Network administrators at the user's location may have different subnet mask requirements or restrictions. Contact local IT for support for IP addressing if needed.
5. Open the Power Xpert *inControl* configuration tool and begin a new project.
6. Begin creating the network topology by adding "Modbus TCP" DTM located on the device catalog. (Please see the "Creating Network Topology" section for a more detailed walkthrough).
7. Configure the Modbus TCP settings to match that of the drive. The default values loaded into the Modbus TCP DTM matches the DG1 default IP address.
8. Add a DG1 device DTM to the network by following the same procedure outlined in step 6. Once added to the network, a prompt will appear requesting an IP address for the device. Enter the same IP address which was set on the device through the keypad in step 2 (Ex: 192.168.001.050), then click "Set".
9. Bring the device online by right-clicking the device node, then select "Go Online", or click the "Go Online" button on the top toolbar.
10. Double-click the DG1 device node to open the drives Online Configuration Screen. The user should now be connected to the drive and have the ability to monitor, configure, and control the device.

Modbus RTU On-Board Communication Details

To connect the drive to the Power Xpert *inControl* remote configuration and control PC Tool, please follow the below procedure:

1. The DG1 drives default slave address for the Modbus RTU communication option is “18”. It is recommended that the user defines the slave address as to insure a unique address is being assigned to the drive. Change the address as desired by changing parameter P20.2.2 (range available is 1–247 per Modbus node).
2. Open the Power Xpert *inControl* configuration tool and begin a new project.
3. Begin creating the network topology by adding “Modbus Serial” DTM located on the device catalog. (Please see the “Creating Network Topology” section for a more detailed walkthrough).
4. Adjust the port setting values for the connected USB-to-serial adaptor by using the Device Manager Option through the control panel to match the default values of the drive or to the user’s preference. Take note of the COM number assigned to the device as it needs to be assigned in the Power Xpert *inControl* Software.

Note: If the USB-to-serial adaptor port, Modbus Serial DTM, and DG1 drive are not all configured to the same communication settings the devices will not communicate.

5. Assign the Modbus Serial communications DTM port setting to match the communication port number found in the device manager in step 4. Adjust all other values to match the drives default values or to the users preference.
 - a. Baud Rate Default: 38400.
 - b. Data Bits Default: 8 (for Modbus TCP specifically).
 - c. Parity Default: Even.
 - d. Stop Bits Default: 1.
6. Add a DG1 device DTM.
7. Assign the same slave address as in step 1 to the drives DTM.
8. This will bring up the Multiframe Setting screen that allows for sizing the drive. This is typically used in creating an offline parameter file. Bring the device online by right-clicking the device node, and then select “Connect” or click the “Connect” button on the top toolbar. The online parameter window will open when once connected.
9. The user should now be connected to the drive and have the ability to monitor, configure, and control the device.

Device

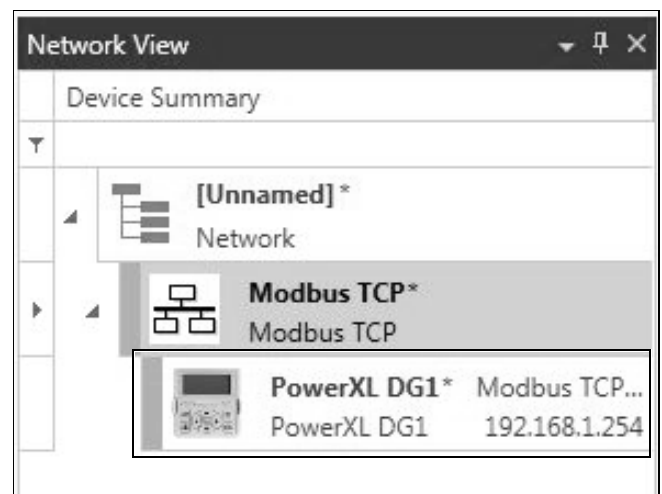
After inserting the communication DTM, the tool will switch to show device DTMs. Select the device you want to connect to and perform the same sets as used to add comm DTM to add the device. Once the device is added, depending on the communication device selected a window will pop up to set slave address or IP address of the device, refer to the device specific DTM for an example of setting the device addresses. Once the correct address is set hit the set button.

Offline/Online

With the devices added to the Network View, it gives the ability to view an Offline parameter set of the device. By stepping through the multi-frame selection screen, it will size the offline file for the correct drive size or you can connect to the device via the selected communication protocol.

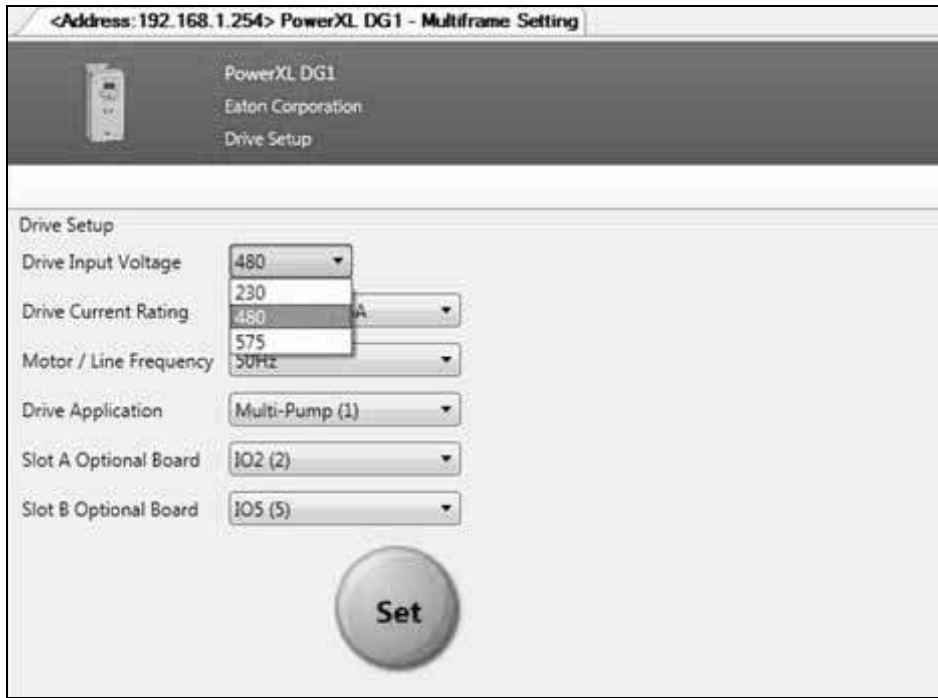
Offline

The offline mode only allows for viewing and setting the parameter without being connect to the device. Once you have the parameters set you can save this configuration and load it to the drive when you are connected to it. To open an offline file after adding the device to the network, it will open the Multiframe Settings Window, set the drop-downs for the required drive information, and hit set. This will then ask to go through the Quick Start Wizard or open parameters. If you click “Yes” for the Start Up Wizard, it will set through parameter settings; once complete, it will open parameter files. If “No” is selected for the Start Up Wizard, it will close the Multiframe and then double clicking on the device will open parameter screen.





Multi-Frame Setting Window.

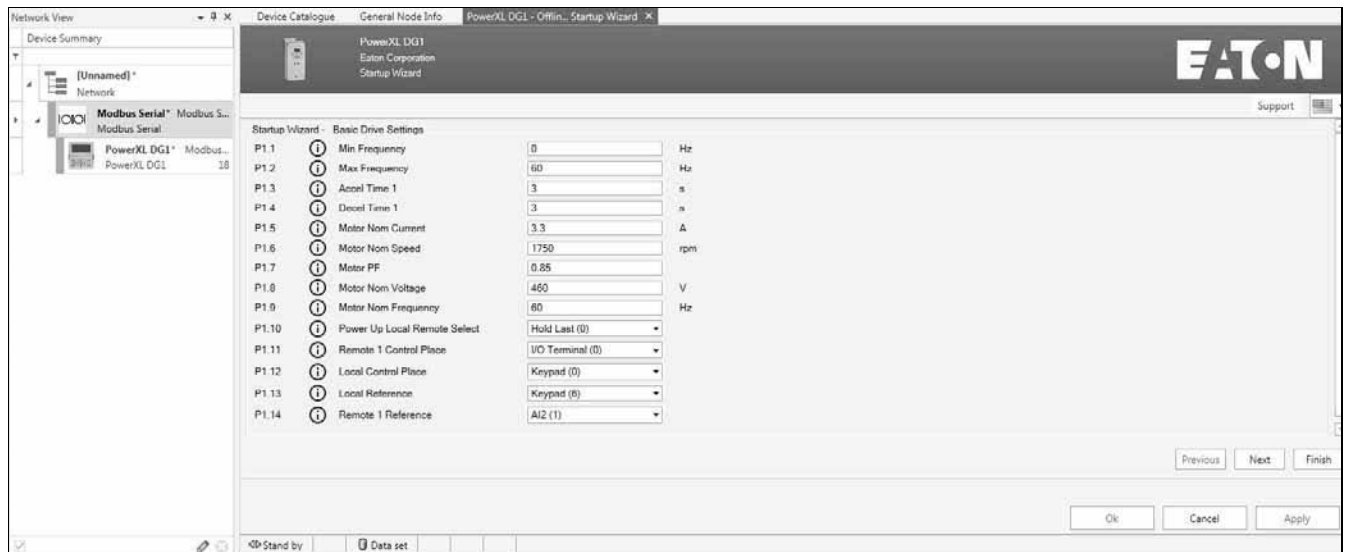


- Drive Voltage would correspond to the voltage rating of the drive it is going to be installed in
- Drive Current Rating would correspond to the current rating of the drive it is going to be installed in
- Motor/Line Frequency will correspond to the line frequency of the facility it is being put into
- Drive Application will select the desired application to be used on the drive depending on the intended use
- If option cards will be used, select the desired option cards and slots they will be inserted in

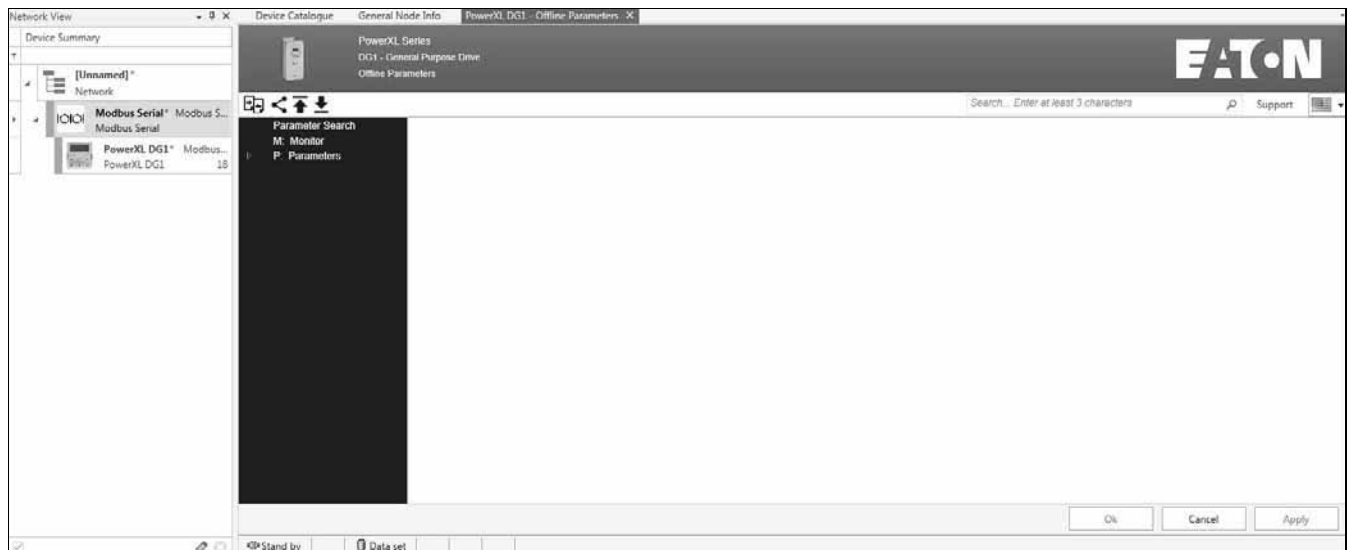
When Set becomes active, it may be pressed to advance to the Startup Wizard screen or can press “No” to close the Multiframing window.

Start-Up Wizard

The application selected will depend on how many screens will be available in the Start-Up Wizard. The Start-Up Wizard will walk through the most used parameter required to get the drive programmed and running. As the screens come up, by selecting “Next” it will advance you to the next screen, “Back” will take you back to the previous screen, and “Finish” will open up the parameter screen.



Start-Up Wizard screens



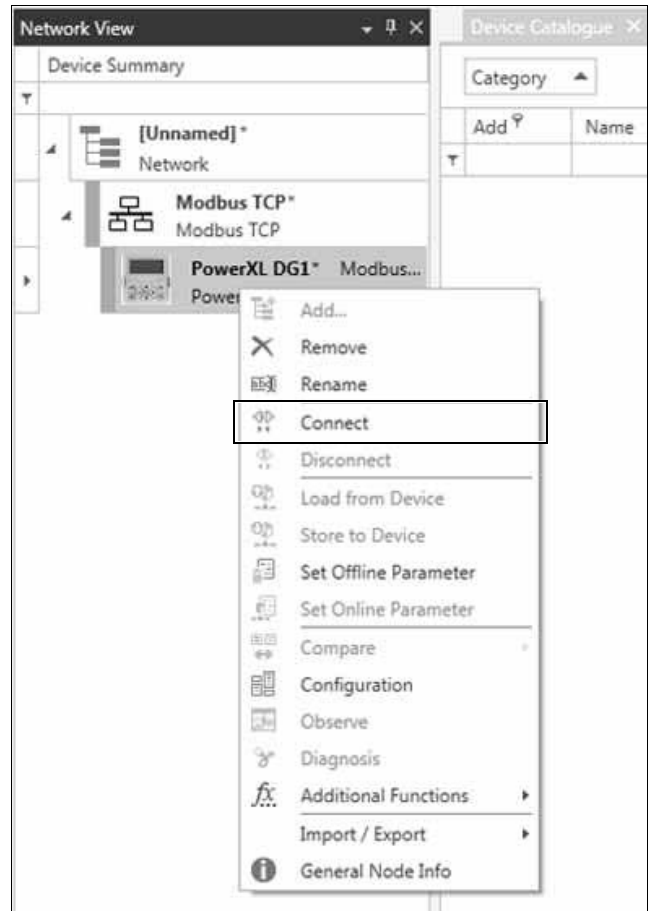
Offline Parameter Window

The Offline Parameter window gives the ability to compare parameter files, perform a parameter distribution, and Export/Import parameter files that we will discuss in a later section. To find a desired parameter or word in a parameter, the Search box allows for a quick way to look for letter order used in a parameter name or by checking the Long description box, it will also look in the parameter descriptions. If further support is needed, the Support button will provide technical support contacts for the Region required. More details on these buttons are described below.

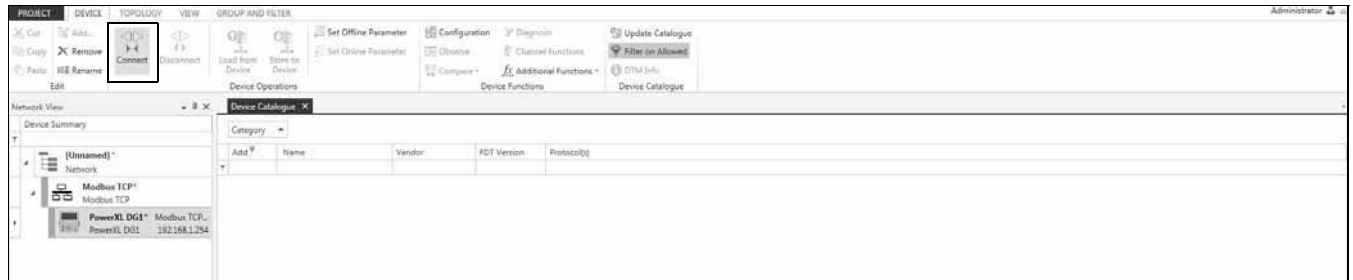
Online

The Online mode is when the tool is connected to the device via the communication protocol. When online, you are able to make changes to the drive and see them change in real time with the drive. It also gives the ability to see fault conditions, monitor device parameters, trend data, and sync real-time clock, compare parameter, device service info, and control the device. To go online with the device, there are a few options.

Right click on the device in the Network View and select Connect.



With a device selected in the Network View, click on the Connect button in the ribbon.



Once connected the Network tree will show a color bar indicating if the devices connection status.

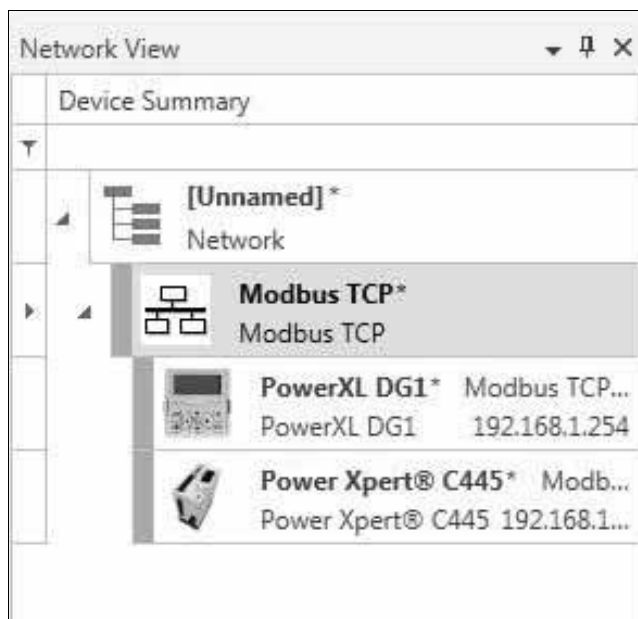
Green—Online

Yellow—Communication set issue, check communication settings

Grey—Offline

Once connected to the device, you can open the application window by double clicking on the device you would like to view and edit. The tab indicator will show that you are in an online window.

To disconnect from a device, there are the same options as there was to connect to the device with either right clicking on the device and selecting Disconnect or through the ribbon when the device is selected.



Edit DTMs

To edit any of the communication or device DTM information, there is a few options, either right click on the device and select configuration or in the Device ribbon select Configuration. Communication DTMs will show communication port settings while Device DTMs will show address settings.

Section 2—PowerXL DG1 Software Features

The following sections of this manual will cover all Eaton DTM files available for use.

Common Features

Several features are common within Eaton DTMs that will be covered within the next section. Please note that these are specific to Eaton-provided DTMs and may not apply to DTMs provided by other manufacturers. All of the below noted common features can be found within the “DTM Interface” window of the tool.

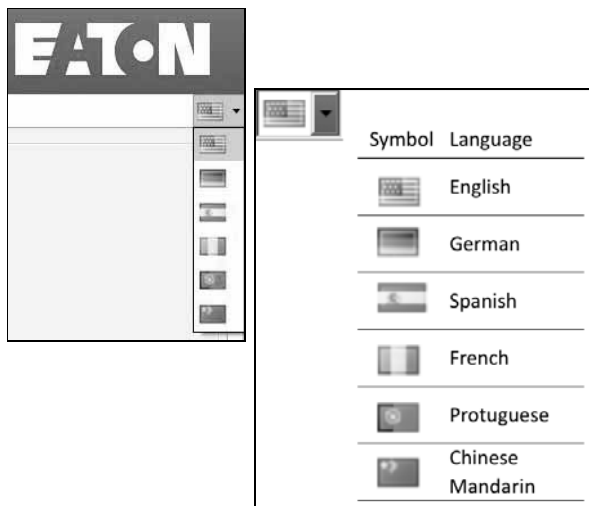
Device Heading

All Eaton DTMs will indicate the Device series, Device type, and what mode of parameter you are in. Similar to the image below.



Language Selection

All Eaton-provided DTMs have a language selection drop-down menu located on any of the DTM interfaces in the upper-right corner of the tab or window. Selecting the symbol for the desired language will change all of the text language within the DTM on the selected tab or window only. The default language for the entire program can be set through the Tools menu option, under “Options,” “General Options.” The language symbols can be seen in the image below.



Support Tool

All Eaton-provided DTMs will have a support option drop-down that will provide customer support for the desired region. The drop-down will have pullouts for different regions, which will provide a phone number or an email for technical support. By clicking on the email, it will open the installed email client program and allow for sending an email. This is available on the tool bar in the online and offline Parameter windows.



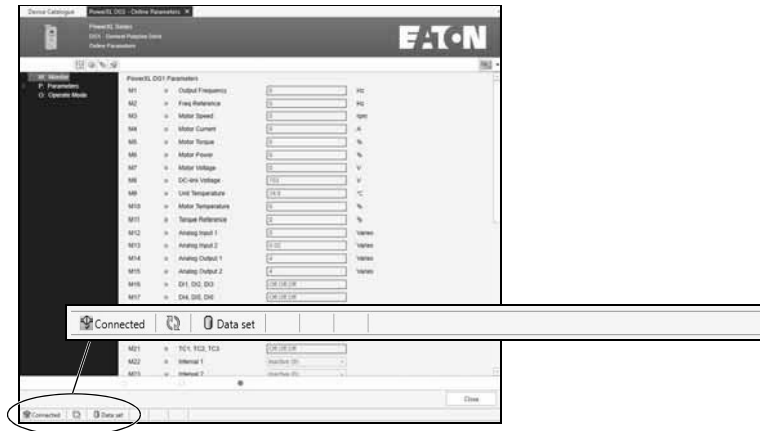
Search Tool

All Eaton-provided DTMs will have a Search feature that allows for typing in at least 3 characters to search for in either the Parameter name or the Parameter Long Description if the check box gets checked. It is defaulted that only parameter name will be searched in every group. This is available on the tool bar in the online and offline Parameter windows. When in the online mode, the Auto Refresh check box may be used to view parameters in real time with a maximum of 8 parameters selected at one time. Also by going to the parameter value, the user can right click and select “View Group Parameters.”

Auto Refresh	Panel Code	Parameter Data	Min Value
<input type="checkbox"/>	P9.2	4mA Fault Frequency 0 Hz	0
<input type="checkbox"/>	P8.17	Frequency Ramp Out FilterTime Constant 0 ms	0
<input type="checkbox"/>	P1.2	Max Frequency 40.56 Hz	0
<input type="checkbox"/>	P1.4	Min Frequency	0

Status Indicators

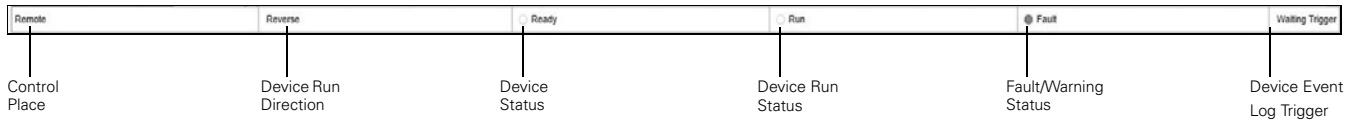
On the bottom portion of each DTM window is a status bar for communication status, network activity, current parameter data, and device status. Each device status is specific to the device rather than the entire system, meaning one device can be disconnected from the network while the remaining devices are active. Please refer to the image below for symbol definitions.



Status Symbol	Indication
	Attempting to connect to the device (going online)
	Actively connected to the device (online)
	Attempting to disconnect from the device (going offline)
	Disconnected from the device (offline)
	Communication to the device has timed out due to one of several possible errors (detected comm.interruption)
	Waiting for connection command (idle)
	Sending data to or refreshing data from device
	Displayed parameter values are loaded from the instance data set and can be changed and saved
	Displayed values are loaded from the instance data set and cannot be changed (locked)

Status Bar

Above the Status Indicators there is a Status bar which appears in every window. This will give you information in regards to the device status.



Control Place—Device control location.

Device Run Direction—Indicates if the device is running in the forward or reverse direction.

Device Status—Indicates if device is ready without faults. (Green = Ready, White = Not Ready)

Device Run Status—Indicates if device is in a run or stop state. (Green = Run, White = Stop)

Fault/Warning Status—Indicates if device is in a fault or warning. (Green = No Fault/Warning, Red = Fault/Warning)

Device Event Log Trigger—Indicates the status of the Event Analyzer trigger.

Quick Launch Toolbar

The Device button bar will have device specified buttons to open other features consistent with the devices along with search for device parameters.



Online Parameter Set

The online parameter set is the currently active parameter set on the drive, meaning if a user were to physically travel to the drive they would see the exact same parameter values displayed through the drives keypad as are displayed in the Power Xpert *inControl* interface.

There are several functions that are available within the Online Parameter set which include the Data Analyzer/Graph, Fault History, and Real-time Clock settings interface. These will be covered in detail over the next 4 sections. Access to these interfaces is available through the quick-launch toolbar within the Online Parameters interface, or through the device node context menu under “Additional Features.”

Offline Parameter Set

The offline parameter set is isolated to the host computer which houses the DTM file for the device. The configuration interface is identical to the Online Parameterization interface, except that the quick-launch bar and associated functions are not available because the parameter set is not associated to a live device in the field. See the previous offline section for explanation of features.

Parameter Configuration

The parameter configuration screen can be accessed through the device menu within the Network View window either by right-clicking or double-clicking the desired node. All available parameter menus are displayed within this window, and can be seen on the left-hand side of the DTM interface window. Each menu tree can be expanded to view the individual parameter menus by clicking the (+) symbol next to the menu name. Selecting the desired menu will display the associated parameter values in the center portion of the screen.



IMPORTANT

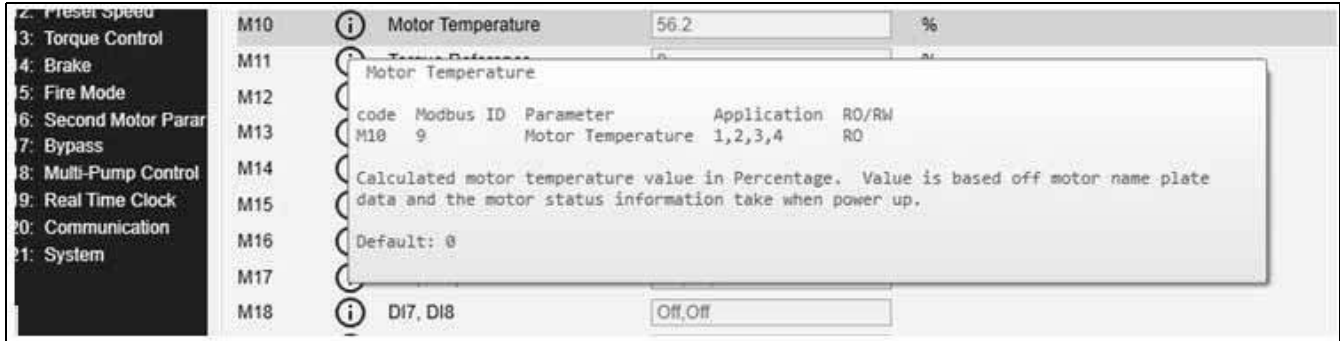
For a detailed breakdown of the PowerXL series DG1 drive parameters, please see the product application manual (MN040004EN).

The Power Xpert *inControl* configuration tool has two different parameter datasets, an Online and Offline set. The “Online” parameter set is the currently loaded and active parameter set on the drive itself. The “Offline” parameter set is isolated to the host computer and cannot become active on the drive until it is downloaded using the “Store to Device” function. These two parameter sets can be entirely separate in terms of parameter values, meaning if a user adjusts the offline parameter set it will not change any values within the online parameter set. Certain features are only available within the Online Parameterization interface specifically for displaying real-time data from the drive, although these can be viewed while the drive is offline. These features will be further explained within the next section.

The screenshot displays the Power Xpert *inControl* software interface. The main window is titled "PowerXL DG1 - Online Parameter" and shows a list of parameters for configuration. The parameters are organized into a tree view on the left, with "M: Monitor" selected. The central area displays a list of parameters with their current values and units. The status bar at the bottom indicates the drive is "Ready" and "No Fault/Warning".

Parameter ID	Parameter Name	Value	Unit
M1	Output Frequency	0	Hz
M2	Freq Reference	0	Hz
M3	Motor Speed	0	rpm
M4	Motor Current	0.8	A
M5	Motor Torque	0	%
M6	Motor Power	0	%
M7	Motor Voltage	0	V
M8	DC-link Voltage	690	V
M9	Unit Temperature	0	°C
M10	Motor Temperature	55.2	%
M11	Torque Reference	0	%
M12	Analog Input 1	1.92	Varies
M13	Analog Input 2	2.26	Varies
M14	Analog Output 1	0	Varies
M15	Analog Output 2	19.99	Varies
M16	DI1, DI2, DI3	Off/On/Off	
M17	DI4, DI5, DI6	Off/On/Off	
M18	DI7, DI8	Off/On	
M19	DI9	On	
M20	DO1, DO2, DO3	Off/On/Off	
M21	TC1, TC2, TC3	Off/On/Off	
M22	Interval 1	Inactive (0)	
M23	Interval 2	Inactive (0)	
M24	Interval 3	Inactive (0)	

Parameter value information can be displayed when hovering over the “i” indication next to the parameter name. This information will include the parameter code, Modbus ID, Parameter name, Applications it is in, Read/Write ability, a long definition of the parameter, and then its default, min and max values. This is available for all the parameters and monitoring values.

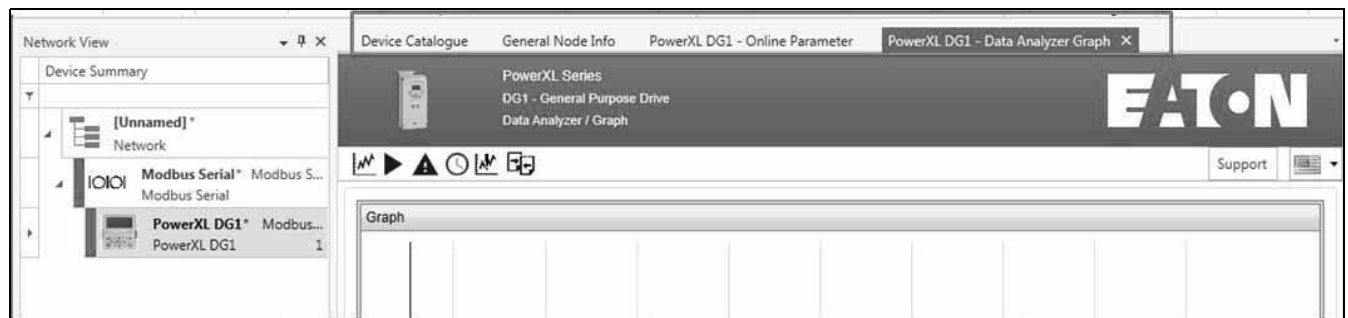
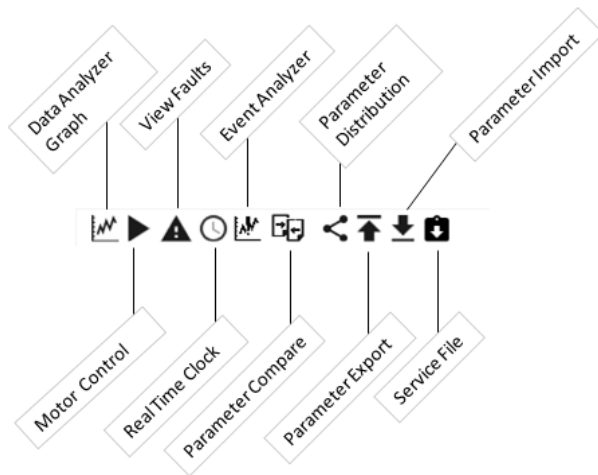


If a parameter requires a change, it can be changed through the setting box to the right of the parameter name. Once a change is made, it sends it down to the drive.

If option boards are installed in the drive, the option card parameters will appear as an additional menu item in the parameter tree on the left of the screen. With no option cards installed this menu does not appear.

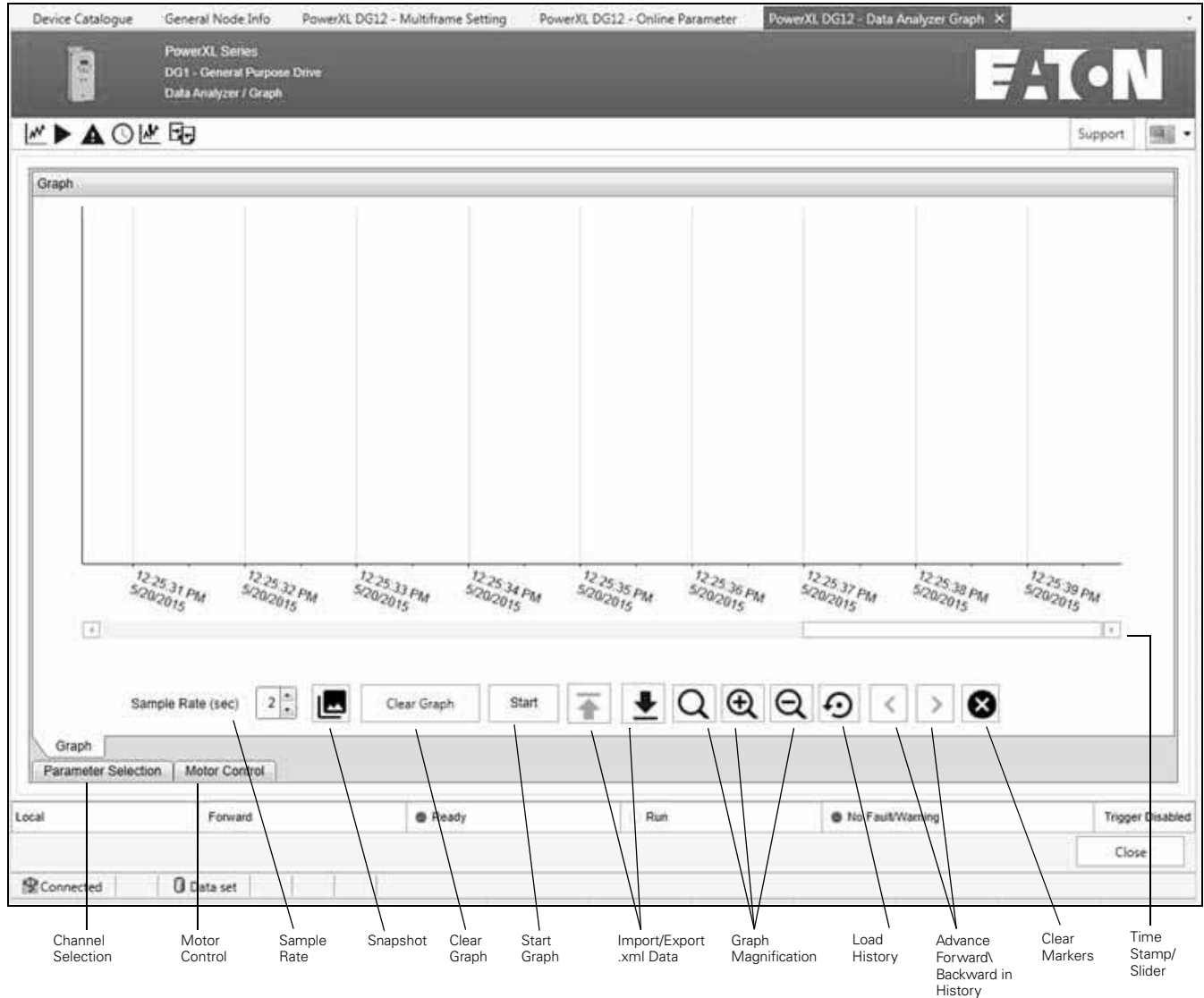
Quick Tool Bar Buttons

The quick tool bar buttons in the PowerXL DG1 DTM consist of a Data Analyzer Graph, Motor Control, View Faults, Real Time Clock, Event Analyzer, Parameter Compare, Parameter Distribution, Parameter Import/Export, and a Parameter Service File. Each of these buttons will open up a new tab window with features used for monitoring, depending on which window.



Data Analyzer/Graph

The Data Analyzer provides a live feed of user-selectable data to be monitored and analyzed. Up to 8 channels or axes can be selected to be displayed within the data graph. Each parameter can be selected and assigned channels within the graph through the Parameter Selection drop-down menu. Users can change the sample rates, take snapshots of the graph, or clear the graph data to begin a new set. Users can also import/export graph data to an .xml format which can be used in programs such as Microsoft Excel®.



Sample Rate—Adjust the sample rate of the graphing tool, 2 to 10 second scale.

Channel Selection—Allows selecting which parameter values you would like to assign to one of the 8 channels. When you click on the tab, it will slide out a window of the parameter assignment along with the 8 channels in a table. There are 8 basic values selected for monitoring but they can be adjusted by using the drop-down box. The table will indicate the parameter name, live value, min value, max value, and units of that value. Once the values are set, the window can slide back as a tab by clicking on the Graphing window above.

Graph

Parameter Selection

AC input voltage RMS

Assign Remove

Channel	Parameter	Live Value	Min Value	Max Value	Units
CH0	Output Frequency	0.00	<input type="text"/>	<input type="text"/>	Hz
CH1	Freq Reference	0.00	<input type="text"/>	<input type="text"/>	Hz
CH2	Motor Speed	0.00	<input type="text"/>	<input type="text"/>	rpm
CH3	Motor Current	0.00	<input type="text"/>	<input type="text"/>	A
CH4	Motor Voltage	0.00	<input type="text"/>	<input type="text"/>	V
CH5	Unit Temperature	0.00	<input type="text"/>	<input type="text"/>	°C
CH6	DC-link Voltage	0.00	<input type="text"/>	<input type="text"/>	V
CH7	Analog Input 1	0.00	<input type="text"/>	<input type="text"/>	Varies

Parameter Selection Motor Control

Channel Values

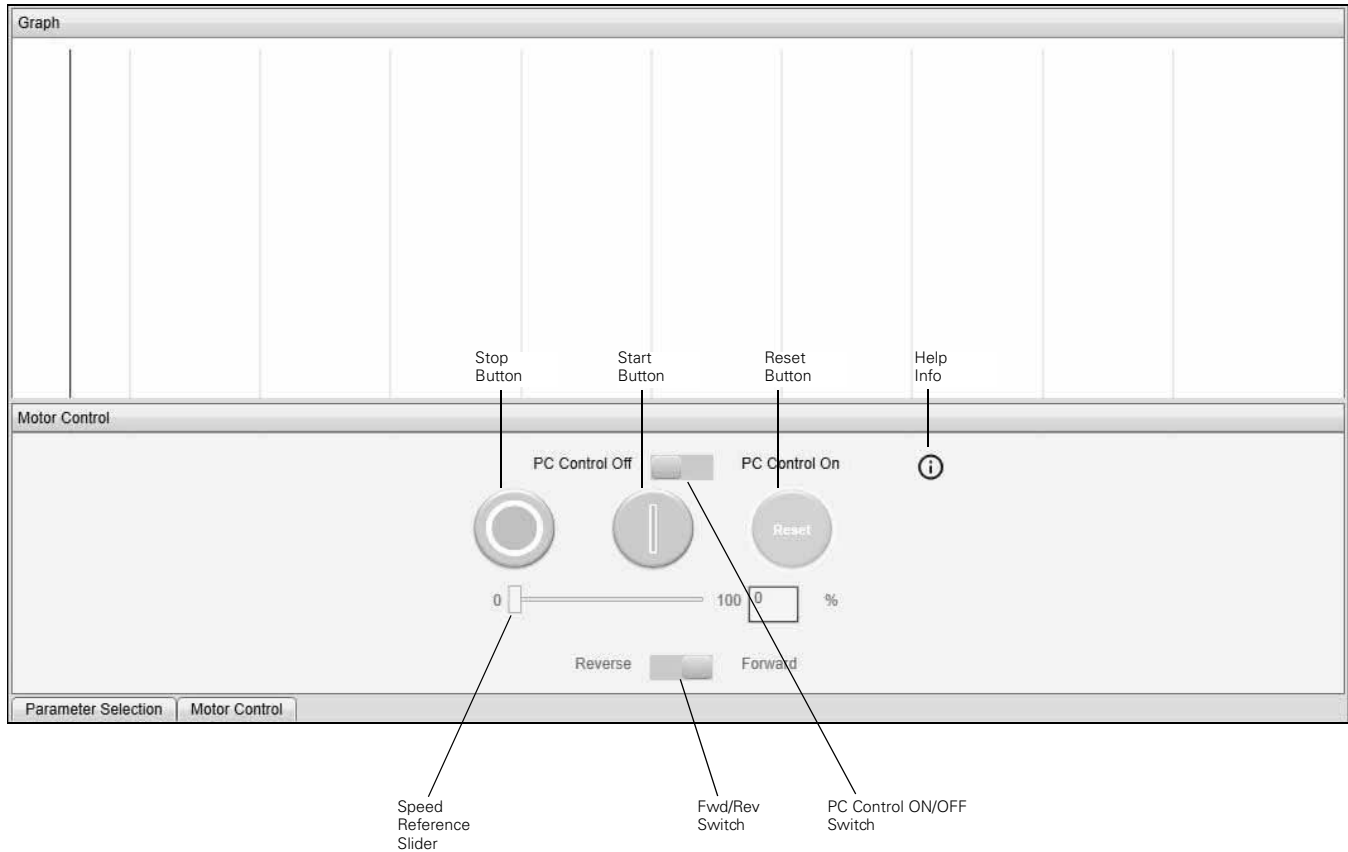
Parameter Monitor Selection

Assign and Remove

To assign a monitoring value to a channel, it requires clicking and highlighting the desired channel and then using the drop-down menu. On the parameter monitoring value selection, you can scroll through and select the desired value. Once the value is selected, click the Assign button to put it to that channel. To remove a channel, it requires the same process of highlighting the channel desired and clicking on Remove. Each channel will have its own y axis scale.

Motor Control—This button allows the PC to take over control of the drive by starting/stopping, changing speed and direction.

Note: Remote control place and reference need to be in fieldbus mode for the control menu to function along with the drive being in that control mode. The PC Control Off/On switch will do these transitions. If PC Control is not on, the buttons will be greyed out.



WARNING

Take all safety procedures required by local management to insure personnel safety. Accidental user activation of the device is possible which increases the potential for safety risks. Please use caution when remotely controlling devices.

Graph Snapshot—This button takes a picture snapshot of the graph at that moment in time. The snapshot saves the graph as a jpeg image without any numbers tied to it.

Clear Data—This button clears the graphed data along with the channel assignments. The default channel parameters are cleared as well. To get these back, close the Graphing window and reopen.

Import/Export .xml—These 2 buttons allow for importing and export .xml graphing files for viewing and further analysis. Upon clicking on the button, it will open an Open window to save or select the desired .xml file. Export becomes valid when data is recorded and it is graphing is in the stop state.

Start/Stop—This button starts the process of logging data into the graph. Once starting the graph will auto scale the Y axis based off the values shown.

Graph View Manipulating—These 3 buttons allow for changing the view of the graph, allowing to zoom in or out on certain areas of the graph window as well as set it back to default view.

Load History—This allows for loading up to 15 hours of stored data, then by using the Advance Forward and Backward buttons to change the 4 hours displayed in the graph window at a time.

Clear Markers—Will clear the markers that can slide out to view values at a specific point in the graph window. The markers are applied by clicking on a desired point on the graph. Two graph points can be pulled up to get comparisons.

Time Stamp/Slider—This area shows the real-time stamp on recorded data from the device. The time is based off the computers real time stamp. The slider allows for going to previous times to view results.

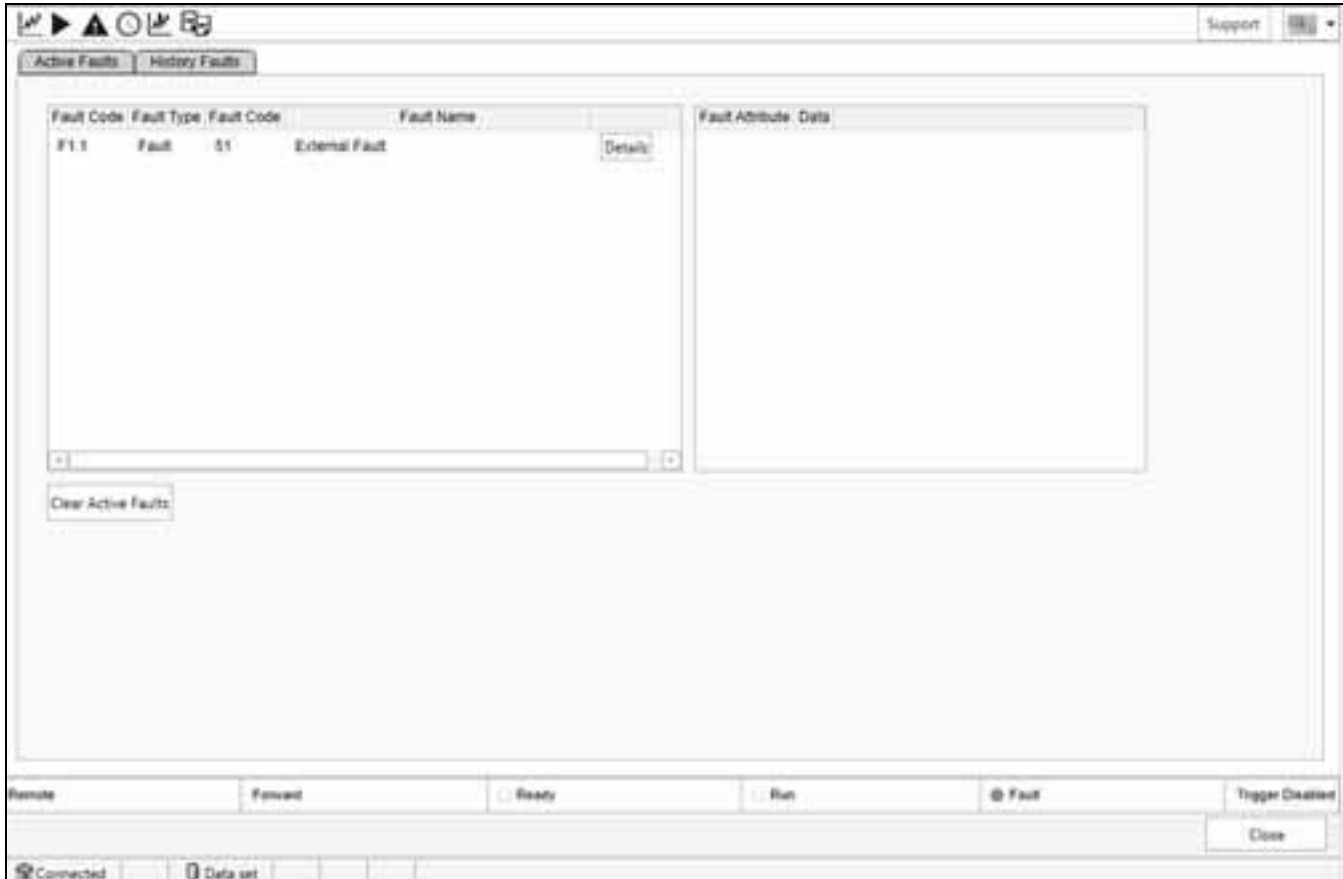


WARNING

Take all safety procedures required by local management to insure personnel safety. Accidental user activation of the device is possible, which increases the potential for safety risks. Please use caution when remotely controlling devices.

Fault History

The Power Xpert *inControl* tool displays any faults or warnings/alarms which have occurred on the drive, currently active faults as well as previously cleared faults are viewable within this interface. There are two tabs within the Fault view screen.



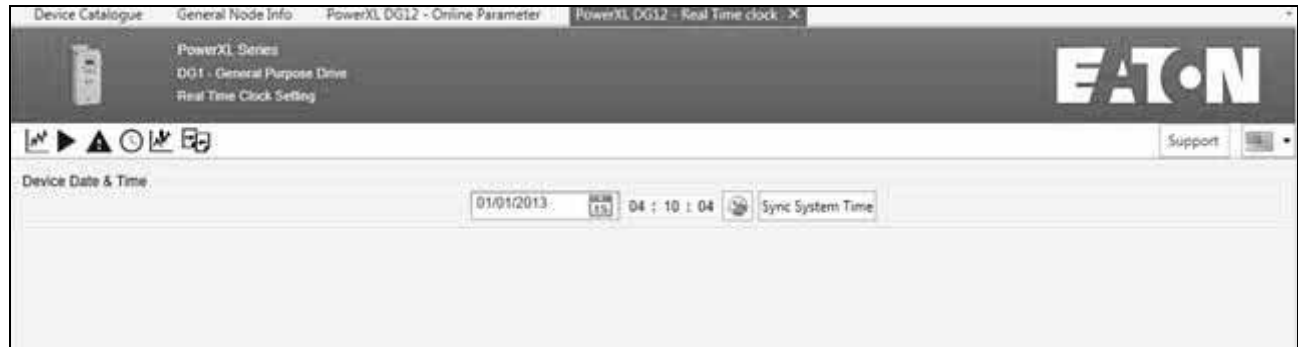
Active Faults—Any currently active faults or alarms will be displayed within the “Active Faults” tab. Users can clear any active faults once the fault condition has been resolved to restore the drives functionality. Faults must be cleared through this screen by clicking the “Clear Faults” button on the “Active Faults” window, the rest button available on the drive control panel, or through local I/O or keypad options (Back/Reset button, fault clear DI, etc.) to restore use of the configuration tools ability to adjust and control the drives parameters and functionality.





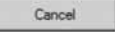

Faults—When looking at faults, they will provide the fault code number and fault description. When hovering over that fault, it will give a pop-out window to provide fault cause and possible remedies for that fault. If additional info is needed, the Details button can be pressed to get 16 parameter values that were stored when the fault occurred.

History Faults—Any previous faults that occurred to the device are logged within this tab. Up to 10 faults can be stored within the DG1 drive, all of which will be shown on this screen if saved. With each fault, there will be a group of parameters that get stored and can be viewed to provide analysis along with a description of what the fault is and how to rectify it.

Real-Time Clock Settings

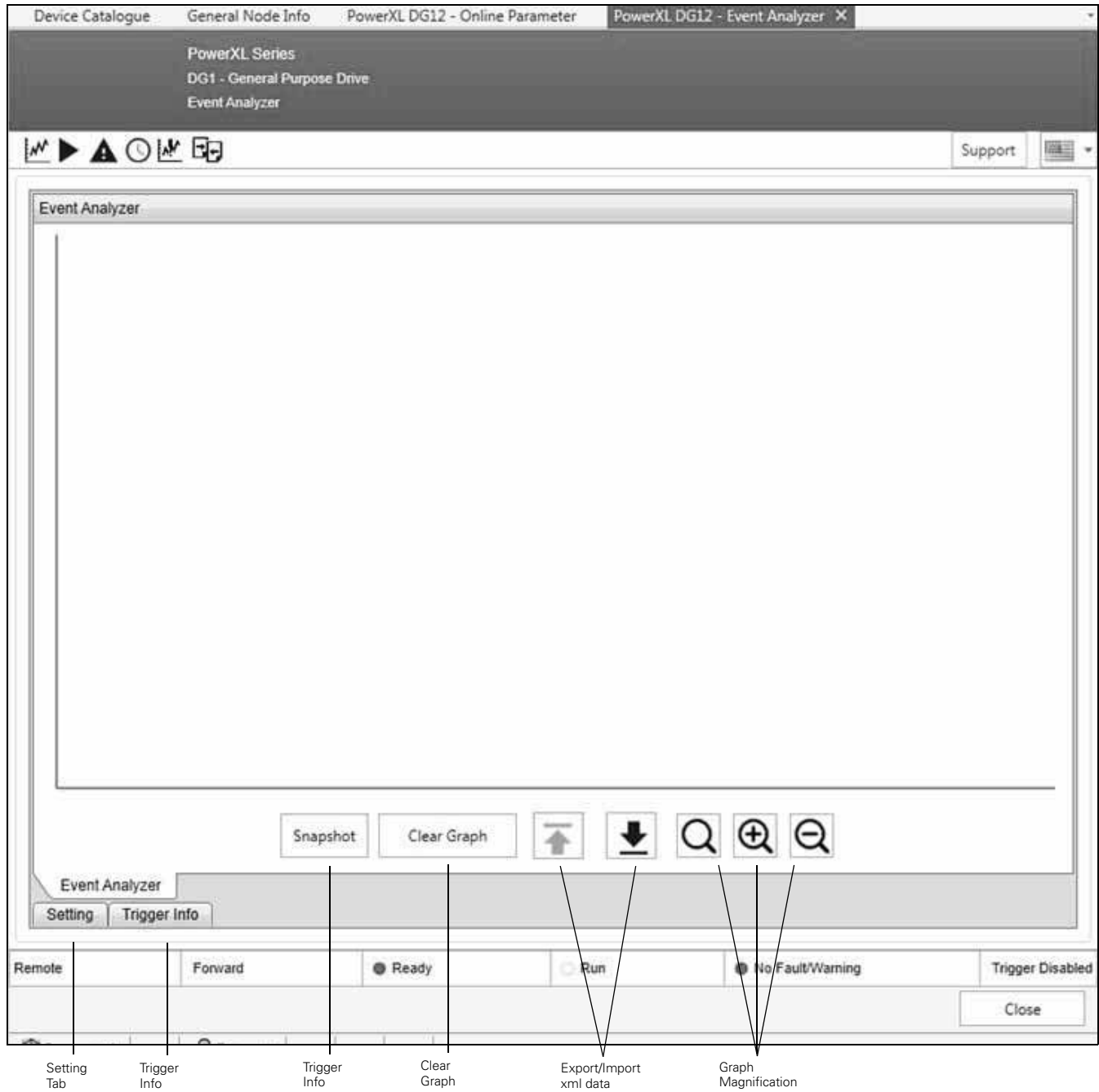
The DG1 drives real-time clock (RTC) settings can be monitored or adjusted through the Power Xpert *inControl* configuration tool. The date and time values can be edited individually or synced with the host computers. The below functions can be performed with their associated button.



Button Symbol	Function
	Refresh the values displayed on the screen with the active values in the drive
	Sync the date and time values on the RTC Settings tab with that of the host computer (which PowerXpert <i>inControl</i> is installed)
	Calendar function for date value selection
	Saves the modified RTC date and time values to the drive and closes the RTC Settings interface
	Cancels any unsaved modifications and closes the interface
	Saves the modified RTC date and time values to the drive

Event Analyzer

The event analyzer is very similar to the graphing tool but it actually uses the drives control board to record different trigger points in the control board that can then be pulled out via the PC Tool to look at the desired channel info. This is looking at data at the 10 msec refresh rate in the control board.



Setting Tab—The setting tab is used to set the control board up with channels and trigger point value. This will also allow for pulling the events out of the drive.

Trigger Info—This tab provides the info on the event log being displayed in the graph window.

Snapshot—This will allow for taking a snapshot of the graph window to allow for sending the picture.

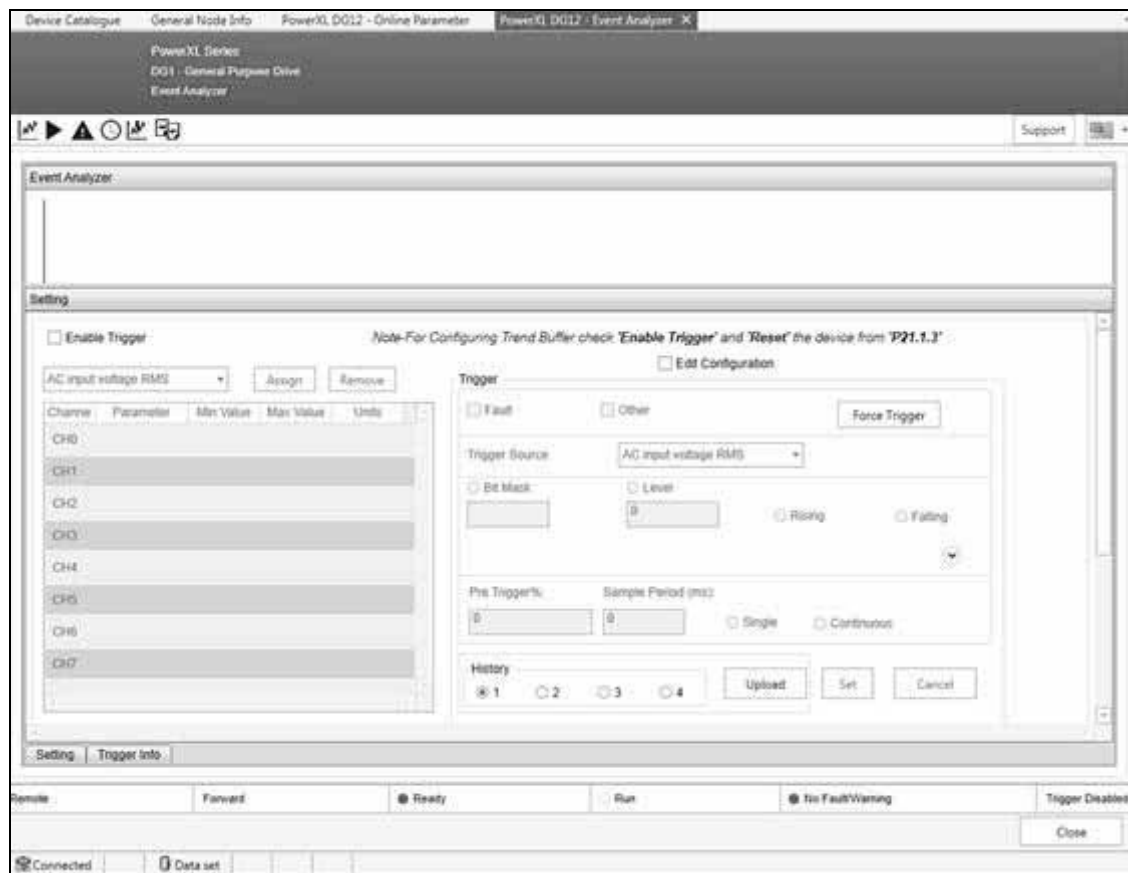
Clear Graph—This button will clear the viewed graph screen.

Export/Import Data—Will allow for saving the data to an xml file, which will allow sending it or putting it into a spread sheet.

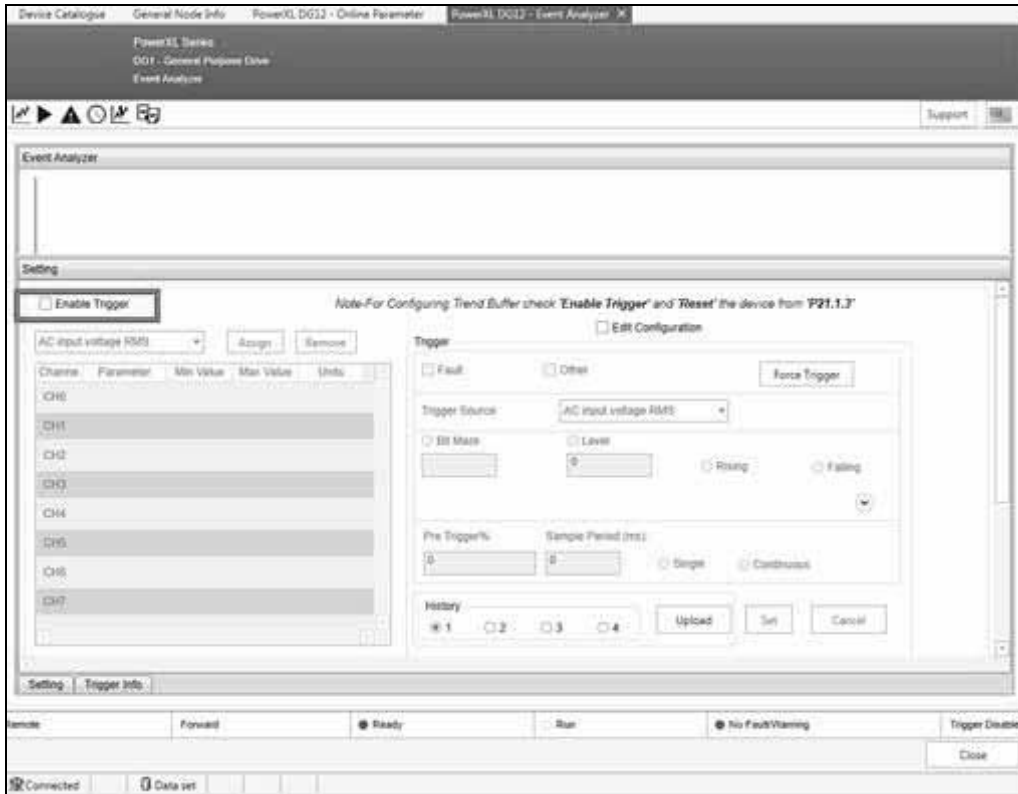
Graph Magnification—These buttons allow for zooming in and out in the graph along with resetting back to defaults window.

To Set up a Trigger.

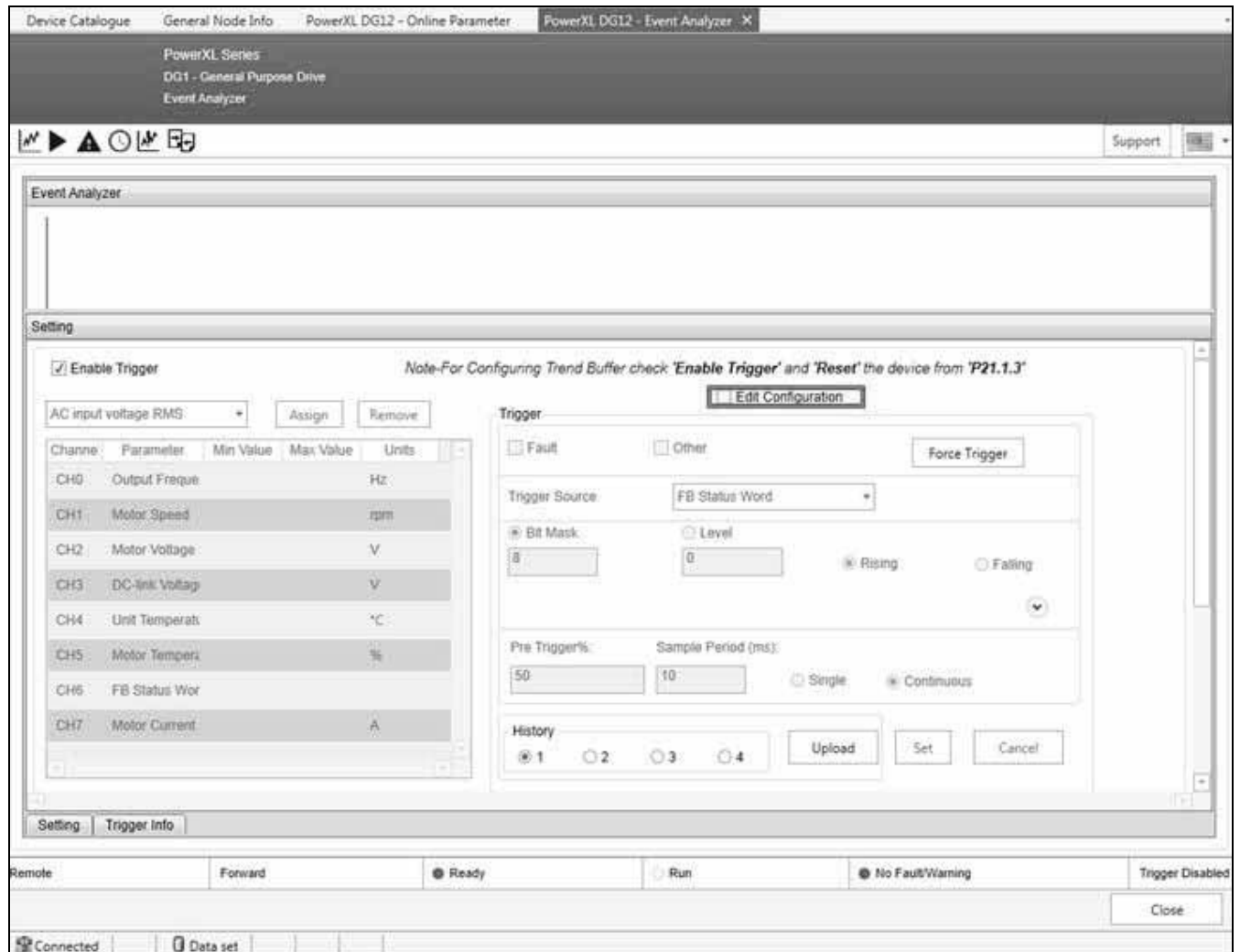
1. Click on the Setting Tab



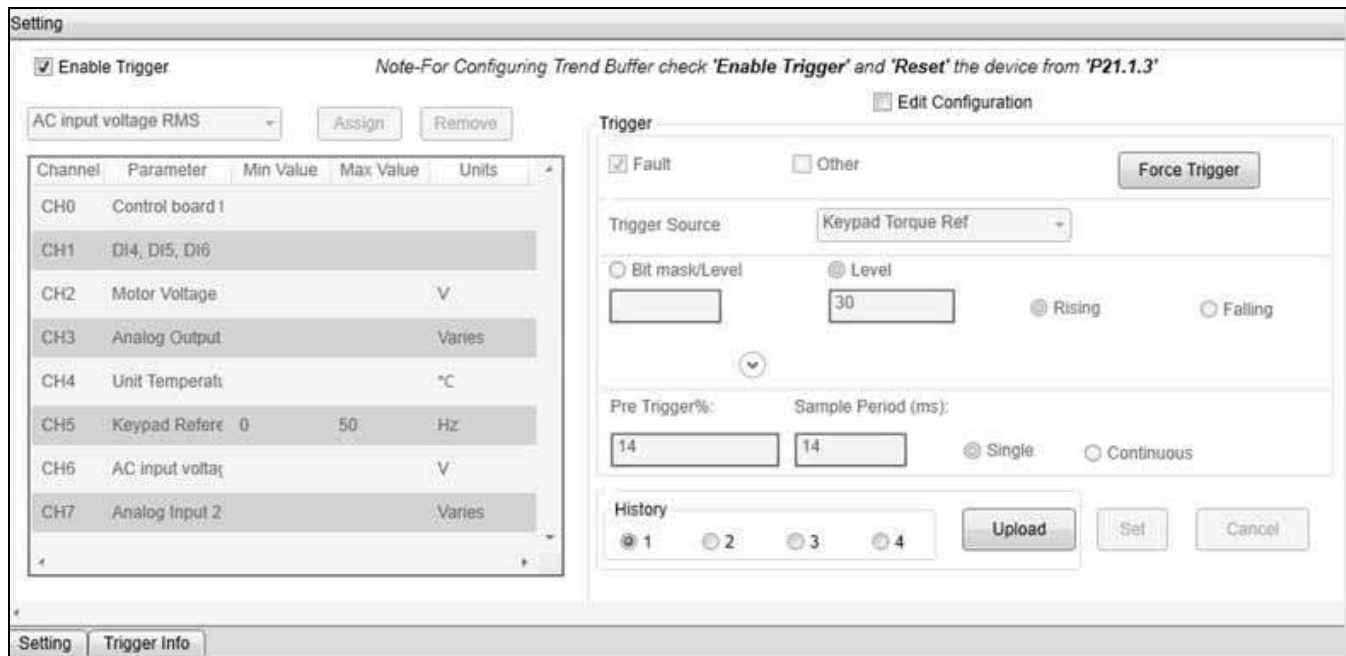
2. Check the Enable Trigger box. You will then see the note that asks to set P21.1.3 to Reset to power cycle the control board or you can perform a manual power cycle.



- Close the Event Analyzer window and reopen after the Reset. From there check the Edit Configuration tab to set up the channels and trigger.



4. There are a set of default values listed in the table but these can be selected by the drop-down window and then assigned to a channel.
5. With the channels selected, select the trigger method as a Fault or Other. Other would correspond to a parameter that can be bit masked to trigger off a level.
6. Select the Pre Trigger %. This is the amount of time before the trigger event that will be stored. Set the Sampling period and if it is a signal shot or continuous. Signal is a single trigger and it is done, Continuous would allow for multiple storage points up to 4, as new ones come in, the oldest is removed.



7. Click the Set button to send settings down to the drive.

From there you can disconnect and let the drive perform. Then when reconnecting, the 4 history boxes can be checked to pull the last 4 items out.

To View Plot

When the trigger condition occurs, the trigger status is changed to '**Triggered.**' User can then upload the trend plot for the set parameters. The latest plot is always available in **History** slot#1. When next 'Triggered' condition occurs, the data from Slot#1 is shifted to Slot#2 and latest data is stored again in Slot#1.

User can take **snapshots** of the trend plot or export the trend file (.xml) that can be imported for viewing in the future.

The Trigger Information of the displayed plot is available in '**Trigger Info**' tab of Event Analyzer.

User can also do a 'Force Trigger' that will trigger immediately.

Parameter Compare

Parameter Compare enables the user to:

- Compare the parameter values between 2 exported configuration files (.exml)

OR

- Compare the parameter values between a configuration file stored in the computer and the device (when the DG1 DTM is Online)

The user can also compare the parameter values between a configuration file and offline parameters (when the DG1 DTM is offline).

This option is available as a shortcut on the toolbar of Online & Offline Parameters window.

Also, 'Parameter Compare' can be launched by right clicking on **DG1 DTM > Additional Functions > Parameter Compare**.

The option to compare 2 files or a file and device is available on the Compare window.

PowerXL DG1 Parameters

First File: C:\Users\le0072155\Documents\Software Application Eng\Galaxy\Customers\JC\IDG1 YPALL

Second File/Device: Device

Panel Code	Parameter Name	First File	Second File/Device	Status
P1.1	Min Frequency	0	0	No Change
P1.2	Max Frequency	60	60	No Change
P1.3	Accel Time 1	30	3	Modified
P1.4	Decel Time 1	30	3	Modified
P1.5	Motor Nom Current	23	2.3	Modified
P1.6	Motor Nom Speed	1150	1750	Modified
P1.7	Motor PF	0.85	0.85	No Change
P1.8	Motor Nom Voltage	460	230	Modified
P1.9	Motor Nom Frequency	60	60	No Change
P1.10	Power Up Local Remote Select	0	0	No Change
P1.11	Remote 1 Control Place	0	0	No Change
P1.12	Local Control Place	0	0	No Change
P1.13	Local Reference	6	6	No Change
P1.14	Remote 1 Reference	0	1	Modified
P1.15	Reverse Enable	1	1	No Change
P2.1	AI1 Mode	1	1	No Change
P2.2	AI1 Signal Range	2	0	Modified

Remote: Forward: Ready: Run: No Fault/Warning: Trigger Disabled:

Ok Cancel Apply

Connected Data set

Parameter Distribution

Parameter Distribution feature allows the user to copy selected parameters from one DG1 DTM to multiple DG1 DTMs. This is an offline operation and is applicable to Offline parameters. Both the source and the destination DTMs need to have the same DG1 setup configuration (i.e., Input Voltage rating and Drive current ratings) to perform Parameter Distribution.

Parameter Distribution can be launched from the toolbar icon in Online Parameters page.

Alternatively, Parameter Distribution can be launched by right clicking on **DG1 DTM > Additional Functions > Parameter Distribution**.

The 'DG1 Parameter Selection' table will display all the offline parameters of Source DG1.

The screenshot displays the 'Parameter Distribution' window. At the top, there's a 'DG1 Device Selection' section with buttons for 'Select All', 'Select None', 'Reverse Selections', and 'Refresh'. Below this is a table with columns: Select, Device, Device Address, and Status. The table contains two rows: 'PowerXL DG1' with address '166.99.170.133' and 'PowerXL DG13' with address '192.168.1.254' and status 'Success'. A 'Send Data' button is located below the table.

The bottom section is 'DG1 Parameter Selection', also with 'Select All', 'Select None', 'Reverse Selections', and 'Refresh' buttons. It contains a table with columns: Select, Panel Code, Parameter, and Value. The table lists parameters from P1.1 to P1.10. P1.7, P1.8, and P1.9 are checked for selection.

Select	Device	Device Address	Status
<input type="checkbox"/>	PowerXL DG1	166.99.170.133	
<input checked="" type="checkbox"/>	PowerXL DG13	192.168.1.254	Success

Select	Panel Code	Parameter	Value
<input type="checkbox"/>	P1.1	Min Frequency	0
<input type="checkbox"/>	P1.2	Max Frequency	60
<input type="checkbox"/>	P1.3	Accel Time 1	3
<input type="checkbox"/>	P1.4	Decel Time 1	3
<input type="checkbox"/>	P1.5	Motor Nom Current	4.8
<input type="checkbox"/>	P1.6	Motor Nom Speed	1750
<input checked="" type="checkbox"/>	P1.7	Motor PF	0.85
<input checked="" type="checkbox"/>	P1.8	Motor Nom Voltage	230
<input checked="" type="checkbox"/>	P1.9	Motor Nom Frequency	60
<input type="checkbox"/>	P1.10	Power Up Local Remote Select	0

Note: Source DG1 is the DTM from which the Parameter Distribution is launched.

Under '**DG1 Parameter Selection**', when 'Send Data' button is enabled, clicking it shall copy the selected parameter values to respective Offline parameters of all DTMs selected in '**DG1 Device Selection**' section.

Import/Export Parameter (Configuration Replicator)

PC Tool enables the user to export PowerXL DG1 device configurations to a file (.exml) that can be later imported to DG1 devices or Offline parameters.

The Export / Import shortcuts are available on the toolbar of Online and Offline Parameters window.

Exporting Offline Configuration

For creating an offline parameter set, user first needs to set up the drive from the Multi-Frame window and then export it using the **Export** icon from the toolbar of Offline Parameters window.

Exporting Online Configuration

Online / Device configuration file can be created by using the **Export** icon from the toolbar of Online Parameters window. It will export all the parameters from the device to the exported file.

Import

Using the Import option will import the previously exported configuration file to the DG1 Offline / Online Parameters.

If a configuration file is imported in Online Parameters, all the parameters from the file are written to device.

Service File

User can print some useful information of DG1 parameters using **Service File Information**. This feature will read the parameter values from the DG1 with **Drive Information** and **History Fault Information**, and show them in a HTML file. User can then print the contents of this window, or save it to a file. This feature is available only in Online mode.

Service File Information can be launched from the toolbar icon in Online Parameters page. After saving the file as an HTML, it will open up an Internet browser and display the parameter file page.

Device Monitoring

Device monitoring is available through two mediums of the Power Xpert *inControl* tool. The Data Analyzer/Graph is available for user-defined parameter monitoring (please see “Data Analyzer/Graph” section for more detail). The Monitoring menu is also available which displays all available monitoring parameters and their current value on the drive.

The screenshot shows the 'PowerXL DG1 - Online Parameter' window. The left sidebar contains a tree view with the following structure:

- M: Monitor
 - P: Parameters
 - P1: Basic Parameters
 - P2: Analog Input
 - P3: Digital Input
 - P4: Analog Output
 - P5: Digital Output
 - P6: Logic Function
 - P7: Drive Control
 - P8: Motor Control
 - P9: Protections
 - P10: PID Controller 1
 - P11: PID Controller 2
 - P12: Preset Speed
 - P13: Torque Control
 - P14: Brake
 - P15: Fire Mode
 - P16: Second Motor Parar
 - P17: Bypass
 - P18: Multi-Pump Control
 - P19: Real Time Clock
 - P20: Communication
 - P21: System
 - B: Optional Boards

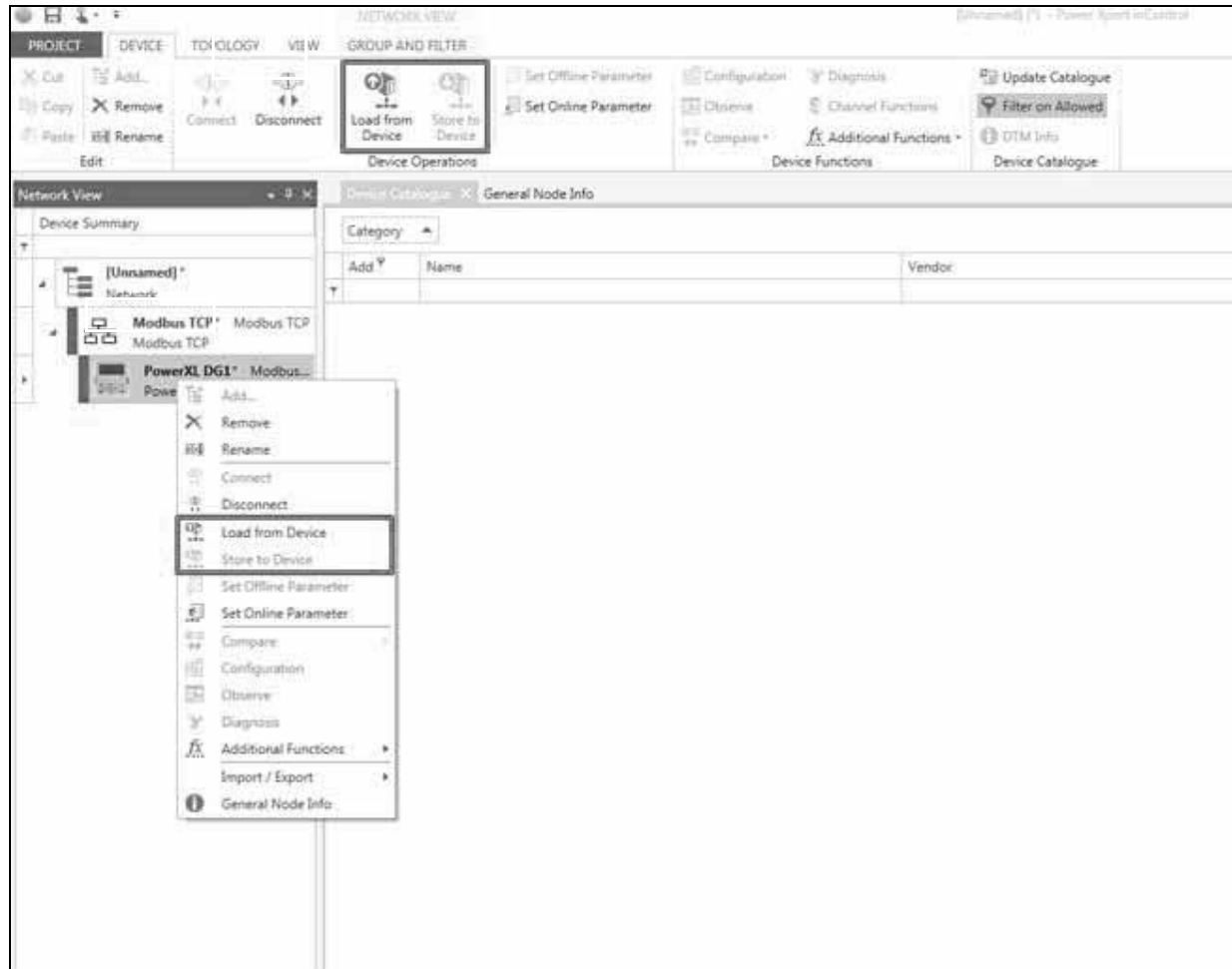
The main content area, titled 'PowerXL DG1 Parameters', lists the following parameters and their values:

Parameter ID	Parameter Name	Value	Unit
M1	Output Frequency	0	Hz
M2	Freq Reference	0	Hz
M3	Motor Speed	0	rpm
M4	Motor Current	6.8	A
M5	Motor Torque	0	%
M6	Motor Power	0	%
M7	Motor Voltage	0	V
M8	DC-link Voltage	699	V
M9	Unit Temperature	0	°C
M10	Motor Temperature	56.2	%
M11	Torque Reference	0	%
M12	Analog Input 1	1.89	Varies
M13	Analog Input 2	7.6	Varies
M14	Analog Output 1	4	Varies
M15	Analog Output 2	19.98	Varies
M16	DI1, DI2, DI3	Off, Off, Off	
M17	DI4, DI5, DI6	Off, Off, Off	
M18	DI7, DI8	Off, Off	
M19	DO1	On	
M20	RO1, RO2, RO3	Off, Off, Off	
M21	TC1, TC2, TC3	Off, Off, Off	
M22	Interval 1	Inactive (0)	
M23	Interval 2	Inactive (0)	
M24	Interval 3	Inactive (0)	
M25	Interval 4	Inactive (0)	

At the bottom of the window, there are status indicators: Remote, Forward, Ready (selected), Run, No Fault/Warning (selected), and Trigger Disabled. A 'Close' button is located in the bottom right corner.

Upload Parameters (Load from Device to PC)

The software tool can upload parameters that are currently active on the drive to the Offline parameter set within the device DTM. Uploading parameters will overwrite all values within the Offline Parameter set and replace them with those from the drive. The device must be online in order to upload parameters.



Download Parameters (Load from PC to Device)

The software tool can download parameter values to the drive from the Offline Parameter set loaded into the device DTM. The drive must not be receiving a "RUN" signal in order to download parameters. Downloading parameters will overwrite all currently loaded parameter values within the drive. The device must be online in order to download parameters to the drive. It is recommended that users save a copy of the parameters they wish to replace by uploading the parameters on the drive to a back-up DTM file. This will help in future trouble-shooting and record keeping if needed.

WARNING

Currently, the PowerXL DG1 series offline parameter set has not been configured to load base parameters based on the frame size of the drive. This means that the **default values loaded in the offline parameter set are incorrect and must be uploaded from the drive to reflect the specific frame size installed the field.** Before downloading parameters to the drive users need to upload parameters from the drive as to ensure that the current values are entered for the particular frame size in use.

Section 3—Firmware Upgrade Process

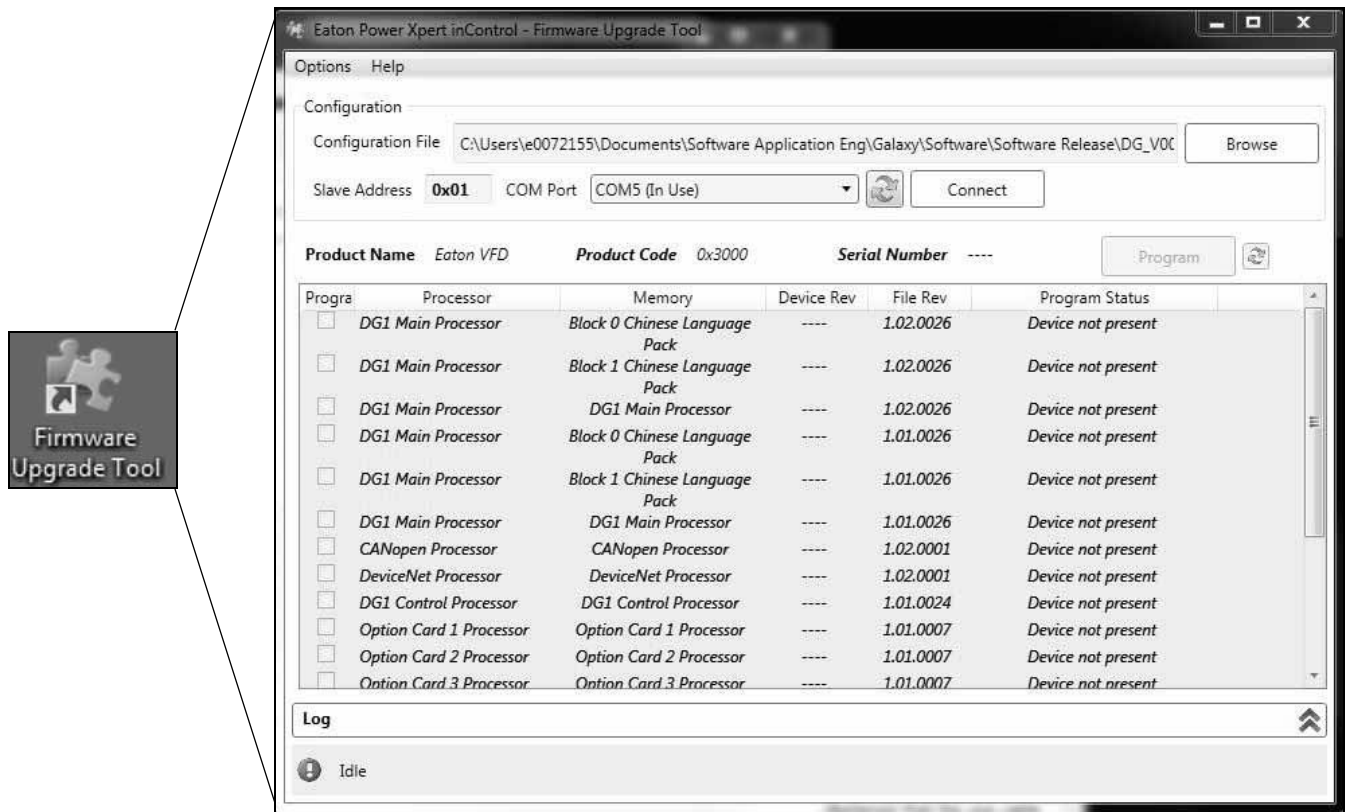
Application Summary

The PowerXL Series DG1 adjustable frequency drive has the ability to upgrade firmware through a PC Firmware Upgrade Tool. It can be used to load a single packaged firmware file to the MCU, DSP, Keypad and Option boards.

How to Load Firmware

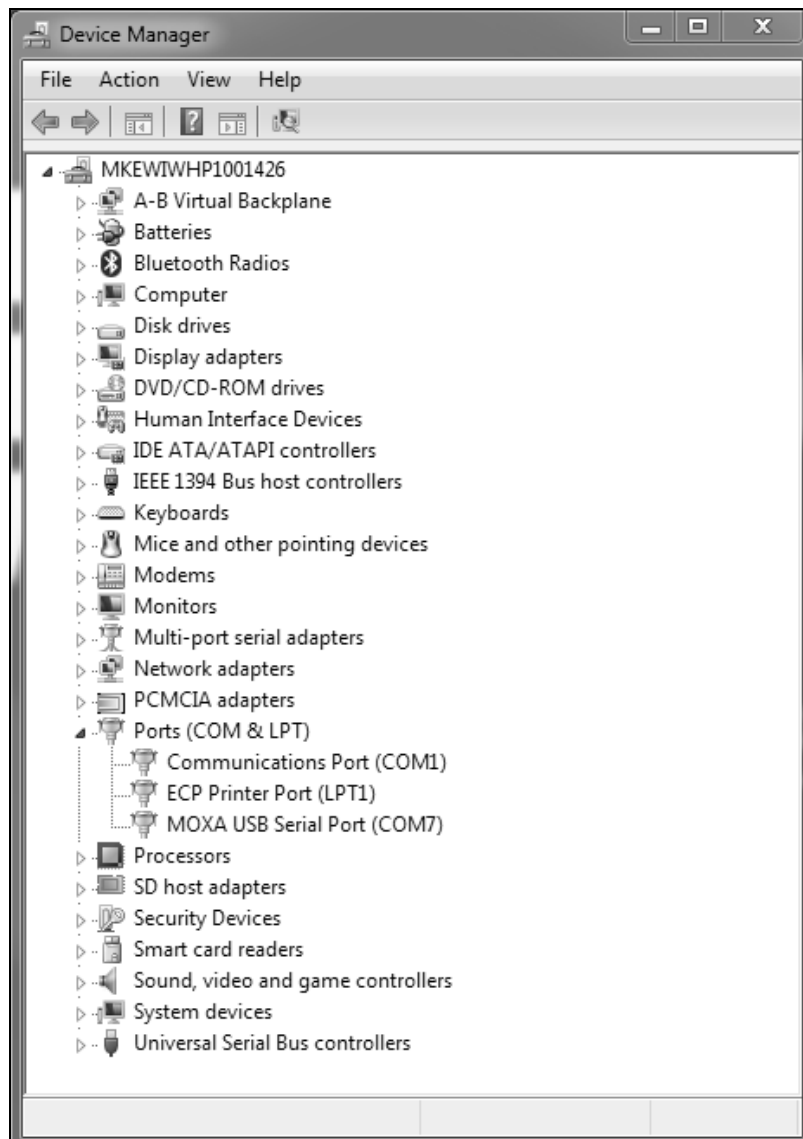
1. Download and open the firmware upgrade tool by clicking on the Firmware Upgrade Tool Icon seen in **Figure 2**.

Figure 2. Eaton Power Xpert *inControl*—Firmware Upgrade Tool



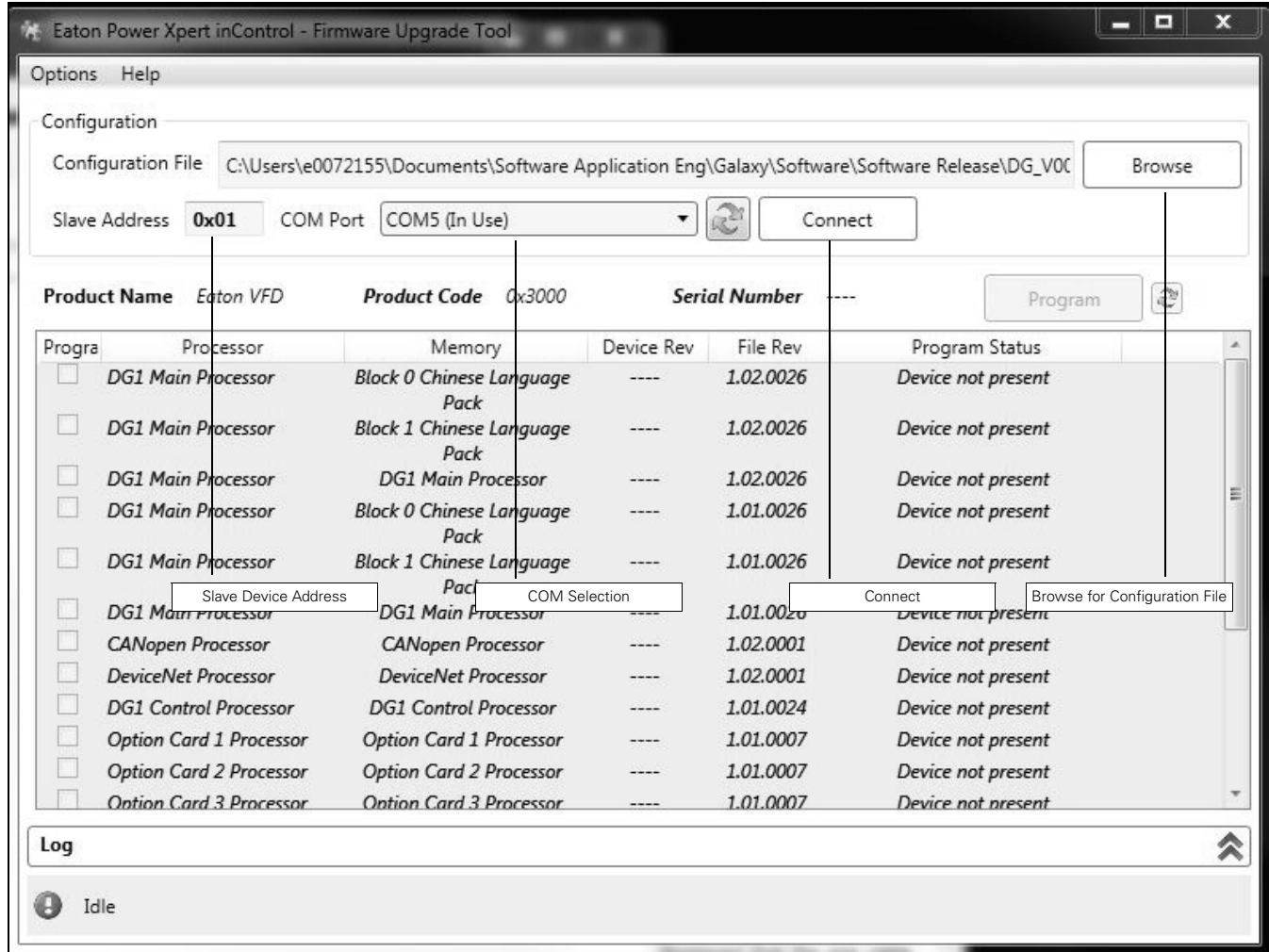
2. Ensure that the correct communication port is selected, loading firmware requires a USB to RS-485 converter that can be connected to either terminals A and B on the drive terminals or to the Key-pad RJ45 port (this is not an Ethernet port).
 - a. Using Windows 7/XP, go to Start Menu.
 - b. Select “Control Panel”.
 - c. Select the “System and Security” Icon.
 - d. Under the “System”, select the link for “Device Manager”.
 - e. In the Device Manger window scroll down to Ports, expand the Ports tree, and check the com port setting of your communication device.

Figure 3. Device Properties



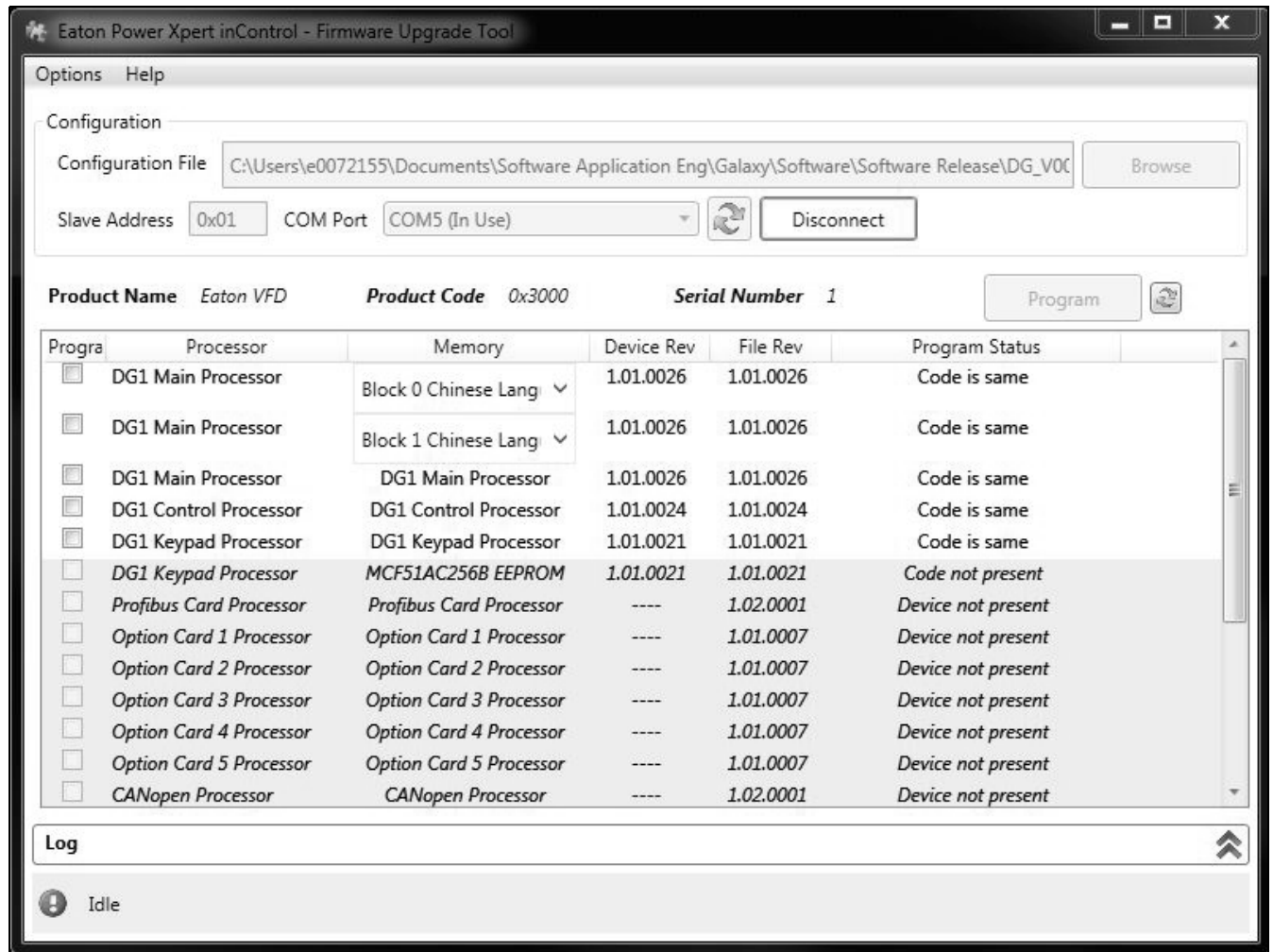
3. Click the **Browse** button, select the configuration file that your Eaton Representative sent you, and click the **Connect** button.

Figure 4. Tool Buttons



- The drive initially will go into a bootloader mode and next the software will go out to scan the drive for the processors that are available for upgrade. It will then compare the processor firmware versions on the drive to the firmware update package file.

Figure 5. Firmware Files

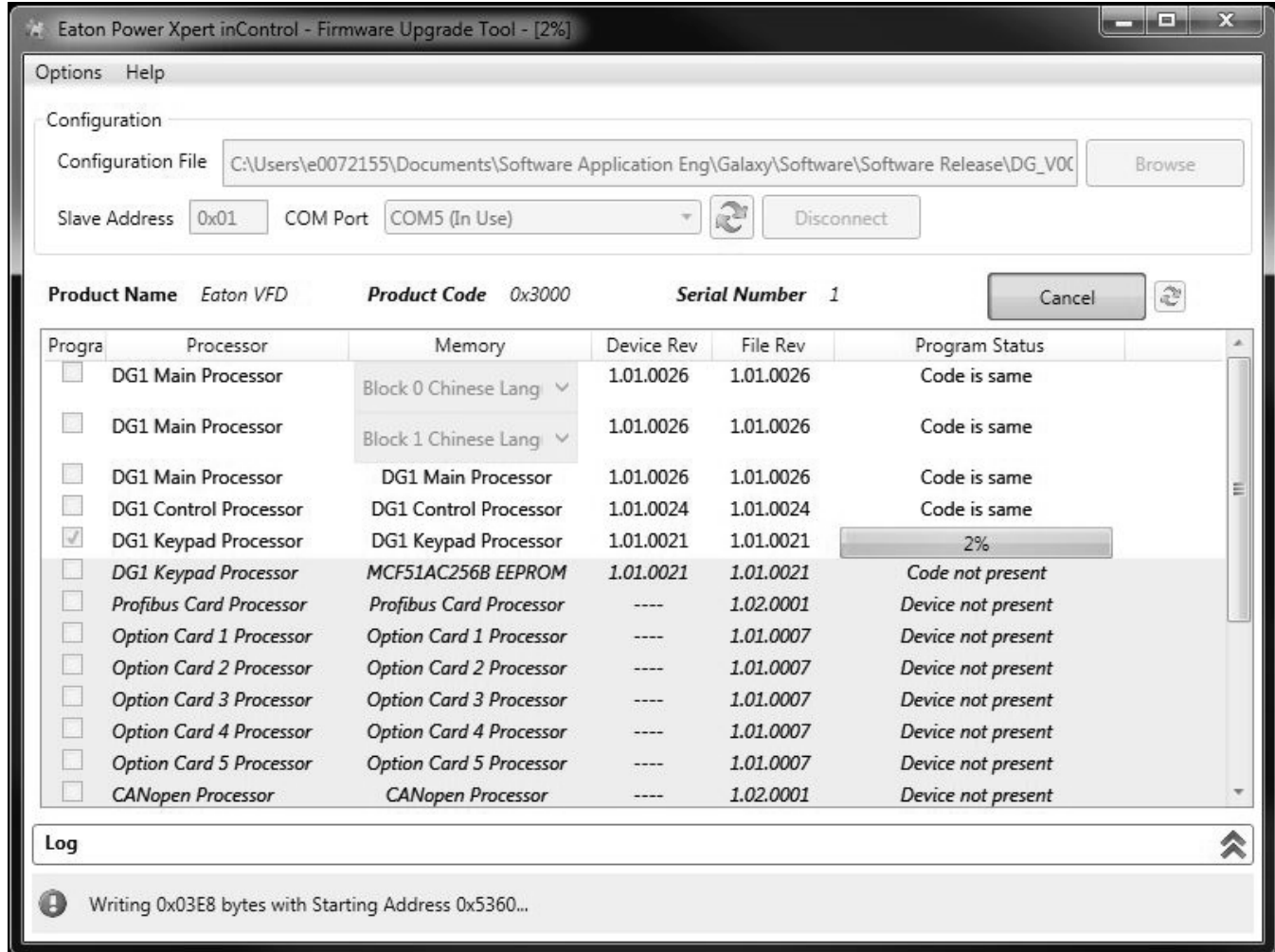


Language Blocks—will pop up with drop-downs to select the desired language in addition to English.

If option cards are installed, they will show up allowing for upgrading. The Program Status will indicate if the code in the drive vs. the file are the same.

- The **Program Status** row will show you the status of the firmware on the drive and the revisions available in the firmware update package file. If you would like to load software to the drive, select the **Program** check box. With that box selected, the Program button will become active; pressing it will start the download process.

Figure 6. Firmware Upgrade Status

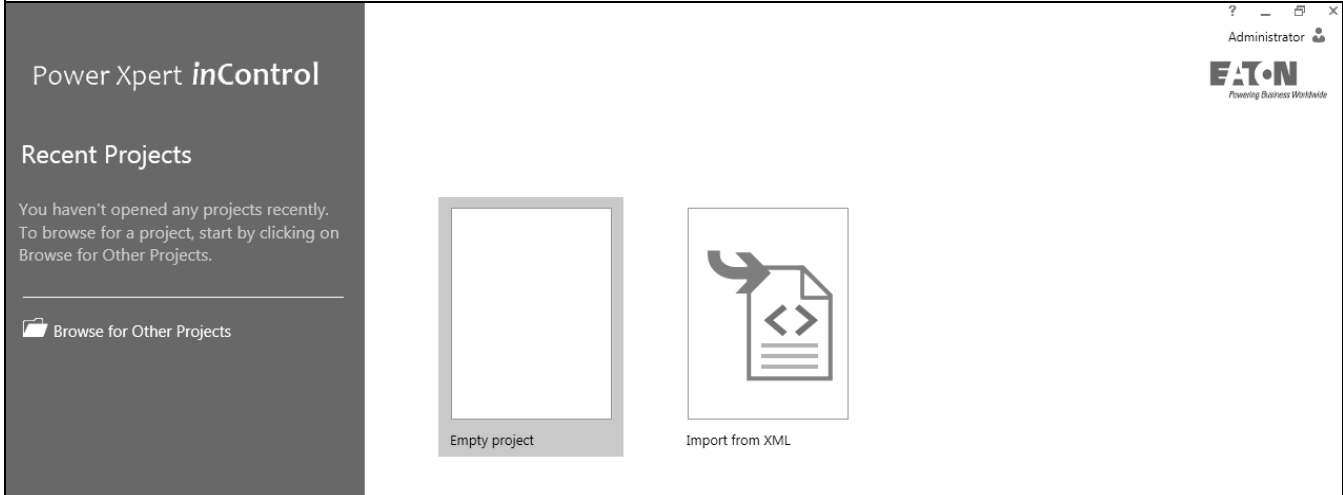


- Upon completion of the firmware download, the drive will come out of bootloader mode by either disconnecting or closing the Firmware Upgrade Tool. After the reset occurs, the drive keypad will then go through the process of uploading the new firmware automatically (while this is occurring there will be a status indication on the keypad).
- The drive should then be powered down and back on, completing the firmware upgrade process. If the drive firmware update fails, please contact your local Eaton Technical Resource Center.

Chapter 6—C445

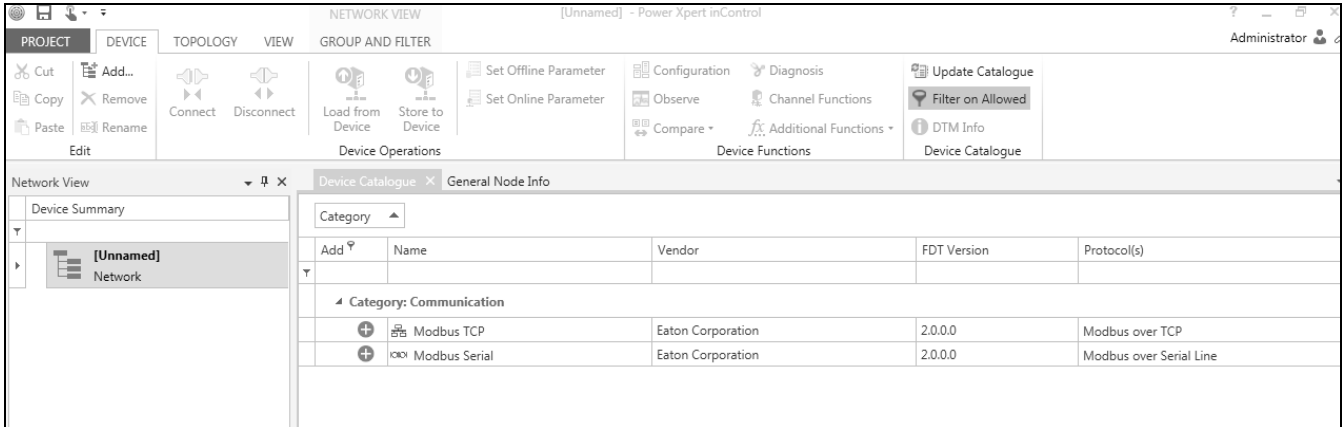
Section 1—Starting a Project

Start the *inControl* software and the following screen will be displayed.



Select "Empty project" to create a new project or "Import from XML" to import a project previously exported. Exporting/Importing a project is discussed later in this chapter.

Select Empty project and a screen displaying the communication DTMs that have been installed will be displayed as shown below.



In this case, the Modbus TCP Ethernet DTM and the Modbus serial DTM are shown.

Connecting using the Modbus Serial DTM

The Modbus serial DTM is used for the following connections between the PC running the *inControl* software and the C445:

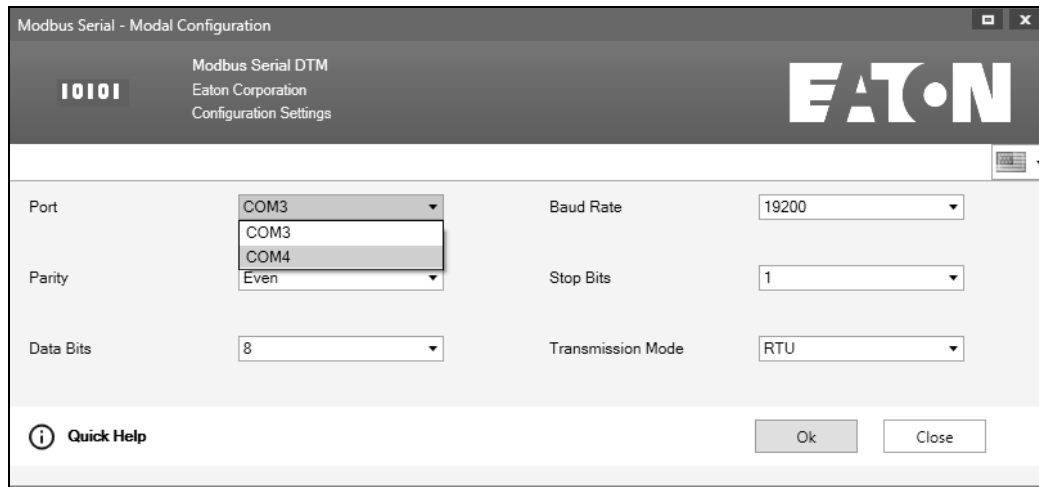
1. USB/Micro USB cable (part number C445XS-USBMICRO) to the Micro USB port on the User Interface
2. USB/Micro USB cable (part number C445-USBMICRO) to the Micro USB port on the Base Control Module
3. RS-485 connections to the Base Control Module, RS-485 Modbus port. This includes a USB/RS-485 cable (part number C445XS-USBLEADS).

The USB driver for the USB/Micro USB cable when connected to the USB Micro port on either the User Interface or Base Control Module is installed on the computer with the *inControl* software. When this cable is plugged into the PC and either port on the C445 system, a virtual communication port will be assigned and will allow it to immediately connect.

It should be noted that if the user does not have administrative rights and is having an IT person install the *inControl* software, the USB/Micro USB cable needs to be connected to a C445 during the installation for the USB driver to be installed. If it is not connected at the time of installation, it must be installed later by a person with administrator rights with the USB cable connected to a C445.

A driver for the USB/RS-485 cable must be installed on the PC running the *inControl* software for that cable to work with the software. The driver for the Eaton cable may be found on the Eaton website.

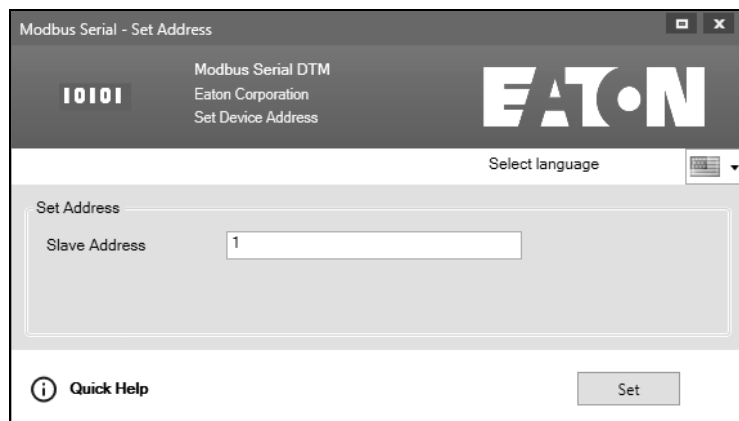
For this example, the Modbus Serial driver will be used with the USB/Micro USB cable. Select the plus sign to the left of the Modbus Serial DTM and the following window will open:



The virtual COM4 port was assigned to the USB port for this application. The other parameters are the default parameters for the micro USB ports on the Base Control Module and the User Interface. Select the COM port and then select the OK button.

Do not select ASCII as the Transmission Mode. This is not supported by this version of the *inControl* software.

Select the plus sign to the left of the C445 DTM that appears on the next screen and the following window will open:



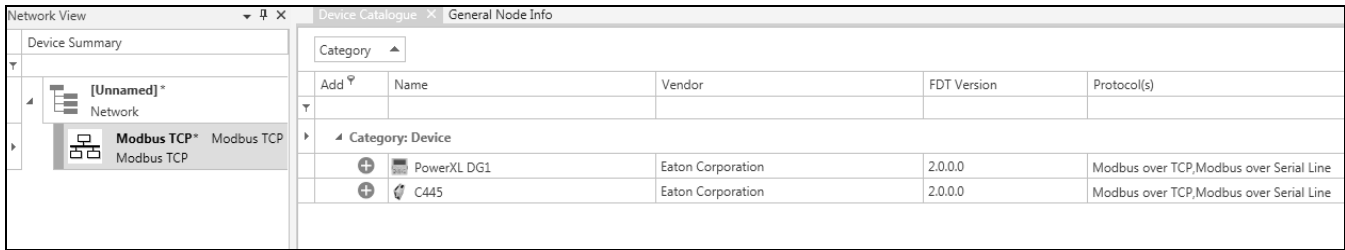
In all cases, the Slave Address will be 1 when using one of the micro USB ports on the C445. If using the RS-485 serial port, the node address of the C445 could be any value from 1 to 253. If that is the case, the actual address of the C445 must be entered here.

One important note concerning the USB/Micro USB connection: Following disconnecting the software from the C445, the only way to connect to the C445 again is to also disconnect the Modbus serial driver, then physically unplug the USB cable from the computer, and then plug it in again. Connect to the C445 DTM again as described above.

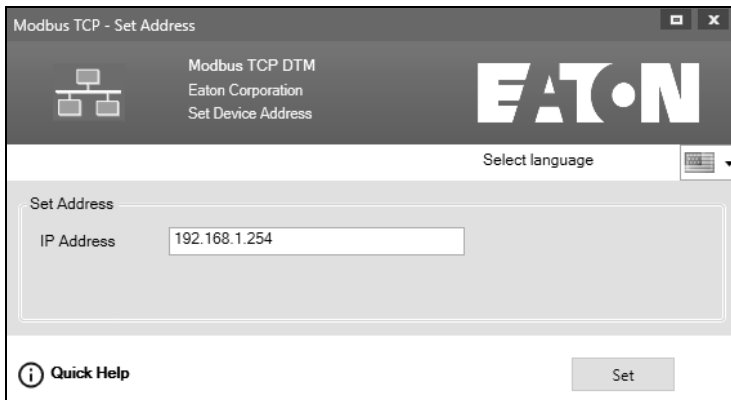
Connecting Using the Ethernet DTM

The Modbus TCP Ethernet driver can only be used if an optional Ethernet card is inserted into the Base Control Module of the C445. Refer to the C445 user manual for information on configuring the IP address of the Ethernet card using the DIP switches on the Base Control Module. The IP address on the computer must then be modified to be in the same range based on the subnet mask.

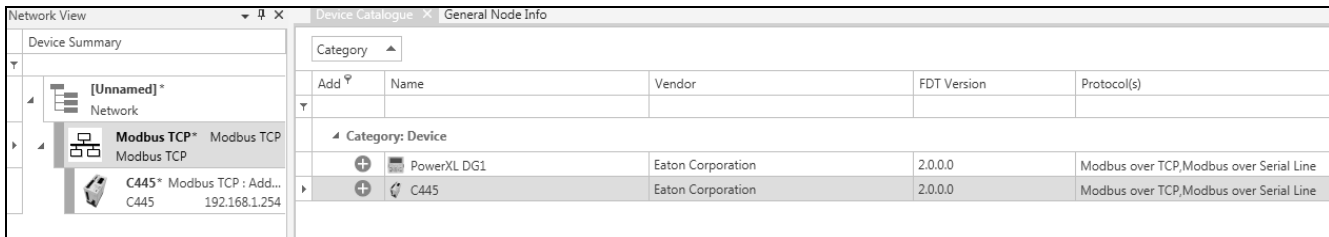
Select the plus sign to the left of the Modbus TCP DTM and the Modbus TCP driver will be added to the tree on the left of the screen as shown below.



Select the plus sign to the left of the C445 DTM and the following window will open:

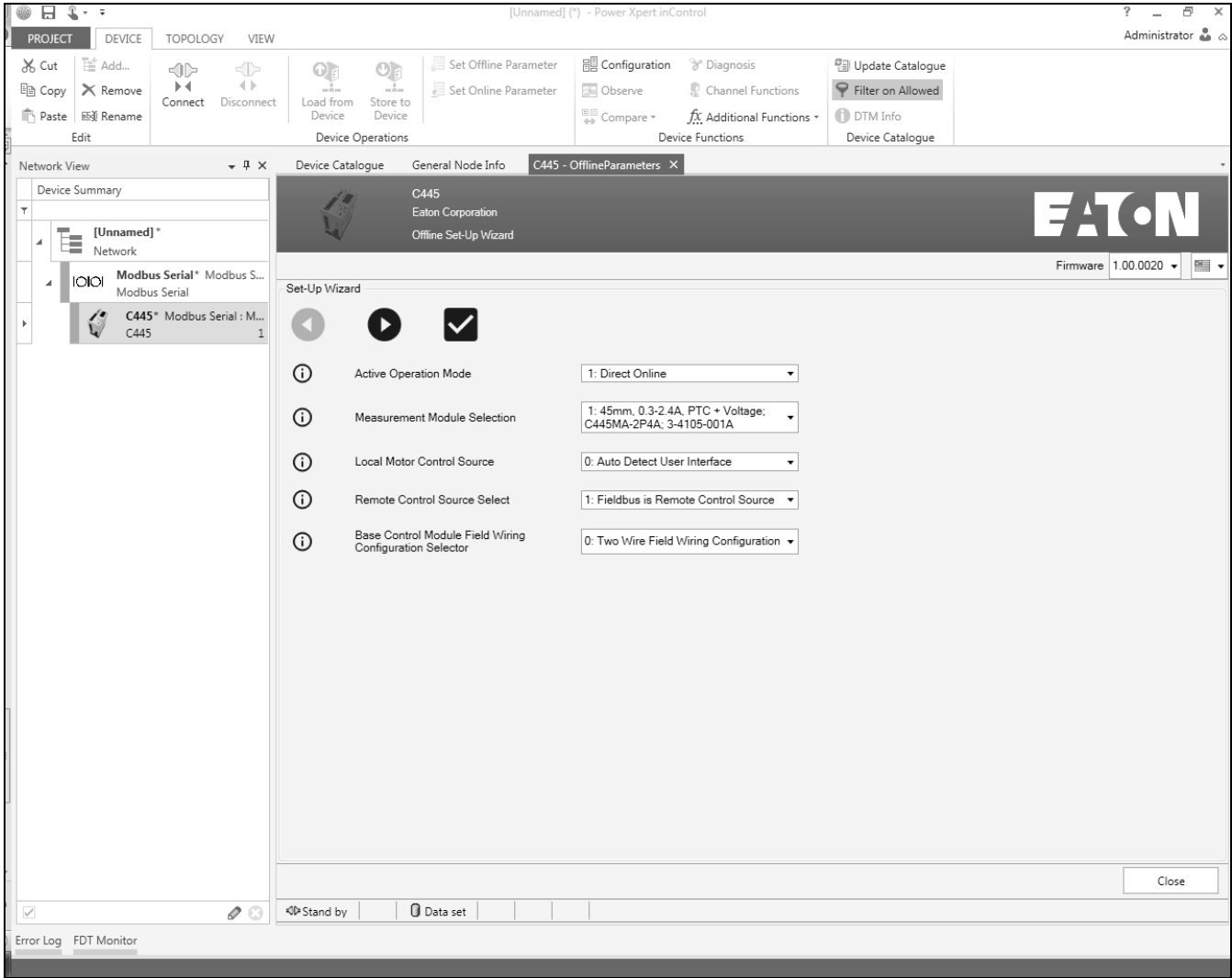


The default IP address for the C445 Ethernet option card is shown. If a different IP address is being used, the IP address in this window must be changed to that IP address. Then select the Set button and the C445 will be shown in the tree on the left under the Modbus TCP driver as shown below.



Section 2—Opening the Offline C445 DTM Mode

For this example, the Modbus Serial driver will be used. From the following screen, double click the C445 DTM in the tree on the left portion of the screen and the C445 Offline Set-up Wizard will open on the right as shown below.



Section 3—Configuring the Offline C445 DTM

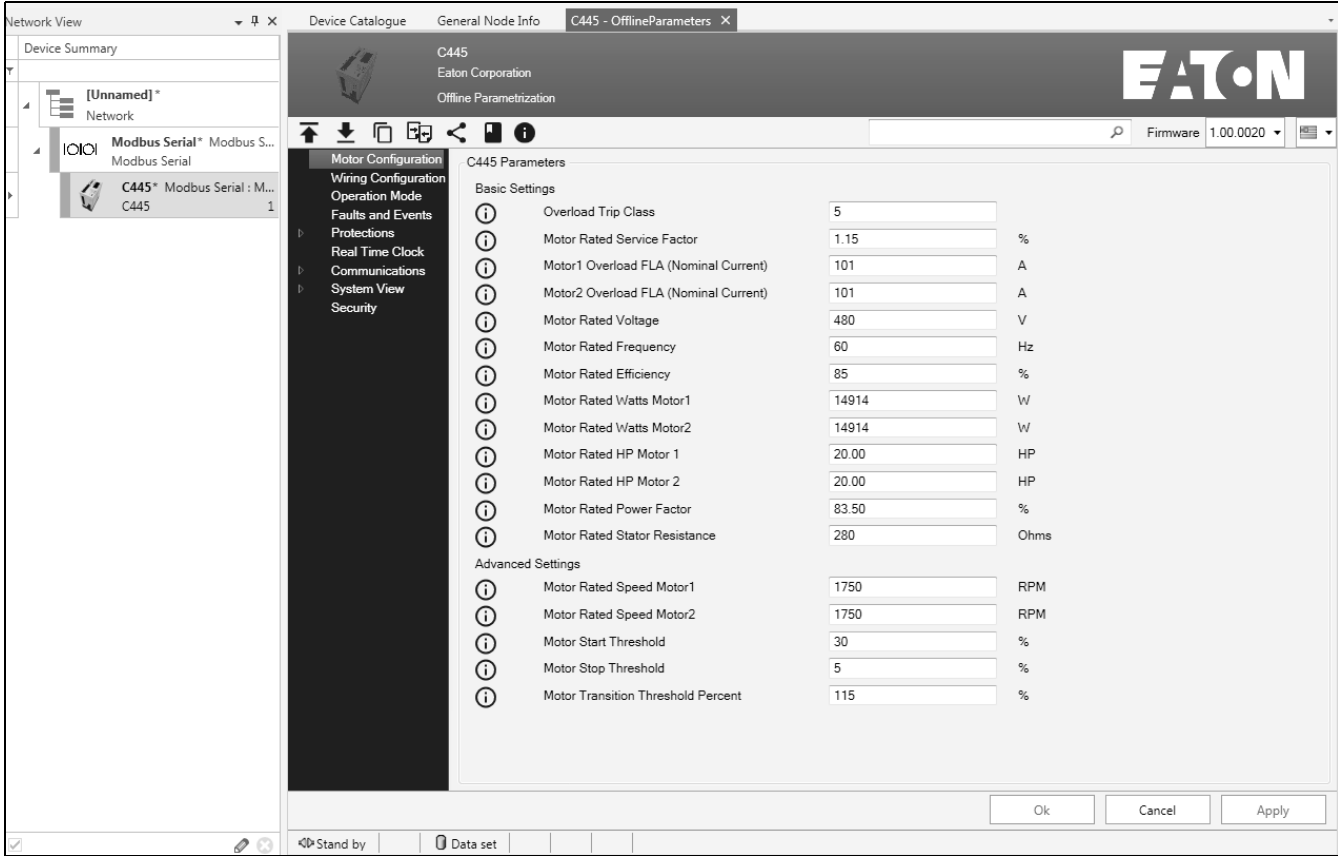
The Set-up Wizard

The Offline Set-up Wizard Operation

1. It will open anytime a new offline DTM is opened.
2. If the Set-up Wizard is finished (not closed) for a particular C445 offline DTM and that DTM is saved, whenever that DTM is opened, the Set-up Wizard will no longer open.
3. If the Set-up Wizard is used with an offline C445 DTM, the part number of the Measurement Module must be selected if this offline DTM is to be stored to the actual device at a later time. If the part number of the Measurement Module in an offline DTM does not match the actual part number of the C445 when attempting to Store to Device, the operation will not be allowed. A way to ensure this operation is to connect to the actual C445 and do a Load from Device and modify the DTM uploaded from the device. This DTM can then be Stored to Device.
4. Selecting the Close button at the bottom right of any of the Set-up Wizard screens will instruct the Wizard to not write any changes to the offline DTM and will immediately close the Wizard. If this operation is selected, the Wizard will re-open if Parameter Distribution is selected from the C445 DTM tool bar.
5. When finishing the Wizard operation by selecting the Check mark at the top of any of the Wizard screens, all changes made to that point will be written to the offline DTM and the Wizard will close. If the Save or Save As function under Project menu is used to save the project, any time this file is opened again, the Set-up Wizard will not open.
6. The arrows at the top of all Wizard screens are used for Wizard navigation.

Parameter Categories

Following the Wizard, whether it is Closed or used to configure important operational and motor parameters, the following C445 categories and parameters will be displayed. Note that the exact Measurement Module type must be selected or the offline DTM will not be allowed to be Stored To Device (downloaded to a C445). The Measurement Module type is very important in determining the range for the FLA setting for example. So, the software does not allow any offline DTM to be downloaded to a C445 unless the Measurement Module type in the offline matches the Measurement Module actually connected to the C445.



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Only categories containing configuration parameters are displayed for the offline DTM. Other categories containing numerous control and monitor parameters are shown in the C445 online DTM.

The Motor Configuration category is displayed by default when initially opening the offline DTM. The parameters for this category include the motor nameplate data. If the Wizard was used, the parameters entered into the Wizard will be shown. Any parameters in this category can be modified at this time.

The parameters for each category may be accessed by selecting the category. A description for each parameter in each category may be found in the C445 user manual, publication MN042003EN, found on the Eaton website at www.eaton.com or accessed under the user manual icon on the C445 DTM toolbar.

Additional information for each parameter may be viewed by hovering over the ⓘ to the left of each parameter.

Additional features accessed with the icons shown above the categories as also shown below are described later in this chapter under the “Overview of C445 DTM Features” section.



Hovering over each icon will provide additional information about that feature.

Configuring an offline C445 DTM is useful when the devices are not present. Each C445 can be configured and saved as a file to be stored to the appropriate device later.

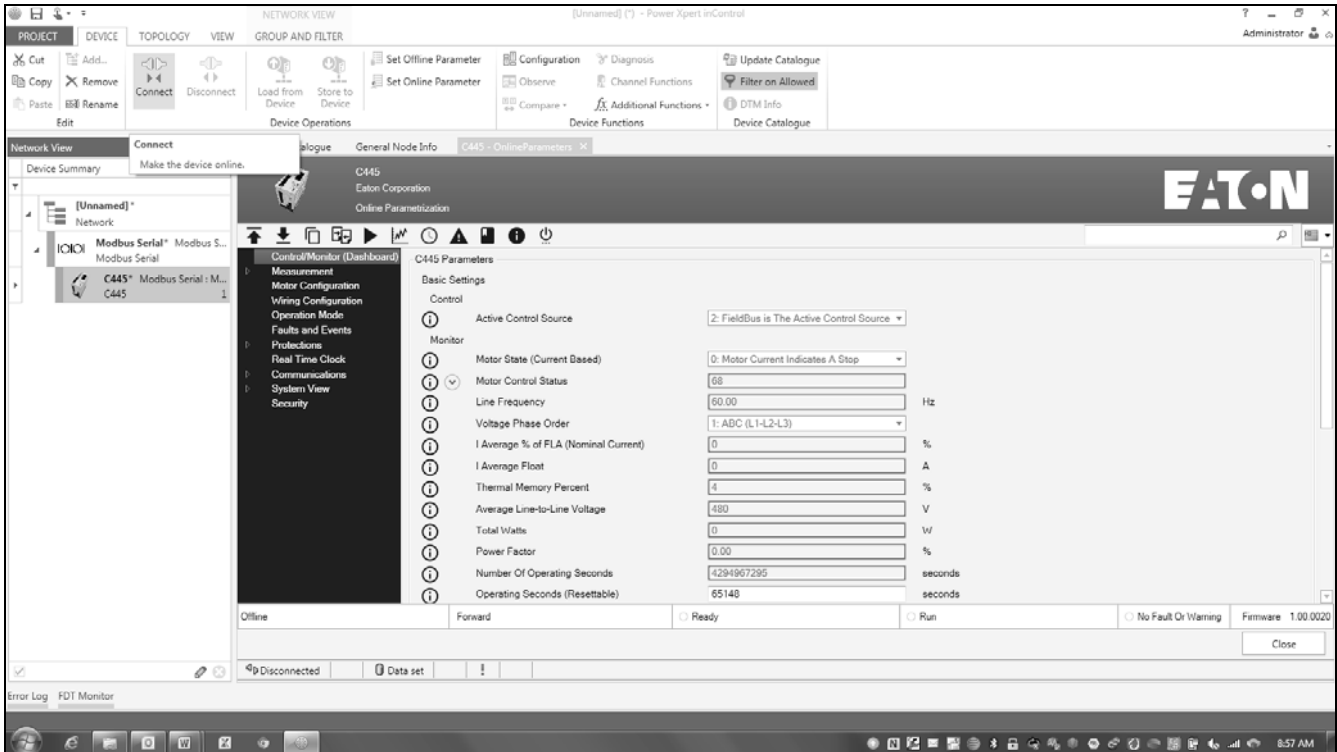
Section 4—Opening and Connecting to the Online C445 DTM

Another way to configure a C445 is to do it online, and then save the final configuration to a file as a backup. Parameter Export is used to save an online or offline DTM and will be discussed later in this chapter.

Another way to save a project is to use Save or Save As under Project. This will save an entire project. If the Check mark is selected for the Start-up Wizard prior to doing a Project/Save, the Wizard will never open again for this file.

In the first section of this chapter, the serial Modbus and the Modbus TCP Ethernet drivers were discussed. These drivers are used to access the C445 parameters by connecting with the C445. For this example, the serial Modbus driver will be used with the USB/Micro USB cable. This USB cable can be used with all C445 configurations because it can be connected to either the Base Control Module or the User Interface.

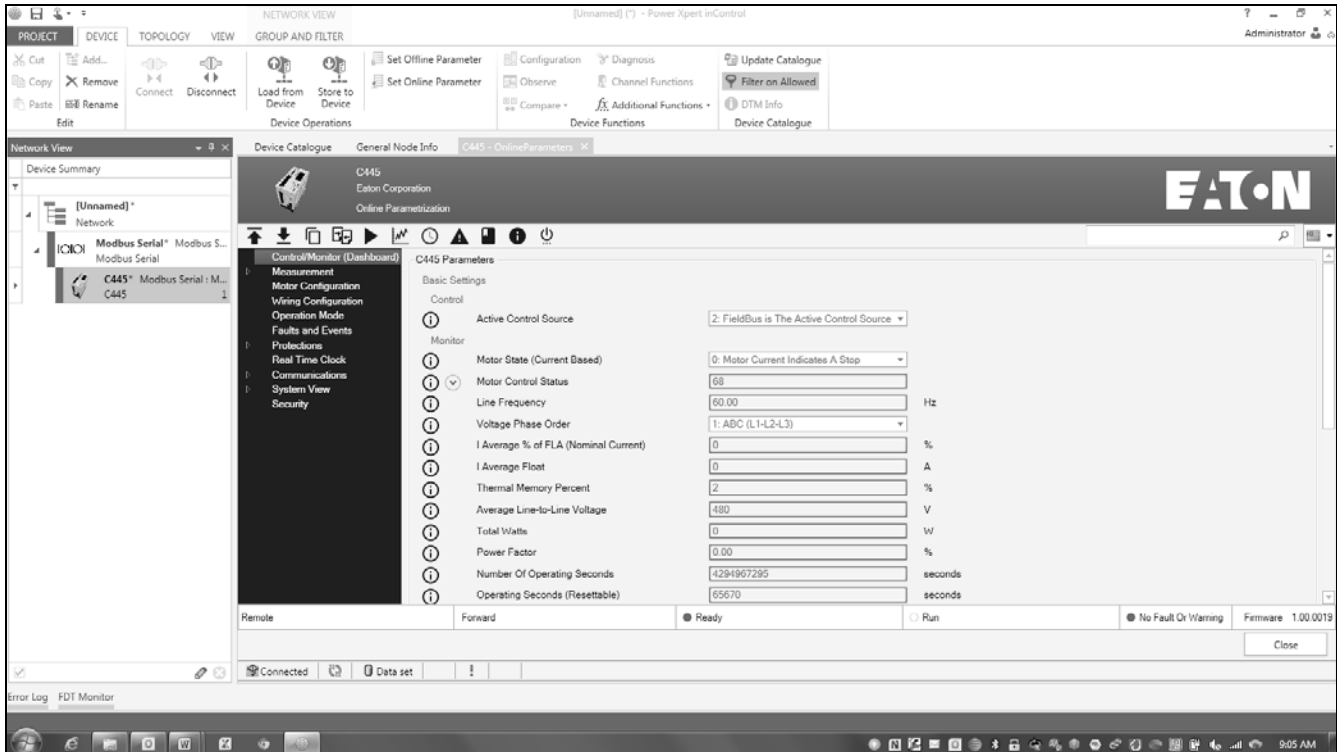
Plug the USB/Micro USB cable into a USB port on the computer and into the micro USB port on either the Base Control Module or the User Interface. From the screen shown below, select the C445 in the tree on the left, and then select Connect from the toolbar.



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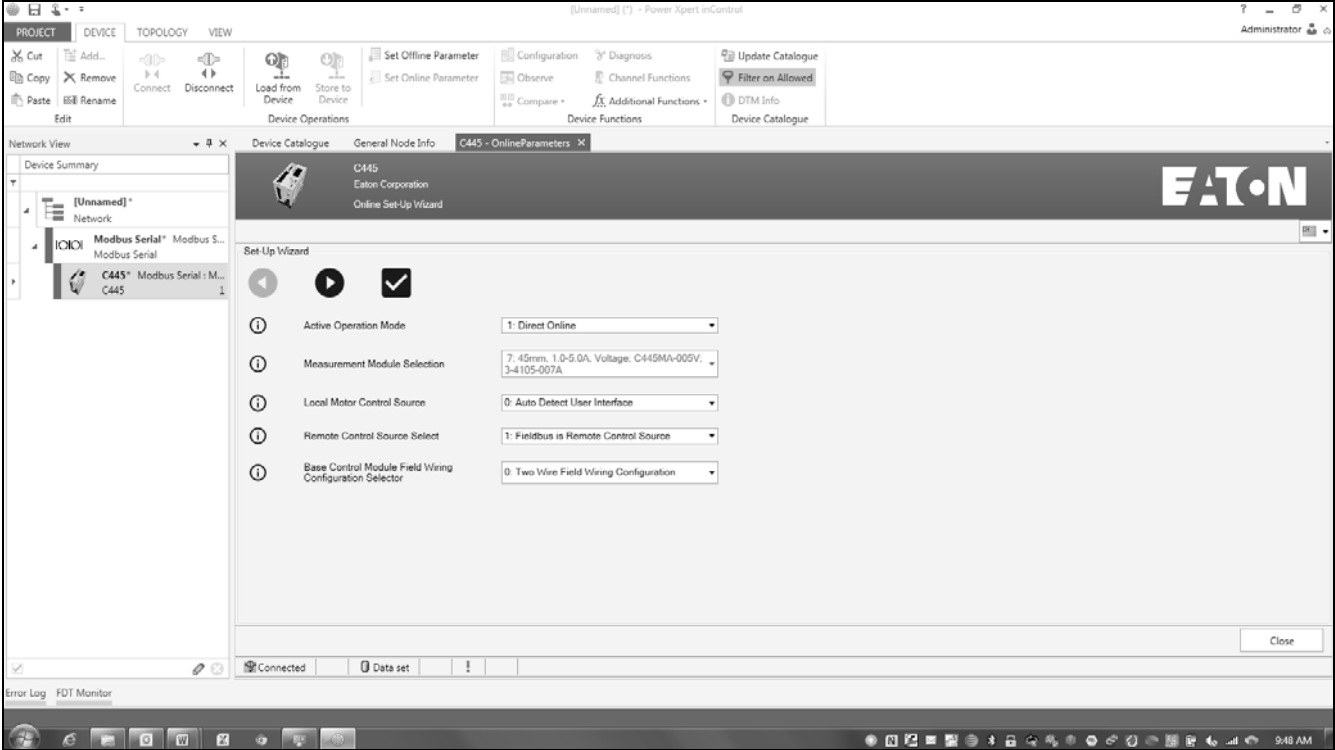
When successfully connecting to the C445, the bar on the left side of the Modbus Serial driver and the C445 in the tree will turn from gray to green. The possible states of those bars are shown below:

- Gray Offline
- Green Connected
- Yellow Attempting to Connect
- Red Failed to Connect



If it does not successfully connect the first time, disconnect and then try again. The USB driver for this cable is installed with the software for Windows 7, 8.0, and 8.1 operating systems. It should work provided the correct virtual communication port was selected when the Modbus DTM was added and that the cable is properly connected to the computer and the C445.

Once connected, double click the C445 DTM in the tree on the left and a progress bar will appear showing that the parameters are being uploaded from the C445. When finished and if this is the first time connecting to this device, the following Set-up Wizard will open as follows:



Section 5—Configuring the Online C445 DTM

Set-up Wizard

The Online Set-up Wizard Operation

1. It will open each time the online DTM is accessed for the first time.
2. It is recommended to set the parameters in the Wizard the first time and be sure when finished to select the Check mark to save them to the device. Then use the Check mark button immediately to easily close the Wizard when accessing the C445 parameters in the future. Using the Check mark instead of the Close button will prevent the Wizard from opening while accessing other features while online, as described below. After configuring the C445 using the Wizard, if the Check mark is selected to write the parameters to the device and if Save or Save As under Project is used to save the project, the Wizard will not open again when using this file.
3. When using the Set-up Wizard online, the parameters in the Wizard contain the actual parameters from the device. That's why the Measurement Module selection is grayed out. It reflects the actual Measurement Module connected to the Base Control Module.

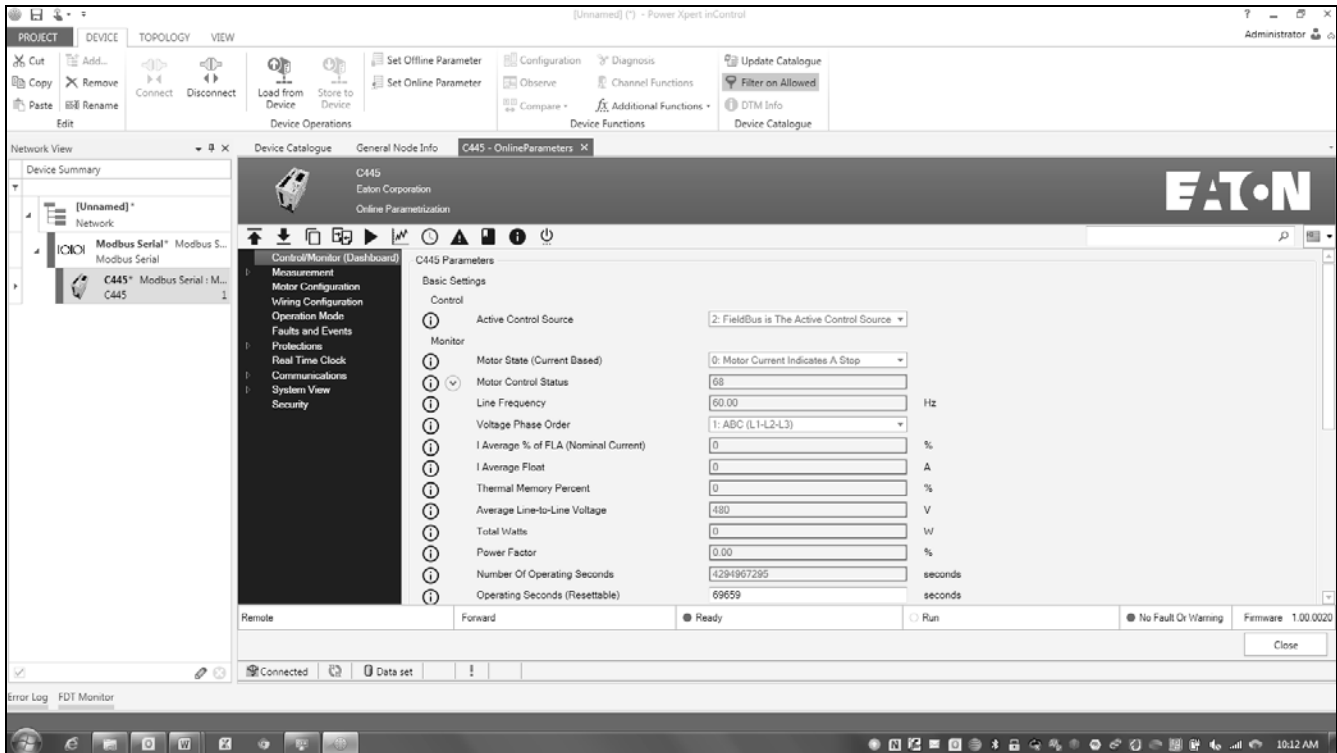
4. Selecting the Close button at the bottom right of any of the Set-up Wizard screens will cancel the Wizard; any changes made will be ignored and the Wizard will close. If this operation is selected, the Wizard will re-open again if the following features are selected when online with the C445:

- Motor Control
- Parameter Watch List
- Real Time Clock
- Fault Logs

5. Selecting the Check mark at the top of any of the Wizard screens will write all changes made to that point to the online DTM and close the Wizard.
6. The arrow at the top of all Wizard screens except the last one will change to the next Wizard screen.

Parameter categories

Following the Wizard, whether it is Closed or used to configure important operational and motor parameters, the following C445 categories and parameters will be displayed.



Note that there are 2 additional categories shown for the online DTM:

- Control/Monitor (Dashboard)
- Measurement

These 2 categories are for monitoring online motor parameters such as currents, voltages, and more.

The Control/Monitor category is displayed when initially opening the online DTM. The parameters for this category include the Active Control Source and numerous motor parameters.

If the Wizard was used, the parameters entered into the Wizard will be shown in their appropriate categories. Any configuration parameters in any category can be modified at this time. Once changed, they will be immediately downloaded to the device. By default, if the C445 is in Run mode, configuration parameters are locked out and cannot be changed. Refer to the Security section later in this chapter for more information.

The parameters for each category may be accessed by selecting the category. A description for each parameter in each category may be found in the C445 user manual, publication MN042003EN, found on the Eaton website at www.eaton.com.

Additional information for each parameter may be viewed by hovering over the circled “i” to the left of each parameter.

Additional online features accessed with the icons shown above the categories and also shown below are described later in this chapter under the “Overview of C445 DTM Features” section.



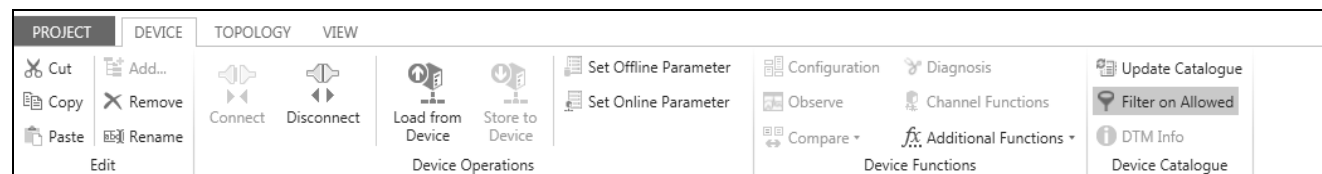
Hovering over each icon will provide additional information about that feature.

Select each category to view the parameters contained in each of them to determine the features and protections for your application.

After configuring the parameters and features for a particular application, they can be saved to a file by using the export feature described later in this chapter.

Section 6—Store to Device / Load from Device

Store to Device and Load from Device are icons shown in the upper toolbar in the inControl software as shown below.

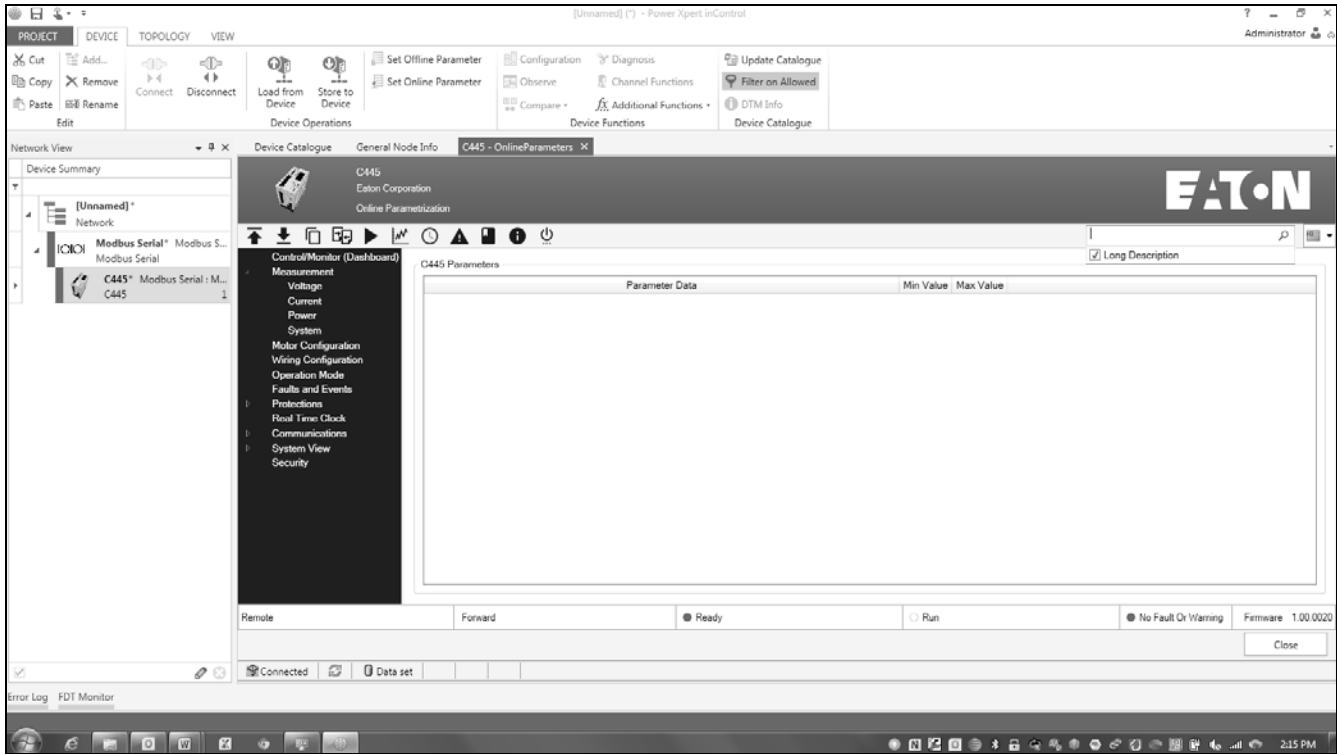


Store to Device allows for the parameters of an offline DTM to be downloaded to an online DTM that is open. The following rules and procedure should be used for this feature.

1. A Load from Device must be performed before a Store to Device can be executed if the Measurement Module type in the offline DTM was not known when the offline Set-up Wizard was executed.
2. The Store to Device operation will be allowed only if the selected Measurement Module in the Set-up Wizard is the same as the one that is actually present.

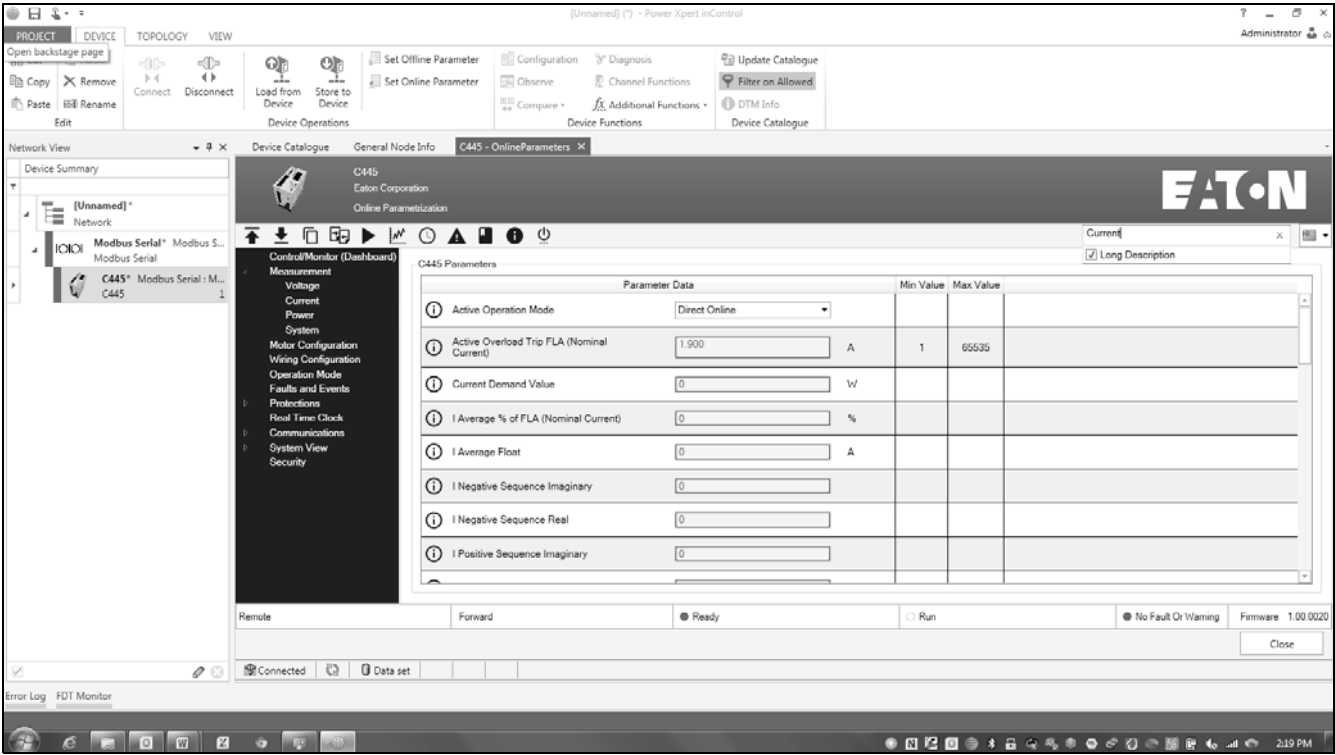
Section 7—Using the Search Feature

The search feature in the *inControl* software searches any character string entered into it and displays all parameters that apply. It begins searching and displaying matches the moment the third character is entered. The search box is at the upper right of the online and offline parameter window as shown below.



If the search is to include the long descriptions found when hovering over the circled “i” to the left of any parameter, check the Long Description box that appears when clicking in the search window, as shown above.

Once a third character is entered, results begin to appear. Continuing to add characters refines the search. Below is an example of searching for “Current.”



With Long Descriptions checked, the search results include parameter names and the descriptions found under the information area for all parameters. To limit the search to only the parameter names, do not check the Long Descriptions box when using the search tool.

Section 8—Overview of C445 DTM Features

DTM Toolbar Features

Additional powerful features in the C445 DTM can be accessed from the toolbar right above the categories as shown below.



Descriptions of these features are displayed by hovering over the icons. These features are described in order from left to right below.

A. Parameter Export

This feature extracts all parameters for the open online or offline DTM and stores them in a local file. It is supported for both an online and an offline DTM.

B. Parameter Import Copy

This feature opens a previously exported local file and copies all non-critical parameters to the open DTM. Non-critical parameters refers to parameters not specific to a particular device, such as Protection selections including Trip and Warning Enable bits, Current and Voltage Alarm Levels and Debounce times can be applied to multiple different C445 DTMs. Parameters specific to each C445 such as FLA setting, serial Modbus node address and IP address if the optional Ethernet card is used are not copied. It is supported for both an online and an offline DTM.

C. Parameter Import Clone

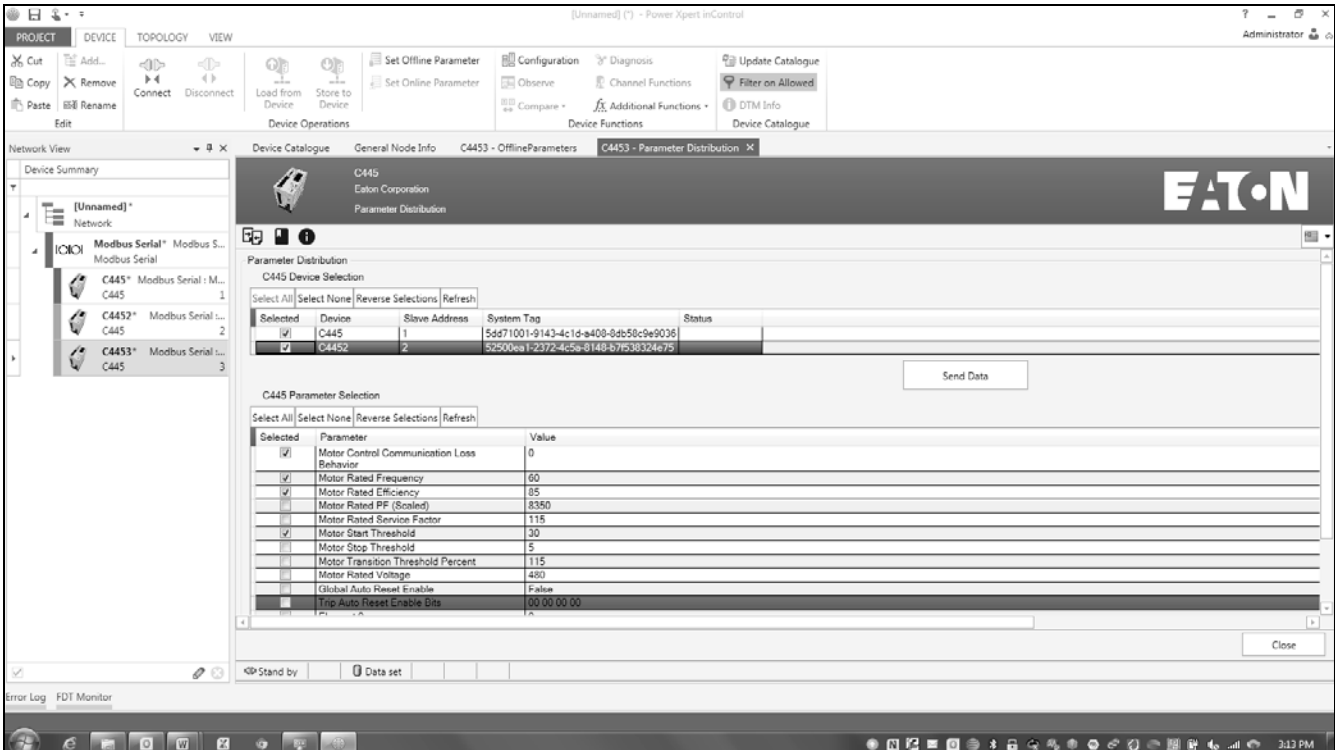
This feature opens a previously exported local file and copies all parameters to the open DTM. This feature is similar to the Import Copy described above, but when this clone feature is executed, all parameter values in the open DTM are overwritten by the imported file. It is supported for both an online and an offline DTM.

D. Local Parameter Compare

This feature compares each parameter of two previously exported local files or the parameters of an open DTM with those of a previously exported local file. The result is a list of all parameters indicating which parameters are different and which contain the same values. The values of each parameter are also displayed. If only parameters that differ are to be displayed, select the Check Box for “Hide Identical Entries.” It is supported for both an online and an offline DTM.

E. Parameter Distribution

This feature only applies to an Offline DTM. It allows selected parameters from the open offline DTM to be copied to any existing offline or online DTMs. Below is an example of a few selected parameters for an offline C445 DTM at node 3 ready to be copied to a selected offline C445 DTM at node 2 and another selected online C445 DTM at node 1.



F. Motor Control

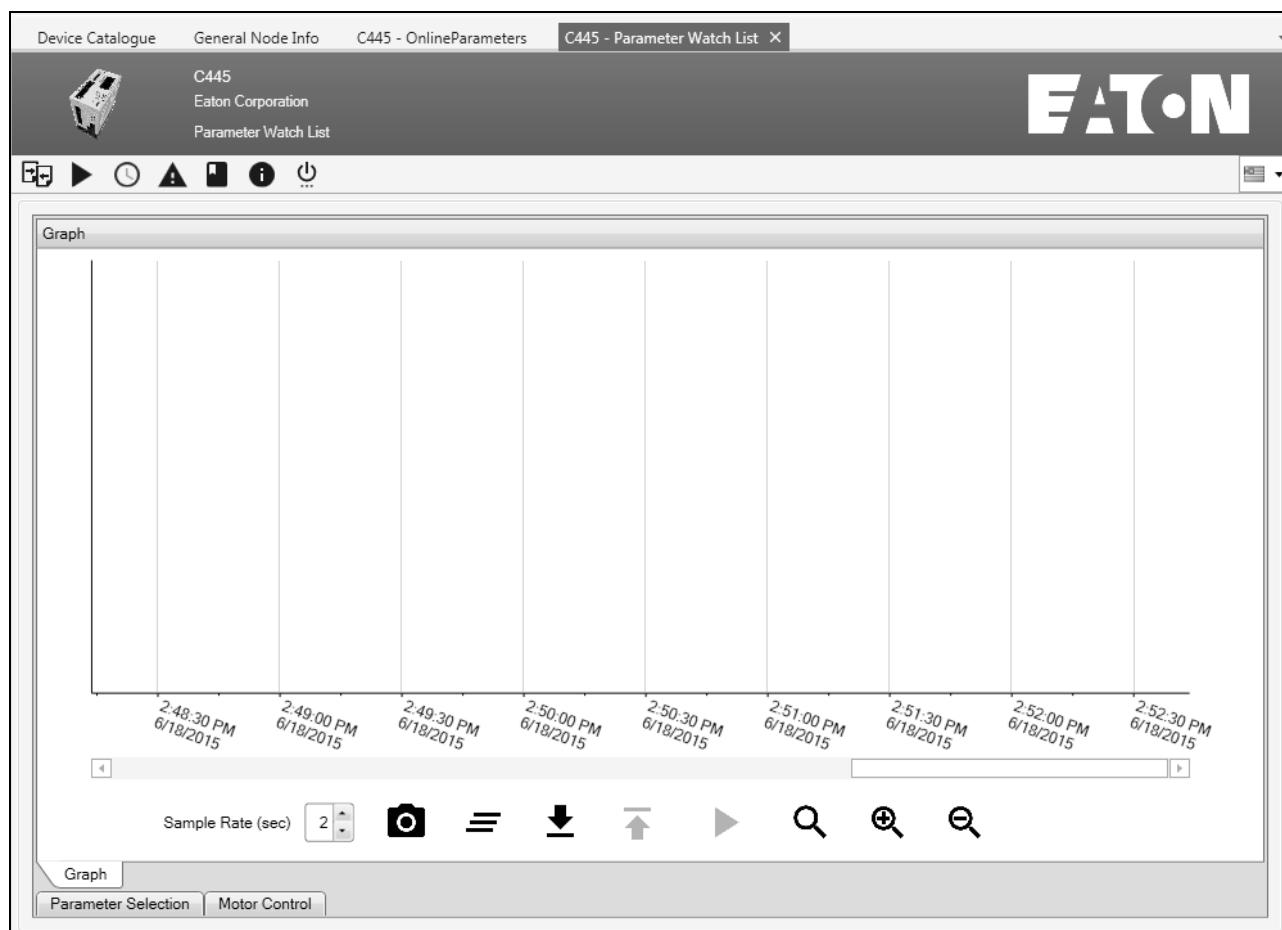
This feature provides the ability to control the C445 as the fieldbus master as well as monitor very useful information such as:

1. Average current as a % of FLA
2. Average voltage
3. Thermal capacity
4. Average current—floating point format
5. Status of 4 inputs on the Base Control Module
6. Status of 4 inputs on the User Interface
7. Status of 3 outputs on the Base Control Module
8. C445 status, i.e., Running, Faulted, Warning, Inhibited, Ready, Remote/Local Control mode
9. Active Fault, Warning, and Inhibit information

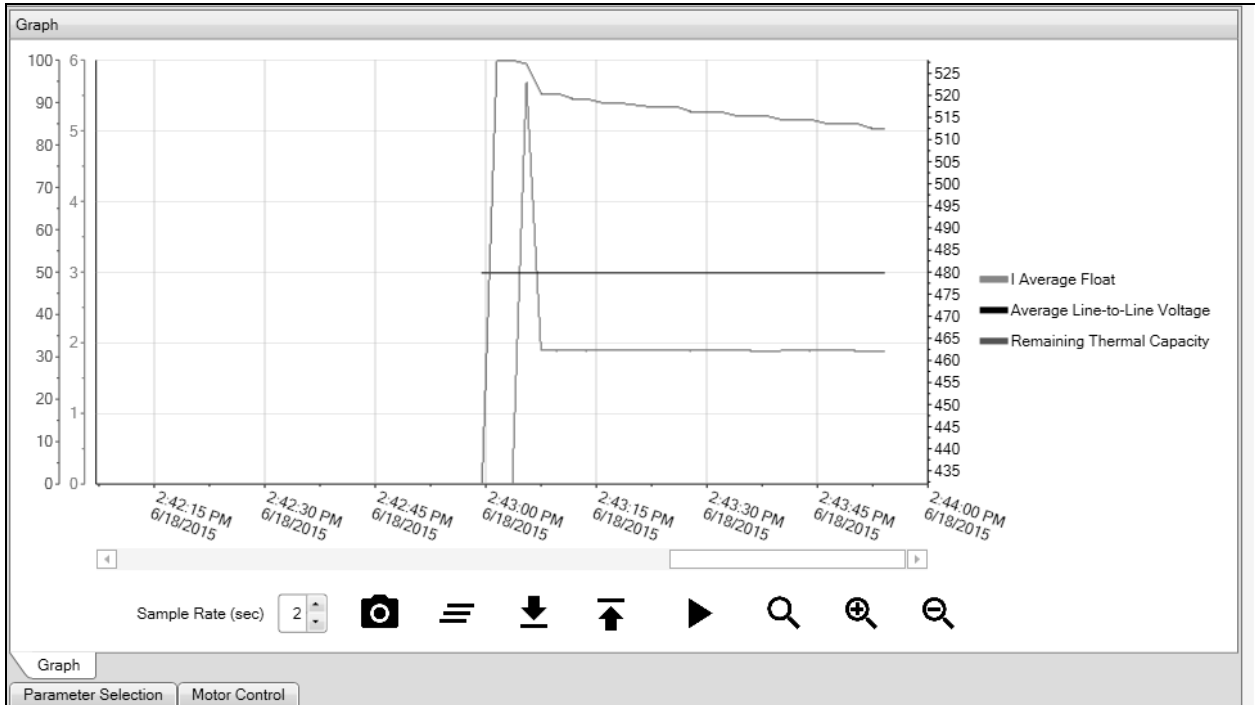
G. Parameter Watch List

This feature provides the ability to plot up to 8 parameters at a time. This is very useful for viewing how different parameters interact with one another as well as how they act relative to time. There are 39 different parameters that can be plotted.

Select the Parameter Watch List icon and the following screen will open:



Select the Parameter Selection tab at the lower left of the screen to access the parameters to plot. Select one of the 8 channel rows starting with CH0, then choose a parameter from the list, and click the Assign button to assign it to the selected channel. The example below shows the startup plot for Average Floating Point Current, Average Voltage, and % Thermal Capacity.



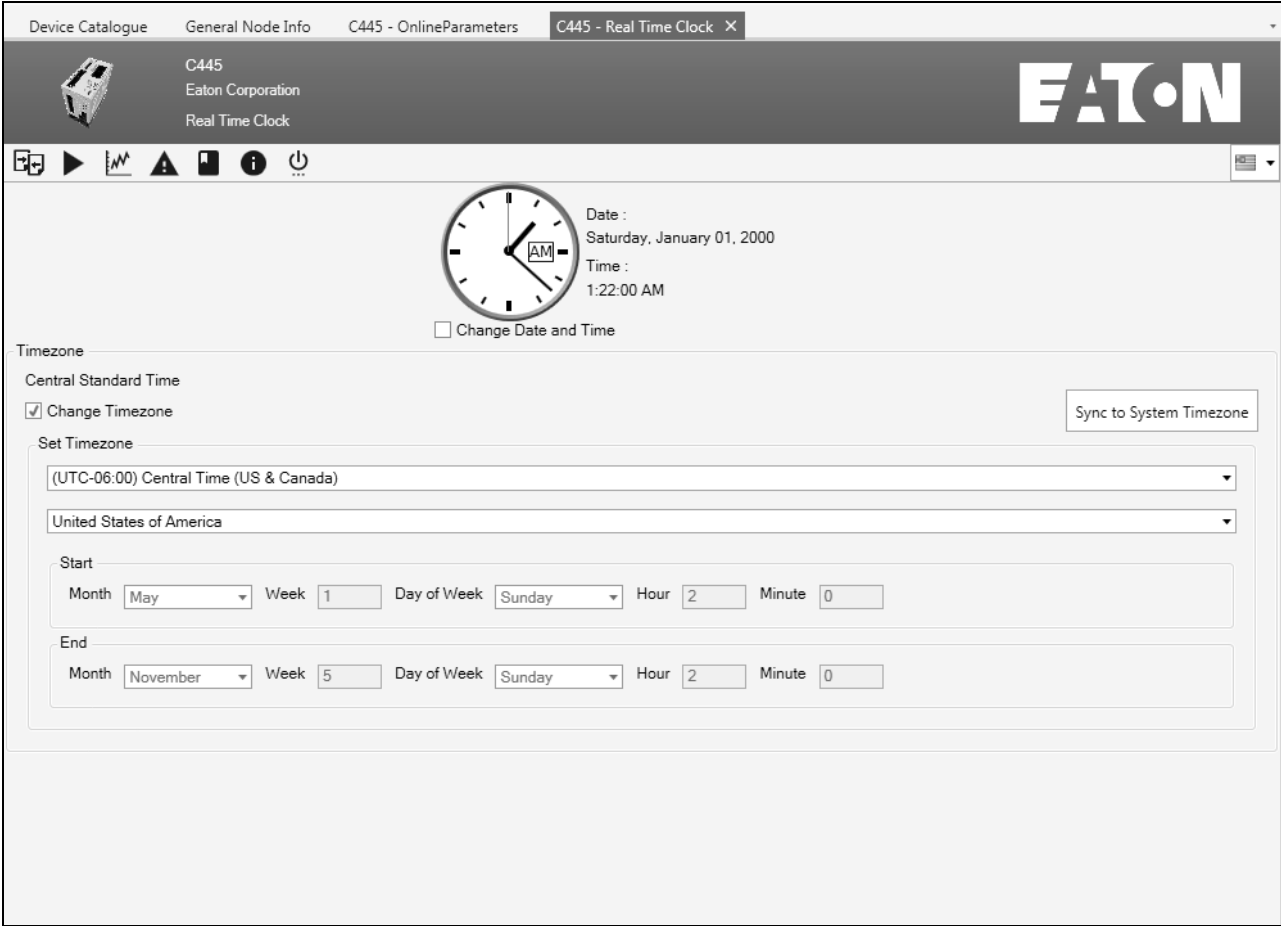
Note that the plot was started prior to running the motor by selecting the Play button shown above. To control the motor from this feature, select the Motor Control tab and select the Play button on that screen to instruct the C445 to close its output that energizes the contactor that runs the motor.

H. Real Time Clock

The Real Time Clock feature uses the optional RTC module that plugs into the Base Control Module behind the communication module slot. The RTC module also contains non-volatile backup of the entire configuration of the C445 it is plugged into. This non-volatile memory is not battery-backed memory, but is non-volatile memory that will retain its contents. Refer the C445 user manual for information on this very useful feature.

The battery on the RTC module is to retain the date/time information. All of the date/time parameters can be found in the Modbus memory map chapter in the C445 user manual. That allows the user to update the date/time from any Modbus or Modbus TCP master as often as needed.

Another method for setting the date/time is to use the *inControl* software tool. Select the Real Time Clock icon and the following screen will open:



Select the box to the left of “Change Date and Time,” and then select the “Sync to System Timezone” button, followed by the Sync to System Time button. The RTC information will be read from the computer and it will be written to the RTC module connected to the C445. This feature is only accessible online.

Device Catalogue General Node Info C445 - OnlineParameters **C445 - Real Time Clock** X

C445
Eaton Corporation
Real Time Clock

EATON

Set Date and Time

June, 2015

Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

Sync to System Time

15 : 01 : 52

Change Date and Time

Timezone

Central Standard Time

Change Timezone

Sync to System Timezone

Set Timezone

(UTC-06:00) Central Time (US & Canada)

Manually Set DST Start and End

The *inControl* software tool can also be periodically connected to each C445 to update the date/time to retain accuracy and keep all C445s at the same date/time from the computer.

I. Fault Logs

This feature provides 2 important pieces of fault information:

1. A history of the last 10 faults
2. A snapshot of numerous critical parameters at the time of the most recent fault.

Both of these pieces of fault information are very important in troubleshooting a problem motor or its motor control system. Below is an example of this Fault Log window:

The screenshot shows the Eaton inControl software interface for a C445 device. The main window is titled "C445 - Fault Logs". It features a navigation bar at the top with tabs for "Device Catalogue", "General Node Info", "C445 - OnlineParameters", and "C445 - Fault Logs". The interface is divided into several sections:

- Active Fault:** Shows "No Faults".
- Active Warning:** Shows "No Warnings".
- Active Inhibit:** Shows "No Inhibits".
- Fault Logs:** A table listing the last 10 faults.

Entry	ID	Fault Description
1	1	Under Voltage
2	1	Under Voltage
3	17	Contactors Failure
4	2	Over Voltage
5	16	Low Power
6	19	Overload
7	2	Over Voltage
8	2	Over Voltage
9	16	Low Power
10	2	Over Voltage
- Fault Snapshot (Trip Cause):** Provides detailed parameters for the most recent fault (Entry 1).

Time Base	: C445 Accumulated Run Time
Fault Code	: 1
Fault Description	: Under Voltage
Fault Time	: 00:01:21
Fault Date	: 2000-01-01
Thermal Memory	: 0 %
Current Phase A (L1)	: 0 A
Current Phase B (L2)	: 0 A
Current Phase C (L3)	: 0 A
Voltage AB (L1-L2)	: 0 V
Voltage BC (L2-L3)	: 0 V
Voltage CA (L3-L1)	: 0 V
Line Frequency	: 0 Hz
Ground Current	: 0 A
Apparent Power	: 0 VA
Real Power	: 0 W
Power Factor	: 0
Troubleshooting	: Trip occurs If mains voltage drops below the Undervoltage Alarm Level. Check

This Fault Log also shows the current Fault, Warning, and Inhibit. It also provides troubleshooting information for the latest fault and when hovering over any of the faults in the Fault queue, it provides a detailed description of the fault.

J. User manual

This button will allow the C445 user manual or the *inControl* software user manual to be opened. This works offline or online.

K. System Services

The System Services consist of the following:

1. Re-Pair External Modules
2. Factory Reset
3. Soft Reset
4. Fault Reset

The Re-Pair feature will clear a fault generated by changing the ports on the Base Control Module that the Measurement Module and the User Interface are plugged into. It will also clear the fault caused by plugging a different size Measurement Module or a different type of User Interface module. It will then instruct the Base Control Module to accept the changes as a valid new system.

Factory Reset will reset the entire C445 system back to factory default settings. This should be used with care so as not to lose the configuration of a C445 system.

A Soft Reset is required following a change of something like the Operation Mode or the Local or Remote Control Source. It forces the C445 to accept the change that will inhibit the C445 until the Soft Reset is executed.

Fault Reset will reset a fault provided the fault condition is no longer present.

Security/Parameter Lock

A. Administrator Password Lock

By default, there is no active Administrator password set.

There are 2 ways to set the Administrator Password.

1. Using the *inControl* software
2. Writing directly to Modbus register 5000 with a Modbus master, and then unlocking the parameters with the password by writing to register 5002. Both are 32 bit values, so 5000 and 5002 are starting addresses and a length of 2 is needed if the password exceeds 16 bits.

The range for the password is 1 to 4,294,967,295. Do not use commas when entering the password value.

All pertinent configuration parameters are protected with the Administrator password. These parameters will be grayed out and cannot be changed with the *inControl* software until the correct password is entered. An error exception code 4 will be received if it is attempted to change configuration parameters via Modbus commands until the password is sent to the Administrator Login registers, 5002-5003.

The password can be set using the *inControl* software when online with the C445 or in the offline DTM followed by a Store to Device. In either case, once a valid password has been set in a C445, a soft reset or power cycle must be performed before it will take effect.

If a password has been set online and an offline DTM is opened and the correct Measurement Module is selected using the offline Wizard, but the password set online is not entered into the offline DTM, a Store to Device will result in an error. If configuration changes are made to an offline DTM and the user wishes to write them to the online C445, the correct password must also be entered into the Security section for the offline DTM, and then a Store to Device will allow the new configuration data to be written to the C445.

A password of 0 means that the system is unlocked and that the Administrator Lock feature is disabled. The Set Admin Password register (5000-5001) will be a value of 0 when the feature is disabled and a value of 4294967295 if a password has been set.

There is no way to read back the Set Admin Password register (5002-5003). If the password is lost, the only way to recover access to the C445 parameters is to perform a factory test.

Procedure for setting an Administrator password in a C445 using the *inControl* software tool in the online mode:

1. Go to the Security page.
2. Enter a Password for the "Set Admin Password" parameter, e.g., 123. It will automatically get written to device.
3. Perform a Soft Reset to allow the device to save this value. The soft reset can be found in System Services.
4. Following the Soft Reset, the C445 will be locked with the Admin Password.
5. Logging into the device and entering the password is required to make configuration changes.
6. Enter the password into the Administrator Login (e.g., 123) and all configuration parameters will be unlocked.

Procedure for setting an Administrator password in an offline C445 DTM using the *inControl* software tool:

1. Use the Set-up Wizard when accessing the offline C445 DTM and be sure the Measurement Module type is selected to match the actual C445 this file will be downloaded to later.
2. Go to the Security page.
3. Enter a Password for the "Set Admin Password," e.g., 123. Then enter the same password into the Administrator Login parameter.
4. Perform a Store to Device to write this offline DTM to the C445.

5. The parameters will now be downloaded to the online DTM.
6. Logging into the device and entering the password is required to make additional configuration changes.
7. Enter the password into the Administrator Login (e.g., 123) and all configuration parameters will be unlocked.

B. USB Password Lock

By default, there is no active USB password.

There are 2 ways to set the USB Password.

1. Using the *inControl* software.
2. Writing directly to Modbus register 5004 (set USB Port Password) with a Modbus master, and then unlocking the parameters with the password by writing to register 5006 (USB Login). Both are 32 bit values, so 5004 and 5006 are starting addresses and a length of 2 is needed if the password exceeds 16 bits.

The range for the password is 1 to 4,294,967,295. Do not use commas when entering the password value.

The USB Password lock prevents changing configuration parameters in a C445 only when being accessed via the Micro USB ports on the User Interface or Base Control Module. If the *inControl* software uses Modbus TCP via an optional Ethernet card or Modbus via the RS-485 port, access to change configuration parameters is unaffected by the USB Password Lock.

The password can be set using the *inControl* software when online with the C445 or in the offline DTM followed by a Store to Device. In either case, once a valid password has been set in a C445, a soft reset or power cycle must be performed before it will take effect.

If a password has been set online and an offline DTM is opened and the correct Measurement Module is selected using the offline Wizard, but the password set online is not entered into the offline DTM, a Store to Device will result in an error. If configuration changes are made to an offline DTM and the user wishes to write them to the online C445, the correct password must also be entered into the Security section for the offline DTM, then a Store to Device will allow the new configuration data to be written to the C445.

A password of 0 means that the system is unlocked and that the USB Port Lock feature is disabled. This Set USB Port Password register (5004-5005) will be a value of 0 when the feature is disabled and a value of 4294967295 if a password has been set.

There is no way to read back the USB Port Password previously set, register (5006-5007). If the password is forgotten, the only way to recover access to the C445 parameters is to perform a factory test.

Procedure for setting a USB password in a C445 using the *inControl* software tool in the online mode:

1. Go to the Security page.
2. Enter a Password for the "Set USB Password," e.g., 123. It will automatically get written to device.
3. Perform a Soft Reset to allow the device to save this value. The Soft Reset can be found in System Services.
4. Following the Soft Reset, the C445 will be locked with respect to modifying configuration parameters via a USB Port, unless the correct password is entered.
5. Logging into the device and entering the password is required to make configuration changes.
6. Enter the password into the USB Login (e.g., 123) and all configuration parameters will be unlocked.

Procedure for setting a USB Port password in an offline C445 DTM using the *inControl* software tool:

1. Use the Set-up Wizard when accessing the offline C445 DTM and be sure the Measurement Module type is selected to match the actual C445 this file will be downloaded to later.
2. Go to the Security page.
3. Enter a Password for the "Set USB Port Password," e.g., 123.
4. Perform a Store to Device to write this offline DTM to the C445, which will include the new USB Port password.
5. The parameters will now be downloaded to the online DTM.
6. Logging into the device and entering the password is required to make additional configuration changes.
7. Enter the password into the USB Login (e.g., 123) and all configuration parameters will be unlocked.

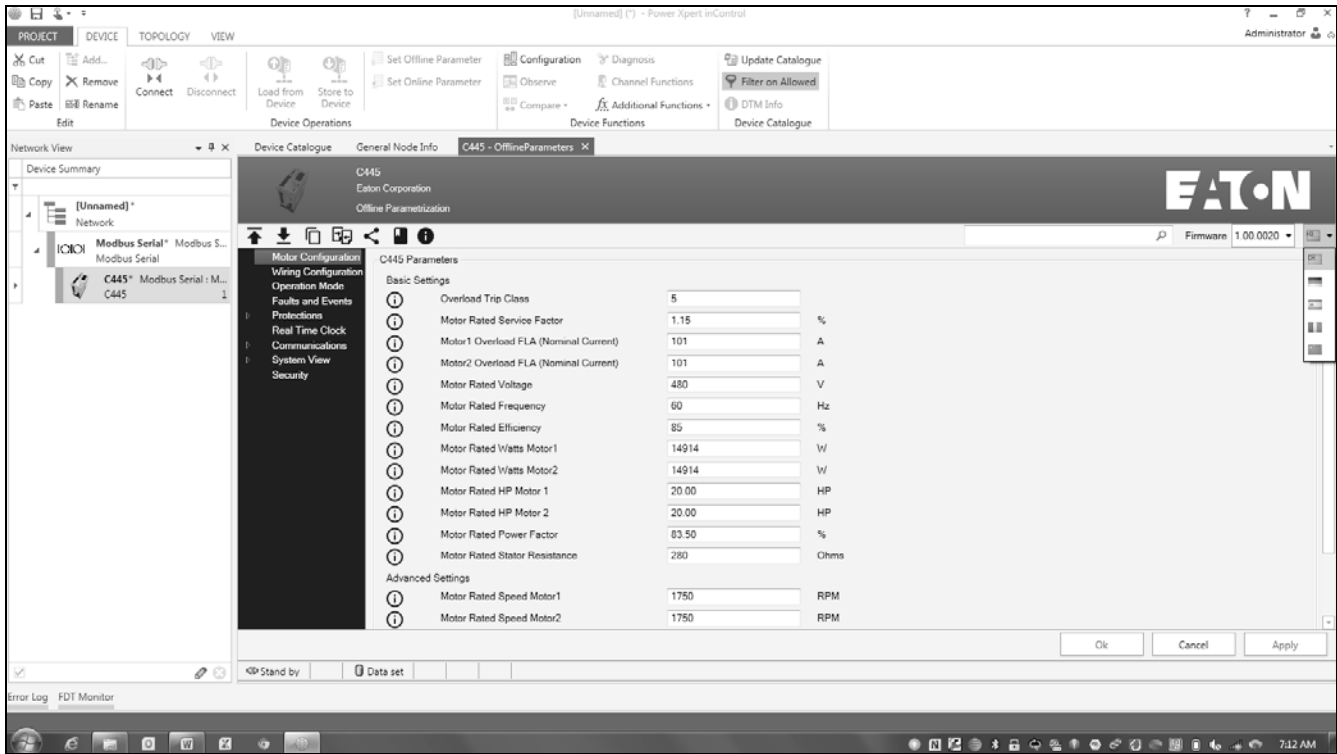
C. Running Parameter Lock

By default, when the C445 is actively running a motor, the configuration parameters are locked. They may not be modified with the *inControl* software or via Modbus Write commands.

To disable this feature, there is a check box in the Operation Mode category of the *inControl* software with the description: Motor Run Parameter Lock Override. Checking this box overrides this Run Lock feature and allows configuration parameters to be changed while the motor is running. Before overriding this safety feature, be sure that allowing configuration parameters to be modifying while the motor is running will not cause harm to personnel or equipment.

Language Selections

Various language selections can be made from a drop-down menu in the software. Per the following, select the down arrow next to the flag located in the upper right corner of the C445 DTM window.



The country represented by each flag can be viewed by hovering over each flag. Select a flag for the language required and all category names and parameter names will immediately change to the selected language for that country.

Section 9—Using the Firmware Upgrade Tool

Updating the firmware for a C445 using the Firmware Upgrade Tool

The latest firmware for the C445 system is located on the Eaton website www.eaton.com. Download the firmware files and then access the Firmware Upgrade Tool from the Start menu, under Eaton/Power Xpert *inControl*. The Upgrade Tool is installed with the One Installer. Be sure to note where the firmware files are stored. The following firmware files allow for upgrading any and all modules in your C445 system:

- C445_Package_xx_Codepack
- C445_Package_xx_Config

The xx will be the firmware revision number. The file C445_Package_xx_Config is the file that must be selected from the Firmware Upgrade Tool. The process is described below.

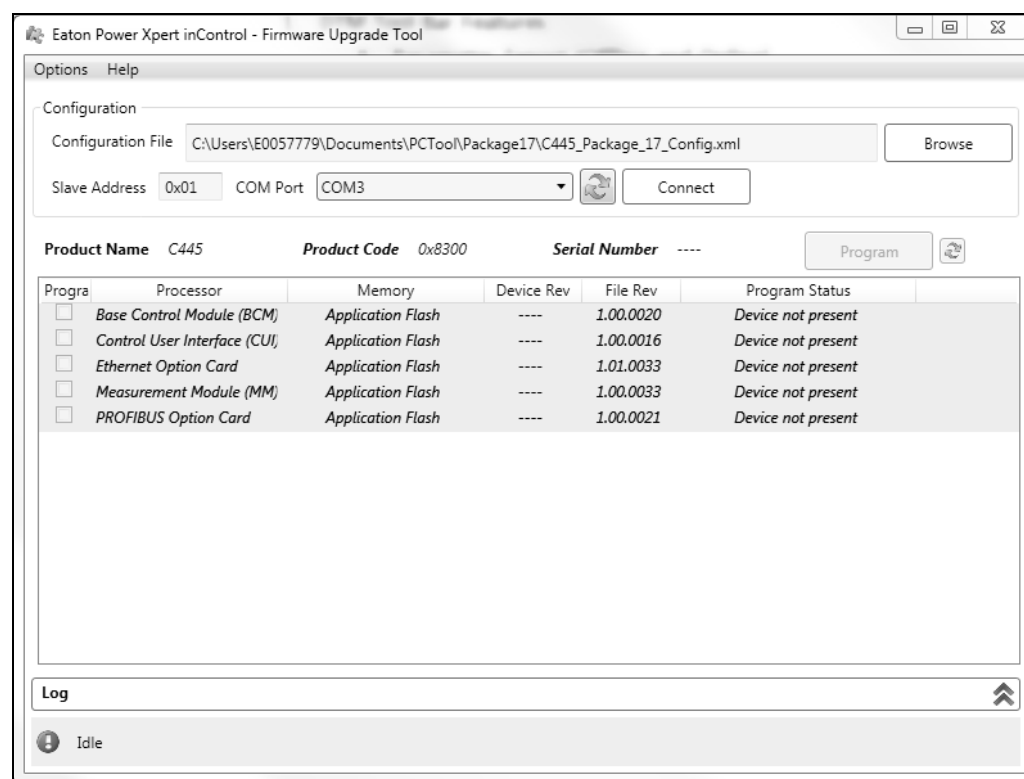
The firmware can be upgraded by connecting to either the RS-485 port on the Base Control Module or to one of the RJ12 ports on the Base Control Module.

Updating the firmware for a C445 using the RS-485 port

The cable for upgrading the firmware for a C445 system using the RS-485 port is the USB/RS-485 cable from Eaton, part number C445XS-USBLEADS. The USB driver for this cable can be found on the Eaton website.

Connect the C445XS-USBLEADS cable between the USB port on the computer and the RS-485 port on the C445 Base Control Module.

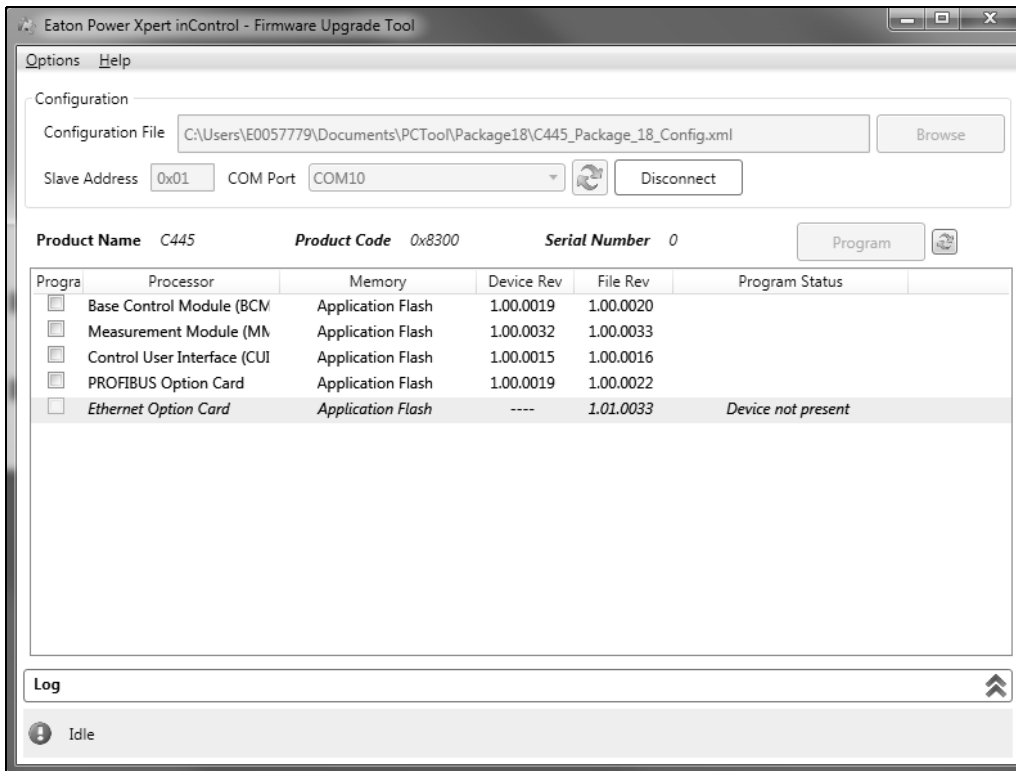
Start the Firmware Upgrade Tool software and the following screen will open.



Chapter 6—C445

The following are the steps for upgrading the firmware:

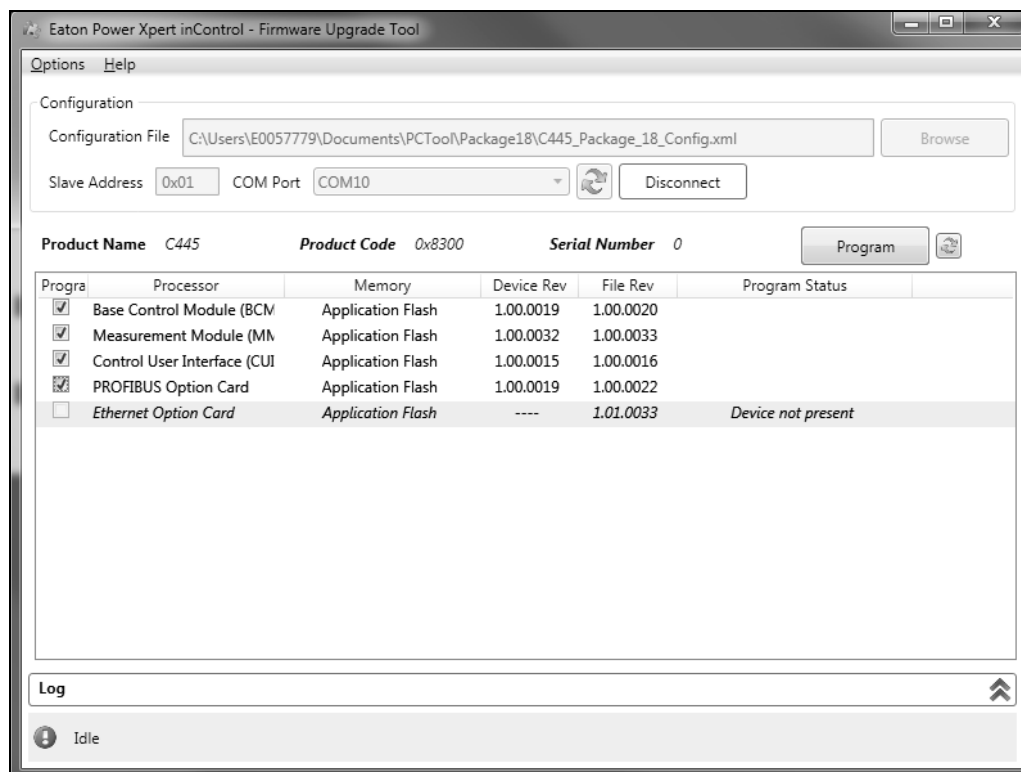
1. Select the Browse button and browse for the firmware files previously downloaded. Select the file: C445_Package_xx_Config.
2. Select the down arrow next to the Com Port and select the virtual Com Port the computer assigned for the USB/RS-485 cable. Also select the slave address of the C445.
3. Click the Connect button to the right of the Com Port selection and the Upgrade Tool will connect to the C445 and display the following.



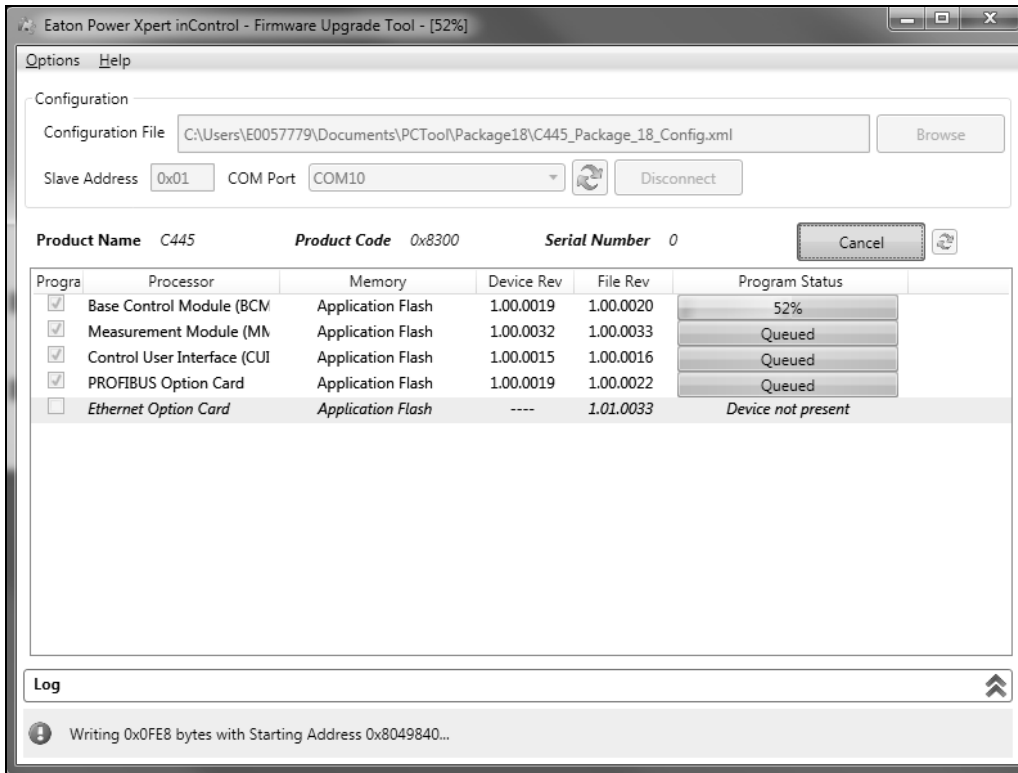
Note that the C445 system has been placed into boot mode. LEDs on all modules will begin to blink fast, indicating they are all in boot mode. The software will then display all possible C445 system modules. It also shows which modules are present and shows the actual version of the firmware in each module as well as the firmware versions in the file selected for the upgrade. This allows the user to compare the version of firmware in the C445 modules with the firmware in the file.

In the screen shot shown above, the firmware version of the file is a later version than what is in the C445 devices. It also shows that this C445 system includes a PROFIBUS card rather than an Ethernet card.

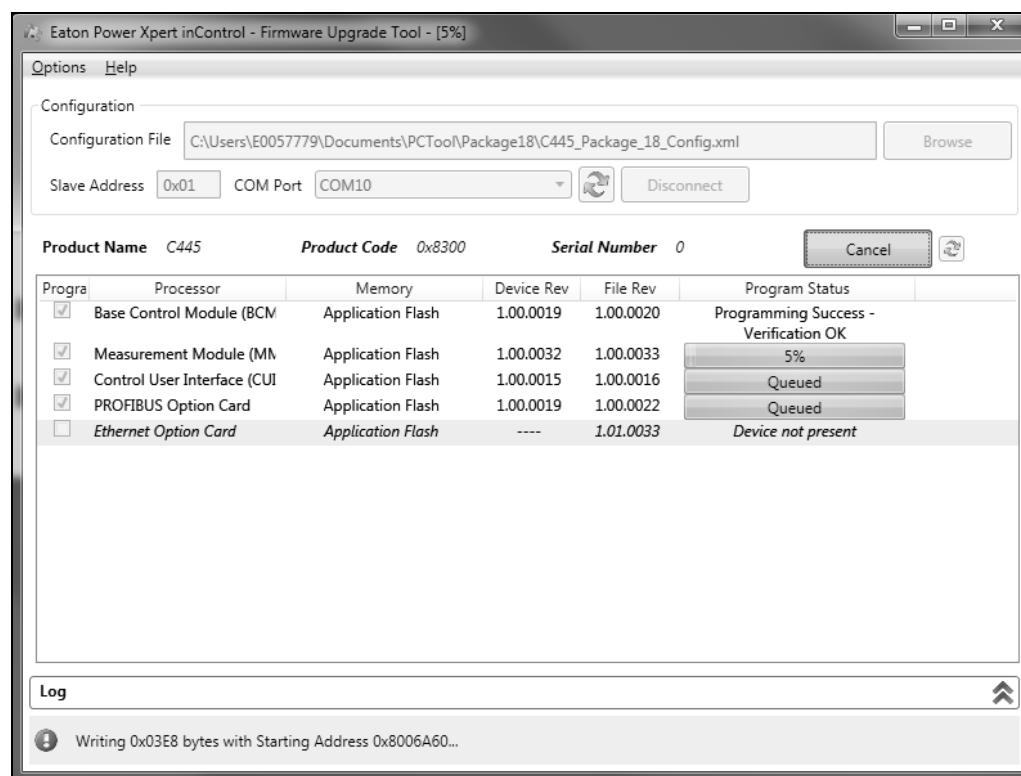
- The next step is to select the boxes to the left of each module to be upgraded, and then select the Program button as shown below.



The firmware will begin upgrading with the first module selected, the Base Control Module.



Progress will be displayed as well as success or failure information for each device.



- When all selected modules have been upgraded and verified, select the Disconnect button to the right of the Com PORT to complete the process and take the C445 out of boot mode. This is indicated by the C445 modules turning their LEDs on then off, and then stop fast flashing them like they were while in boot mode. When the modules turn all LEDs on then off, this indicates the C445 modules are executing a Soft Reset, which takes them out of boot mode. The C445 is now ready to be configured and operated normally.

Updating the firmware for a C445 using an RJ12 port

The process for updating the firmware using the USB/RJ12 port connected to either RJ12 port on the C445 Base Control Module is similar to the procedure above for the USB/RS-485 cable except it must be accomplished in two firmware downloads and the C445XS-USBRJ12 cable is required.

Note: When connecting with this cable, the slave address does not matter and is not used.

The User Interface Module and the Measurement Module are typically connected to the two RJ12 ports on the Base Control Module. Because the upgrade can only be done to the Base Control Module, one of the RJ12 devices connected to it must be disconnected for the firmware download. All connected modules in the C445 system may then have the firmware updated, but a second download will be necessary for the module that was disconnected to accommodate the USB/RJ12 cable for the first firmware download.

For example,

1. Disconnect the User Interface from the Base Control Module to free up a port for the USB/RJ12 cable.
2. Plug the cable into the free RJ12 port and update the firmware for the Base Control Module, the Measurement Module, and the optional Ethernet or PROFIBUS module if used.
3. When finished, select the Disconnect button to complete the process and bring the C445 modules out of boot mode.
4. Then power down the C445 system, disconnect the Measurement Module and connect the USB/RJ12 cable to the port vacated by this module. Then connect the User Interface to the other RJ12 port on the Base Control Module.
5. Then connect the User Interface to its original RJ12 port and run the Firmware Upgrade Tool again, but this time only select the User Interface. When it finishes, select the Disconnect button to complete the process and bring the C445 modules out of boot mode.

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Publication No. MN040013EN / Z16881
August 2015

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