
Part Number D301597X012

Form A6267

May 2017

DS800 Development Suite Quick Start Guide for the FloBoss™ 107

Revision Tracking Sheet

May 2017

This manual may be revised periodically to incorporate new or updated information. The revision date of each page appears at the bottom of the page opposite the page number. A change in revision date to any page also changes the date of the manual that appears on the front cover. Listed below is the revision date of each page (if applicable):

Page	Revision
Initial issue	Jan-09
Cover, back of cover page, page 1, page 63, and back cover (all pages re-dated)	May 2017

Introduction

The DS800 Development Suite software (“DS800”) is an integrated development environment that allows you to build IEC 61131-3 compliant programs. You install DS800 on your PC and use the software to develop programs and download those programs (using a serial connection) to the FloBoss 107 (“FB107”).

Note: For further technical information, refer to the product data sheet *DS800 Development Suite Software* (part D301160X012).

This *Quick Start Guide* provides both a high-level overview and the detailed steps you need to install and configure the DS800 software on your PC. It also provides a very simple example of building an IEC 61131-3 compliant program.

Note: FB107 firmware version 1.4 added user program slot 7. This slot uses the same memory space as the DS800 kernel, which is **not** included in the program and must be downloaded into the FB107. Consequently, you cannot have the DS800 kernel installed and use program slot 7 for a separate user program at the same time.

The installation process requires you to:

1. Verify versions of ROCLINK 800 and the FB107 firmware.
2. Install the DS800 Runtime License on the FB107.

Note: Perform software installations using the **LOI** point on the FB107.

3. Install the DS800 Runtime kernel on the FB107.
4. Set CPU and I/O scanning speed on the FB107.
5. Define a comm port on the FB107 for the DS800 communications.
6. Create a configuration file (which the DS800 software uses).
7. Save the FB107 Flash configuration.
8. Install the DS800 Workbench software (DS800 Development Suite and LicenseManager) on your PC.
9. Verify the successful installation.

Note: To understand all the steps and system requirements, we suggest that you read through this **entire** guide **before** you begin the installation and configuration process.

After you have successfully installed the software, review *Creating a Sample Workbench Project* for a detailed example of building a simple IEC 61131-3 program.

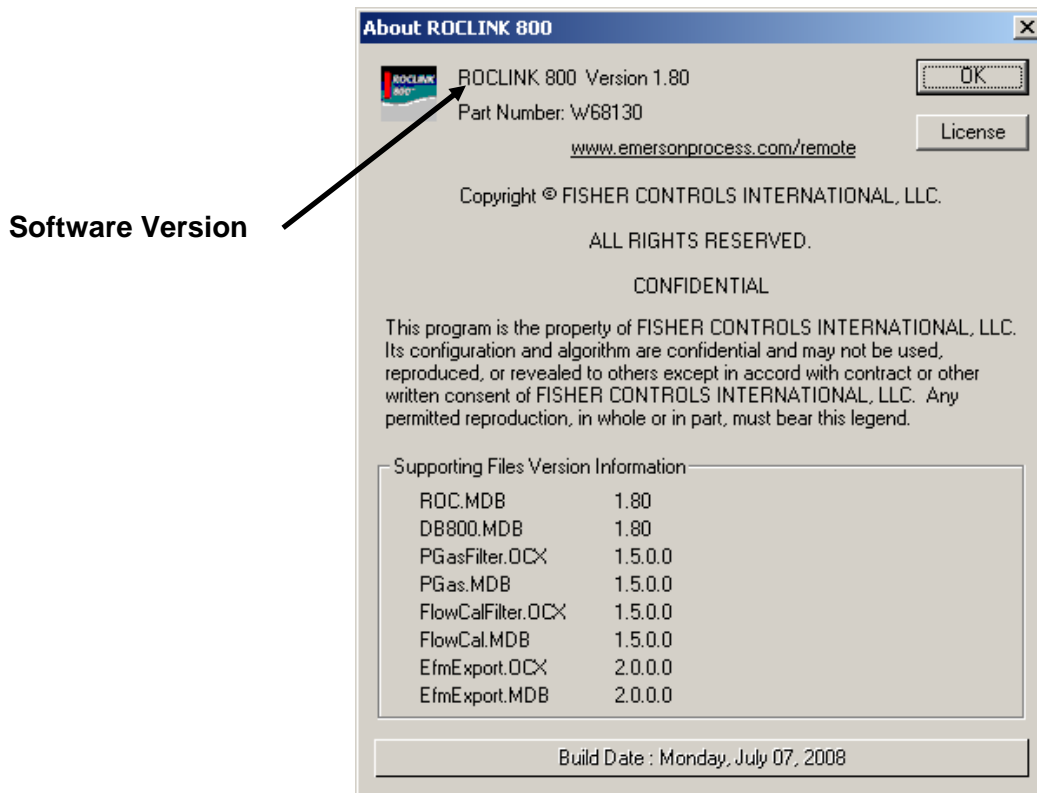
1. Verify Versions of ROCLINK 800 and FB107

When installed on an FB107, the DS800 software requires:

- Version 1.80 (or greater) of ROCLINK 800.
- Version 1.20 (or greater) of FB107 application firmware.

To verify the versions:

1. Start ROCLINK 800.
2. Click **Help** on the ROCLINK 800 tool bar and click **About ROCLINK 800** from the drop-down menu. The About ROCLINK 800 screen displays.



3. Verify that the version of ROCLINK 800 is **1.80** or greater.

Note: If the version is **not** at least 1.80, contact your Remote Automation Solutions representative to upgrade ROCLINK 800.

4. Click **OK**. The FB107 graphic displays.
5. Click **ROC** on the ROCLINK 800 toolbar and click **Information** on the drop-down menu. The Device Information screen displays.

Device Information

General | Points | Other Information | Revision Info

Station Name: FB107 Device Type: 107

Address: 1

Group: 2

Contract Hour: 9 Force End of Day Units: US Metric

FST Execution: 20 Instructions Per Cycle

Update OK Cancel Apply

6. Select the **Other Information** tab. The Other Information screen displays.

Device Information

General | Points | Other Information | Revision Info

Customer Name: NONE

Version Name: w68182 Ver 1.20 ← **Firmware Version**

ID: Emerson Process RAS

Time Created: Jun 23, 2008 7:40

ROM Serial #: 000000000000

MPU Loading: 34.20263

Update OK Cancel Apply

7. Verify that the firmware version for your FB107 is **1.20** or greater.

Note: If the version is **not** at least 1.20, contact your Remote Automation Solutions representative to upgrade the firmware.

8. Click **OK** to close the Device Information screen, but do not exit ROCLINK 800. Proceed to *Install the DS800 Runtime License*.

2. Install the DS800 Runtime License

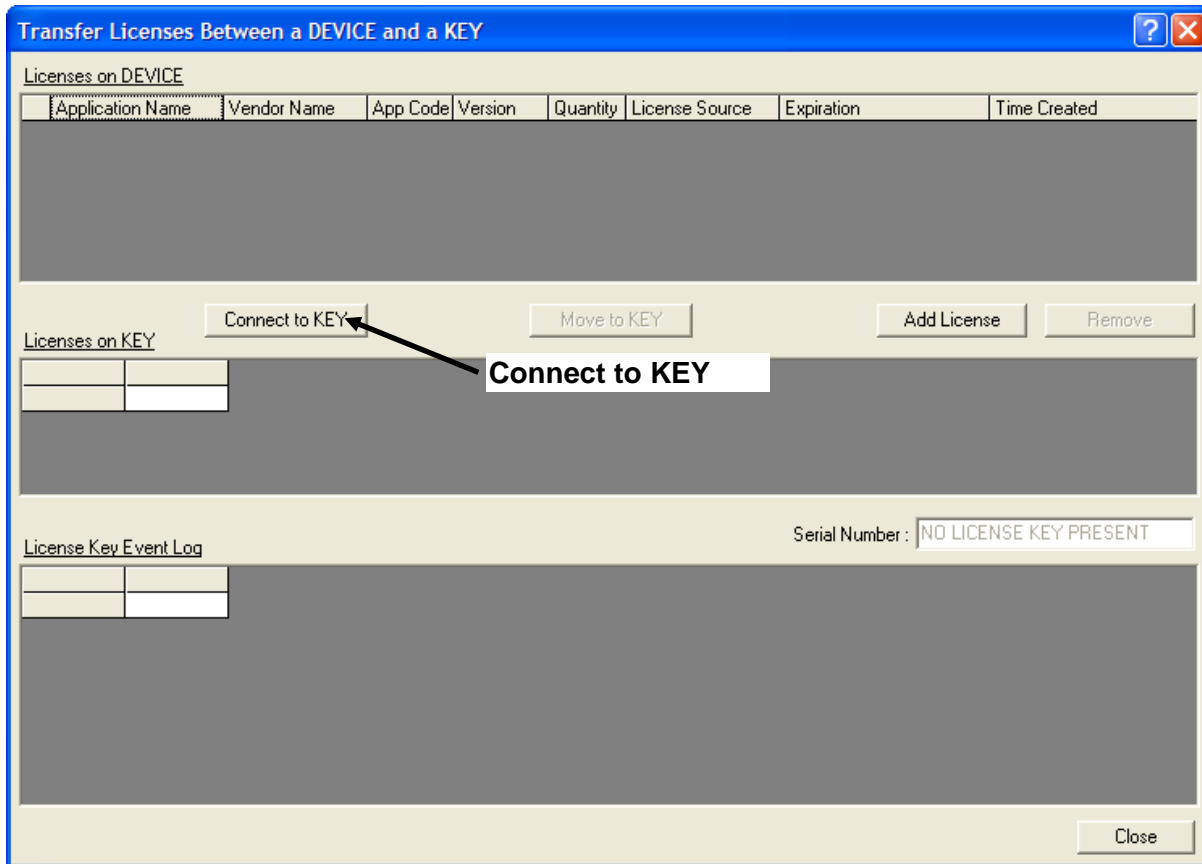
The DS800 software requires you to install a runtime license on the FB107. If you do not load this runtime license, you cannot download DS800 “projects” (applications) from your PC to the FB107. Remote

Automation Solutions distributes the runtime license using a security-enhanced USB drive (or “key”) with a **purple** label:

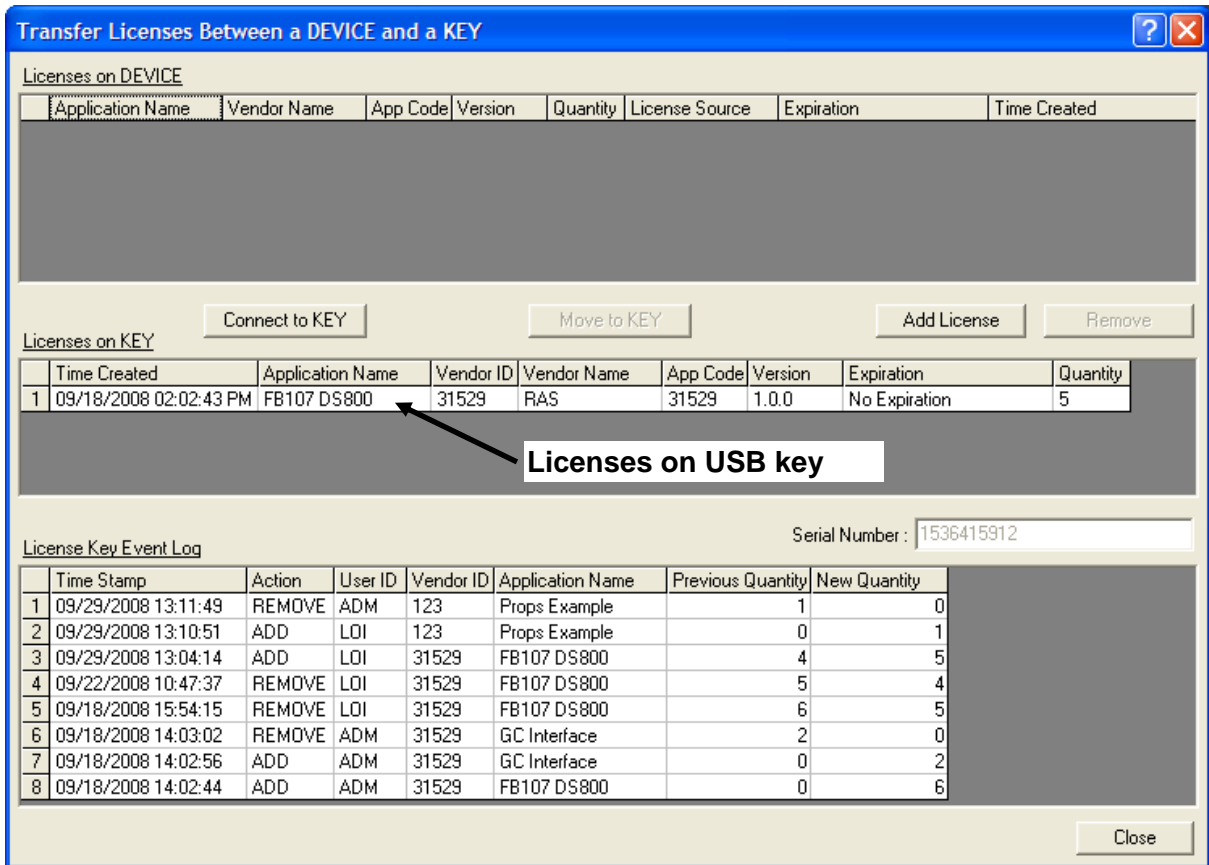


To install the runtime license:

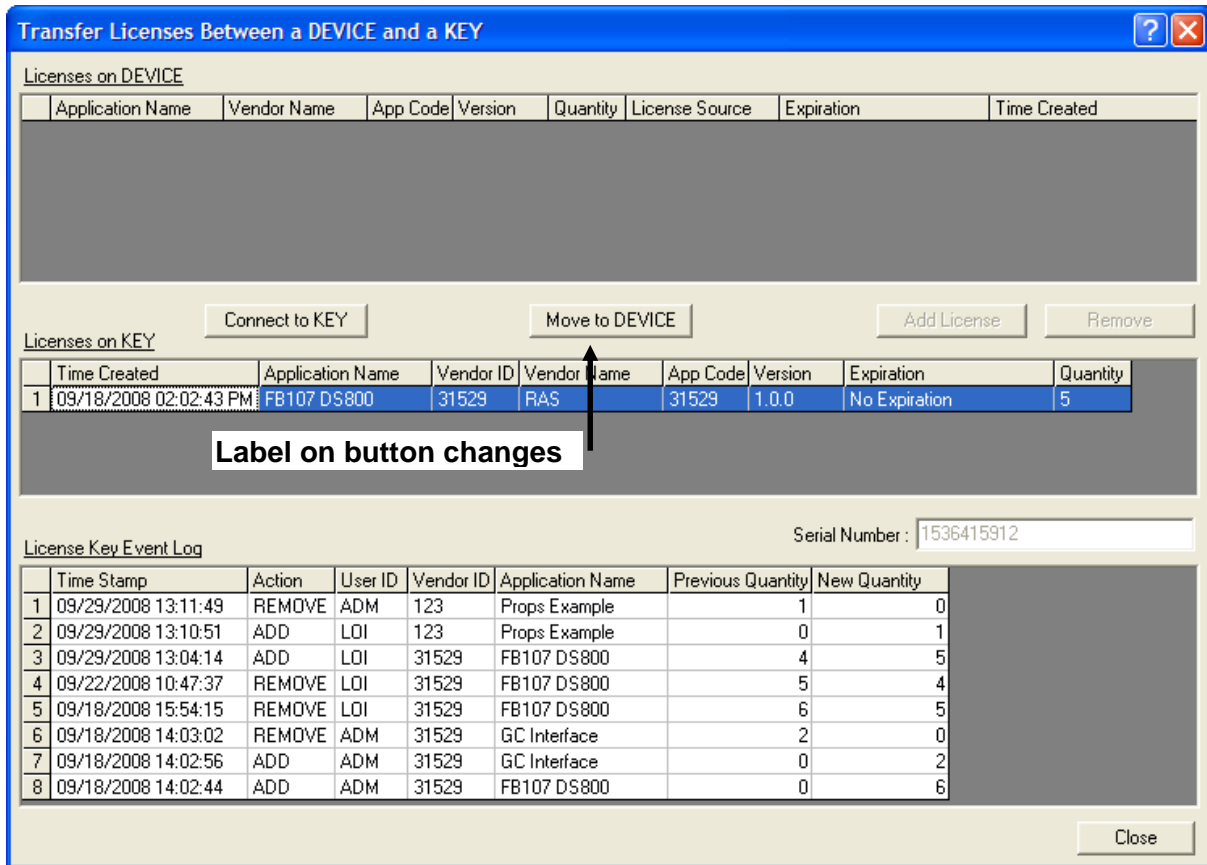
1. Click **Utilities** on the ROCLINK 800 menu bar, highlight **License Key Administrator** on the drop-down menu, and click **Transfer between DEVICE and KEY**. The Transfer Licenses Between a Device and a Key screen displays.



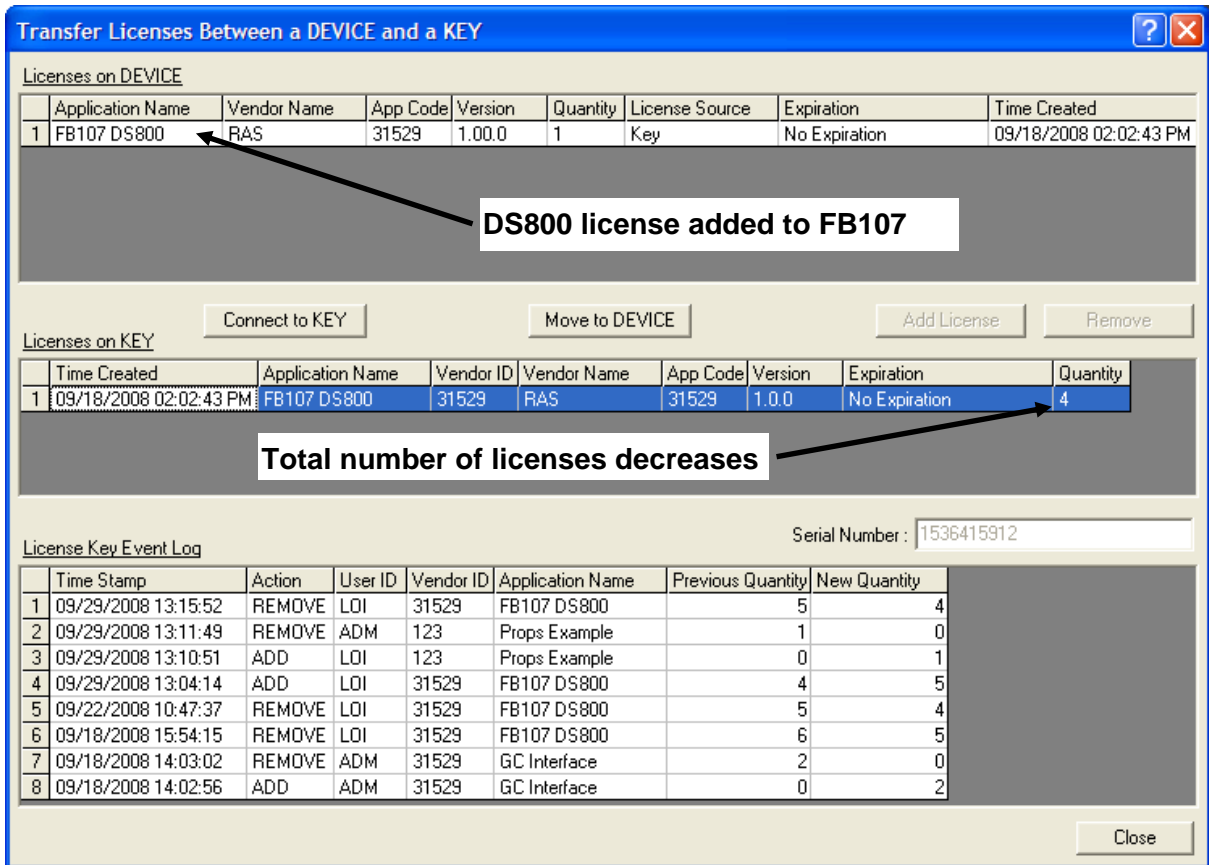
2. Insert the security-enhanced USB drive in a USB port on your PC and click **Connect to KEY**. This refreshes the screen and shows the licenses on the USB key.



3. Click the line for the licenses on the key to highlight it. Note that the label on the **Move to KEY** button changes to **Move to DEVICE**.



4. Click **Move to DEVICE**. ROCLINK 800 moves one license from the key to the FB107.



5. Click **Close** to exit the screen and redisplay the FB107 graphic. Do not exit ROCLINK 800. Proceed to *Install the DS800 Runtime Kernel*.

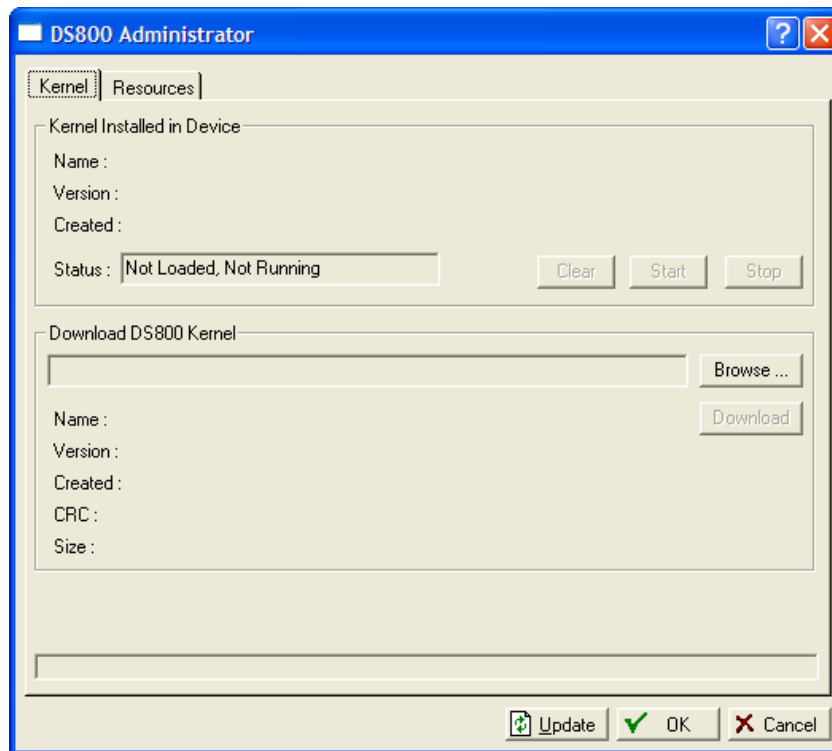
Note: For more information on FB107 software licenses, refer to the *ROCLINK™ 800 Configuration Software User Manual (for FloBoss™ 107)*, Form A6217.

3. Install the DS800 Runtime Kernel

The DS800 kernel is the “connecting engine” which runs inside the FB107 and interprets and executes DS800 programs. The kernel is not a standard FB107 component; you must install it. Remote Automation Solutions distributes the kernel on a CD-ROM.

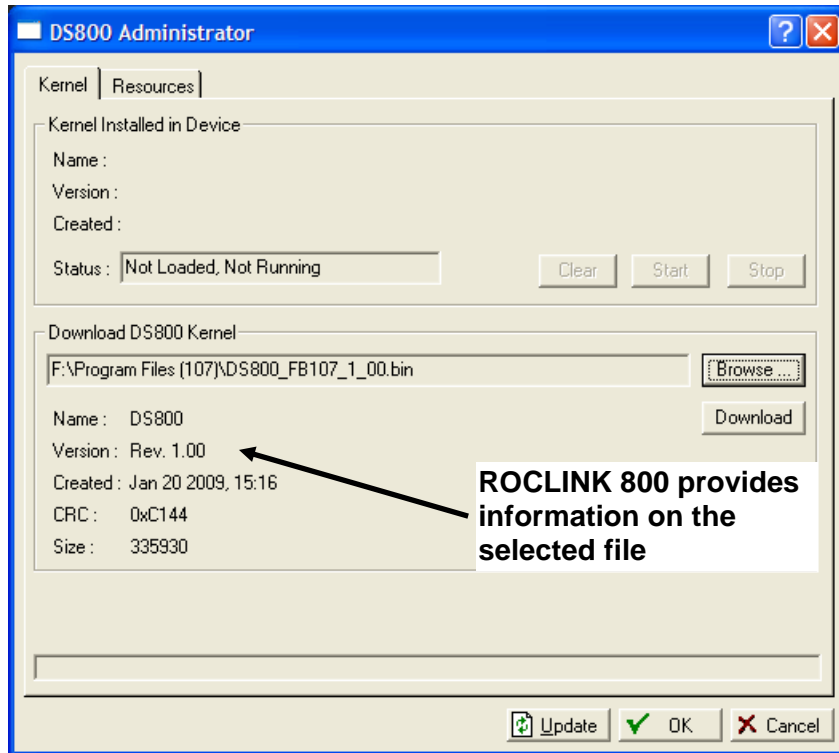
To install the DS800 kernel:

1. Insert the CD-ROM.
2. Click **Configure** on the ROCLINK 800 tool bar, highlight **Control** on the drop-down menu, and click **DS800**. The DS800 Administrator screen displays.

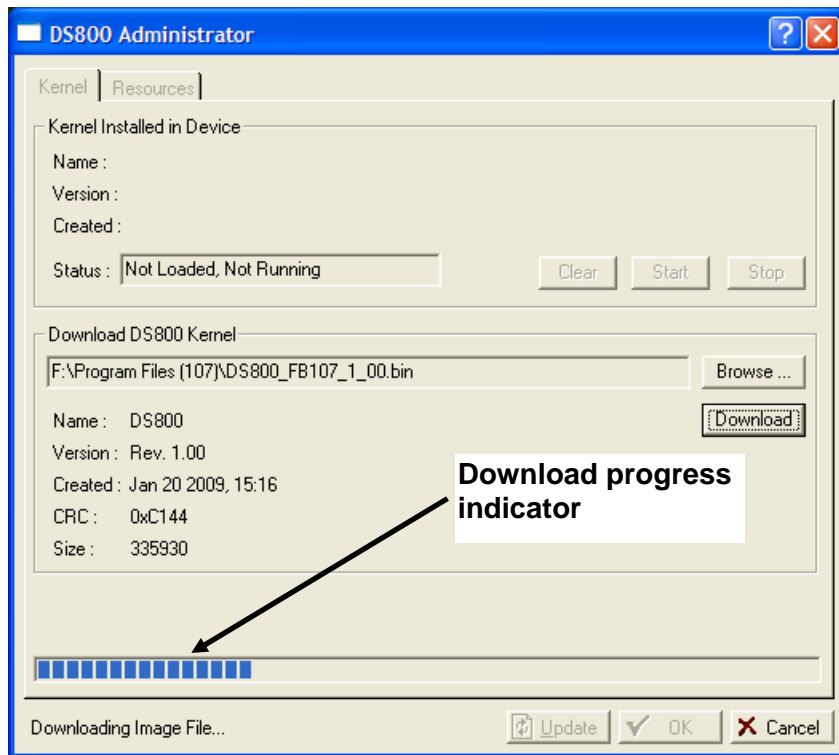


Note: This screen has two tabs: **Kernel** and **Resources**. Use the **Kernel** tab to load the DS800 kernel and view associated information. Use the **Resource** tab to load binary DS800 programs without the PC-based Workbench software. The upper frame on the Kernel tab (**Kernel Installed in Device**) provides information on the kernel currently installed; the lower frame identifies and provides specific information on kernels you may want to download to the FB107.

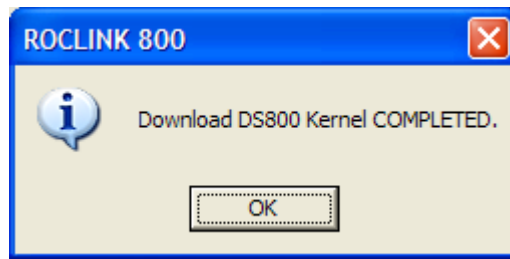
3. Review the upper frame on the Kernel tab. If the kernel has not been installed in the FB107, the Status field displays the message *Not Loaded, Not Running*.
4. Click **Browse** in the lower frame. A Select DS800 Kernel File dialog displays. Remote Automation Solutions distributes the DS800 kernel as a file with a .bin extension (*D:\CD Name\Folder\Kernel\DS800_FB107_1_00.bin*). Browse to the location on the CD where this file is stored and click **Open**. A populated version of the DS800 Administrator screen displays.



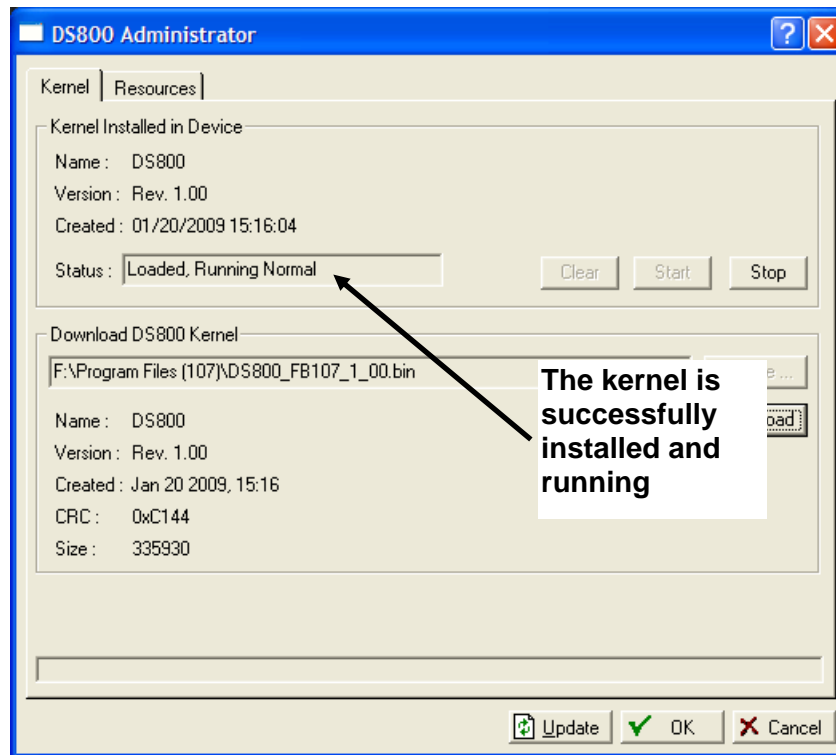
5. Click **Download**. ROCLINK 800 displays an authorization dialog box. Click **Yes** to begin the download. As the download proceeds, ROCLINK 800 displays a progress bar at the bottom of the screen.



When the download completes, ROCLINK 800 displays a notification dialog.



6. Click **OK** to complete the download. The Status message changes to indicate that the kernel is installed and running.



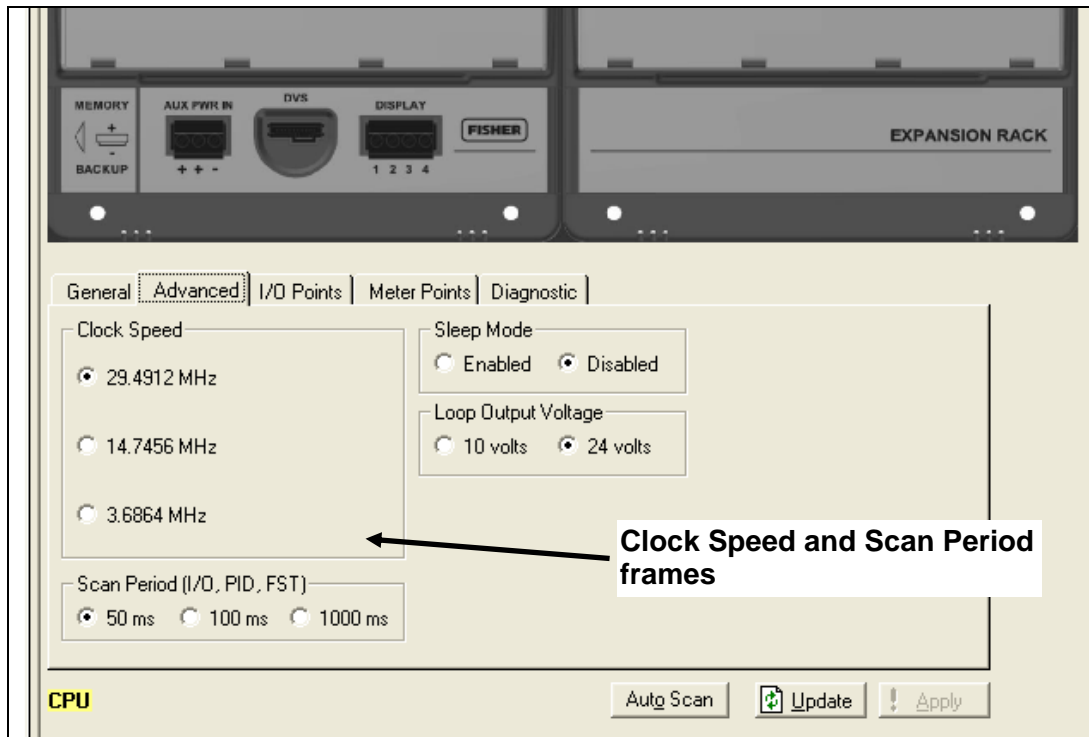
7. Click **OK** to exit the DS800 Administrator screen and display the FB107 graphic. Do not exit ROCLINK 800. Proceed to *Set CPU Clock and I/O Scanning Speed*.

4. Set CPU Clock and I/O Scanning Speed

Set the CPU and I/O scanning speed on the FB107 to ensure the fastest possible Workbench installation.

To set the CPU and I/O scanning speed:

1. Click the **Advanced** tab on the folders immediately below the FB107 graphic. The Advanced tab displays:



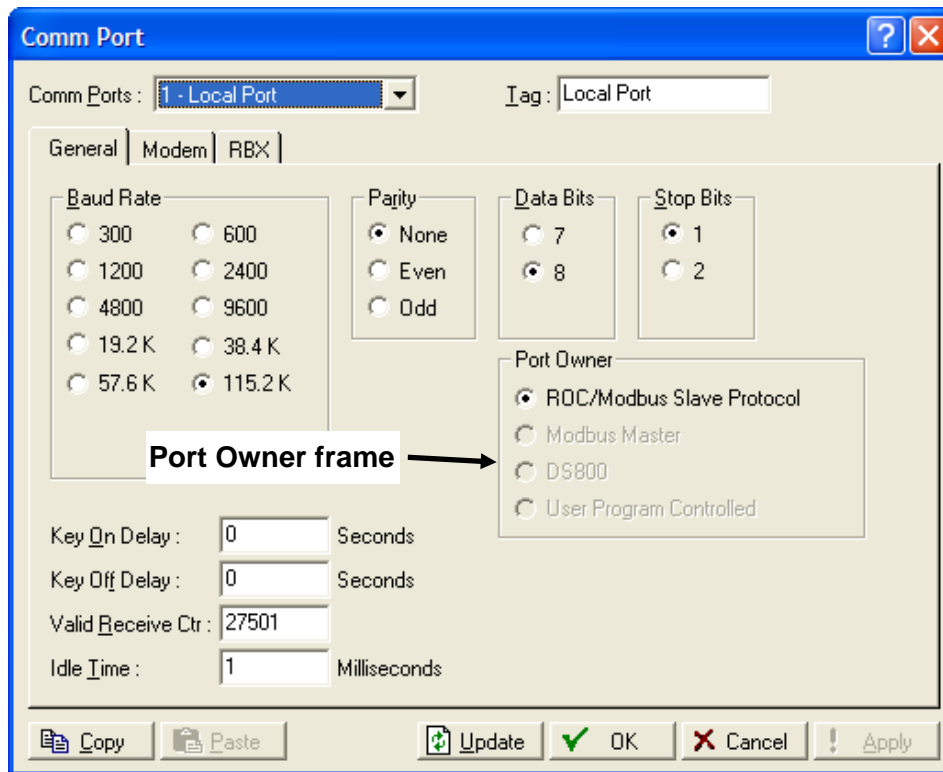
2. Verify that the value in the Clock Speed frame is set to **29.4912** MHz.
3. Verify that the value in the Scan Period frame is set to **50** ms.
4. Click **Apply** if you have changed any values on this screen. Do not exit ROCLINK 800. Proceed to *Set Comm Port Owner*.

5. Set Comm Port Owner

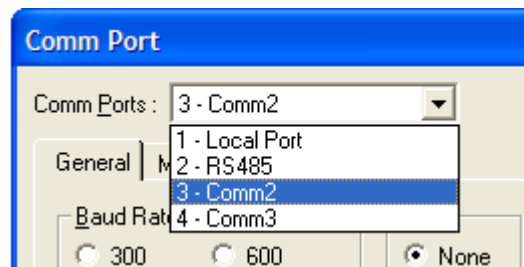
Defining an application (in this case, DS800) as a communications port owner enables the application to communicate directly with the FB107.

To set the comm port owner:

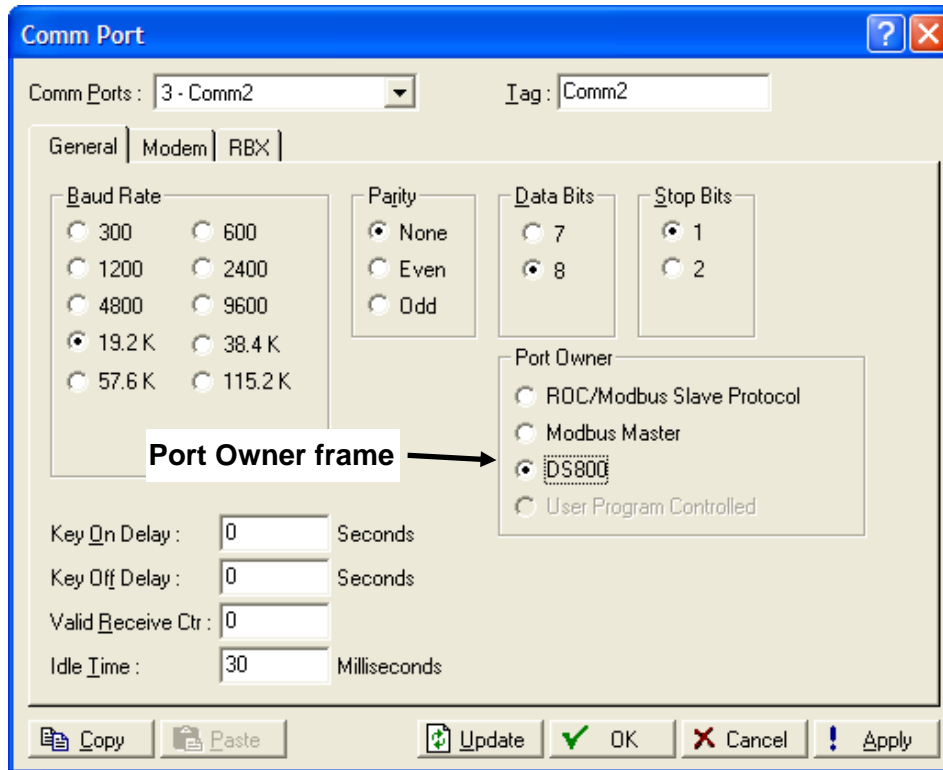
1. Click **ROC > Comm Ports** on the ROCLINK 800 menu bar. The Comm Port screen displays.



2. Click ▼ to the right of the Comm Ports field to display all available comm ports.



3. Click **Comm2**. The DS800 option in the Port Owner frame activates.



4. Select **DS800**.

Note: ROCLINK 800 automatically changes the value in the Baud Rate frame to **19.2 K** to match the DS800 option you have selected. 19.2K is also the maximum baud rate DS800 supports.

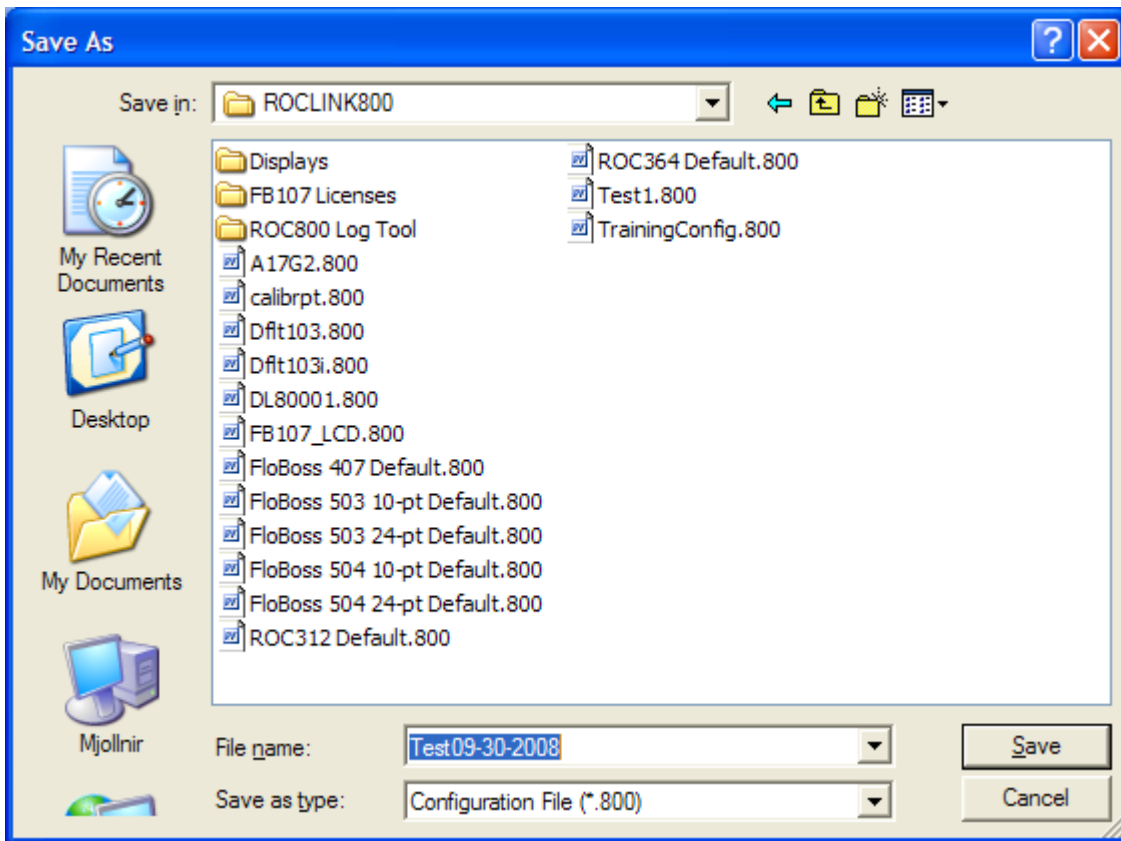
5. Click **Apply** to save your changes, and then click **OK** to display the FB107 graphic. Proceed to *Create Configuration File*.

6. Create Configuration File

Creating a configuration (.800) file preserves the I/O configuration you have defined on your FB107. The DS800 Workbench software uses this configuration file (and its defined point types) to correctly map information you define in the Workbench back to your FB107.

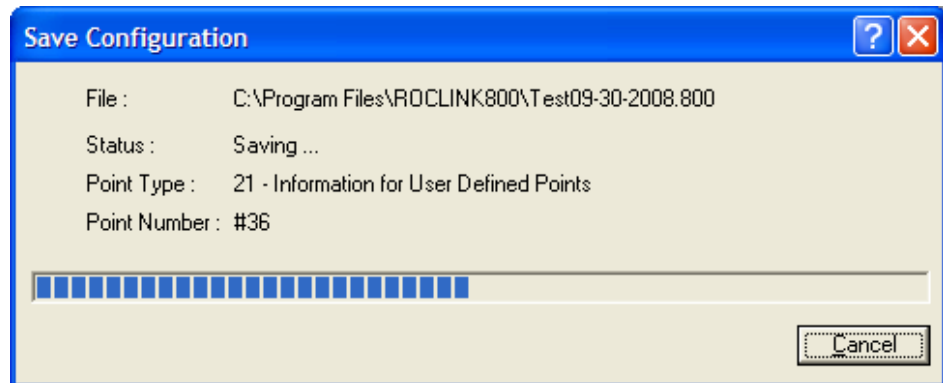
To create a configuration file:

1. Click **File > Save Configuration** on the ROCLINK 800 menu bar. A Save As dialog screen displays.

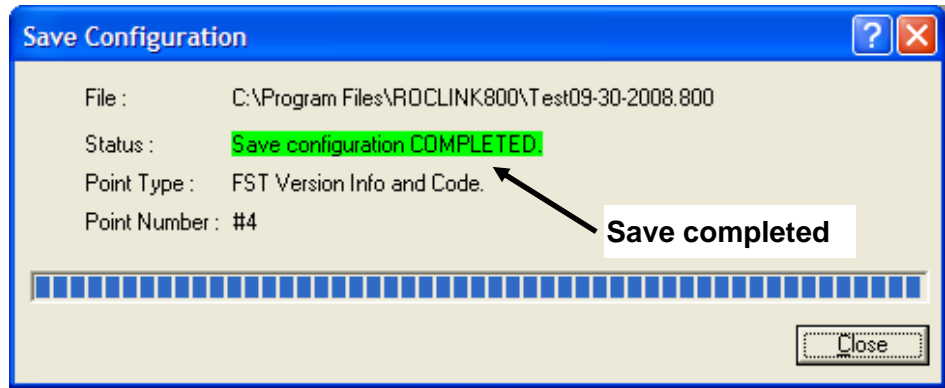


2. Complete the File name field with a meaningful file name (here, **Test09-30-2008**). Click **Save**. ROCLINK 800 displays a dialog box that shows the progress of the save.

Note: By default, ROCLINK 800 places all configuration files in the /ROCLINK800 folder on your PC.



A change in the Status message indicates when the process finishes.

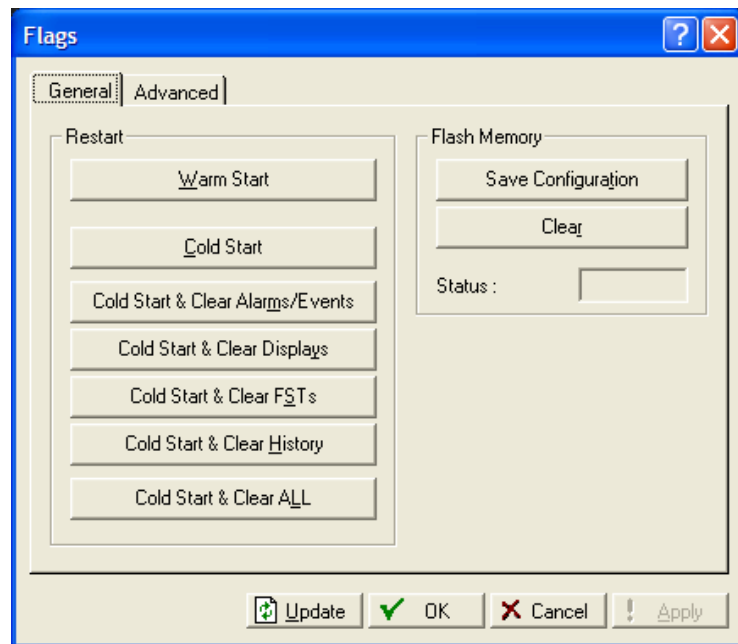


3. Click **Close** to complete the process. The Save Configuration dialog box closes and displays the FB107 graphic. Proceed to *Save Flash Configuration*.

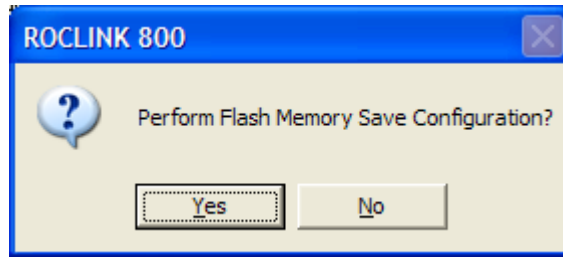
7. Save Flash Configuration

Saving the Flash configuration in your FB107 is a precautionary step.

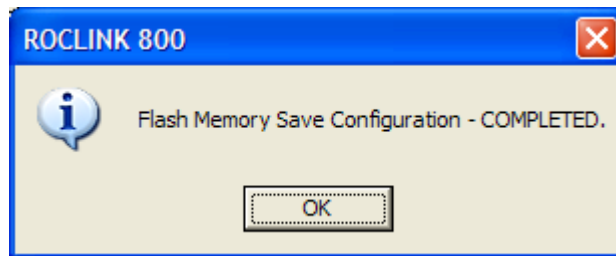
1. Select **ROC > Flags**. The Flags screen displays.



2. Click **Save Configuration** in the Flash Memory frame. ROCLINK 800 displays a confirmation dialog:



3. Click **Yes**. ROCLINK 800 saves the configuration and displays a dialog box when it finishes.



4. Click **OK** to close this dialog box. The Flags screen displays. Click **OK** to display the FB107 graphic. Proceed to *Install the DS800 Workbench Software*.


8. Install the DS800 Workbench Software

The DS800 Workbench software provides the development environment you use to create DS800 “projects” (IEC 61131-3 compliant programs) which you consequently download to the FB107.

Note: For more information on creating DS800 projects, refer either to *Create a Sample Workbench Project* in this document or to the *DS800 Development Suite Software User Manual* (Form A6126).

Remote Automation Solutions delivers the DS800 Workbench software on a CD-ROM. Your PC must have the following minimum requirements:

- Pentium-class processor (233 MHz or greater recommended).
- CD-ROM drive.
- Windows 2000 (Service Pack 2), XP, or Vista.
- Serial port.
- Administrative privileges for the PC on which the software is to be installed.

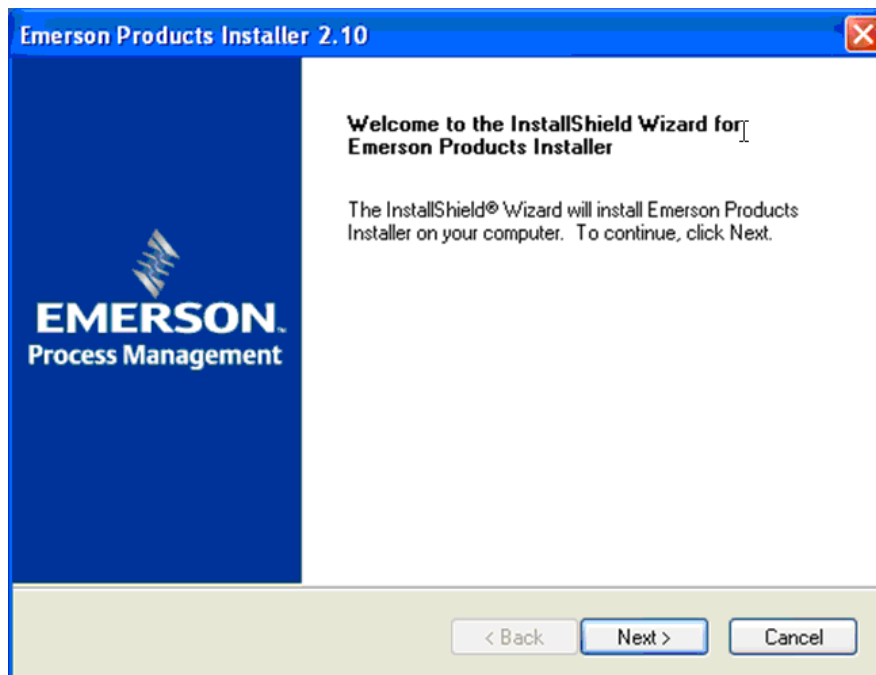
 **Caution** A Sentinel USB license key provides access to all the DS800 Workbench features. Do not insert the Sentinel USB license key in any USB port on your PC until directed to do so. Using the key before the Workbench is completely installed may cause unpredictable results.

To install the software:

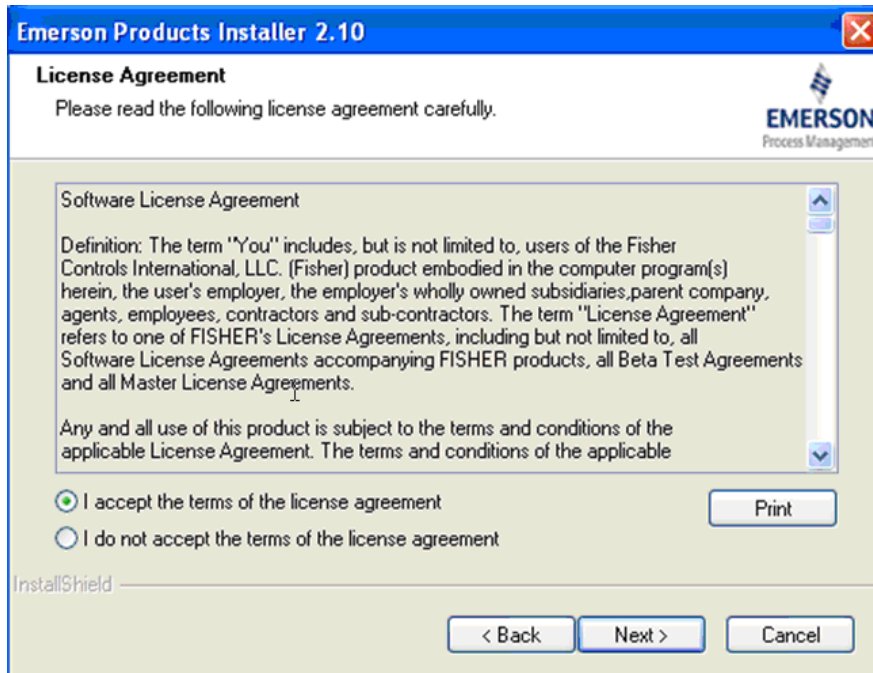
1. Place the CD-ROM into your PC's CD drive. The Product Installer wizard starts automatically.

Note: If you have Autorun enabled on your computer, the Product Installer wizard starts automatically. If you have **disabled** Autorun, use this procedure to start the wizard:

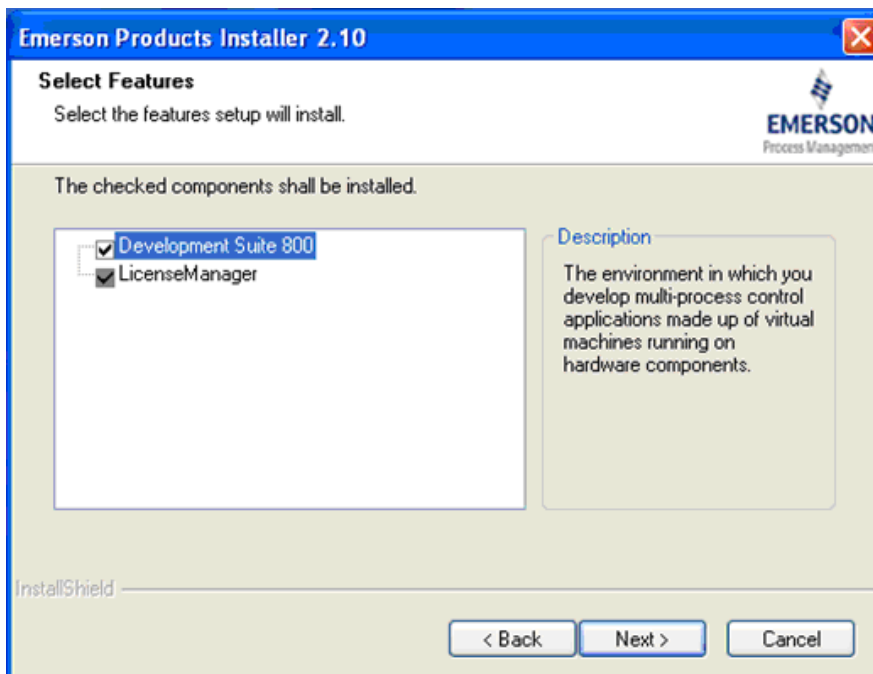
- a. Click **Start** > **Run**. The Run dialog box displays.
 - b. Click **Browse**, navigate to the folder on the CD-ROM containing the Workbench software, and select the Setup.exe file in that folder. The Run dialog box displays.
 - c. Click **OK**. The Product Installer wizard screen displays.
-



2. Click **Next**. A software license agreement displays.



3. Read the entire DS800 software license agreement. If you agree to the terms of the license, select **I accept the terms of the license agreement** and click **Next**. A Select Features screen displays.



4. Use this screen to select the two DS800 features you must install:
 - **Development Suite 800**
Also known as the “Workbench,” this is the development

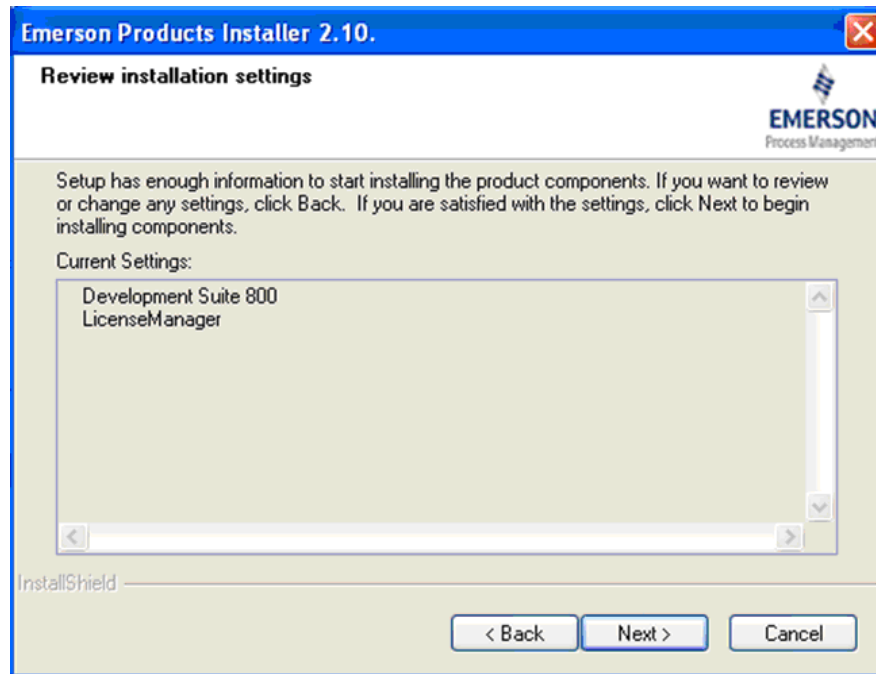
environment you use to create, view, and download custom control applications to the FB107.

- **LicenseManager**

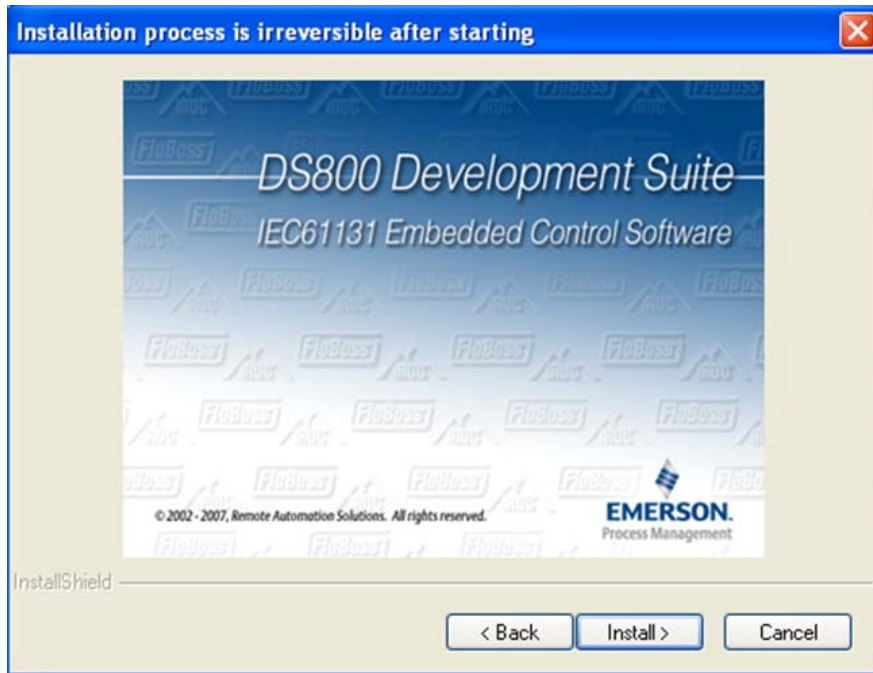
Supports the USB Sentinel license key which is required to access all Workbench features. You also use this utility to transfer licenses and update existing license keys.

Note: The wizard selects these two features as defaults.

5. Click **Next**. A review screen displays.

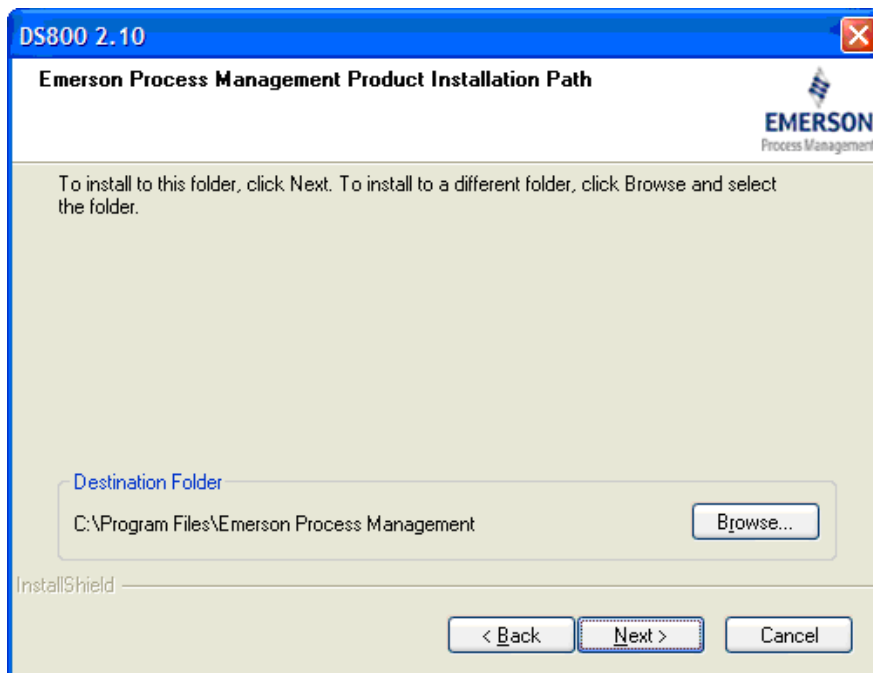


6. Review the options you have selected for installation and click **Next**. The DS800 initial (or “splash”) screen displays.



Note: Once you begin the DS800 installation process, you cannot stop it until it completes.

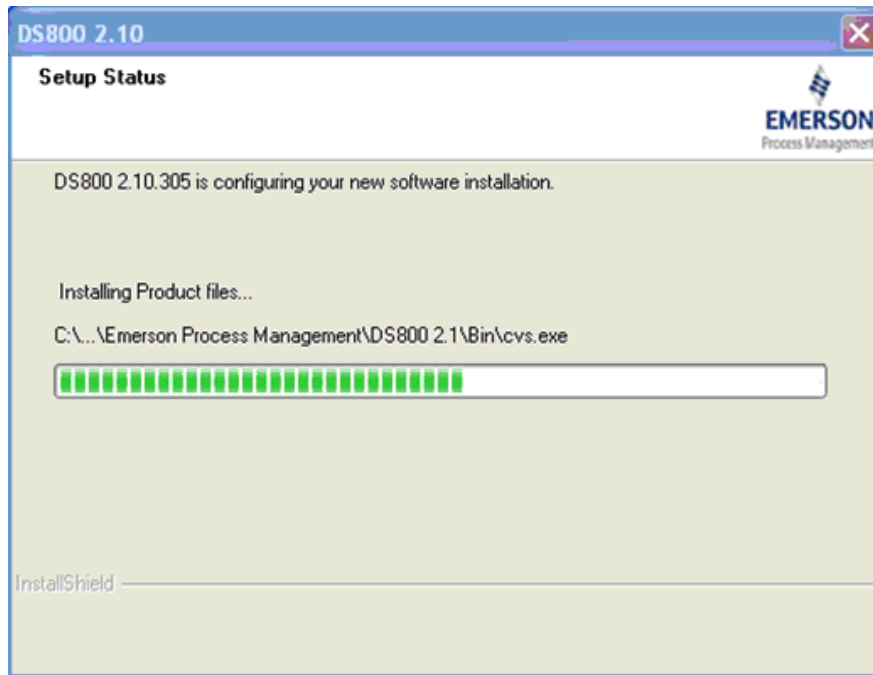
7. Click **Install**. The wizard prompts you to select the location for the installed software.



8. Click **Next** to accept the default location or click **Browse** to select another location.

Note: If you have inserted the Sentinel USB license key in your computer, **remove it BEFORE you click Next.**

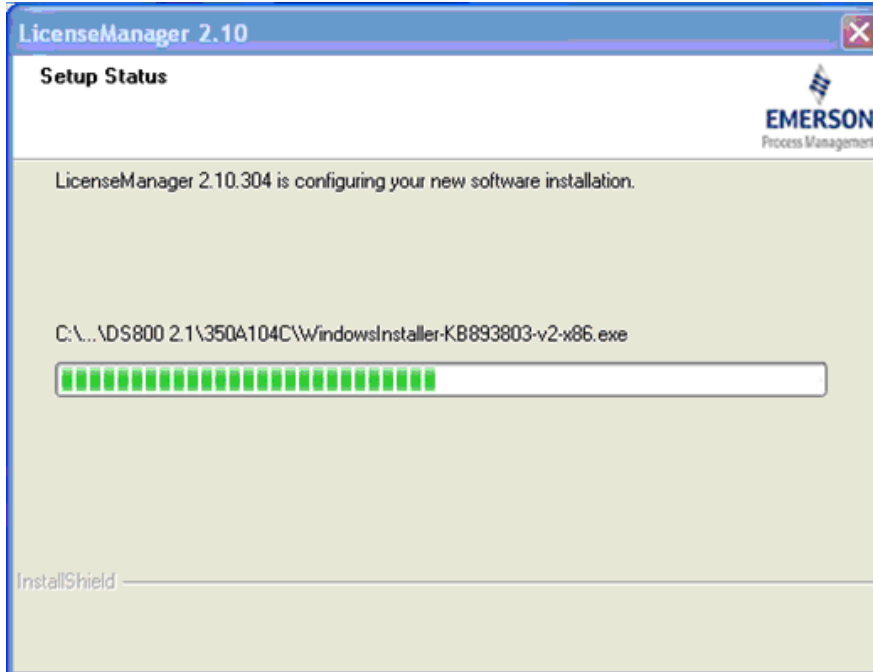
9. The wizard begins installing the first component (the DS800 Workbench).



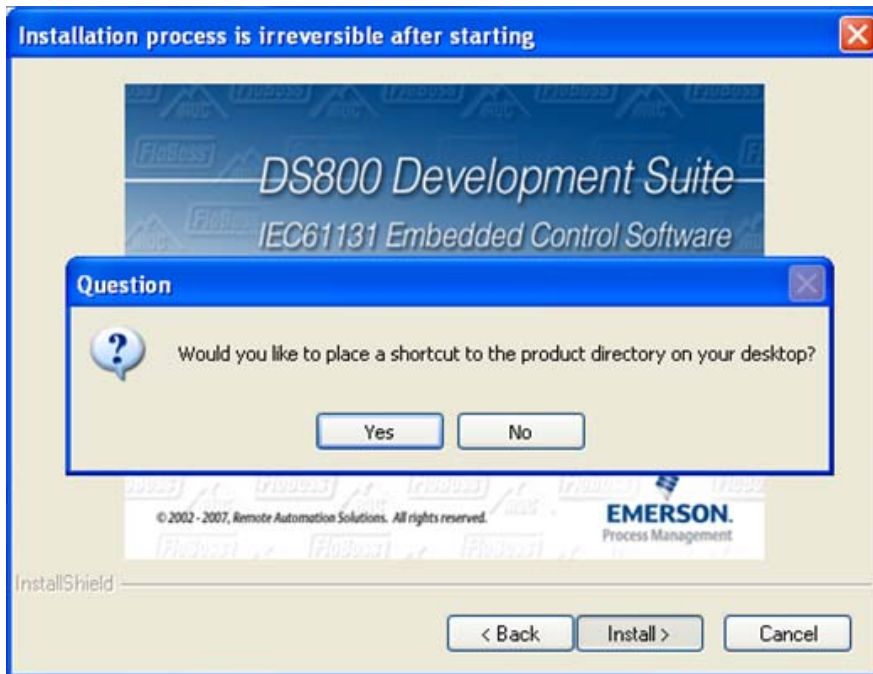
10. When the installation of the Workbench completes, the wizard prompts you to include an icon on your desktop.



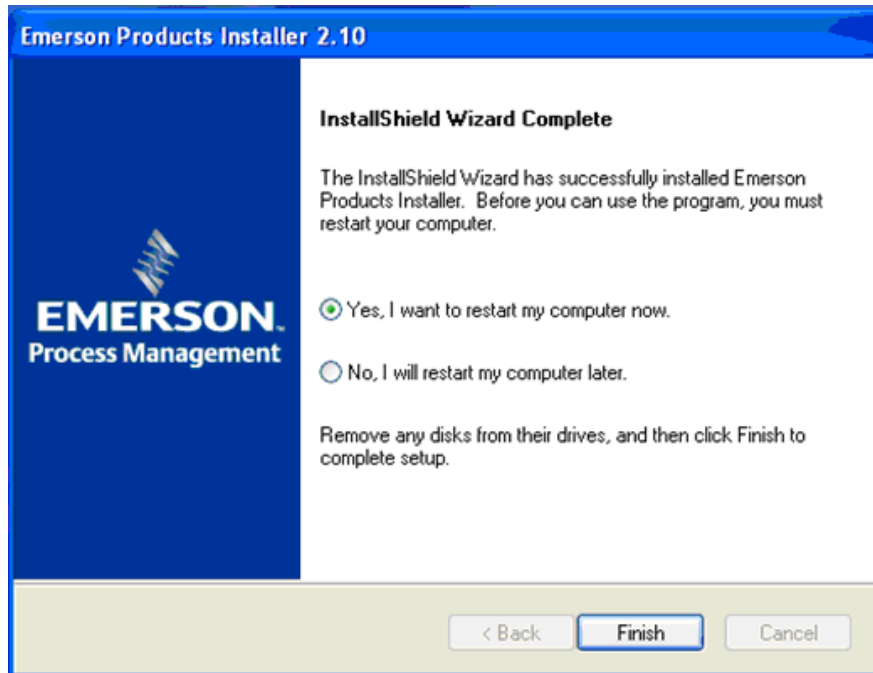
11. Click either **Yes** or **No** to continue. The wizard begins installing the second component (the LicenseManager).



12. When the installation of the LicenseManager completes, the wizard prompts you to include an icon on your desktop.



13. Click either **Yes** or **No** to continue. The wizard prompts you to restart your computer.



Note: Until you restart your computer, **do not** start the DS800 application.

14. Proceed to *Verify the DS800 Workbench Installation*.

9. Verify the DS800 Workbench Installation

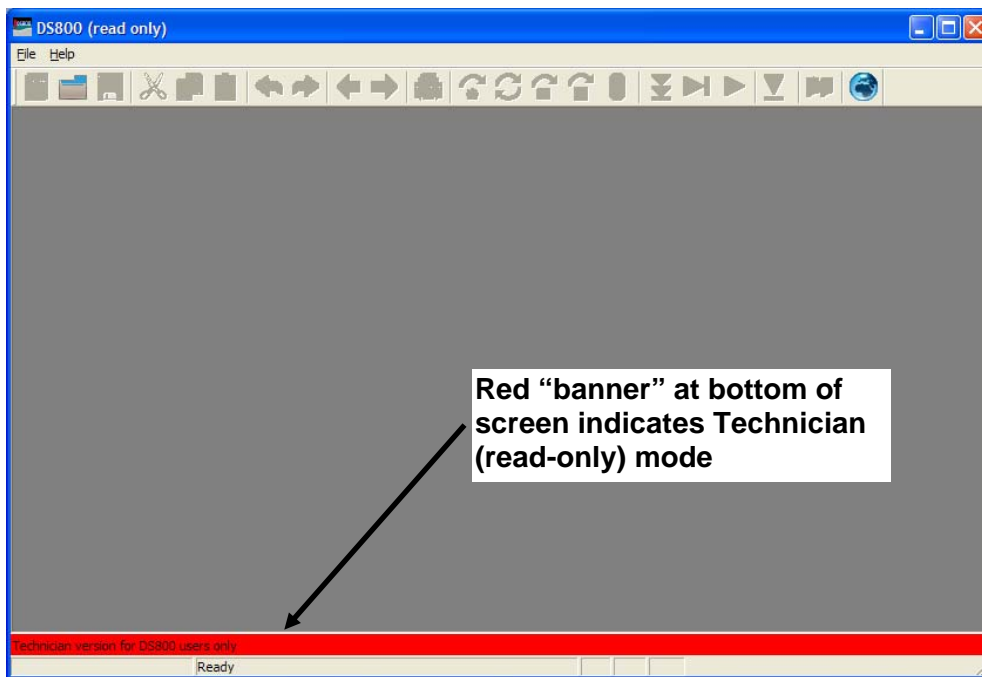
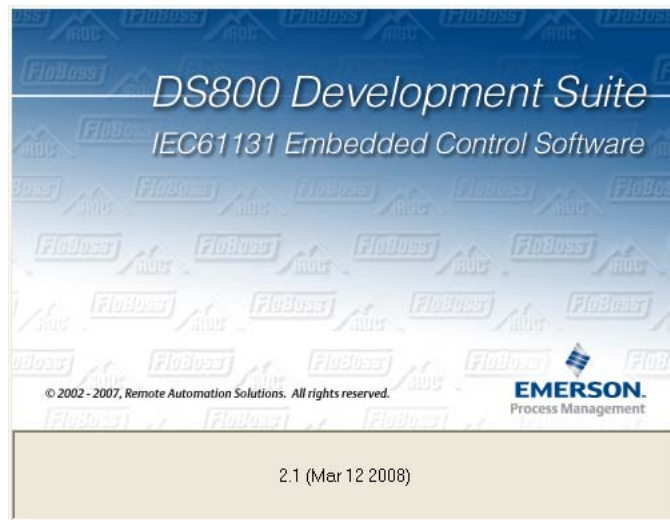
Remote Automation Solutions distributes the DS800 Workbench license on a Sentinel USB key with a **blue** label:



Note: During this verification process, you are instructed to insert this Sentinel USB license key in your computer. **Do not** insert the Sentinel USB license key into a USB port on your computer **until** directed to do so.

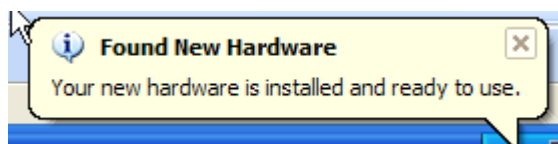
To start Workbench:

1. Click **Start > Programs > Emerson Process Management > DS800 2.1** (select the DS800 2.1 **application**, not the folder). A splash screen (indicating the version number and build date for the software) displays briefly, and then closes to display the DS800 screen.



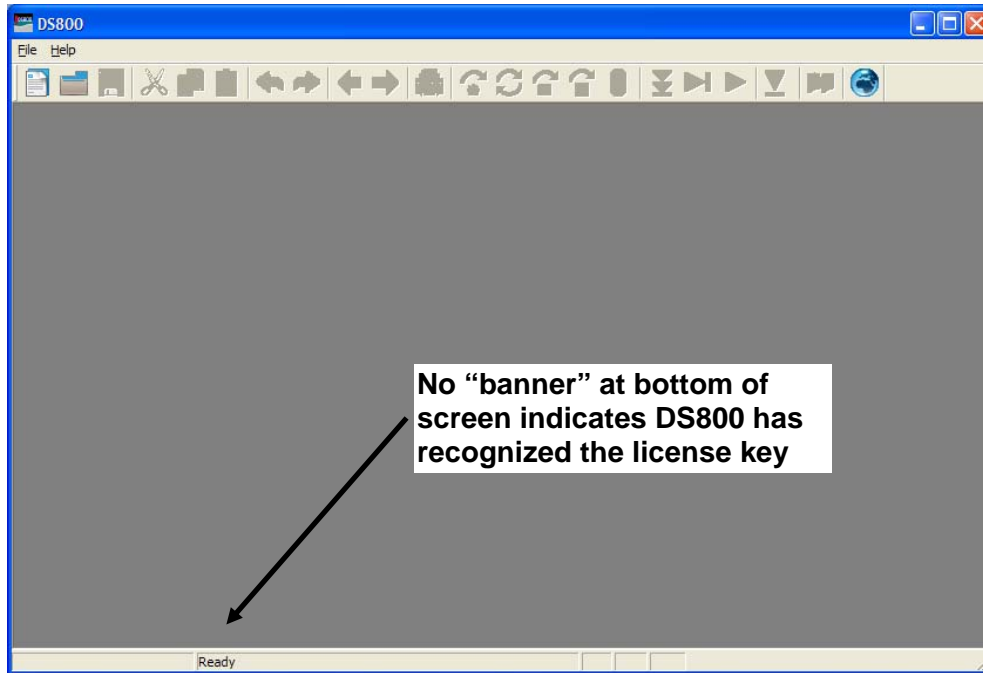
The red banner at the bottom of the DS800 screen indicates that the software successfully installed but was unable to find the license key.

2. Exit the application (select **File** > **Exit** on the DS800 menu bar).
3. Insert the Sentinel USB license key into a USB port on your computer. Windows automatically recognizes the USB device and displays a recognition message in the System Tray.



Note: If Windows **does not** automatically recognize the USB device, proceed to the *Troubleshooting* section of this document.

4. Click **Start > Programs > Emerson Process Management > DS800 2.1** (again, select the **application** and not the folder). The splash screen displays, followed by the DS800 screen.



Note: This version of the DS800 screen **does not** have a red banner across the bottom of the screen. This means that DS800 detected the license key and changed the Workbench functionality accordingly. If the DS800 **still** has a red banner, proceed to the *Troubleshooting* portion of this document.

5. You can begin to develop DS800 projects. Refer to *Creating a Sample Workbench Project* in this guide.

Troubleshooting the Installation

The DS800 Development Suite software and the USB Sentinel[®] license key use Sentinel Protection from SafeNet[®] Incorporated. Other software vendors today use the same technology, so if Windows does not recognize an attached USB license key, it's possible that conflicting versions of the SafeNet Sentinel software are installed on your computer.

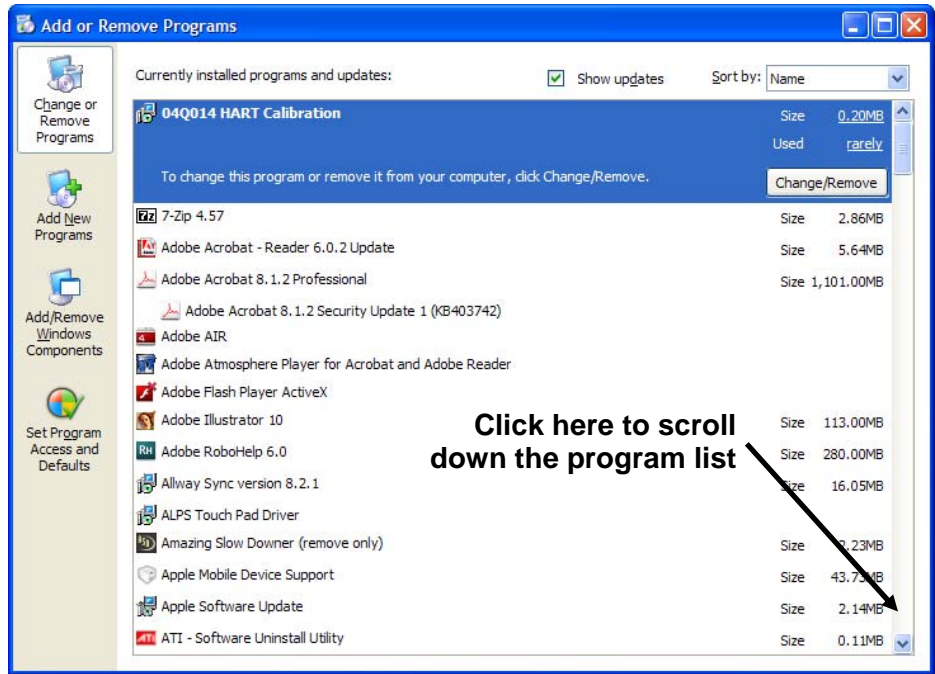
To resolve this conflict, you must uninstall all versions of the Sentinel driver from your computer and install the latest version. The updated

driver allows Windows to recognize the USB license key and does not adversely affect any other programs which use the SafeNet Sentinel driver.

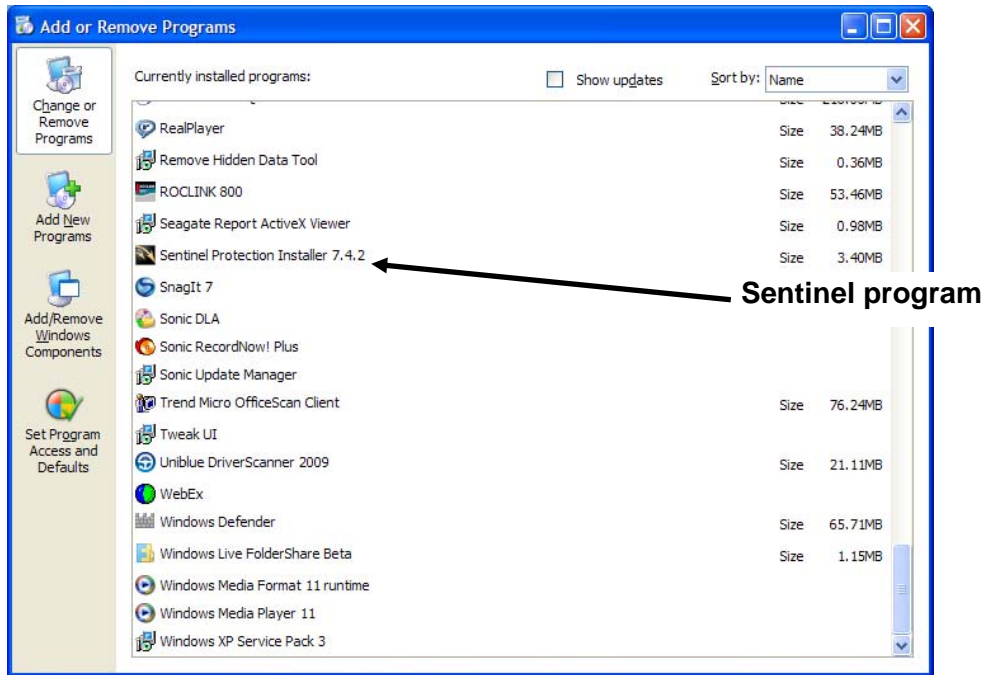
To uninstall prior versions of the Sentinel driver:

Note: Before you update any drivers, close all applications (such as DS800 Development Suite) which may require a USB license key.

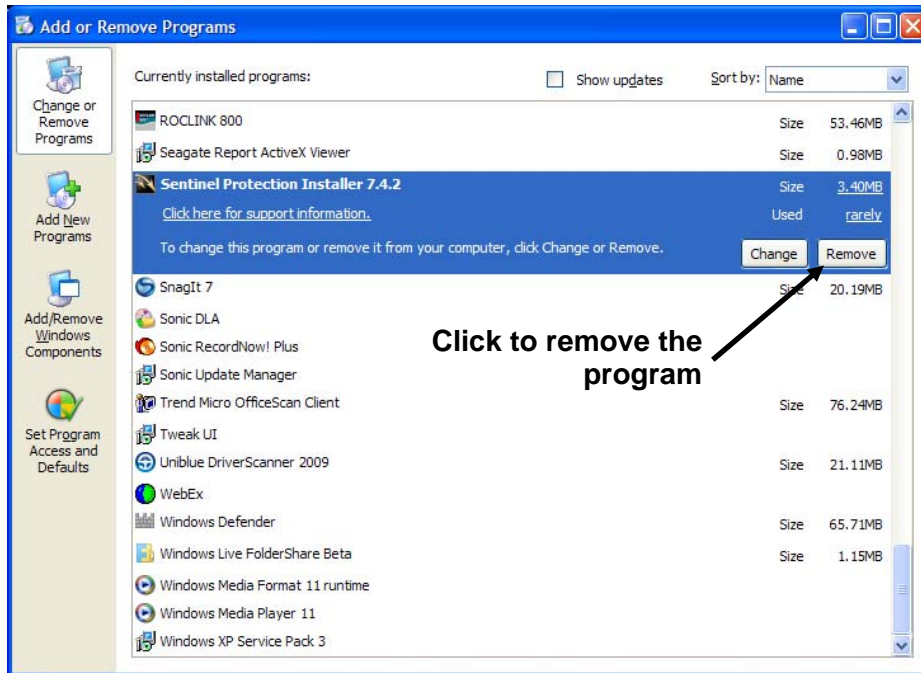
1. Open the Windows Control Panel (click **Start > Settings > Control Panel**).
2. Double-click **Add or Remove Programs**. Windows builds a list of all programs currently installed on your computer.



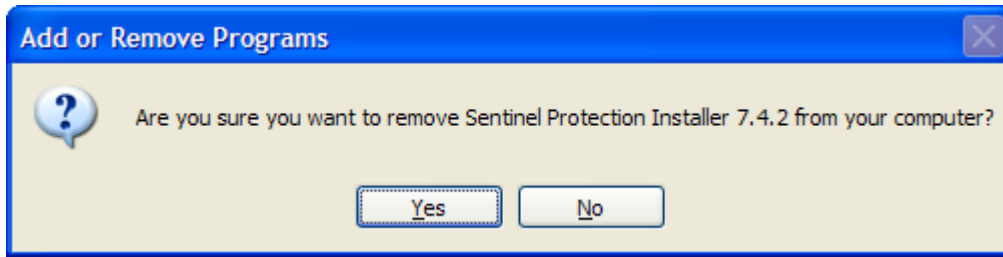
3. Scroll down the program list until you find software programs which begin with the word “Sentinel.”



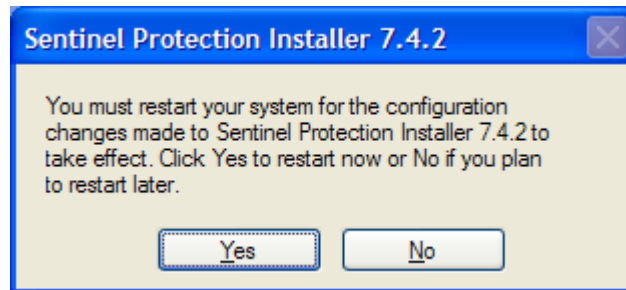
4. Click the program label. Windows opens a program-specific dialog box you use to change or remove this program.



5. Click **Remove**. Windows displays a verification dialog box asking you to verify the removal request.



6. Click **Yes** to continue. Windows displays a number of dialog boxes as it removes the program. If necessary, the last dialog box reminds you to restart your computer.

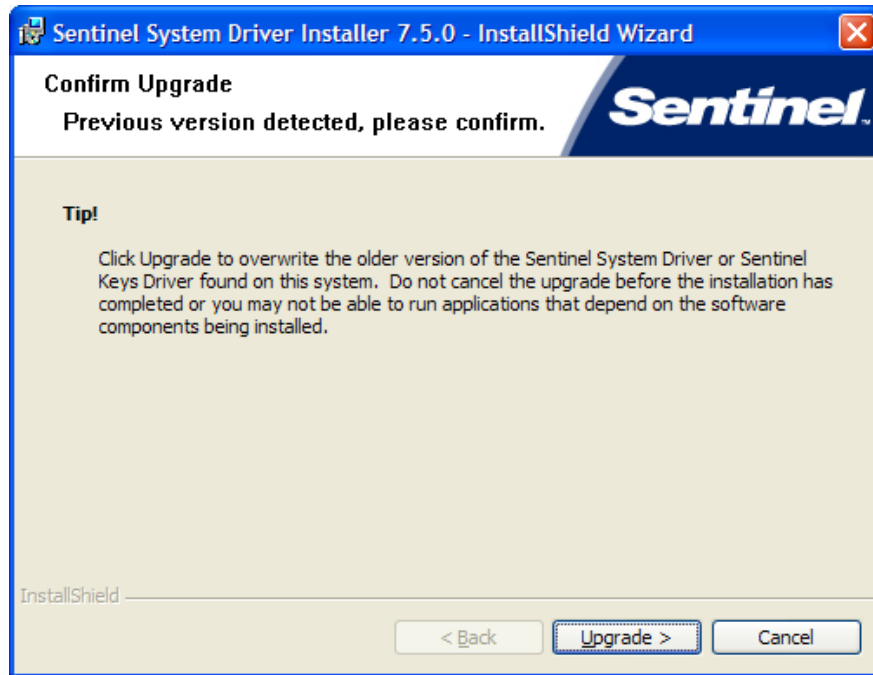


Note: If you have several programs to remove, remove all programs **before** you restart your computer.

7. Repeat steps 3-6 for any other Sentinel drivers. When you have uninstalled all previous versions of Sentinel drivers, you can install the most current Sentinel driver.

To install the most current version of the Sentinel driver:

1. Place the CD-ROM you used to install the DS800 software in your computer's CD drive.
2. Click **Start > Run**. The Run dialog box displays.
3. Click **Browse**. Remote Automation Solutions placed the 7.5.0 Sentinel driver in the \Sentinel folder on the CD-ROM. Select the *Sentinel System Driver Installer 7.5.0.exe* file. The Run dialog box displays the selected file.
4. Click **OK**. The InstallShield wizard displays.

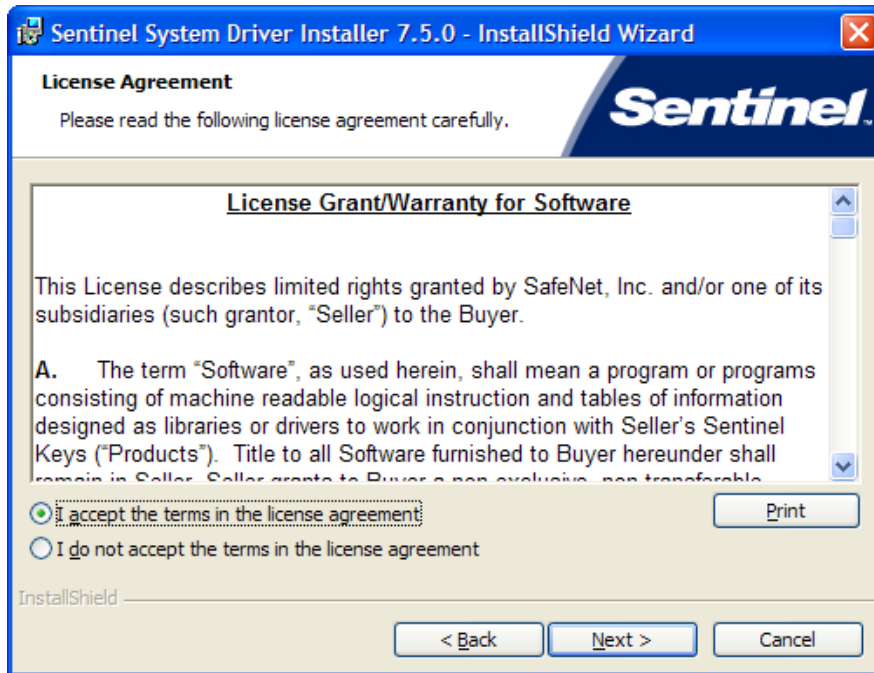


Note: If you have not removed all prior versions of the Sentinel Protection Installer, the wizard detects those versions and displays this screen to ensure the upgrade of all previous versions.

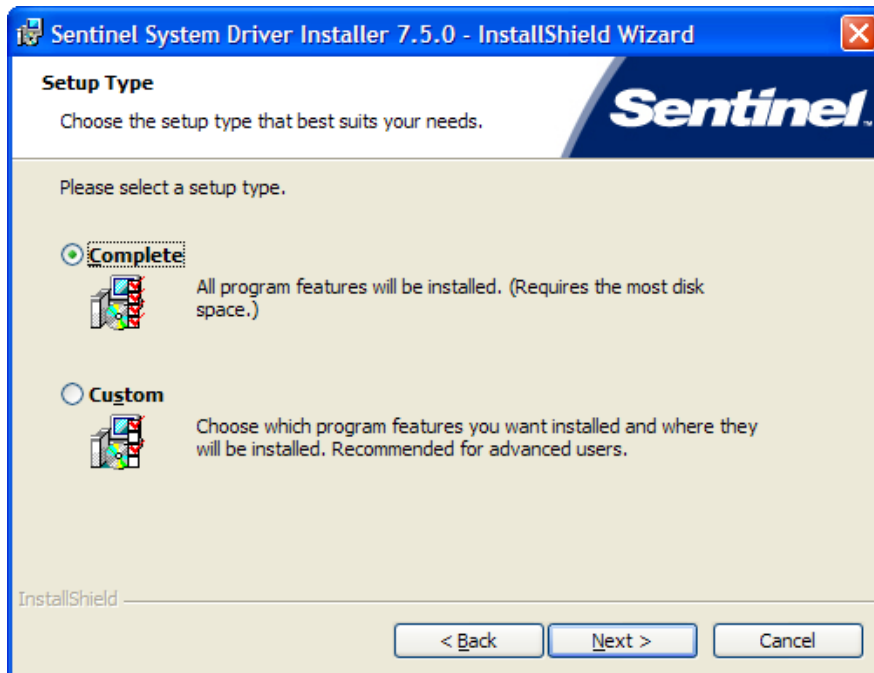
5. Click **Upgrade**. The wizard displays the installation splash screen.



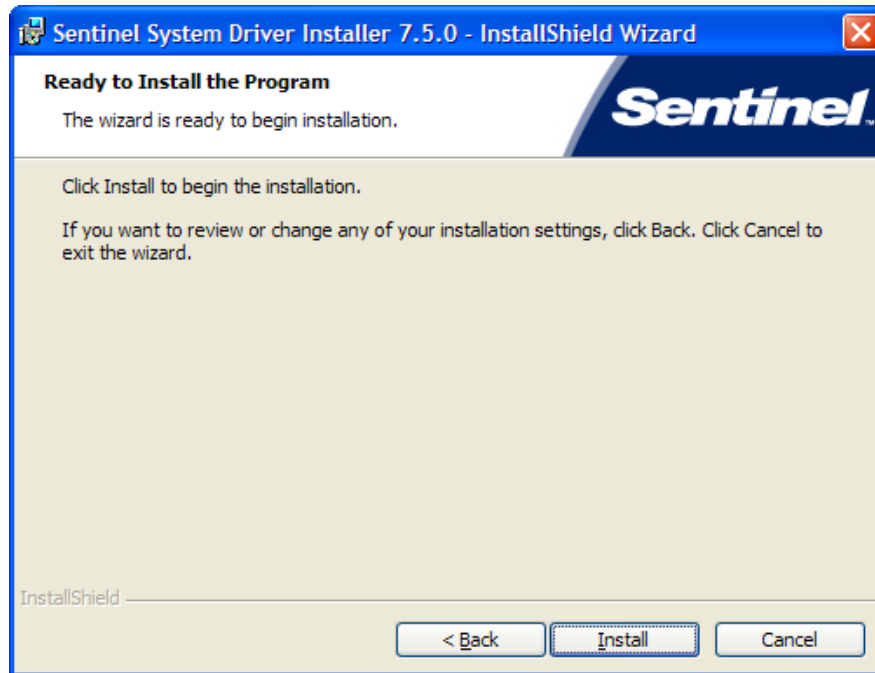
6. Click **Next**. A license agreement screen displays.



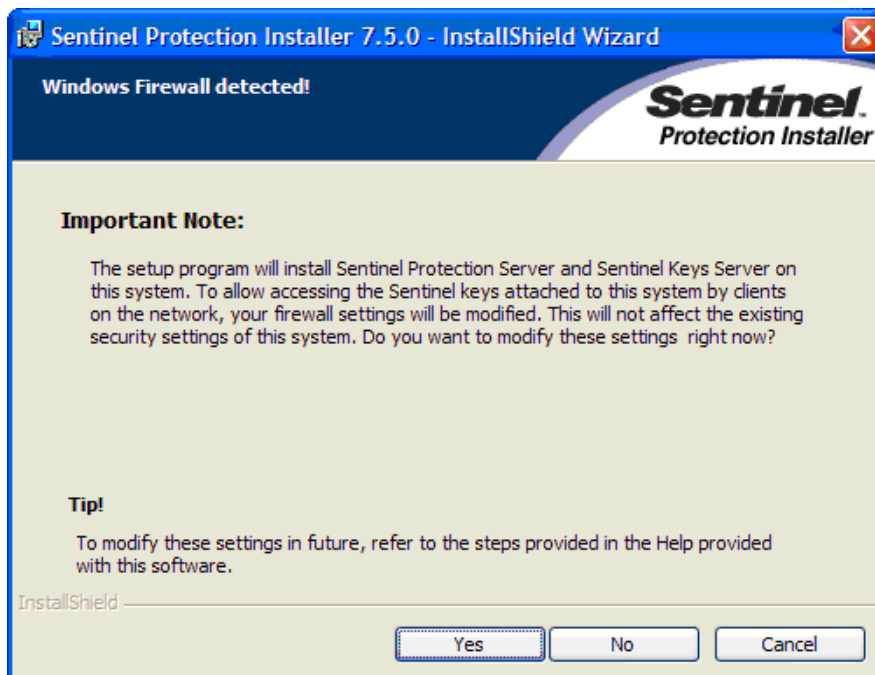
7. Select **I accept the terms in the license agreement** and click **Next**. The wizard displays a screen for the type of setup.



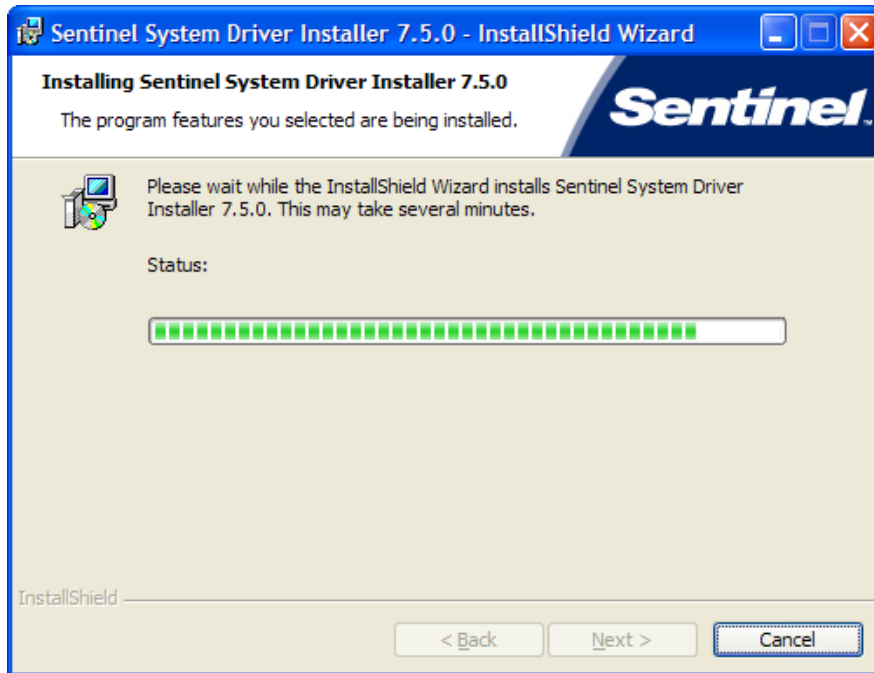
8. Select **Complete** and click **Next**. The wizard displays a screen used to start the actual installation.



9. Click **Install**. The wizard displays a security settings screen.



10. The DS800 does not include the ability to access Sentinel license keys from a remote machine. If you are aware of any installed software on your computer which requires this functionality, click **Yes**. Otherwise, click **No**. The wizard begins installing the software based on your selections.



11. As the installation proceeds, the wizard displays a progress indicator. When the installation finishes, the wizard displays a completion screen.



12. Click **Finish** to exit the installation wizard.

Creating a Sample Workbench Project

The DS800 Workbench software provides the development environment you use to create DS800 “projects” (IEC 61131-3 compliant programs) which you consequently download to the FB107.

The functionality in the DS800 Workbench varies depending on the license key installed. With no license key installed, Workbench runs in Technician mode.

Technician mode can be considered “read-only” mode. You cannot create a new project or edit previously created projects. You can view existing projects and download them into the FB107. When the software is running in Technician mode, a red banner appears across the bottom of the window reading “Technician version for DS800 users only.”

Two license keys—PR2 and PRD—allow full use of Workbench.

The **PR2** license key enables you to use Workbench to create and edit an unlimited number of projects. However, PR2-created projects can only contain a single configuration (hardware unit), a single resource, and are limited to 128 points of I/O.

The **PRD** license key also enables you to use Workbench to create and edit an unlimited number of projects. However, PRD-created projects can contain an unlimited number of configurations (hardware units), define up to 4 resources per unit, and have an unlimited number of I/O points. You can distribute PRD-created projects across multiple devices.

With the FB107, you can define only a single resource. Although you can use a PRD license to create projects for the FB107, the PRD is typically used in conjunction with the ROC800-Series devices.

A trial version of Workbench is also available. The trial version has the same features as a PRD license, but it operates for only 30 days. After 30 days the trial expires and you must uninstall the software. Any projects you may have created with the trial version require a copy of Workbench with a PR2 or PRD license key. Contact your local Remote Automation Solutions representative to receive a copy of the trial version of Workbench.

	Hardware Units Supported	Resources per Hardware	I/O Points	Notes
Technician	Unlimited	4	Unlimited	Cannot create or edit projects
PR2	1	1	128	
PRD	Unlimited	4	Unlimited	
Trial	Unlimited	4	Unlimited	Expires in 30 days

Technician mode is basically a “read-only” mode. You cannot create new projects or edit previously created projects, but you can view existing projects and download projects.

Getting Started with DS800

The DS800 workbench is designed to help you build process control applications. You can distribute these applications across several platforms or enable the applications to communicate with each other through networks. A DS800 project shows the distribution and links between each PLC loop, which the DS800 kernel (or “virtual machine”) executes on each platform.

Using the function block diagram language, this section details the steps required to build a sample project (creating an incrementing counter in a soft point parameter) and familiarizes you with the views, buttons, and vocabulary of DS800.

The following steps are involved:

1. Creating a New Project
2. Importing a Device Configuration
3. Adding Variables to the Dictionary
4. Creating a Program to the Resource
5. Compiling the Program
6. Compiling the Project
7. Downloading the Project
8. Debugging the Project
9. Verifying the Program in ROCLINK 800

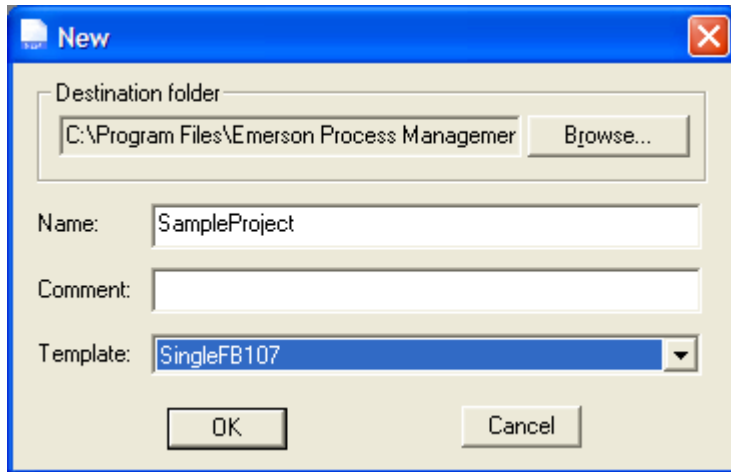
1. Creating a New Project

To create a new DS800 project:

1. Click the DS800 2.1 icon on your desktop. The DS800 workspace screen displays.

Note: If you did not create a desktop icon for this application, you can also click **Start > Programs > Emerson Process Management > DS800 2.1**.

2. Click the New Project icon () on the DS800 workspace toolbar. A New project dialog box displays.

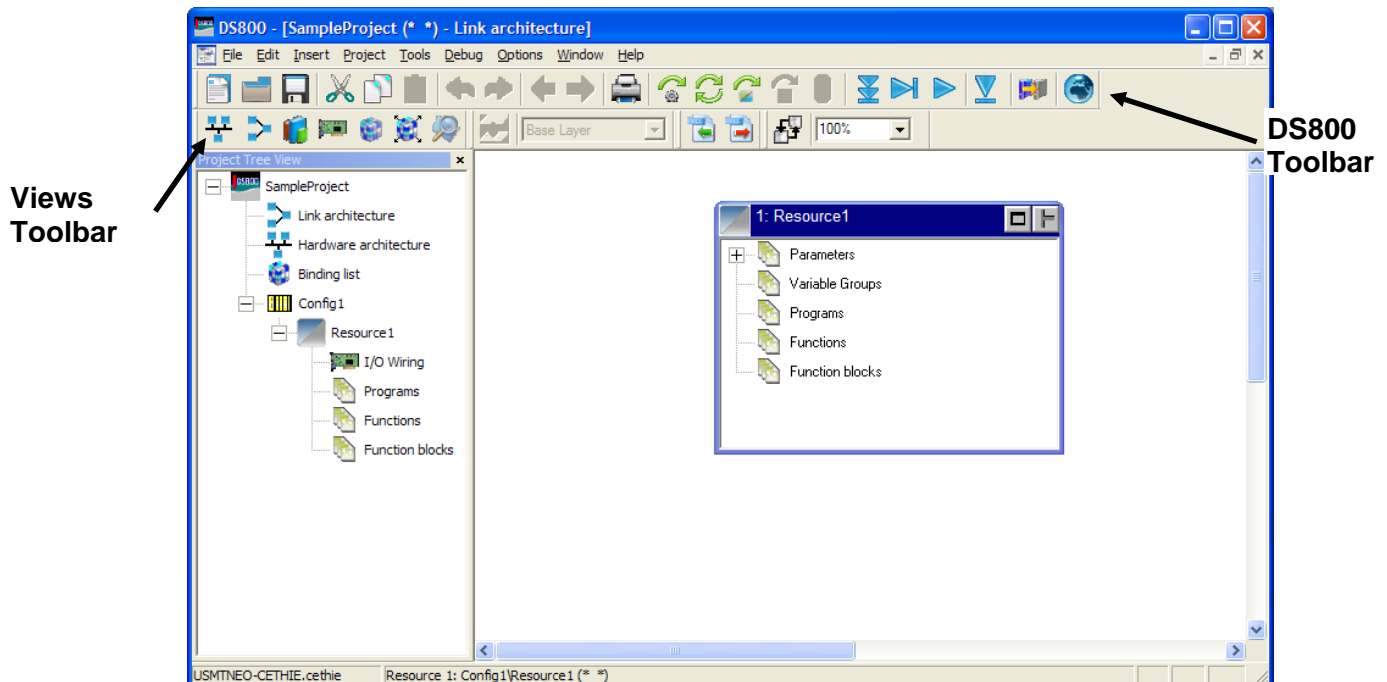


Note: By default, DS800 places project files in the folder C:\Program Files \ Emerson Process Management\ Projects\ DS800 2.1. If you want your project files in another location, click **Browse** to select that location.


3. Enter **SampleProject** in the Name field.
4. Click ▼ in the Template field to open a drop-down menu. Select **SingleFB107**.

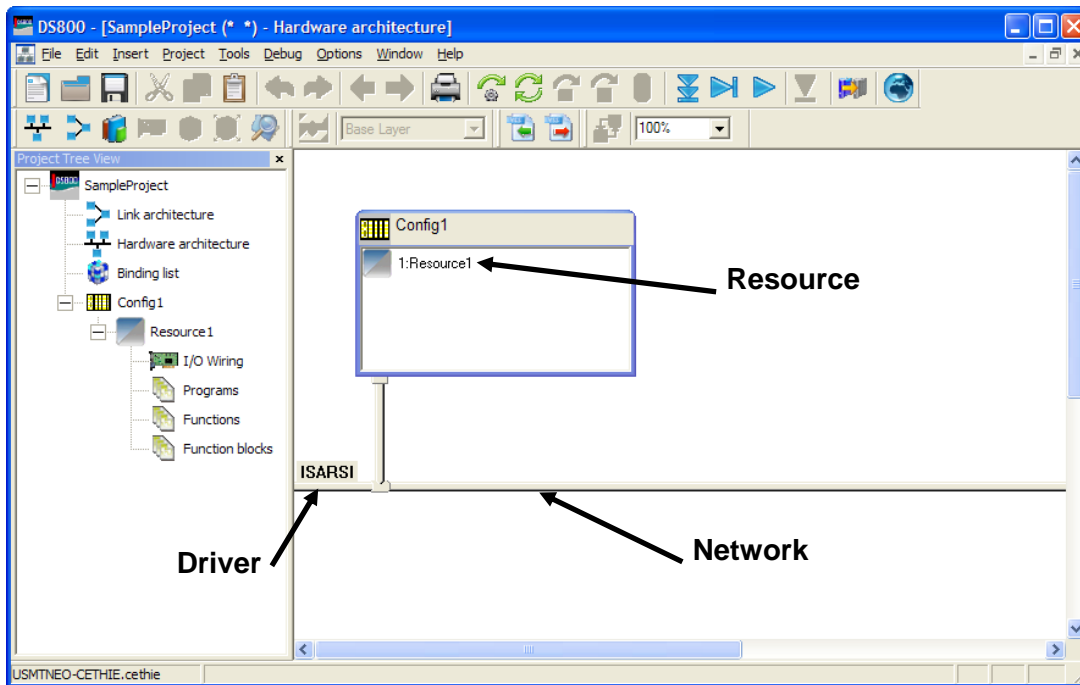
Note: By default, DS800 creates a template for a single ROC800. This template tells the application how to structure data. **SingleFB107** is the template that works with the FB107.

5. Click **OK**. The DS800 Resource view screen displays.



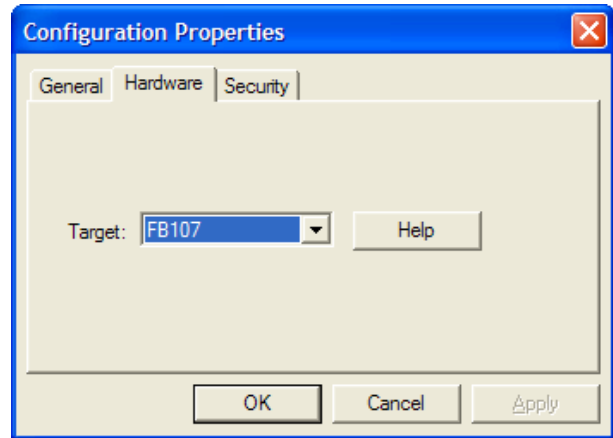
Use the icons on the DS800 toolbar and the Views toolbar to work with the project data. Small descriptive tags appear as you move the cursor over each toolbar icon.

- Click the hardware architecture icon () on the Views toolbar to display the Hardware Architecture view.



This screen shows your project in relationship to existing hardware.

Resource	A resource is composed of programs and corresponds to a PLC loop. You compile a resource and then download its code to configuration, where the DS800 kernel (“virtual machine”) executes it.
Configuration	A hardware platform, linked to other hardware platforms by a serial network. Use DS800’s Hardware Architecture view to display configurations.
Target	You attach a configuration to a specific target. A target contains definitions about the hardware platform and the virtual machine running on it. Double-click the configuration’s title bar to display a Configuration Properties screen, which has three tabs:



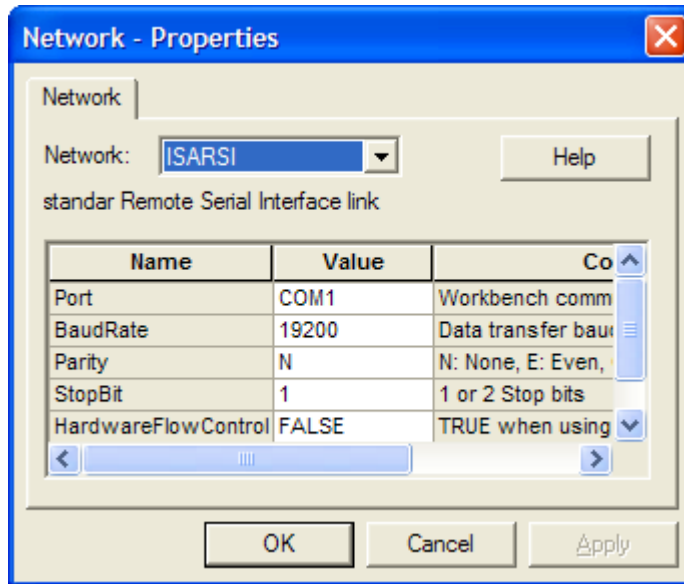
- **General**, which provides a title and any comments for the configuration.
- **Hardware**, which indicates the target device (such as the FB107) for this configuration. This is the first tab that displays.
- **Security**, which sets a password security to prevent unauthorized changes to the configuration's properties.

Specifying a target for a configuration affects the list of functions and function blocks that you can call in your programs, the list of I/O devices that you can use, and the networks that you can connect to your configuration.

Network

In the hardware architecture view, you can see that resources communicate via the ISARSI (Serial) network. ISARSI is the standard driver Remote Automation Solutions provides to communicate over a serial protocol link. The Workbench debugger also uses ISARSI to communicate with the resources running on the configurations.

7. Double-click the horizontal (Network) line to open the network configuration. A Network Properties screen displays.

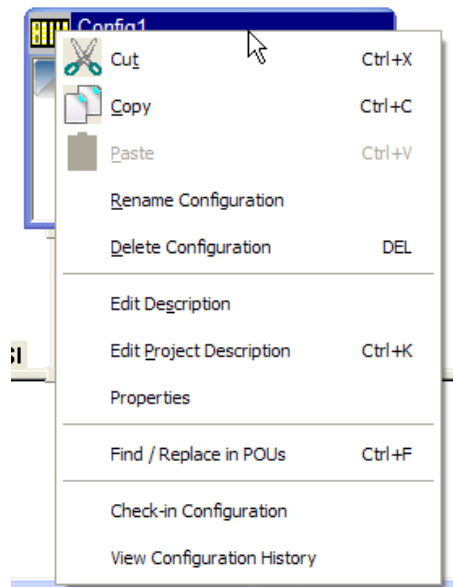


8. Modify the values on this screen according to the serial port on the PC you intend to use to connect to the device (here, the FB107). Click **OK** to save any values.
9. Proceed to *Importing a Device Configuration*.

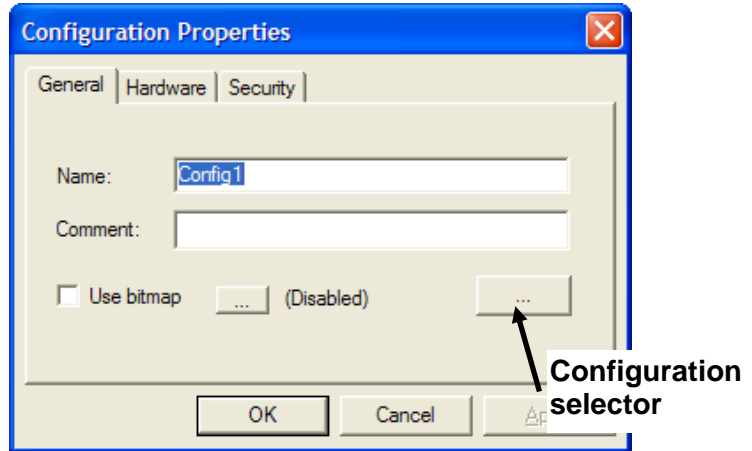
2. Importing a Device Configuration

The device configuration file contains device-specific information (such as number of points, number of meters, and TLPs) the DS800 application needs to appropriate place data. (You created a configuration file for the FB107 in **Step 6** of the installation process.)

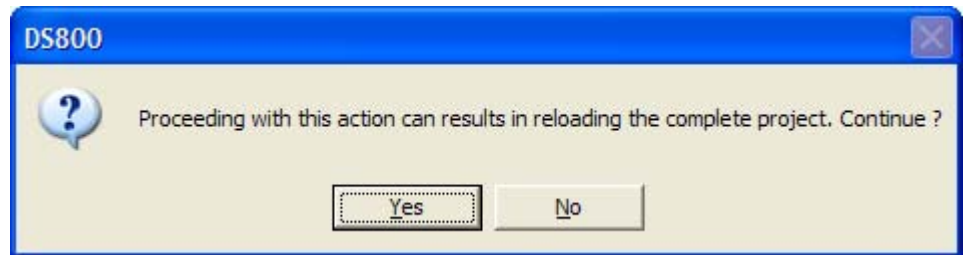
1. Right-click the configuration's title bar. A menu displays.



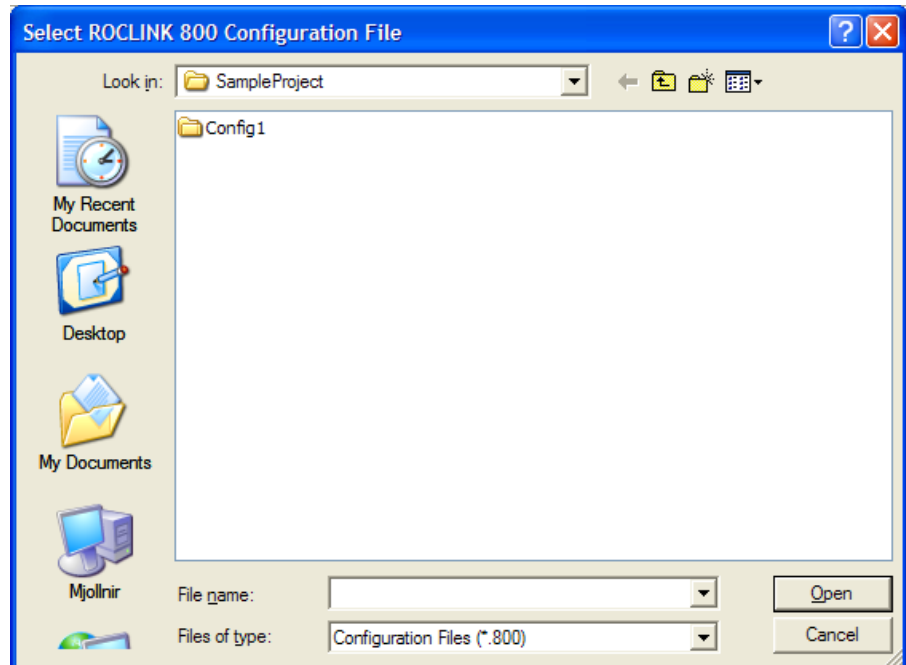
2. Select **Properties**. The Configuration Properties screen displays.



3. Click the right-most browse button. A message box cautions you that importing a configuration may reload the entire project.

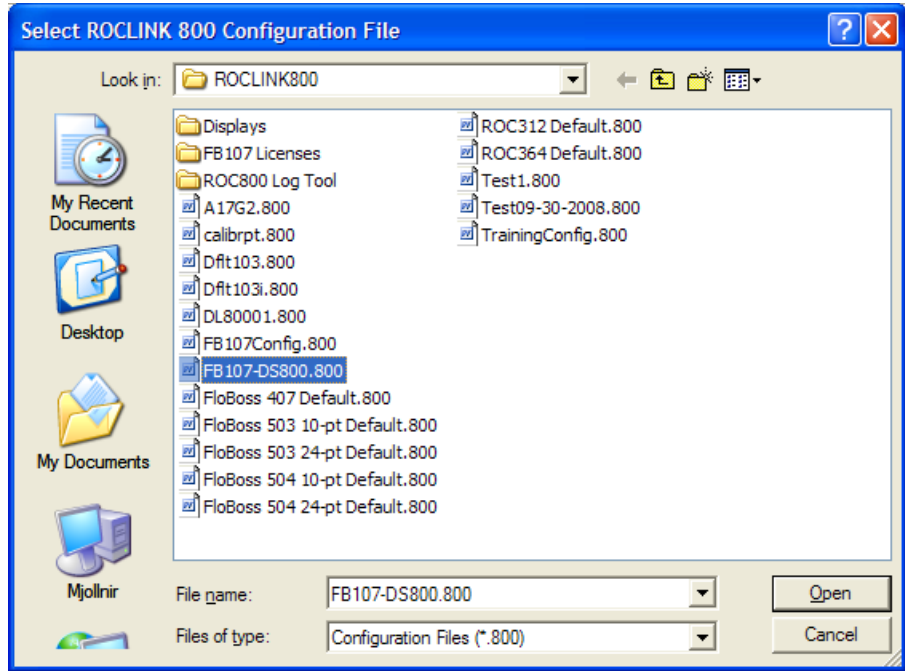


4. Click **Yes**. The Select ROCLINK 800 Configuration File screen displays.

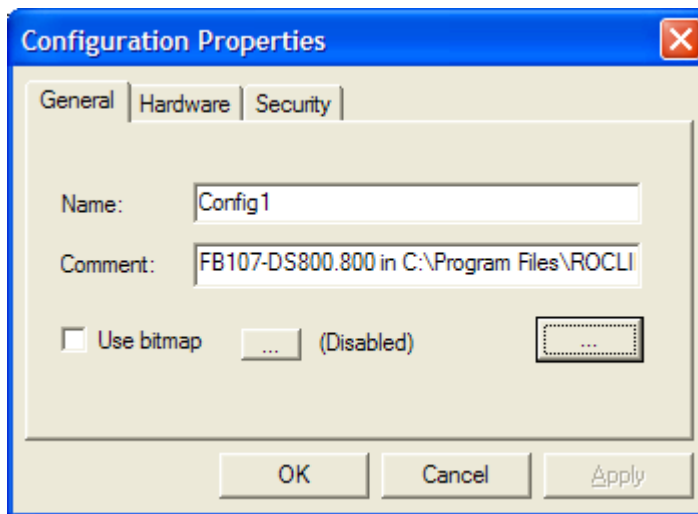


Note: As a default, ROCLINK 800 stores configuration files in the folder C:\Program Files\ROCLINK800. You may need to browse to this folder to locate the configuration file you want.

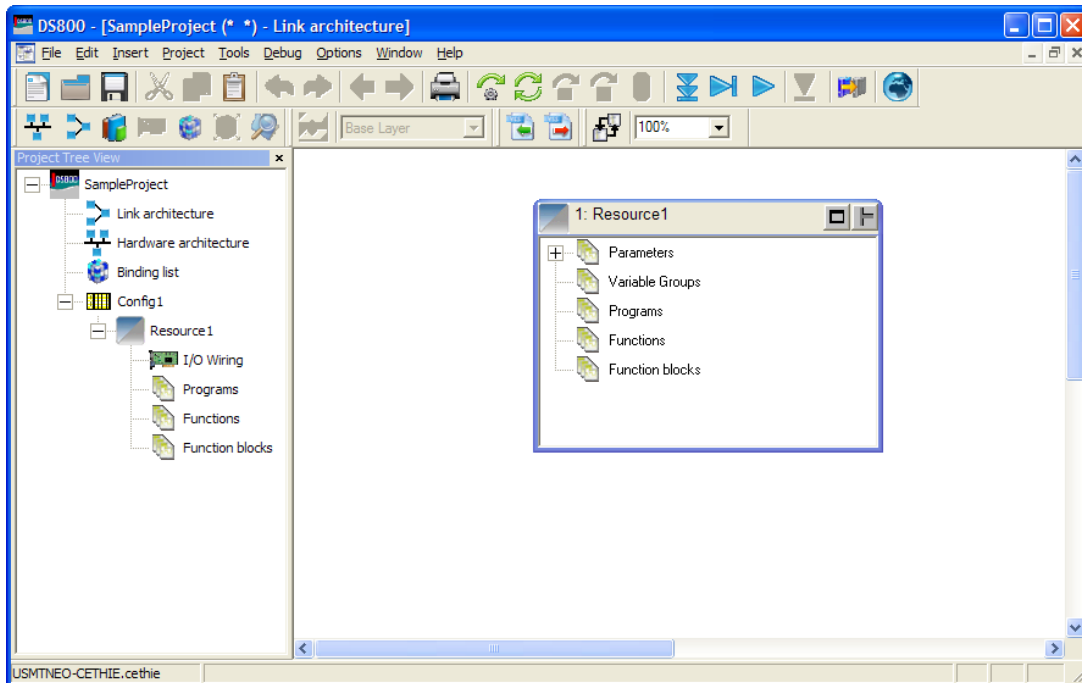
5. A dialog box displays that you use to select the configuration file to import.



6. Select a file and click **Open**. The Configuration Properties screen displays with the configuration you have selected.



7. Click **OK** to apply the configuration file to the project. Once the file is loaded, DS800 displays the Resource view.

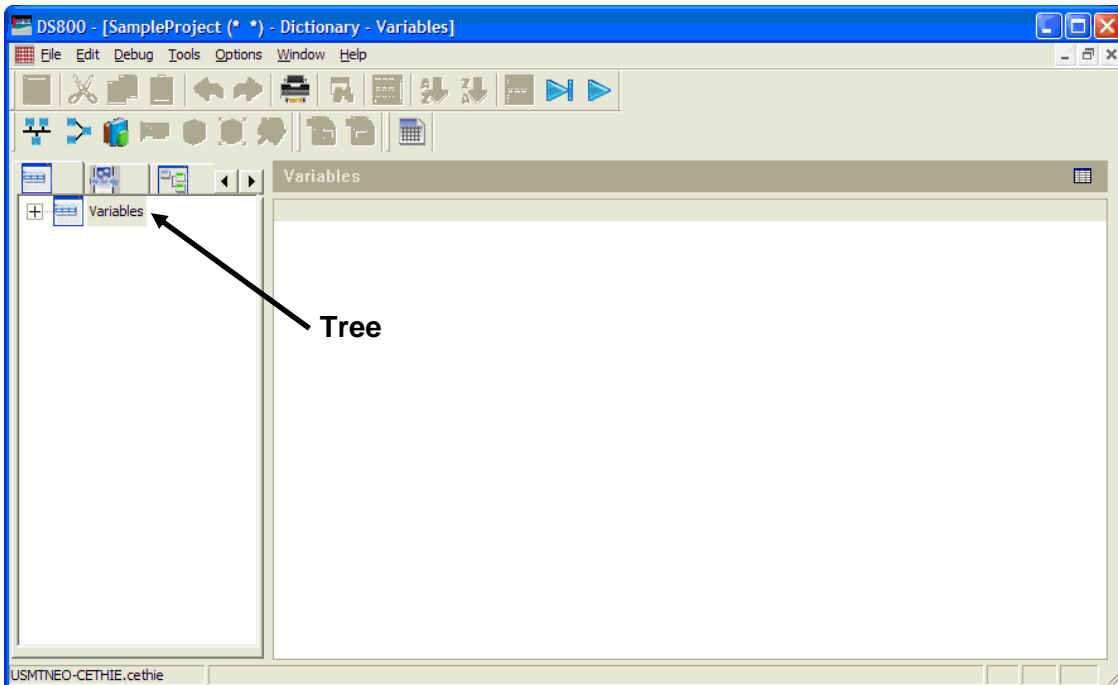


8. Proceed to *Adding Variables to the Dictionary*.

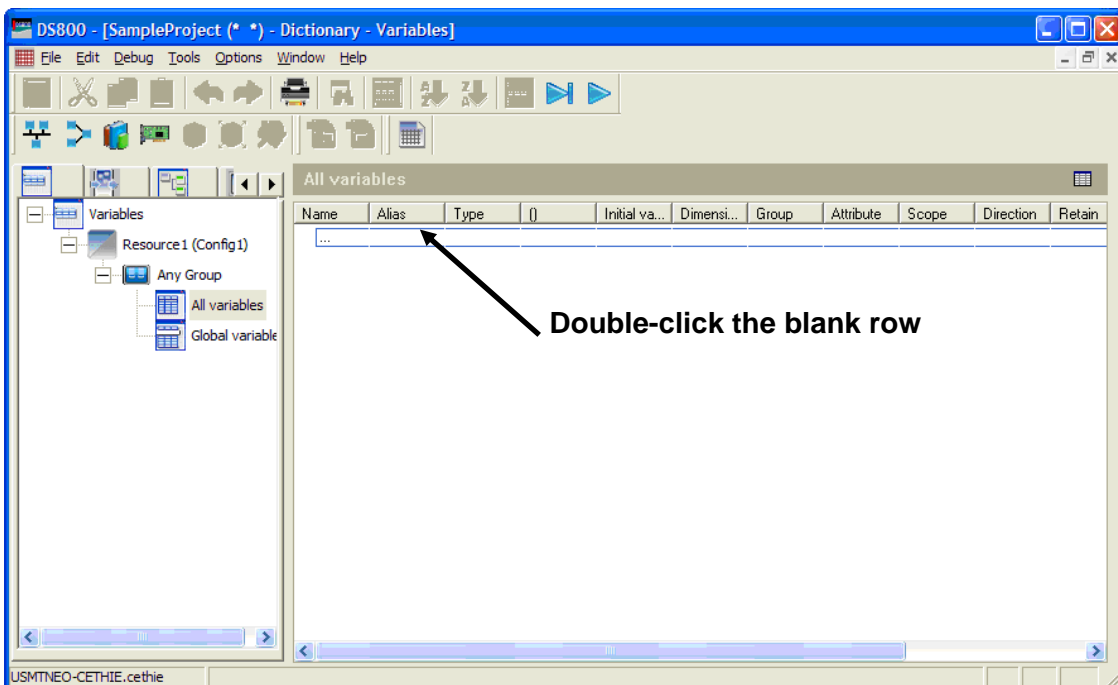
3. Adding Variables to the Dictionary

Once you have a configuration loaded, you can begin to define variables in the DS800 dictionary. Variables associate TLPs in the FB107 with DS800 content. To add variables:

1. Click the Dictionary icon () on the toolbar to open the Dictionary view.



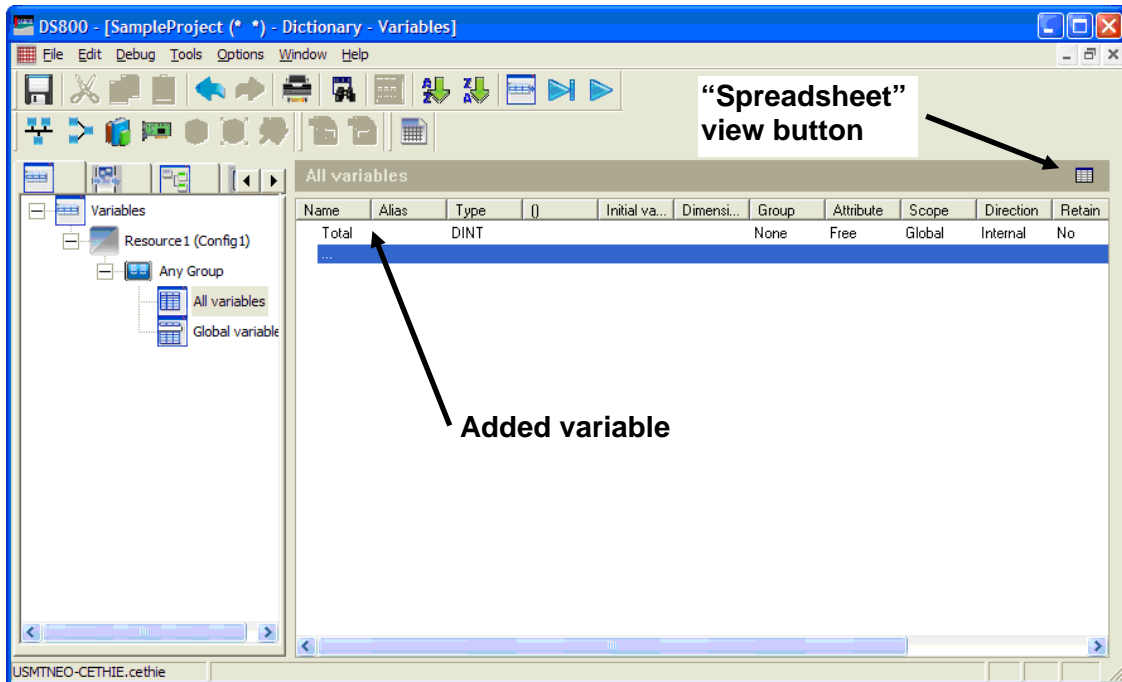
2. In the tree to the left of the screen, click **Variables > Resource1 > Any Group > All variables**. The panel in the right portion of the screen changes to a grid format.



3. Double-click the blank row to open a dialog box that helps you to define the new variable.

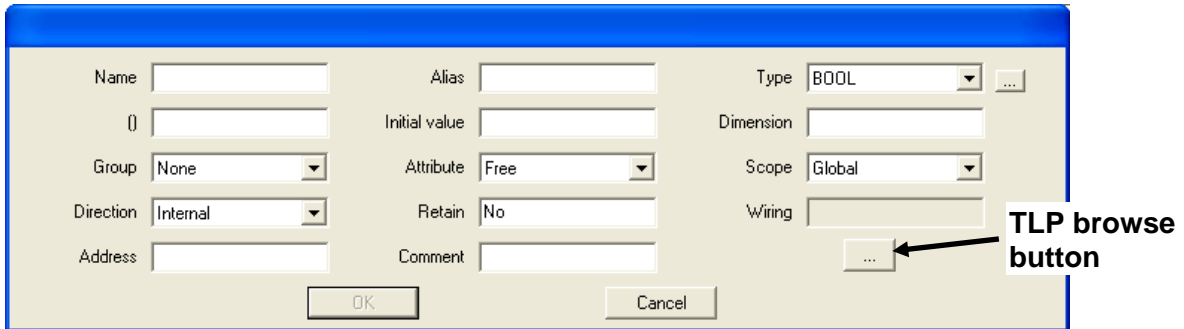
4. Enter **Total** in the Name field, and select **DINT** (signed double integer) in the Type file.

5. Click **OK** to add the variable. The Dictionary screen redisplay with the variable added.

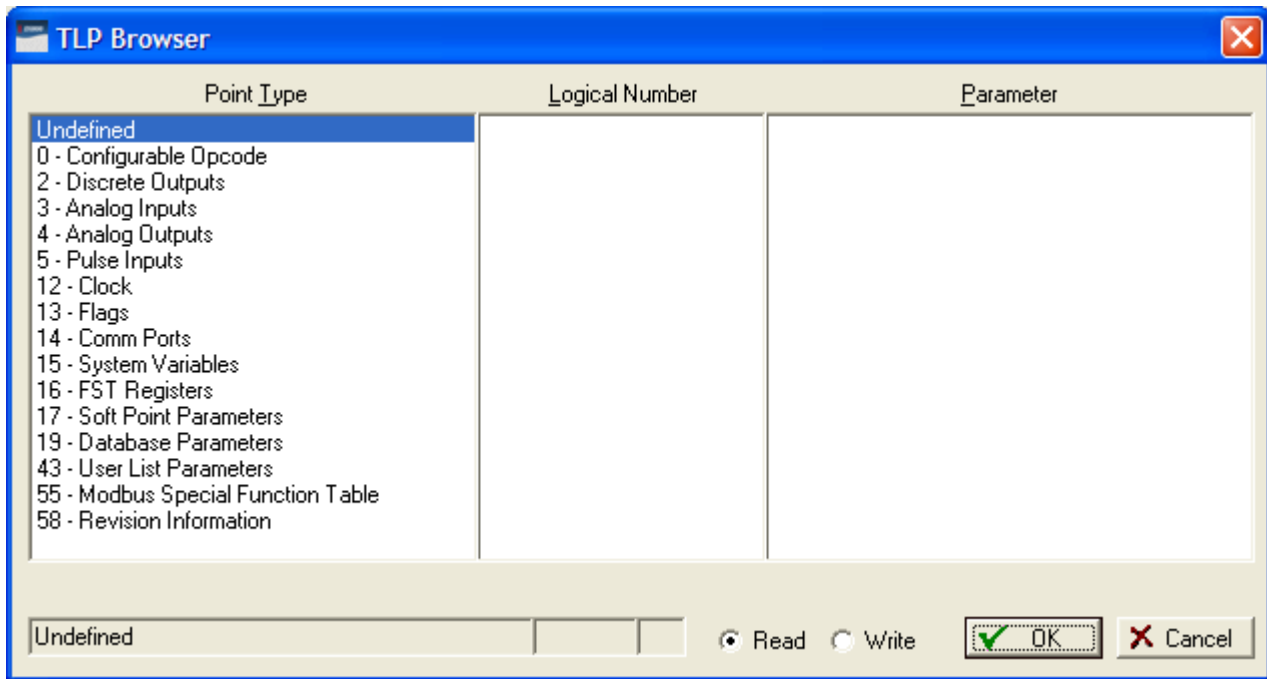


Note: Click the button in the upper right corner of the variable view to display the variable table in an editable spreadsheet format.

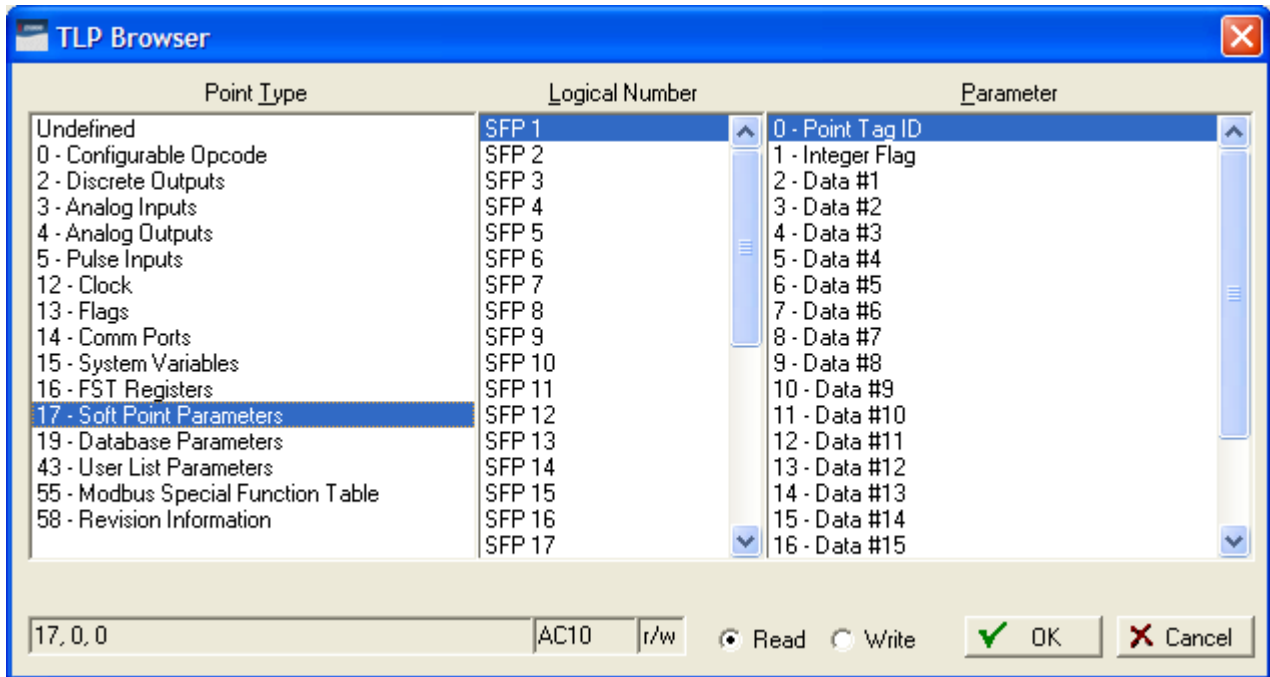
6. To define a second variable that is connected to a parameter in the FB107, double-click the highlighted blank row to open the dialog box.
7. Click the TLP browse button on the dialog box.



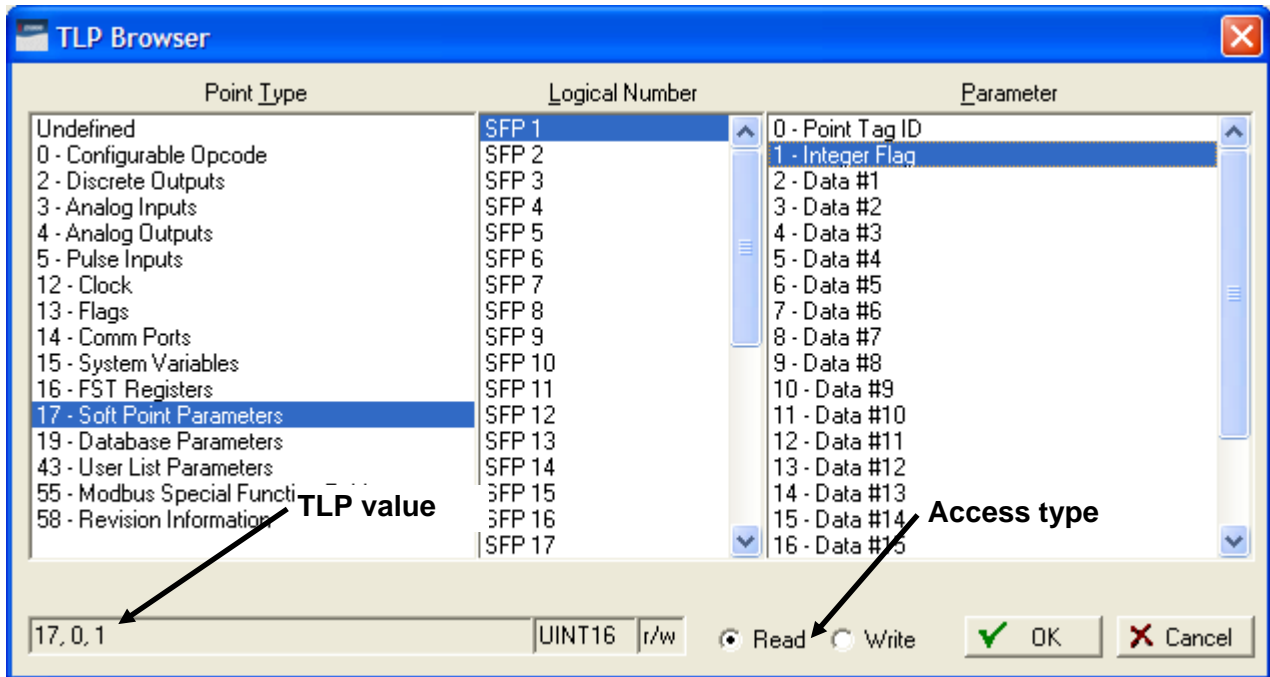
A TLP Browser screen displays.



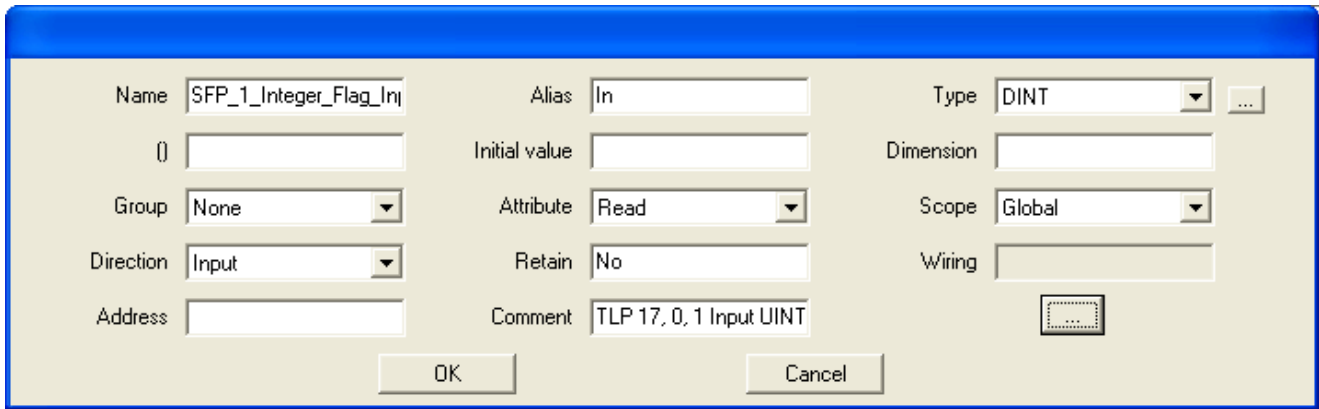
8. Select **17 – Soft Point Parameters** in the Point Type column. The program completes the Logical Number and Parameter columns.



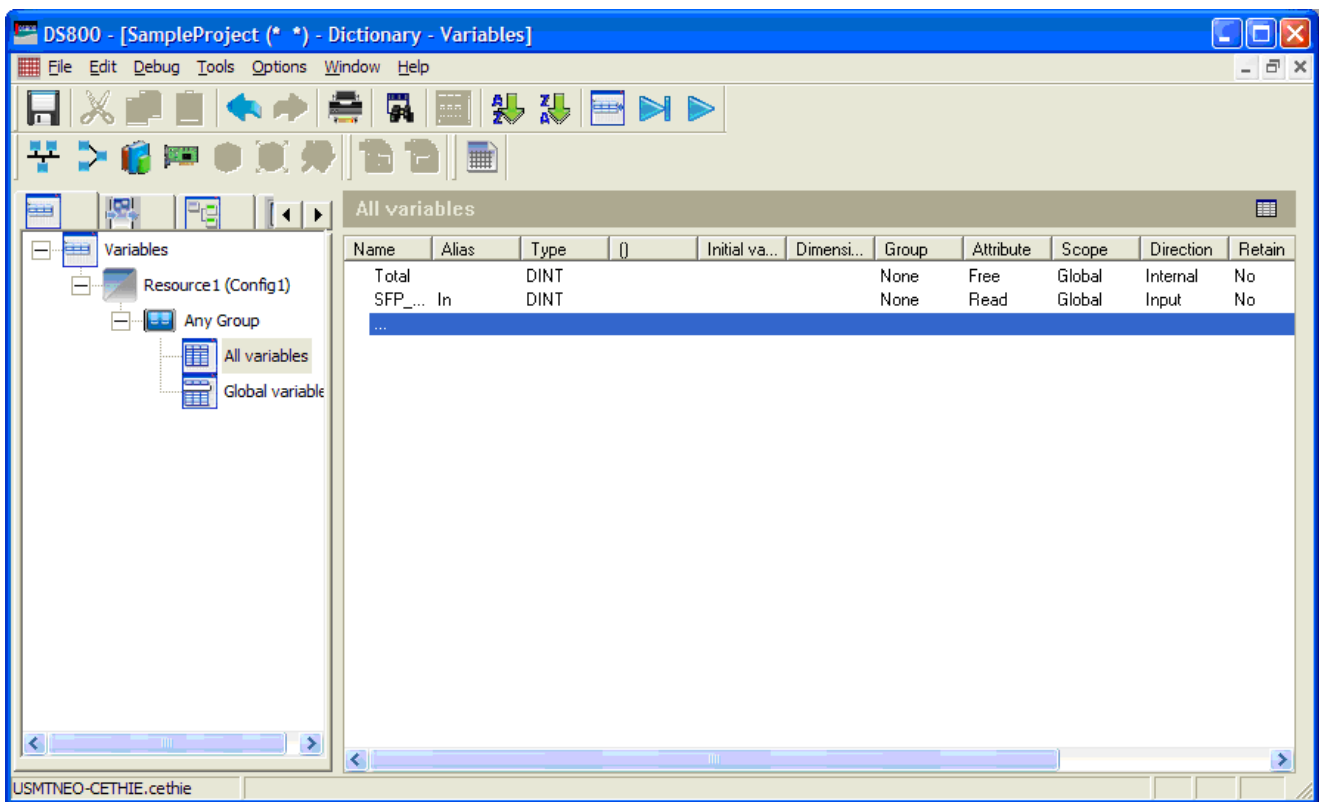
9. Leave **SFP 1** as the value in the Logical Number column and select **Integer Flag** in the Parameter column.





10. Finally, select **Write** as the access type. Click **OK**. The variable dialog box displays. Note that the values in several fields have changed to correspond to your defined variable.



11. Click **OK** to add the variable to the dictionary.



12. Click the Save icon () to save your changes to the dictionary.

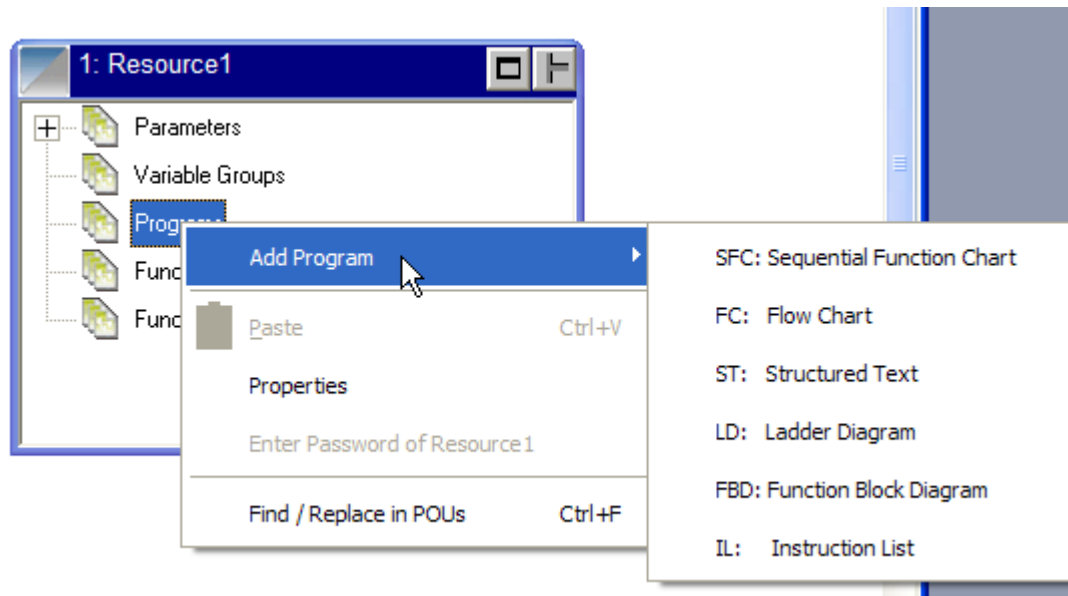
13. Click the Link view icon () to display the project's link architecture.

14. Proceed to *Adding a Program to the Resource*.

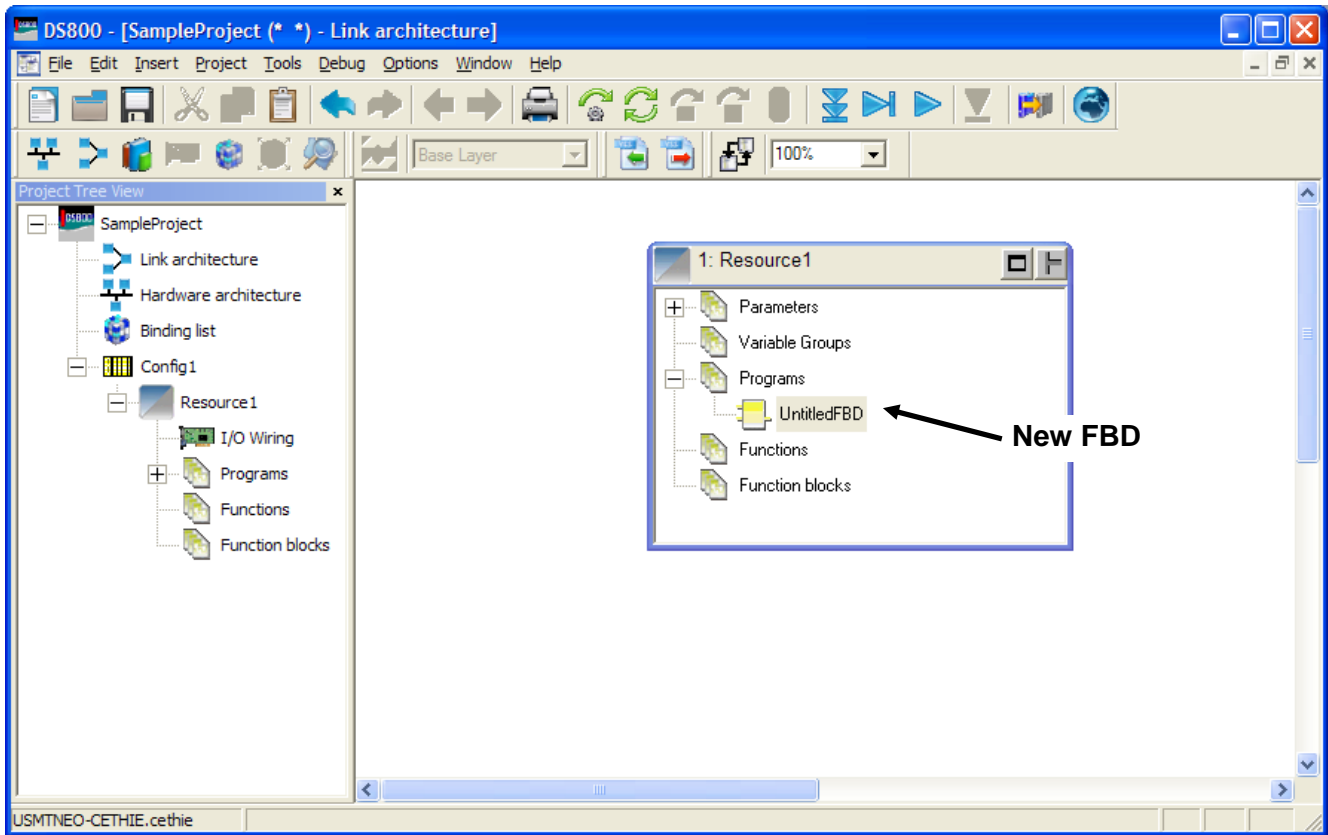
4. Adding a Program to the Resource

Using the Link Architecture view, you can see how the components of your DS800 project fit together. The next step is to give the FB107 resource functionality by adding a program:

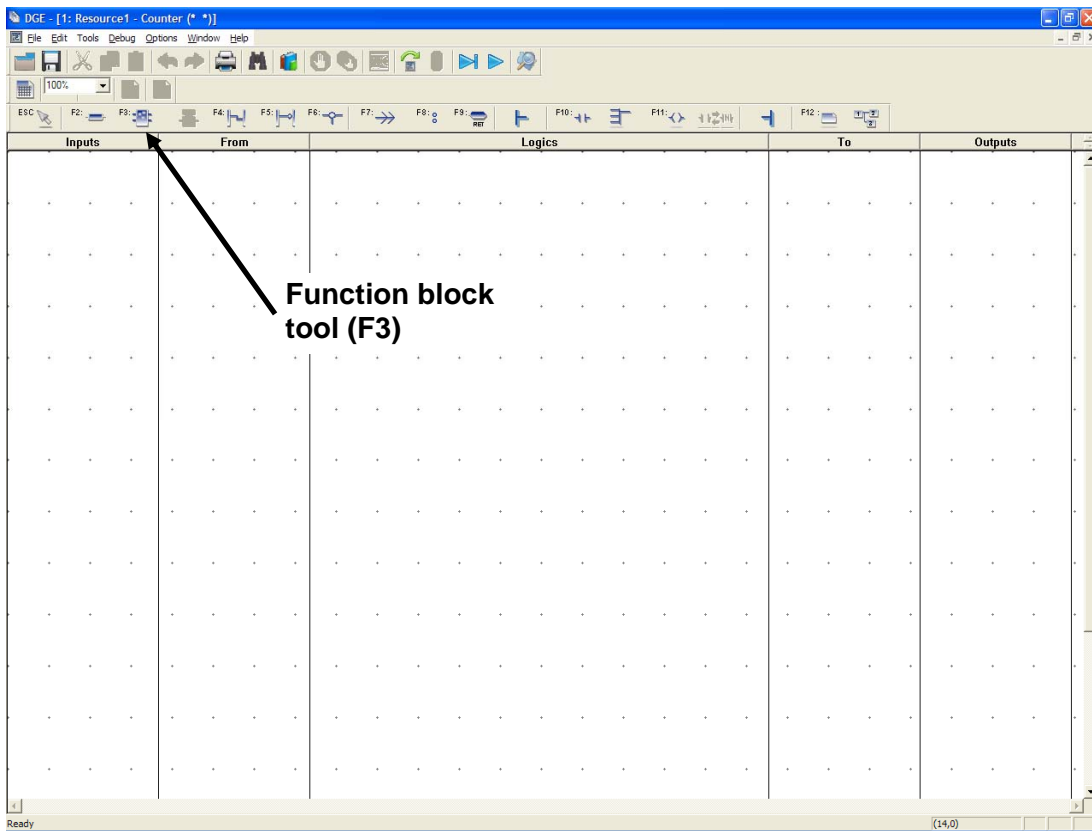
1. Right-click **Programs** in the Resource1 box. A menu displays.
2. Move the cursor over the **Add Program** option to display a menu of programming languages.



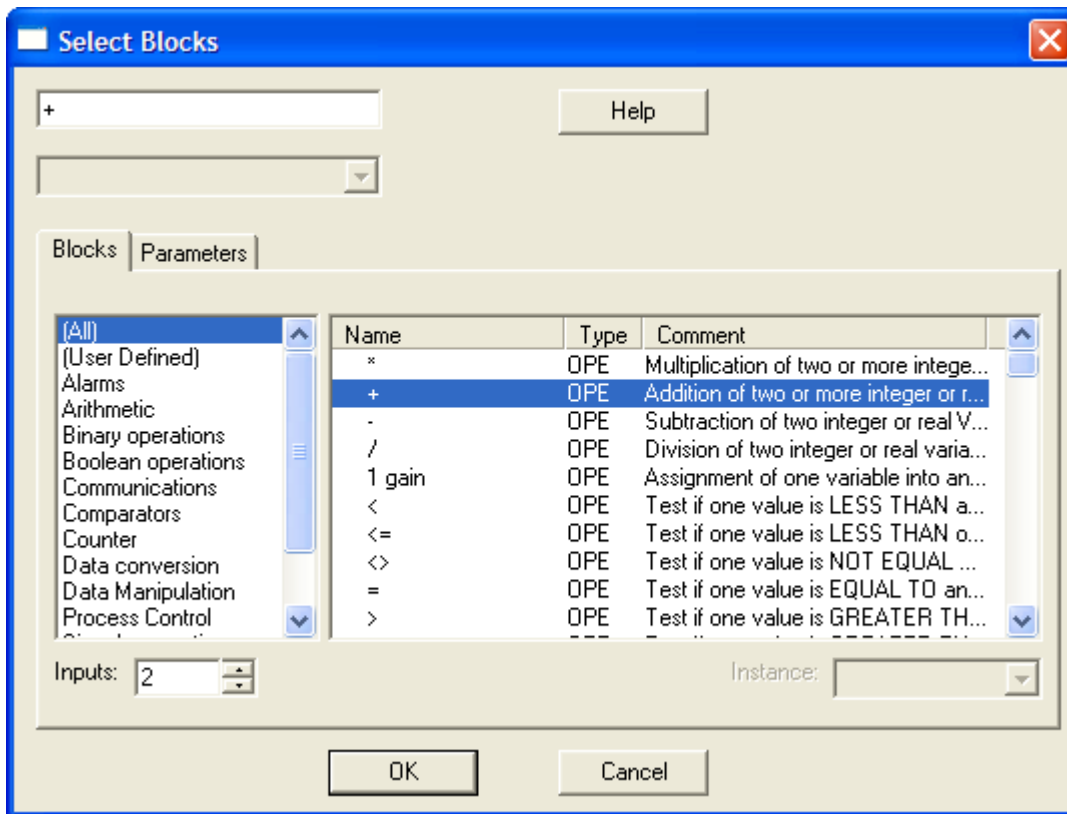
3. Select **FBD: Function Block Diagram**. The Link Architecture view displays, showing an unnamed FBD.



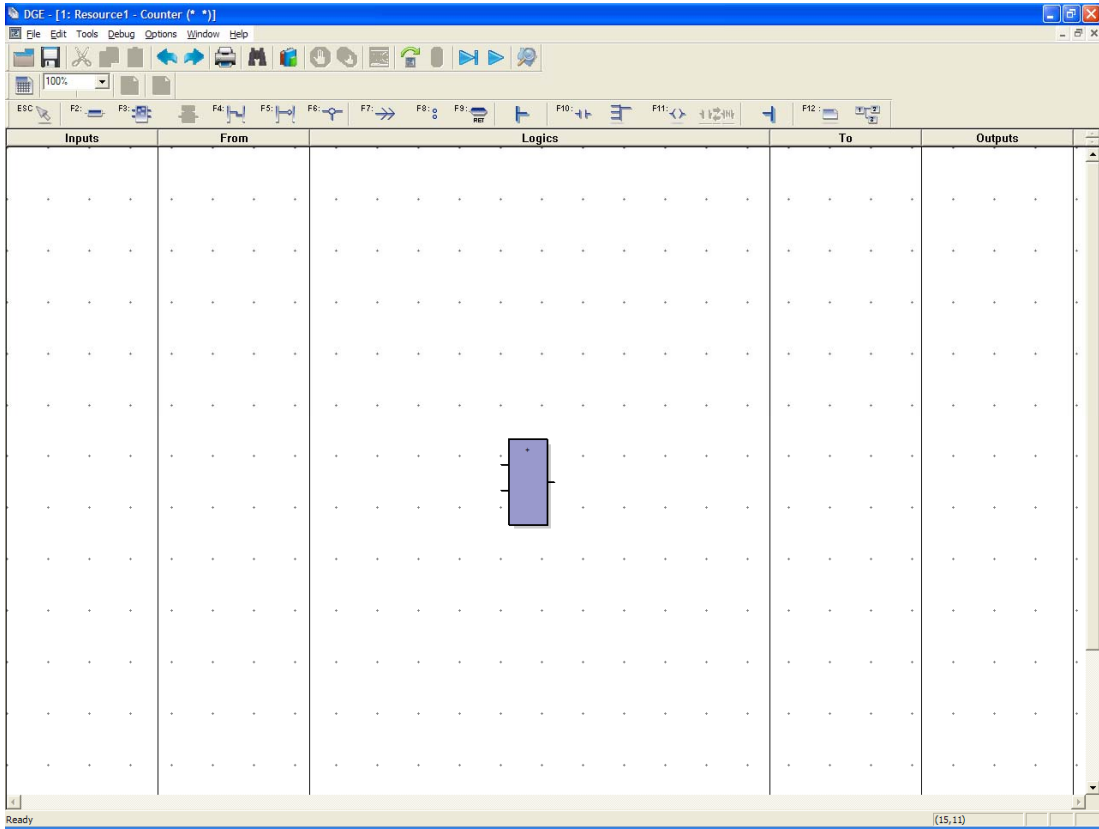
4. Rename the UntitledFBD program as **Counter**.
5. Double-click the Counter program to open the DS800 Editor program.



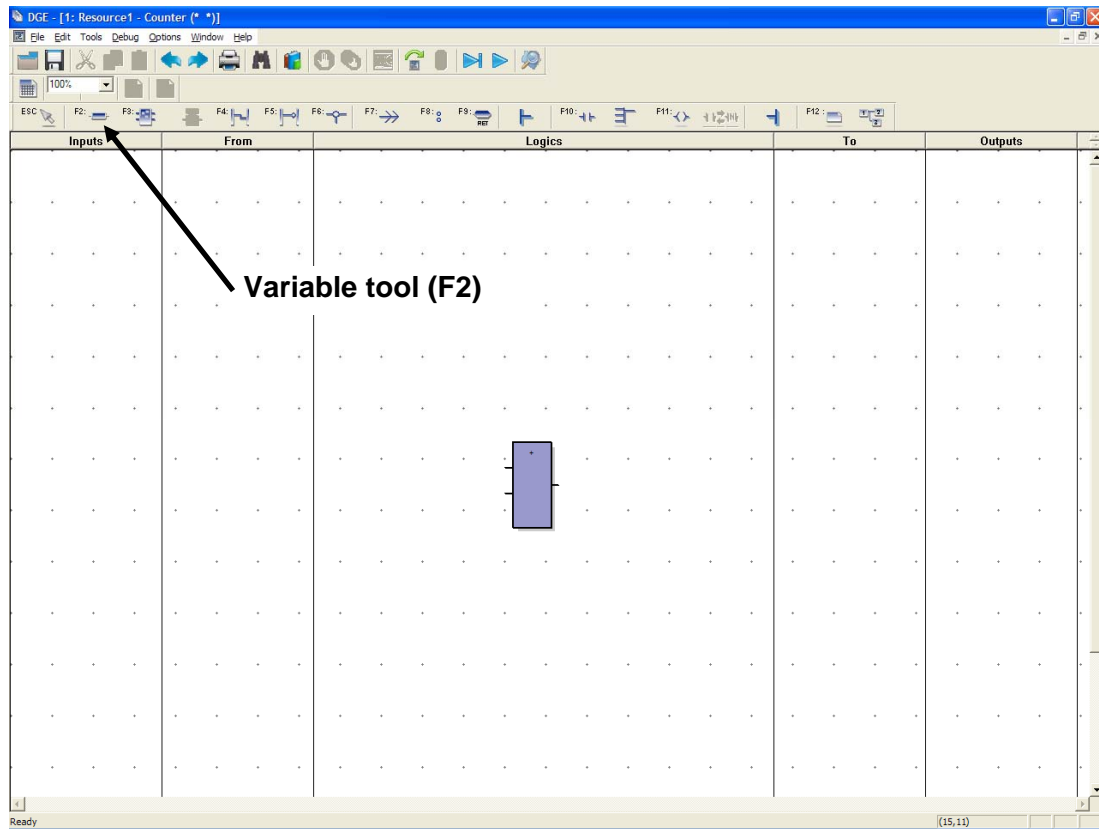
6. Click the function block tool on the language toolbar (or press **F3**). The cursor becomes a function block tool once you move it into the editor grid.
7. Move the cursor in the middle of the editor screen and click. A Select Blocks screen displays.



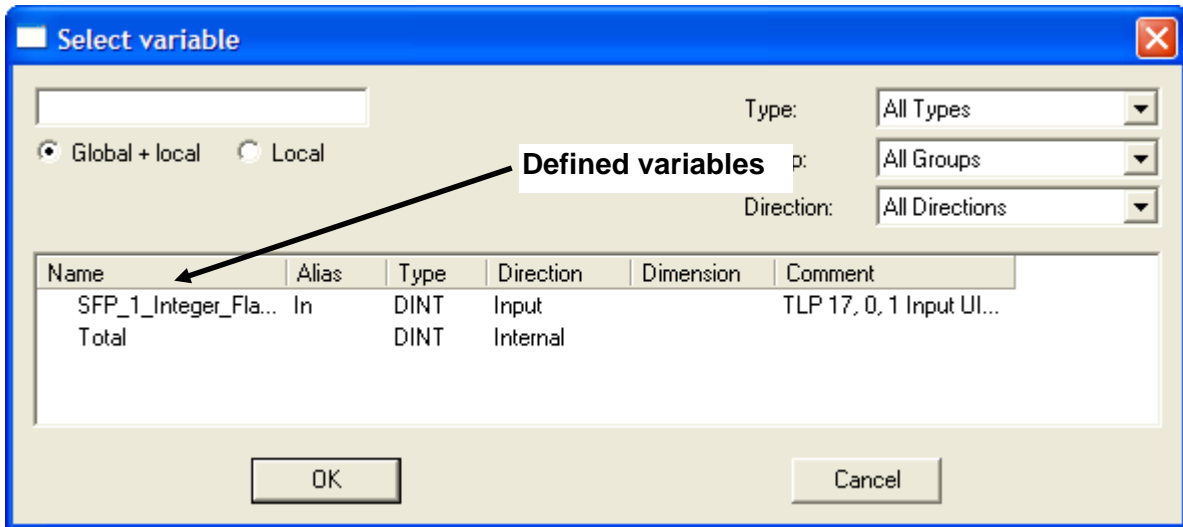
8. In the right-hand panel, select the second block option (**Addition of two or more integer or...**) and click **OK**. The editor changes the shape of the generic function block to an addition function block. Note the two inputs on the left side of the block and one output (which provides the sum) on the right side of the block.



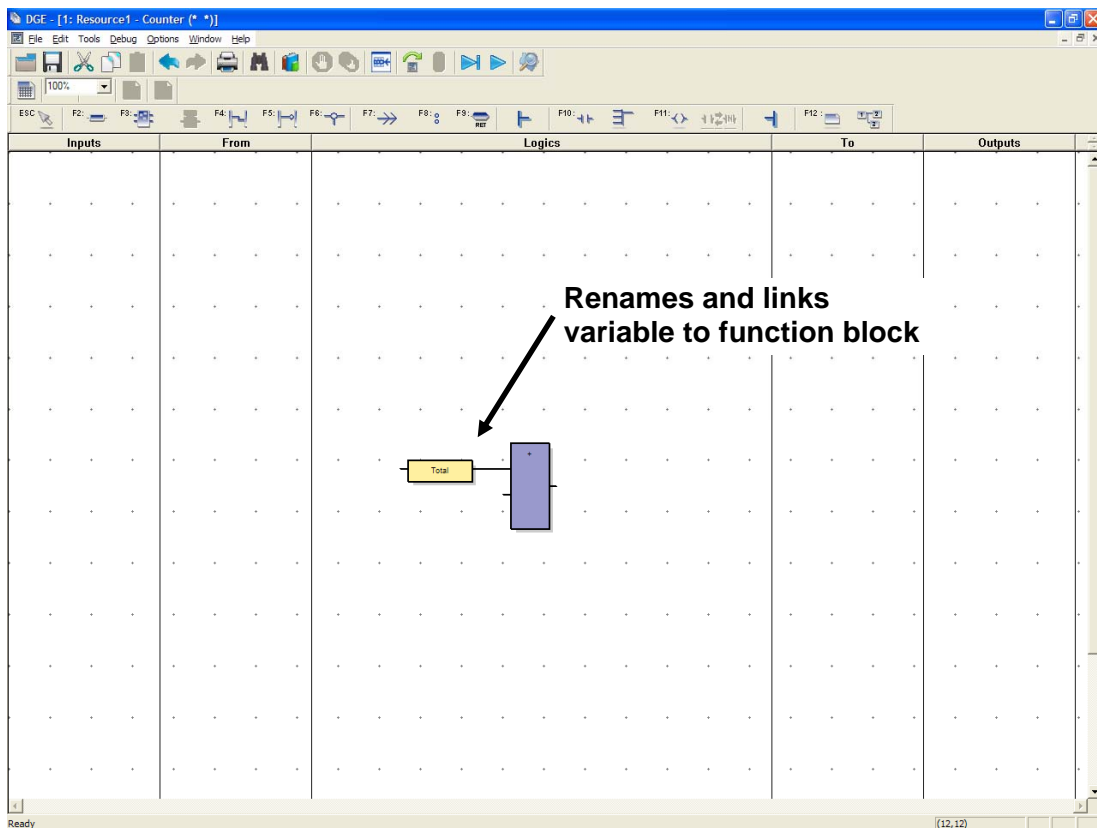
- Click the variable tool on the language toolbar (or press **F2**). The cursor becomes a variable tool once you move it into the editor grid.



10. Move the variable tool close to one of the inputs on the left side of the function block and click. The Select Variable dialog box displays, which shows the variables currently defined for this project.



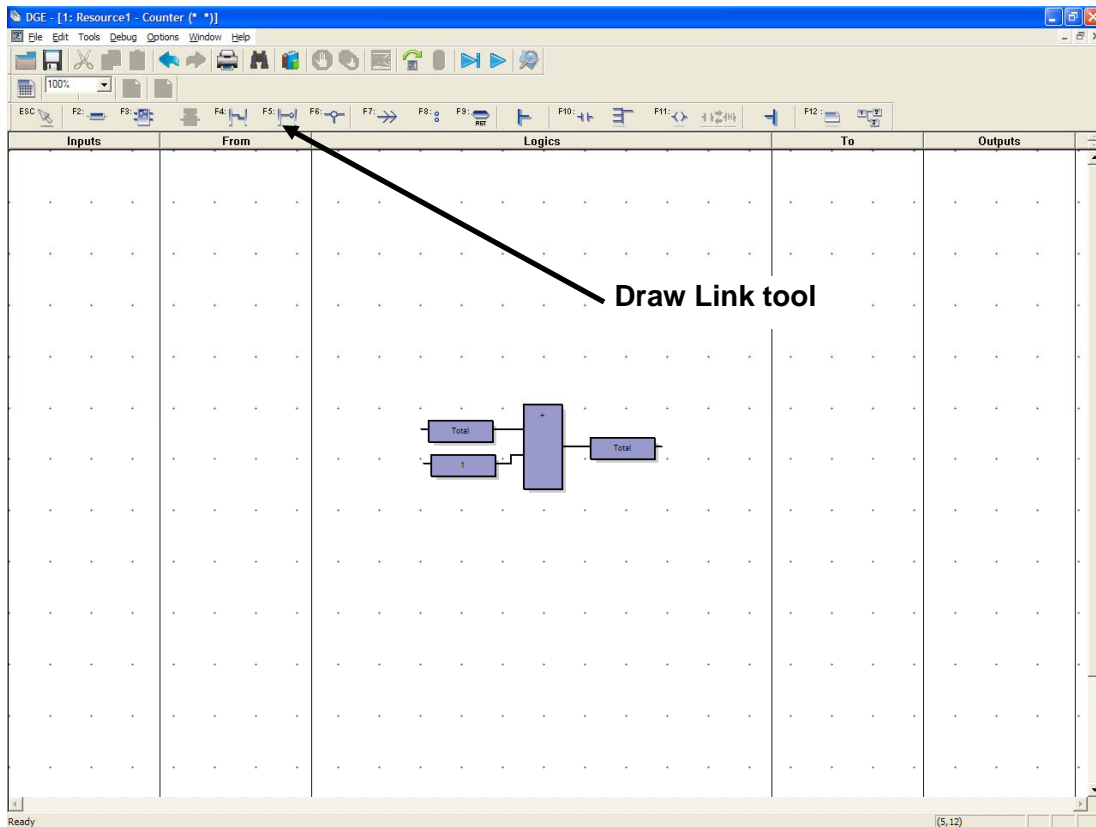
11. Select the Total variable and click **OK**. The editor renames the variable and, if the variable is close to the function block, automatically links the variable and function block.



12. Select the variable tool again and click near the second input on the function block to display the Select variable dialog box.
13. Enter **1** in the upper left-most field in the Select variable dialog box and click **OK**.

Note: This value is not a variable, but is a constant value.

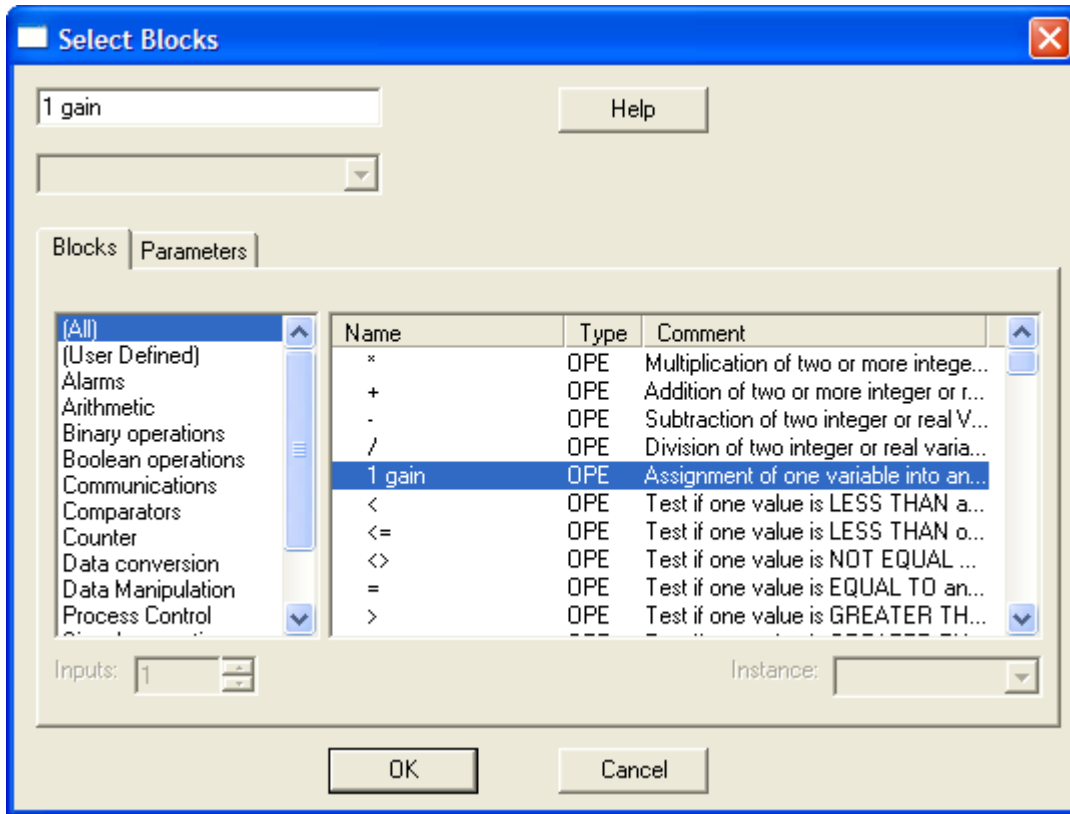
14. Select the variable tool a third time, but click near the **output** on the function block. When the Select variable dialog box displays, select the Total variable and click **OK**. At this point, the program should look like this:



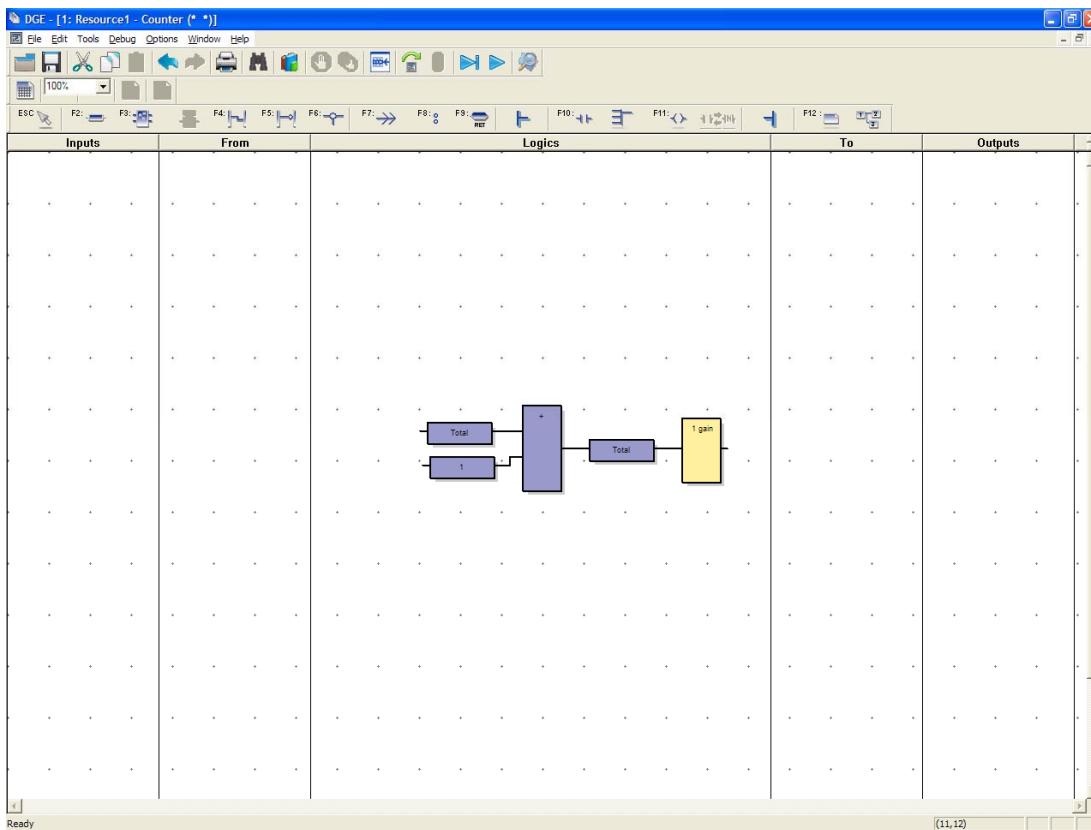
Note: If the editor has not automatically connected the variables to the function block, select the Draw Link tool (**F4**) to connect the variables. Alternately, you can move the variables closer to the function block.

A text-based equivalent for this program would be **Total = Total + 1**. Once you have defined the program, you need to write it to a parameter in the FB107.

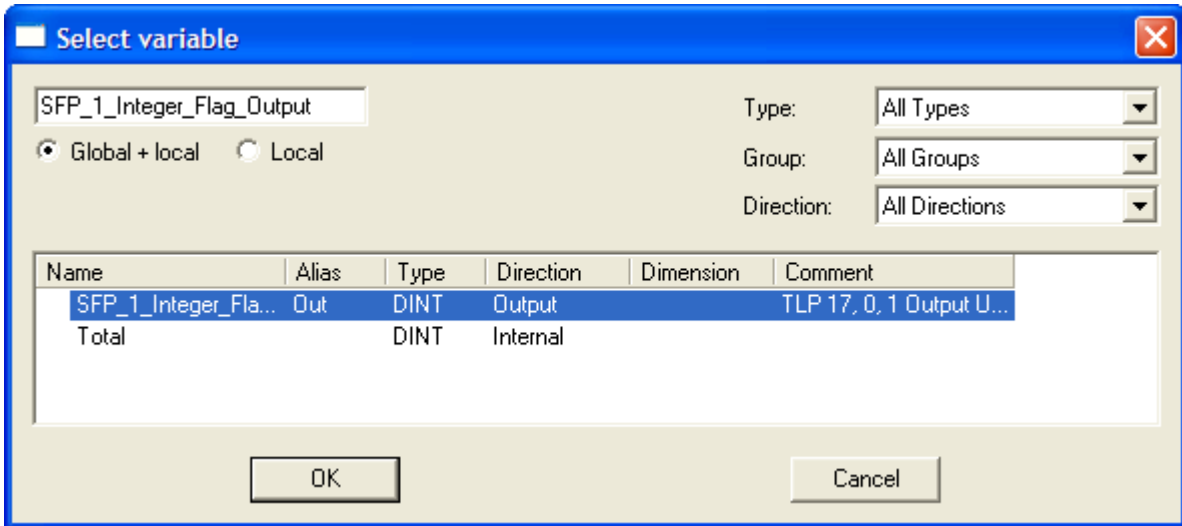
15. Select the function block tool (or click **F3**) and click at the extreme right-hand end of the current block structure. The Select Blocks dialog box displays.



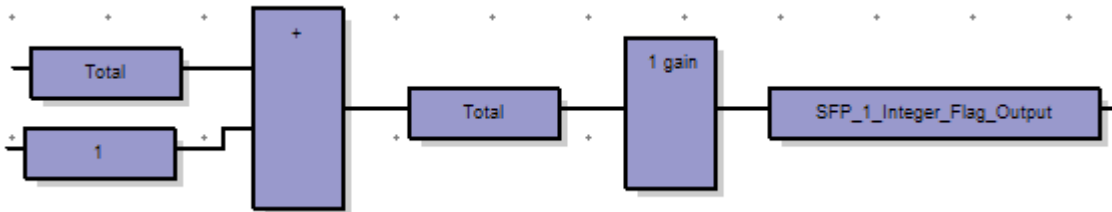
16. Select the **1 gain** function block (as shown above) and click **OK**. The editor renames the function block.




17. Select the variable tool (**F2**) and move the cursor to the right of the 1 gain function block. The Select variable dialog box displays.




18. Select the **SFP_1_Integer_Flag_Output** variable (as shown above) and click **OK**. The finished block structure should look like this:

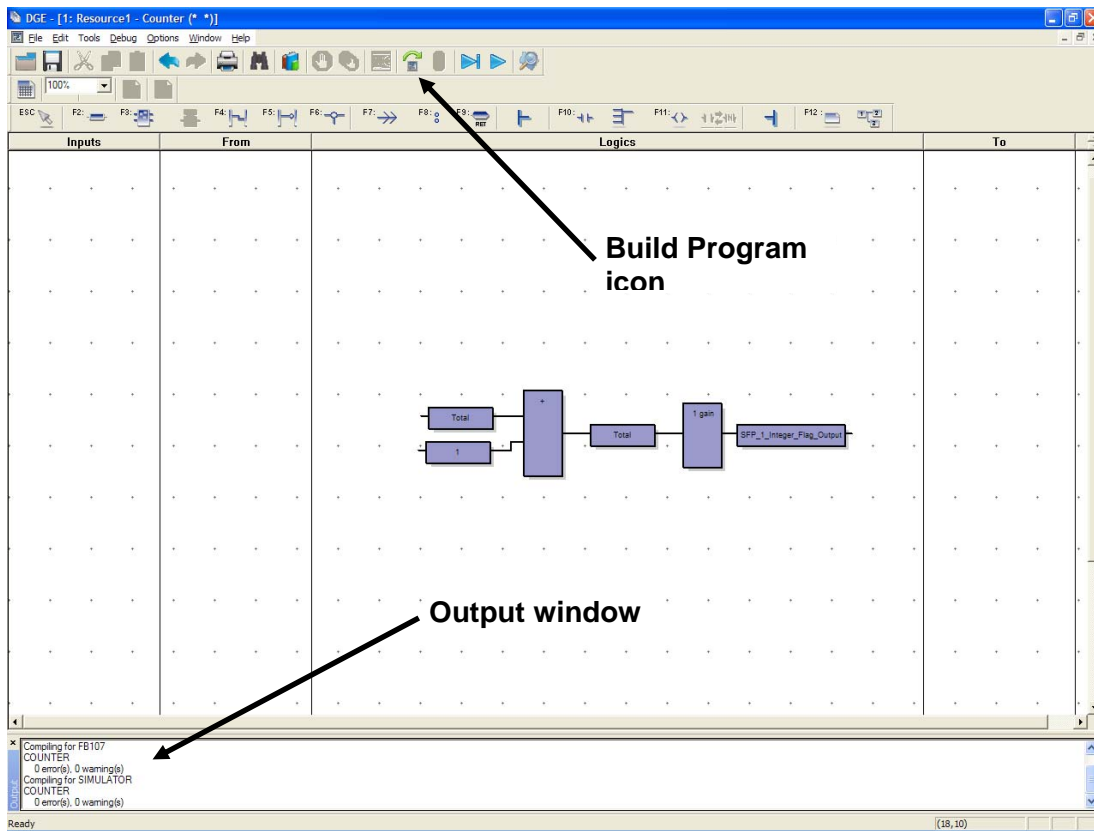


19. Click the Save icon () on the toolbar to save the program.
20. Proceed to *Building the Program*.

5. Building the Program

Once you complete and save your program, you must build (or compile) it.

1. Click the Build Program icon () on the editor toolbar. As the program builds, the Output window at the bottom of the screen notes any errors or warnings.



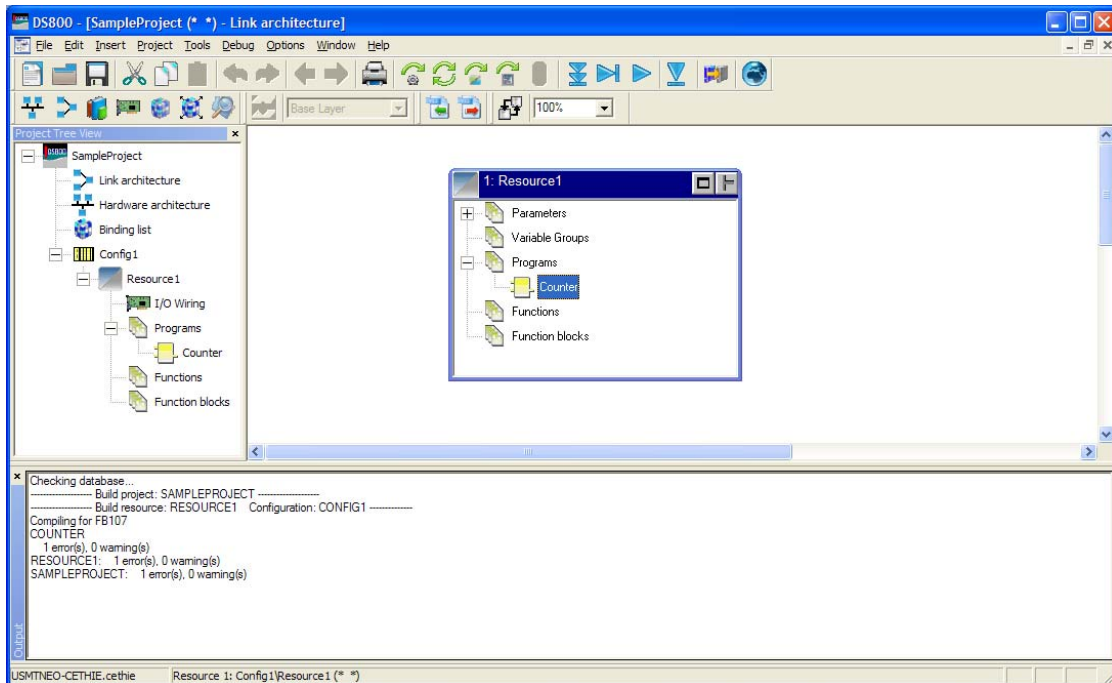
Note: The Output window shows the result of the code generation. During testing, it can also show any execution messages. You can change the height of the window to display more or fewer lines.

2. When the build completes, the message in the Output window should resemble the following:

```

Checking database...
----- Check POU: RESOURCE1 -----
Compiling for FB107
COUNTER
  0 error(s), 0 warning(s)
Compiling for SIMULATOR
COUNTER
  0 error(s), 0 warning(s)
  
```


3. Close the editor window. The main workbench window displays.

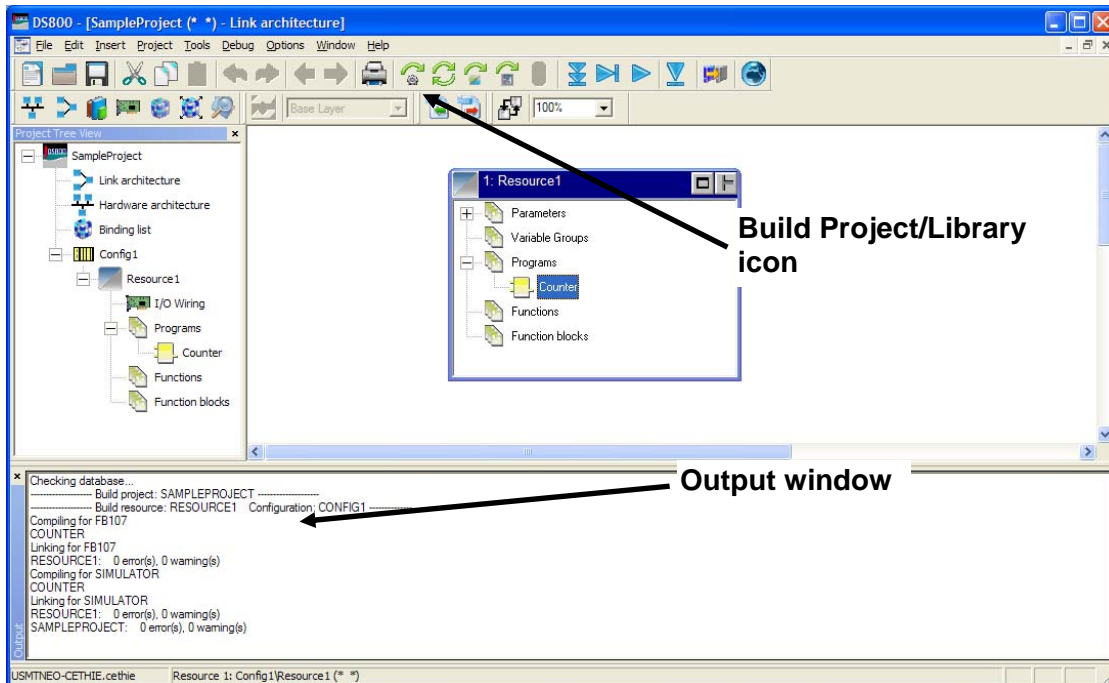


4. Proceed to *Compiling the Project*.

6. Compiling the Project

As noted before, a project may have one or more programs. Our simple project has only one program, but if your project has multiple programs, you need to successfully compile—or “build”—each program (when the Output window displays *0 error(s), 0 warning(s)*). Only then should you attempt to compile the project. To compile the project:

1. Click the Build Project/Library icon () on the DS800 toolbar. The Output window indicates whether any errors or warnings occurred:




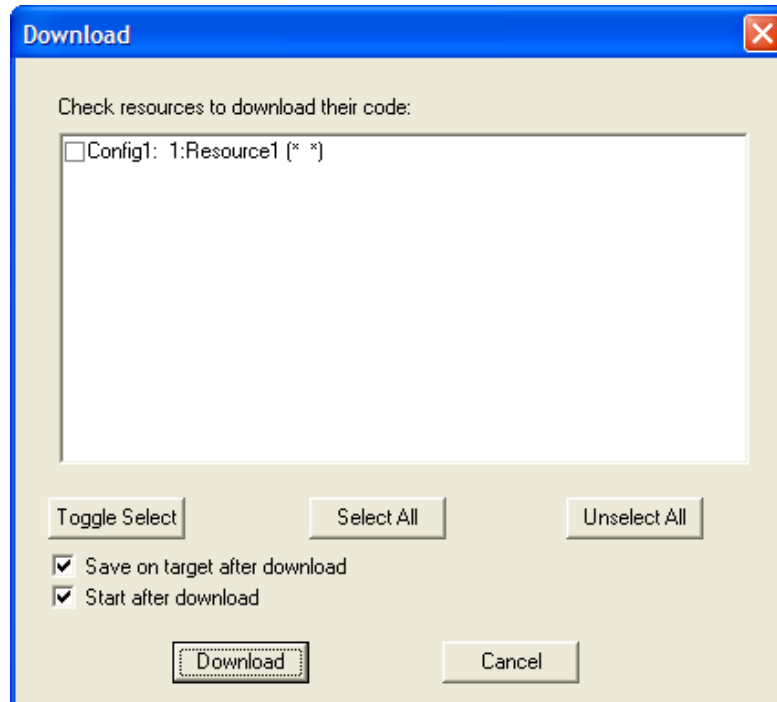
2. For a successful compile, the Output window should display *0 error(s), 0 warning(s)*.
3. Proceed to *Downloading the Project*.

7. Downloading the Project

Once you have successfully compiled the project, you can download it to the FB107 for execution there. Ensure that your PC is connected to the target FB107 (the same FB107 from which you imported your configuration file).

Note: To download the project, DS800 must have a designated communications port on the FB107. You defined this in **Step 5** of the installation process. Without this designated comm port, DS800 cannot download the project.

1. Click the download icon () on the toolbar. The Download dialog box displays.



2. Click **Select All** to choose the resource you want to download. (For this sample project, we defined only one resource.) You can de-select any resources you want to omit them from this download.
3. Click **Download** to start the download process. When the download completes, DS800 displays the following message in the Output portion of the Workbench screen.



```
Checking database...
03-November-08 14:11 Download completed successfully
```
4. Proceed to *Debugging the Project*.

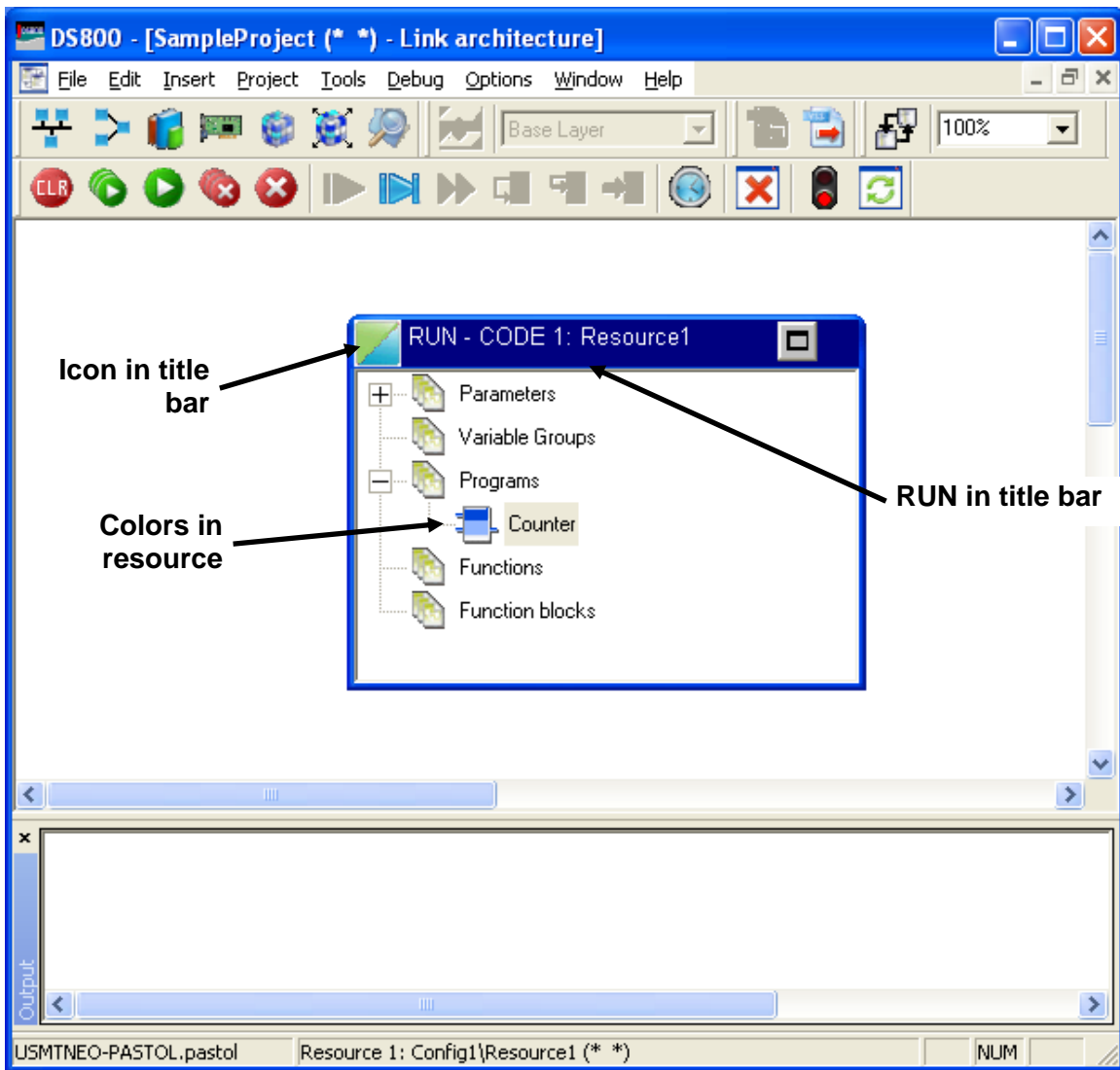
8. Debugging the Project


Debug mode enables you test resources while you are online. The debug routine establishes a connection with the hardware and displays the current value of variables while the code executes. This “live view” helps you to detect and remove errors.

Note: You must have successfully downloaded a project to use debug mode.

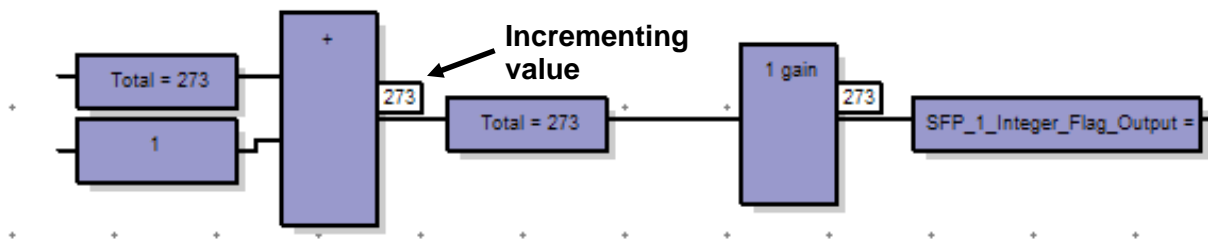
To start a debugging session:


1. Click the Debug Target icon () on the toolbar. The Workbench software connects to the FB107 and includes the word **RUN** in the title of the Resource 1 dialog box.



The green and blue icon in the upper left corner of the screen () indicates that no errors are present.

2. Double-click the Counter program to open the editor.
3. Review the real-time results of the program. The editor displays the block diagram showing the current value of the variables and the output of the function blocks. The value increases at a rate of once each second, which is how frequently the code executes.



4. Click the Stop Debug Target icon () on the toolbar to stop the real-time display and exit Debug mode. Close the editor. The DS800 screen displays.
5. Proceed to *Verifying the Program in ROCLINK 800*.

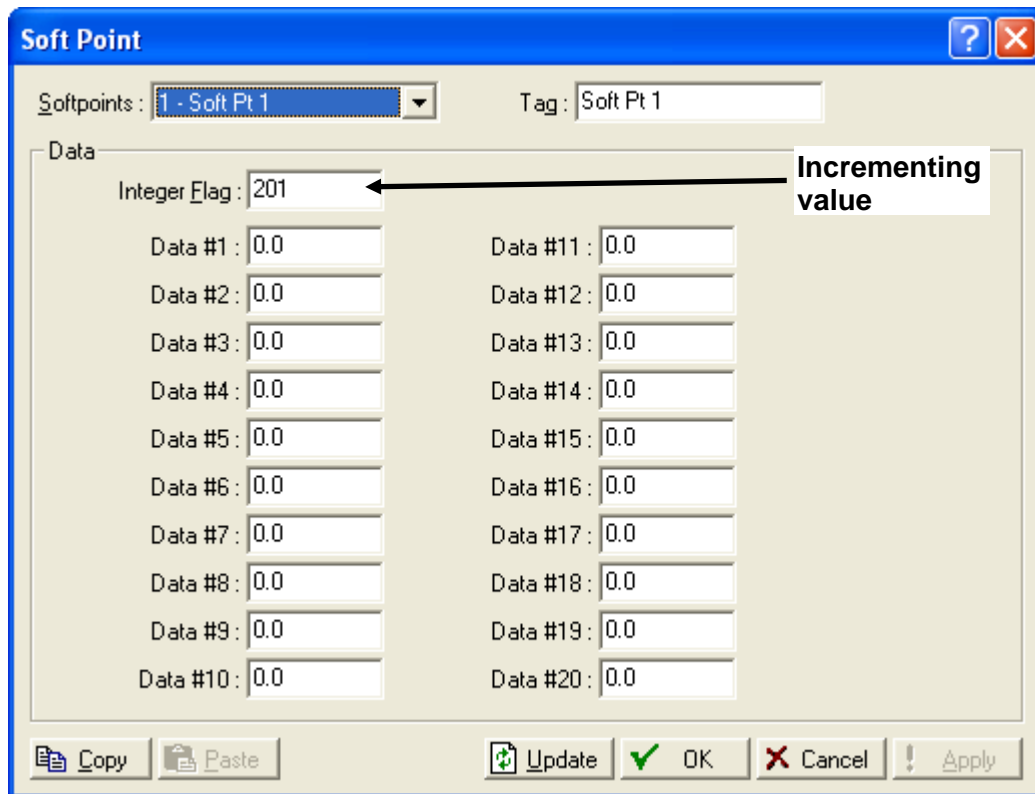
9. Verifying the Program in ROCLINK 800

The final step in the process of developing a program is to access ROCLINK 800 software and verify that the program is correctly incrementing the soft points you have targeted.

1. Disconnect from DS800.

Note: Because your PC typically uses the same communications port for both ROCLINK 800 and DS800, you cannot connect to both ROCLINK 800 and DS800 at the same time **unless** you use **different** serial communication ports for each program.

2. Connect to the FB107 using ROCLINK 800.
3. Select **Configure > I/O > Soft Points** from the ROCLINK 800 menu bar. The Soft Point screen displays.



4. Note the value in the Integer field. Click **Update** several times over 5-10 seconds, and watch the value increase. This indicates that the

DS800 program is incrementing that value once each second, as you intended.

Summary

To meet the needs of your organization, the DS800 programs you develop will—of course—be more complex than this simple example. But the processes you use to develop those programs are the same. If you need further information on the DS800 software, refer to the *DS800 Development Suite Software User Manual* (Form A6126).

Troubleshooting

While attempting to download a DS800 project to the FB107, you may see the message *Error occurred during downloading to configuration! Connection to the Configuration Manager failed.* This means that the workbench cannot communicate with the DS800 kernel inside the FB107. Following are some tips to help you diagnose and resolve this problem.

- **Who “owns” the PC serial port?**

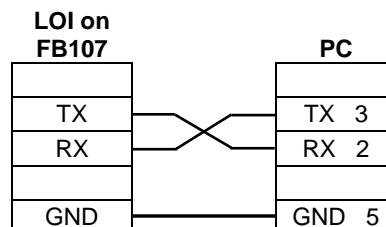
If ROCLINK 800 is running, try closing that program. When ROCLINK 800 connects to a device via a PC serial port, it locks access to that port, and no other applications are allowed to use it. This is a common problem for computers with a single serial port.

- **Who “owns” the FB107 comm port?**

Access the Comm Port screen in ROCLINK 800 (**ROC > Comm Ports**). Check that the Port Owner field is set to **DS800** for the comm port you are attempting to use.

- **Using null-modem cable wiring?**

The signal routing between the FB107 comm port and the PC's comm port should use a null-modem connection. In a null-modem connection, the FB107's EIA-232 (RS-232) transmit (TX) connects to the PC's receive (RX). Similarly, the FB107's receive (RX) connects to the PC's transmit (TX), as shown in the following diagram:



- **Is the DS800 kernel inside the FB107 running?**

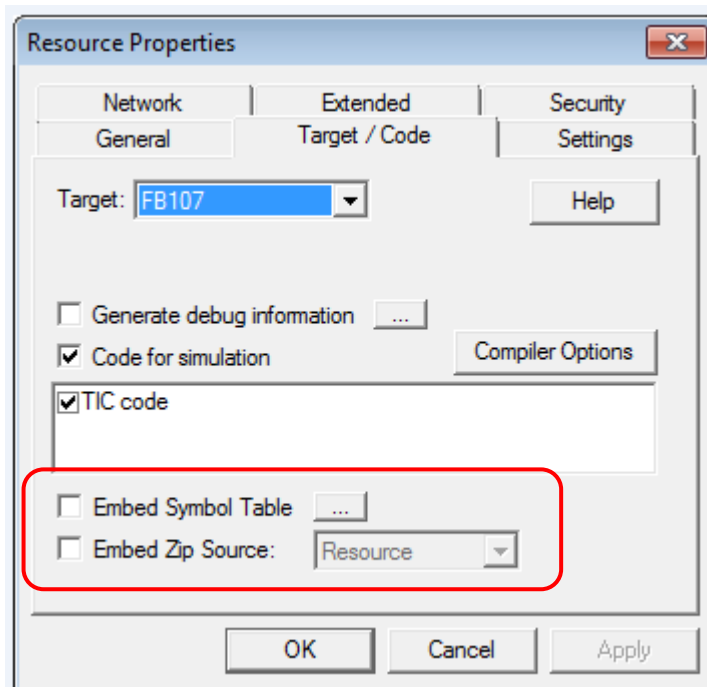
Go into the ROCLINK 800 DS800 configuration, (**Configure > Control > DS800**) and ensure that the Status field contains the message *Loaded, Running Normally*. If not, review 3. *Install the DS800 Runtime Kernel*.

- **Have you accidentally created a Library Project?**

Does a CD and Book icon appear in the lower left corner of the Resource view of the Workbench? If so, you've accidentally created a library, which is not downloadable to an FB107. You'll need to create a new project using the template **SingleFB107**.

- **Have you selected the option to embed zipped source?**

The FB107 (as a low-power, low-memory device) does not support the ability to embed the project zipped source code in the device. If you have enabled either the **Embed Symbol Table** or the **Embed Zip Source** option on the Resource Properties dialog, you must **disable** these options:



For customer service and technical support, visit www.EmersonProcess.com/Remote/Support.

Global Headquarters,

North America, and Latin America:

Emerson Automation Solutions
Remote Automation Solutions
6005 Rogerdale Road
Houston, TX 77072 U.S.A.
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Europe:

Emerson Automation Solutions
Remote Automation Solutions
Unit 8, Waterfront Business Park
Dudley Road, Brierley Hill
Dudley UK DY5 1LX
T +44 1384 487200 | F +44 1384 487258

Middle East/Africa:

Emerson Automation Solutions
Remote Automation Solutions
Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone – South 2
Dubai U.A.E.
T +971 4 8118100 | F +971 4 8865465

Asia-Pacific:

Emerson Automation Solutions
Remote Automation Solutions
1 Pandan Crescent
Singapore 128461
T +65 6777 8211 | F +65 6777 0947

© 2009-2017 Remote Automation Solutions, a business unit of Emerson Automation Solutions. All rights reserved.

This publication is for informational purposes only. While every effort has been made to ensure accuracy, this publication shall not be read to include any warranty or guarantee, express or implied, including as regards the products or services described or their use or applicability. Remote Automation Solutions (RAS) reserves the right to modify or improve the designs or specifications of its products at any time without notice. All sales are governed by RAS terms and conditions which are available upon request. RAS accepts no responsibility for proper selection, use or maintenance of any product, which remains solely with the purchaser and/or end-user.