

RapidHMI

Developed by **KJ**Olinski

What is RapidHMI?

- RapidHMI is a Human Machine Interface development application designed to work with Rockwell control systems.
- The RapidHMI system consists of two applications, RapidHMI and PLCExplorer.
 - RapidHMI is for design and testing of projects.
 - PLCExplorer is the end user application that runs the finished projects.

Why use RapidHMI?

- RapidHMI has some key benefits.
 - It can be used as a development aid when writing and testing PLC applications.
 - It provides a method to expose elements of a control system for observation and manipulation.
 - It is very fast to learn.
 - It is very easy to use.

What types of devices can I work with in RapidHMI?

- RapidHMI is designed to work directly with RSLogix500 and RSLogix5000 PLCs.
- As long as the project file format is maintained you can actually work with other devices but you must manually edit the project files. An example of a modified project file comes with the download.
- You can also use an OPC other than RSLinx if you manually edit the project files.
- The project file format is straightforward. See "File format" for the structure of a project file.

What is a project?

- A project is a structured grouping of pages containing groupings of DDE topics.
- The user interface uses a tree control to manage the hierarchy of collections of pages.
- A page is made up of a collection of logically grouped DDE topics.
- DDE stands for Dynamic Data Exchange, it is a method of sharing data between applications. RapidHMI uses DDE to communicate with RSLinx. RSLinx communicates with the devices.

What is required to run RapidHMI?

- RapidHMI requires the following:
 - A device that you wish to control such as a PLC.
 - A version of RSLinx capable of creating DDE/OPC topics to use with your device.
 - RSLogix500 or RSLogix5000.

How to install RapidHMI?

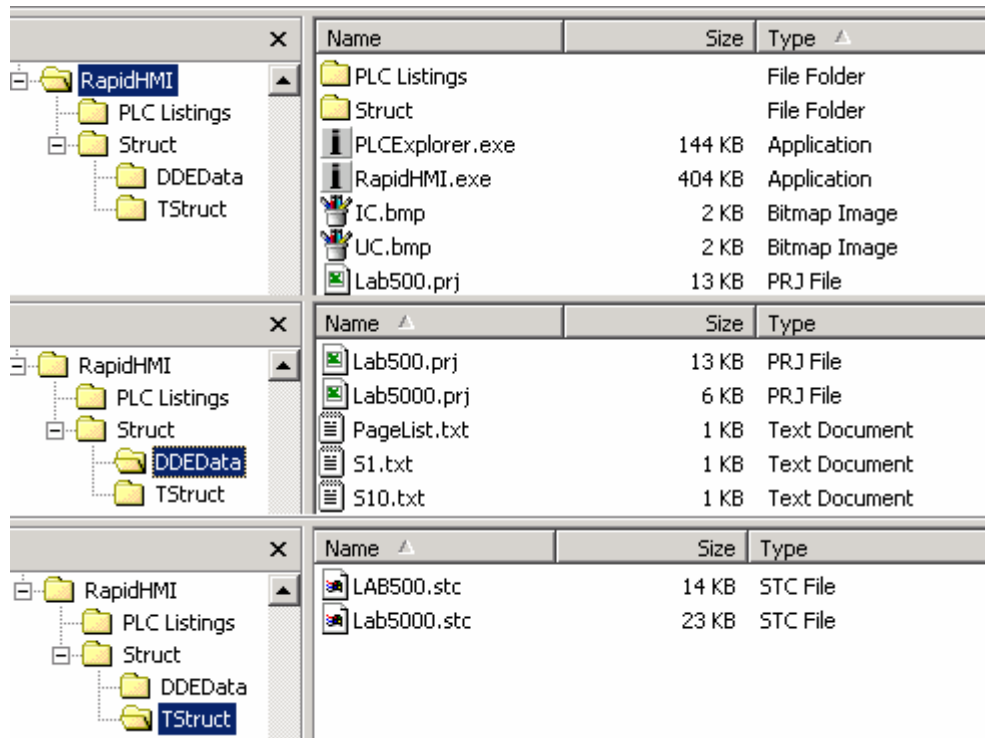
- RapidHMI is distributed in a single zipped file that contains the executable files and the required sub folders for the application to function properly. See “File locations and File Types”, for more information.
- The sub folders must exist in relation to the executable file RapidHMI.exe. The name of the root folder, in this example “RapidHMI”, can be anything you wish to label it.
- Registry entries – None!
- Simply extract the application to where you want it and begin using it.

How to install PLCExplorer?

- PLCExplorer is contained in the same zipped file as RapidHMI.
- PLCExplorer can be placed anywhere you wish.
- The executable PLCExplorer.exe will search the folder it is in for any project files and add them to the list of possible projects to load. Place all finished project files in the same folder.

File locations and File Types.

This figure demonstrates the folders and file types contained in them.



- In this example, RapidHMI holds all the executables and sub-folders. Again, you may name the folder RapidHMI anything you want.
- PLCEXplorer is in this folder too, but that is not essential.
- The folder "...\Struct\DDEData", is hard coded in the software. This is the working folder for project development. There are three file types:
 - 1) "*.prj", are finished projects.
 - 2) "PageList.txt", is the tree structure for the current project.
 - 3) "S--.txt", are lists of DDE topics for each page in the project.
- The folder "...\Struct\TStruct", is hard coded in the software. Imported listings are stored here.
- The folder "...\PLC Listing", is an optional folder created to store PLC listings exported from RSLogix.

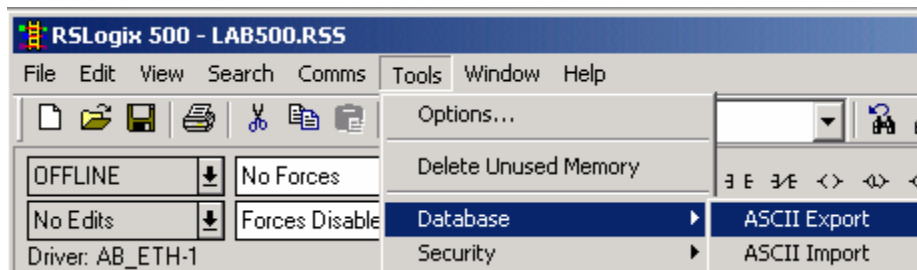
Where to start?

Export a listing in RSLogix and create DDE links in RSLinx.

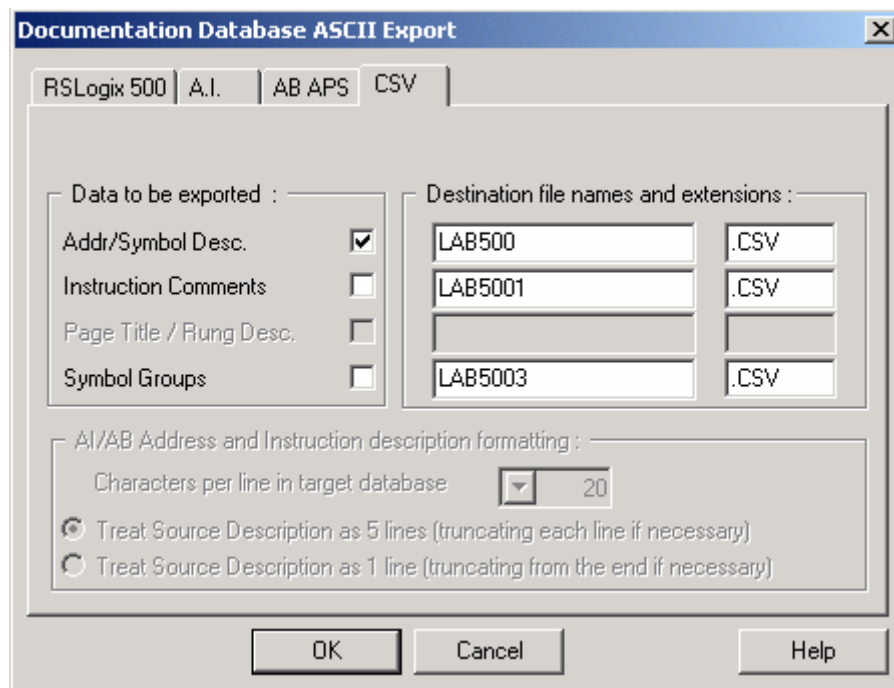
- To start using RapidHMI you will need an exported listing of a PLC's tags from RSLogix.
 - It is very important that the PLC tags are labeled since RSLogix will not export tags if they do not have a label.
 - In RapidHMI you will import the listing to create a PLC structure file.
- In RSLinx you must set up DDE topics for devices you want to communicate with. RapidHMI will use these DDE links to communicate with your devices.

RSLogix500: Exporting tags.

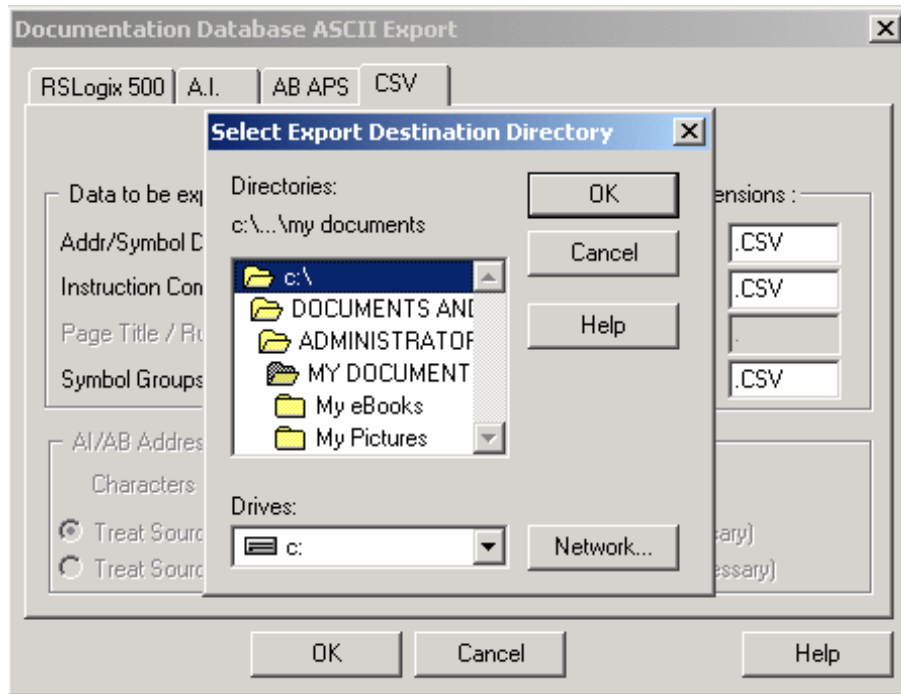
Step 1 - Select ASCII Export from the menu.



Step 2 - Select the file format CSV, comma separated variables.

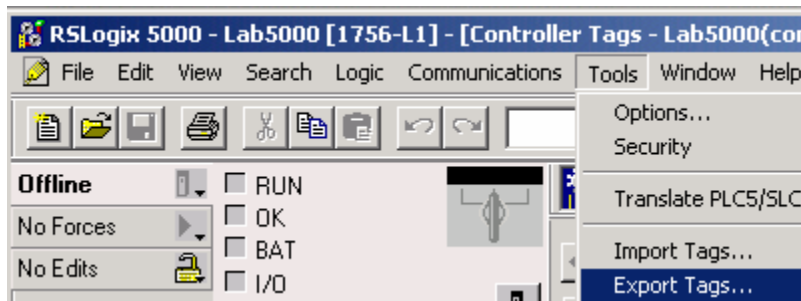


Step 3 - Select the path to store the export and click on OK.

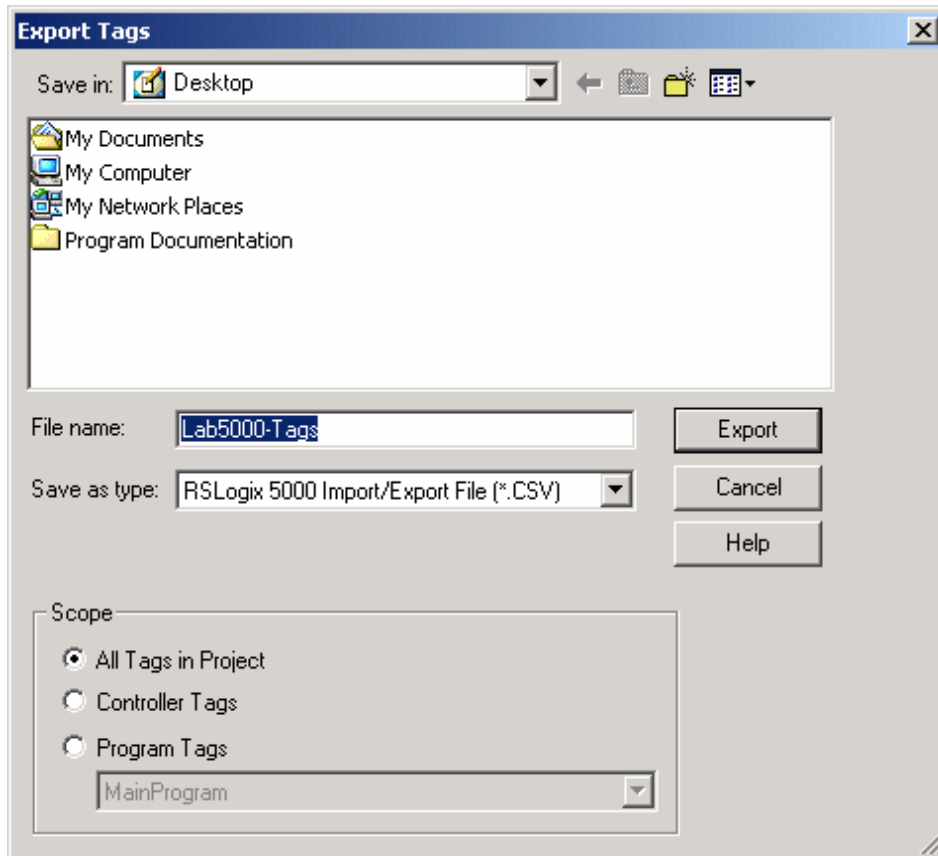


RSLogix5000: Exporting tags.

Step 1 - Select Export tags.

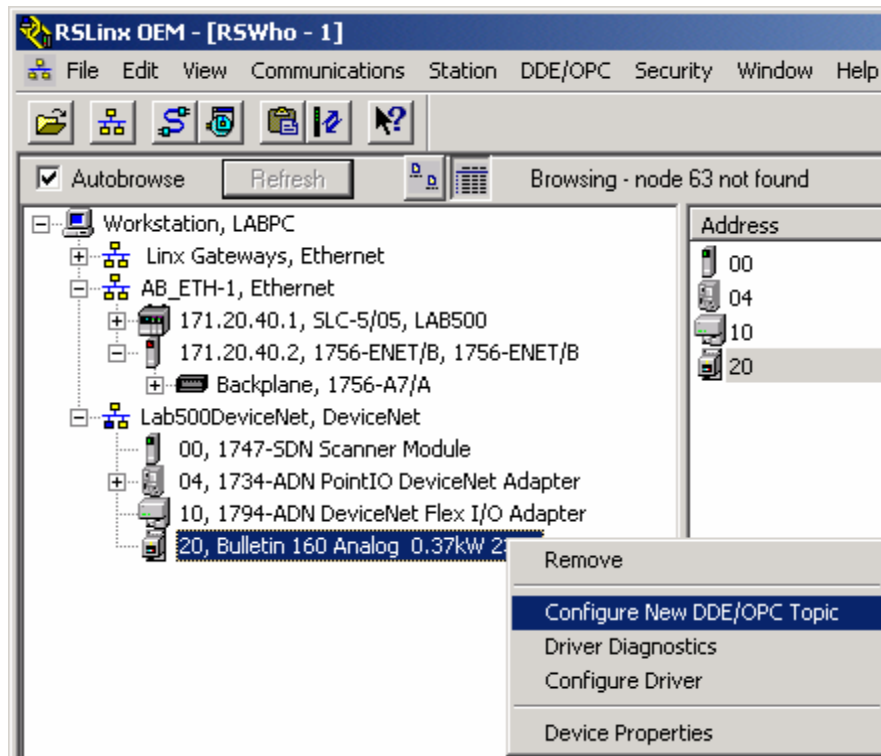


Step 2 - Select the path for the export and click on Export.

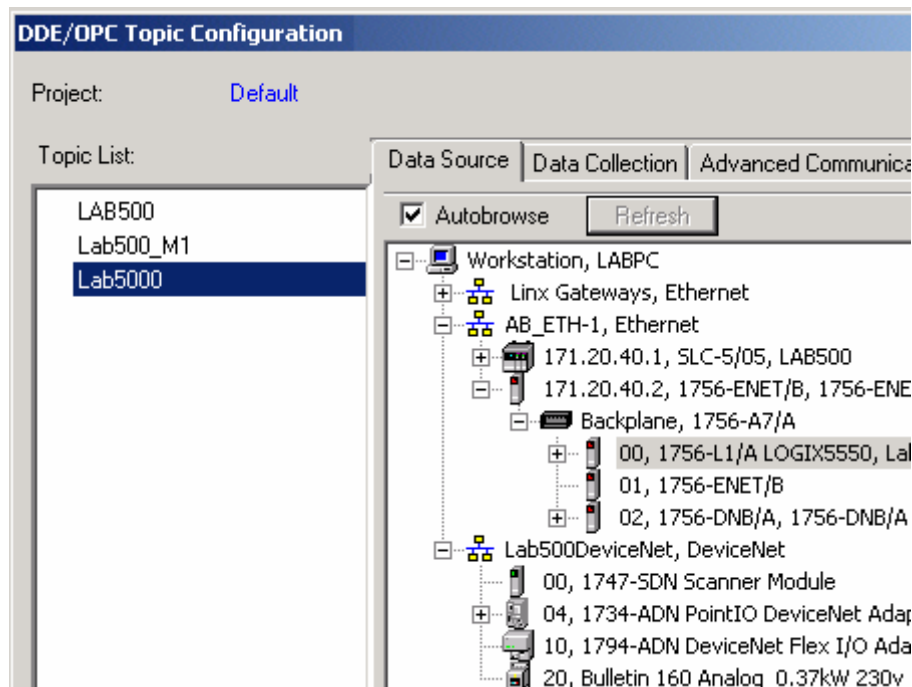


RSLinx: Setting up DDE topics.

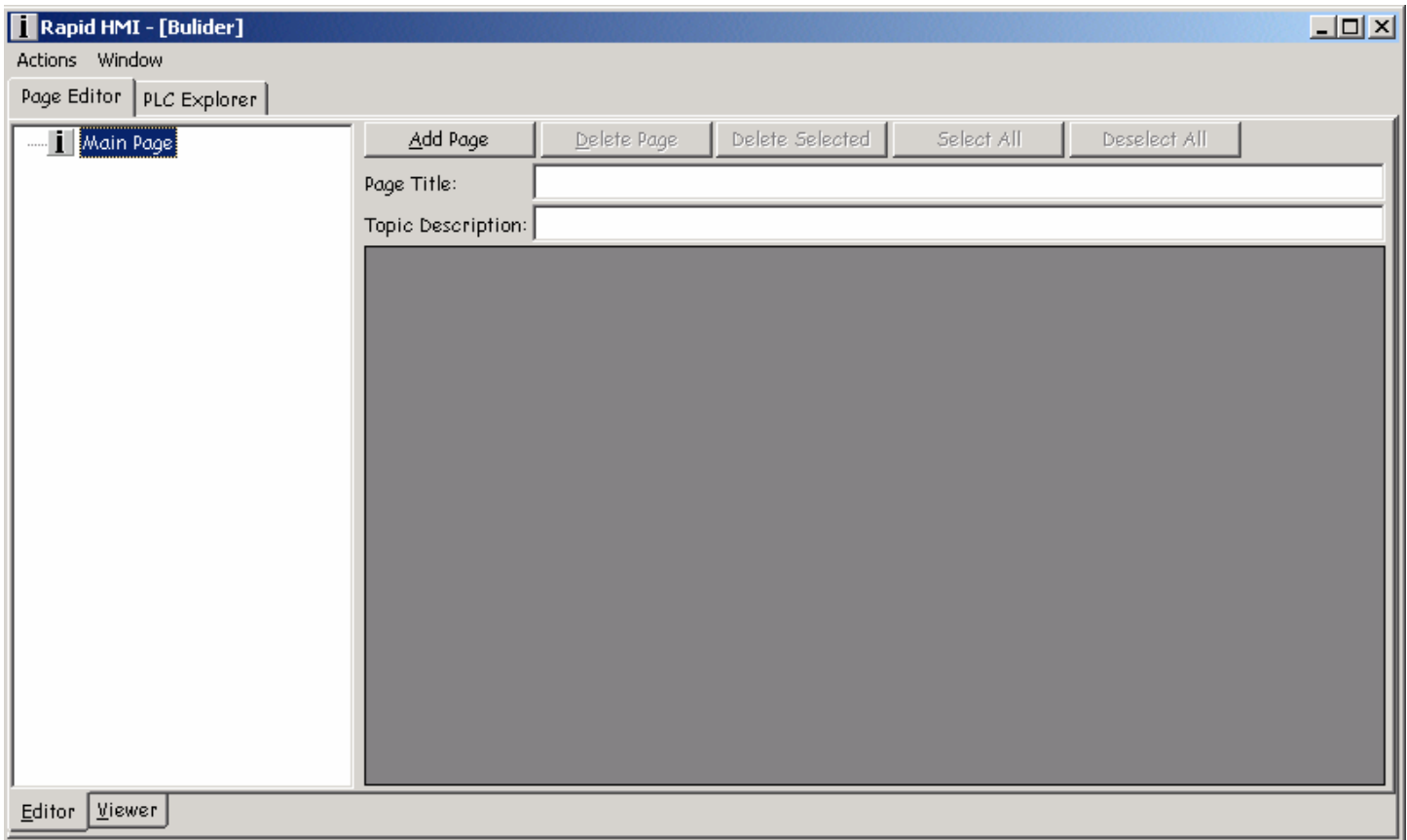
Step 1 - Select the device you want to configure a DDE topic for. Right click on the device to call up the popup menu or click on the "Topic Configuration", button.



Step 2 - Give the DDE topic a name. The name of the topic will be used by RapidHMI to communicate with your device.



Using RapidHMI.

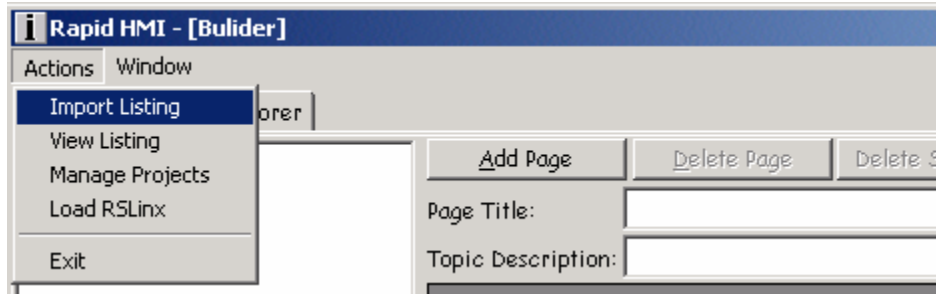


- RapidHMI loads to the Page Editor screen.
- The major functions are located at the top of the screen. They are:
 - "Page Editor"
 - "PLC Explorer"
- Each major function has two minor functions located at the bottom of the screen.
 - "Page Editor" the minor functions are:
 - "Editor"
 - "Viewer".
 - "PLC Explorer" the minor functions are:
 - "PLC List"
 - "Tag Explorer".

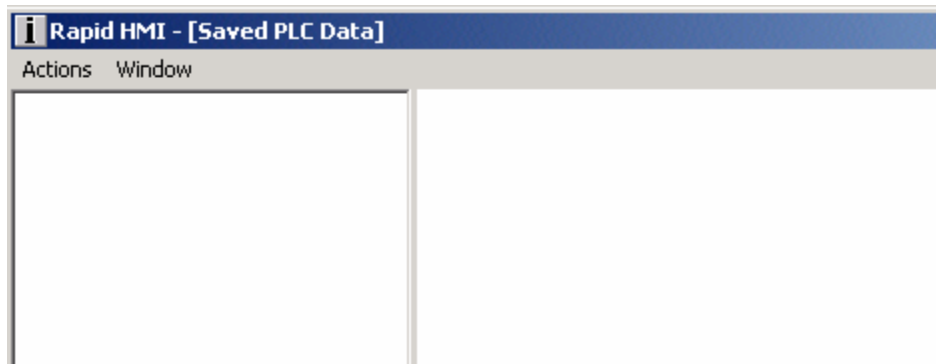
Importing a PLC Listing

Perhaps the best place to start is to import the PLC listings that you have exported with RSLogix. Follow the steps below to import your listings.

Step 1 - From the "Actions" menu select "Import Listing".



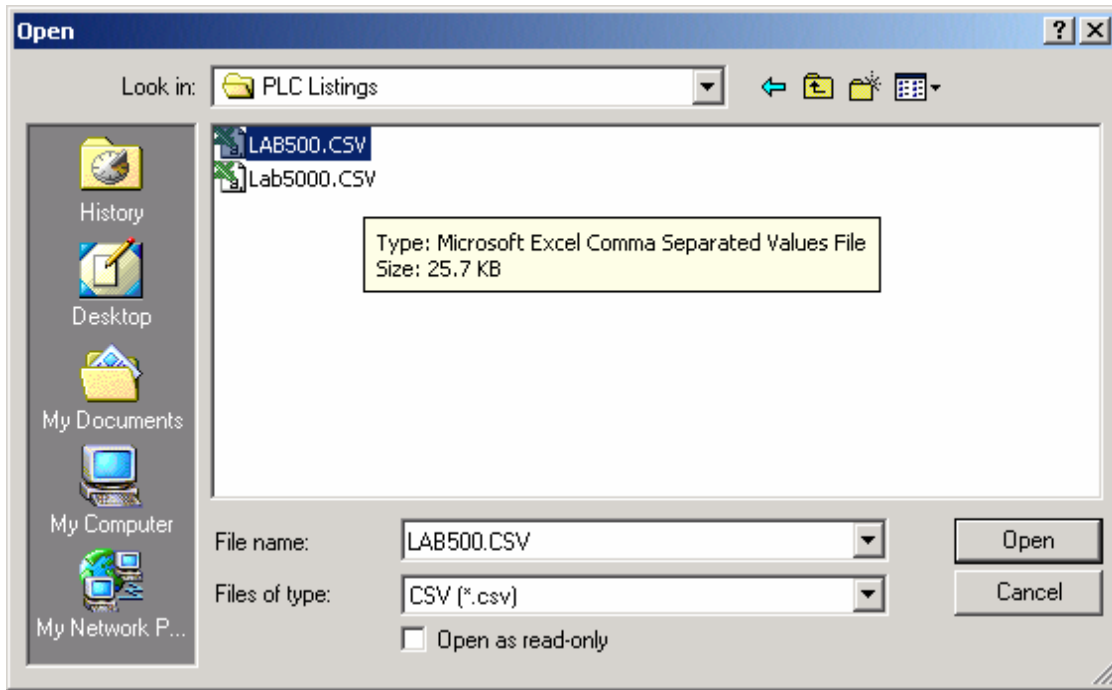
This will bring you to the import functions of the application.



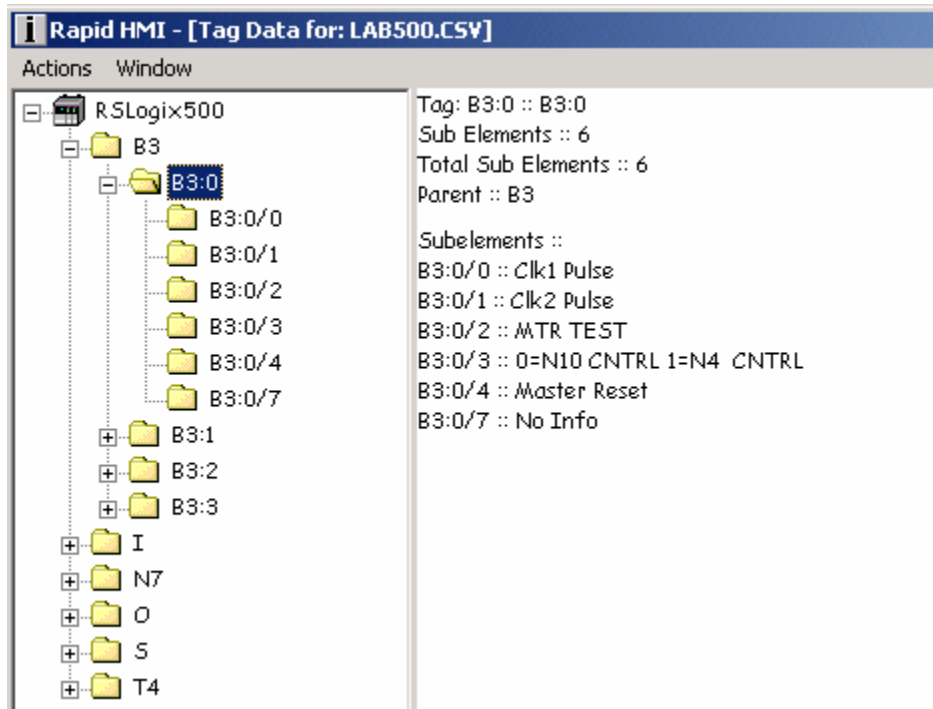
Step 2 - From the "Actions" menu select "Load Tags".



Step 3 - Select the PLC you wish to import and click on the "Open" button.

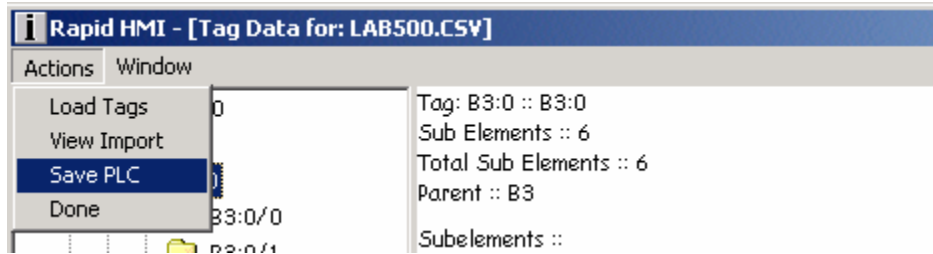


After the listing is imported it should resemble the screen shot displayed. Here you may explore the tags imported from your listing. No edit functions are available.

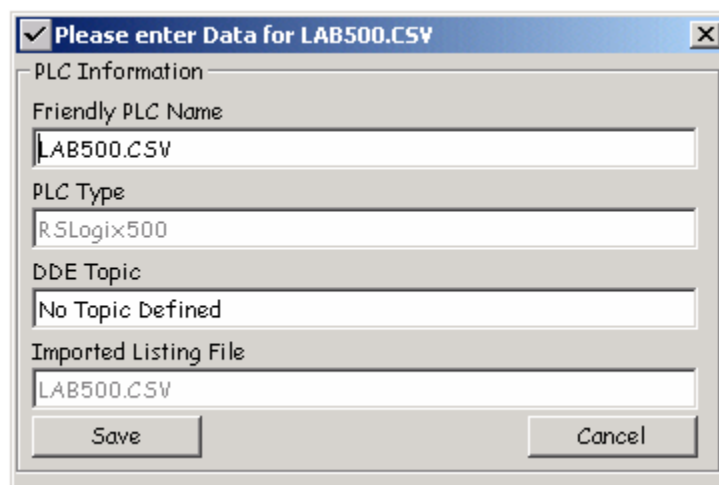


Saving a PLC Listing.

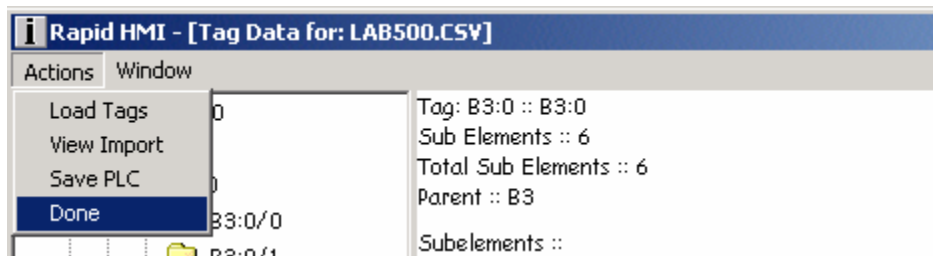
Step 4 - From the "Actions" menu select "Save PLC".



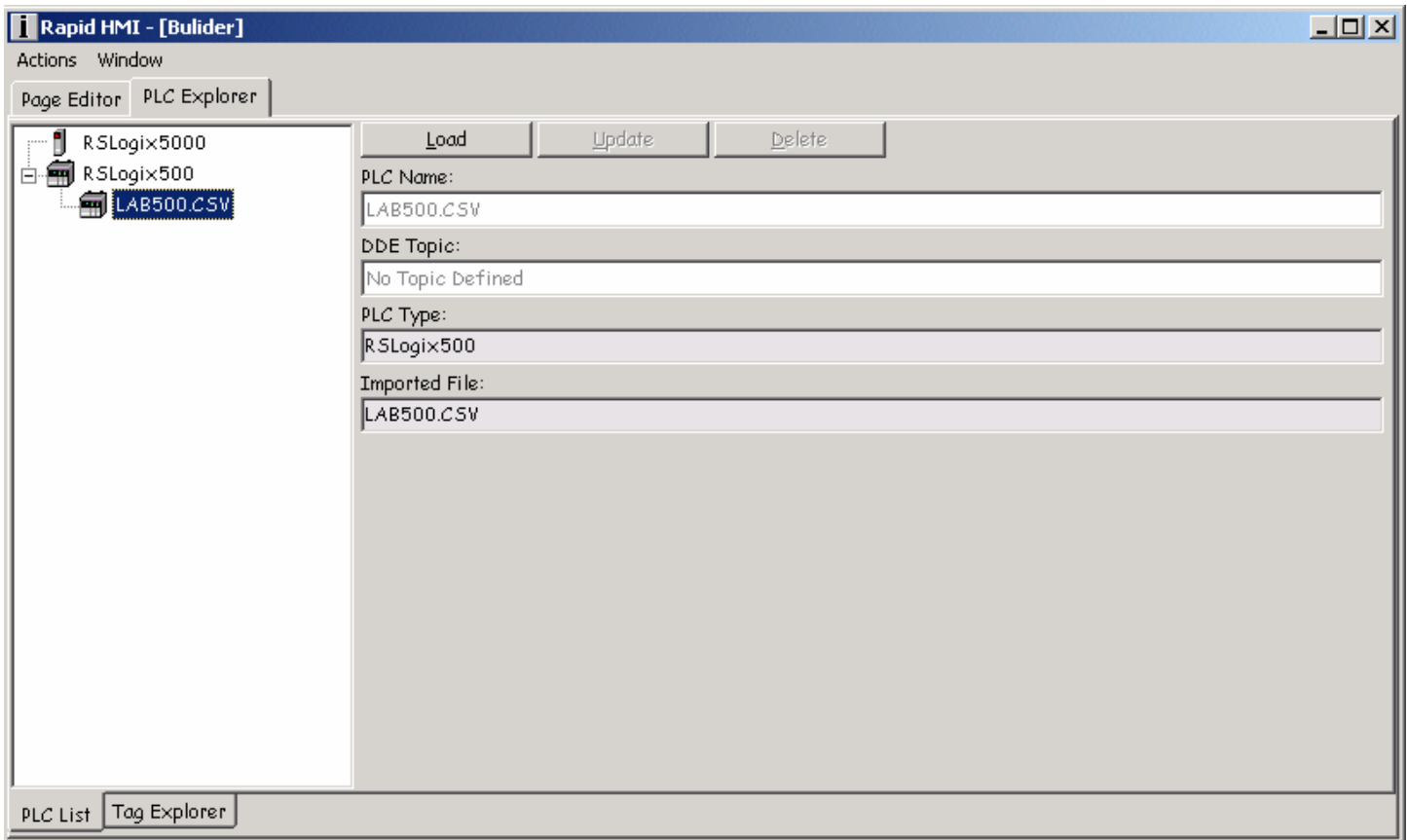
Step 5 - Click on the "Save" button. You do not have to enter any data about your listing. You will have a chance later to edit the data.



Step 6 - From the "Actions" menu select "Done". You must select "Done" to update the "PLC List".



Editing the PLC Listing.



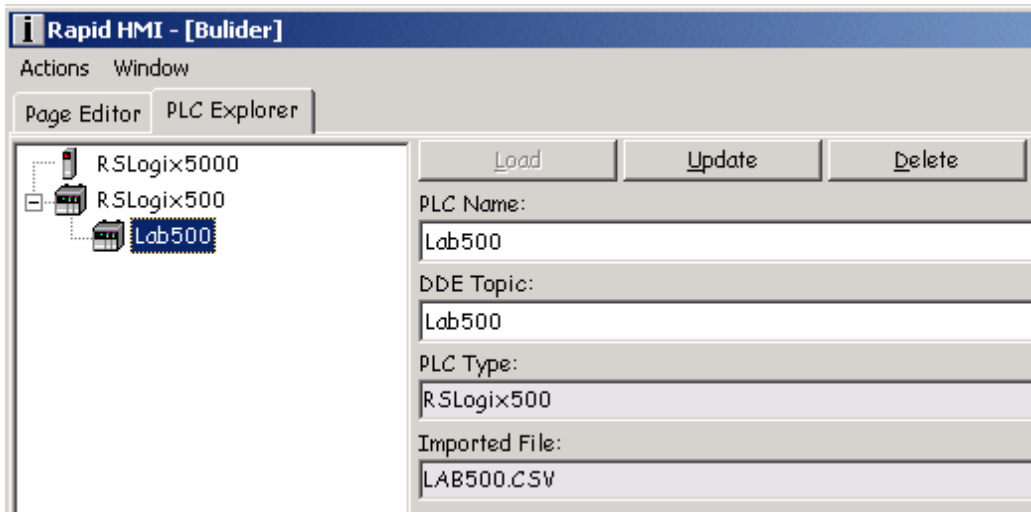
Step 1 - Using the tabs, navigate to the PLC Explorer >> PLC List.

Step 2 - Select the PLC you wish to edit and click on the "Load" button.

Step 3 - Once loaded, you may edit:

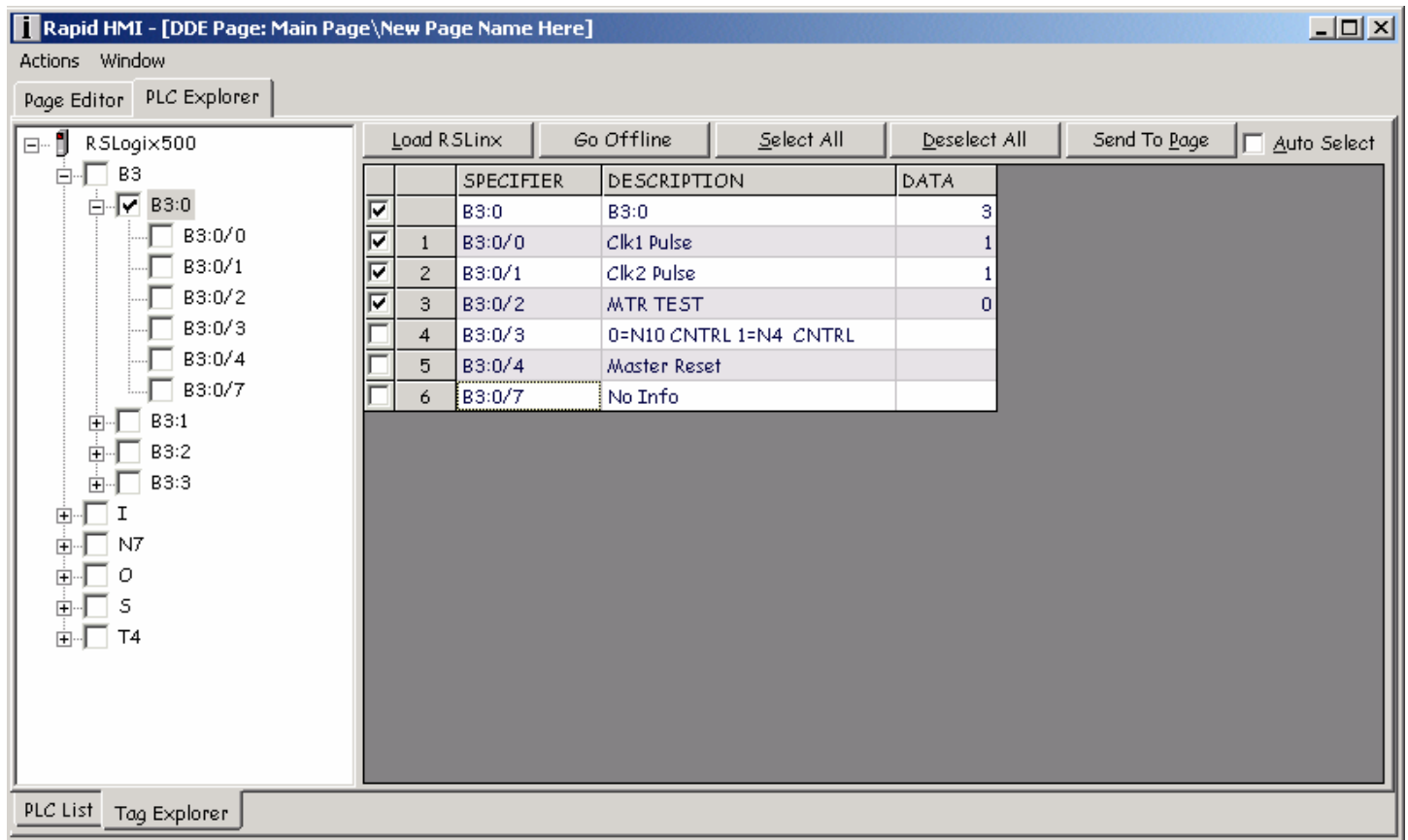
- 1) "PLC Name", this is the name that appears in the PLC list tree.
- 2) "DDE Topic", this is the name of the DDE topic you created in RSLinx. It is essential that you edit this information prior to any attempts to go online.

Step 4 - Once you have edited the data for the stored PLC click on "Update" button to commit the changes.



Using the Tag Explorer

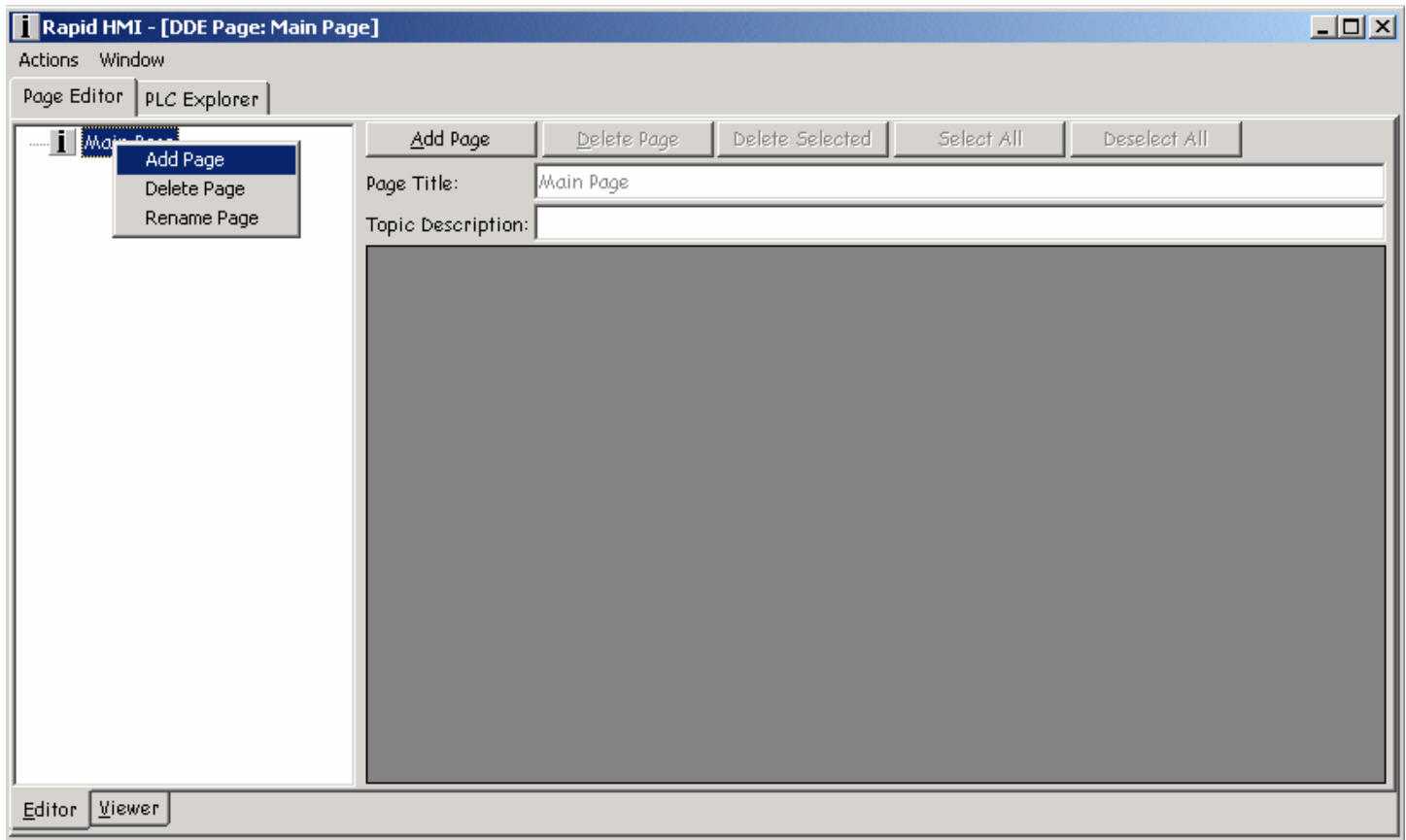
Click on the "Tag Explorer" tab to explore the tags in your imported listing.



Button functions

Load RSLinx	Runs the application RSLinx.
Go Offline	When offline is labeled "Monitor". When online is labeled "Go Offline". This button will toggle the communication state between online and offline. It only affects the "Tag Explorer" functions. Selected topics will be monitored if online.
Select All	Selects all the topics in the grid.
Deselect All	Deselects all the topics in the grid.
Send to Page	Will become enabled if: <ol style="list-style-type: none">1) A page has been added to the current project2) A page has been selected in the "Page Editor".3) One or more topics have been selected. Clicking on this button will send the selected topics to the currently selected page.
Auto Select	If this is checked, navigating through the tree will automatically select all topics.
Check the topic box	In the grid you can manually select and deselect tags.

Using the Page Editor.

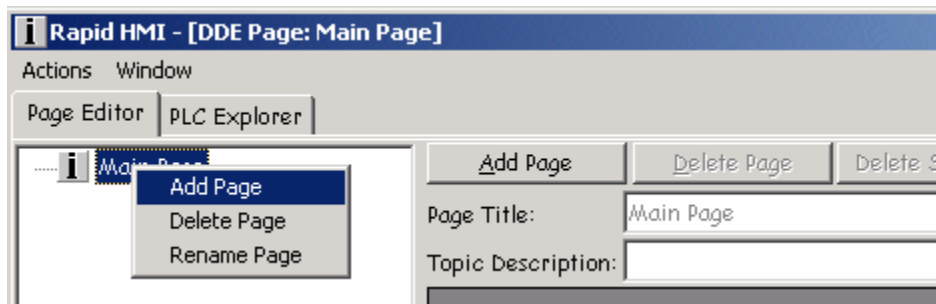


- The “Page Editor” has two sub functions, the “Editor” and the “Viewer”
 - The “Editor” allows you edit the tags sent to the page from the “Tag Explorer”.
 - The “Viewer” allows you to see the page as it will appear in the finished project. In the “Viewer” you may also go online and interact with your project.
- Projects consist of groups of pages and pages contain groups of topics.
- You can add pages in ether tab.
- About pages:
 - All projects start with the first page which is the “Main Page”. You may not edit the name of this page. In a finished project the “Main Page” will be given the project file’s name.
 - Each page has a name which is displayed in the tree.
 - Page names do not have to be unique.
 - Each page has a title which is displayed at the top of the page.
 - Pages may contain topics from multiple PLCs and devices.

Adding Pages.

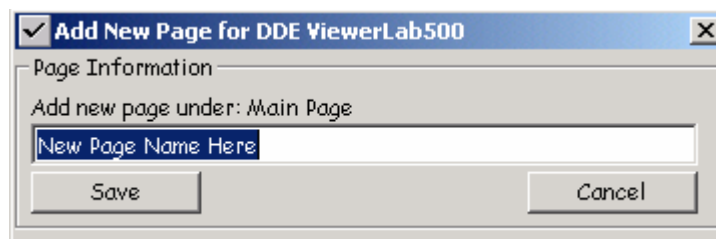
Start your project by adding new pages.

Step 1 - Right click on the tree to call up the popup menu or click on the "Add Page" button.



Step 2 - Name your new page. You may name the page now or name it later with the popup menu.

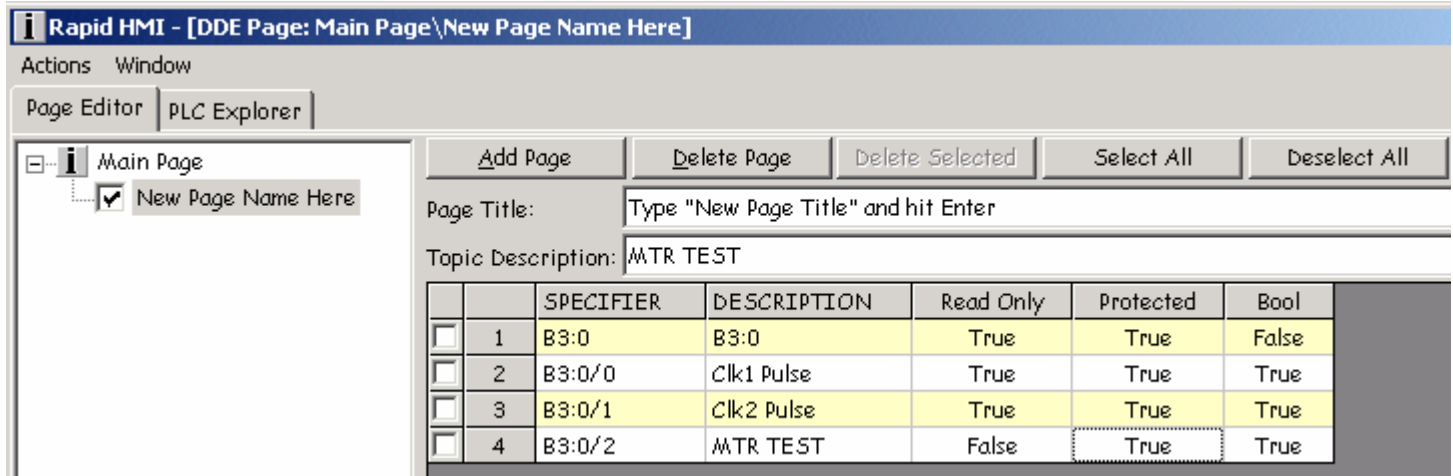
Step 3 - Click on the "Save" button to add the page to the project.



Step 4 - Edit the page title. Select your new page. By default, the page title will be the page name. You may edit the page title in the "Page Title" text field. To save your changes to the title you must hit the "Enter" key.

Editing Pages

The project now has a page added to it. Note that the path of the selected page appears in the title of the application. In the “Tag Explorer” you may now begin to send topics to your new page with the “Send to Page” button.



Button functions

Add Page	Adds a page under the currently selected page.
Delete Page	Deletes the current page and all sub pages under it.
Delete Selected	Deletes a selected topic from a page.
Select All	Selects all topics on a page.
Deselect All	Deselects all topics on a page.

Grid Terms

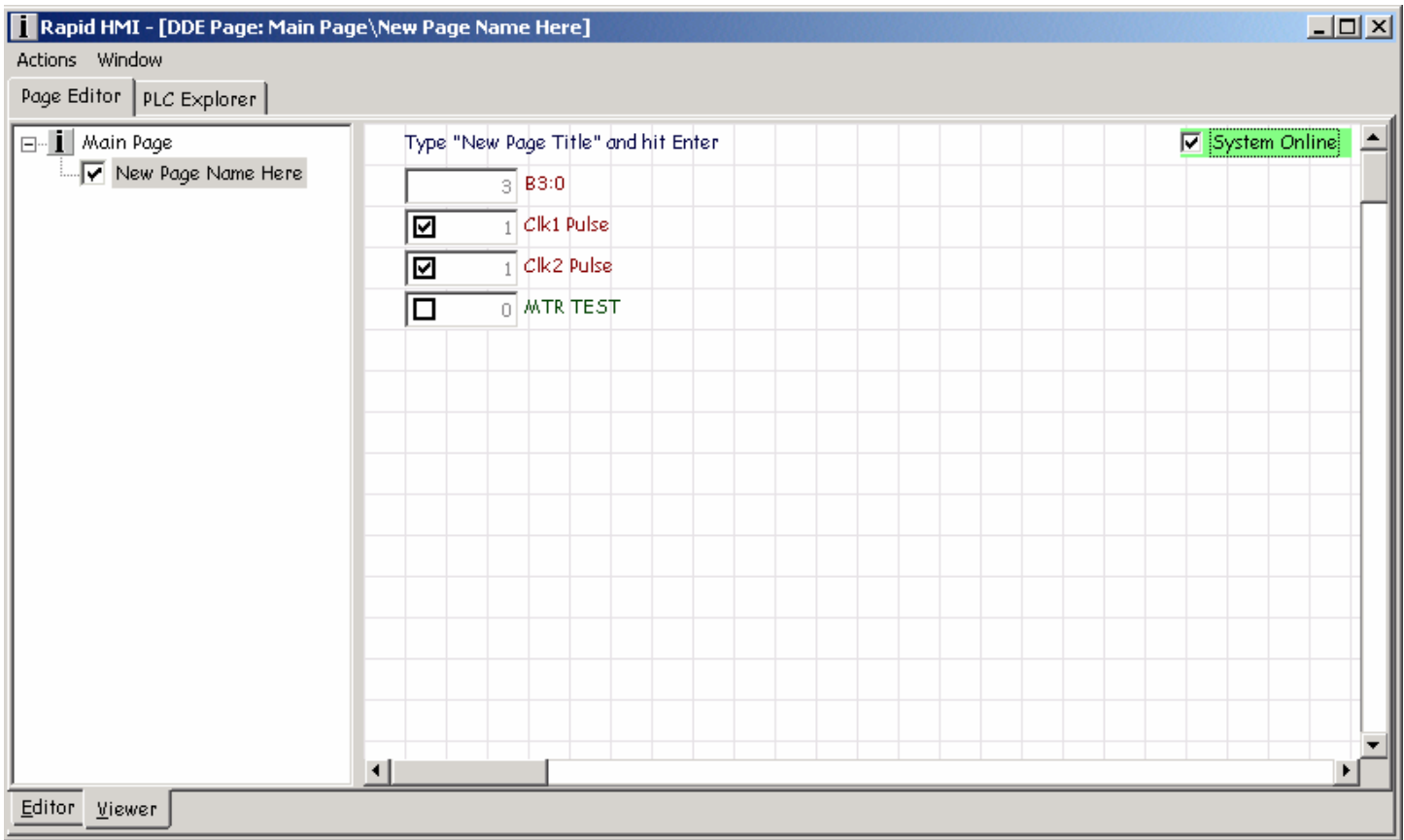
SPECIFIER	DDE LinkItem	Cannot Edit
DESCRIPTION	Label displayed on page. Changing this will not affect the PLC structure.	Use "Topic Description" text field to edit the description. You must save your changes with the "Enter" key.
Read Only	Read Only	Click on to toggle value
Protected	Requires Password to edit	Click on to toggle value
Bool	Data type Boolean	Click on to toggle value

Passwords and Protection

- If a topic is Read Only then passwords and protection will not be applied.
- If a topic is not Read Only then passwords and protection will be applied as follows:

Read Only	Protected	Topic
False	False	Can be edited by anyone in the PLCExplorer application.
False	True	Requires a logon with a password in the PLCExplorer application.

Using the Viewer

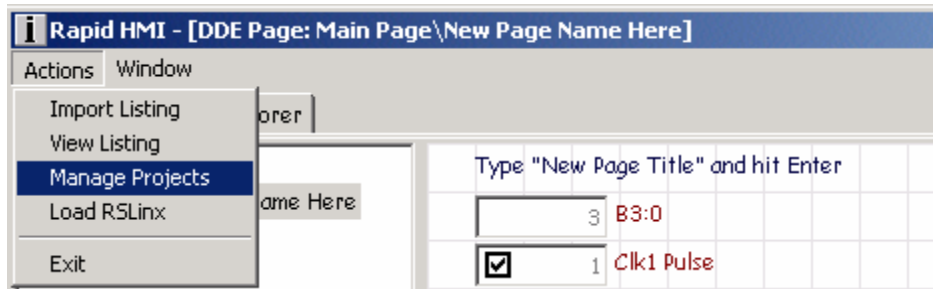


- The “Viewer” will allow you to test the finished project.
- You may go online and offline independently of the “Tag Explorer”.
- The viewer will display all pages as they will appear in the PLCExplorer application when logged on.
- Red labels will indicate Read Only.
- Green Labels will indicate Read/Write.
- Check Boxes will indicate Boolean.

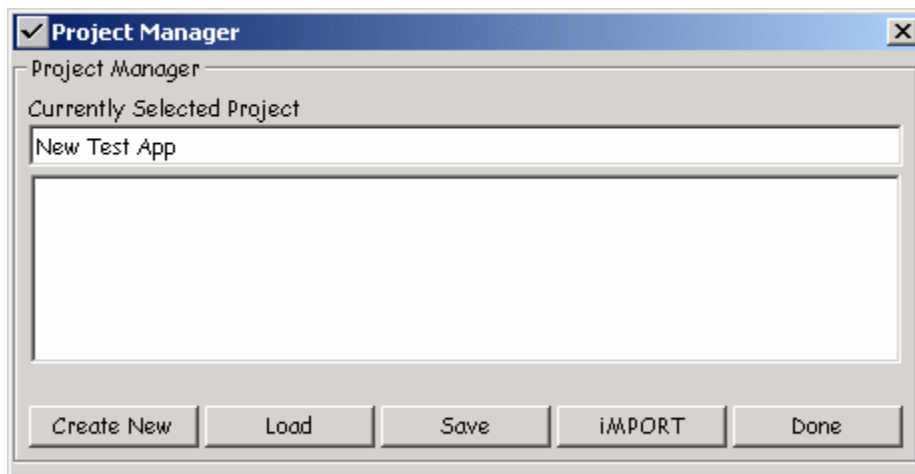
Saving Projects

During the process of design several files may accumulate. A working project consists of a page list file and possibly several page files. The saving of a project will combine all these files into a single project file. This project file can then be used with the PLCExplorer application.

Step 1 - From the "Actions" menu select "Manage Projects".

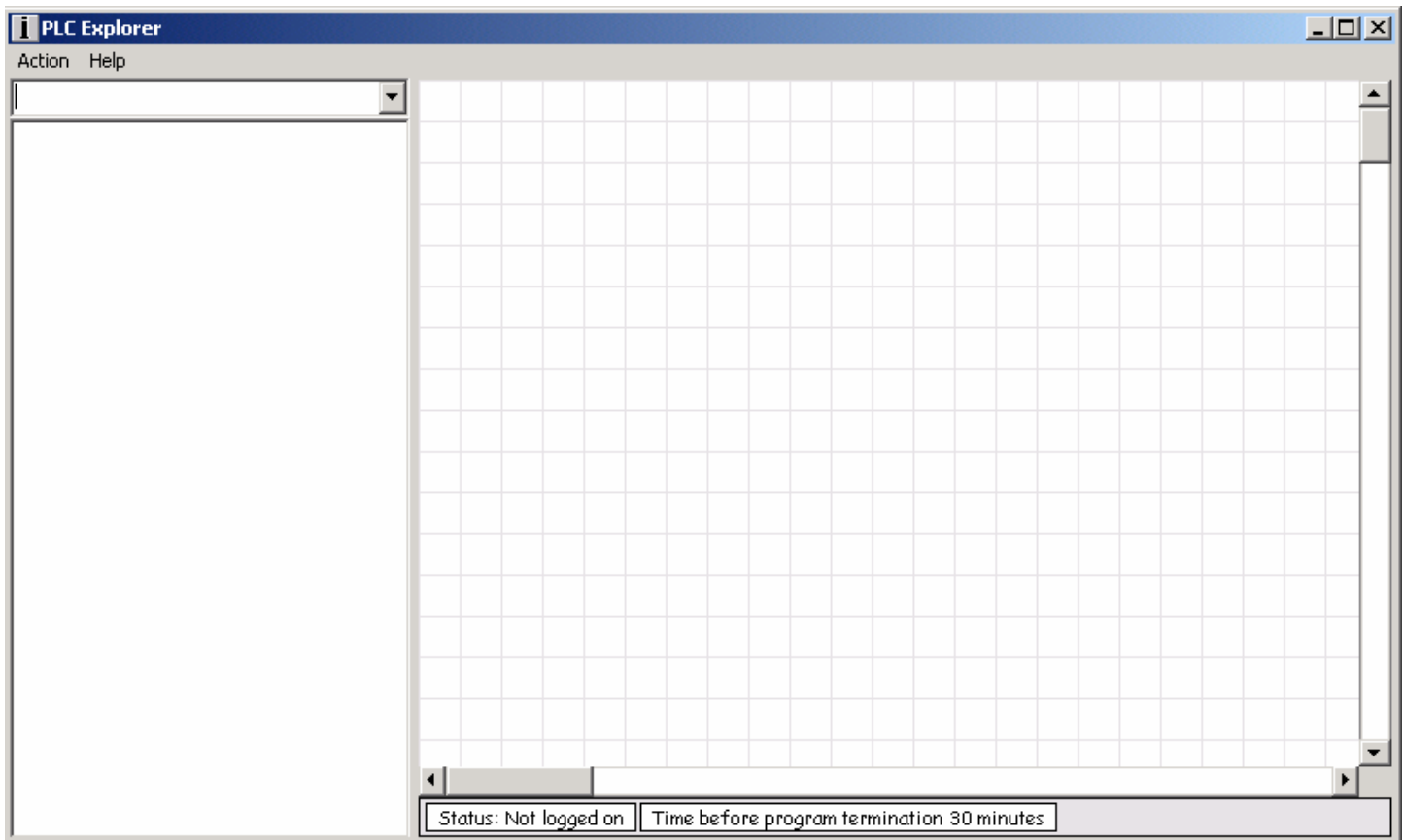


Step 2 - Type in the name of your project. Or, if there is already a project file in the list for your project, select it. Click on the "Save" button.



The "iMPORT" button has a special function. Project files have a specific file format. If you decide to edit the project in Excel you will need to use the import function to put the file back in the correct format. See "File format" for specifications of the project file format.

Using PLCExplorer



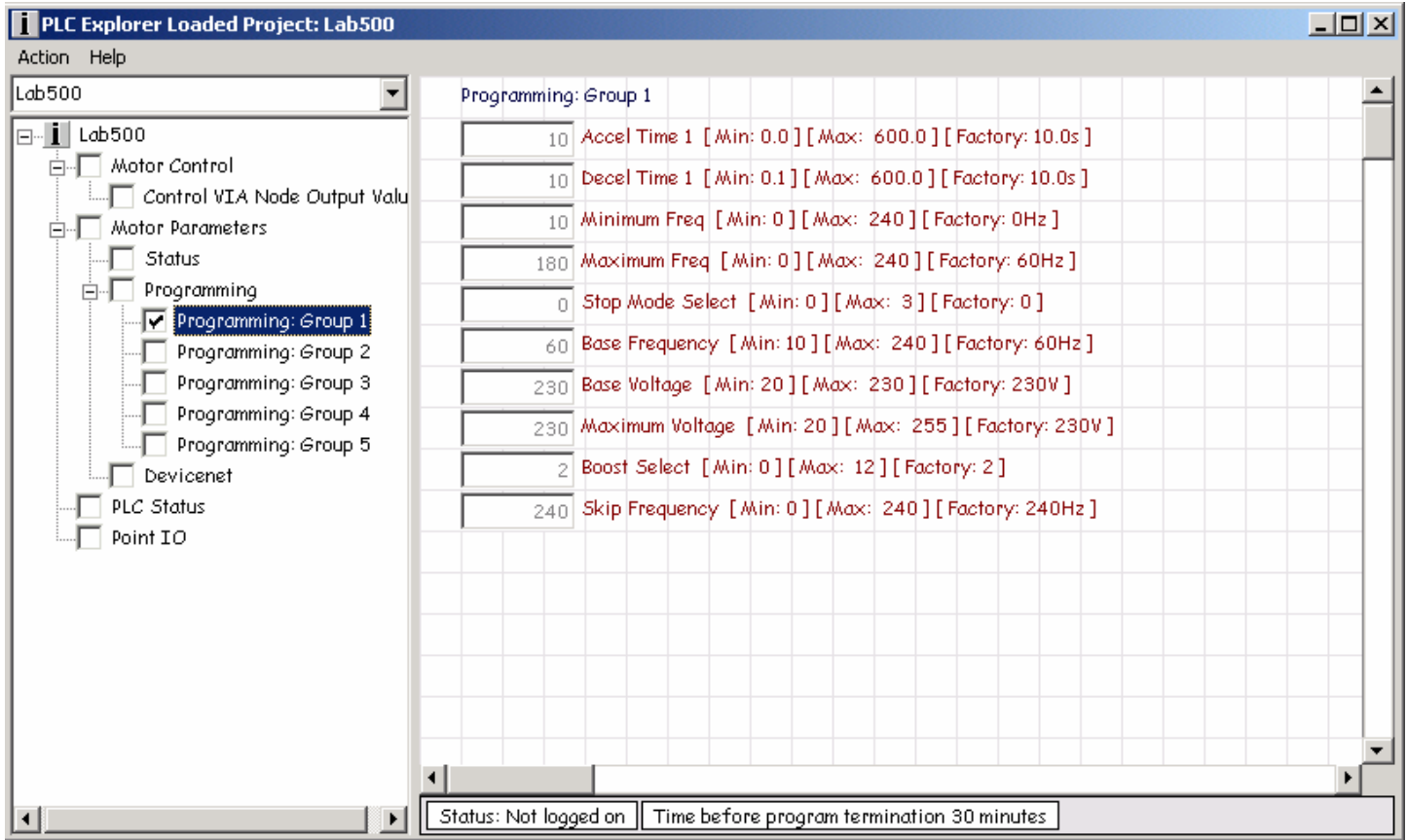
PLCExplorer is a application designed to run the finished project files created by RapidHMI.

PLCExplorer features:

- PLCExplorer is extremely easy to use.
- PLCExplorer looks for projects to load in its folder only. It will not scan sub folders.
- PLCExplorer assumes that the client PC is already running RSLinx and starts up and remains in the online mode.
- If PLCExplorer does not find RSLinx running it will attempt to load RSLinx.
- If the user does not interact with the application for 30 minutes then the application will terminate.
- The user must logon to PLCExplorer in order to manipulate protected topics.
- Logon time is selectable from 5 to 30 minutes. After that the user is logged off.

Loading Projects

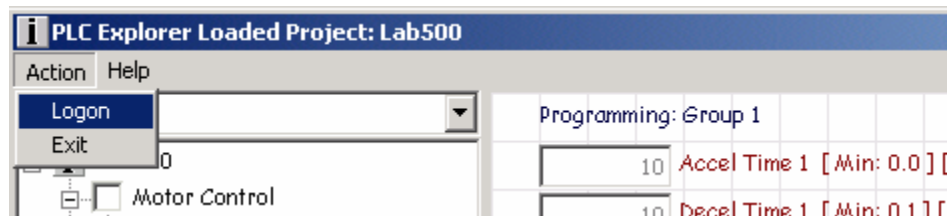
From the drop-down list select the project you want to load.



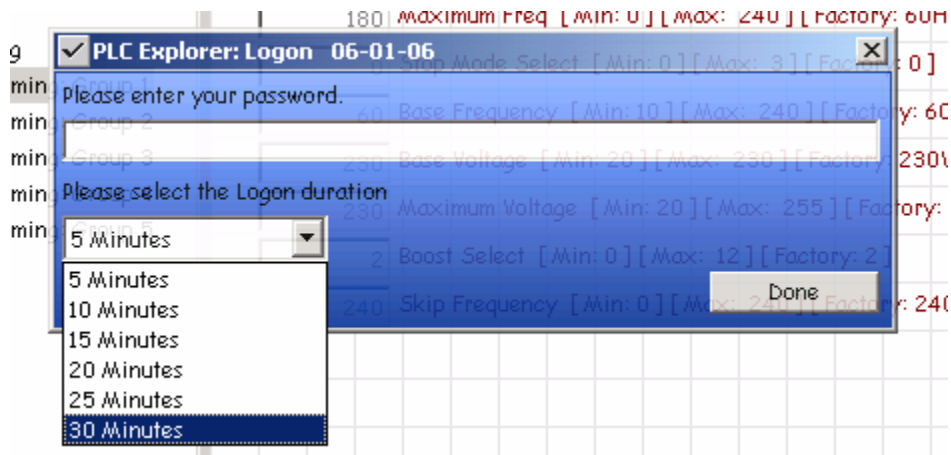
The project displayed here is interesting because it displays the application parameters of a motor drive 160 SSC. It also displays topics from a PLC.

Logging on to PLCExplorer

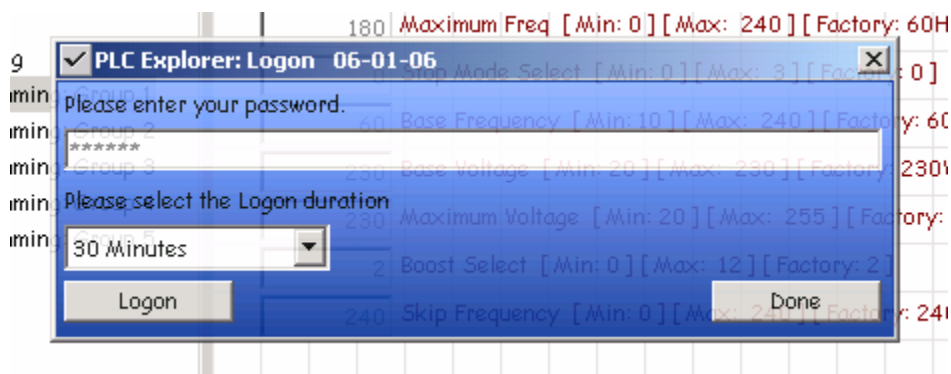
Step 1 - From the "Action" menu select "Logon".



Step 2 - Select the duration you want to be logged on.

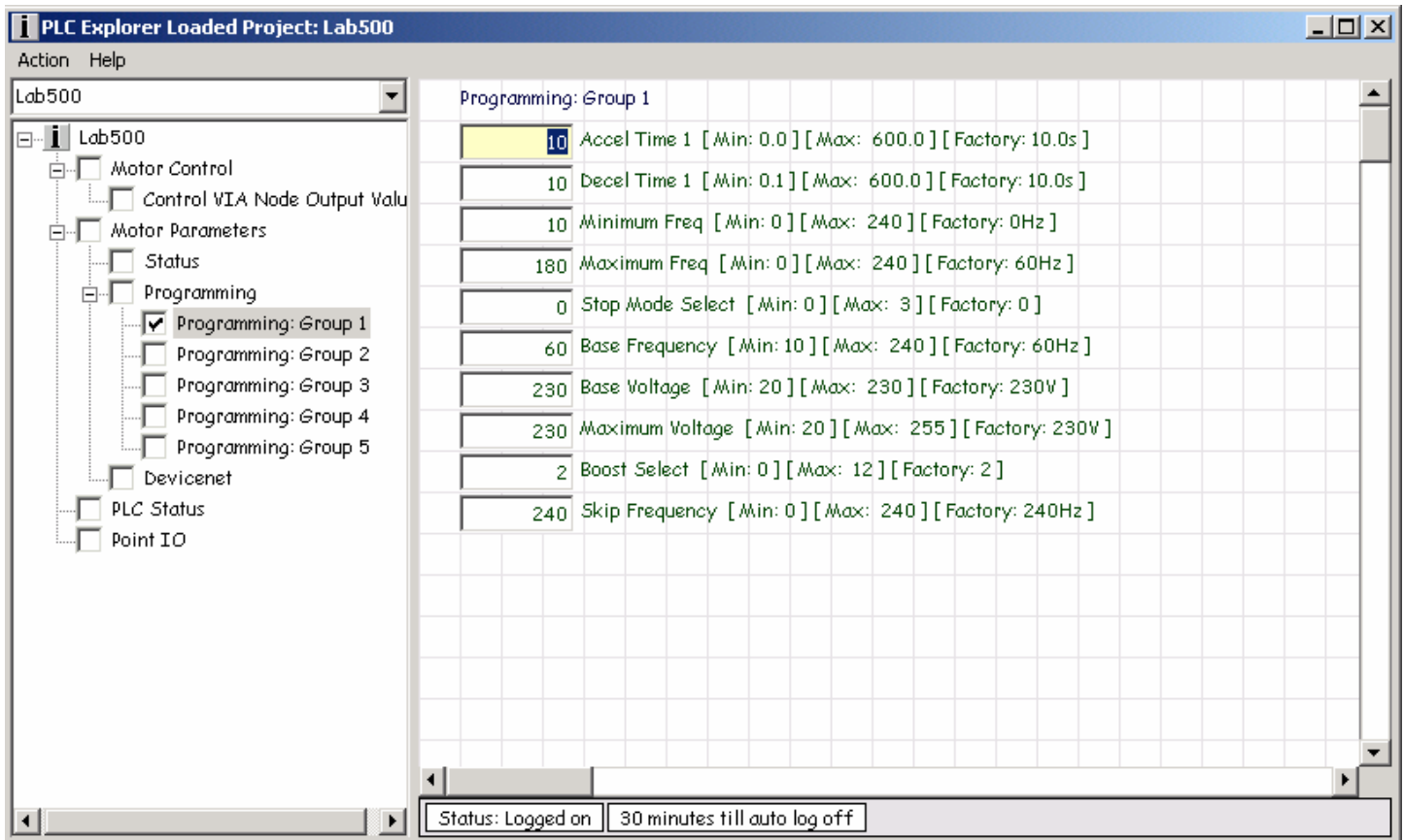


Step 3 - Enter the password and hit the "Enter" key or click on the "Logon" button.



The PLCExplorer Password

The password for PLCExplorer is always the date in the format mmddyy. The date is displayed at the top of the logon screen. In this example the password would be "060106".



Once logged on user may edit any fields you have given them access to. Those fields are displayed in green. Fields that cannot be be edited are displayed in red.

Sample of a project in PLCExplorer

To All Techs,

Please note that changes have been made to the "PLC Explorer" application on line 114469.

A new category has been added called "Consistency Checks". The purpose of these new pages is to allow the technician to make side by side comparisons of similar settings. In theory all values on the consistency check pages should contain the same value across the board. It will be left to the technicians to assure the consistency of the program settings for the machines.

The screenshot shows the PLC Explorer interface for a project named 'L469 Erector'. The left sidebar contains a tree view with the following categories: Production Counters, Robot Enable Signals, Machine Status Signals, Input Parameters, Program Settings, Drive Parameters, Consistency Checks (highlighted), Forming Head Length, Forming Head Width, and Compression Rod. The 'Forming Head Length' category is expanded, showing a list of values: 192mm, 288mm, 384mm, 432mm, 480mm, 192mm (checked), 240mm, 288mm, and 114mm. The main window displays a table with the following data:

Applies to box sizes: LB56, LB57, LB5 9x7 [Non-Standard Size]	
187	LB5 6-48
187	LB5 6-60
0	LB5 6-72
0	LB5 6-96
0	LB5 6-114
187	LB5 7-48
187	LB5 7-60
187	LB5 7-72
187	LB5 7-96
187	LB5 7-114
187	LB5 9x7-48
187	LB5 9x7-60
187	LB5 9x7-72
0	LB5 9x7-96
0	LB5 9x7-114

Callout boxes provide the following information:

- An oval highlights the 'Consistency Checks' category in the tree view, with a box stating: "This is the main category and".
- An oval highlights the 'Forming Head Length' category in the tree view, with a box stating: "Side by side view quickly points out".
- An oval highlights the top row of the table (187 LB5 6-48), with a box stating: "Each page indicates what box".

Figure 1 New Erector Check

PLC Explorer Loaded Project: L469 Closer

Action Help

L469 Closer

Applies to box sizes: LBS6, LBS 7, LBS9x7[Non-Standard Size]

193	LBS 6-48
193	LBS 6-60
192	LBS 6-72
193	LBS 6-96
194	LBS 6-114
193	LBS 7-48
192.5	LBS 7-60
193	LBS 7-72
193	LBS 7-96
193	LBS 7-114
288	LBS 9x7-48
193	LBS 9x7-60
193	LBS 9x7-72
0	LBS 9x7-96
0	LBS 9x7-114

Production Counters
 Machine Status Signals
 Input Parameters
 Program Drive Settings
 Drive Parameters
 Consistency Check
 Feed in Belt Width
 192mm
 240mm
 288mm
 Rail Width in Machine
 192mm
 240mm
 288mm
 Width in Buffer
 192mm
 240mm
 288mm
 Rail Height in Machine
 48mm
 60mm
 72mm
 96mm
 114mm

Each page indicates what box

Side by side view quickly points out

This is the main category and

Figure 2 New Closer Check

File format

It is important to remember that all working files are tab delimited. The text below is a partial project example. The example comes with the distribution of the application.

The first part of the project file is the tree structure. It is in the format:

- 1) Page Parent
- 2) Page key, a unique string that is generated by the application. You may change it to a simpler string.
- 3) Page Name
- 4) Page Title

"Begin Topics" signals the application that page topics will follow.

"#S" pound sign followed by the Page key

Topics of the page then follow. It is in the format:

- 1) DDE Link, OPC|DDE Topic, application | topic
- 2) DDE Link Item
- 3) Label displayed on the page
- 4) Read Only, True=1, False=0
- 5) Protected, True=1, False=0
- 6) Boolean, True=1, False=0

```
Main S010606061144PM1 Local:2:O.DATA[0] Local:2:O.DATA[0]
Main S010606061144PM2 From SLC500 via EtherNetIP From SLC500 via EtherNetIP
Main S010606061144PM3 Test Flags Test Flags
S010606061144PM3 S010606061144PM4 Test Flag Bits Test Flag Bits
Begin Topics
#S010606061144PM1
RSLinx|Lab5000 Local:2:O.DATA[0] Local:2:O.DATA[0] 110
RSLinx|Lab5000 Local:2:O.DATA[0].0Local:2:O.DATA[0].0111
RSLinx|Lab5000 Local:2:O.DATA[0].1Local:2:O.DATA[0].1111
RSLinx|Lab5000 Local:2:O.DATA[0].2Local:2:O.DATA[0].2111
RSLinx|Lab5000 Local:2:O.DATA[0].3Local:2:O.DATA[0].3111
RSLinx|Lab5000 Local:2:O.DATA[0].4Local:2:O.DATA[0].4111
RSLinx|Lab5000 Local:2:O.DATA[0].5Local:2:O.DATA[0].5111
RSLinx|Lab5000 Local:2:O.DATA[0].6Local:2:O.DATA[0].6111
RSLinx|Lab5000 Local:2:O.DATA[0].7Local:2:O.DATA[0].7111
RSLinx|Lab5000 Local:2:O.DATA[0].8Local:2:O.DATA[0].8111
#S010606061144PM2
RSLinx|Lab5000 From500[0] From500[0] 110
RSLinx|Lab5000 From500[1] From500[1] 110
RSLinx|Lab5000 From500[2] From500[2] 110
RSLinx|Lab5000 From500[3] From500[3] 110
RSLinx|Lab5000 From500[4] From500[4] 110
RSLinx|Lab5000 From500[5] From500[5] 110
RSLinx|Lab5000 From500[6] From500[6] 110
RSLinx|Lab5000 From500[7] From500[7] 110
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