



Control Technology Inc.

CTI 2500 Visualization Panels

QUICK START MANUAL



Version 1.6

CTI Part # 062-00386-012

Powered by Zenon

2500-VPxx Quick Start Manual V1.6

**Copyright© 2012-2014 Control Technology Inc.
All rights reserved.**

This manual is published by Control Technology Inc. (CTI) 5734 Middlebrook Pike, Knoxville, TN 37921. This manual contains references to brand and product names which are tradenames, trademarks, and/or registered trademarks of Control Technology Inc., COPA-DATA®, Siemens®, SIMATIC®, and Series 505®, and 505® are registered trademarks of Siemens AG. Other references to brand and product names are tradenames, trademarks, and/or registered trademarks of their respective holders.

DOCUMENT DISCLAIMER STATEMENT

Every effort has been made to ensure the accuracy of this document; however, errors do occasionally occur. CTI provides this document on an “as is” basis and assumes no responsibility for direct or consequential damages resulting from the use of this document. This document is provided without express or implied warranty of any kind, including but not limited to the warranties of merchantability or fitness for a particular purpose. This document and the products it references are subject to change without notice. If you have a comment or discover an error, please call us toll-free at 1-800-537-8398 or email us at sales@controltechnology.com.

| REVISION HISTORY | | |
|-------------------------|--------------|---|
| V 1.0 | Mar 17, 2011 | Initial Release |
| V1.1 | Jun 13, 2011 | Corrections on pages 28 and 79. |
| V1.2 | Feb 8, 2012 | Revise Manual for Windows 7 Embedded |
| V1.3 | July 7, 2012 | Revise Manual for Zenon 7.00 Operator |
| V1.4 | Sep 30, 2013 | Revise Manual for Zenon 7.10 Operator |
| V1.5 | Jun 6, 2014 | Revised for VP15A / VP12 |
| V1.6 | Jan 20, 2015 | Updated photo, added reminder to turn on power switch |

PREFACE

This ***Quick Start Manual*** provides reference information for the CTI 2500 Series Visualization Panels. The information in this manual is directed to individuals who will be installing and operating the panel as well as those who will be designing systems that use the panel.

USAGE CONVENTIONS

NOTE

Notes alert the user to special features or procedures.

CAUTION

Cautions alert the user to procedures that could damage equipment.

WARNING

Warnings alert the user to procedures that could damage equipment and endanger the user.

TABLE OF CONTENTS

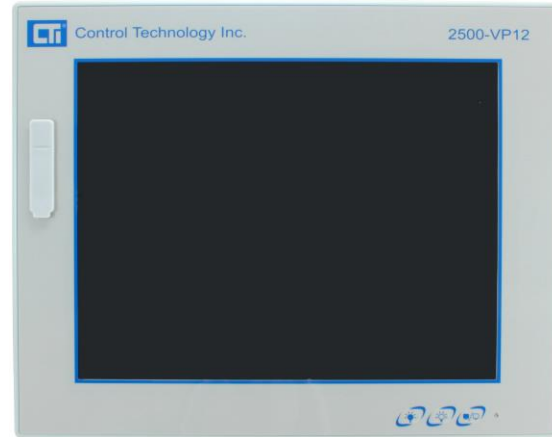
| | |
|--|-----------|
| CHAPTER 1 HARDWARE OVERVIEW AND INSTALLATION | 5 |
| 1.1 Introduction | 5 |
| 1.2 Visualization Panel Features | 5 |
| 1.2.1 Hardware Specifications | 5 |
| 1.2.2 IO Connections Diagram | 6 |
| 1.3 HMI Installation in Control Panel..... | 7 |
| 1.4 Connecting Power to HMI Panel..... | 8 |
| 1.5 Ethernet Connectivity..... | 9 |
| 1.6 Setting the IP address | 9 |
| CHAPTER 2 ZENON EDITOR INSTALLATION | 13 |
| 2.1 Installation of Zenon Editor Software | 13 |
| 2.1.1 Computer Considerations | 13 |
| 2.1.2 Starting the Installation | 13 |
| 2.2 Connecting USB License Dongle | 16 |
| 2.3 Licensing the Zenon Editor Software | 17 |
| CHAPTER 3 USING THE ZENON EDITOR..... | 18 |
| 3.1 Starting the Editor | 18 |
| 3.2 Creating a New Project..... | 19 |
| 3.2.1 Definitions of a Project and a Workspace | 19 |
| 3.2.2 Naming a Project and Creating a Workspace | 20 |
| 3.2.3 Storing Projects on a Server | 20 |
| 3.3 Learning the Zenon Editor Layout..... | 21 |
| 3.4 Required Zenon Project Settings for the 2500-VPxx Panel..... | 22 |
| 3.4.1 Setting Properties Window Format | 22 |
| 3.4.2 Adding a PLC Driver to the Project | 22 |
| 3.4.3 Configuring Zenon Runtime Graphical Settings | 26 |
| 3.5 Starting a New Project Using the CTI Project Template..... | 29 |
| 3.6 Building a Project with the Zenon Editor | 33 |

| | |
|--|-----------|
| 3.6.1 Adding Frames and Screens | 33 |
| 3.6.1.1 Adding a Frame | 34 |
| 3.6.1.2 Adding a Screen | 36 |
| 3.6.1.3 Setting the Project Start Screen | 39 |
| 3.6.2 Adding Variables to Your Project | 40 |
| 3.6.2.1 Creating a New Variable | 42 |
| 3.6.2.2 Selecting a Secondary Object Type | 44 |
| 3.6.2.3 Setting the Variable Offset | 45 |
| 3.6.2.4 Setting Variable Limits | 46 |
| 3.6.3 Creating Functions | 49 |
| 3.6.4 Creating Buttons | 52 |
| 3.6.5 Adding Graphical Symbols | 53 |
| 3.6.5.1 Linking a Variable to a Graphics Symbol | 55 |
| 3.6.6 Adding Numerical Displays | 56 |
| 3.6.7 Adding a Trend Element | 59 |
| 3.6.8 Testing your Runtime Project | 61 |
| 3.7 Transferring a Project Runtime to the Panel..... | 62 |
| 3.7.1 Configuring Communications Between Editor PC and HMI Panel | 62 |
| 3.7.2 Configuring and Establishing a Remote Transfer Connection | 63 |
| 3.7.1 Transferring Project Files and Setting Start Project | 66 |
| 3.8 Running Your Project for the First Time | 68 |
| LIMITED PRODUCT WARRANTY..... | 69 |
| REPAIR POLICY..... | 71 |

CHAPTER 1 *HARDWARE OVERVIEW AND INSTALLATION*

1.1 Introduction

The CTI 2500-VPxx Visualization Panel is a color, touchscreen HMI (Human Machine Interface) panel, available in 15" or 12" sizes. It is especially suitable for process control applications that require advanced graphical process visualization, intuitive operational controls, process data trending, and process alarm history. The 2500-VPxx HMI panel is available either integrated with powerful Zenon® HMI / Scada software or as a user configurable Windows 7 Embedded operator panel ready for use with your own software.

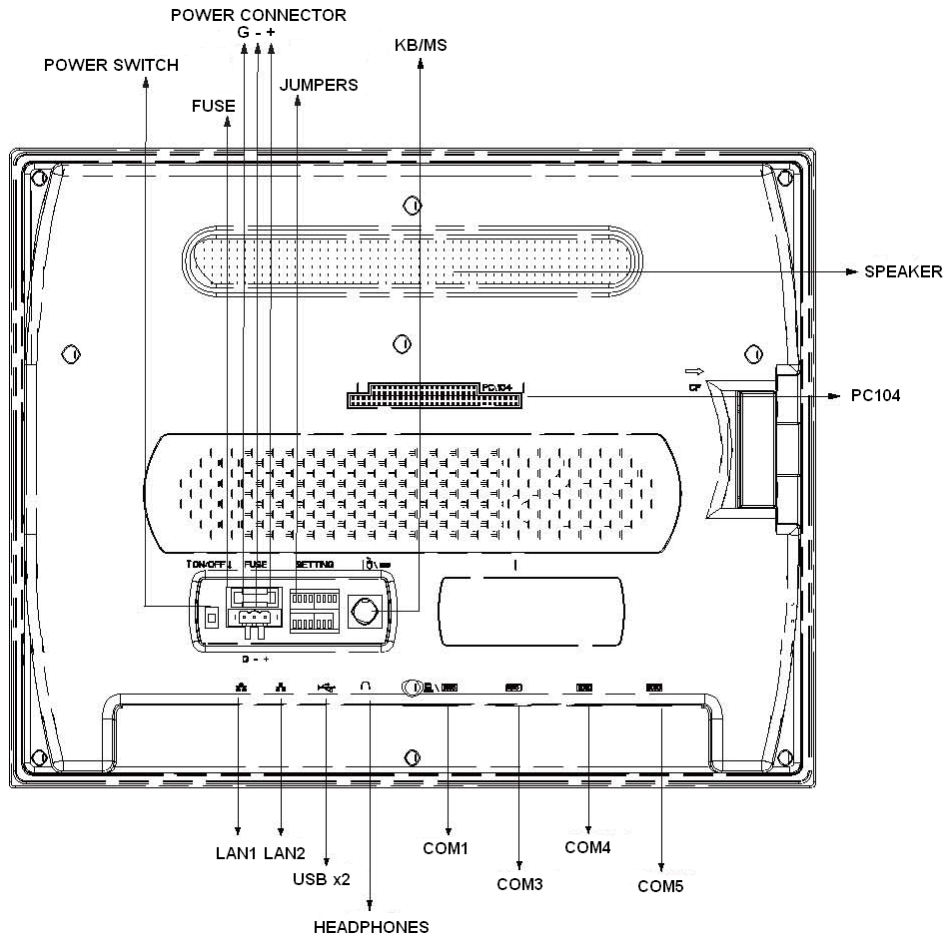


1.2 Visualization Panel Features

1.2.1 Hardware Specifications

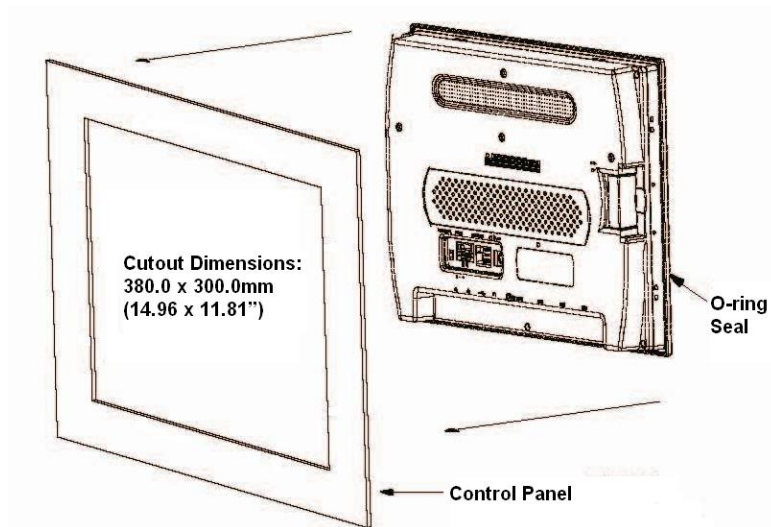
| | |
|--------------|--|
| Processor: | Intel® Atom™ N2600 dual-core 1.6GHz CPU |
| Resolution: | 15" or 12" 1024 x 768 XGA Color TFT LCD |
| Brightness: | Super Bright 400 cd/m ² |
| Touchscreen: | 5-wire, Analog Resistive |
| Memory: | 2GB of DDR2 |
| Storage: | 32GB CFast Compact Flash Card |
| Serial Port: | 2 x Isolated RS-232 ports; 2 x Isolated RS-422/485 ports (with optical isolation design of 3.75KV) |
| USB Port: | 5 x USB 2.0 (Host) |
| KB/MS: | 1 x PS2 Keyboard and Mouse |
| LAN: | 2 x Gigabit Ethernet controllers |
| Chassis: | Front Panel NEMA4/IP65 Compliance |
| Materials: | Aluminum (Front Panel), PC + ABS (Bezel) |
| Cooling: | Passive; Fanless |
| Power Input: | DC 9 ~ 33V |
| Consumption: | 45W |
| Op. Temp.: | 0 ~ 50°C (32 ~ 122°F) |
| Weight: | 4.4 kg (9.7 lb) |

1.2.2 IO Connections Diagram

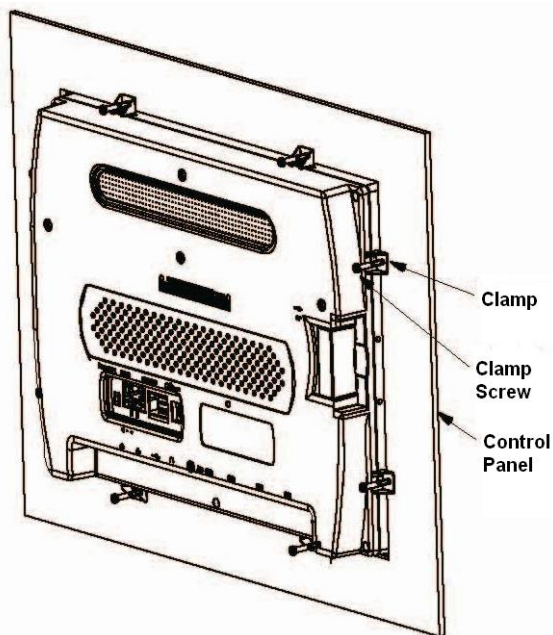


1.3 HMI Installation in Control Panel

Step 1: Install rubber o-ring gasket in the groove on the backside of the bezel.



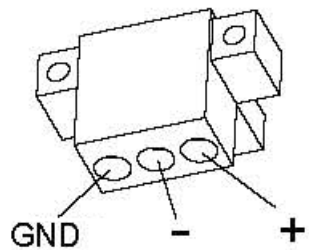
Step 2: Insert the back of HMI panel into the control panel cutout.



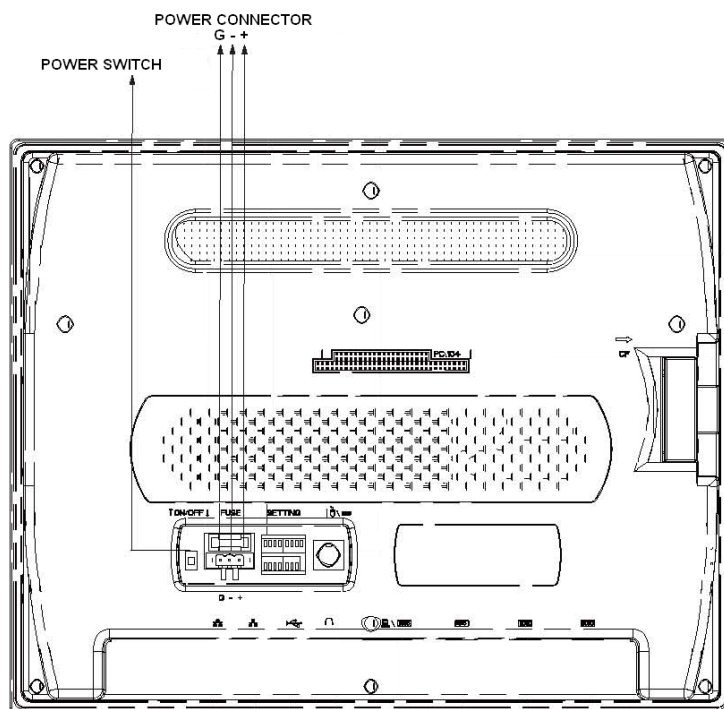
Step 3: Install 8x mounting clamps and tighten screws against the inside face of the control panel.

1.4 Connecting Power to HMI Panel

- Step 1:** Verify that the power switch on the back of the HMI panel is on the 'OFF' position.
- Step 2:** Terminate 9~33VDC power to included power plug. The HMI panel draws 45 watts of power. Make sure your DC power supply has sufficient capacity.



- Step 3:** Plug the DC power connector into the receptacle on the back of the panel.
- Step 4:** Move the power switch on the rear panel to the ON position
- Step 5:** Press the power button on the front panel.



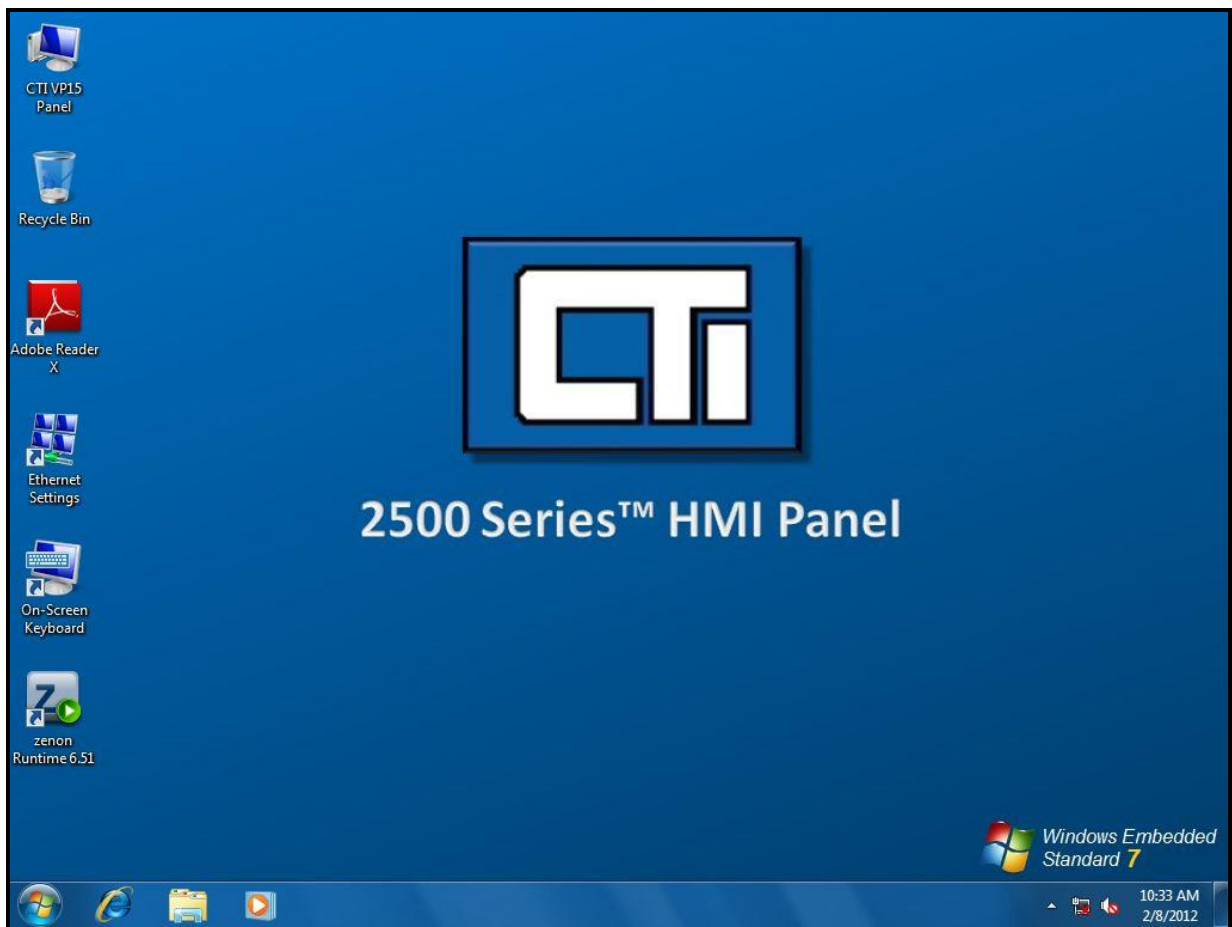
1.5 Ethernet Connectivity

Your 2500-VPxx has two onboard gigabit ethernet controllers. When viewing the HMI panel from the screen side, port 1 is on the right and port 2 is on the left. See the *IO Connections Diagram* in Section 1.2.3.

NOTE

When connecting the 2500-VPxx HMI panel to a CTI 2500 Series CPU, it is important to remember that only up to three devices can share communications on the 2500 series CPU ethernet port.

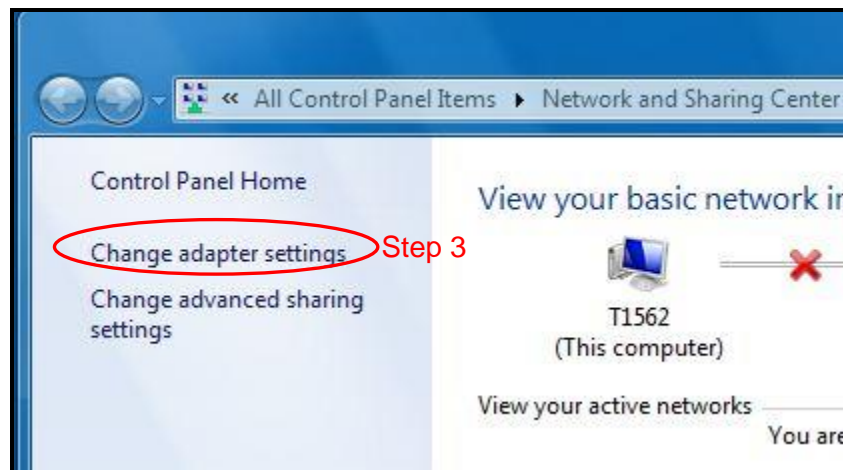
1.6 Setting the IP address



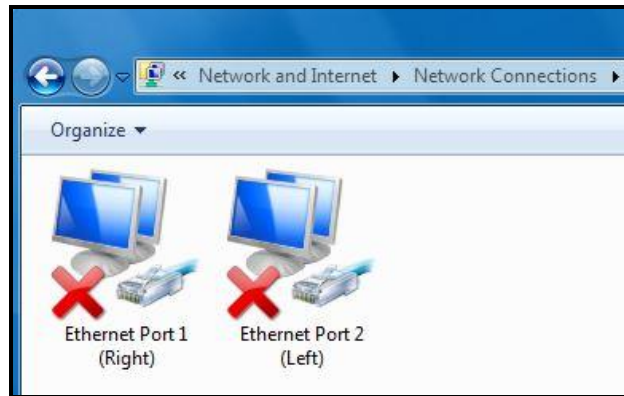
Step 1: Turn on the power switch on the back of the 2500-VPxx panel in order to boot the panel to the Windows 7 operating system desktop.



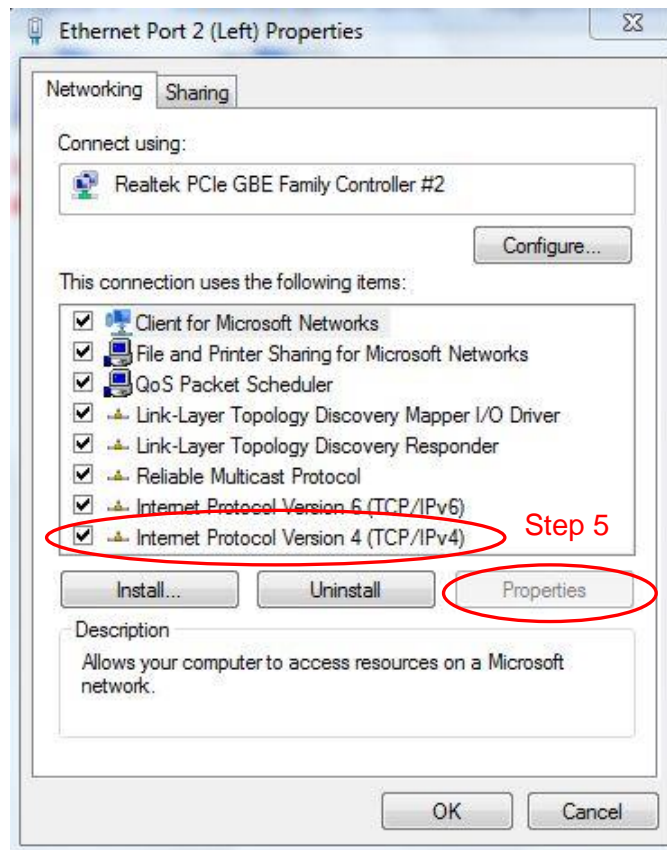
Step 2: After your HMI panel has booted to the Windows desktop, the IP address can be set by double tapping on the *Ethernet Settings* icon.



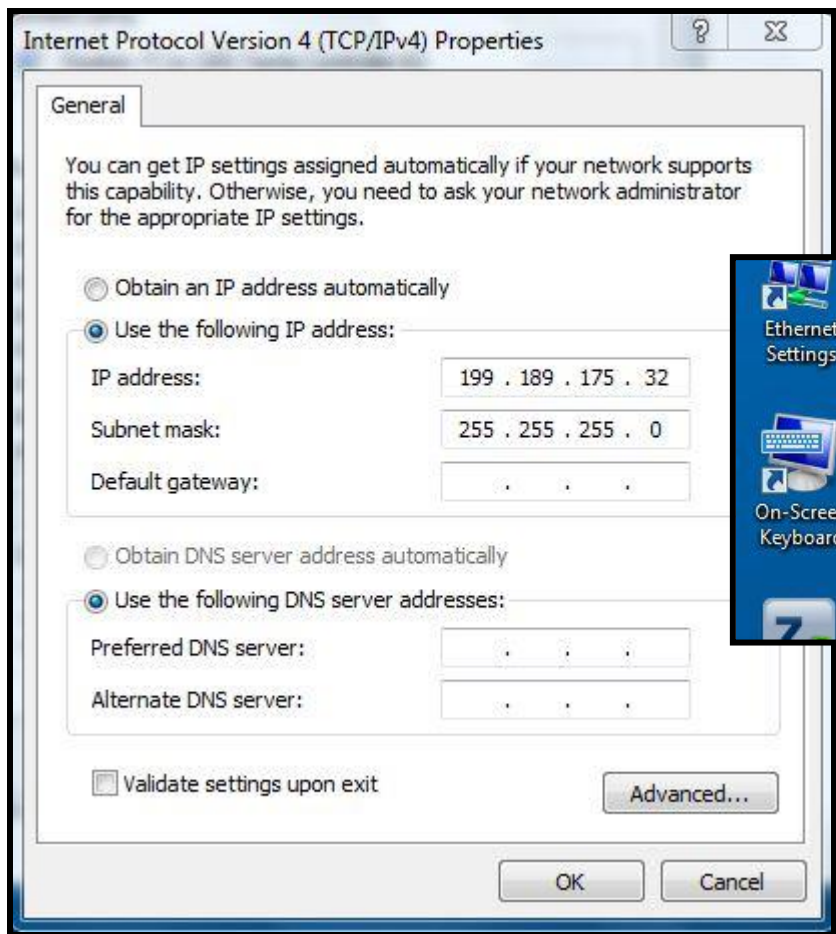
Step 3: When the Network and Sharing Center window appears, double tap the *Change adapter settings* menu item.



Step 4: Double tap the icon of the port to which the network connection will be made. *Ethernet Port 1* is the right-most port from the front side of the panel. *Ethernet Port 2* is the left-most port from the front side of the panel.



Step 5: Tap to select the *Internet Protocol Version 4 (TCP/IPv4)* connection, and then tap the *Properties* button.



Step 6: Enter a static (fixed) IP address for the panel and the appropriate subnet mask that matches the network class to which you will be connecting. An on-screen keyboard is available on the windows desktop. A USB or PS2 keyboard can also be connected to the panel.

NOTE

It is recommended that a 'static' (manual) IP address be used for the HMI panel. Using automatic addressing (DHCP) may cause loss of communications between your HMI panel and other devices.

NOTE

You must choose your IP address and subnet mask to match the class of network in which your control system will reside. For example, a class 'C' network has a subnet mask of 255.255.255.0 and the first three numbers of all of the IP addresses on the network must match.

CHAPTER 2 ZENON EDITOR INSTALLATION

The installation of the Zenon Editor consists of the following steps:

- 1) Reading this Chapter
- 2) Installing the Zenon Editor Software
- 3) Connecting the USB Dongle
- 4) Entering the Serial and Activation Numbers

2.1 Installation of Zenon Editor Software

2.1.1 Computer Considerations

Before installing the Zenon Editor software on your PC, you should be sure that your computer meets the following compatibility criteria:

| | |
|------------------------|-------------------------------|
| Operating System: | Windows XP SP3, Vista, or 7 |
| Free Hard Drive Space: | 2GB Minimum |
| Memory: | 2GB Minimum |
| Processor: | Pentium Class 1 GHz or better |
| Port for Dongle: | 1x USB |
| Programming Port: | 1x Ethernet Port |
| Optical Drive: | DVD-ROM Drive |

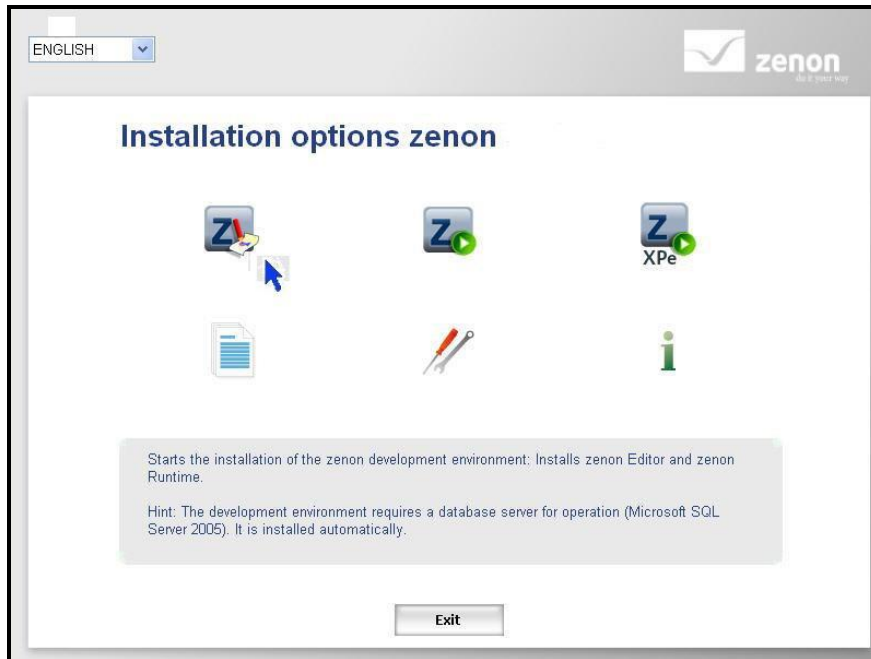
NOTE

It is recommended that the user close any open programs and temporarily halt virus protection software during the installation of the Zenon Editor software.

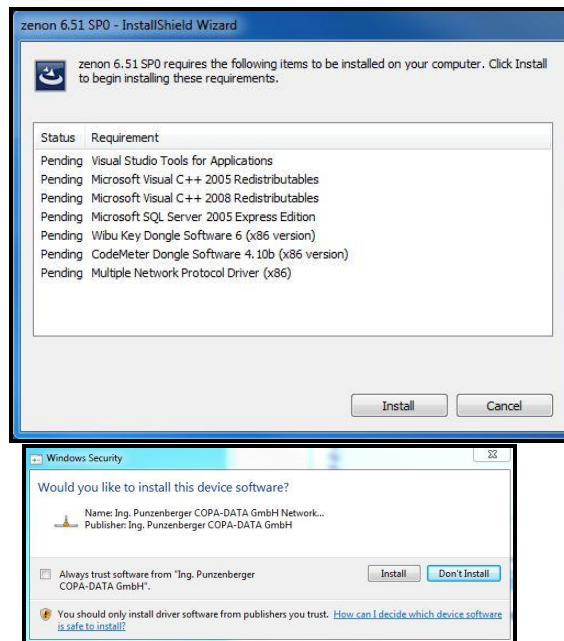
2.1.2 Starting the Installation

- Step 1:** Insert the CTI Zenon Editor installation DVD into your DVD-ROM drive. The installation process should begin automatically. If the installation does not automatically commence, run the program 'Start' from the DVD.

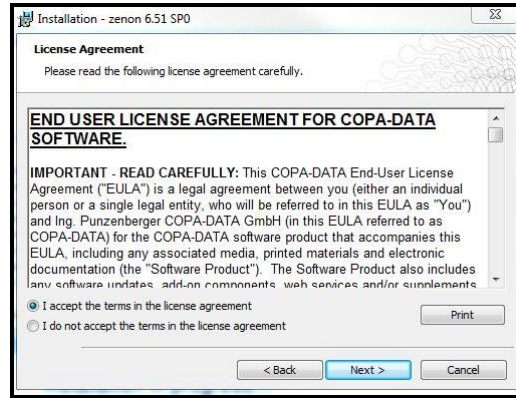
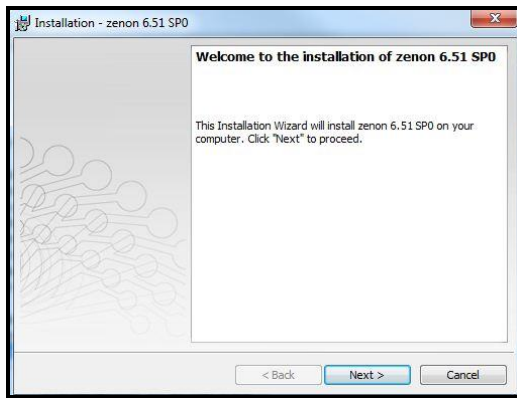




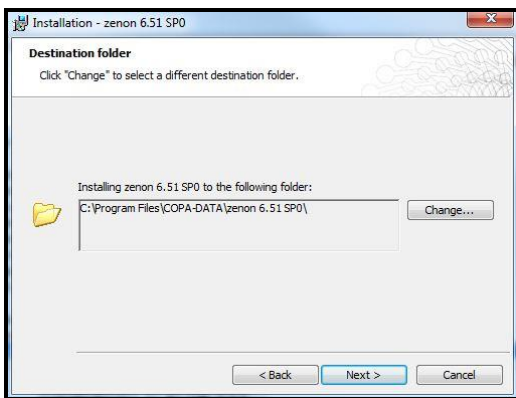
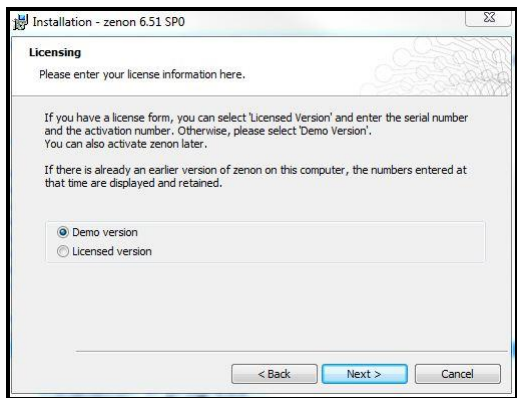
Step 2: When the installation options menu appears on the screen, click the 'Z with red pencil' icon to install the Zenon editor.



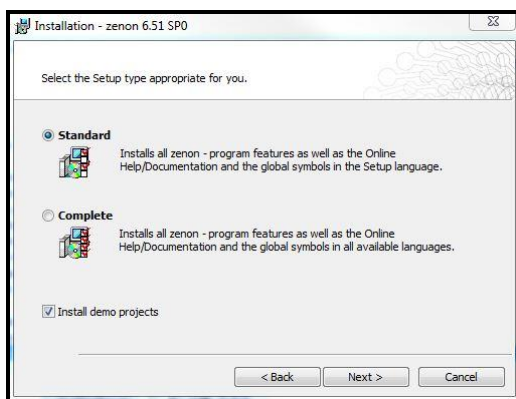
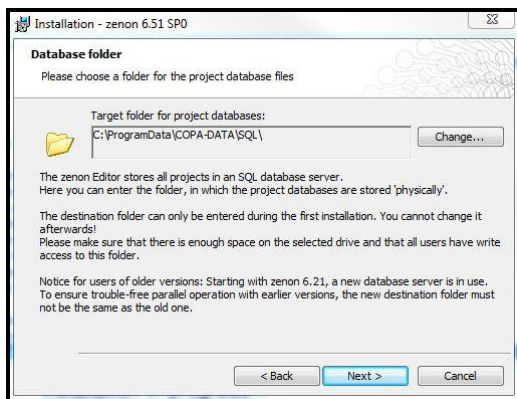
Step 3: When the InstallShield Wizard screen appears, click 'Install' to proceed. Zenon will now install support software required for the Zenon editor to run on your computer. If Windows Security gives a warning about installing the COPA-DATA network device driver, permit the driver to be installed by clicking 'Install'.



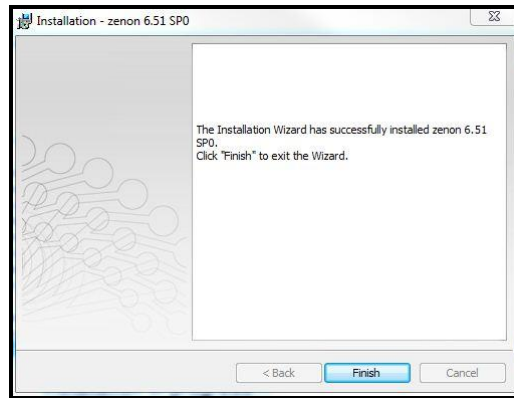
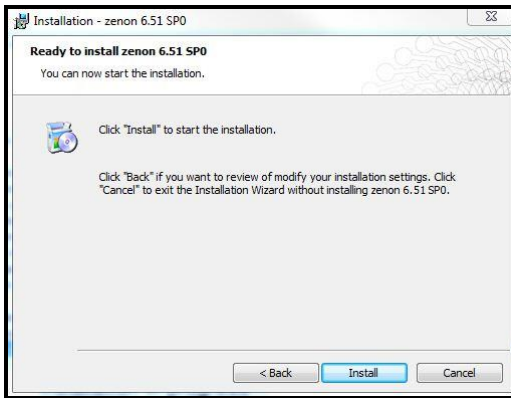
Step 4: Click 'Next' to continue installing the Zenon Editor. Accept the license agreement when prompted.



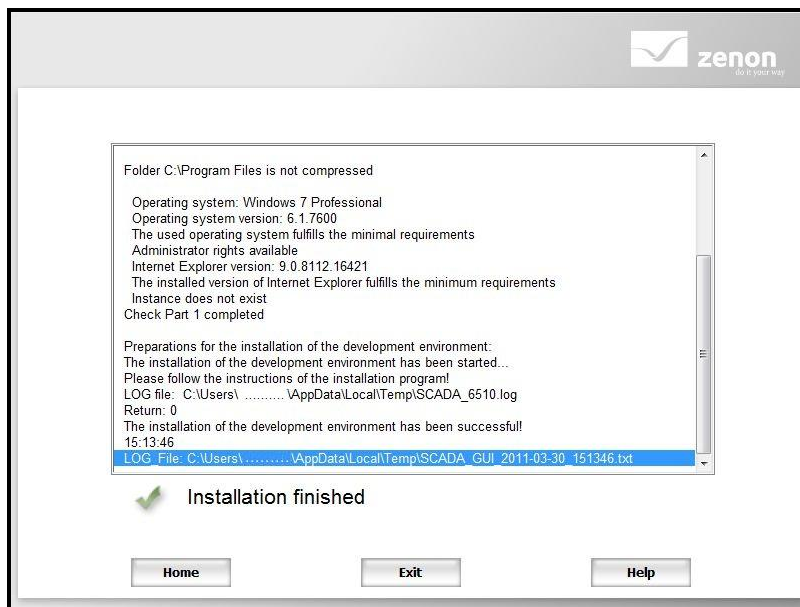
Step 5: When the Licensing screen appears, select 'Demo version' and click 'next'. Then, retain the default setting for the destination folder, and click 'next'.



Step 6: Retain the default setting for the project database folder, and click 'next'. Then select the 'standard' installation on the setup type screen. Installing demo projects is optional. Click 'next' to proceed.



Step 7: Start the installation by clicking 'Install'. When the installation is completed click the 'Finish' button.



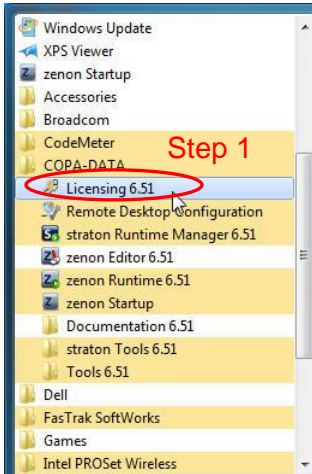
2.2 Connecting USB License Dongle

CTI has chosen to license the Zenon editor with a USB dongle. A dongle can be moved from one computer to another. This allows the editor software to be installed on several computers. However, only the computer that has the dongle attached will be able to run the Zenon editor software in licensed mode.

Once the Zenon editor is installed, connect the USB dongle to one of the computer's available USB ports.

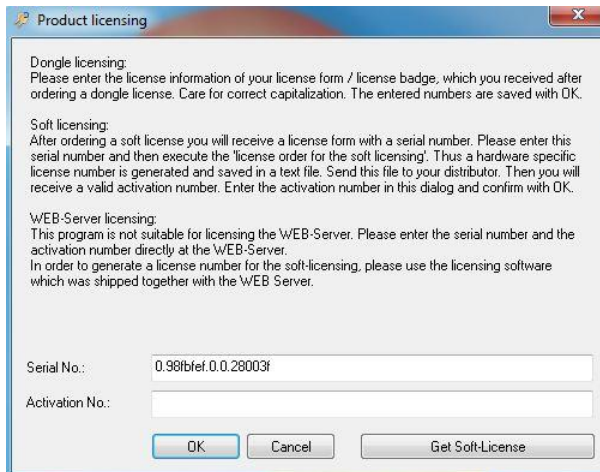


2.3 Licensing the Zenon Editor Software



A license sheet was provided with the Zenon Editor software DVD's and dongle. This sheet has the serial number and activation code that works with this dongle. The number printed on the dongle must match the first digits of the serial number on the license sheet.

Step 1: From the Windows Start menu, find the programs folder and the COPA-DATA subfolder. Double click the 'Licensing x.xx' program.



Step 2: Enter the serial and the activation numbers from the license sheet supplied with your editor software. After entering the numbers into the Product Licensing screen correctly, click the 'OK' button. The Zenon editor software is now licensed and ready for use.

NOTE

Keep the license sheet in a safe place. Any time the Zenon editor software needs to be reinstalled the license sheet will be required along with the dongle in order to license your software. If you misplace your license sheet, please call CTI toll-free at 1-800-537-8398 or email us at sales@controltechnology.com.

CHAPTER 3 Using the Zenon Editor

To begin this chapter, you must have successfully installed and licensed the Zenon editor as detailed in chapter 2.

3.1 Starting the Editor



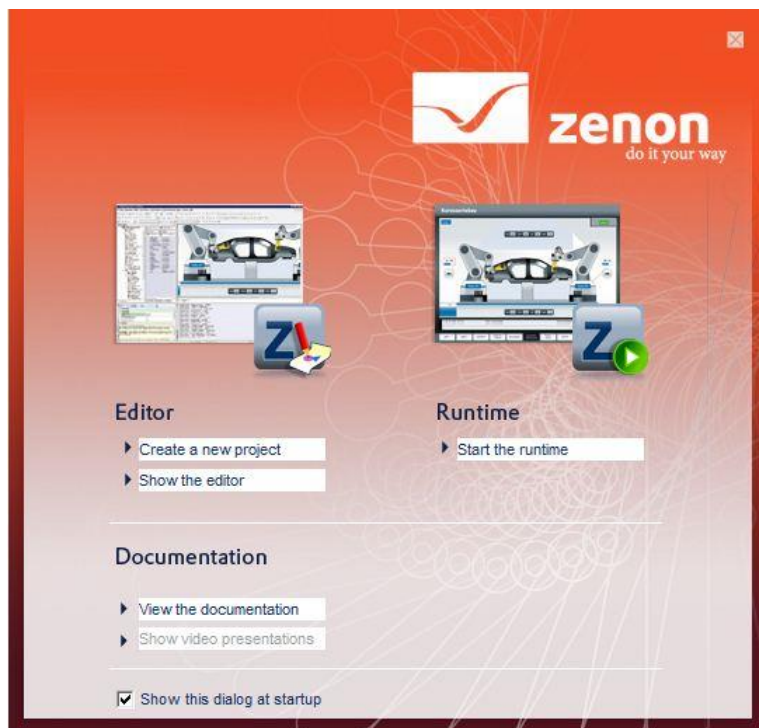
You will now start the Zenon editor for the first time by double clicking the Editor icon on your computer desktop.

The screen pictured below will appear the first time that you start Zenon.

You may click on *Create a new project* to start a new project from scratch.

OR

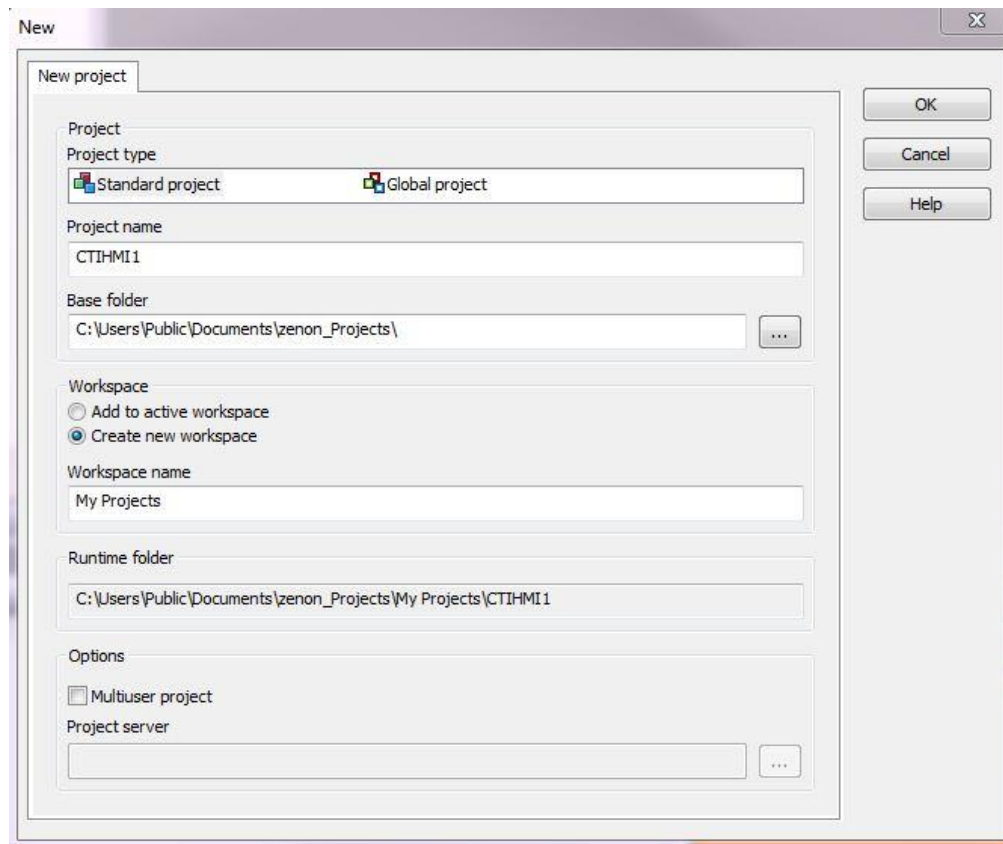
You may choose to click on *Show the editor* if you would like to use the CTI project template [Recommended].



3.2 Creating a New Project

Sections 3.2 through 3.4 are to be used for those starting a new project without a project template. If you wish to start a project using the CTI template then you should read sections 3.2-3.4 but skip to section 3.5 to start your project.

A 'new project' window will appear if you chose the 'Create a new project' option in Section 3.1.



3.2.1 Definitions of a Project and a Workspace

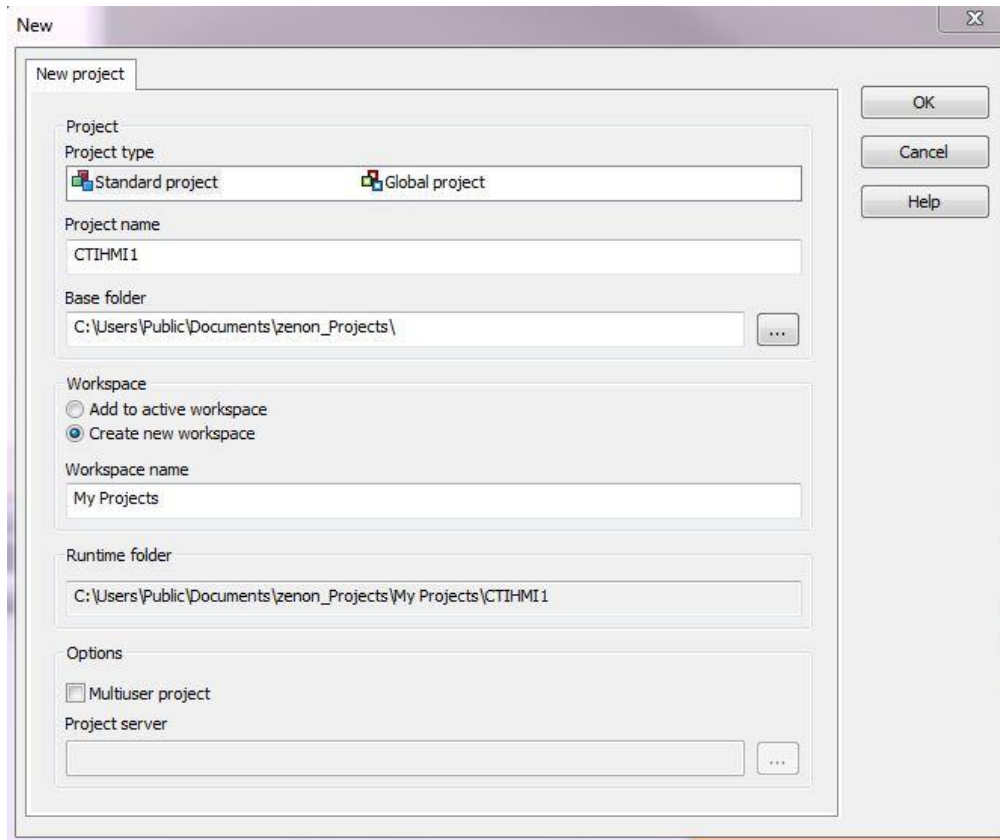
A *project* is a summary of settings, screens, functions, variables, recipes, etc. for displaying on a HMI panel. Projects are created in the Editor and displayed with the Runtime software on the HMI panel. Only one project runtime can be running on an HMI panel at a time. Project file storage can take place locally on the Editor computer or on a server. A backup of a project can be created anytime and can be read back on the same or a different computer.

A *workspace* is an administrative unit in the Zenon Editor in which projects can be grouped. A workspace is like a folder in which to keep a collection of HMI projects. Only projects which are added to a workspace can be edited in the Editor.

3.2.2 Naming a Project and Creating a Workspace

Step 1: Enter a *project name* that is descriptive of the HMI application that you will be creating. Examples: KnoxvillePlantHMI1
WinderHMI1
FurnaceHMI

Step 2: If this is your first project, then you will want select the 'Create new workspace' option in the new project window and then enter a 'Workspace name'. Examples: My projects
CTI HMI Projects
Knoxville HMI Projects

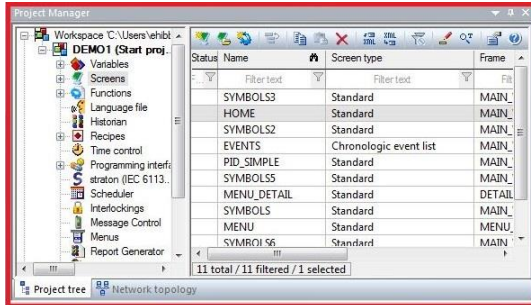


3.2.3 Storing Projects on a Server

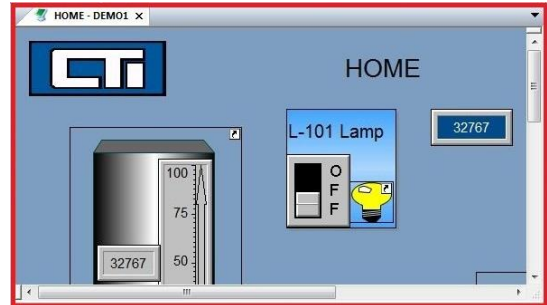
If you will be keeping your projects on a central server, then select the 'Multiuser project' option and enter the name of the server on your company network where the projects will be stored. You may also browse the company network to choose the server name. You may need to change the 'base folder' and 'runtime folder' locations if you are storing your projects on a network server.

3.3 Learning the Zenon Editor Layout

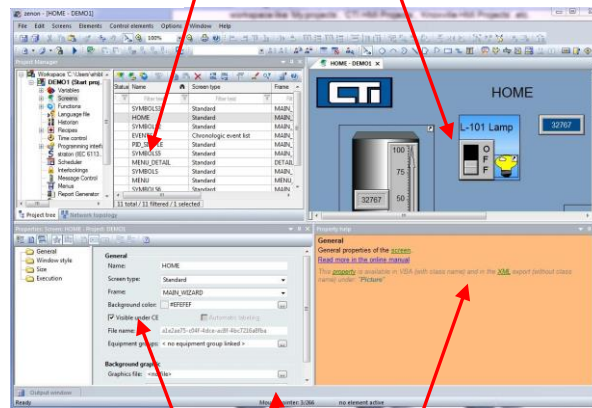
In this section, you will need to familiarize yourself with the layout of the Zenon Editor Screen. The default Editor layout contains five windows. There is a project manager window, a screen editor window, a properties window, a property help window, and an output window. The default layout is pictured below.



Project Manager Window: Window in the Editor in which the project tree, the detail view, and the network topology are displayed.

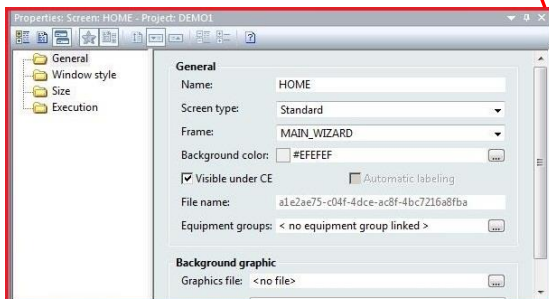


Screen Editor Window: Window in the Editor in which screens, frames, and graphics symbols are displayed.

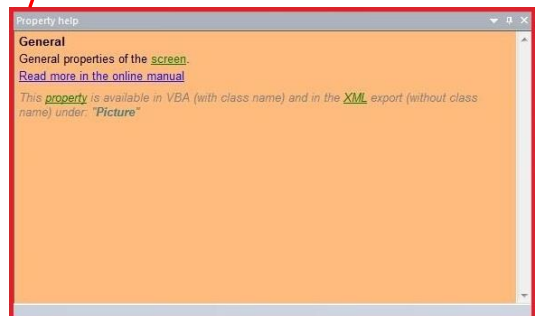


Properties Window: Window in the Editor in which properties of a selected element from the project manager are displayed.

Property Help Window: Window in the Editor in which displays a short explanation for a selected property.



Output Window: Window in the Editor in which messages from the Remote Transport and from create Runtime files are displayed.



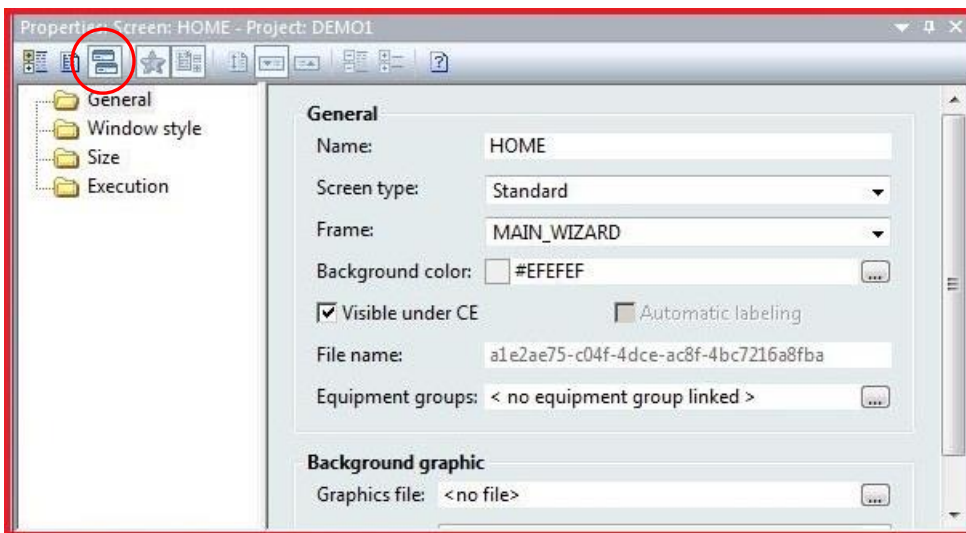
3.4 Required Zenon Project Settings for the 2500-VPxx Panel

There are a number of settings that are required in every Zenon project in order for the project to display properly on the CTI 2500-VPxx panel. This section will guide you in making necessary project settings so that your project will work on the CTI panel.

NOTE

During the installation of the CTI Driver and Component software in Section 2.5, a project template that was preconfigured with these necessary settings was installed on your computer. If you will be using the project template, instructions for starting a project with the CTI project template are found in section 3.6.

3.4.1 Setting Properties Window Format



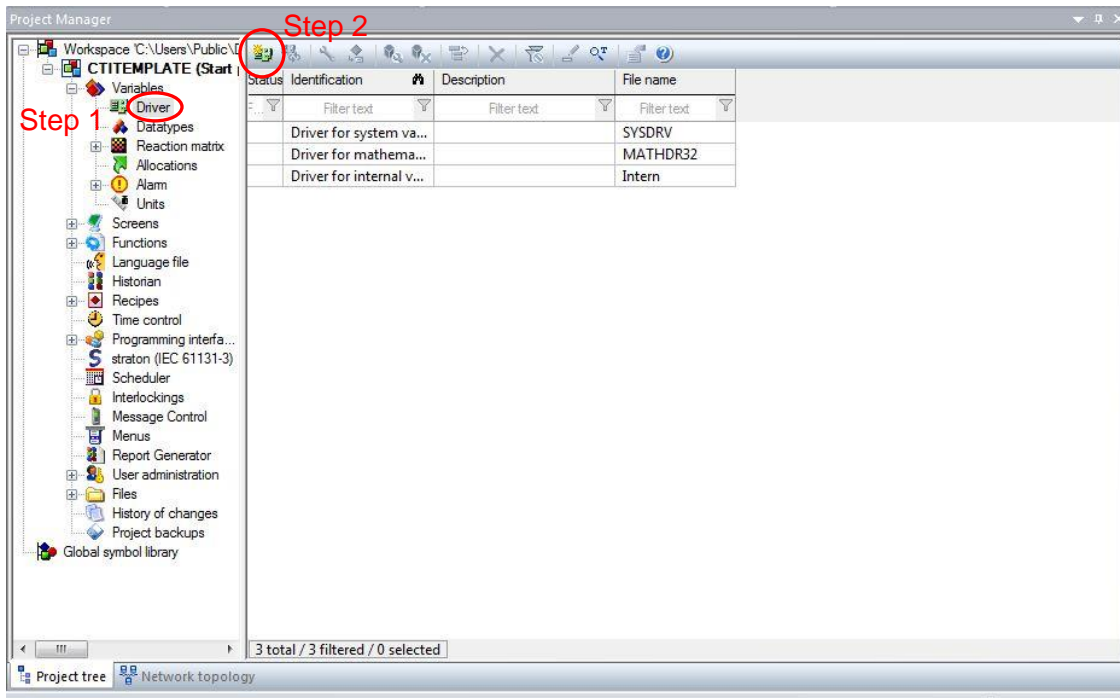
It is recommended that the properties window be set to display information in the dialog view format as pictured above. For simplification of instruction, this manual will give examples of making property settings using only the dialog view format. The dialog view format can be selected by clicking on the icon marked in the screen image above.

3.4.2 Adding a PLC Driver to the Project

The first component that must be added to the new project is the PLC driver. This driver will allow the HMI to communicate with a PLC. The 2500-VPxx can communicate with a large variety of PLC brands and types. This manual will deal exclusively with the CTI 2500 series PLC.

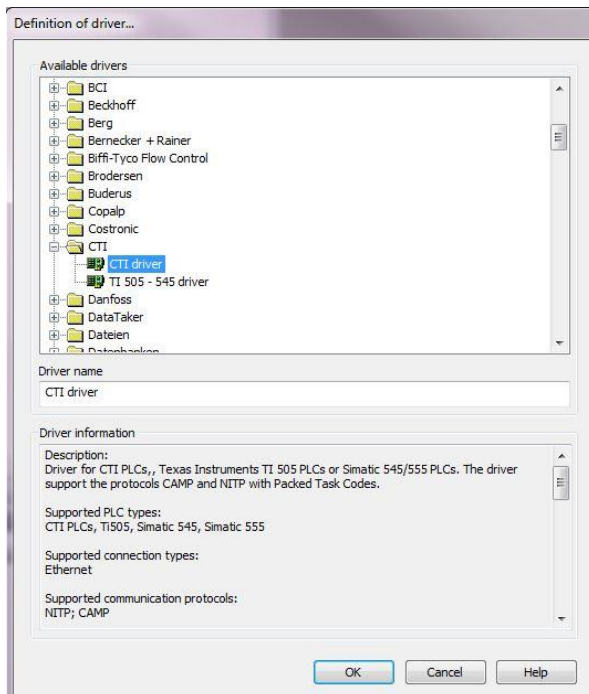
NOTE

The CTI panel can communicate with up to three different PLC drivers at a time. Only one instance of a driver can be used in a project. For example, only one instance of the CTI driver can be used in a project. However, a single CTI driver can communicate with multiple CTI processors.

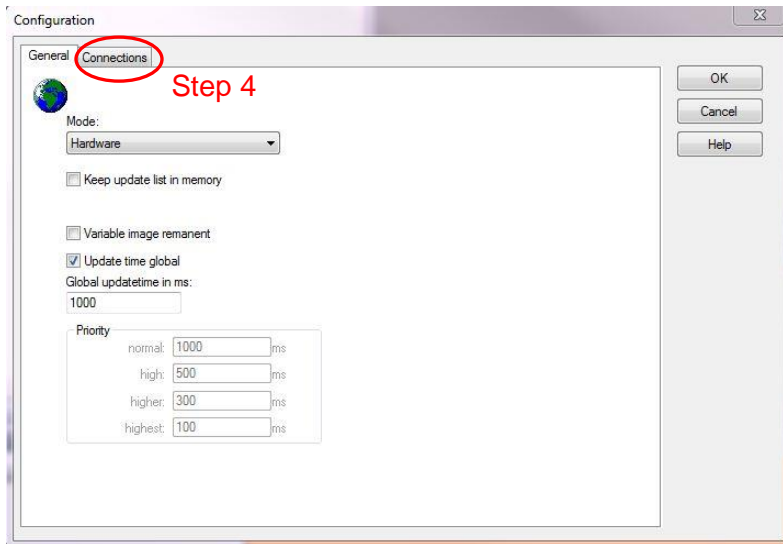


Step 1: In the *Project Manager* window, expand the *Variables* branch of the project tree and click on the 'Driver' icon. A list of device drivers will appear in the *Detail View* window to the right of the project tree.

Step 2: Click on the 'new driver' icon as noted in the picture above. A *Definition of driver* window will now appear.



Step 3: Find and expand the *CTI* folder in the driver list. Select the *CTI driver* and click 'OK' on the bottom of the window.

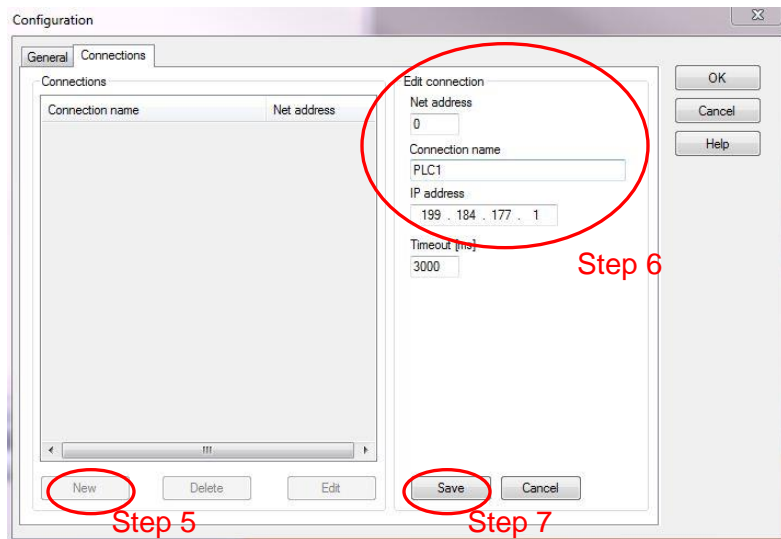


Step 4: When the *Configuration* window appears, click on the *Connections* tab.

Step 5: Under the 'Connections' tab, click the 'New' button to add a new PLC connection.

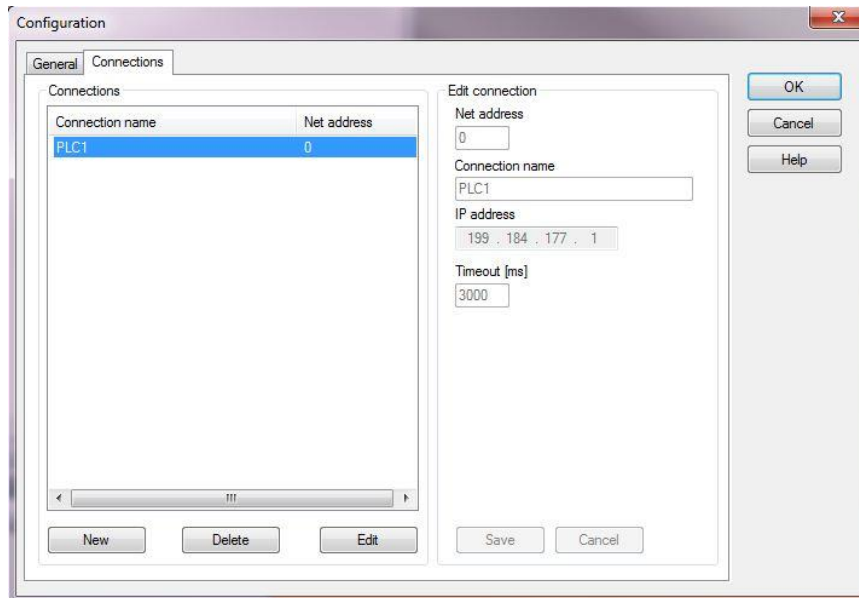
Step 6: Enter a unique Net address and Connection name. Enter IP address of the PLC processor.

Step 7: After entering the connection information for your PLC, click on the 'Save' button to add the new PLC connection to the CTI driver.



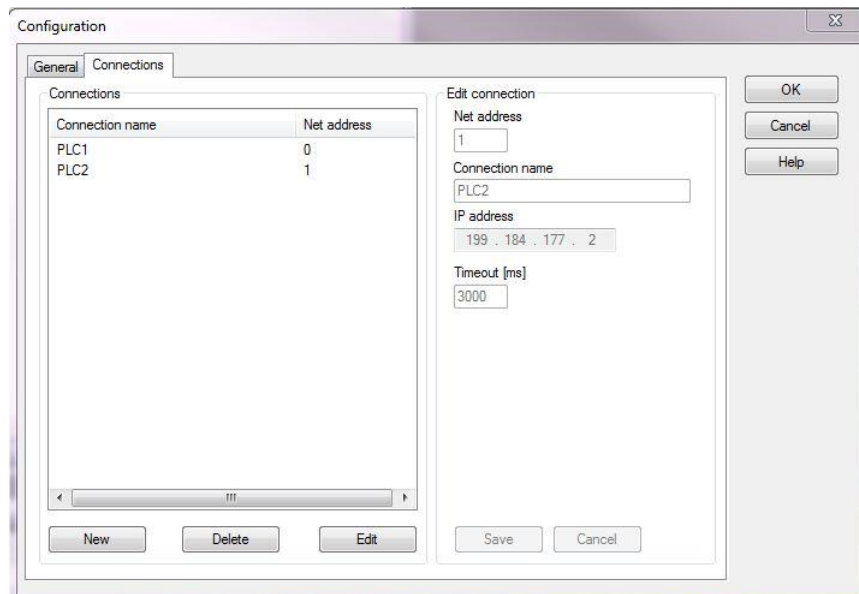
NOTE

Be sure that you have entered the correct IP address of the PLC processor to which you are connecting the HMI panel. If the IP addresses do not match, the HMI panel and PLC will not communicate.



Step 8: The project now contains a connection to the CTI PLC processor at the IP address entered. Additional PLC connections may be added if needed.

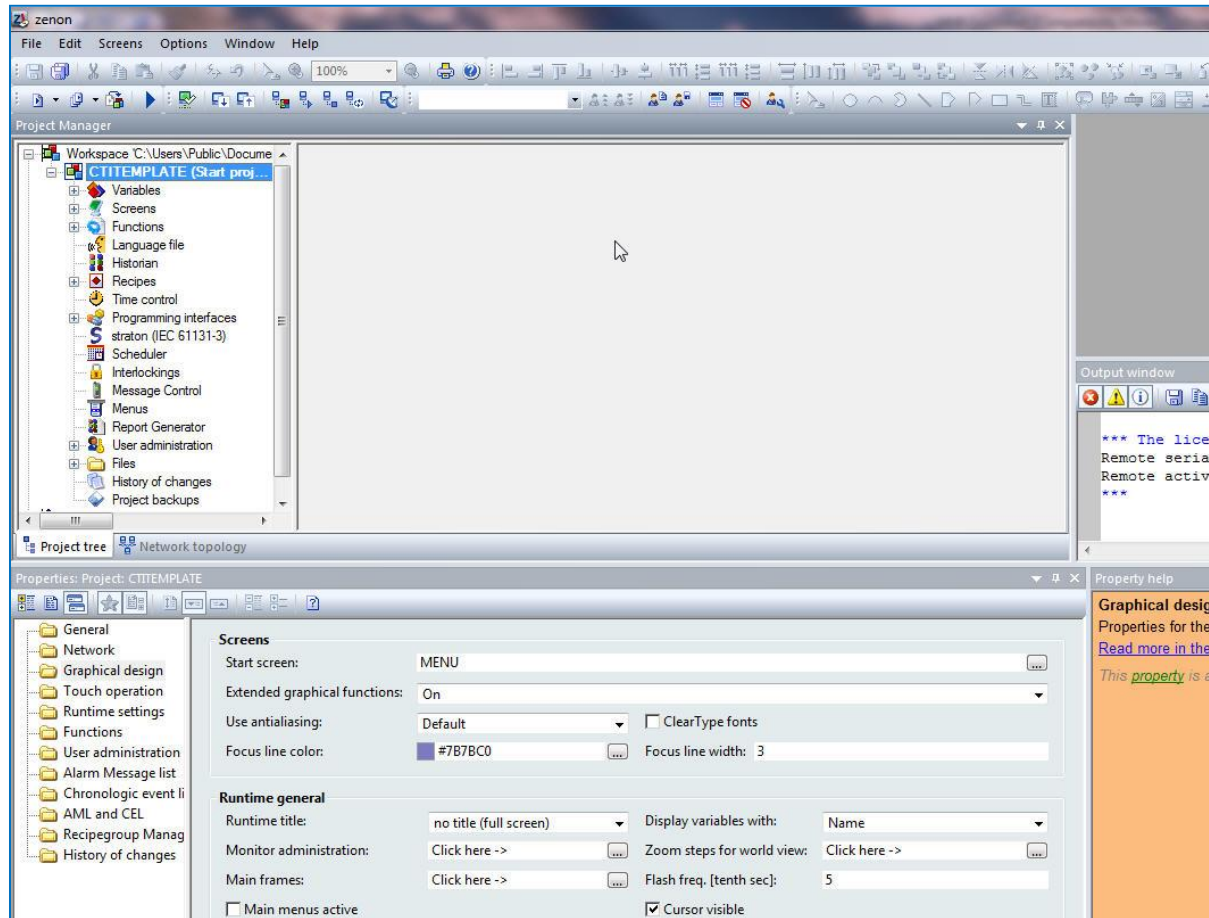
NOTE
Each PLC connection will require a unique net address, connection name, and IP address. Up to three PLC connections can be made under the CTI PLC driver.



Step 9: If required, additional PLC connections can be made by repeating the procedure of this section.

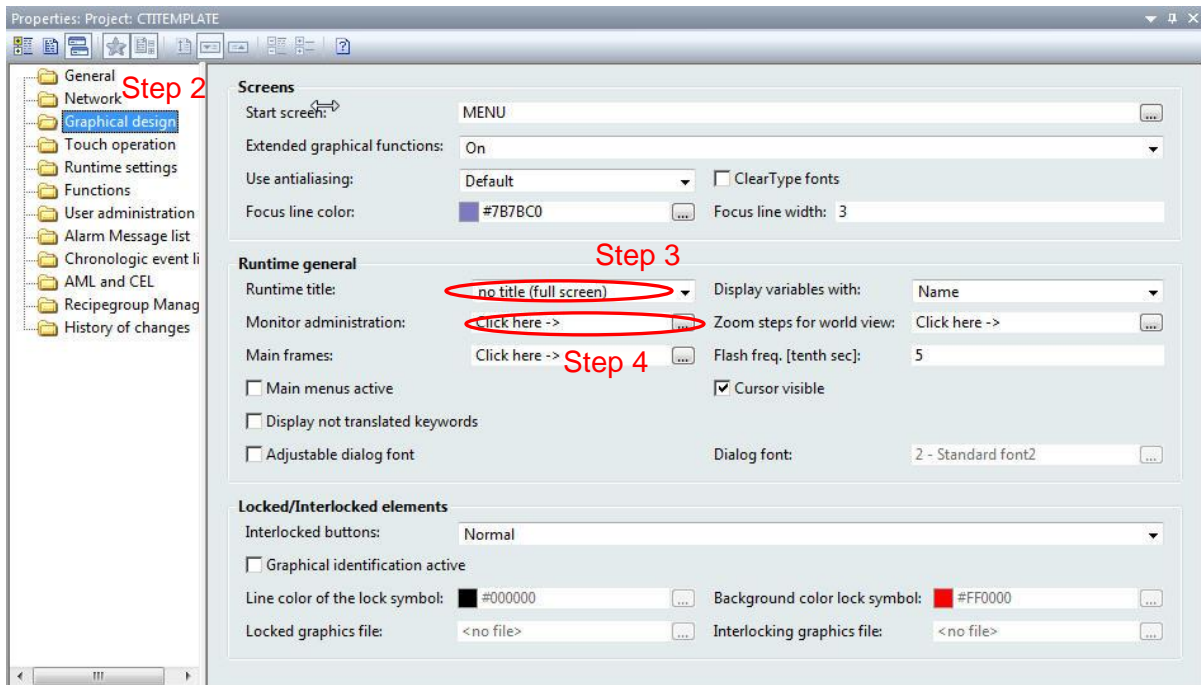
3.4.3 Configuring Zenon Runtime Graphical Settings

The maximum display resolution of the CTI 2500-VPxx panel is 1024x768 pixels. Your Zenon project must be configured to the proper screen resolution. When you begin to create frames and screens for your project, you must keep in mind that the maximum displayable screen size is 1024x768 pixels.



Step 1: Click on the name of your project in the project tree. The property settings for your project will display in the *Properties Window*.

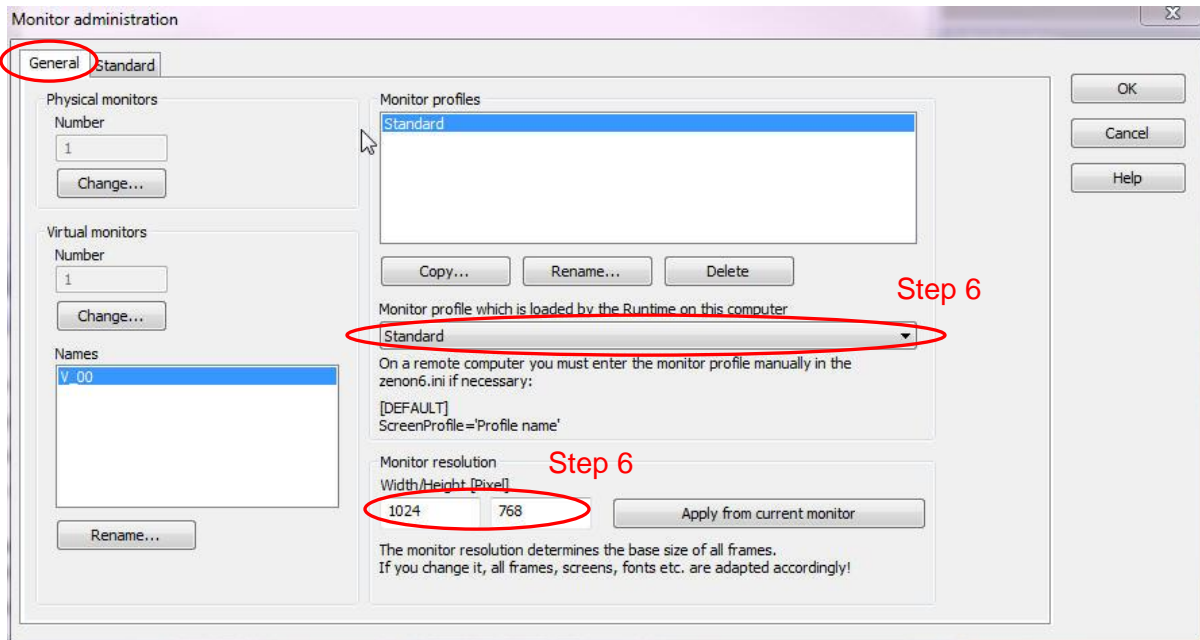
NOTE
The Properties Window should be set to the dialog view option. See Section 3.5.1.



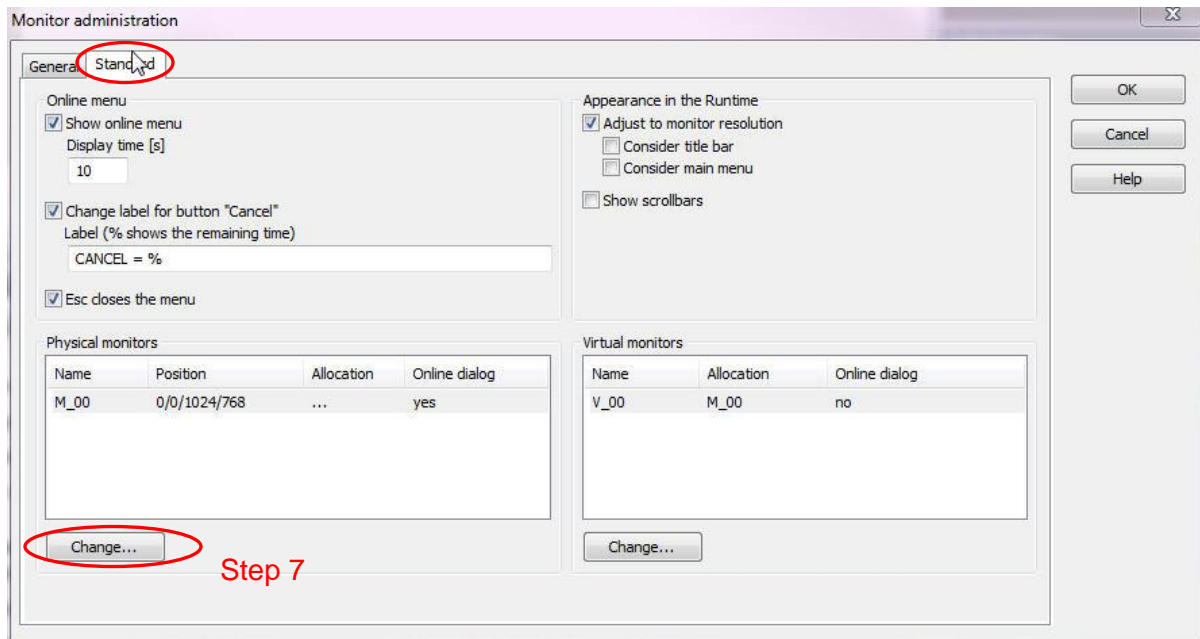
Step 2: Click on the *Graphical design* tab in the *Properties* window to view the graphical properties for your runtime project.

Step 3: In the *Runtime title* list box, select 'no title (full screen)' from the drop down menu. This setting will allow your project to be displayed full screen without a title bar on the HMI panel.

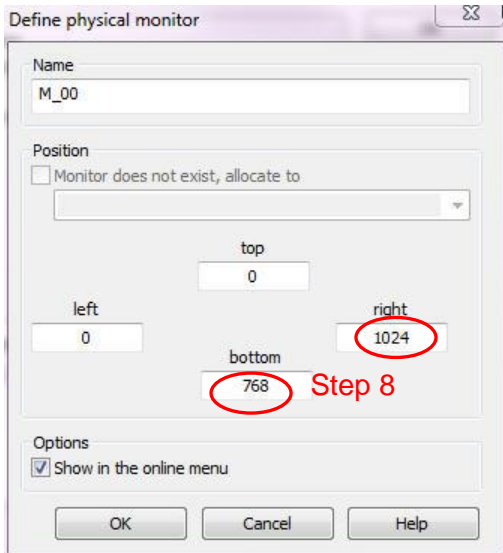
Step 4: Click on the button beside the *Monitor administration* property to open the *Monitor Administration* window.



Step 6: In the *Monitor Administration* window, under the *General* tab, make sure that the 'standard' monitor profile is selected and the monitor resolution is set to 1024x768.



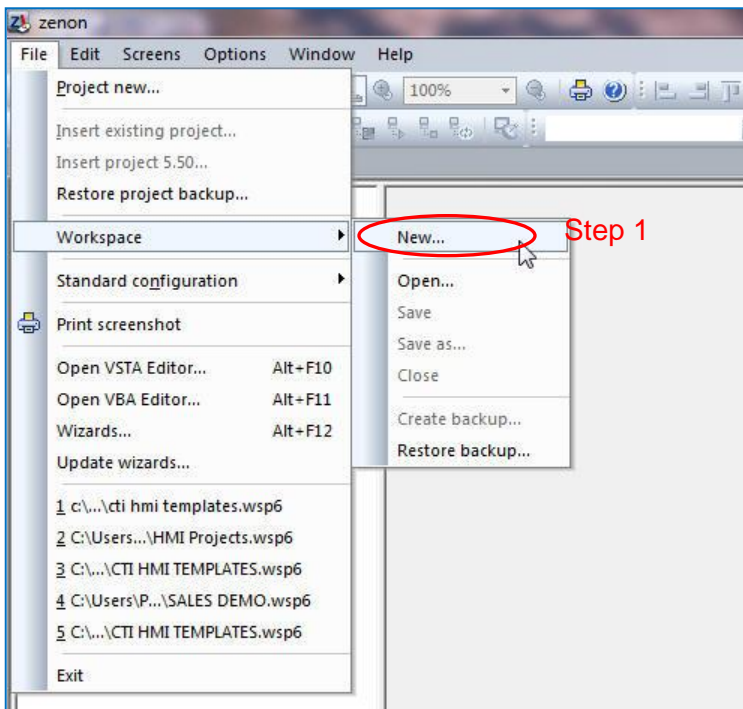
Step 7: In the *Monitor Administration* window, under the *Standard* tab, click on the 'change' button on the bottom left of the Monitor administration window under the *Physical monitors* display box.



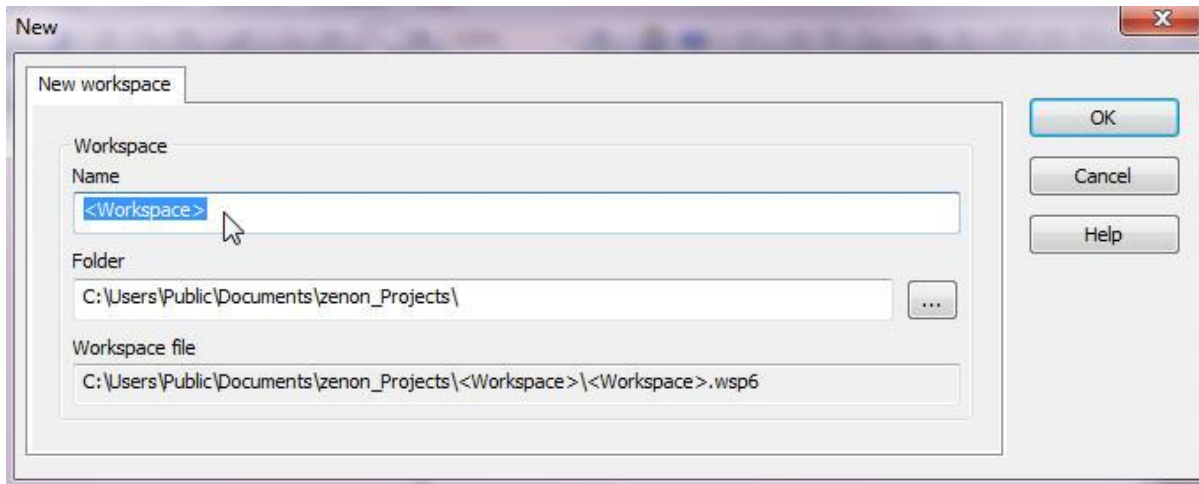
Step 8: In the *Define physical monitor* window, click in the 'right' box and enter the number 1024. Then, click in the 'bottom' box and enter the number 768. The 'top' and 'left' boxes should contain zeros. Click 'OK' when you are done.

3.5 Starting a New Project Using the CTI Project Template

On the *CTI Visualization Panel Editor Software DVD*, there is a folder named *Project Template*. This section will give instructions on how to start a new project using the CTI project template. The CTI project template is preconfigured with the correct settings for the 2500-VPxx panel.

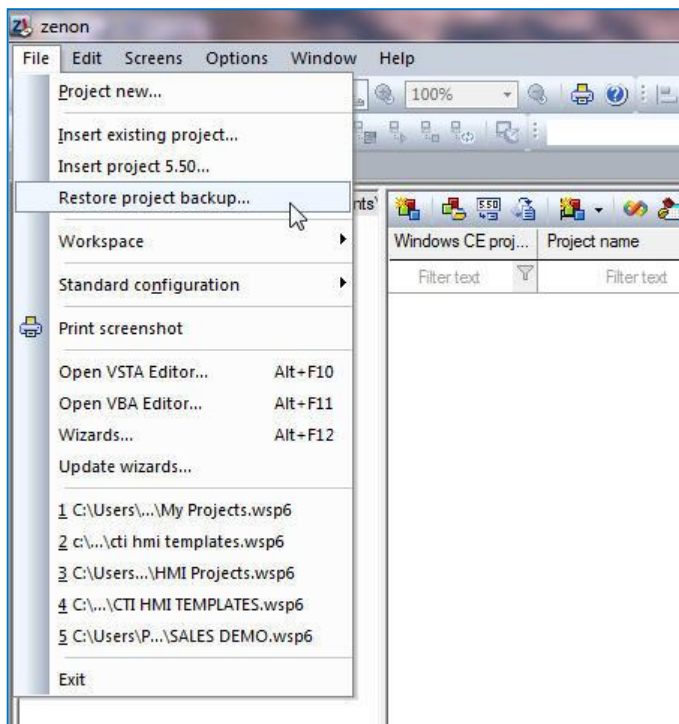


Step 1: You will need to create a new workspace. A workspace is like a folder in which to keep a collection of HMI projects. A project can only be edited if it is added to a workspace. Under the *File* menu and the *Workspace* menu item, click on the submenu item *New*.

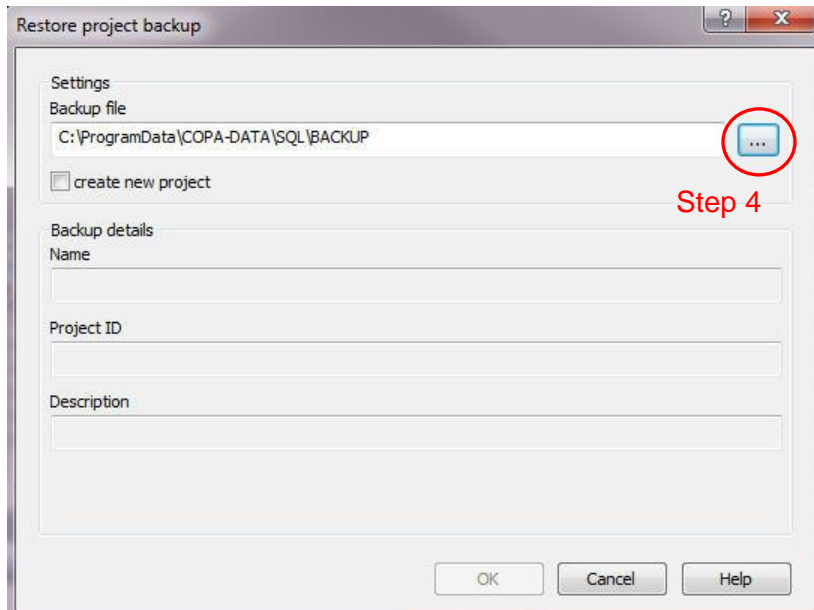


Step 2: Enter a name for your workspace and click 'OK'. A workspace is like a folder where you will store your project(s).

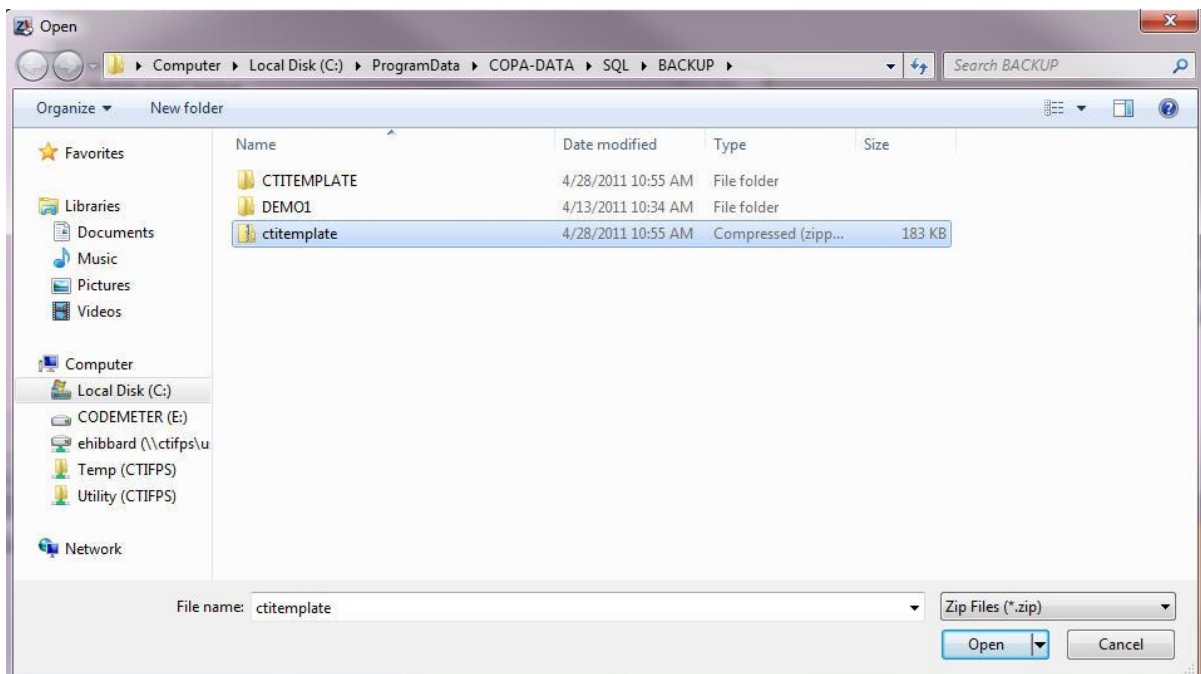
Examples of names: My HMI projects
 CTI HMI Projects
 Knoxville HMI Projects



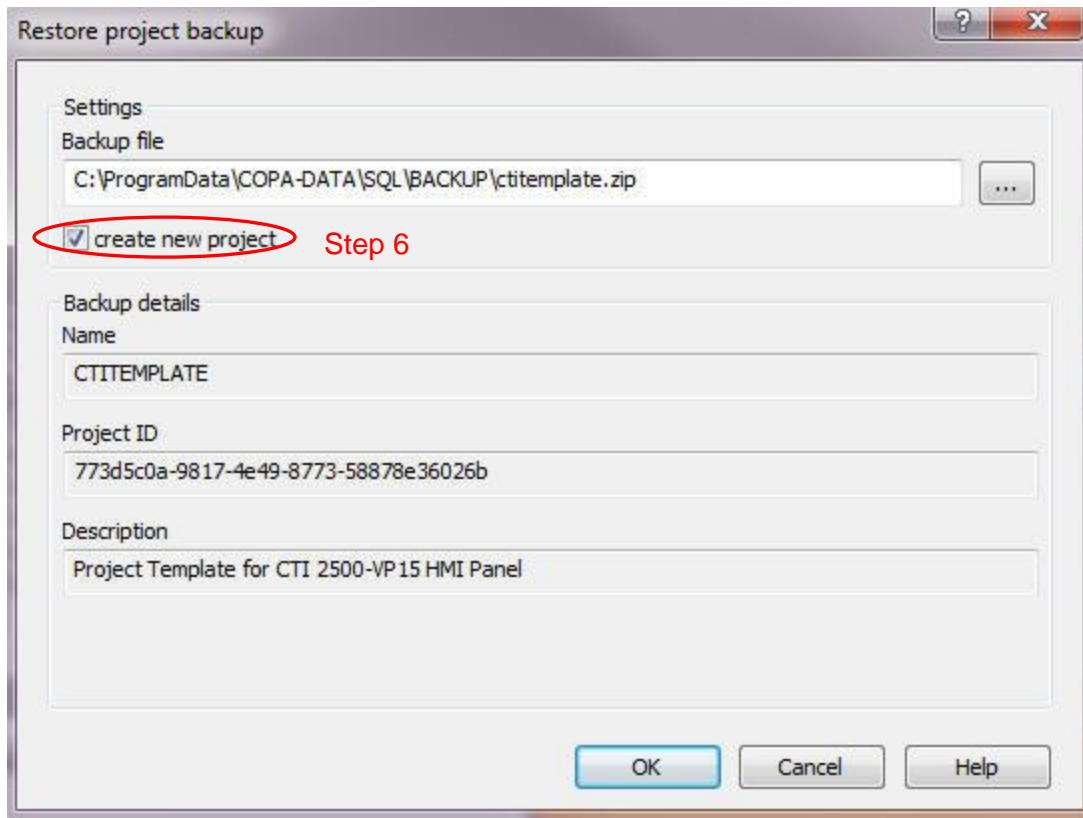
Step 3: You will now restore a project backup. This backup project that you will restore is the CTI project template that is contained on the Editor Software DVD. Click on 'Restore project backup' under the *File* menu.



Step 4: To select a project file to restore, click on the browse button indicated in the image above.



Step 5: Select the file 'ctitemplate.zip' on the Editor Software DVD and click 'Open'. This file is located in the *Project Template* folder on the Editor DVD.



Step 6: Click in the box 'create new project' and then click 'OK'.



Step 7: Enter a name for your project and click 'OK'. You are now ready to build your project.

Examples: KnoxvillePlantHMI1
WinderHMI1
FurnaceHMI

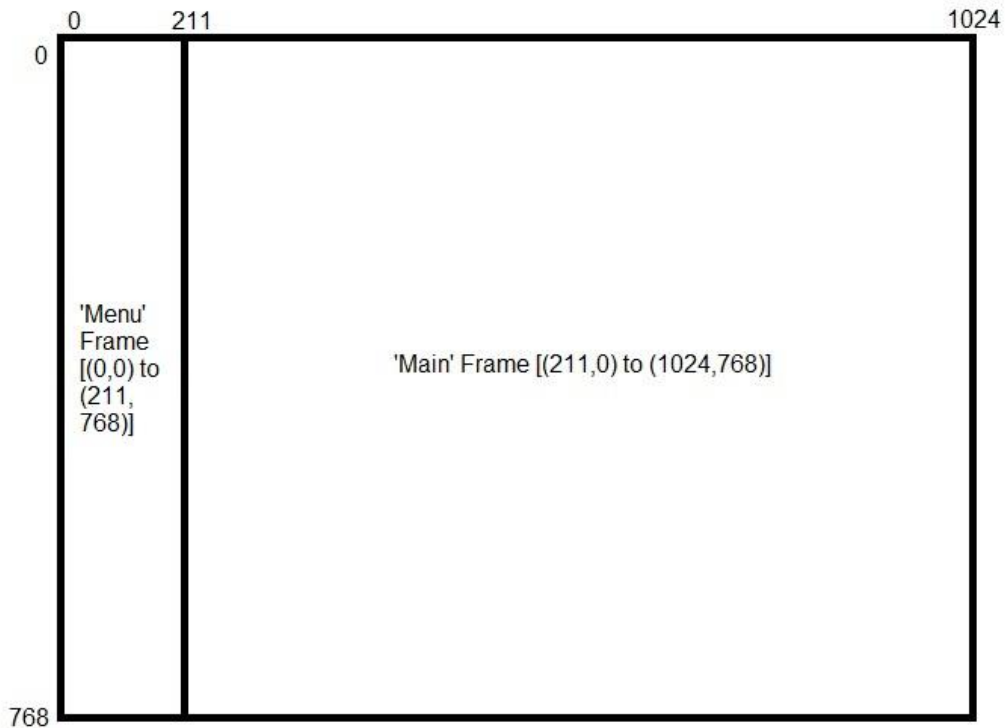
3.6 Building a Project with the Zenon Editor

This section will familiarize you with how to create frames, screens, variables, buttons, functions, numerical value displays, and trend elements. These basic elements will allow you to build a project. You will also learn how to test the functionality of your project by starting the runtime on your editor computer.

3.6.1 Adding Frames and Screens

A *Frame* defines the size and location of an area on the monitor in which screens are displayed in the Runtime. A frame must be created before you can draw your first screen. A frame is like a template for a screen. You can define certain settings for a frame which are then transferred to all screens which are based on the particular frame.

A *Screen* is a limited area on the monitor which contains elements/objects for operating, controlling, monitoring, evaluating, etc. machinery, equipment, and processes. There are different types of screens which bring along predefined functions. Screens are always based on frames which define their location on the monitor.

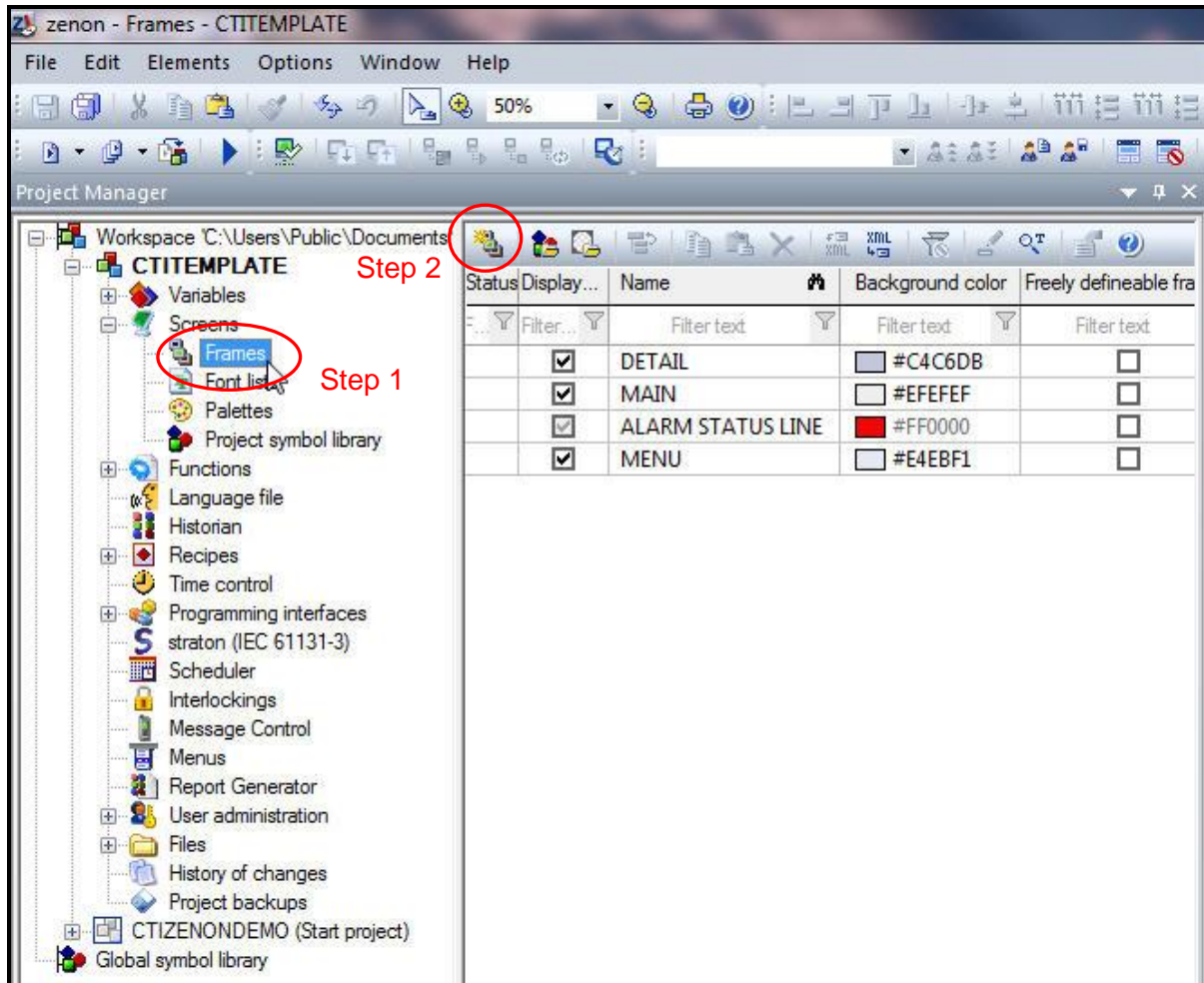


The CTI 2500-VPxx panel has a screen resolution of 1024x768 pixels. The frames that you create must fit within the displayable screen size. Above is an example of a two frames that are sized to fit the CTI HMI screen. The 'Main' frame would be used to create your main

screens and the 'Menu' frame would be used to create menu screens. All screens draw their size and position properties from the linked frame.

If you are using the CTI template to create your project, then some frames and screens have already been created for you. You can adjust the properties of the existing frames in the detail view or the properties window.

3.6.1.1 Adding a Frame



Step 1: Click on the 'Frames' icon in the Project tree under the 'Screens' branch.

Step 2: Click on the 'New Frame' icon in the detail view of the Property tree. See the image above.

Step 3: Adjust the size and position of your new frame. Frames can be sized and positioned in the Detail View of the Project Tree, in the Screen Editor Window, and in the Properties Window.

| Status | Display... | Name | Background color | Freely defineable fram... | Left [pixels] | Top [pixels] | Right [pixels] | Bottom [pixels] |
|-------------------------------------|------------|-------------------|------------------|---------------------------|---------------|--------------|----------------|-----------------|
| | Filter... | Filter text | Filter text | Filter text | Filter text | Filter text | Filter text | Filter text |
| <input checked="" type="checkbox"/> | | DETAIL | #C4C6DB | <input type="checkbox"/> | 211 | 708 | 1024 | 768 |
| <input checked="" type="checkbox"/> | | MAIN | #EFEFEF | <input type="checkbox"/> | 211 | 0 | 1024 | 768 |
| <input checked="" type="checkbox"/> | | ALARM STATUS LINE | #FF0000 | <input type="checkbox"/> | 0 | 0 | 1024 | 18 |
| <input checked="" type="checkbox"/> | | MENU | #E4EBF1 | <input type="checkbox"/> | 0 | 0 | 211 | 768 |

Detail View

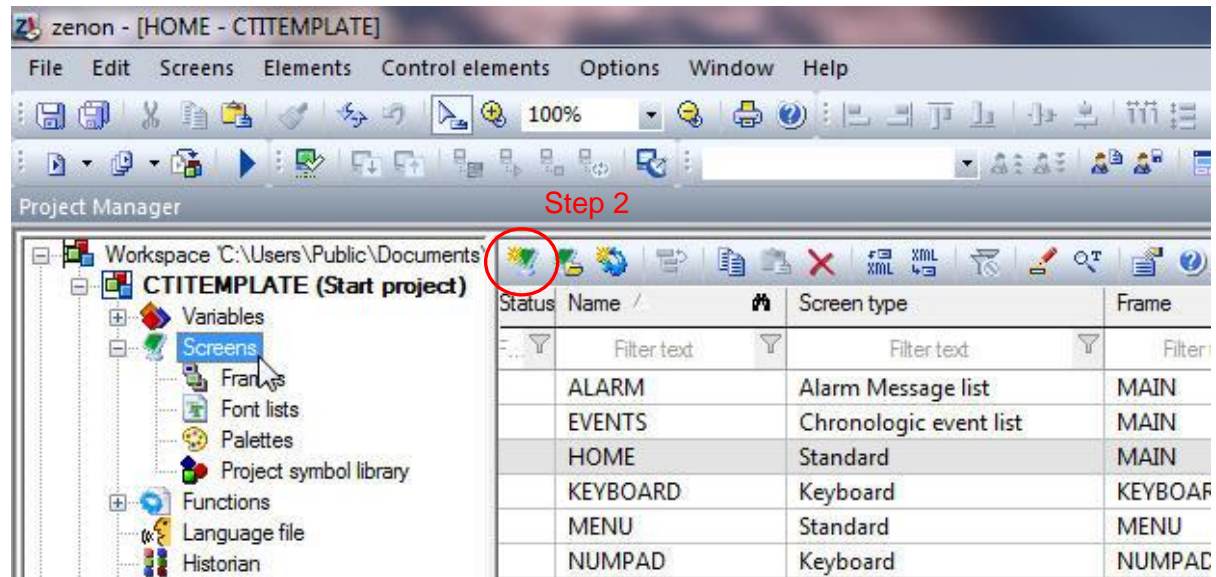
In the Detail View of the Project tree, a frame's size and position can be changed numerically. This same numerical data is available in the Properties Window.



Screen Editor Window

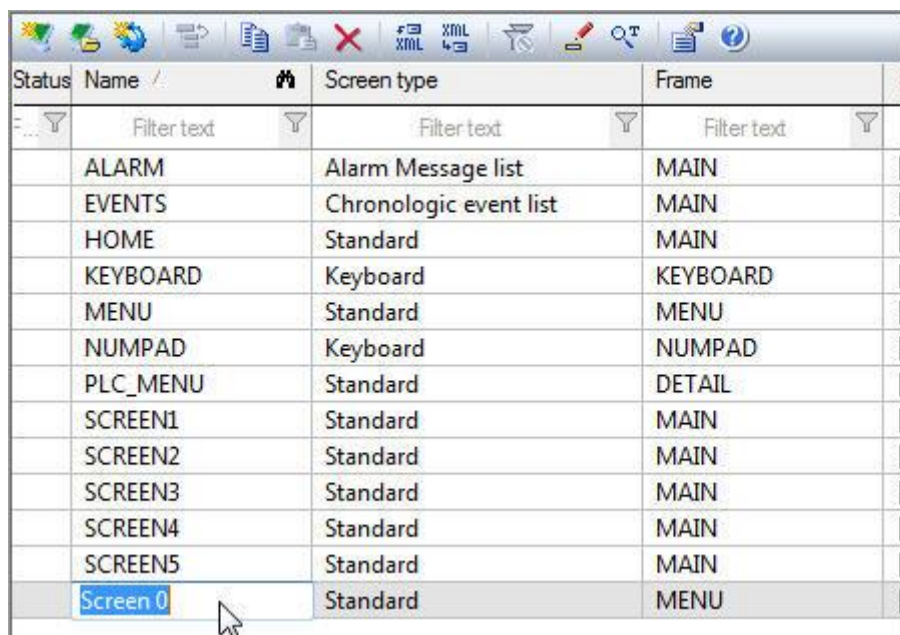
In the Screen Editor Window, a frame's size and position can be changed graphically by dragging and stretching the frame.

3.6.1.2 Adding a Screen

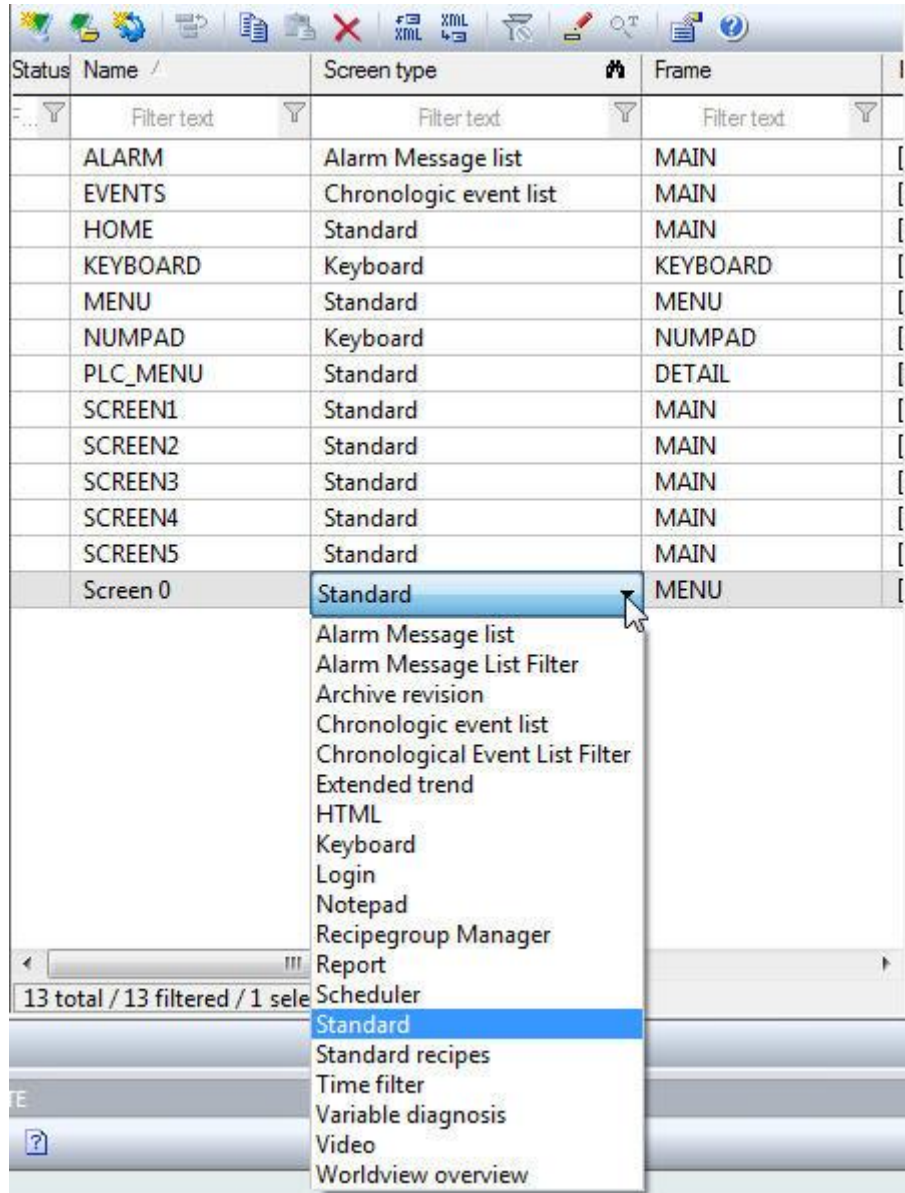


Step 1: Click on the 'Screens' icon in the Project tree.

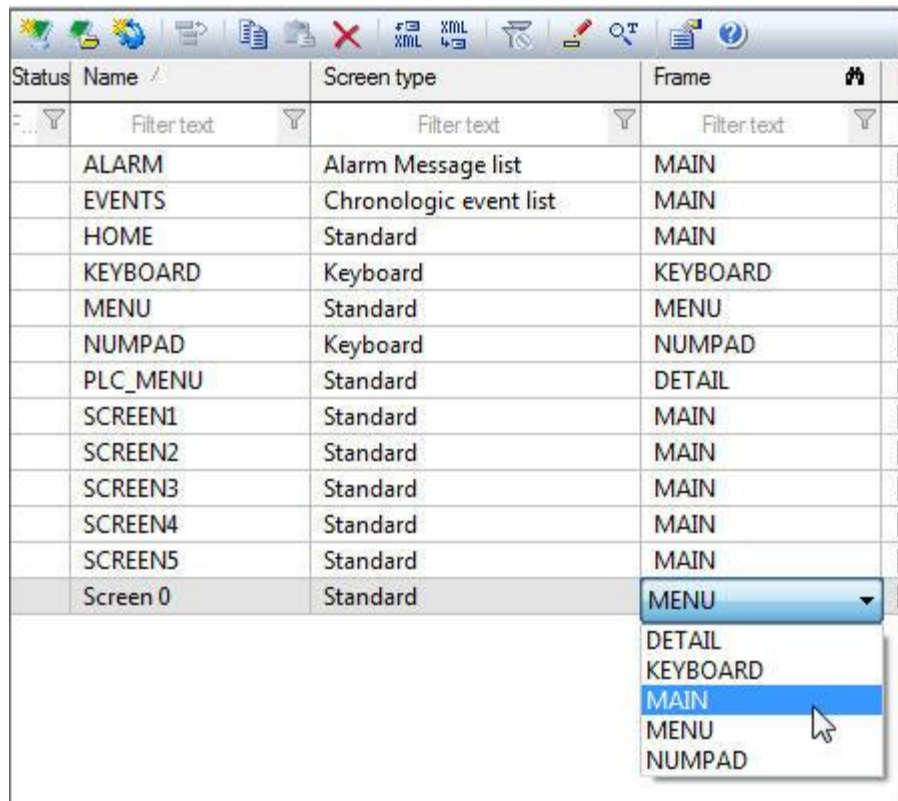
Step 2: Click on the 'New Screen' icon in the Detail View window.



Step 3: Type a name for your new screen. The default name is 'Screen 0'.



Step 4: Select the *Screen type* for your new screen. The default type is 'Standard'. Most screens that you will create will be of the 'Standard' type.



Step 5: Select one of your project's Frames to use as the new screen's template.

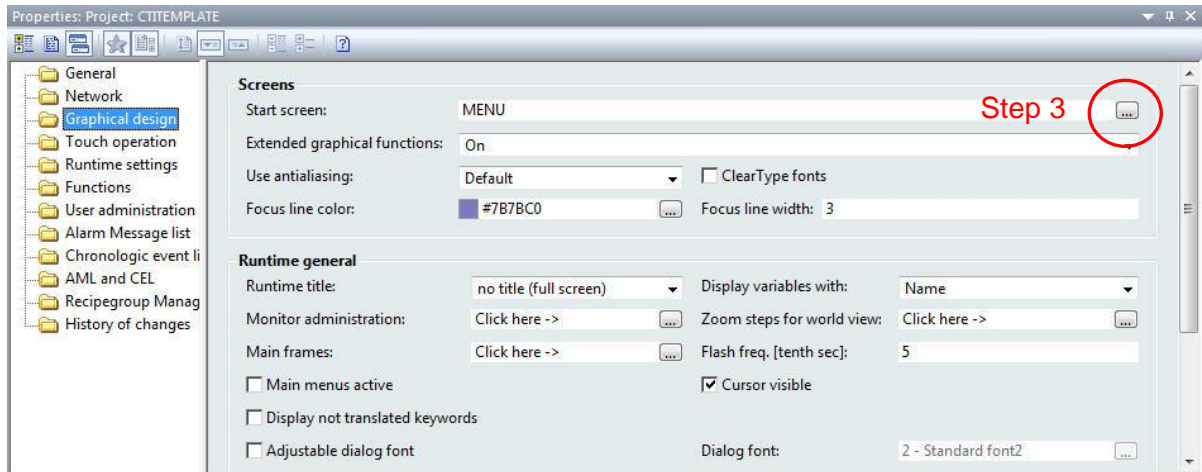
| Status | Name | Screen type | Frame | Background color | Start function | End function |
|--------|----------|------------------------|----------|----------------------------------|-------------------|-------------------|
| | ALARM | Alarm Message list | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | EVENTS | Chronologic event list | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | HOME | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | KEYBOARD | Keyboard | KEYBOARD | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | MENU | Standard | MENU | <input type="checkbox"/> #E4EBF1 | scrSTART | < no function ... |
| | NUMPAD | Keyboard | NUMPAD | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | PLC_MENU | Standard | DETAIL | <input type="checkbox"/> #C4C6DB | < no function ... | < no function ... |
| | SCREEN1 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | SCREEN2 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | SCREEN3 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | SCREEN4 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | SCREEN5 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |
| | Screen 0 | Standard | MAIN | <input type="checkbox"/> #EFEFEF | < no function ... | < no function ... |

Step 6: You can change the background color of your screen, set the Start function and End function from the Detail View window. The *Start function* is a function that is executed just after your screen has been opened. The *End function* is a function that is executed when the screen is closed.

3.6.1.3 Setting the Project Start Screen

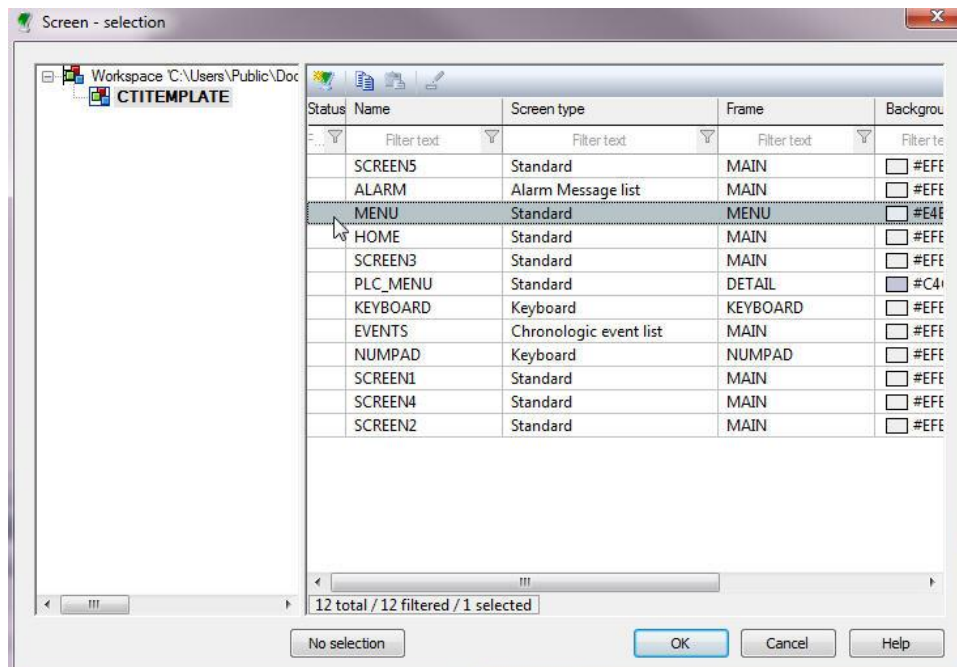
Your project must have a starting screen that is called when the project runtime is started.

Step 1: Click on your project's name in the Project tree.



Step 2: In the Properties window, click on the Graphical design folder.

Step 3: In the Properties detail window, click on the button for setting the Start screen.



Step 4: In the Screen selection window, select your desired starting screen and click the OK button.

3.6.2 Adding Variables to Your Project

A variable represents a value in the memory of the control system. Variables are based on a data type and a driver object type. All variables are linked to an object driver. Some variables are linked to an internal driver and some are linked to an external driver. The CTI 2500 Series driver is an external driver.

A PLC driver must be added to your project in order to create variables mapped to that PLC. See section 3.5.2 for instructions on adding a PLC driver.

| CTI 2500 Series Variable Types | | | | |
|--------------------------------|--------------|--------------|---|--------------------------|
| Driver Object Type | Channel Type | Read / Write | Supported Data Types | Description |
| V memory | 64 | R / W | BOOL, SINT, USINT, INT, UINT, DINT, UDINT, REAL, STRING | Programmable Data Memory |
| K memory | 65 | R | BOOL, SINT, USINT, INT, UINT, DINT, UDINT, REAL, STRING | Constant Memory |
| STW memory | 66 | R / W | INT,UINT | PLC Status Word Memory |
| WX memory | 67 | R / W | INT,UINT | Analog Input Memory |
| WX memory | 68 | R / W | INT,UINT | Analog Output Memory |
| X memory | 69 | R / W | BOOL | Digital Input Memory |
| Y memory | 70 | R / W | BOOL | Digital Output Memory |
| C memory | 71 | R / W | BOOL | Control Relay Memory |
| Time/Counter | 72 | R / W | INT | Timer and Counter Memory |
| Drum | 73 | R / W | INT | Drum Variable Memory |
| Loop variable | 74 | R / W | INT,UINT,REAL | PID Loop Variable Memory |
| Alarm variable | 75 | R / W | INT,UINT,REAL | Alarm Variable Memory |

In the above table, the different *Driver Object types* or *Variable types* are listed for the CTI 2500 Series driver. All variable types can be read and written except the K memory which is read only. The supported data types are also listed for each variable type.

Some variable types like timers, counters, loops, and alarms have a *Secondary Object type*. These variable types have more than one value associated with them. For example, a timer has a preset value and a current count value. CTI has chosen to make these values accessible under the timer object type as secondary objects.

The following table contains the available Secondary Object types available with the CTI 2500 Series driver.

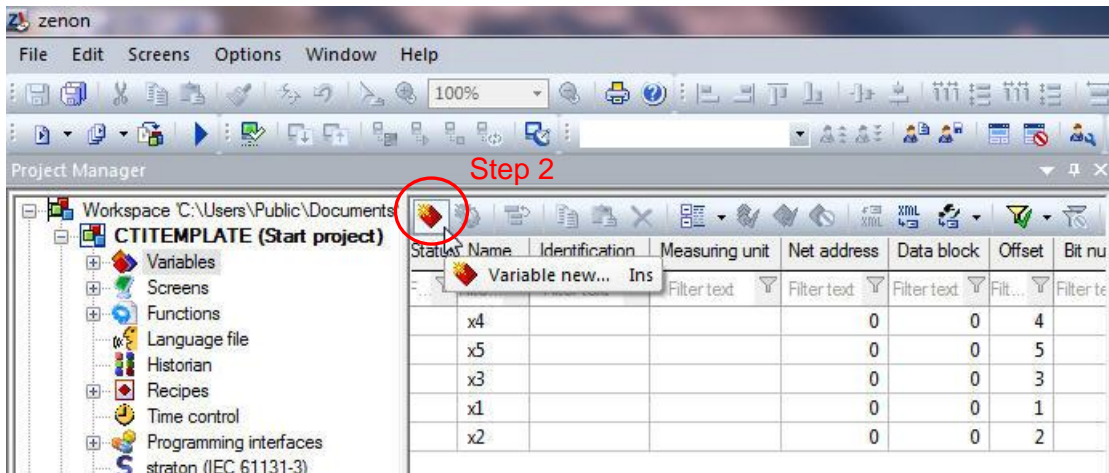
| CTI 2500 Series Secondary Variable Types | | |
|---|------------------|---------------------|
| Secondary Object Type | Data Type | Object Value |
| Timer / Counter | | |
| Preset (TCP) | INT | 0 |
| Current (TCC) | INT | 1 |
| Drum | | |
| Step Preset (DSP) | INT | 0 |
| Step Current (DSC) | INT | 1 |
| Count Preset (DCP) | INT | 2 |
| Count Current (DCC) | INT* | 3 |
| Loop Variable | | |
| Gain (LKC.) | REAL | 0 |
| Reset Time - min (LTI.) | REAL | 1 |
| Rate Time – min (LTD.) | REAL | 2 |
| Sample Rate – sec (LTS) | REAL | 3 |
| Process Variable (LPV) | REAL, INT | 4 |
| PV High Limit (LPVH) | REAL | 5 |
| PV Low Limit (LPVL) | REAL | 6 |
| Set Point (LSP) | REAL, INT | 7 |
| SP High Limit (LSPH) | REAL, INT | 8 |
| SP Low Limit (LSPL) | REAL, INT | 9 |
| Output (LMN) | REAL, INT | 10 |
| Bias (LMX) | REAL, INT | 11 |
| Error (empty) | REAL, INT | 12 |
| High-High Alarm Limit (LHHA) | REAL, INT | 13 |
| High Alarm Limit (LHA) | REAL, INT | 14 |
| Low Alarm Limit (LLA) | REAL, INT | 15 |
| Low-Low Alarm Limit (LLLA) | REAL, INT | 16 |
| Alarm Deadband (LADB) | REAL, INT | 17 |
| Orange Dev Alarm Limit (LODA) | REAL, INT | 18 |
| Yellow Dev Alarm Limit (LYDA) | REAL, INT | 19 |
| Rate of Change Alarm Limit (LRCA) | REAL | 20 |
| Alarm Acknowledge Flags (LACK) | UINT | 21 |
| Deriv Gain Limiting Coeff (LKD) | REAL | 22 |

| | | |
|-----------------------------------|------------|----|
| Loop Status | UINT | 23 |
| Loop Mode | UINT | 24 |
| Loop V-Flags (LVF) | UINT | 25 |
| Control Flags – MSW (LCFH) | UINT | 26 |
| Control Flags – LSW (LCFL) | UINT | 27 |
| Ramp/Soak Status Flags (LRSF) | UINT | 28 |
| Ramp/Soak Step Number (LRSN) | INT | 29 |
| Alarm Variable | | |
| Sample Rate – sec (ATS) | REAL | 0 |
| Process Variable (APV) | REAL, INT | 1 |
| PV High Limit (APVH) | REAL | 2 |
| PV Low Limit (APVL) | REAL | 3 |
| Set Point (ASP) | REAL, INT | 4 |
| SP High Limit (ASPH) | REAL, INT | 5 |
| SP Low Limit (ASPL) | REAL, INT | 6 |
| Error (AERR) | REAL, INT* | 7 |
| High-High Alarm Limit (AHHA) | REAL, INT | 8 |
| High Alarm Limit (AHA) | REAL, INT | 9 |
| Low Alarm Limit (ALA) | REAL, INT | 10 |
| Low-Low Alarm Limit (ALLA) | REAL, INT | 11 |
| Alarm Deadband (AADB) | REAL, INT | 12 |
| Orange Dev Alarm Limit (AODA) | REAL, INT | 13 |
| Yellow Dev Alarm Limit (AYDA) | REAL INT | 14 |
| Rate of Change Alarm Limit (ARCA) | REAL, INT | 15 |
| Alarm Acknowledge Flags (AACK) | UINT* | 16 |
| Alarm V-Flags (AVF) | UINT* | 17 |
| Alarm Control Flags – MSW (ACFH) | UINT | 18 |
| Alarm Control Flags – LSW (LCFL) | UINT | 19 |

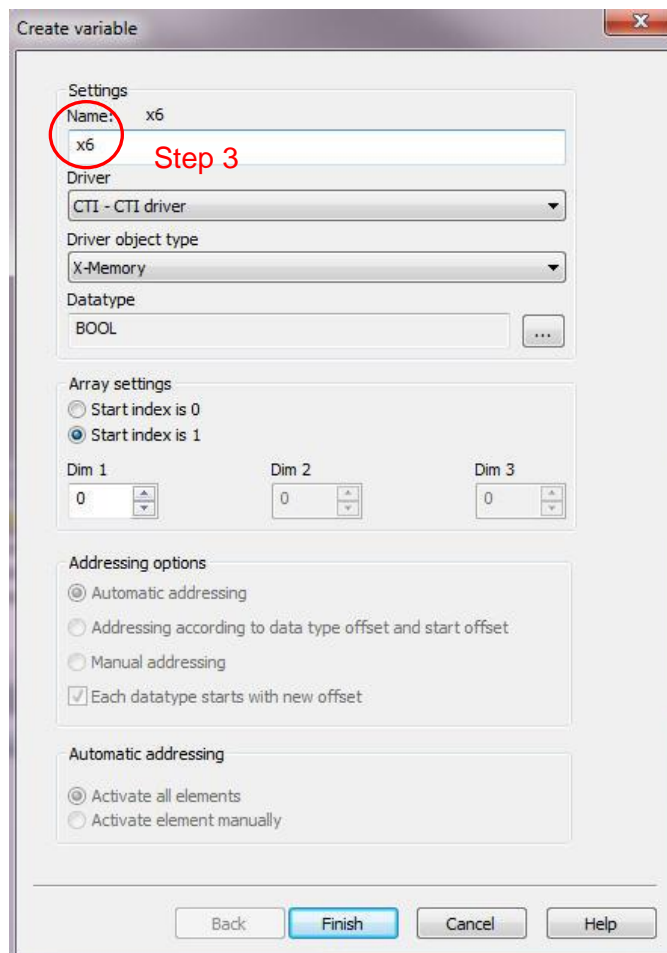
* Read Only

3.6.2.1 Creating a New Variable

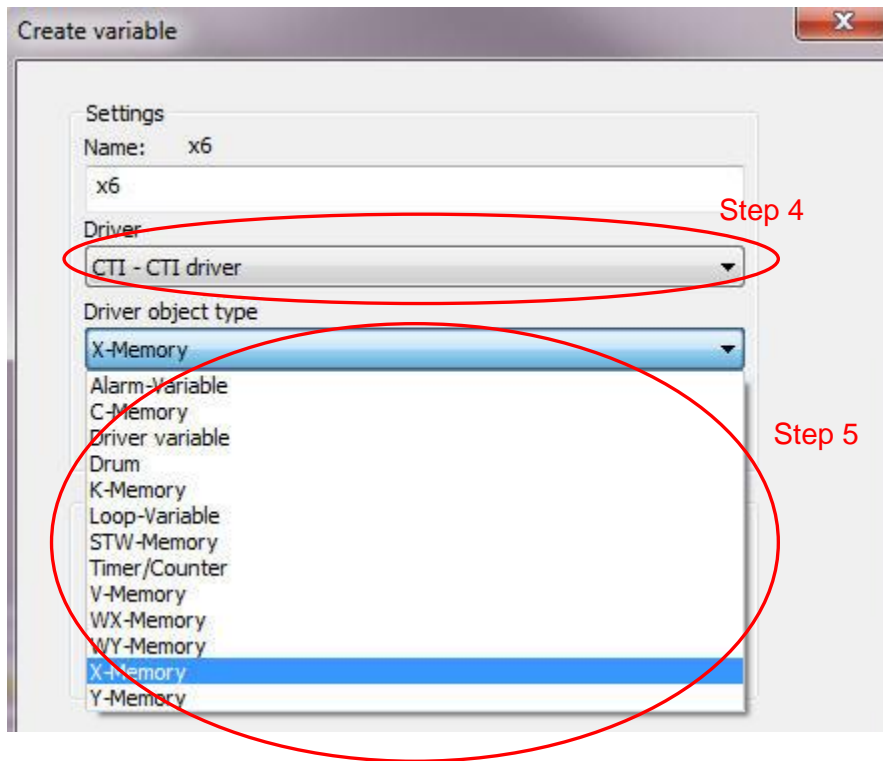
Step 1: In the Project tree, click on the *Variables* branch.



Step 2: In the Detail View window, click on the *Variable new* icon.



Step 3: When the Create variable window appears, enter a name for your variable in the name box.



Step 4: In the Create variable window, select the PLC driver.

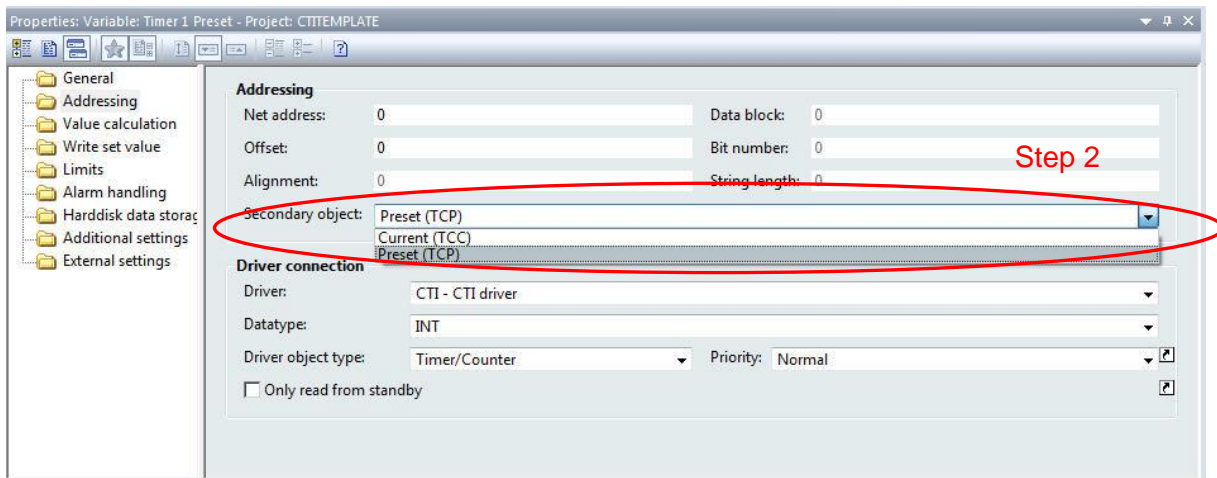
Step 5: In the *Driver object type* list box, select the variable type that you wish to create.

Step 6: Click the finish button when you are done.

3.6.2.2 Selecting a Secondary Object Type

For timer, counter, drum, loop, and alarm variables, you must select a secondary object type. Secondary Objects are currently only used in the CTI driver.

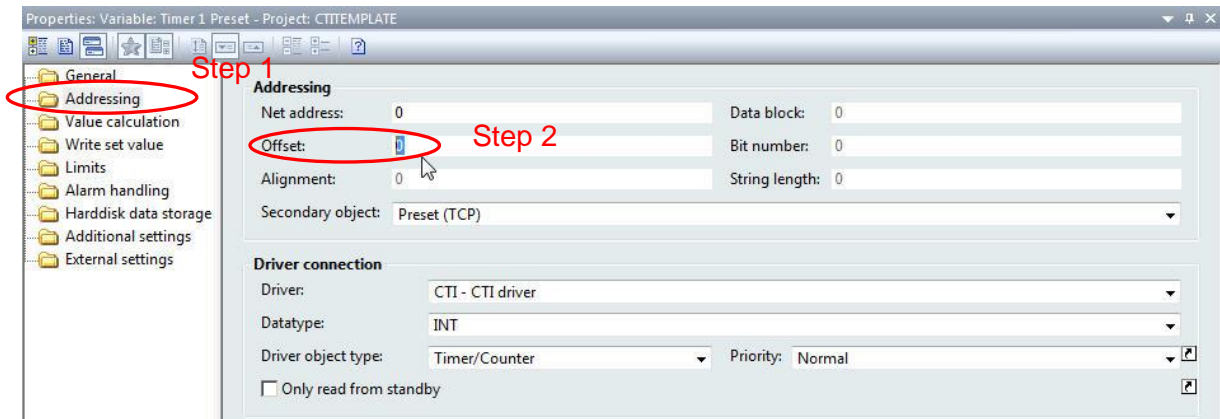
Step 1: In the Variables Detail view, click on the variable that requires a secondary object.



Step 2: Under the Addressing folder in the Properties window, select the Secondary Object type from the list box.

3.6.2.3 Setting the Variable Offset

Another necessary step after creating a new variable is setting the variable's offset. The offset value corresponds to the memory address of the PLC variable to which you are connecting. For example, for the X memory type of the CTI PLC, the offset value is '1' for digital input 'x1'. If there was a counter 2 variable in the CTI PLC the offset would be a value of '2'.



Step 1: In the Variables Properties window, click on the *Addressing* folder.

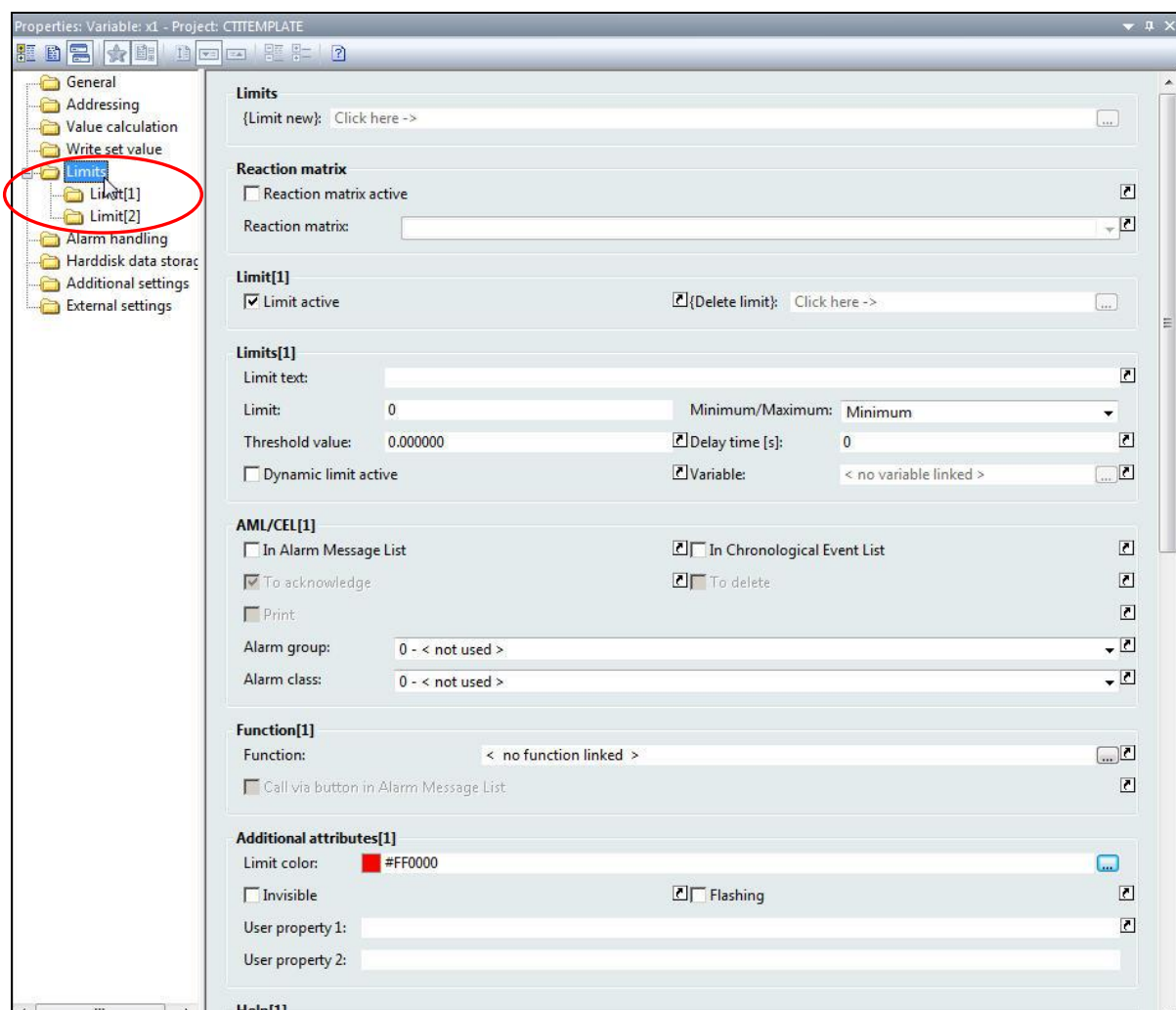
Step 2: Enter the Offset value in the Properties detail window.

3.6.2.4 Setting Variable Limits

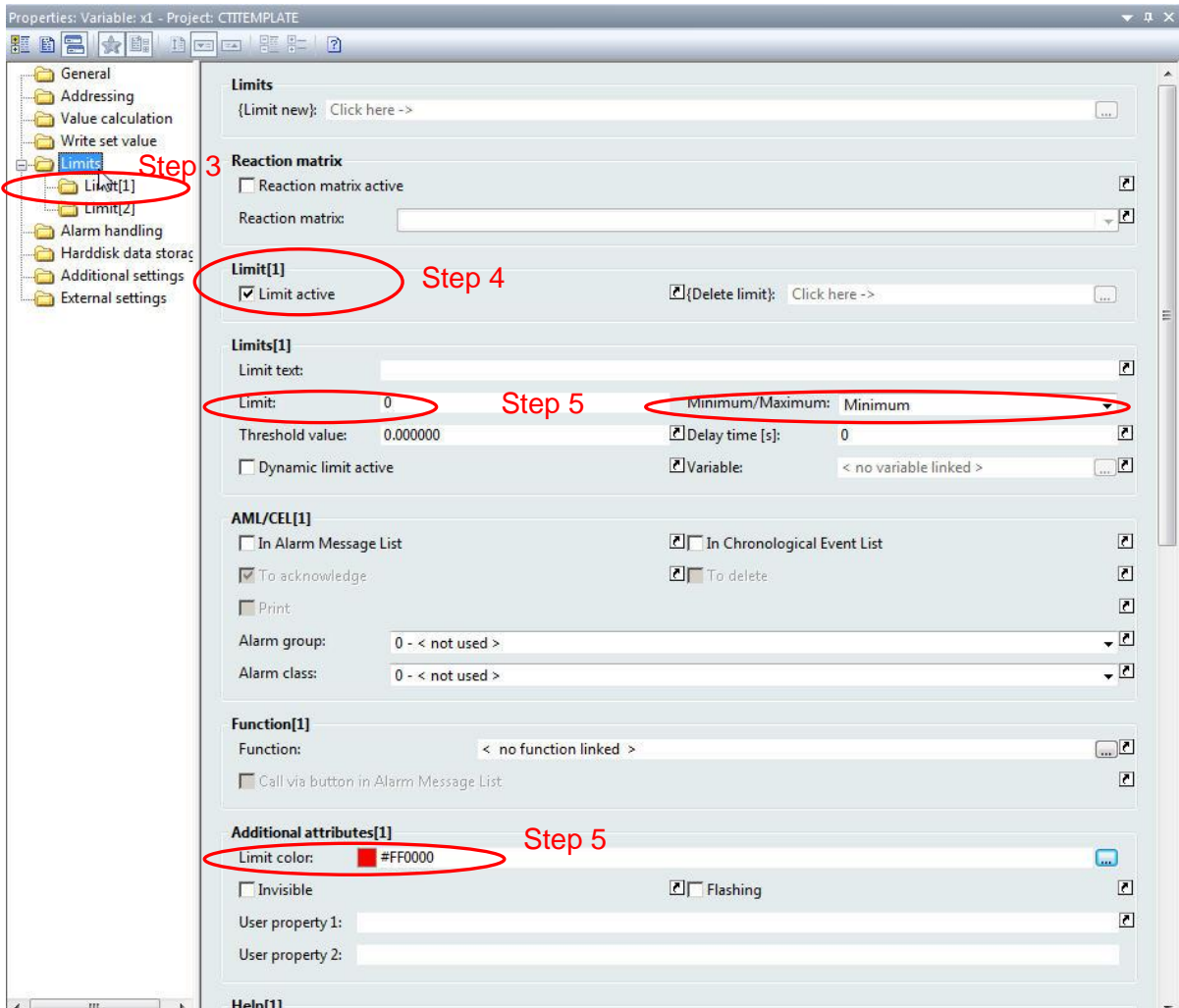
The Limit property of a variable is a very important feature for obtaining variable status and triggering alarms. Limits are handled in the properties of the variable not in the properties of an onscreen object. If, for example, you would like a picture of a valve to turn red when closed and green when opened, then you must use the limit property of the variable tied to the valve position.

Example: A valve has a position switch wired to digital PLC input 'X1'. This switch gives a full signal when the valve is opened and no signal when the valve is closed.

Step 1: Create a variable for the CTI driver named 'X1'. This variable will be an X memory variable with an offset of 1. See Section 3.7.2.1 for instructions to create a new variable.



Step 2: In the Properties window for the new variable that you just created, expand the *Limits* folder. You will see two limits already defined by Zenon by default.

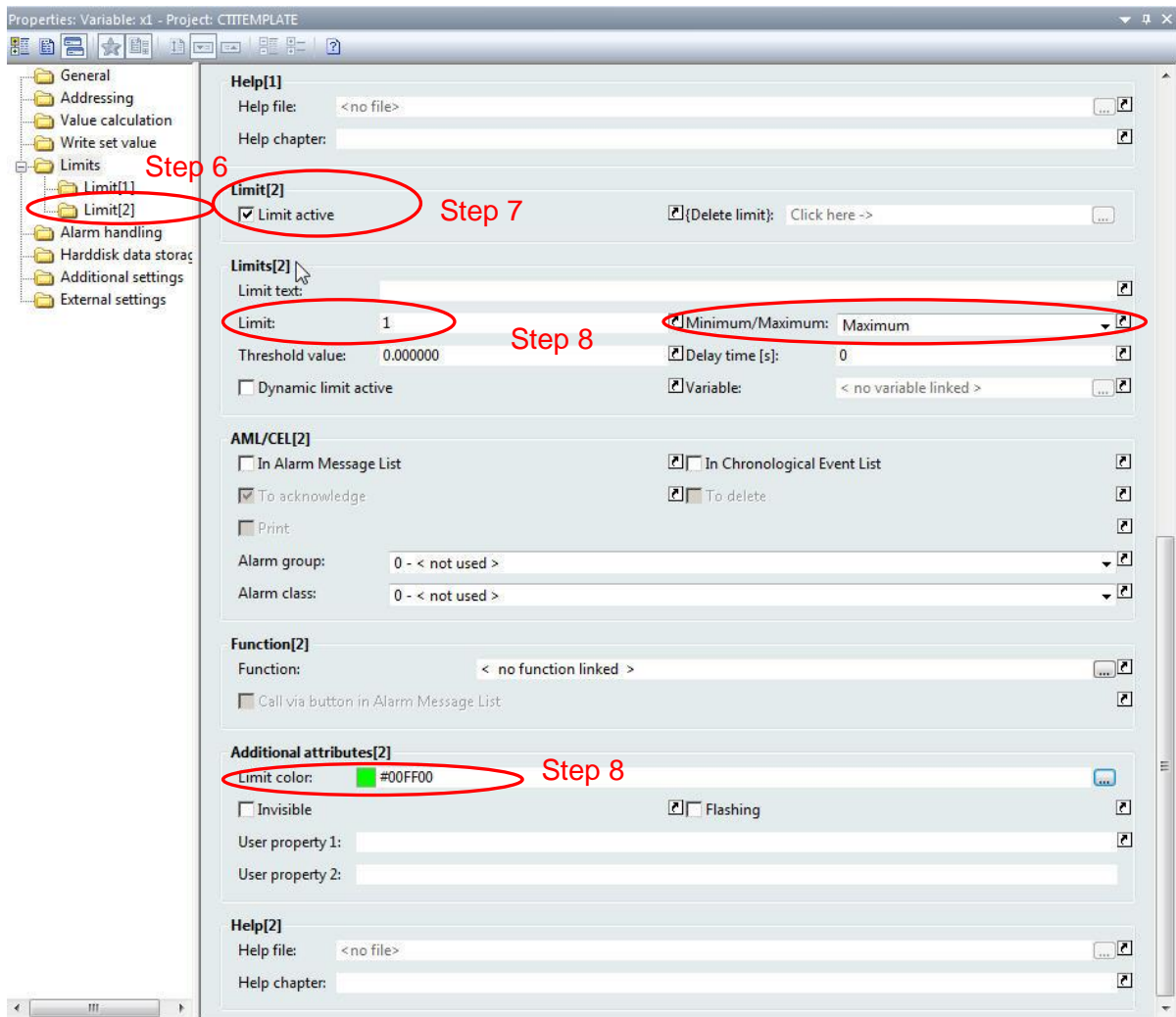


Step 3: Click on the *Limit[1]* folder.

Step 4: Notice that the *Limit active* checkbox is checked. In order for a limit to be enabled, the *Limit active* box must be checked.

Step 5: Notice that Limit 1 has been preconfigured to be a minimum limit of value '0' with a limit color of red. What this means is that when X1 is equal to zero then the limit color of red is triggered.

A *Minimum* limit is triggered when a variable value is equal to or less than the minimum limit value.



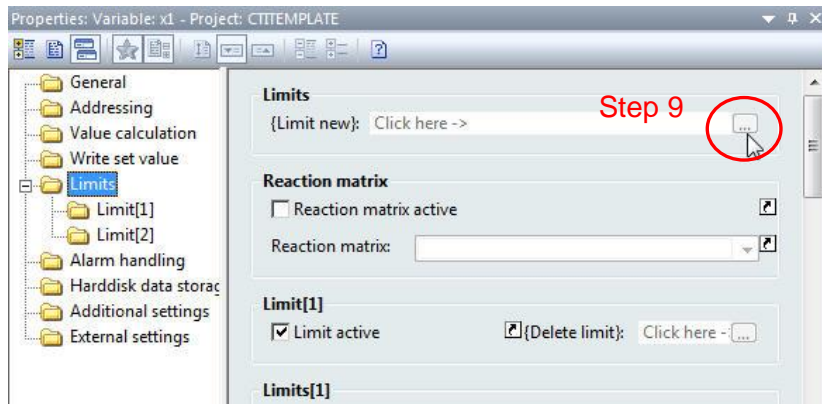
Step 6: Click on the *Limit[2]* folder.

Step 7: Notice that the *Limit active* checkbox is checked. In order for a limit to be enabled, the *Limit active* box must be checked.

Step 8: Notice that Limit 2 has been preconfigured to maximum limit of value '1' with a limit color of green. This means that when X1 is equal to '1' then the limit color of green is triggered.

A *Maximum* limit is triggered when a variable value is equal to or greater than the maximum limit value.

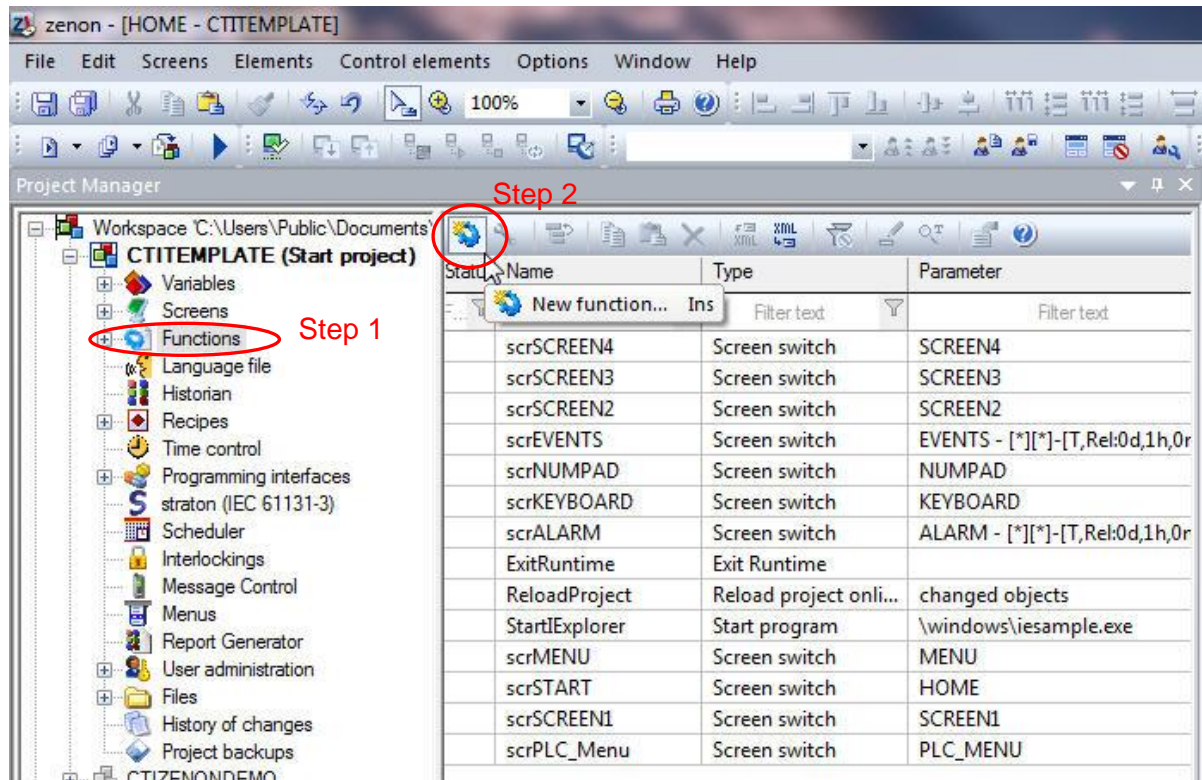
For integer or real type variables, multiple limits can be added and configured.



Step 9: To add a new limit, click on the *Limit new* button in the Limits folder.

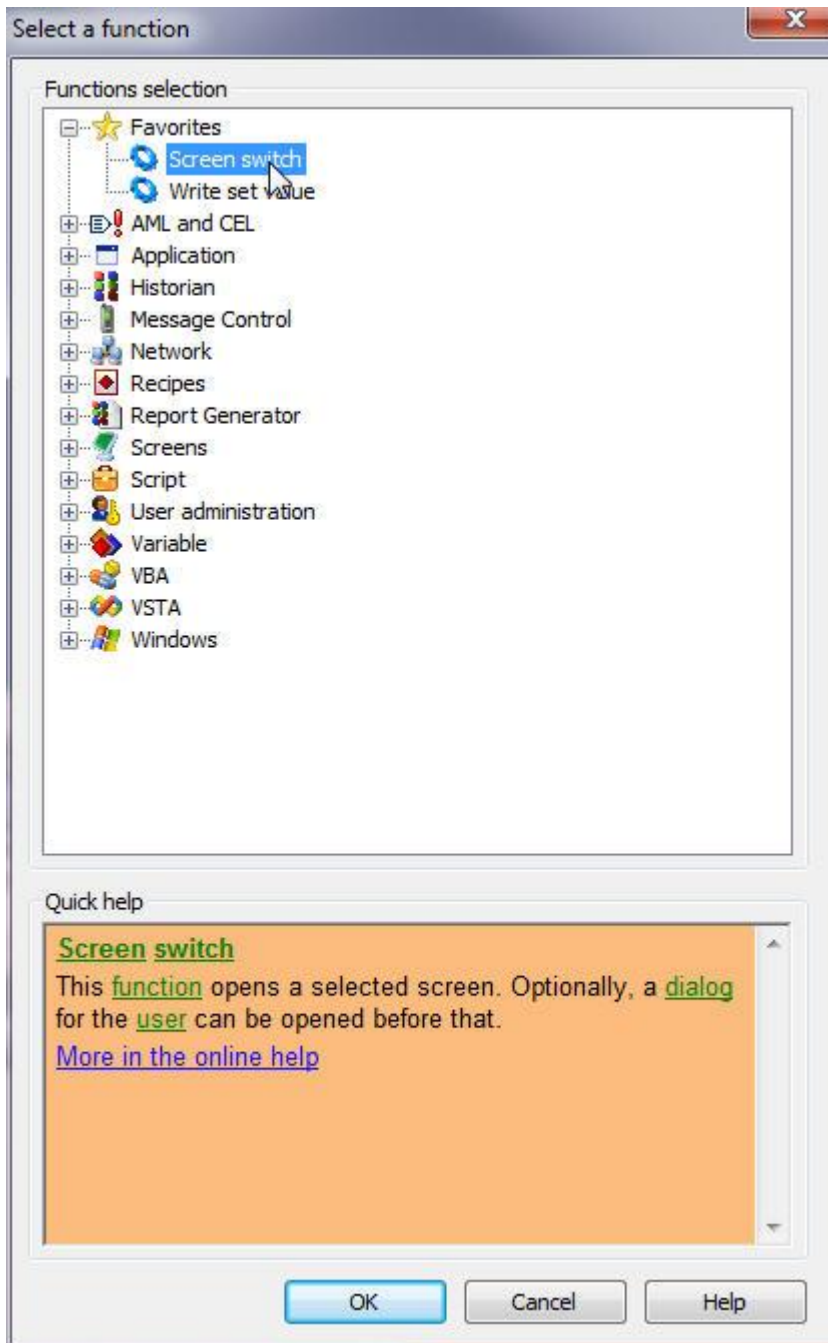
3.6.3 Creating Functions

A function is a predefined action which can be triggered in the Runtime; e.g. a screen switch or a file operation, etc. Before a button can be added to your project, you must first create the function that the button will activate. Two of the most common functions that you will use are the *screen switch* and *write set value* functions.

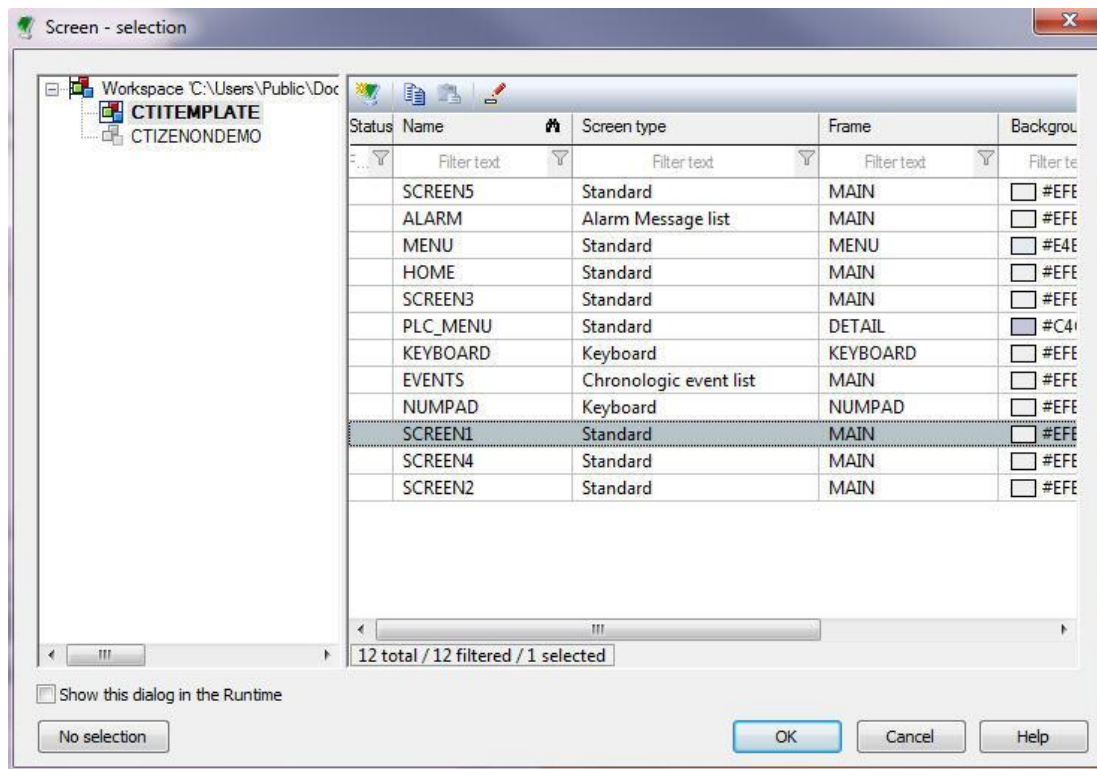


Step 1: In the Project tree, click on the *Functions* icon.

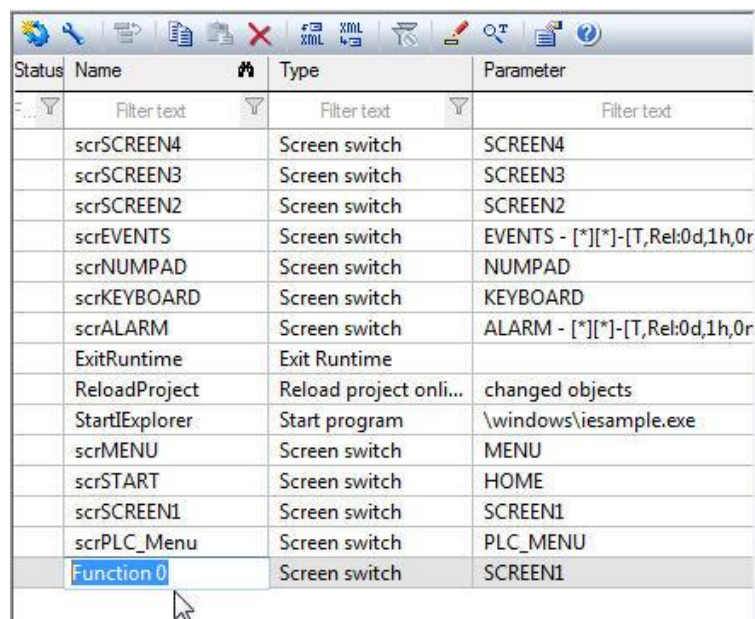
Step 2: In the Detail view, click on the *New function* icon.



Step 3: When the *Select a function* window appears, select a function from the list and then click the OK button. In this example, the screen switch function is selected.



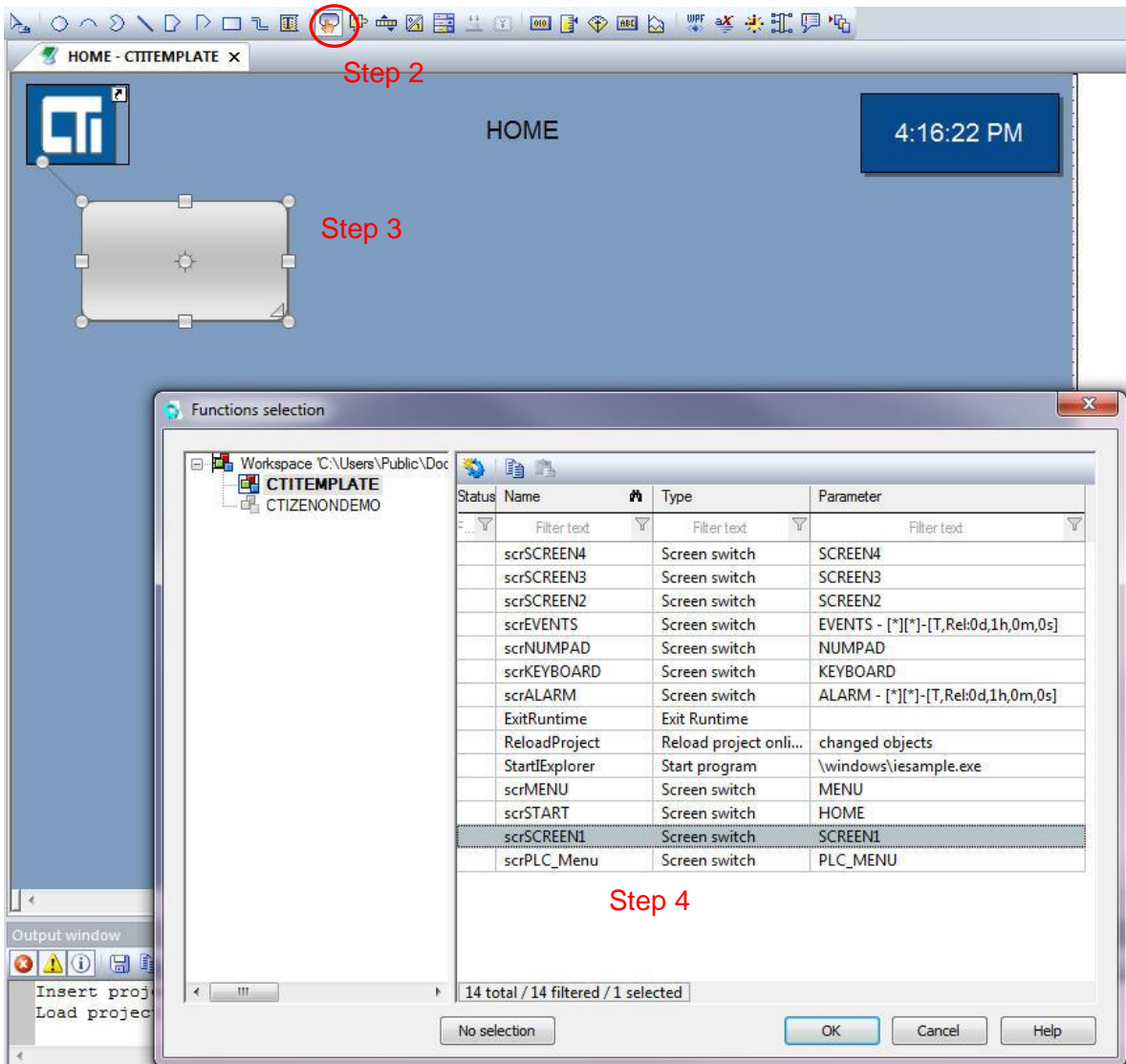
Step 4: When the *Screen - selection* window appears, select a screen from the list and then click the OK button.



Step 5: In the Detail View, you can click on the new function to rename it.

3.6.4 Creating Buttons

Step 1: In the Project tree, click on the Screens icon. In the Detail View, double click on the screen in which you will be placing a new button.



Step 2: Click on the icon for *Create a button*.

Step 3: In the *Screen Editor* window, click and drag a new button on the screen.

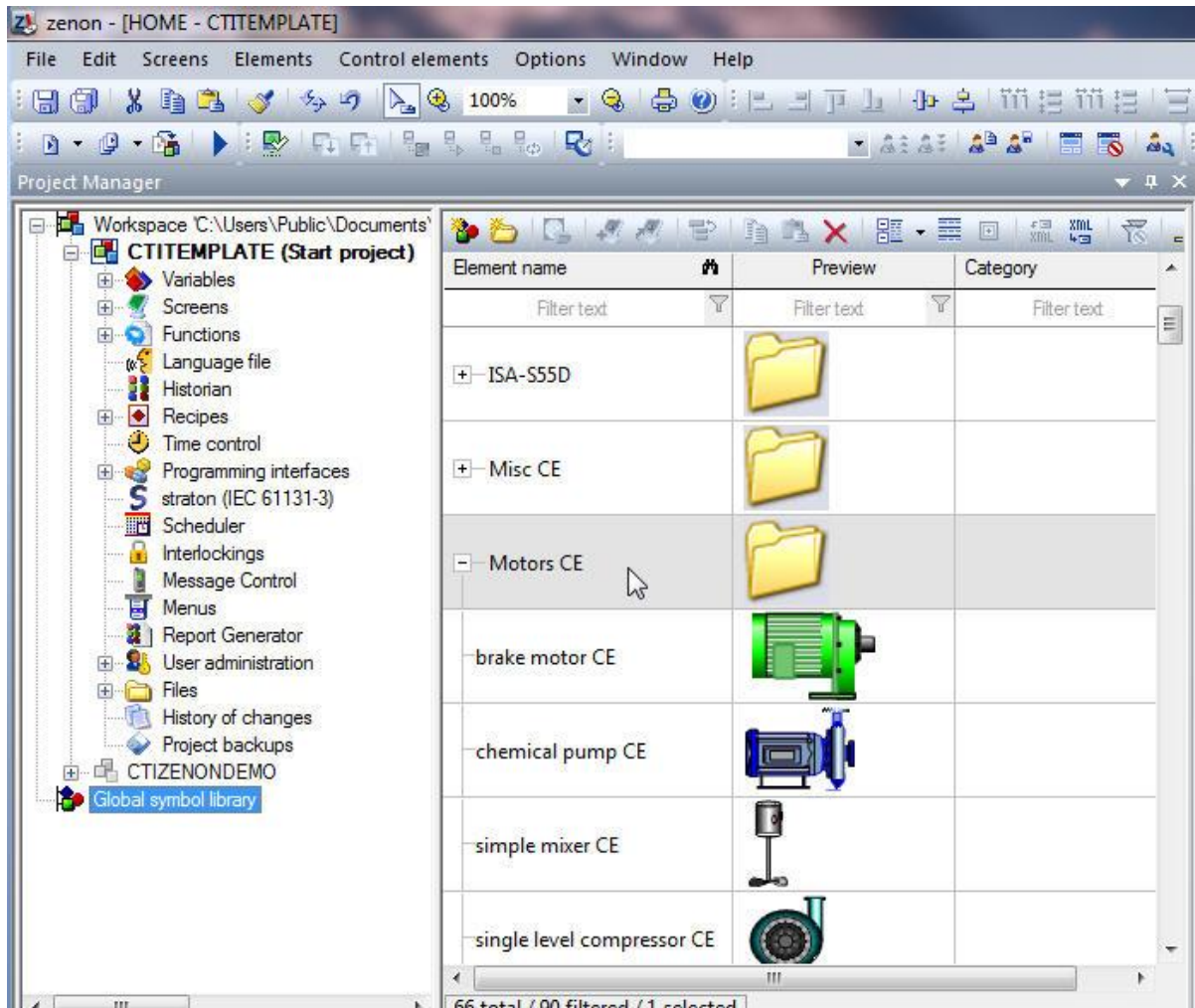
Step 4: You will now need to select a function for your button. When the Functions selection window appears, select the function and click the OK button.



Step 5: Double click on the new button. You will now be able to type a label for the button.

3.6.5 Adding Graphical Symbols

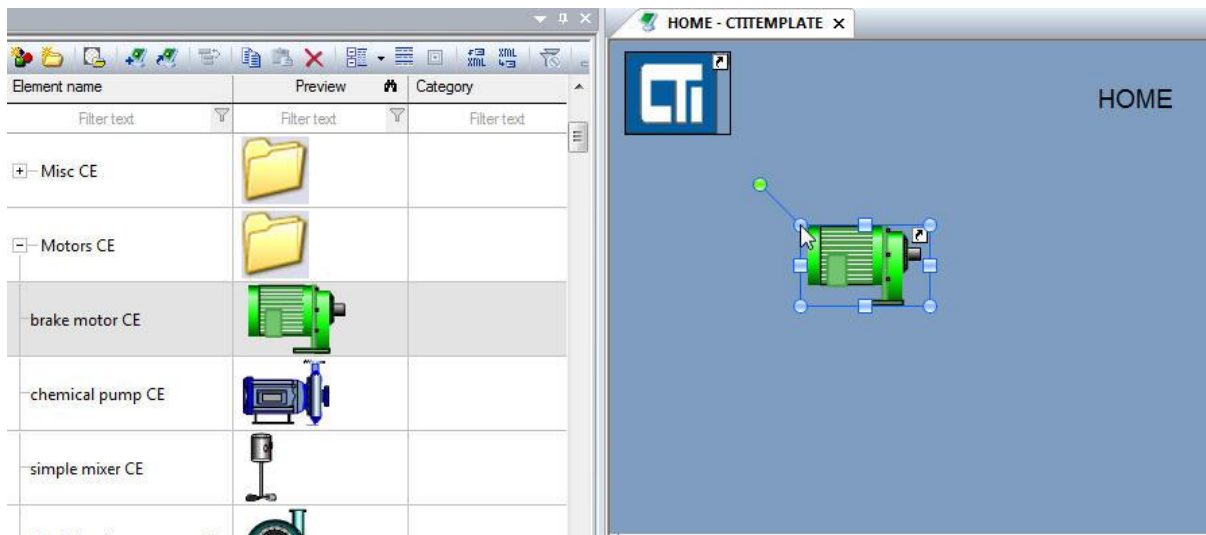
The Zenon Editor has a large graphical symbols library that you may use to create your project screens. You may use these symbols in your project or create your own by editing an existing symbol.



Step 1: To add a graphical symbol to your project screen, click on the *Global symbol library* icon in the Project tree.

Step 2: Find a symbols folder that contains your desired symbol, for example the 'Motors' folder contains a variety of motor and pump symbols.

Step 3: Click on the '+' beside the desired folder to view the symbols contained therein.

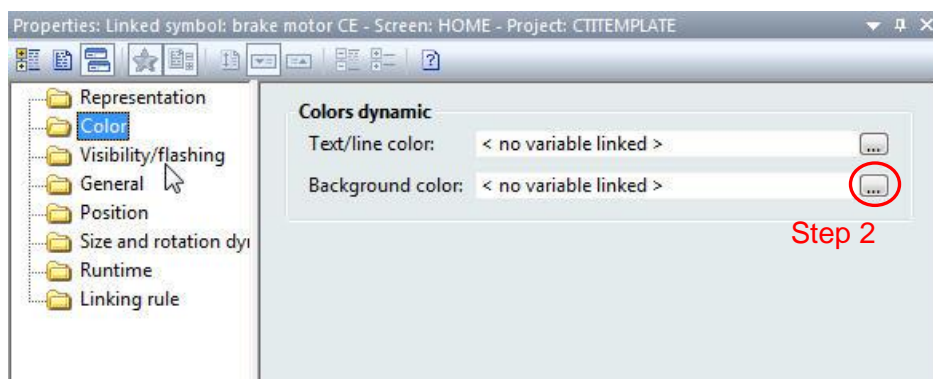


Step 4: Click and drag a symbol from the library folder onto an open screen in the Screen Editor window.

3.6.5.1 Linking a Variable to a Graphics Symbol

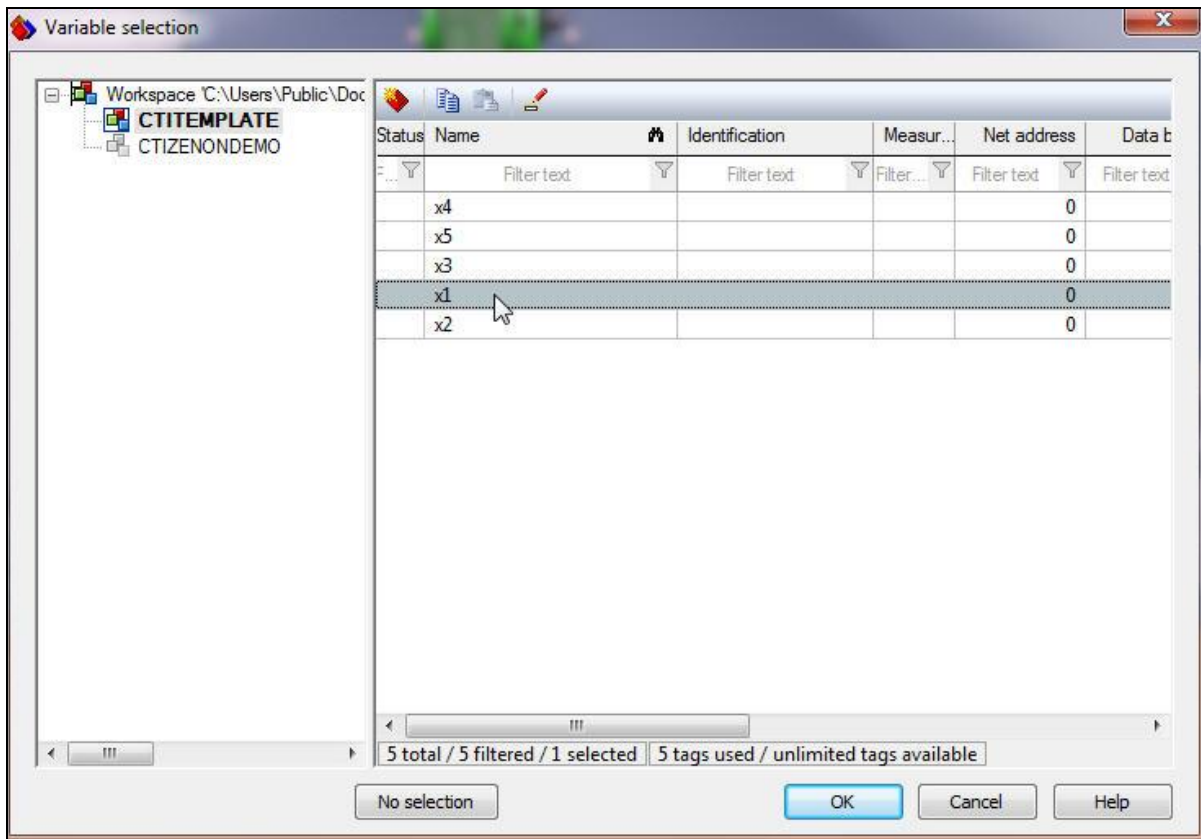
The color and visibility of a graphics symbol can be controlled by linking the symbol to a variable which has defined limits. For example, earlier in section 3.7.2.1, we created a variable which we named 'X1'. Variable 'X1' had two defined limits, one limit that displayed the color red when X1 was equal to '0' and the other limit that displayed the color green when X1 was equal to '1'.

If we link this variable to the background color property of the new graphics symbol that we added to our project, then the motor color will appear red when X1 is equal to zero and it will appear green when X1 is equal to '1'.



Step 1: In the Properties window for the new graphics symbol, click on the *Color* folder. You can also link a variable to *Visibility/flashing* properties.

Step 2: Click on the Background color button to link a variable to this property.



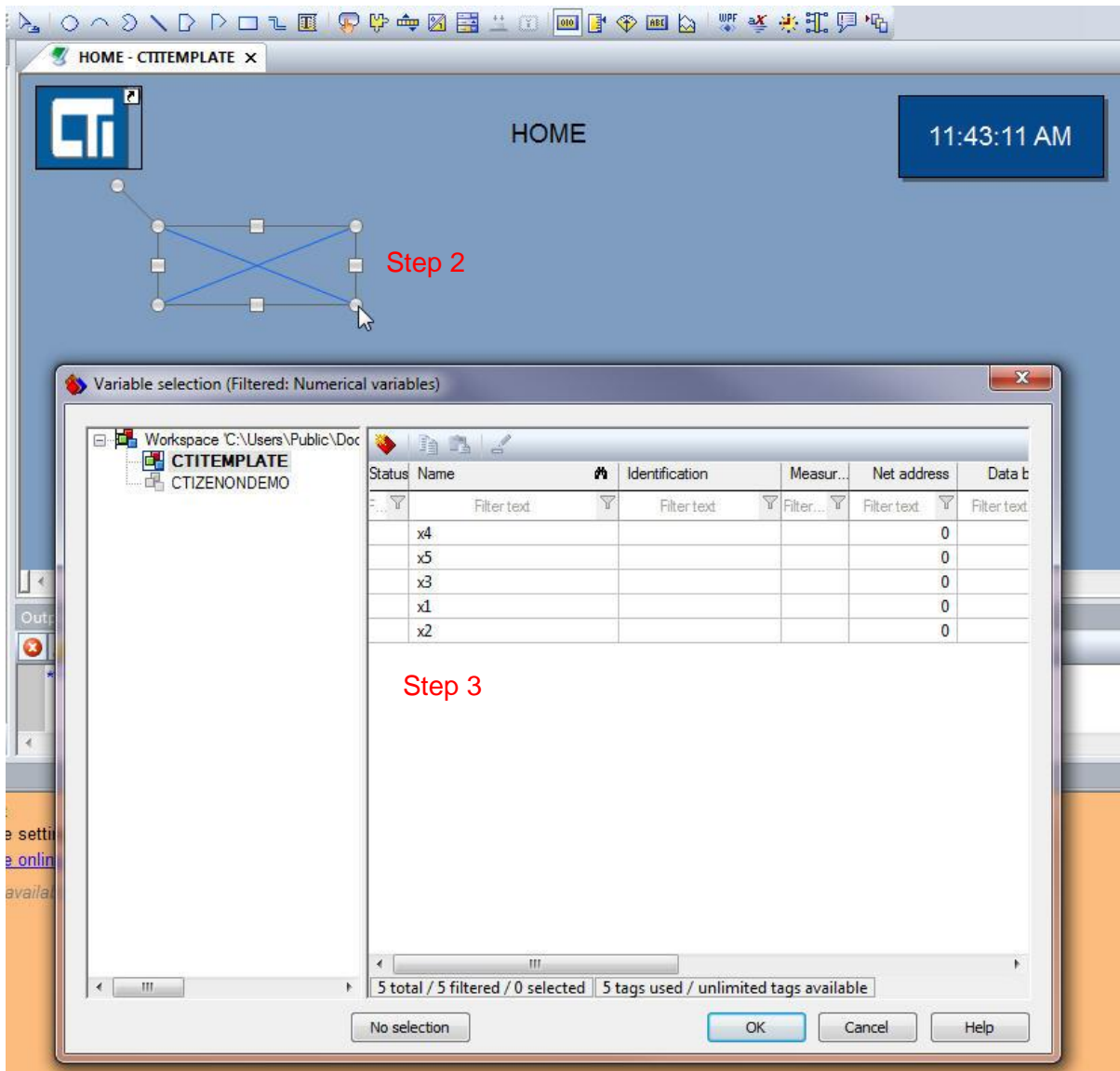
Step 3: Select the variable to link to your symbol and then click the OK button.

3.6.6 Adding Numerical Displays

A Numerical value display box is used to give a graphical readout of a variable value on a project screen.

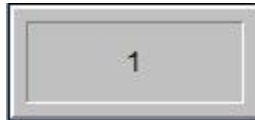


Step 1: To add a *Numerical value* display to your project screen, click on the *Numerical value* icon in the *Elements* toolbar.

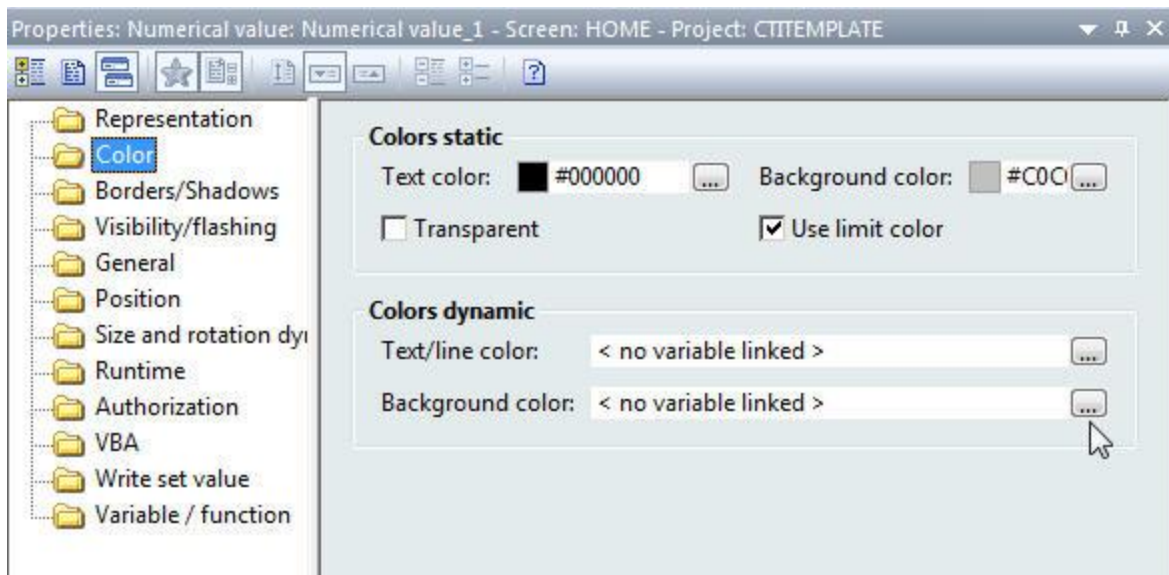


Step 2: Click and drag the numerical display to the desired size.

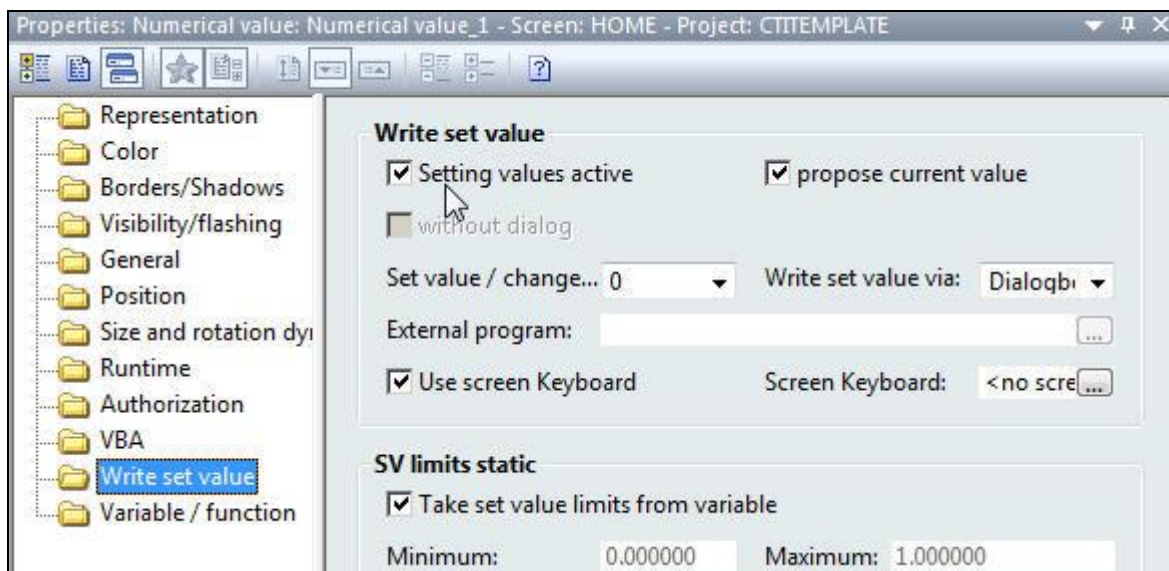
Step 3: When the variable selection window appears, click to select a variable to display and then click the OK button.



There are a number of properties available to customize your Numerical value display. We will examine a couple of them.



Step 4: Under the color folder, the background color and Text/line color can be link to a variable with defined limits.



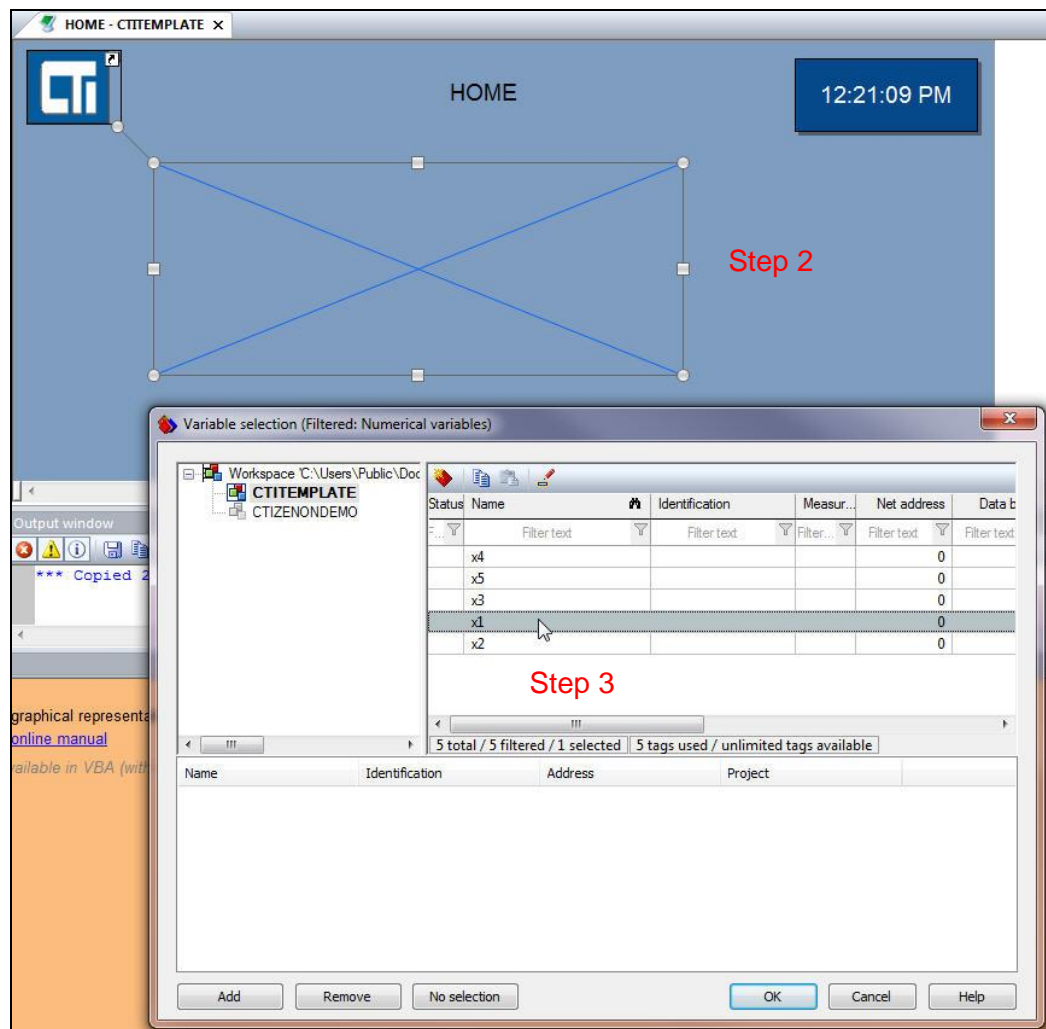
Step 4: Under the Write set value folder, the Setting values active checkbox allows the value in the Numerical value display to be changed in the Runtime by the user. Removing the check from the checkbox disables the Runtime user from being able to change the value from the Numerical value display. If *Setting values active* is selected then you may configure the input method. You may use a dialog box, an onscreen keyboard, a slider, etc. for the input method.

3.6.7 Adding a Trend Element

A Trend element is a dynamic element for displaying variable values in trend curves. Trend curves depict the course of value over a selected time interval.

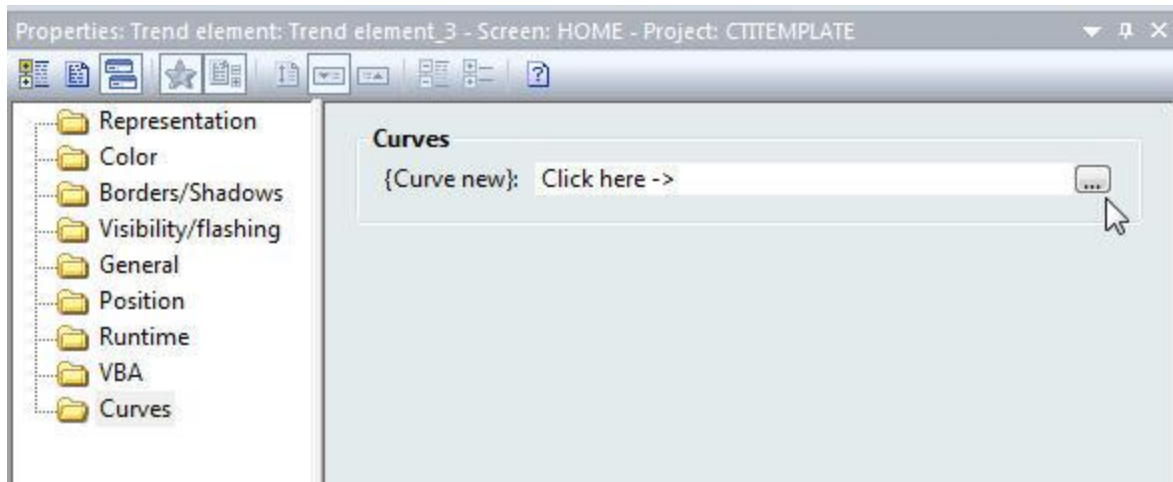


Step 1: To add a *Trend element* to your project screen, click on the *Trend Element* icon in the *Elements* toolbar.



Step 2: Click and drag the Trend element to the desired size.

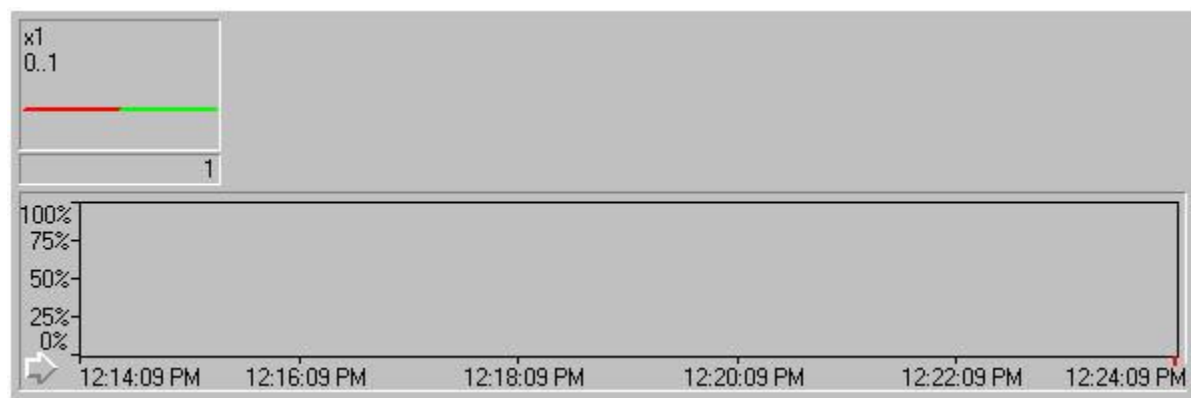
Step 3: Select a variable to display in the trend graph.



Step 4: In the Properties window, click on the *Curves* folder.

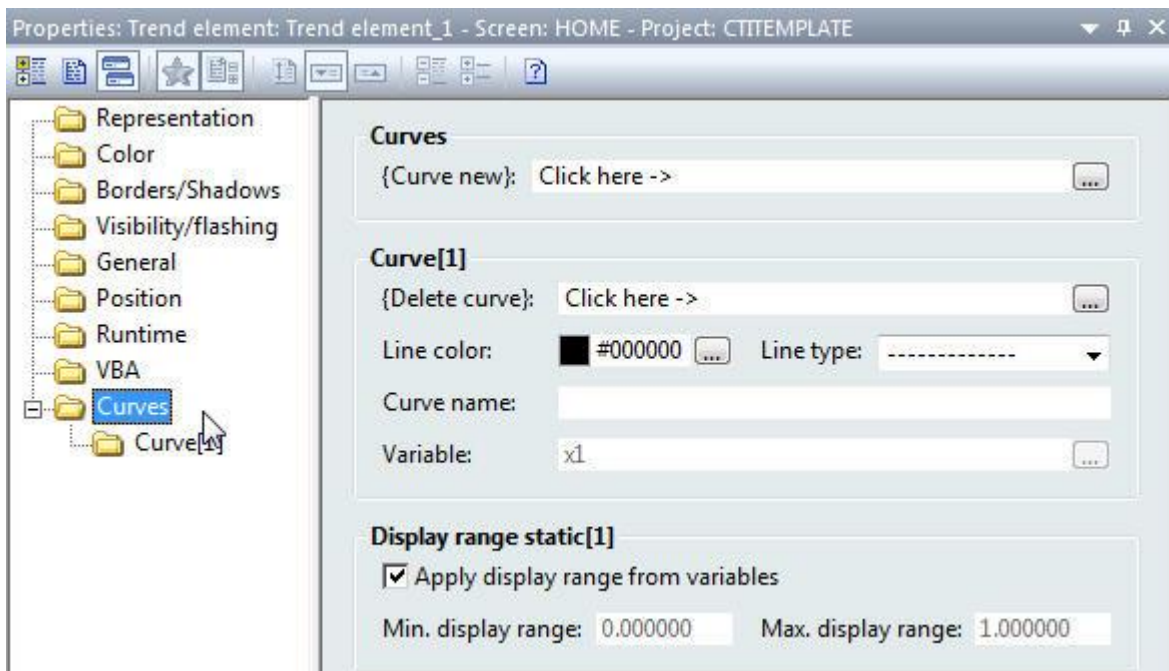
Step 5: Click the *Curve new* button.

Step 6: When a variable selection window appears, select a variable from the list and click the OK button.



The Trend element display contains a data chart area and a variable key.

Step 7: Resize the trend chart as needed to allow for proper viewing of data.

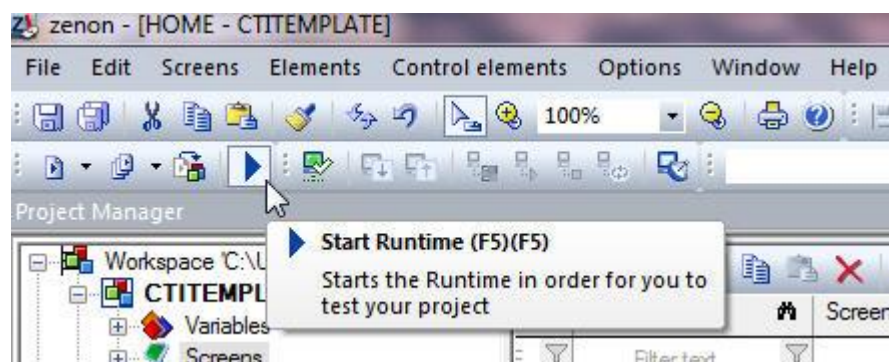


Step 8: Properties for the new Trend curve such as line color and type can be changed in the Properties window under the Curve folder.

Step 9: Additional curves can be added to the Trend element display by clicking on the *Curve new* button.

3.6.8 Testing your Runtime Project

After adding various elements to your project, you can test them by executing a test runtime on your computer.



Step 1: Click the *Start Runtime* button in the Runtime files toolbar to test your Project changes. If you do not have an Exit button defined in your project, press ALT+F4 to exit the runtime.

3.7 Transferring a Project Runtime to the Panel

Transferring a project runtime to your HMI panel consists of the following steps:

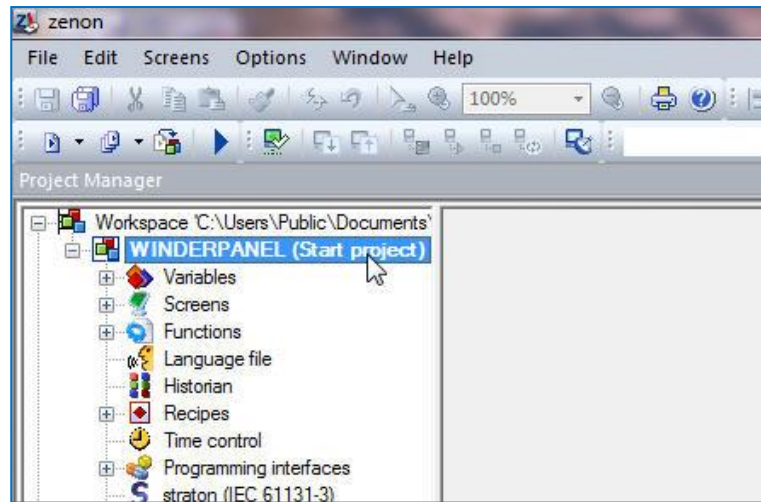
- 1) Reading this Section
- 2) Setting the IP address of your Panel
- 3) Connecting the Editor PC to 2500-VPxx Panel
- 4) Establishing a Remote Transfer Connection
- 5) Transferring Project Files
- 6) Setting the Start Project

3.7.1 Configuring Communications Between Editor PC and HMI Panel

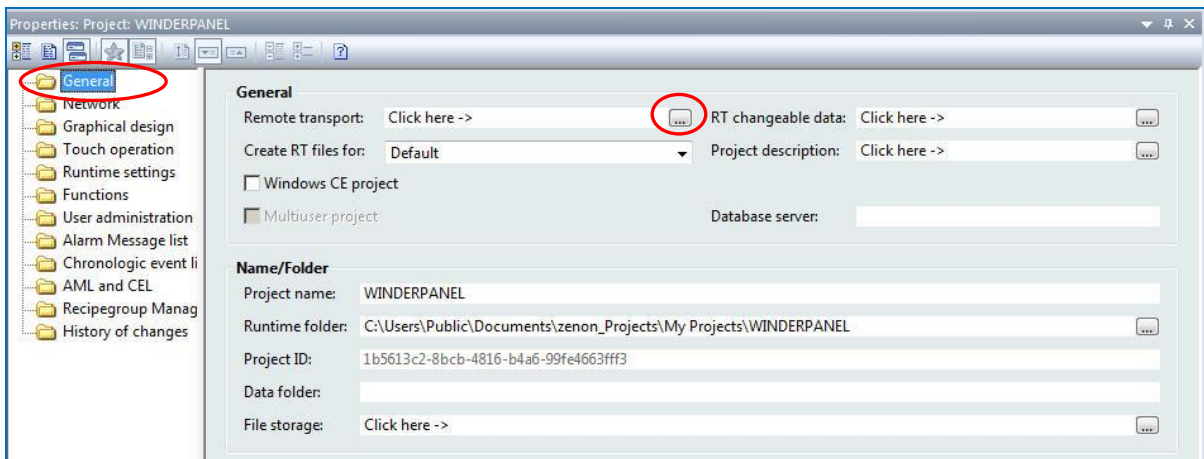
To download a runtime project to your HMI panel you will need to do the following things to establish a communication link:

1. Connect your editor computer to the CTI 2500-VPxx panel with an Ethernet cable. You may also connect through an Ethernet switch or over a network.
2. Boot your panel to the Windows Desktop.
3. Ensure that you have chosen an IP address and subnet mask for your panel that matches the class of the network to which you are connecting. See section 1.6.

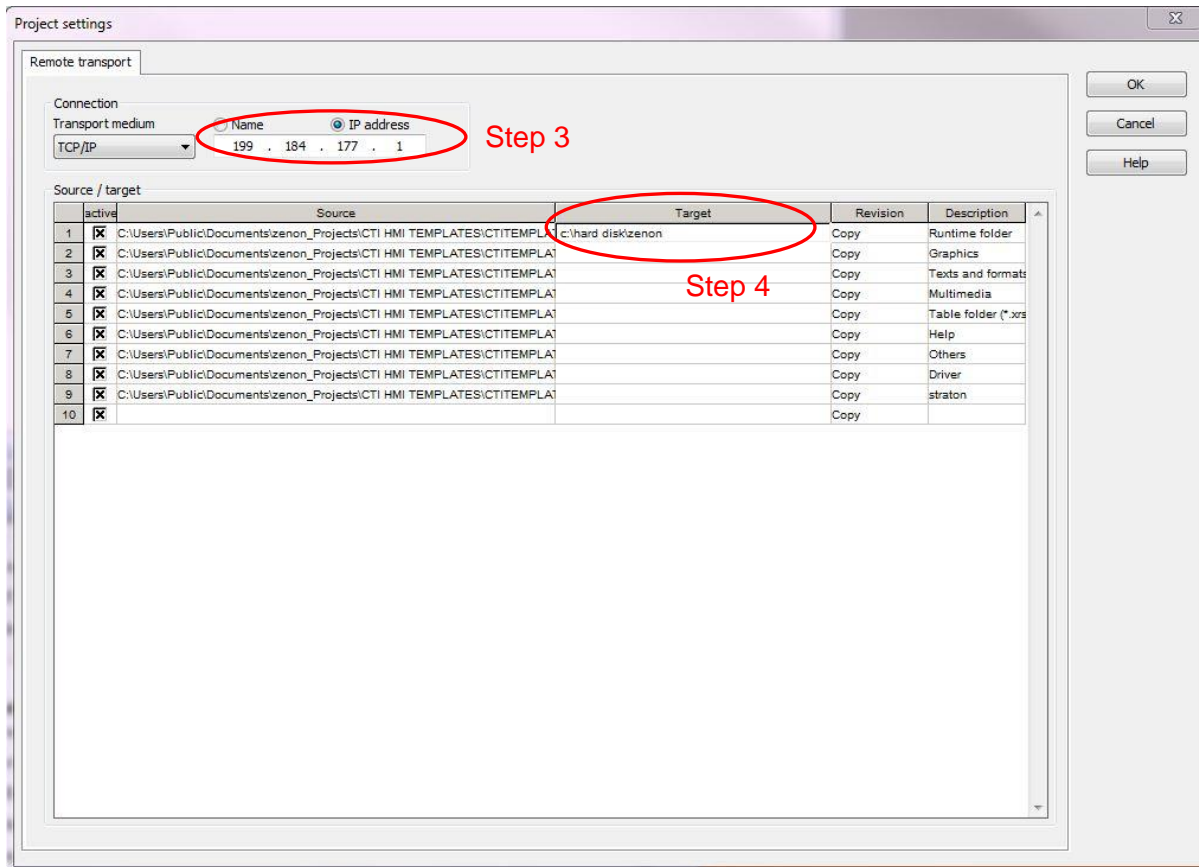
3.7.2 Configuring and Establishing a Remote Transfer Connection



Step 1: Click on the name of your project in the Project tree of your Zenon Editor software.

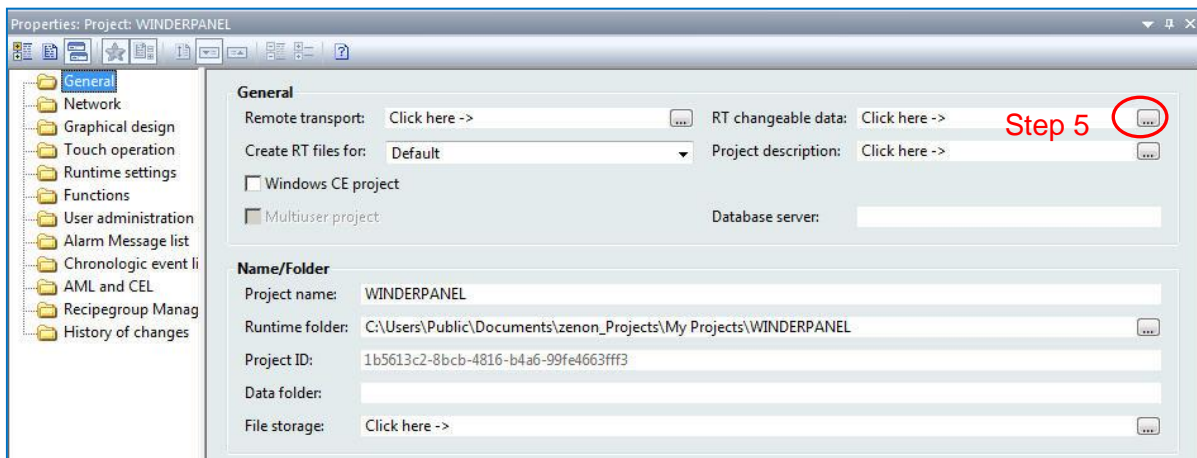


Step 2: In the *Properties* window of the Editor, click on the *General* folder. Then click on the button for *Remote transport* found in the properties detail window.

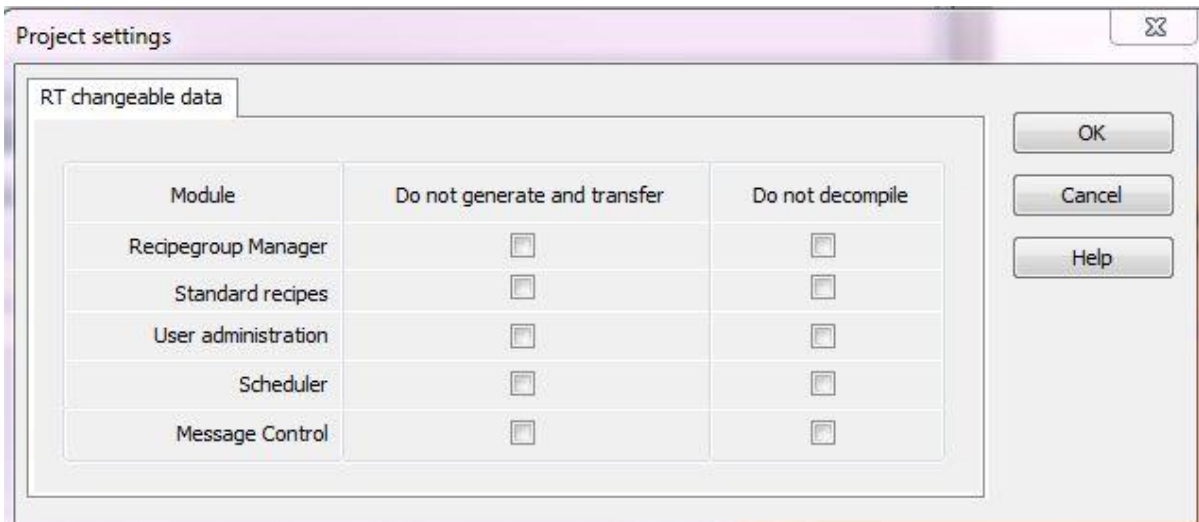


Step 3: Enter the IP address of the CTI panel in the box near the top of the remote transport window.

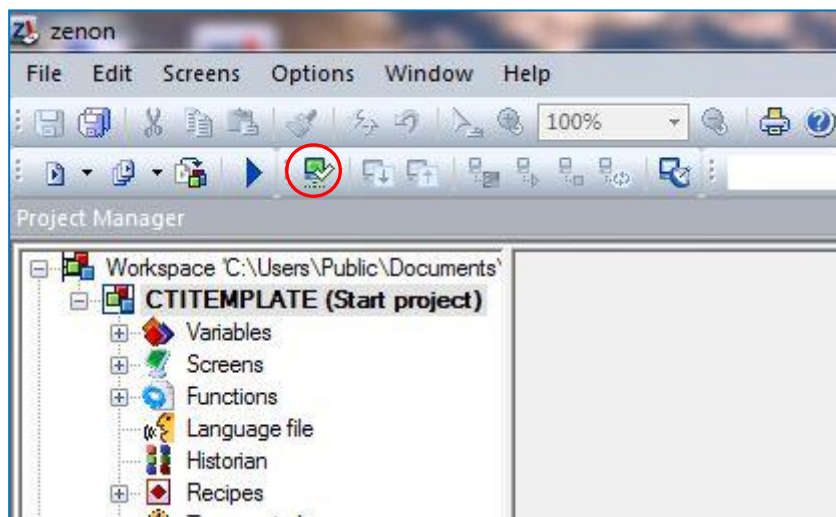
Step 4: Enter the following *Target* location in line 1 of the Source/target table: 'c:\zenon'. Then, click the OK button.



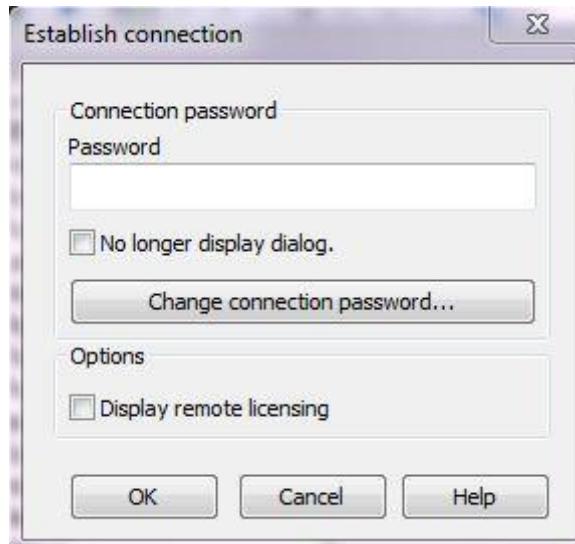
Step 5: In the *Properties* window of the Editor, click on the *General* folder. Then click on the button for *RT changeable data* found in the properties detail window.



Step 6: Make sure that all of the boxes are empty in the RT changeable data window. If there are any check marks in the boxes, click to remove them. Then click the OK button.



Step 7: Click on the icon for *Establishing a Remote Transport Connection* as indicated in the above image.



Step 8: When the window pictured above appears, click on the OK button.

3.7.1 Transferring Project Files and Setting Start Project



Step 1: Click on the icon for *Transfer changed runtime files* as indicated in the image above. In the Output window of the Zenon editor, you will see a number of files being transferred to the CTI Panel.



Step 2: Click on the icon for *Set remote start project* as indicated in the image above.



Step 3: Click on the icon for *Remote: Start runtime* as indicated in the image above. Your project should soon appear on the 2500-VPxx panel.

3.8 Running Your Project for the First Time

After you have successfully transferred your project to the CTI Panel, the panel is ready to be connected to your control system. Once a project is loaded on the CTI panel, the panel will automatically start the project when the panel is rebooted.

Step 1: Connect the Ethernet Cable to the 2500-VPxx that permits it to communicate with the PLC processor(s).

NOTE

The 2500-VPxx has two Ethernet ports. Ensure that you have connected to and configured the correct panel Ethernet port.

NOTE

It is recommended that a 'static' (manual) IP address be used for the HMI panel. Using DHCP may cause loss of communications between your HMI panel and other devices.

NOTE

You must choose your IP address and subnet mask to match the class of network in which your control system will reside. For example, a class 'C' network has a subnet mask of 255.255.255.0 and the first three numbers of all of the IP addresses on the network must match.

Step 2: Reboot the 2500-VPxx panel. Your HMI project should automatically load.

Step 3: Test your project screens for proper data display and control functionality.

NOTE

If there is a communication problem between your HMI panel and target device(s), you will see small, square red dots next to data display items. The red dot indicates that a variable cannot be updated due to failed communications.

LIMITED PRODUCT WARRANTY

Warranty. Control Technology Inc. ("CTI") warrants that this CTI Industrial Product (the "Product") shall be free from defects in material and workmanship for a period of one (1) year from the date of purchase from CTI or from an authorized CTI Industrial Distributor, as the case may be. Repaired or replacement CTI products provided under this warranty are similarly warranted for a period of 6 months from the date of shipment to the customer or the remainder of the original warranty term, whichever is longer. This Product and any repaired or replacement products will be manufactured from new and/or serviceable used parts which are equal to new in the Product. This warranty is limited to the initial purchaser of the Product from CTI or from an authorized CTI Industrial Distributor and may not be transferred or assigned.

2. Remedies. Remedies under this warranty shall be limited, at CTI's option, to the replacement or repair of this Product, or the parts thereof, only after shipment by the customer at the customer's expense to a designated CTI service location along with proof of purchase date and an associated serial number. Repair parts and replacement products furnished under this warranty will be on an exchange basis and all exchanged parts or products become the property of CTI. Should any product or part returned to CTI hereunder be found by CTI to be without defect, CTI will return such product or part to the customer. The foregoing will be the exclusive remedies for any breach of warranty or breach of contract arising therefrom.

3. General. This warranty is only available if (a) the customer provides CTI with written notice of a warranty claim within the warranty period set forth above in Section 1 and (b) CTI's examination of the Product or the parts thereof discloses that any alleged defect has not been caused by a failure to provide a suitable environment as specified in the CTI Standard Environmental Specification and applicable Product specifications, or damage caused by accident, disaster, acts of God, neglect, abuse, misuse, transportation, alterations, attachments, accessories, supplies, non-CTI parts, non-CTI repairs or activities, or to any damage whose proximate cause was utilities or utility-like services, or faulty installation or maintenance done by someone other than CTI.

4. Product Improvement. CTI reserves the right to make changes to the Product in order to improve reliability, function or design in the pursuit of providing the best possible products.

5. Exclusive Warranty. THE WARRANTIES SET FORTH HEREIN ARE CUSTOMER'S EXCLUSIVE WARRANTIES. CTI HEREBY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. WITHOUT LIMITING THE FOREGOING, CTI SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, COURSE OF DEALING AND USAGE OF TRADE.

6. Disclaimer and Limitation of Liability. TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, CTI WILL NOT BE LIABLE FOR ANY BUSINESS INTERRUPTION OR LOSS OF PROFIT, REVENUE, MATERIALS, ANTICIPATED SAVINGS, DATA,

CONTRACT, GOODWILL OR THE LIKE (WHETHER DIRECT OR INDIRECT IN NATURE) OR FOR ANY OTHER FORM OF INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND. CTI'S MAXIMUM CUMULATIVE LIABILITY RELATIVE TO ALL OTHER CLAIMS AND LIABILITIES, INCLUDING OBLIGATIONS UNDER ANY INDEMNITY, WHETHER OR NOT INSURED, WILL NOT EXCEED THE COST OF THE PRODUCT(S) GIVING RISE TO THE CLAIM OR LIABILITY. CTI DISCLAIMS ALL LIABILITY RELATIVE TO GRATUITOUS INFORMATION OR ASSISTANCE PROVIDED BY, BUT NOT REQUIRED OF CTI HEREUNDER. ANY ACTION AGAINST CTI MUST BE BROUGHT WITHIN EIGHTEEN (18) MONTHS AFTER THE CAUSE OF ACTION ACCRUES. THESE DISCLAIMERS AND LIMITATIONS OF LIABILITY WILL APPLY REGARDLESS OF ANY OTHER CONTRARY PROVISION HEREOF AND REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHERWISE, AND FURTHER WILL EXTEND TO THE BENEFIT OF CTI'S VENDORS, APPOINTED DISTRIBUTORS AND OTHER AUTHORIZED RESELLERS AS THIRD-PARTY BENEFICIARIES. EACH PROVISION HEREOF WHICH PROVIDES FOR A LIMITATION OF LIABILITY, DISCLAIMER OF WARRANTY OR CONDITION OR EXCLUSION OF DAMAGES IS SEVERABLE AND INDEPENDENT OF ANY OTHER PROVISION AND IS TO BE ENFORCED AS SUCH.

7. Adequate Remedy. The customer is limited to the remedies specified herein and shall have no others for a nonconformity in the Product. The customer agrees that these remedies provide the customer with a minimum adequate remedy and are its exclusive remedies, whether based on contract, warranty, tort (including negligence), strict liability, indemnity, or any other legal theory, and whether arising out of warranties, representations, instructions, installations, or non-conformities from any cause. The customer further acknowledges that the purchase price of the Product reflects these warranty terms and remedies.

8. Force Majeure. CTI will not be liable for any loss, damage or delay arising out of its failure (or that of its subcontractors) to perform hereunder due to causes beyond its reasonable control, including without limitation, acts of God, acts or omissions of the customer, acts of civil or military authority, fires, strikes, floods, epidemics, quarantine restrictions, war, riots, acts of terrorism, delays in transportation, or transportation embargoes. In the event of such delay, CTI's performance date(s) will be extended for such length of time as may be reasonably necessary to compensate for the delay.

9. Governing Law. The laws of the State of Tennessee shall govern the validity, interpretation and enforcement of this warranty, without regard to its conflicts of law principles. The application of the United Nations Convention on Contracts for the International Sale of Goods shall be excluded.

REPAIR POLICY

In the event that the Product should fail during or after the warranty period, a Return Material Authorization (RMA) number can be requested orally or in writing from CTI main offices. Whether this equipment is in or out of warranty, a Purchase Order number provided to CTI when requesting the RMA number will aid in expediting the repair process. The RMA number that is issued and your Purchase Order number should be referenced on the returning equipment's shipping documentation. Additionally, if the product is under warranty, proof of purchase date and serial number must accompany the returned equipment. The current repair and/or exchange rates can be obtained by contacting CTI's main office at 1-800-537-8398 or go to www.controltechnology.com/support/repairs/.

When returning any module to CTI, follow proper static control precautions. Keep the module away from polyethylene products, polystyrene products and all other static producing materials. Packing the module in its original conductive bag is the preferred way to control static problems during shipment. Failure to observe static control precautions may void the warranty.