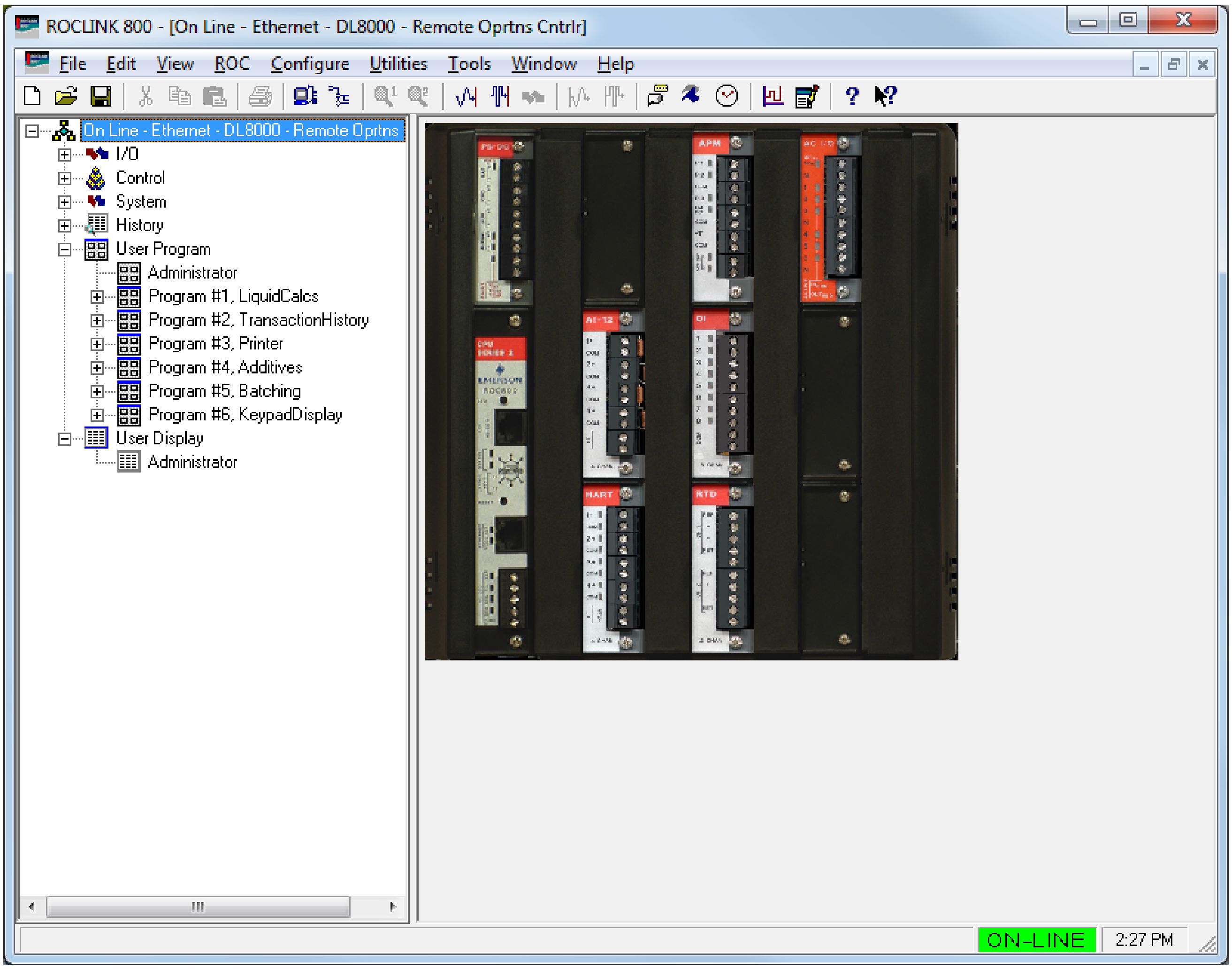
Part D301259X012
February 2024

ROCLINK™ 800 Configuration Software User Manual (for DL8000)



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Contents

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Chapter 1 – Introduction

In This Chapter

This chapter describes the ROCLINK™ 800 Configuration software (ROCLINK 800) you use to configure and monitor the DL8000 Preset Controllers (ROCs) and the dynamic user interface.

1.1 ROCLINK 800 Software Basics

ROCLINK 800 Configuration software enables you to monitor, configure, and calibrate Remote Operations Controllers (ROCs). Remote Automation Solutions provides the software and user documentation on a DVD-ROM.

ROCLINK 800 is designed for ease of use. Drop-down menus simplify accessing the functions provided by the software. Dialog boxes and drop-down list boxes (▼) help to direct selections and data entry. You can perform actions with the keyboard or a pointing device, such as a mouse. Refer to *User Interface Basics* (located in this chapter) for a description of the user interface.

You access help screens either from the Help menu or in a context-sensitive fashion pressing the **F1** key when your cursor is in a field. This feature makes it easy to access on-line information for any ROCLINK 800 topic.

You can build custom displays for the ROC that combine both graphic and dynamic data elements, and then use these displays to monitor the operation of the ROC either locally or remotely.

The software also provides multiple levels of security for controlling access to ROCLINK 800 functions, as well as the ROC database.

1.2 Computer Requirements

ROCLINK 800 works on most personal computers (PCs) running Microsoft® Windows® operating systems. The PC can be a desktop or a portable computer, but must meet the following minimum requirements:

- Pentium-class processor (233 MHz or greater recommended).
- DVD-ROM drive.
- Windows 7 (32-bit and 64-bit).
- Windows 8 (32-bit and 64-bit).
- Windows 10 (32-bit and 64-bit).
- Windows Server 2012
- 64 MB of RAM (random access memory).
- SVGA color monitor, 800 by 600 pixels, small fonts.
- 105 MB of available hard disk space depending on operating system and revision level.
- EIA-232 (RS-232) serial connection or USB-to-serial adaptor, a TCP/IP connection, or a dial-up modem connection.

1.3 Contacting Technical Support

For technical support, please contact your local sales representative. You may also contact Remote Automation Solutions directly.

Emerson Automation Solutions
Energy and Transportation Solutions
Marshalltown, IA 50158 USA
Houston, TX 77065 USA
Pickering, North Yorkshire UK Y018 7JA

Website: http://www.emersonprocess.com/remote/

Technical Support Website:
http://www2.emersonprocess.com/en-US/brands/remote/systems_and_software/supportnet/support_contacts/Pages/support_contacts.aspx

Toll Free: (US and Canada) 800.537.9313
Hours: 24x5 during normal business days
SupportNet Login:
www3.emersonprocess.com/remote/support/v2/login.html

1.4 Software Installation

Note: The device requires version 1.88 or later of ROCLINK 800. If you are using Windows 8 or Windows 7 operating system, refer to *Installing ROCLINK 800 under Windows10, Windows 8 and Windows 7* (located in this chapter).

To install ROCLINK 800:

1. Extract the zip file to the local hard drive (for example, in the C:\TEMP\directory) or place the DVD-ROM into the drive.
2. Double-click the **setup.exe** file if the Installation Wizard does not automatically launch. The Installation Wizard screen appears
3. Click **Next** in the ROCLINK 800 Welcome screen. Read the License Agreement and click **Yes** to accept it. Enter your **Name** and **Company** name, and click **Next**.

   The program installs the software in the default recommended directory C:\Program Files\ROCLINK800 or C:\Program Files (x86) \ROCLINK800. Select an alternative destination folder if you want to install the software in a folder other than the default.
4. Follow the setup installation instructions.
5. Click **Finish** in the Wizard Complete screen.

Note: You may need to restart your PC to complete the installation.

1.4.1 Installing ROCLINK 800 under Microsoft Windows 10, Windows 8 or Windows 7

To install or upgrade ROCLINK 800 on the Microsoft Windows 10, Windows 8 or Windows 7 platform, you must temporarily disable User Account Control **before** performing the installation and change your PC's Regional Settings.

Disabling User Account Control ensures that all files copy and are not limited by Windows' security enhancements. Refer to *Disabling User Account Control (Windows 10), Disabling User Account Control (Windows 8)* and *Disabling User Account Control (Windows7)* (located in this chapter).

Changing your PC's Region Settings prevents you from potentially encountering configuration file errors. Refer to *Changing Region Settings (Windows 10), Changing Region Settings (Windows 8)* and *Changing Region Settings (Windows 7)* (located in this chapter).

Disabling User Account Control (Windows 10)

Note: User Account Control must remain **disabled** in order to run ROCLINK 800.

To disable User Account Control:

1. Right-click the Start menu and select **Search** from the pop-up menu.

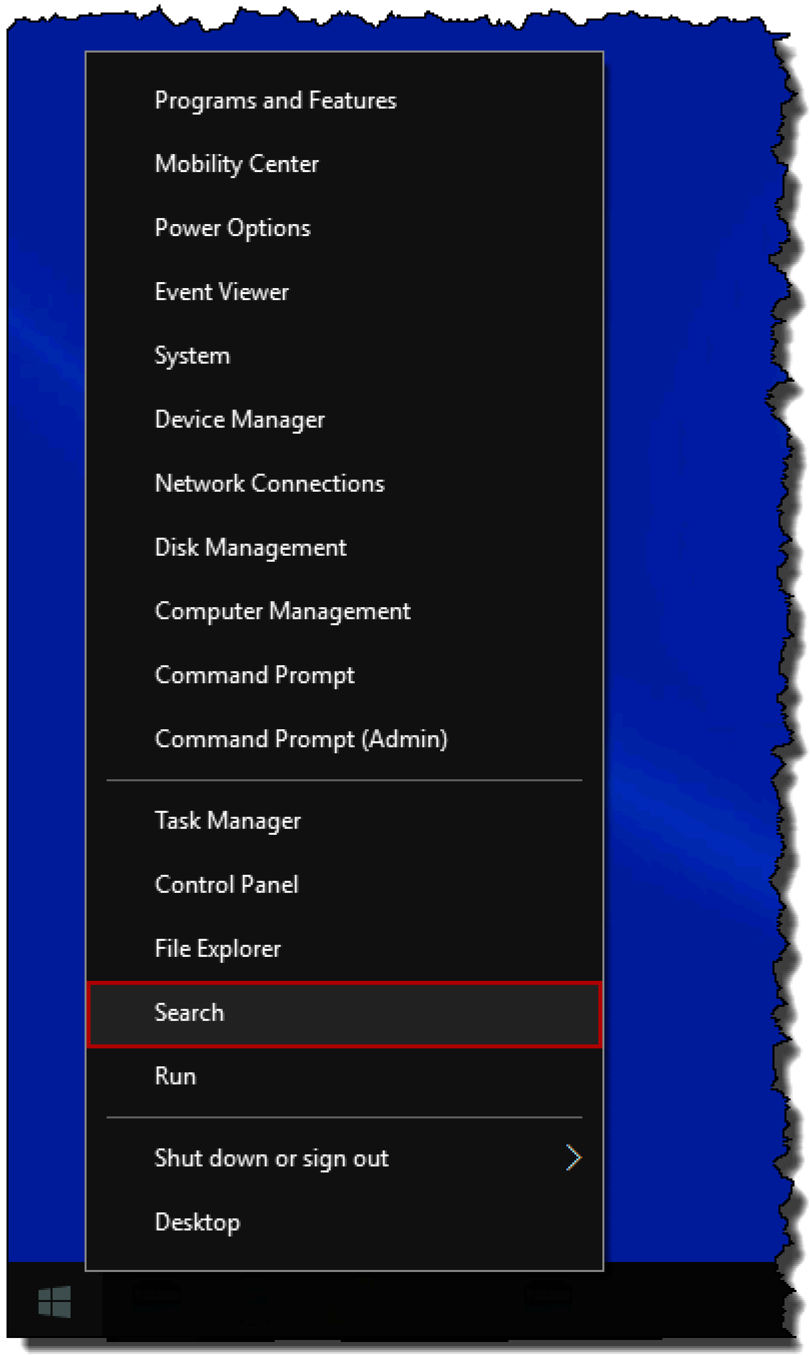


Figure 1-1. Pop-Up Menu

2. Type **UAC** into the Search field.

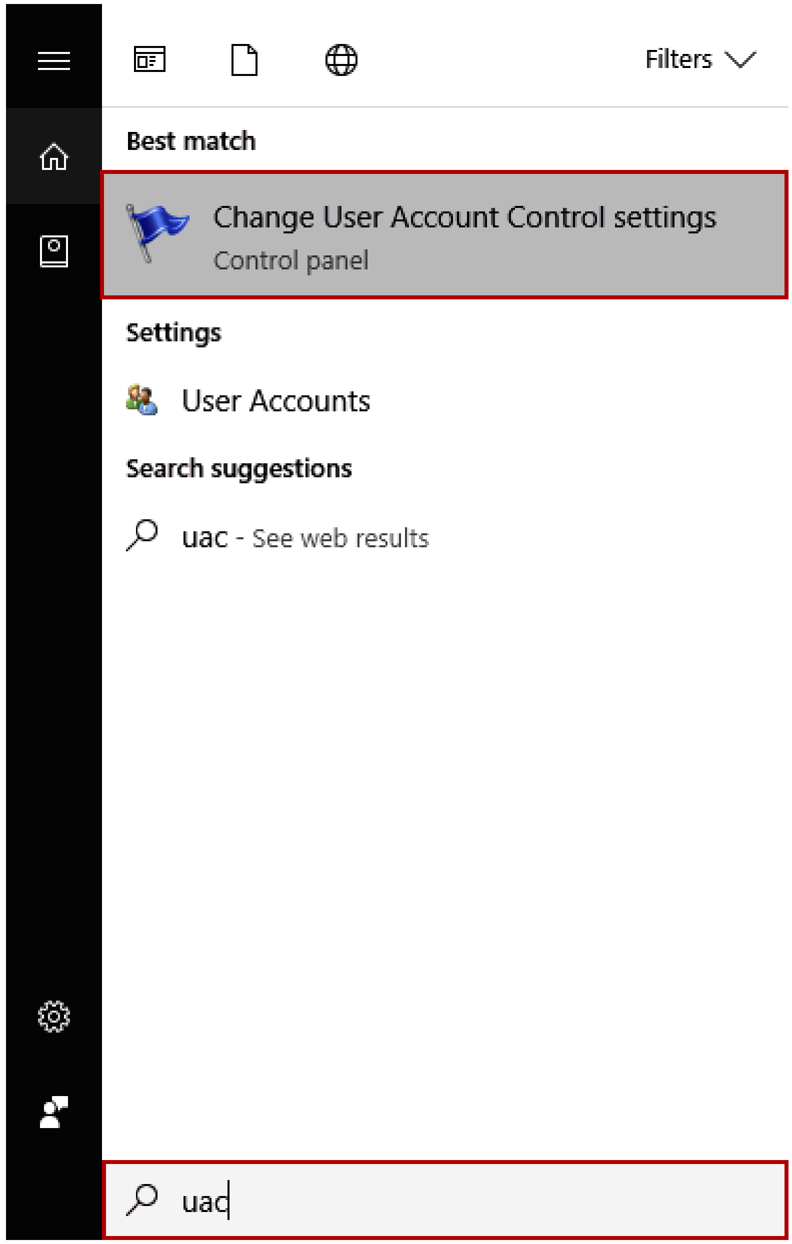


Figure 1-2. Search

3. Click **Change User Account Control settings** in the results list.
4. Move the User Account Control slider to **Never Notify**.

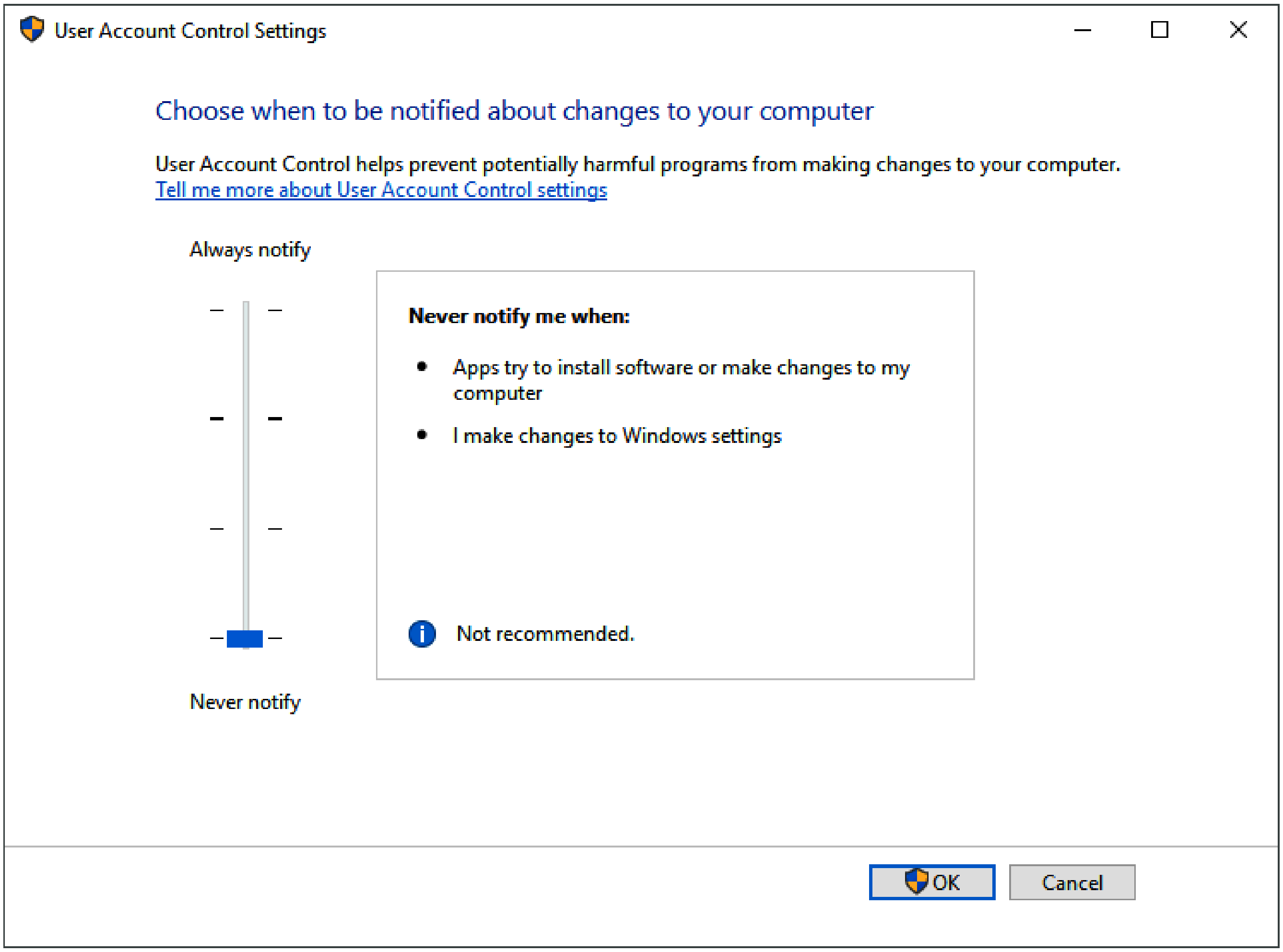


Figure 1-3. User Account Control Settings (Windows 10)

5. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter Administrator password if necessary) if Windows asks if you want to allow the changes.

6. **Reboot** the computer for your changes to take effect.
7. Start **ROCLINK 800**. Refer to *Starting ROCLINK 800 Software* (located in this chapter).

Disabling User Account Control (Windows 8)

Note: User Account Control must remain **disabled** in order to run ROCLINK 800.

To disable User Account Control:

1. Select **Search** and type **UAC** into the Search field.

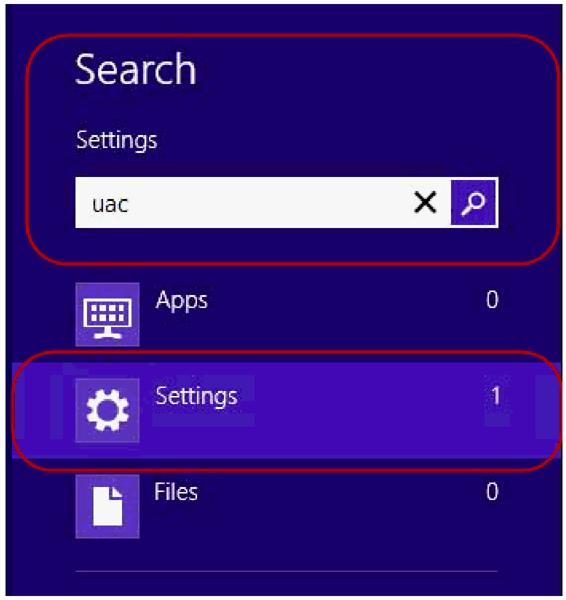


Figure 1-4. Search

2. Select **Settings** and click **Change User Account Control settings**.

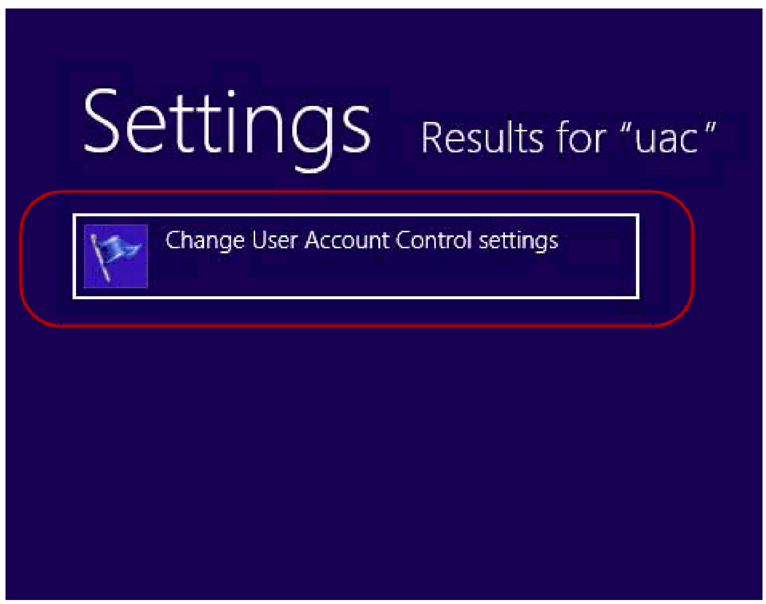


Figure 1-5. Settings- Results for "uac"

3. Move the User Account Control slider to **Never Notify**.

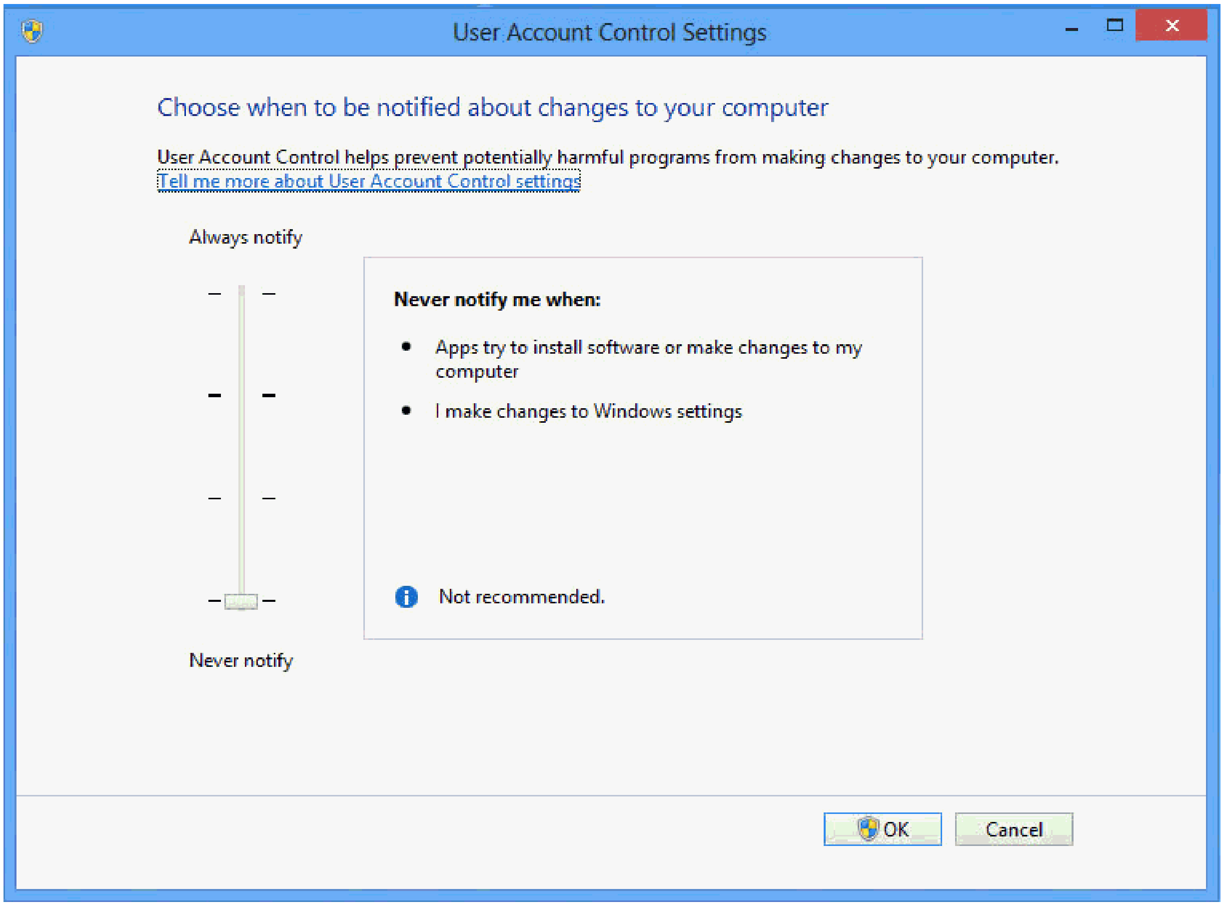
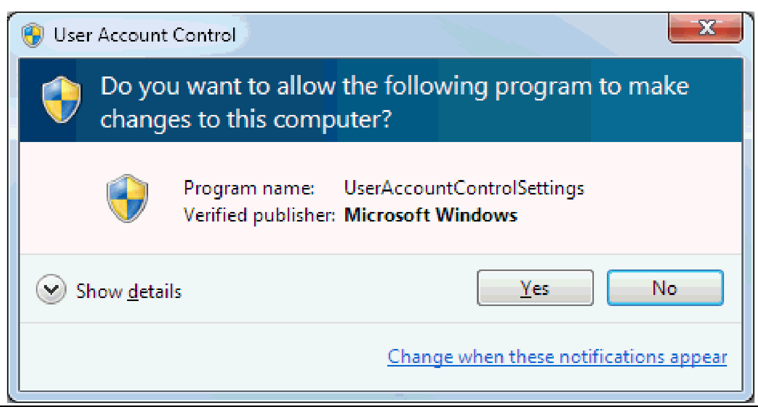


Figure 1-6. User Account Control Settings

4. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter Administrator password if necessary) if Windows asks if you want to allow the changes.



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5. Reboot the computer for your changes to take effect.
6. Start **ROCLINK 800.** Refer to *Starting ROCLINK 800 Software* (located in this chapter).

Disabling User Account Control (Windows 7)

Note: User Account Control must remain **disabled** in order to run ROCLINK 800.

To disable User Account Control:

1. Select **Start** and type **MSCONFIG** in the Search field.
2. Click the program file **msconfig.exe**. The System Configuration screen displays.

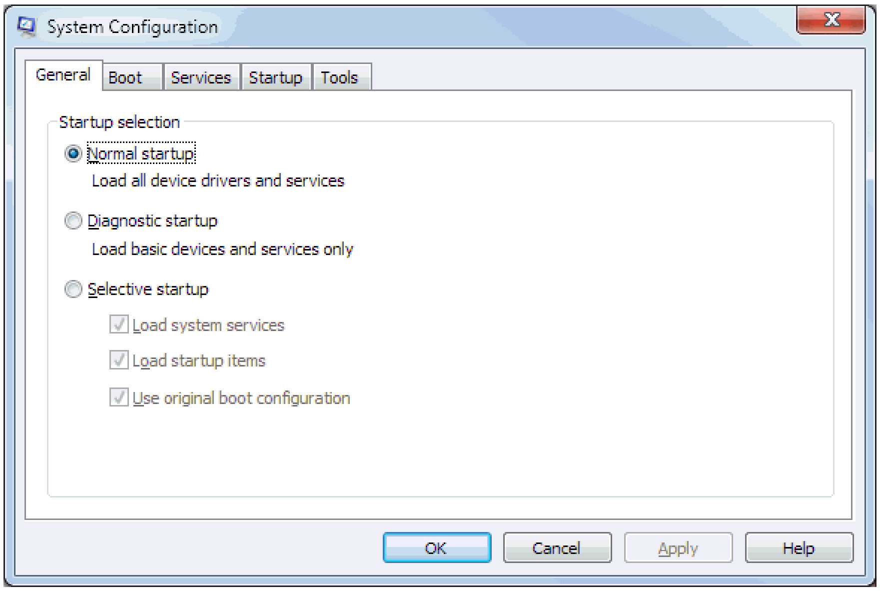


Figure 1-7. System Configuration

3. Click the **Tools** tab.

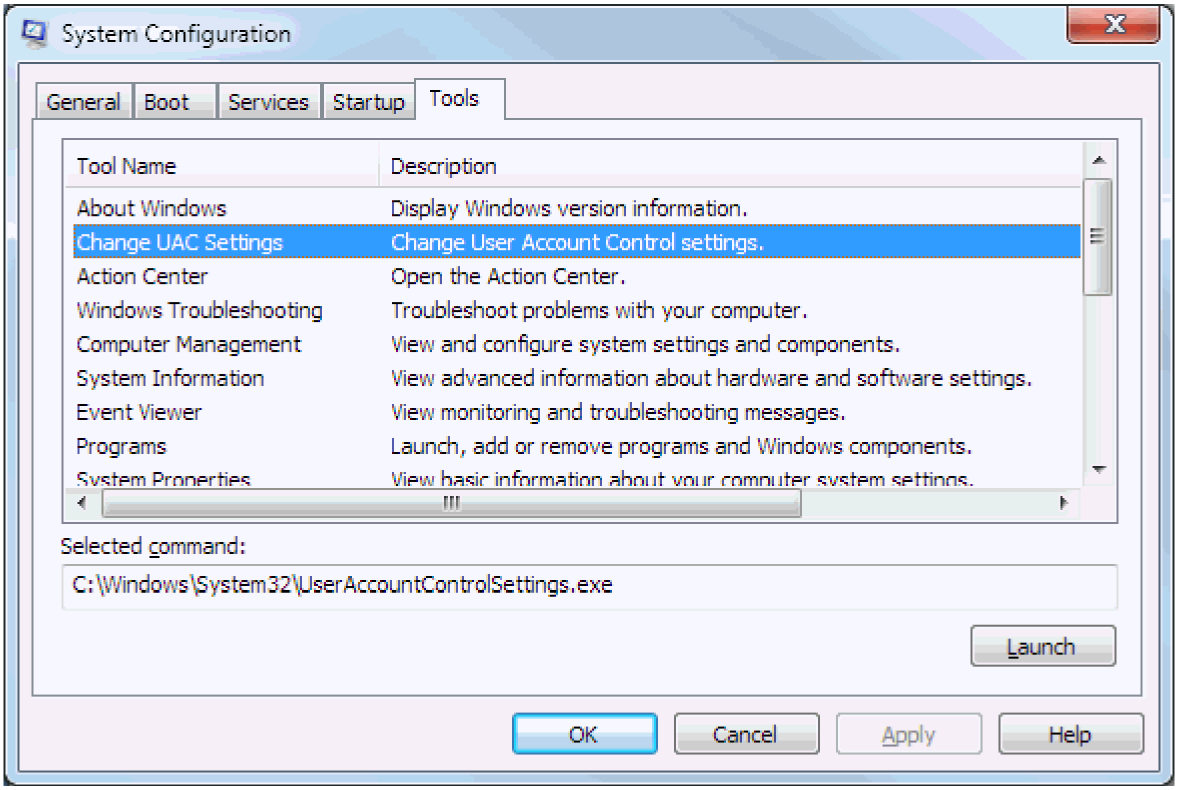


Figure 1-8. Change UAC Settings

4. Select **Change UAC Settings**.
5. Click **Launch**. The User Account Control Settings window displays.

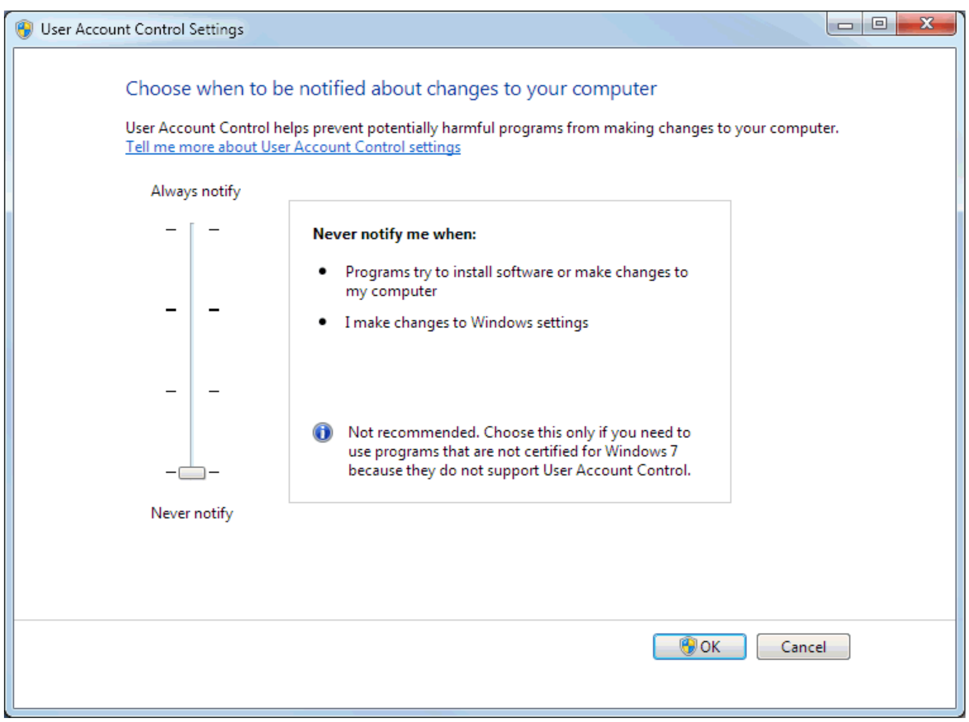
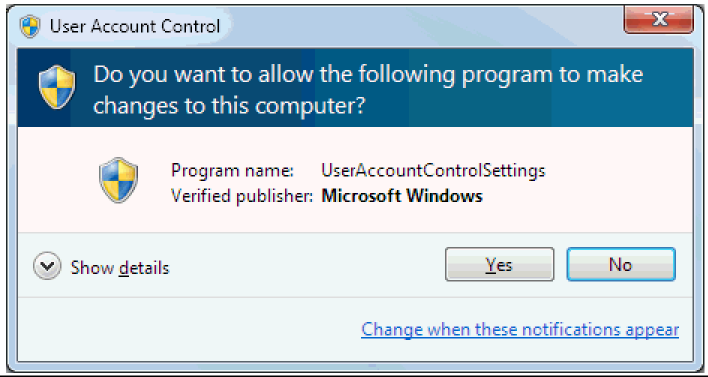


Figure 1-9. User Account Control Settings

6. Move the User Account Control slider to **Never Notify**.

7. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter the Administrator password if necessary) if Windows asks if you want to allow the changes.



8. Reboot the computer to apply the changes.
9. Start ROCLINK 800. Refer to *Starting ROCLINK 800 Software*.

Changing Region Settings (Windows 10)

To avoid potential error when opening configuration files, we recommend that you change your PC's location to United States.

To change your PC's location:

1. Right-click the Start menu and select **Search** from the pop-up menu.

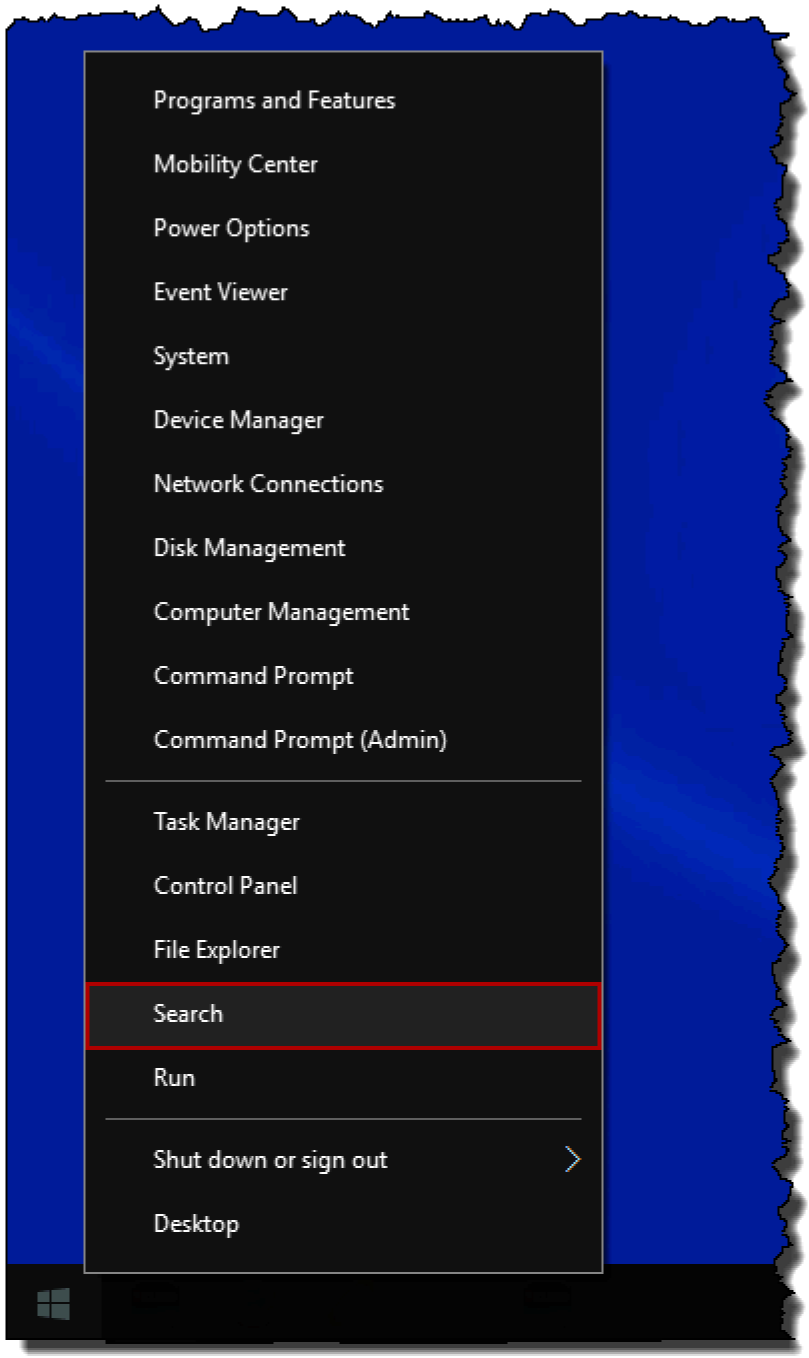


Figure 1-10. Pop-Up Menu

2. Type **region** into the search field.

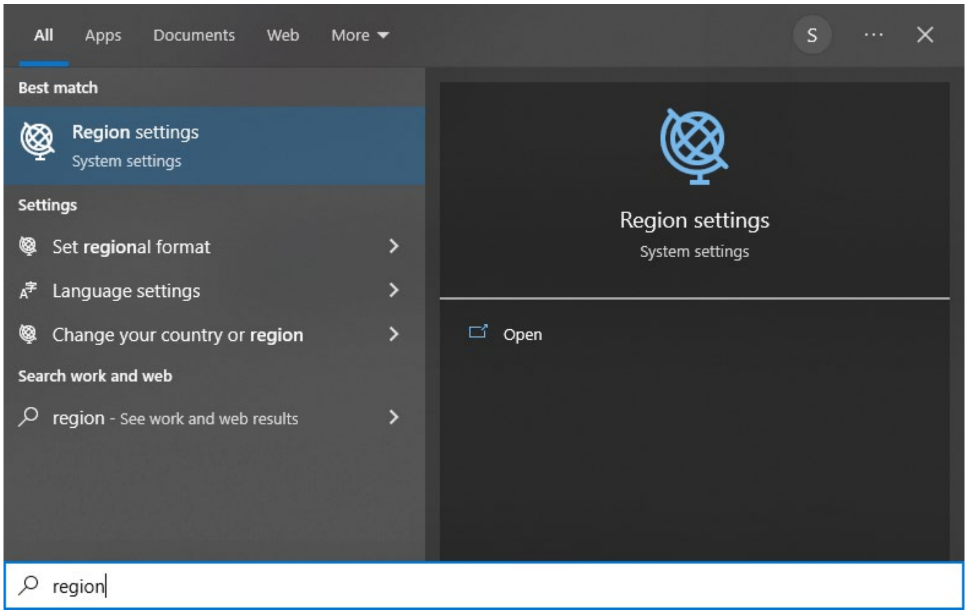


Figure 1-11. Search

3. Click **Region settings** in the results list.
4. Change or verify that the Regional format field is set to **English (United States)**.

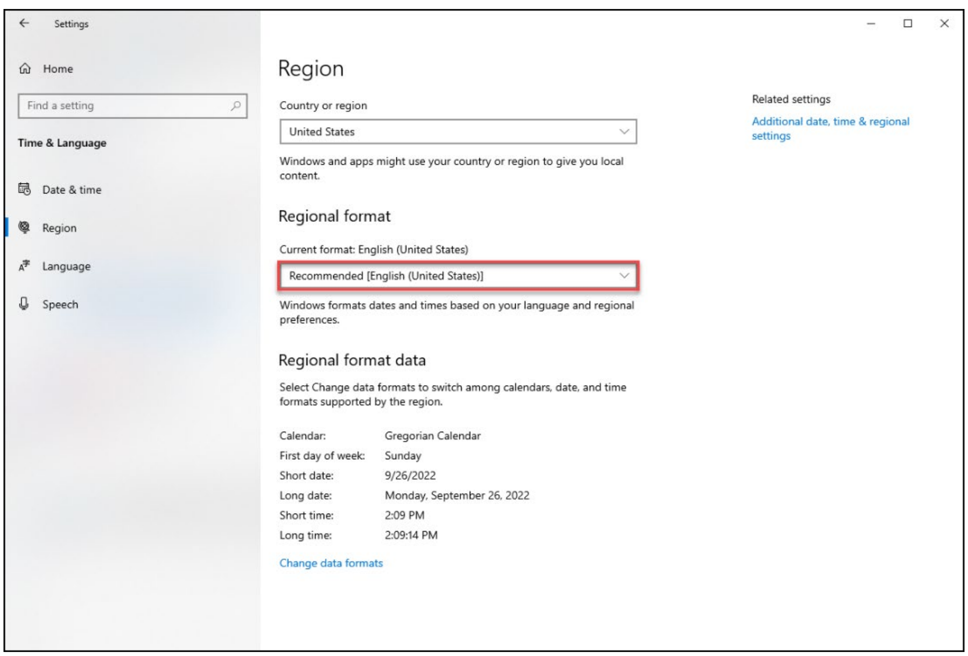


Figure 1-12. Regional Format

Changing Region Settings (Windows 8)

To avoid potential errors when opening configuration files, we recommend that you change your PC’s location to United States.

To change your PC’s location:

1. Select **Search** and type **region** into search field.

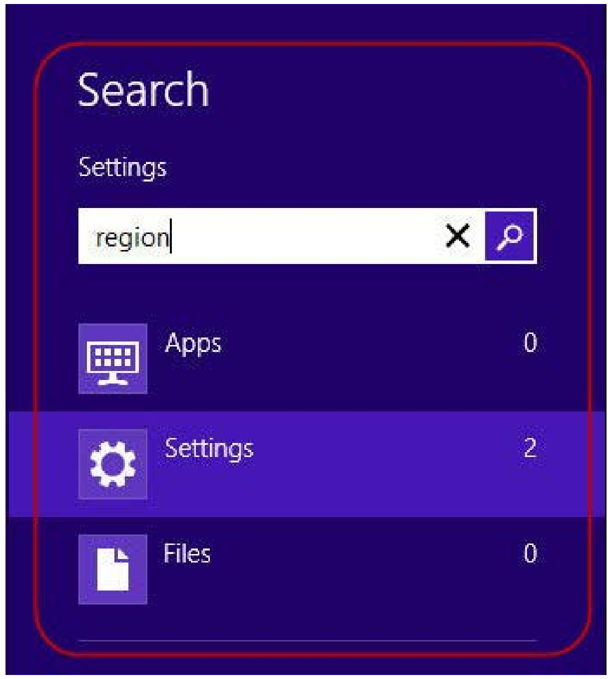


Figure 1-13. Search

2. Select **Settings** and click **Region** in the results list.

Figure 1-14. Search Results

3. Change or verify that the current location is set to **United States**.

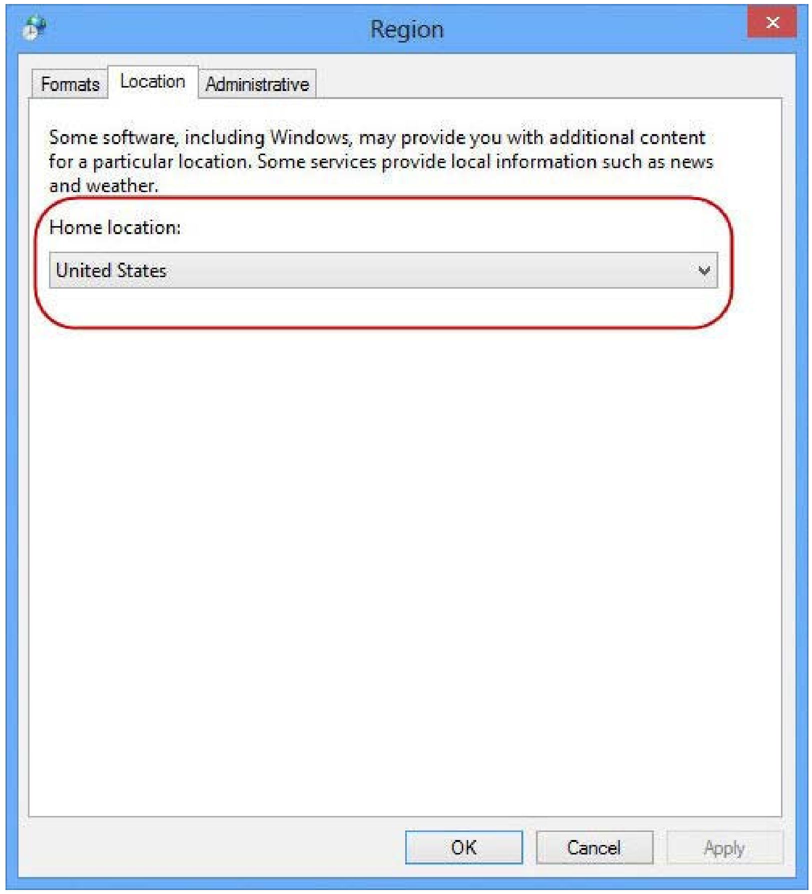


Figure 1-15. Home Location

4. Click **OK** to save changes and close the Region window.

Changing Region Settings (Windows 7)

To avoid potential errors when opening configuration files, we recommend that you change your PC's location to United States.

To change your PC's location:

1. Select **Start > Control Panel.** The Control Panel displays:

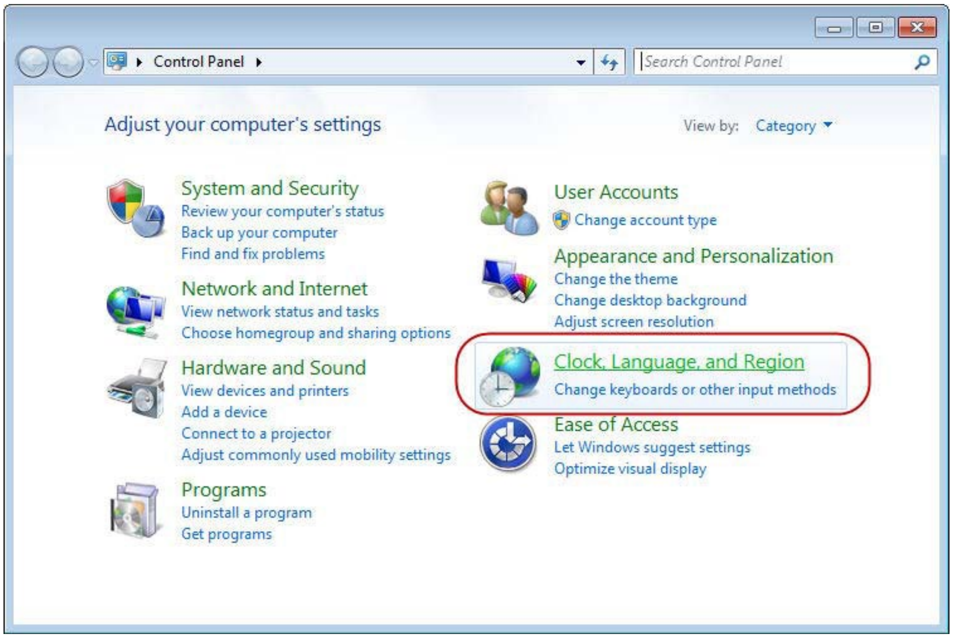


Figure 1-16. Control Panel

2. Select **Clock, Language, and Region**. The Clock, Language, and Region screen displays:

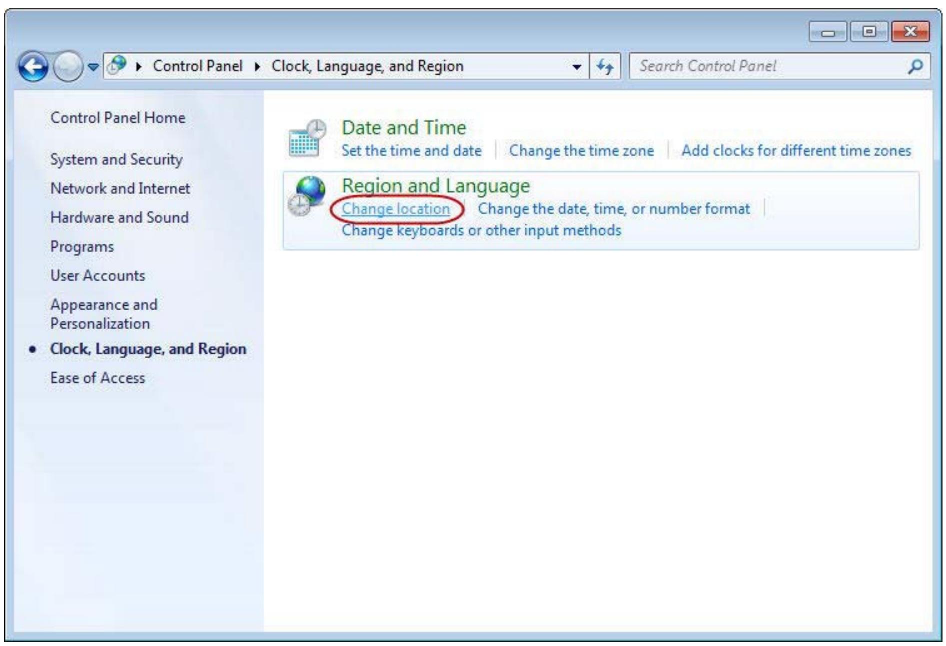


Figure 1-17. Clock, Language, and Region

3. Click **Change location**. The Region and Language screen displays showing the Location tab.

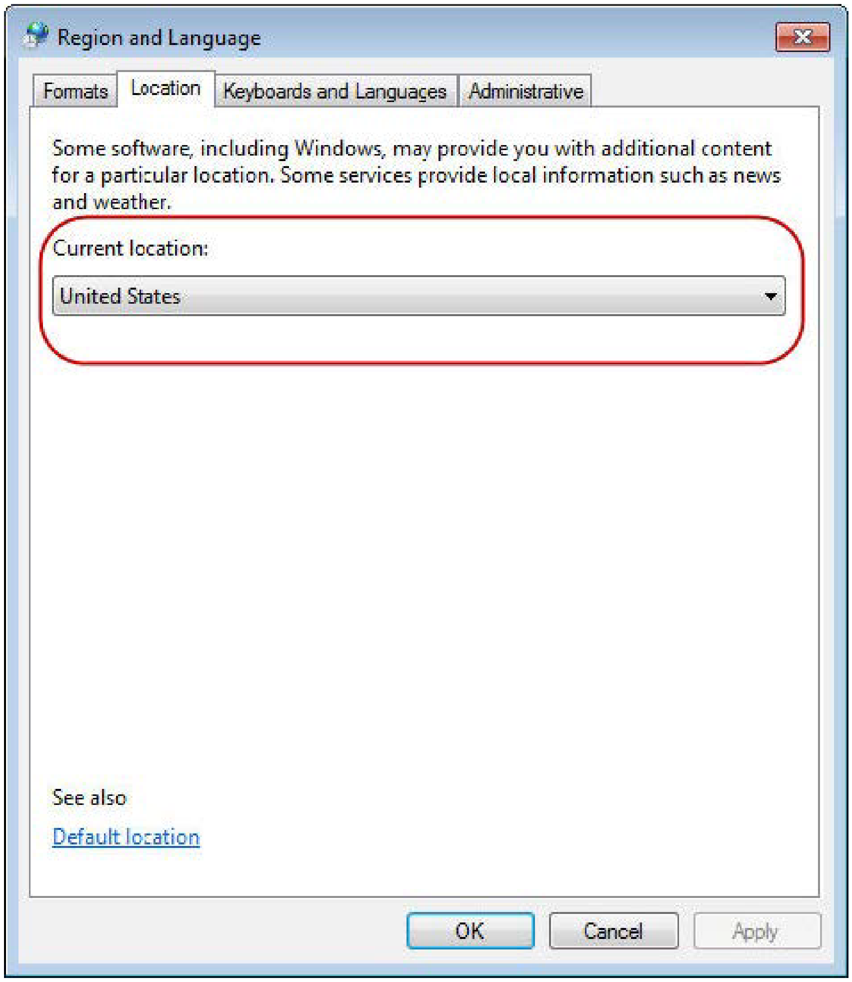


Figure 1-18. Region and Language

4. Change or verify that the current location is set to **United States.**
5. Click **OK** to save your changes and close the Region and Language window.

Enabling User Account Control (Windows 10)

Note: User Account Control must remain disabled in order to run ROCLINK800.

To enable User Account Control:

1. Right-click the Start menu and select **Search** and from the pop-menu.

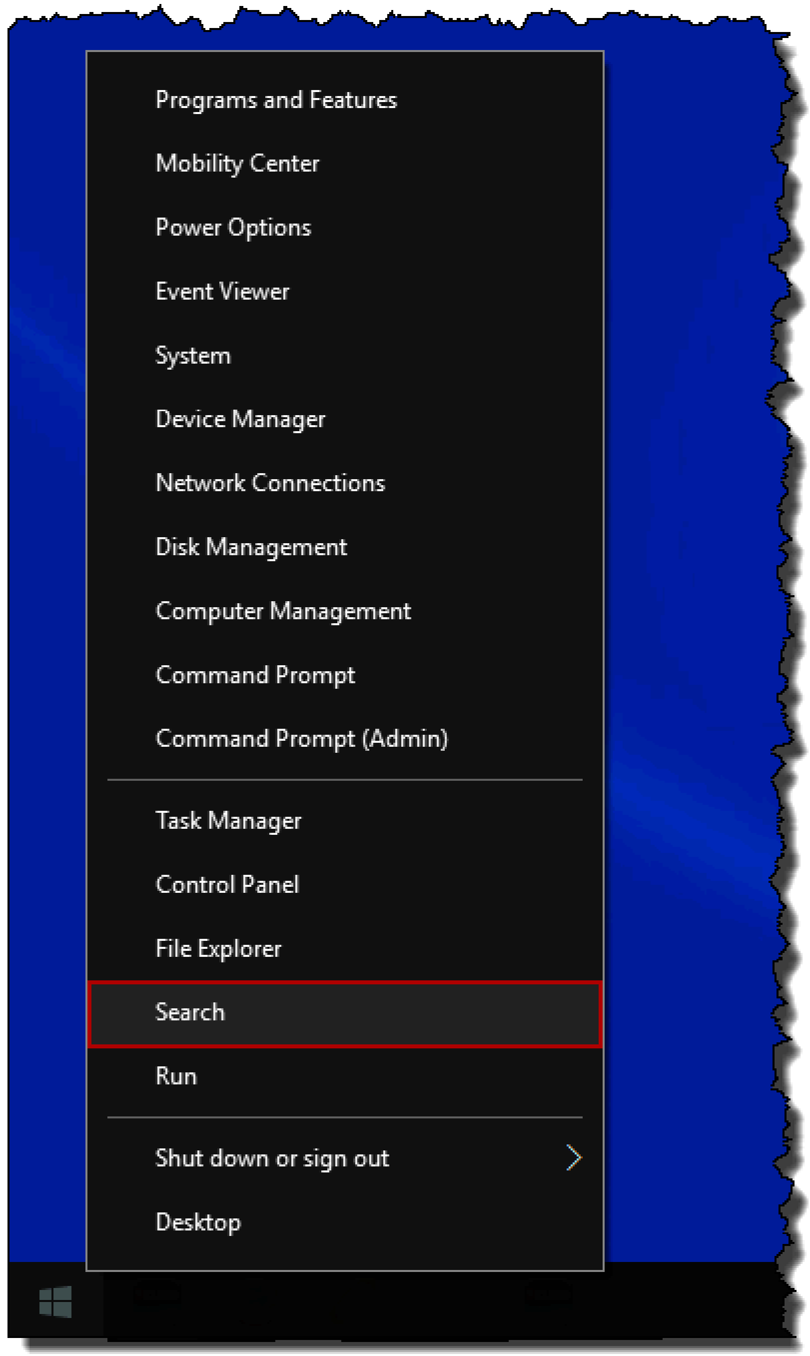


Figure 1-19. Pop-Up Menu

2. Type **UAC** into the search field.

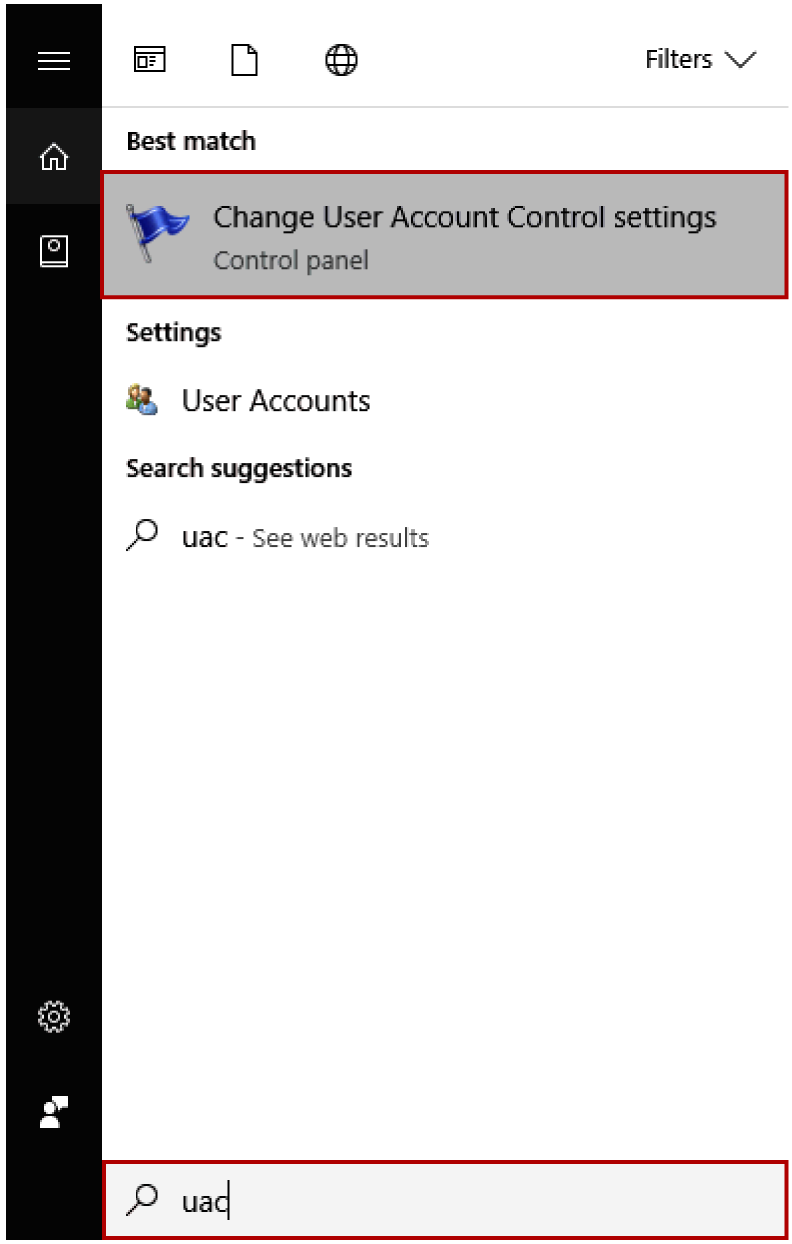


Figure 1-20. Search

3. Click **Change User Account Control settings** in the results list.
4. Move the User Account Control slider to the **default** position.

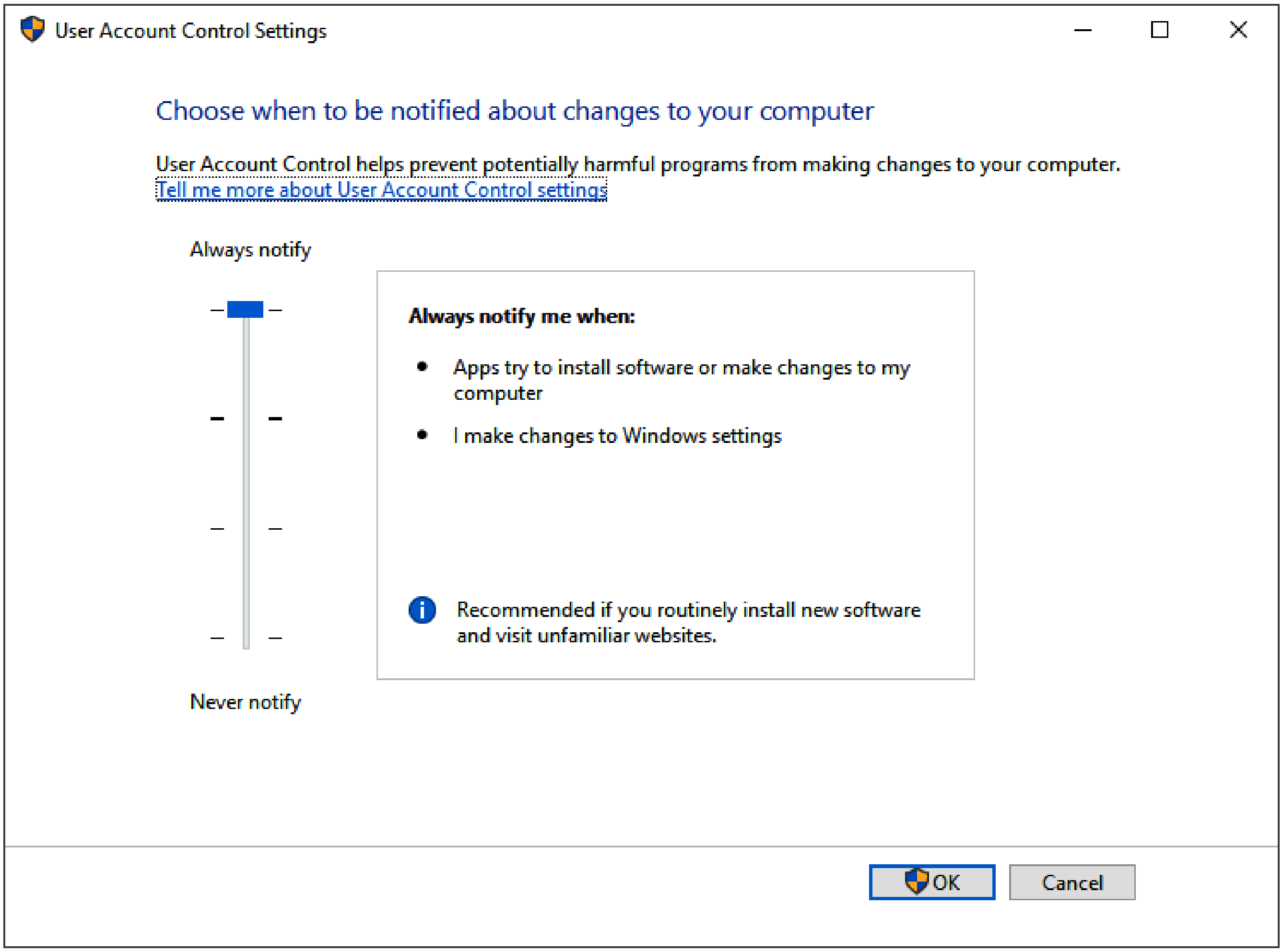


Figure 1-21. User Account Control Settings

5. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter Administrator password if necessary) if Windows asks if you want to allow the changes.

6. **Reboot** the computer for your changes to take effect.
7. Start **ROCLINK 800**. Refer to *Starting ROCLINK 800 Software* (located in this chapter).

Enabling User Account Control (Windows 8)

Note: User Account Control must remain disabled in order to run ROCLINK800.

To disable User Account Control:

1. Select **Search** and type **UAC** into the search field.

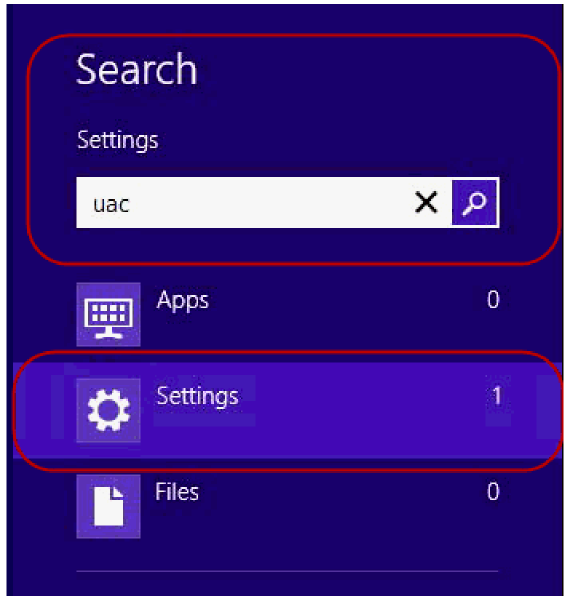


Figure 1-22. Search

2. Select **Settings** and click **Change User Account Control settings.**

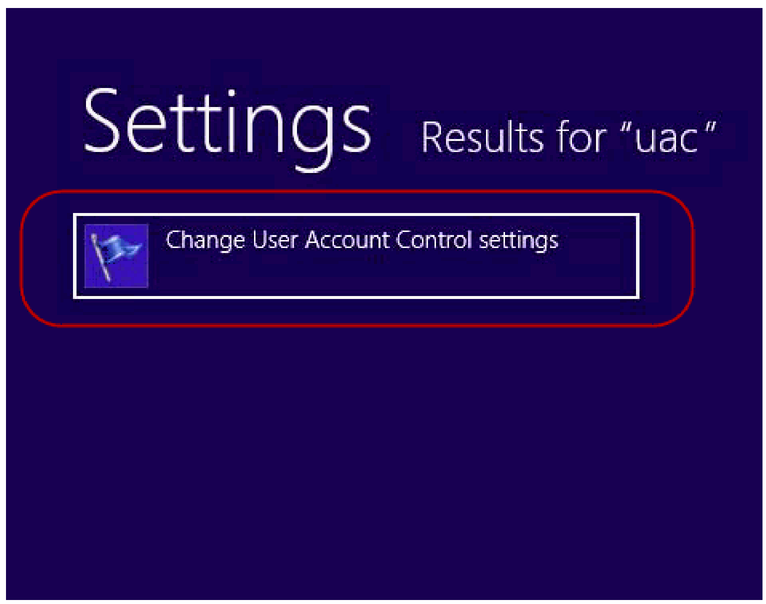


Figure 1-23. Setting, Results for "uac"

3. Move the User Account Control slider to the **default** position.

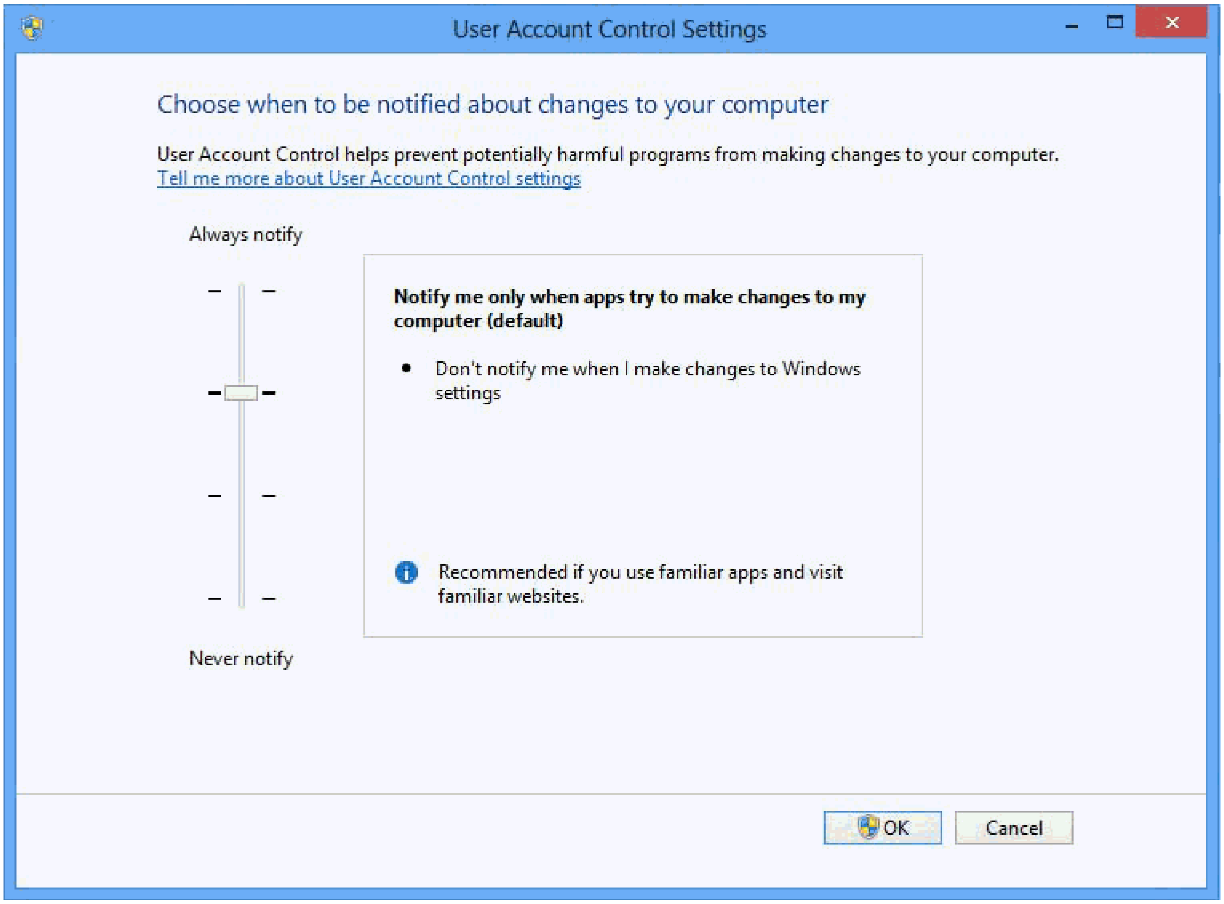
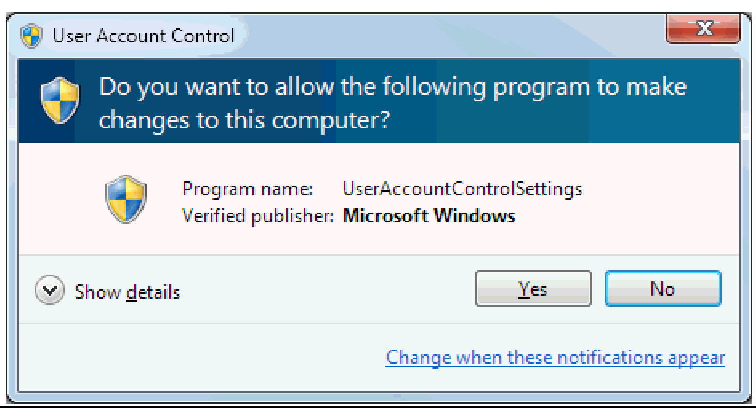


Figure 1-24. User Account Control Settings

4. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter the Administrator password if necessary) if Windows asks if you want to allow the changes.



5. **Reboot** the computer for your changes to take effect.

6. Start **ROCLINK 800**. Refer to *Starting ROCLINK 800 Software* (located in this chapter).

Enabling User Account Control (Windows 7)

Note: User Account Control must remain **disabled** in order to run ROCLINK 800.

To enable User Account Control:

1. Select **Start** and type **MSCONFIG** in the Search field.
2. Click the program **msconfig.exe**. The System Configuration screen displays:

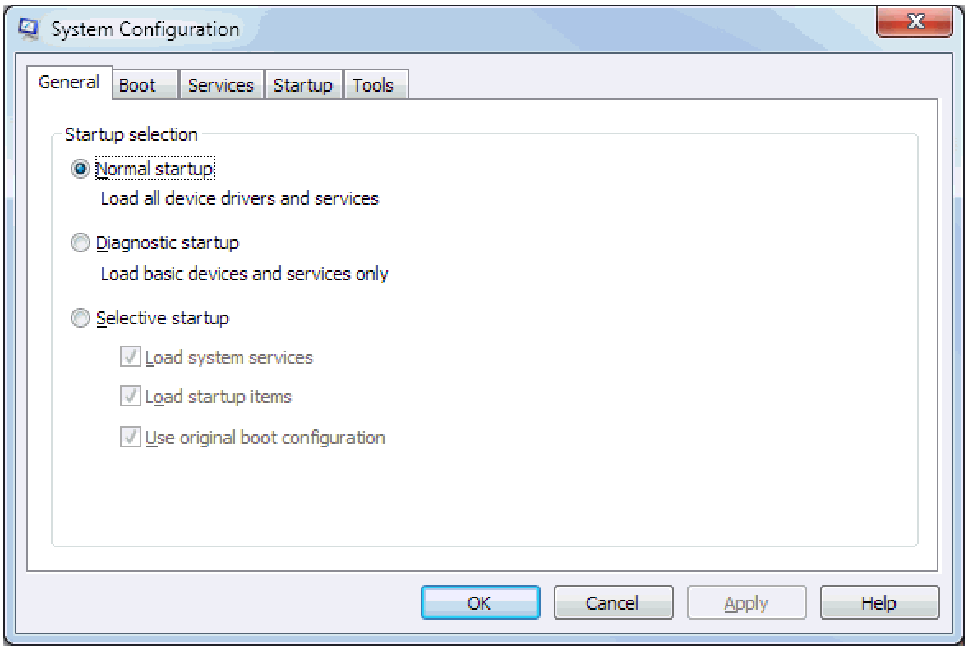


Figure 1-25. System Configuration

3. Click the **Tools** tabs.

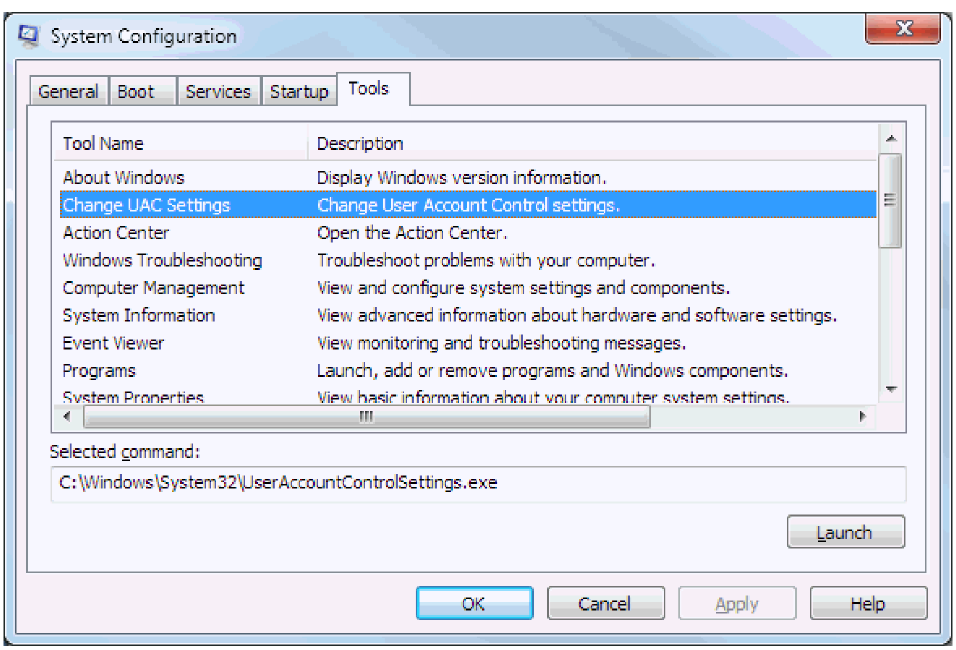


Figure 1-26. Change UAC Settings

4. Select **Change UAC Settings**.
5. Click **Launch**. The User Account Control Settings screen displays.

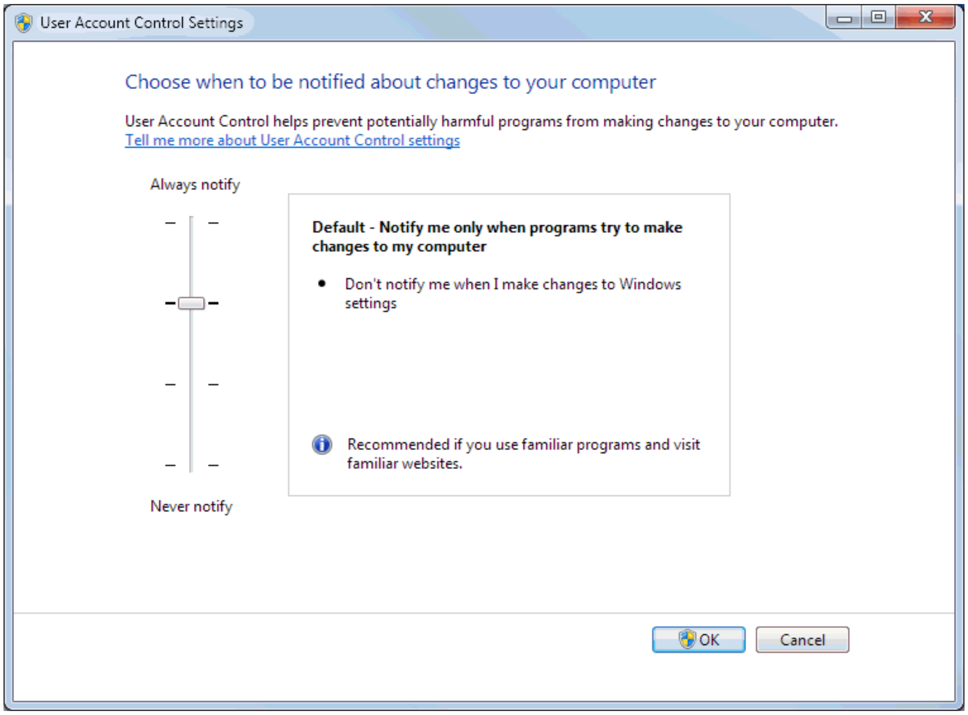
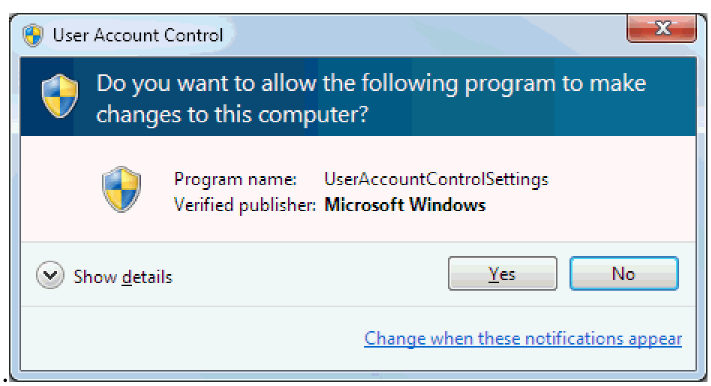


Figure 1-27. User Account Control Settings

6. Move the User Account Control slider to the default position.
7. Click **OK** to save your changes and close the User Account Control Settings window.

Note: You must have Administrator rights to make this change. Click **Yes** (and enter the Administrator password if necessary) if Windows asks if you want to allow the changes.



8. Reboot the computer to apply your changes.
9. Start ROCLINK 800. Refer to Starting ROCLINK 800 Software.

1.4.2 Un-installing ROCLINK 800

To remove ROCLINK 800 from your PC:

1. Click the Windows **Start** button.
2. Select **Settings** > **Control Panel**.
3. Double-click the **Add/Remove Programs** icon.
4. Select **ROCLINK 800**.
5. Click **Add/Remove**.
6. Follow the instructions.

1.5 Starting ROCLINK 800 Software

To use ROCLINK 800 to configure a hardware device, you must have the ROC properly connected to power. Refer to the appropriate hardware instruction manual. You must also connect the PC to the device's Local Operator Interface (LOI), Ethernet, serial, or modem port.

To run ROCLINK 800, perform one of the following:

- Double-click the Desktop Shortcut.
- Select **Start** > **Programs** > **ROCLINK 800** > **ROCLINK 800**.

The software loads and initializes.

Note: You can only run **one** version of ROCLINK 800 at a time.

1.5.1 Logging On

To log on to ROCLINK 800:

1. **Connect** the ROC to the Local Operator Interface (LOI – Local Port) and launch ROCLINK 800.

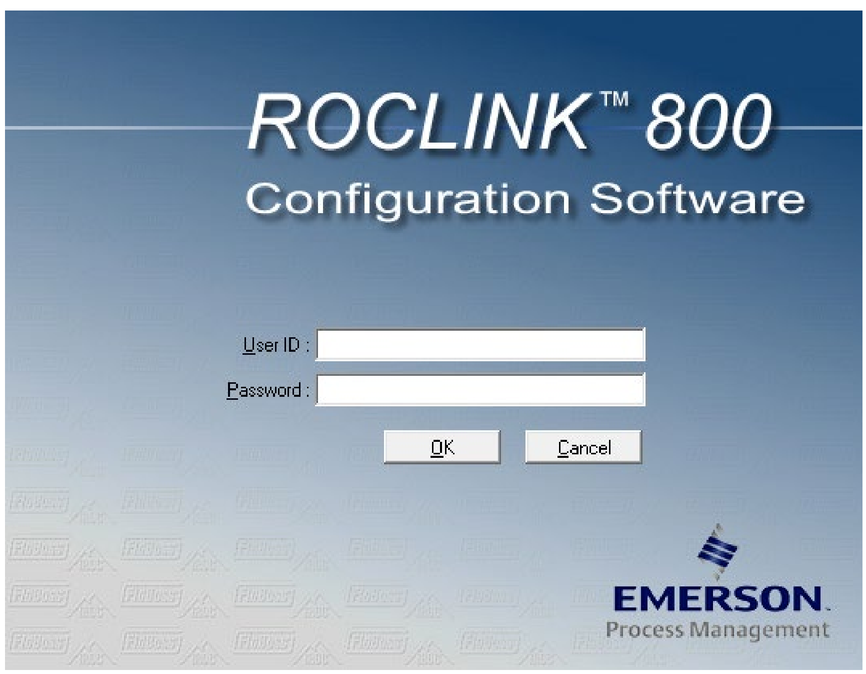


Figure 1-28. Logon

2. Type your assigned **User ID**. If User IDs have not yet been assigned, try using the default User ID of **LOI**. You assign User IDs using the **ROC > Security** features of ROCLINK 800.

Note: The requirements for the **User ID** field differ based on if you have selected **Enable Enhanced Security Features** (**ROC > Security**). For more information, refer to *Section 3.7.3 Enhanced Security*.

3. Type your assigned **Password** and click **OK**.

For added security, the software displays an asterisk for each number that you type. If passwords have not yet been assigned, use the default password of **1000** (valid with default User ID of **LOI**).

Note: The requirements for the **Password** field differ based on if you have selected **Enable Enhanced Security Features** (**ROC > Security**). For more information, refer to *Section 3.7.3 Enhanced Security*.

ROCLINK 800 validates the User ID and Password you enter against a predefined list.

If the log on is **not** valid, a dialog box appears. Click **OK** and re-enter the User ID and Password. You can repeat the procedure as many times as needed until you successfully enter a valid User ID and Password. If the log on is valid, ROCLINK 800 displays the Device Directory screen.

To exit from the log on screen, press **Esc** or click **Cancel**. This closes ROCLINK 800 and returns you to the point where you started ROCLINK 800.

1.6 User Interface Basics

You interact with ROCLINK 800 using various displays on the computer monitor, keyboard, and pointing device.

The major components of ROCLINK 800 user interface are:

- Graphical interface.
- Menu bar and menus.
- Toolbar.
- Function screens.
- Dialog boxes.
- Help system, including the Status bar and message boxes.
- Device Directory or Configuration Tree menu.

ROCLINK 800 employs a graphical user interface (GUI) with a standard Windows menu structure. After logging on to ROCLINK 800, available functions display in a menu bar with drop-down menus:

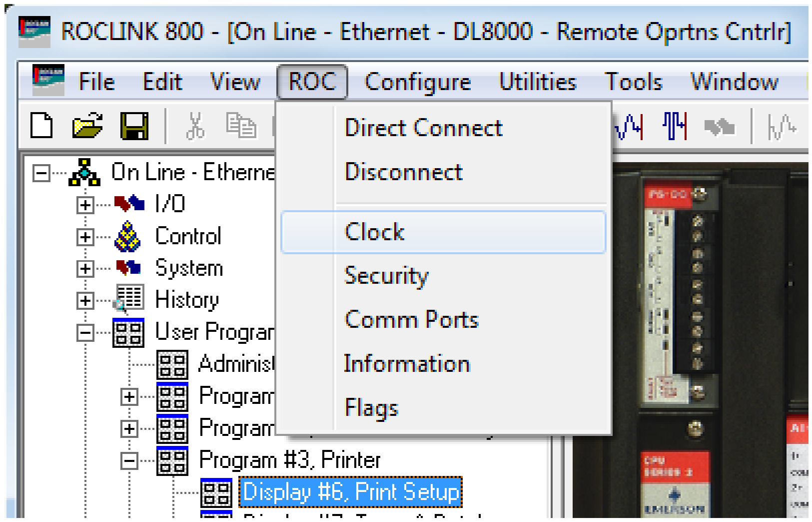


Figure 1-29. ROCLINK 800 Menu

A **Status Line** at the bottom left of the display contains pertinent information about the highlighted item, such as a menu option or a parameter.

Buttons display dialog boxes for further configuration details or perform a desired action, such as the **Update** button. To activate the button:

1. Click the button with a left click of the mouse.
2. When a button is active, press **Enter** or a function key.

Dialog boxes are areas that "pop up" inside the current screen to allow further selections or enter values. Dialog boxes also provide messages or more detailed information.

The menu structure lists choices from which you can set the desired function. Once a function is selected, the screen or dialog box for that function displays. This screen or dialog box provides the requested information and lets you enter the applicable configuration data.

Table 1-1. Menu Listing for ROCLINK 800 (DL8000)

Menu	Options
File	New, Open, Download, Close, Save Configuration, Print Configuration, Print, Print Setup, [List of recent files], Exit
View	Directory, EFM Report, Calibration Report, History, Alarms, Events, Weights & Measure Events, Display, I/O Monitor, Toolbar, Refresh User Program Tree
ROC	Direct Connect, Connect, Disconnect, Collect Data, Clock, Security, Comm Ports, Information, Flags **Note**: The Direct Connect menu option is the default; it directs ROCLINK 800 to connect with any available valid connection. The Connect menu option becomes available when you select a connection option (COM1, COM2, Ethernet, and such.) from the Device Root. By clicking Connect, you tell ROCLINK 800 to use that specific communications connection.

Menu	Options
Configure	I/O, Control, History Segments, History Points, Opcode Table, MODBUS
Utilities	Update Firmware, License Key Administrator, Convert EFM File, User Program Administrator, ROCLINK 800 Security, AI Calibration Values, RTD Calibration Values, MVS Calibration Values, FST Editor, Custom Display Editor, Custom EFM Report Editor, Read File From Device, Communications Monitor
User Programs	(Located under the Configuration Tree) LiquidCalcs, Transaction History, Printer, Additives, Batching, Keypad Display
Tools	Options
Window	Cascade, Tile, Device Directory, [List of open windows]
Help	Help Topics, About ROCLINK 800

1.6.1 Device Dynamic Interface

You can navigate the device options either by using the ROCLINK menu structure or by clicking on the ROC graphical dynamic interface and selecting a tab or button. The dynamic interface display shows the current settings of the point including alarms and integrity.

The system displays a white line around objects that are links when you hover your cursor over them. A link descriptor displays indicating the links definition.

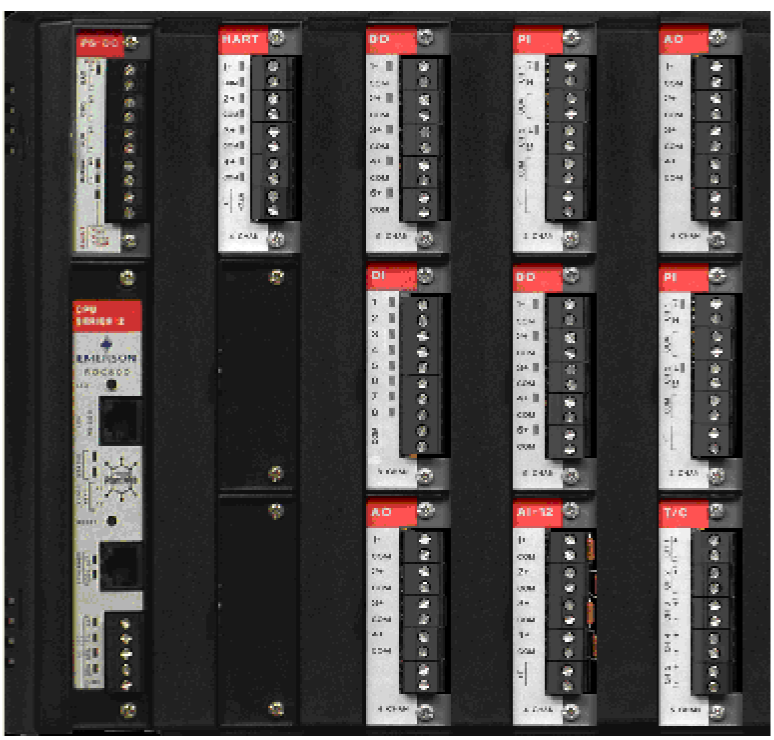
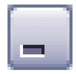
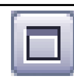
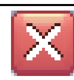


Figure 1-30. Device User Interface

1.6.2 Standard Buttons

Several buttons appear on the majority of ROCLINK 800 screens.

Button	Description
	Minimizes and hides windows.
	Maximizes the size of the windows to fit in the screen area.
	Restores window to original size.
	Closes a window.
+	Expands options listed in the Device Directory or Configuration Tree Menu.
–	Hides options listed in the Device Directory or Configuration Tree Menu.
	Prints the active display.
...	Click to Browse for a selection.
Update	Updates contents of the active window from the device.
Copy	Copies the contents of window to Clipboard.
Paste	Pastes the contents of the Clipboard to the active window.
OK	Applies changes on the active window to the device and close the active window. A Confirm Save dialog box appears if there are unsaved changes.
Cancel	Cancels without saving changes and closes the active window.
Apply	Applies changes on the active window to the device. Clicking **Apply** does not close the active window.
Save	Saves the contents of the active window to the configuration file.
Close	Closes the active window. A Confirm Save dialog box appears if there are unsaved changes.
Delete	Deletes the current selection.
Auto Scan	Starts automatic device polling.
Stop Scan	Stops automatic device polling.

1.6.3 Toolbar Buttons

The following buttons appear in the ROCLINK 800 toolbar.

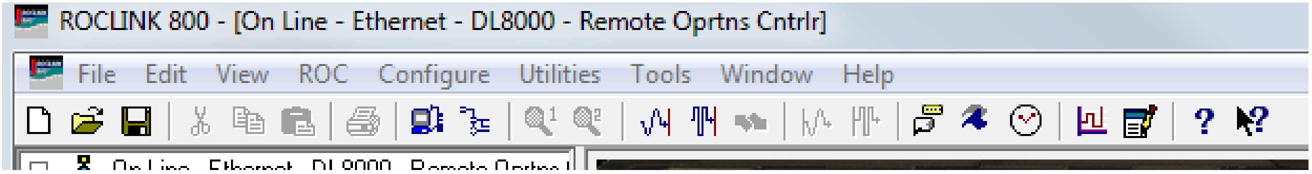
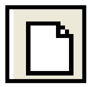
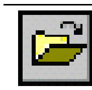
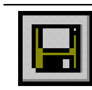
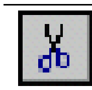
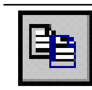
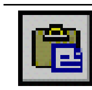
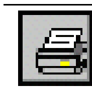
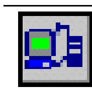
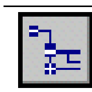
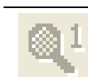
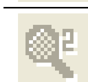
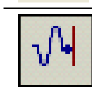
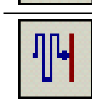
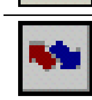
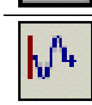
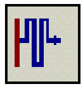
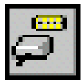
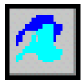
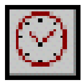
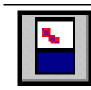
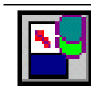
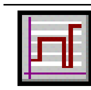
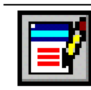
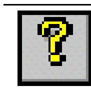
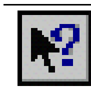


Figure 1-31. ROCLINK 800 Toolbar

ROCLINK 800 grays out a button if it is not applicable to the current screen.

Button	Description
	Creates a new configuration file. You specify available configuration parameters using menu selections. Configure the file as if you were connected to the device. Functions requiring a live connection are unavailable in this mode.
	Opens an existing configuration file. You create configuration files using the New Device or Save Configuration functions.
	Saves the current configuration of the connected device to a disk file.
	Deletes currently selected text and place it in the Clipboard. **Note**: Currently not available.
	Copies currently selected text and places it in the Clipboard. **Note**: Currently not available.
	Pastes text currently in the Clipboard at the cursor's current location. **Note**: Currently not available.
	Prints the configuration file. **Note**: Currently not available.
	Connects to a device locally using the (LOI) Local Operator Interface port.
	Disconnects from a device.
	Displays the first of two .DSP files loaded on the device. **Note**: Not currently functional on the DL8000 platform.
	Displays the second of two .DSP files loaded on the device. **Note**: Not currently functional on the DL8000 platform.
	Displays the Analog Input (AI) screen.
	Displays the Discrete Input (DI) screen.
	Displays the Pulse Input (PI) screen.
	Displays the Analog Output (AO) screen.

Button	Description
	Displays the Discrete Output (DO) screen.
	Displays the Comm Port screen.
	Displays the Flags screen.
	Displays the Clock screen.
	Displays the Meter Setup screen.
	Displays the Plate Change screen.
	Displays the PID Loop screen.
	Opens the Function Sequence Table (FST) Editor.
	Displays an About ROCLINK 800 screen providing program information, version, creation date, and copyright for ROCLINK 800.
	Launches the ROCLINK 800 on-line help system.

1.6.4 Configuration Tree Menu

When you open a configuration file or go on-line with a ROC, the Configuration Tree appears on the left-hand side of the screen. The tree hierarchically displays the parts of a configuration (such as I/O, Meter Runs, and History) that you can change.

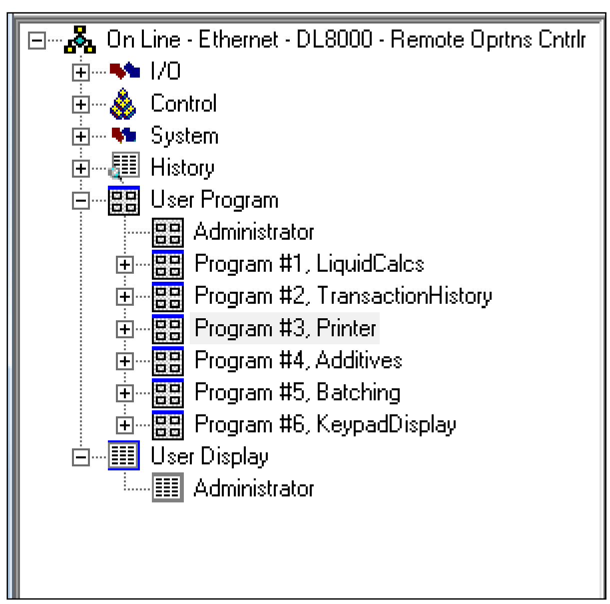


Figure 1-32. Configuration Tree Menu

From the Configuration Tree, you may change the configuration or monitor current operations. Once you are in the Configuration Tree menu, you can use the + and – symbols to display or hide various options.

Double-click the desired function in the Configuration Tree to display the associated screen. Double-clicking an icon is the same as selecting the option in the menu bar or clicking a Toolbar button.

If this is the first time that you have connected to the ROC, refer to *Setting the Clock.*

1.6.5 Keystrokes

If you are using the keyboard, you may use the **Alt** key plus one or more letters to access menus. Windows underlines the appropriate letter in the menus. For example, to access the Open File dialog box, press **Alt + F** and press **O**. You may also use the Left Arrow (←) and Right Arrow (→) keys to highlight a menu bar item (the help Status Line at the bottom of the screen provides a description of the menu) and press the letter.

With a menu displayed, you can highlight the desired item by using the Down Arrow (↓) and Up Arrow (↑) keys or the mouse. Once you have highlighted an item, press **Enter** to activate the function.

To leave a menu or submenu, press **Esc**. You can then select another menu. You can also access another menu using ← and →.

The text scrolling keys are **Page Up** and **Page Down**.

To use the keyboard in configuration screens and dialog boxes, press **Tab** to move in a predetermined sequence from one parameter field or button to the next. The selected field or button becomes highlighted. Fields unavailable for changes are automatically skipped.

When you **Tab** to the last field or button in the screen or dialog box, pressing **Tab** again jumps back to the first field or button. To go back to a previous field or button, press **Shift + Tab**.

In an option field, the currently selected option is highlighted. To select one of the other options, use ↑ or ↓ to highlight the desired option and then press **Enter**.

In a field that requires a text or numerical entry, type in the required characters or numbers from the keyboard. Use **Backspace** or **Delete** to erase unwanted characters. Use ← and → to move the cursor one character at a time and **Home** and **End** to place the cursor at the beginning and end of the field, respectively.

Other keys or key combinations include:

- **F1** – Launches ROCLINK 800 on-line help.
- **Esc** – Cancels the current activity, closes the screen, and returns you to the last-used place in the menu structure, screen, or other place from which the dialog box originated. If a menu is active, **Esc** closes

the last-opened menu, taking you up one level in the menu structure. If the menu bar is active, **Esc** de-selects all menu options. Press **Alt** or click with the mouse to reactivate the menu bar.

- **Ctrl** + **N** – Creates a new configuration file.
- **Ctrl** + **O** – Opens a configuration file.
- **Ctrl** + **S** – Saves the current configuration file.

1.6.6 Help System

The Help menu provides detailed on-screen information about getting started with ROCLINK 800 and performing keyboard operations, a list of the Help topics, and the ROCLINK 800 version.

To display context sensitive help on a field, a parameter, or a button, press **F1** while the field, parameter, or button is highlighted. A help window appears on the screen.

To view detailed help, select **Help** > **Help Topics** from the menu bar.

Table 1-2. Help System

Option	Description
Contents	Presents a list of Help Topics that display based on task-oriented situations. Each screen, tab, and field has a help topic associated with it. For example: the MODBUS Scale Values tab is located under **Modbus > Modbus Configuration > Scale Values** tab.
Index	Locates specific Help Topics. The Index lists each field by the tab or screen in which the field appears.
Search	Activates a search function on a specific word.
Back	Returns to the last topic that you viewed.
Print	Sends the currently displayed topic to the PC's default printer.
See Also	Displays topics related to the currently selected topic.
<< / >>	Navigates forward (**>>**) or backwards (**<<**) through the help system on a per topic basis. The Browse Sequence follows the order of the topics as displayed in the Contents tab.

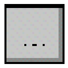
1.6.7 Basic Navigation

When you start the ROCLINK 800, the Device Directory displays. After you connect to a ROC, the Configuration Tree View displays.

Use the + and – symbols to display or hide various options. Double-click a point to display the associated parameter configuration screen. You can also use the menu options and buttons to display the associated parameter configuration screen.

The Status Line at the bottom of the Device Directory and Configuration Tree provides critical information. The left side displays brief information about the device being connected. The right side displays the device status (on-line or off-line) and system time.

TLP Selections



In many locations in ROCLINK 800, you can click the TLP Browse button (a button with three dots) to view the Select TLP dialog. The Select TLP dialog allows you to assign specific inputs and outputs to parameters. ROCLINK 800 uses Point Type (T), Logical Number (L), and Parameter (P) to define point locations.

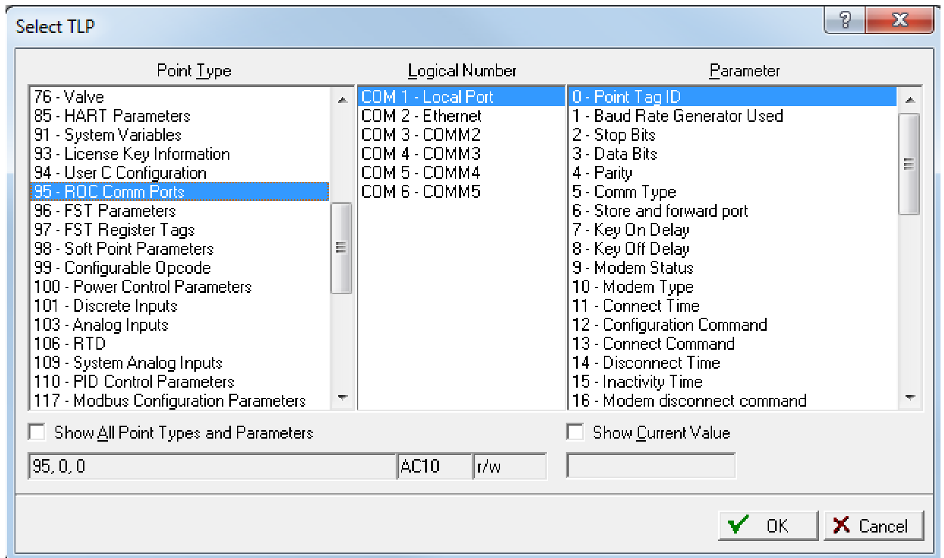


Figure 1-33. Select TLP

To use the Select TLP dialog box:

1. Select the **Point Type** from the list. This opens a list of logical numbers and parameters that belong to that Point Type.
2. Select the **Logical Number**. In the configuration screens, the Logical Number is generally referred to as Point Number or Number.
3. Select the specific **Parameter**. These are usually called by the same term as the Tag on the configuration screen.

   The field at the bottom of the Select TLP dialog displays the numeric point location of the TLP point or a text abbreviation, depending on the setting in the **Tools > Options** window.

4. Select the **Show All Point Types and Parameters** checkbox to view all points and parameters regardless of their validity. By default, ROCLINK only displays points and parameters that are valid for the current configuration you are performing.
5. Click **OK**.

Display TLP

Displays values on the Select TLP screen as either text or numbers. For example, the TLP for Register 2 of FST 1 could display as either "FST 1,R2" or "96, 0, 3".

Auto Scan Update Interval Select **Tools > Options** to set the time interval, in seconds, at which the Auto Scan feature on various screens in ROCLINK 800 polls the ROC. Clicking **Auto Scan** causes ROCLINK 800 to poll the device automatically until you click **Stop Scan**.

1.6.8 Text Boxes

Text boxes appear in various places throughout ROCLINK 800. You can enter alphanumeric character (A through Z and 0-9) into text boxes. For example, you can enter name (tag) for a device or a short description for an I/O point.

Chapter 2 – Device Directory and Device Root

In This Chapter

This chapter describes the Device Directory screen and the Device Root, the graphical representation of all devices, which appears on that screen.

2.1 Device Directory

The Device Directory is the first screen that displays after you successfully log onto ROCLINK 800 but before you connect to a device.

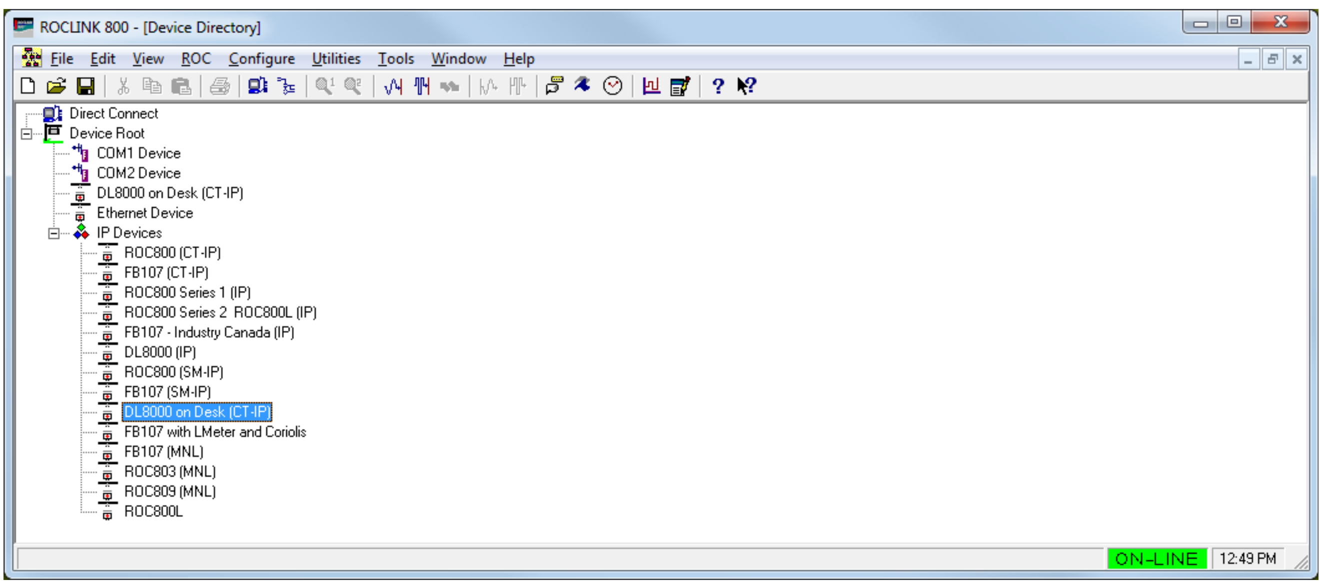


Figure 2-1. Device Directory and Device Root

Note: Once you connect to a device, ROCLINK 800 replaces the Device Directory screen with a device-specific configuration tree screen (see *Figure 2-2*).

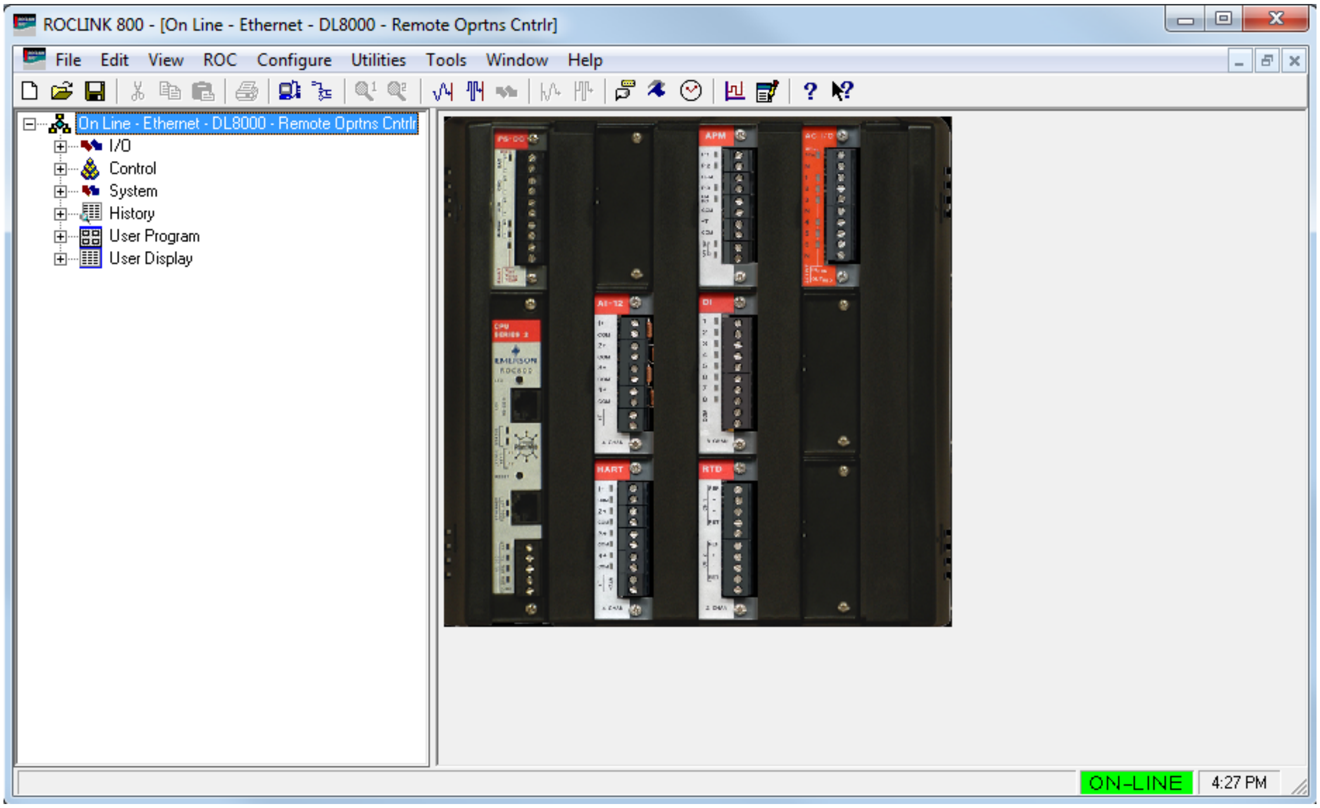


Figure 2-2. Configuration Tree

You use the Device Directory screen to create and maintain communications setup configurations for a PC running ROCLINK 800. You can uniquely configure the communication ports on the PC to send data to a specified ROC. You may add, delete, or modify these communications setups and establish a tree of groups and devices.

Use the + and – symbols to display or hide various options.

Note: You can only configure a PC's communications ports from the Device Directory screen. To re-display the Device Directory screen at any time, select **Window > Device Directory** or **View > Directory**.

2.1.1 Communication Parameters Setup Screen

The ROCLINK 800 Communication Parameter Setup screen allows you to change your PC communications port, time-out settings, and other variables ROCLINK 800 uses when establishing a connection to a device.

In order for ROCLINK 800 to communicate with a device, ROCLINK 800 must know to which device it is communicating. Each device within a group is given a unique device address.

To set the PC communication parameters:

1. Right-click the label in the Device Directory that corresponds to the PC port you want to use.

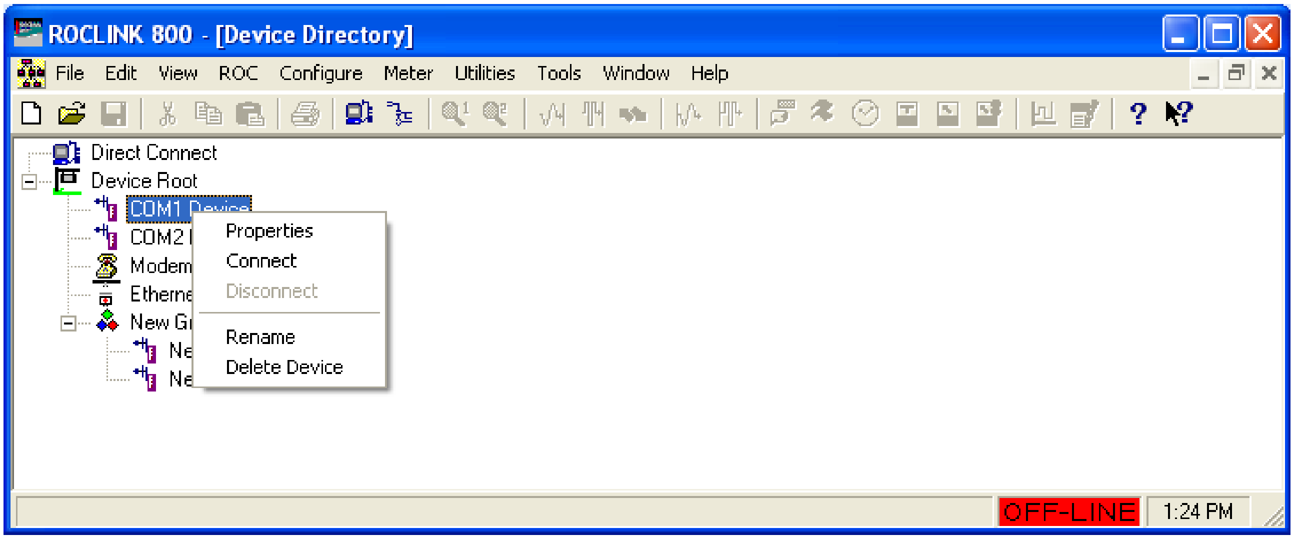


Figure 2-3. Device Pop-up Menu Tree

2. Select **Properties**. The ROCLINK 800 Communications Parameters screen displays.

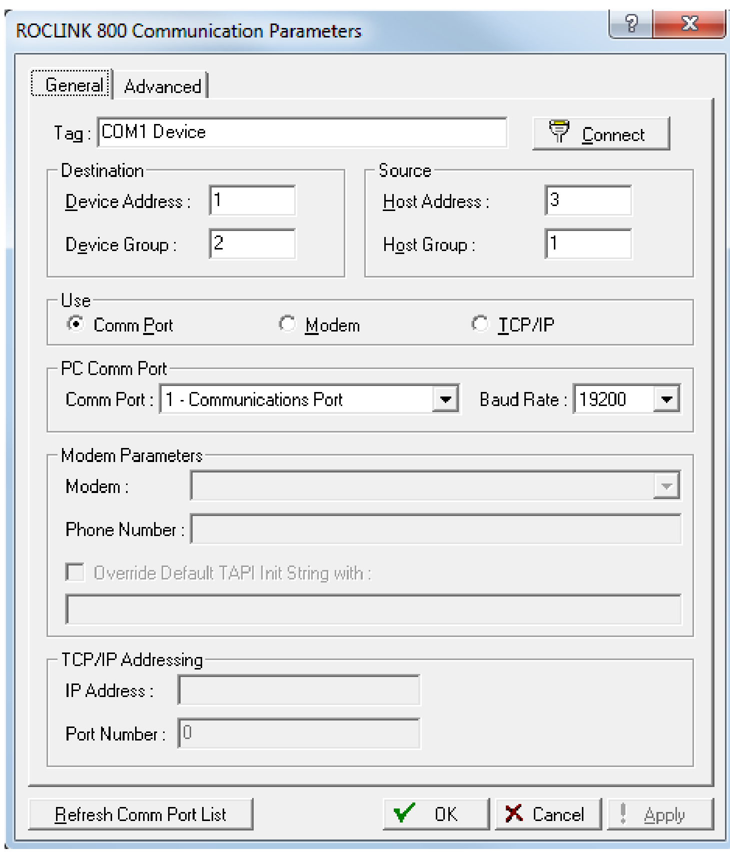


Figure 2-4. Communication Parameters

3. Configure the ROCLINK 800 communications parameters (refer to *Chapter 3, Communications and Security* for a complete discussion of this screen).

4. Click **Apply**. You are ready to connect to the ROC.

2.2 Device Root

The device root graphically represents the devices and their organizational structure on the Device Directory screen. When you open ROCLINK 800, the device root displays the default device labels. Using the Communication Parameters screen, you can modify the communications setup configurations for these devices or add new devices with new configurations. Each icon on the device root represents a different type of communications connection.

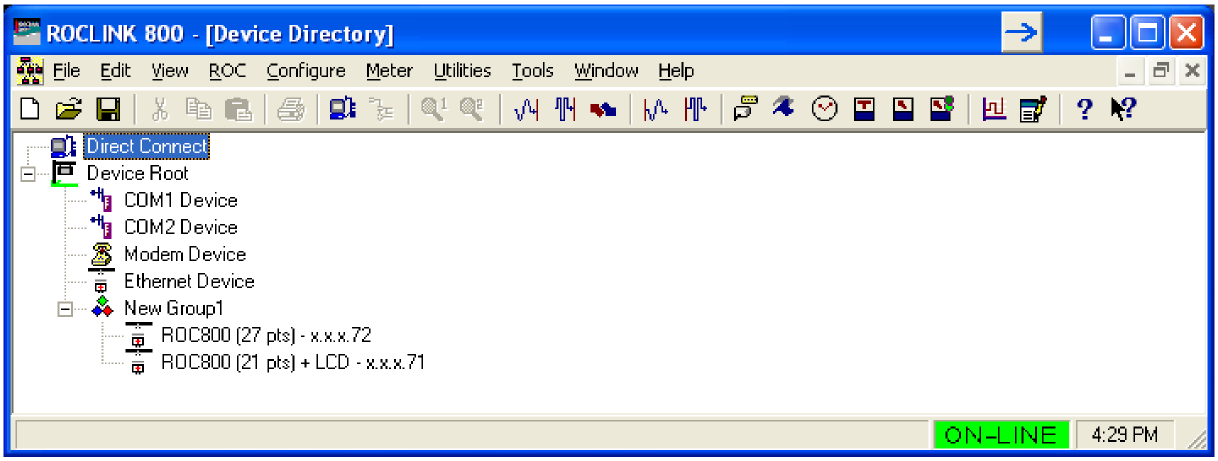


Figure 2-5. Device Root

The default device labels, which correspond to available communication ports, include:

- COM1 Device.
- COM2 Device.
- Modem Device.
- Ethernet Device.
- New Group1 > New Device1.
- New Group1 > New Device2.

You may add, delete, or modify the communication configurations for each of these devices. You can also define device groups.

2.2.1 Backing Up Configurations

After you configure your device settings, we strongly recommend that you create a back-up file of those settings. ROCLINK 800 stores these values in the file **ROC_USER.mdb**. Use Windows Explorer to find the **ROC_USER.mdb** file, then copy the file and store it in a safe place. This backup file enables you to restore your settings in case they ever become corrupted.

You can configure devices on-line communications using the Local Operator Interface (LOI) Port (also known as the "local port") or a communication port, such as a modem.

2.2.2 Adding a Group

You can organize devices into groups. Typically, groups contain devices in the same geographical area or with another common feature. When you double-click a group icon, ROCLINK 800 displays all devices or subgroups associated with that group.

To add a **new group** to the device root directory:

1. Right-click the Device Root icon. A pop-up menu displays.
2. Select **Add a Group**. ROCLINK 800 adds the new group icon to the device root graphic.

To add a **subgroup** to an existing group:

1. Right-click the Group icon. A pop-up menu displays.
2. Select **Add a Group**. ROCLINK 800 adds the new group icon to the selected group.

2.2.3 Deleting a Group

To delete a group:

1. Right-click a group icon. A pop-up menu displays.
2. Select **Delete Group**. A Confirm Delete dialog box displays.

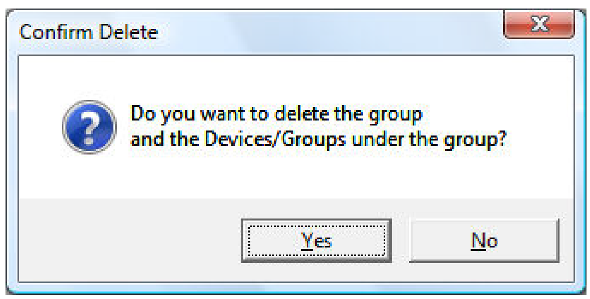


Figure 2-6. Delete Group

3. Click **Yes** to delete the group and all subordinate groups and devices in that group.

2.2.4 Adding a Device

To add a new device to the device root:

1. Right-click the device root icon. A pop-up menu displays.
2. Select **Add a Device**. ROCLINK 800 adds a device icon to the device root.
3. Configure the new device's communication parameters (see *Chapter 3, Communications and Security*).

To add a device to an existing group:

1. Right-click the group icon. A pop-up menu displays.

2. Select **Add a Device**. ROCLINK 800 adds a device icon in the selected group.
3. Configure the new device's communication parameters (see *Chapter 3, Communications and Security*).

2.2.5 Deleting a Device

To delete a device:

1. Right-click a device icon. A pop-up menu displays.
2. Select **Delete Device**. A Confirm Delete dialog displays.

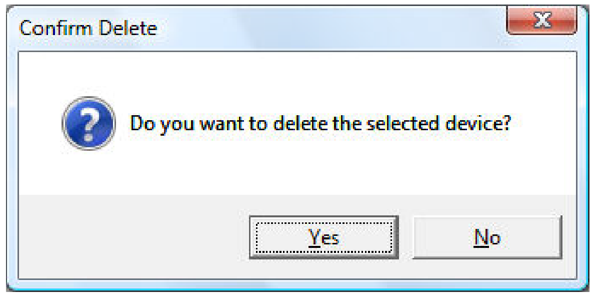


Figure 2-7. Delete Device

3. Click **Yes** to delete the device.

2.2.6 Deleting All Devices

To delete all device communication parameter configurations in the device root directory:

Note: This deletes **all** ROC units that you currently have configured.

1. Right-click the device root icon. A pop-up menu displays.
2. Select **Delete All Devices**. A Confirm Delete dialog displays.

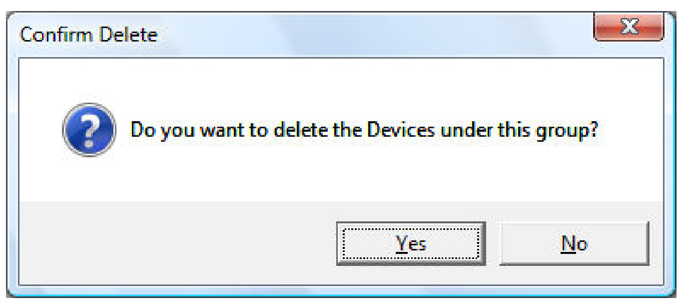


Figure 2-8. Delete All Devices

3. Click **Yes**. ROCLINK 800 deletes all devices in the device root.

2.2.7 Renaming a Group or Device

You can easily replace the ROCLINK 800-provided default group or device names with names you choose. To rename a group or device in the Device directory:

1. Right-click the device or group icon. A pop-up menu displays.

2. Select **Rename**.
3. Enter a name.

Note: Although your label can be up to 72 characters in length, keep the label short for easy recognition.

4. Press **Enter** when finished. ROCLINK 800 adds the new label to the device or group.

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Chapter 3 – Communications and Security

In This Chapter

This chapter describes how to configure the communication ports on a PC and on a ROC. It also describes how to use the Connect and Direct Connect features in ROCLINK 800 and how to define security to control access to the DL8000 and ROCLINK 800.

3.1 Communications

Before you attempt to connect to a ROC, you must configure communication parameters in two places:

- **ROCLINK 800 Communications**
  Configure device communications on the Device Directory screen (Device Directory and Device Root). This sets the PC's comm ports to communicate with a specific device.
- **Communication Ports on the DL8000**
  Select **ROC > Comm Ports** to access the Comm Port screen and configure the device communication ports for incoming or outgoing communications. Refer to *Section 3, Communication Ports*.

3.2 ROCLINK 800 Communications

The Device Directory communication configurations allow ROCLINK 800 to communicate to an individual DL8000.

To set the PC communication parameters:

1. Right-click the label in the Device Directory that corresponds to the PC port you want to use.
2. Select **Properties**. The ROCLINK 800 Communication Parameters screen displays.
3. Configure the ROCLINK 800 communications parameters. Refer to *Communications and Security*.
4. Click **Apply**. You are ready to connect to the ROC.

3.2.1 ROCLINK 800 Communications General Tab

The Device Directory is the first screen that displays after you successfully log onto ROCLINK 800 but before you connect to a device.

To display the ROCLINK 800 Communication Parameters screen, right-click on a device icon in the device root and select **Properties**. The ROCLINK 800 Communication Parameters screen displays, showing the General tab.

Use the General tab to configure basic communications for the PC running ROCLINK 800.

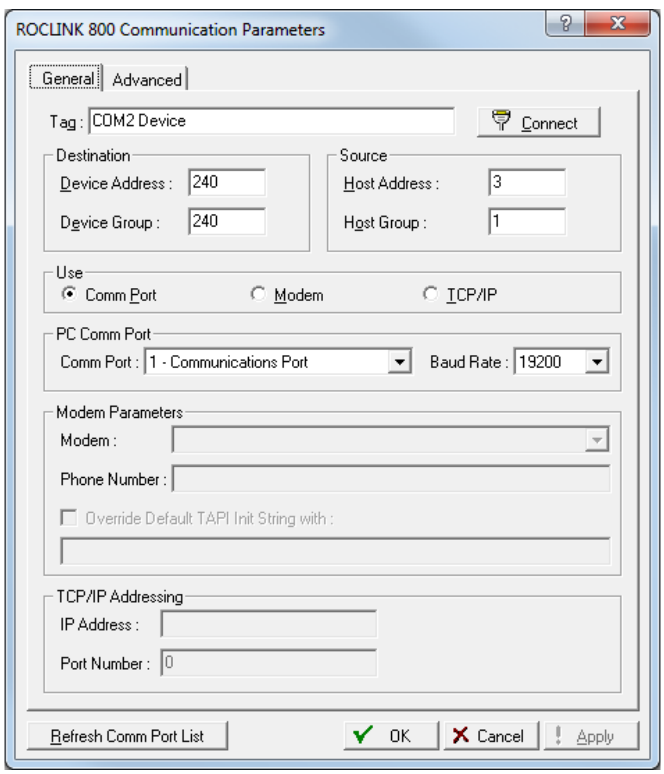


Figure 3-1. ROCLINK 800 Communication Parameters, General tab

Field	Description
Tag	Sets a unique name for the DL8000. Enter up to 50 alphanumeric characters to identify the device.
Connect	Click to communicate with the PC using the parameters you configure for this PC's communications port.
Device Address	Sets the address of the specific DL8000 with which you desire to communicate. If you connect to a multi-drop series of devices, enter the **Device Address** and **Device Group** of the specific device. **Note**: The default values for the Device Address and Device Group are both **240**. .
Device Group	Associates the ROC with a specific group. The default Device Group is **240**. **Note:** If you connect a PC running ROCLINK 800 directly to the device's LOI (Local Port), ROCLINK 800 makes a request to Device Group of 240 and Device Address of 240. The Local Port of a device always responds to a request for Address 240 and Group 240, no matter what Device Address and Device Group is configured in the device if the LOI Security is valid.
Host Address	Identifies the PC's host address, which by default is Address **3**. If more than one computer running ROCLINK 800 communicates with a group of devices (either by radio or by other multi-drop communications), you must define unique host address for each device to avoid multiple responses. The host address must also be different from any other host system that may access the communications link. Use the following host group and host address conventions: 0 and 240 are reserved
Host Group	Identifies the PC's host group, which by default is **1**. When using ROC Protocol, the group address must match the address defined at the destination device in order for communications to properly transmit. Use the following host group and host address convention: 0 and 240 are reserved
Use	Sets the type of connection. Valid values are **Comm Port**, **Modem**, or **TCP/IP**. **Note:** If you select **TCP/IP**, ROCLINK 800 applies **only** the Time Out parameter you define on the **Advanced** tab. No other parameters defined on that tab apply.

Field	Description
PC Comm Port	Sets the PC comm port ROCLINK 800 uses for this setup. The ROC can communicate through any of the PC's configured comm ports. The default comm port is **1**. **Note:** This field is available **only** if you set the **Comm Port** option. Before you select this parameter, check to see which communications ports are assigned in the PC.
PC Baud Rate	Sets the baud rate ROCLINK 800 uses to communicate with the device through a serial port (COM port). For successful communications, the baud rate you set here must match the baud rate on the PC. The default value is **19200**. If you have difficulties communicating to your device, set the baud rate in both the device and the computer to the default baud rate. **Note:** This field is available **only** if you select the **Comm Port** option.
Modem	Indicates the modem ROCLINK 800 uses. Click ▼ to list all available modems. Only the modems defined in the Windows Control Panel display. Ensure that the modem you select is properly set up. **Note:** This field is available **only** if you select the **Modem** option.
Phone Number	Sets the telephone number for the device ROCLINK 800 dials. **Note:** This field is available **only** if you select the **Modem** option.
Override Default TAPI Init String	Indicates that ROCLINK 800 should use an override initialization string configuration. When you select this option, you must provide an override initialization string. **Note:** This field is available **only** if you select the **Modem** option.
IP Address	Indicates the IP address for the **TCP/IP** connection. **Note:** This field is available **only** if you select the **TCP/IP** option.
Port Number	Indicates the port for the **TCP/IP** connection. **Note:** This field is available **only** if you select the **TCP/IP** option.
Refresh Comm Port List	Click to enable ROCLINK 800 to refresh the listing of the displayed comm ports for the PC.

3.2.2 ROCLINK 800 Communications Advanced tab

Use the Advanced tab on the ROCLINK 800 Communication Parameters screen to configure advanced communications features.

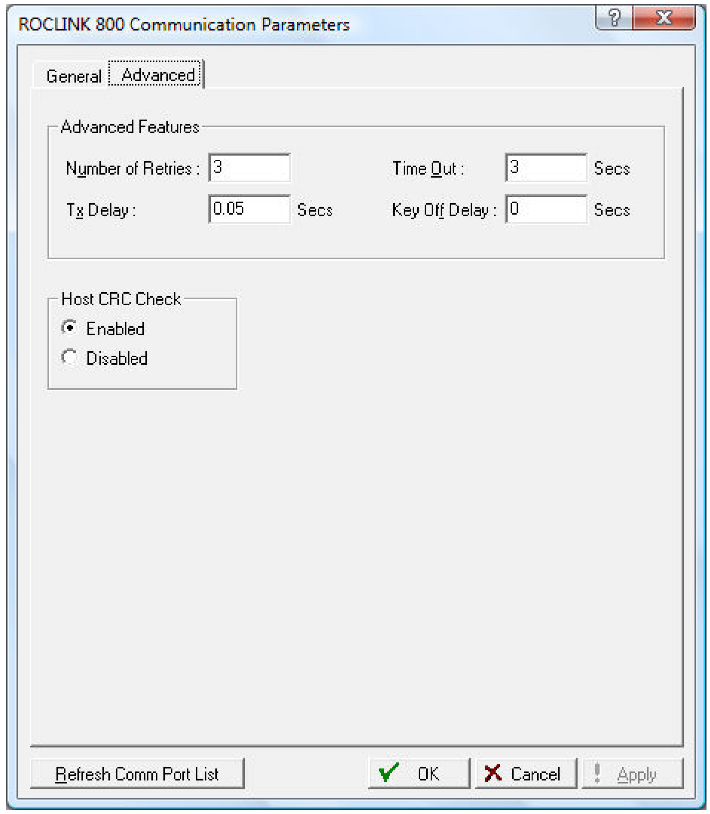


Figure 3-2. ROCLINK 800 Communication Parameters, Advanced tab

Field	Description
Number of Retries	Sets the number of times (after the initial attempt) ROCLINK 800 tries to request data from the specified device before reporting a timeout error. Valid values are between **0** and **25**. The default is **3**. Use the Time Out parameter to adjust the amount of time between retries. **Note:** This parameter does not apply to the dial-up modem, which only tries to establish a connection once.
Tx Delay	Sets, in seconds, the amount of time ROCLINK 800 waits before transmitting data. This delay enables the request-to-send (RTS) line for the amount of delay specified before transmitting data. The default is **0.05**. Typically, this value allows a radio to fully stabilize before the system applies data for transmission. ▪ For EIA-232 (RS-232) and dial-up modem communications, set this value (and the value in the Key Off Delay field) to 0 (zero) or the default of **0.05** seconds. ▪ For EIA-485 (RS-485) and radio communications, set this value to **0.1**. **Note:** These variables may change, based on your situation. These are general values that you need to assess for each circumstance.
Time Out	Sets, in seconds, the actual amount of time that ROCLINK 800 waits to receive a valid message after it sends a request to a device. The default is **3**. Modem users typically accept the default value. **Do not** set this field to **0** (zero). This prevents ROCLINK 800 from timing out, and quickly exhausts the retries. **Note:** If you select **TCP/IP** as the communications method on the General tab, ROCLINK 800 applies **only** the Time Out parameter. No other parameters defined on that tab apply.
Key Off Delay	Sets, in seconds, the amount of time ROCLINK 800 waits after transmitting a message before turning off the ready to send (RTS) signal. The default is **0**. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For radios, a value of **0.01** may be appropriate.
Host CRC Check	Indicates whether ROCLINK 800 uses cyclical redundancy checking. The default value is **Enabled**.

3.3 Communication Ports

In addition to configuring the communications ports on the PC, you also configure the device-specific communication parameters.

While in a configuration and on-line with a device, select **ROC > Comm Ports** to display the Comm Port screen. Each communications port has a unique set of parameters on the screen.

Use the Comm Port screen to set up the communications ports that are available for incoming and outgoing communications with the ROC.

Note: Use the Device Directory to define PC communication ports.

The communication ports located on the ROC provide a data link to ROCLINK 800, other devices, and host systems. The type of module enables the following communications:

- EIA-232 (RS-232) serial communications.
- EIA-422 (RS-422) serial communications.
- EIA-485 (RS-485) multi-point serial communications.
- Dial-up modem communications.
- TCP/IP communications.

Table 3-1. Communication Ports for the ROC800-Series

Port	Port Location	Default Tag	Function/Type
1	CPU RJ-45 (top)	Local Port	LOI / RS-232D
2	CPU RJ-45 (middle)	COMM1	Ethernet
3	CPU 5-pin (bottom)	COMM2	Serial / EIA-232 (RS-232)
4	Module Slot 1	COMM3	EIA-232 (RS-232), EIA-485 (RS-485), or Modem
5	Module Slot 2	COMM4	EIA-232 (RS-232), EIA-485 (RS-485), or Modem
6	Module Slot 3	COMM5	EIA-232 (RS-232), EIA-485 (RS-485), or Modem

3.4 Configuring Communications Ports

The ROC comm. ports provide a link to computers, such as one running ROCLINK 800 or a host computer.

Select **ROC > Comm Ports** to set up communication ports available for the ROC.

The SRBX or RBX (Spontaneous Report-by-Exception) alarming feature is available for serial communication ports. It is not supported on the Ethernet port. This feature allows the device to call in to a host computer when a configured alarm occurs. To prevent "nuisance" alarms from being reported to the host, configure the parameters correctly. If you wish to configure dial-up RBX, a modem must be present with the correct configuration.

When using RBX Alarming, you must ensure that the alarms are enabled and configured for each point you desire to monitor. Configure the alarm parameters so that an alarm occurs only when desired. Configure the parameters on the Alarms tabs of the I/O configuration screens.

After you configure the alarms, save the configuration of all communications ports to programmable ROM using **ROC > Flags > Flash Memory Save Configuration**.

Note: You also access the Comm Port screen by selecting **ROC > Comm Ports** from the ROCLINK 800 menu bar and then selecting the appropriate comm port from the drop-down menu or by selecting the Comm Ports icon from the menu bar.

3.4.1 Configuring TCP/IP Communications on the Ethernet Port

Use TCP/IP connections through the Ethernet port for DS800, Modbus® RTU encapsulated in TCP/IP, Modbus TCP/IP, or ROC Plus Protocol communications.

To configure TCP/IP communications:

1. **Connect** to the DL8000.

2. If using ROC Plus, Modbus RTU Encapsulated in TCP/IP, or Modbus TCP/IP, set the parameters on the **ROC > Information > Internet** tab.
3. If using DS800, set the parameters and enable the DS800 communications on the **Configure > Control > DS800** screen.
4. If using Modbus RTU Encapsulated using TCP/IP or Modbus TCP/IP, set the communications port and configure the parameters on the **Configure > Modbus > Configuration** screen.

Note: The parameters on the General, Modem, SRBX, and Store and Forward Tabs of the **ROC > Comm Ports** screen do **not** apply to the Ethernet port.

The **ROC > Comm Ports Diagnostics** tab displays the communication statistics available for all Modbus and ROC Plus Protocol communications transmitted using TCP/IP connections. Refer to the discussion of the *Comm Ports Diagnostics* tab.

The Ethernet port supports up to six ROC Plus connections, six Modbus slave connections, and one Modbus Master connection **all** at the same time. The number of active TCP/IP connections displays on the Active Connections field on the **ROC** > **Information** > **Internet** tab.

You cannot transmit SRBX messages or firmware updates over a TCP/IP connection.

Once a ROC Plus Protocol, Modbus RTU encapsulated in TCP/IP, or Modbus TCP/IP connection occurs, the communication session can be closed via a timeout. The three timeouts that can close a connection include:

- A **security timeout** starts after a valid login. If a valid ROC Plus Protocol message is not received within 60 minutes, the connection closes. The timeout is reset after each valid message.
- An **inactivity timer** start after a valid login for each TCP/IP connection. The **ROC > Information** > **Internet** tab> Inactivity Time field sets this parameter in seconds. A value of 0 disables the timer. If the DL8000 does not receive a valid ROC Plus Protocol message within the Inactivity Time, the connection closes.
- Each connection remains alive by periodic transmissions of messages (probes). If the other side of the connection fails to respond to ten repetitive probes, the connection closes. You configure the amount of idle time (in seconds) before the first probe is configurable is set in the **ROC** > **Information** > **Internet** tab > Keep Alive Time field. The other nine probes will be 64 seconds apart. The total time will be [(9*64) + the value of the **Keep Alive Time** parameter].

DS800 Use the DS800 Development Suite Software to develop programs, independently of ROCLINK 800. You can download these programs over the Ethernet port to a DL8000 that has the optional license key installed.

Once you enable DS800 on the **Configure > Control > DS800** screen, the Ethernet port for DS800 is always available to accept DS800 connections.

The DL8000 is capable of distinguishing TCP/IP messages received from DS800, in Modbus, or in ROC Protocol. The firmware routes the DS800 messages to the correct communications task.

ROC Plus Protocol **ROC > Security** for the Ethernet port enables or disables security for all ROC Plus Protocol based Ethernet connections.

The Ethernet port is always available to accept ROC Plus Protocol connections.

Modbus The DL8000 allows both Modbus RTU encapsulated in TCP/IP and Modbus TCP/IP communications on the Ethernet port. Modbus RTU encapsulated in TCP/IP is the form of Modbus protocol traditionally supported on serial connections in the DL8000, which is encapsulated in a TCP/IP message. Modbus TCP/IP is the protocol developed for use over TCP/IP connections.

The Ethernet port is always available to accept Modbus connections.

The DL8000 supports Modbus communications on any of the serial ports, at the same time as Modbus RTU encapsulated over TCP/IP or Modbus TCP/IP connections.

3.4.2 Comm Ports General Tab

Select **ROC > Comm Ports** to configure the communications ports on the ROC. The Comm Port screen displays, showing the General tab.

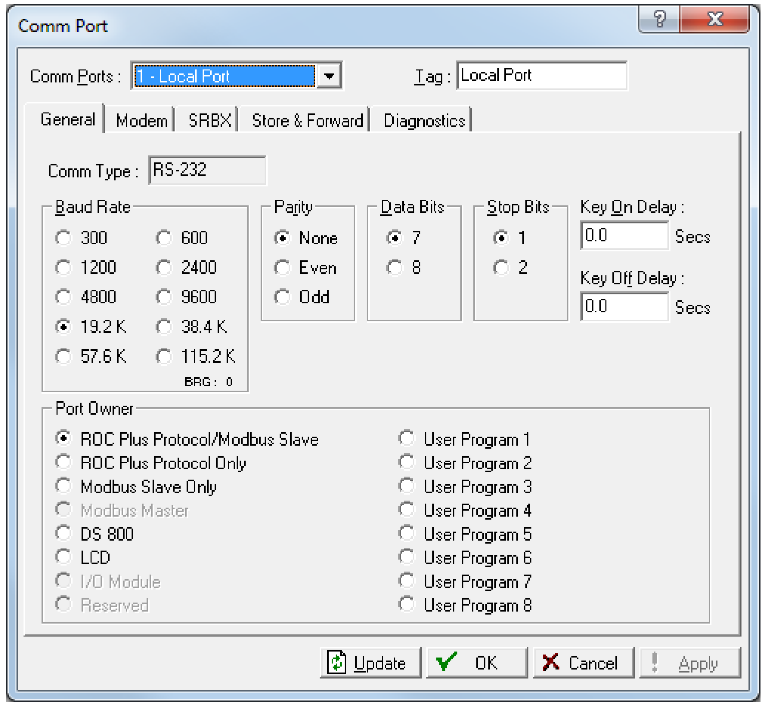


Figure 3-3. Comm Port, General tab

Field	Description
Comm Ports	Sets the specific comm port to be configured. Click ▼ to display all valid selections.
Tag	Sets a 10-character name (“tag”) to help identify the comm port.
Comm Type	This **read-only** field displays the type of communications port, such as EIA-232 (RS-232) or Ethernet. **Note**: The message “No Module” appears in this field when no communication module is present in slots 1, 2, or 3.
Baud Rate	Sets, in bits per second, the transmit and receive data baud rate for the comm port. The default is **19.2K**.
Parity	Sets whether the communications controller performs parity checks and, if selected, sets the parity value (odd or even). The default value is **None**.
Data Bits	Sets the number of data bits contained in an asynchronous byte, or character. The default is **8**.
Stop Bits	Sets the number of stop bits contained in an asynchronous byte, or character. The default is **1**.

Field	Description
Key On Delay	Sets, in seconds, the amount of time the ROCLINK 800 waits after turning on the ready to send (RTS) signal before beginning transmission. The default is **0**. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For older radios, you may need to set this value to 0.2 seconds. For newer radios, 0.02 seconds should be sufficient.
Key Off Delay	Sets, in seconds, the amount of time ROCLINK 800 waits after transmitting a message before turning off the ready to send (RTS) signal. The default is **0**. You can change this value to optimize communications. The default value should be sufficient for dial-up modems and EIA-232 (RS-232) connections. For radios, a value of 0.01 may be appropriate. **Note:** These variables may change, based on your situation. These are general values that you need to assess for each circumstance.

Field	Description
Port Owner	Sets the communication protocol this port uses ▪ **ROC Plus Protocol/Modbus Slave** configures the port to automatically switch between Modbus and ROC Plus Protocol messages. ▪ **ROC Plus Protocol Only** configures the port to only accept ROC Plus protocol messages (Modbus Slave is disabled). ▪ **Modbus Slave Only** configures the port to allow the ROC to act only as a Modbus slave device (ROC Plus Protocol is disabled). **Note:** Use the "Only" options only if the messages received use this specific protocol. Otherwise, select **ROC Plus Protocol/Modbus Slave** if this comm port is going to have both protocols communicate on it. ▪ **Modbus Master** configures the port to allow the DL8000 to poll Modbus devices. ▪ **DS800** configures the port to download and debug Development Suite 800 projects only. You will not be able to connect two ROC units together with this option. It is exclusively configured for DS800/PC communications. **Note**: Modems are **not** supported for the DS800 communication type. ▪ **LCD** configures the port for communications with a DL8000 Keypad Display. ▪ **I/O Module** configures this port to use the communications protocol residing in the I/O module. ▪ **Reserved** indicates that this port is reserved and cannot be used for communications. ▪ **User Program** configures this port to use the communications protocol residing in the loaded user program. The user program number here matches the user program number in the Configuration Tree menu and the User Program Administrator screen.

3.4.3 Comm Ports Modem Tab

Use the **Modem** tab on the Comm Ports screen to configure the device's modem communication ports.

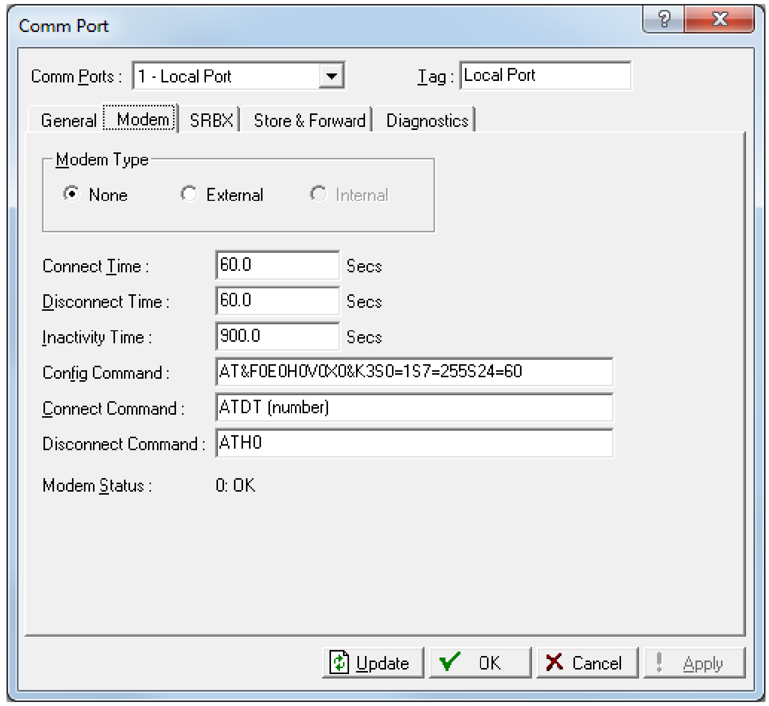


Figure 3-4. Comm Port, Modem tab

Field	Description
Modem Type	Sets the modem type. Valid values are **None** (using a serial link to the host), **External** (using an external modem), and **Internal** (using an internal modem). The default is **None**.
Connect Time	Sets, in seconds, the amount of time that ROCLINK 800 waits after initiating a call to receive a connect message from a device (typically the modem) before it terminates the call. The default is **60** seconds. The **Connect Time** varies from system to system and can take up to 60 seconds to make and complete a dial up connection. If a successful connection is made, the Disconnect Time begins.
Disconnect Time	Sets, in seconds, the amount of time that ROCLINK 800 waits for further activity on the line before it hangs up. ROCLINK 800 resets this timer after each valid receive signal.
Inactivity Time	Sets, in seconds, how long ROCLINK 800 waits without receiving a signal before resetting the modem. ROCLINK 800 must receive a valid receive counter to remain active. The default is **900.0** seconds.
Config Command	Sets the string of characters the device requires to initialize the modem. For external modems, refer to the manufacturer's literature. For an internal modem, use the default value or the modem card may not operate correctly. Refer to your modem's documentation for default **Config Command** characters.

<table>
<tr><th>Field</th><th colspan="2">Description</th></tr>
<tr><td>Connect Command</td><td colspan="2">Sets the Hayes-style connect command the device requires to contact the host. Typically, this is the command ATDT followed by the telephone number (for example, ATDT5155551212). The unit requires this parameter for dial-out operations, such as SRBX Alarming.</td></tr>
<tr><td>Disconnect Command</td><td colspan="2">Sets the Hayes-style disconnect command required to disconnect the contact to the host. Typically, this is the command ATH0.</td></tr>
<tr><td rowspan="10">Modem Status</td><td colspan="2">This read-only field shows the modem’s current status result code. Valid values are:</td></tr>
<tr><td>Result Code</td><td>Definition</td></tr>
<tr><td>0 = OK</td><td>Successfully executed command line</td></tr>
<tr><td>1 = CONNECT</td><td>Connection established</td></tr>
<tr><td>2 = RING</td><td>Ring signal detected</td></tr>
<tr><td>3 = NO CARRIER</td><td>Carrier not detected/lost</td></tr>
<tr><td>4 = ERROR</td><td>Error in command line</td></tr>
<tr><td>6 = NO DIAL TONE</td><td>No dial tone detected</td></tr>
<tr><td>7 = BUSY</td><td>Busy signal detected</td></tr>
<tr><td>8 = NO ANSWER</td><td>Line not picked up on the called end</td></tr>
</table>

3.4.4 Comm Ports SRBX Tab

Use the **SRBX** tab to configure the Spontaneous-Report-by-Exception alarming features.

The SRBX (Spontaneous Report-by-Exception) alarming feature is available for serial communication ports. This feature allows the device to call in to a host computer when a configured alarm occurs. If you wish to configure dial-up RBX, then a modem must be present and appropriately configured.

When you use RBX alarming, ensure that you enable and configure alarms for each point you desire to monitor. Configure the alarm parameters so that an alarm occurs only when desired. This prevents "nuisance" alarms. You configure RBX alarm parameters on the **Alarms** tab on the I/O, MVS, and Meter Setup configuration screens.

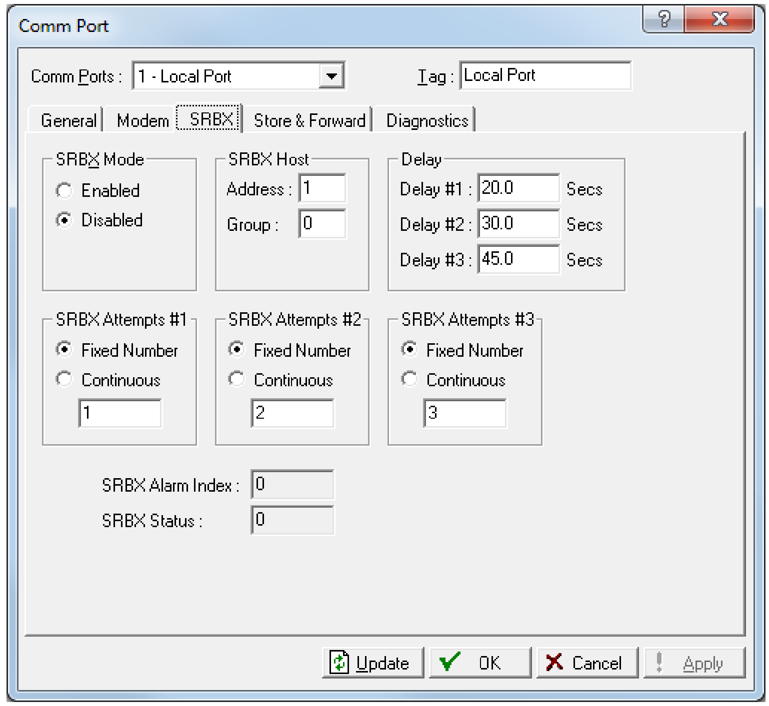


Figure 3-5. Comm Port, SRBX tab

Field	Description
SRBX Mode	Sets the SRBX Mode for Spontaneous-Report-by-Exception alarming on this comm port. The default is **Disabled**.
SRBX Host Address	Sets the address of the host to which the SRBX feature communicates. The default value is **1**.
SRBX Host Group	Sets the group of the host to which the SRBX feature communicates. The default value is **0**.
Delay	Sets, in seconds, the time the device waits between attempts to transmit an SRBX or RBX message. Each SRBX or RBX Attempts parameter has an associated delay parameter. The default for **Delay #1** is **20** seconds, the default for **Delay #2** is **30** seconds, and the default for **Delay #3** is **45** seconds.

Field	Description
SRBX Attempts	Sets the number of times the device attempts to resend a message if it does not obtain a valid response on the first try. "Attempt" refers to the initial message plus any retries. ROCLINK 800 provides three parameters. The default for all parameters is **Fixed Number**. The default value for **SRBX Attempt #1** is **1**. The default value for **SRBX Attempt #2** is **2**. The default value for **SRBX Attempt #3** is **3**. Select **Fixed Number** to set how many times ROCLINK 800 retries sending a message after the first unsuccessful attempt. If you enter **0**, no retries occur. Select **Continuous** (255) to start continuous retries that stop only when the host acknowledges the SRBX alarm.
SRBX Alarm Index	This **read-only** field shows the current SRBX alarm.
SRBX Status	This **read-only** field shows the status of SRBX messaging. Valid values are **Active** (SRBX alarm is processing) or **Inactive**.

3.4.5 Comm Ports Store & Forward Tab

Select **ROC** > **Comm Ports** > **Store & Forward** tab to configure the Store & Forward features on the ROC.

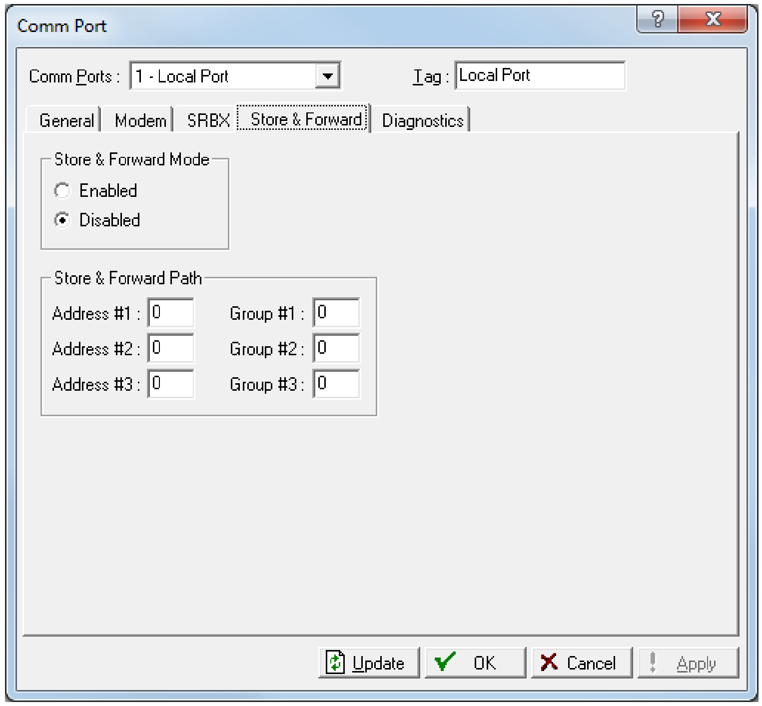


Figure 3-6. Comm Port - Store & Forward tab

Field	Description
Store & Forward	Indicates whether the port transmits messages (Store & Forward). Valid values are **Enabled** (transmit messages out of the port) and **Disabled** (do **not** transmit messages).

Field	Description
Store & Forward Path	Sets the path and group numbers of the devices that need to receive this SRBX message and forward it on to the next device to extend the communications path. You may also specify addresses for other devices that support the ROC Protocol. The device you specify by the last non-zero **Address** or then sends the message to the host from by the previous parameter.

3.4.6 Comm Ports Diagnostics Tab

Select **ROC > Comm Ports > Diagnostics** tab to view the communications diagnostic features on the ROC.

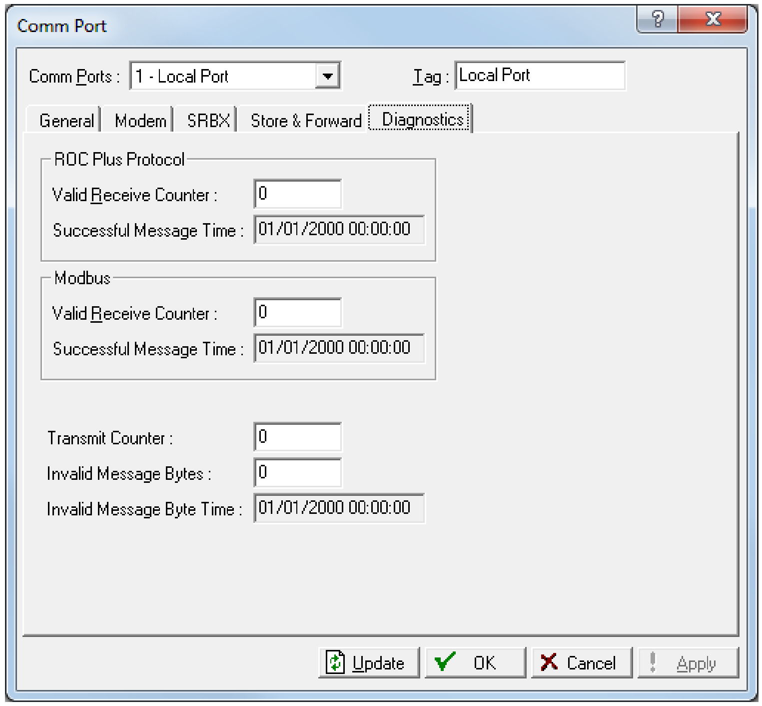


Figure 3-7. Comm Port – Diagnostics tab

Field	Description
Valid Receive Counters	Indicates the number of valid ROC Plus protocol or Modbus protocol messages the ROC800 has received. Although these are incrementing values, you can zero them out if necessary.
Successful Message Time	This **read-only** field Indicates the time and date of the last valid ROC Plus protocol or Modbus protocol message received.
Transmit Counter	Indicates the number of messages sent by the ROC. This is an incrementing value that you can zero out if necessary.
Invalid Message Bytes	Indicates the number of ROC Plus protocol or Modbus protocol bytes lost. This is an incrementing value that you can zero out if necessary.
Invalid Message Byte Time	This **read-only** field shows the time and date of the last invalid message.

3.5 Connecting to a ROC

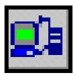
To connect the computer to a remotely located ROC a serial, dial-up modem, radio, satellite, or other communications line should be installed. This connection may be made through the LOI (Local Port) or other Communications Port on the ROC.

Use the **Connect** command to connect to a serial or dial-up modem. To use Connect:

1. Physically **connect** the ROC.

2. Launch and **log in** to ROCLINK 800.
3. Perform one of the following:
   - Select a device from the Device Directory and press the **Enter** key.
   - Double-click a device in the Device Directory.
   - Select a device from the Device Directory and click the **Connect** button on the toolbar.
   - Select **ROC > Connect** to connect to the device currently selected in the Device Directory.

3.5.1 Direct Connect



Click the Direct Connect icon to establish a connection with a ROC. ROCLINK 800 attempts to establish communications through all PC comm ports at various baud rates, until it receives a valid reply.

By default, ROCLINK 800 tags the LOI Port as the local port (comm 1), as shown on the Comm Port screen (**ROC > Comm Ports**).

For the Direct Connect option to work, security conditions must be met, and the PC must be connected to the Local Operator (LOI) port of the device with communication settings of:

- 8 Data Bits.
- 1 Stop Bit.
- No Parity.

When you click **Direct Connect**, ROCLINK tries to initiate communications with the device by performing a search of the PC communication ports at various baud rates. ROCLINK then "locks on" to the first comm port and baud rate that are successful in communicating with a device.

To use Direct Connect:

1. Physically connect a cable to the ROC.
2. Launch and log into ROCLINK 800.
3. Do one of the following:
   - Click on the **Direct Connect** icon in the Device Directory.
   - Click the **Direct Connect** button on the toolbar.
   - Select **ROC > Direct Connect**.
4. If this is the first time that you have connected to the ROC, continue to the steps for *Setting the Clock*.

3.5.2 Local Port (LOI)

The PC running ROCLINK 800 physically connects to the device through a cable. For a local connection, this cable is typically a prefabricated local operator interface (LOI) cable (available from Remote Automation Solutions). One end of the cable (a 9-pin, D-shell, female connector) plugs into a serial communications port on the PC running ROCLINK 800. The other end of the cable plugs into the ROC operator interface connector called the Local Port.

Note: If your PC does not have a serial port, you may use a USB-to-serial connector for the LOI connection.

3.5.3 Connect to a ROC

To connect the computer to a remotely located ROC, install a serial, dial-up modem, radio, satellite, or other communications line. This connection may be made through the LOI (Local Port) or other communications port on the ROC.

Use the **Connect** command to connect to a serial or dial-up modem. To use Connect:

1. Physically **connect** the ROC.
2. Launch and **log in** to ROCLINK 800.
3. Perform one of the following:
   - Select a device from the Device Directory and press the **Enter** key.
   - Double-click a device in the Device Directory.
   - Select a device from the Device Directory and click the **Connect** button on the toolbar.
   - Select **ROC > Connect** to connect to the device currently selected in the Device Directory.

3.5.4 Successful Login

A successful login produces an on-line connection and displays a tree representing the configuration in the ROC. Refer to Configuration Tree Menu.

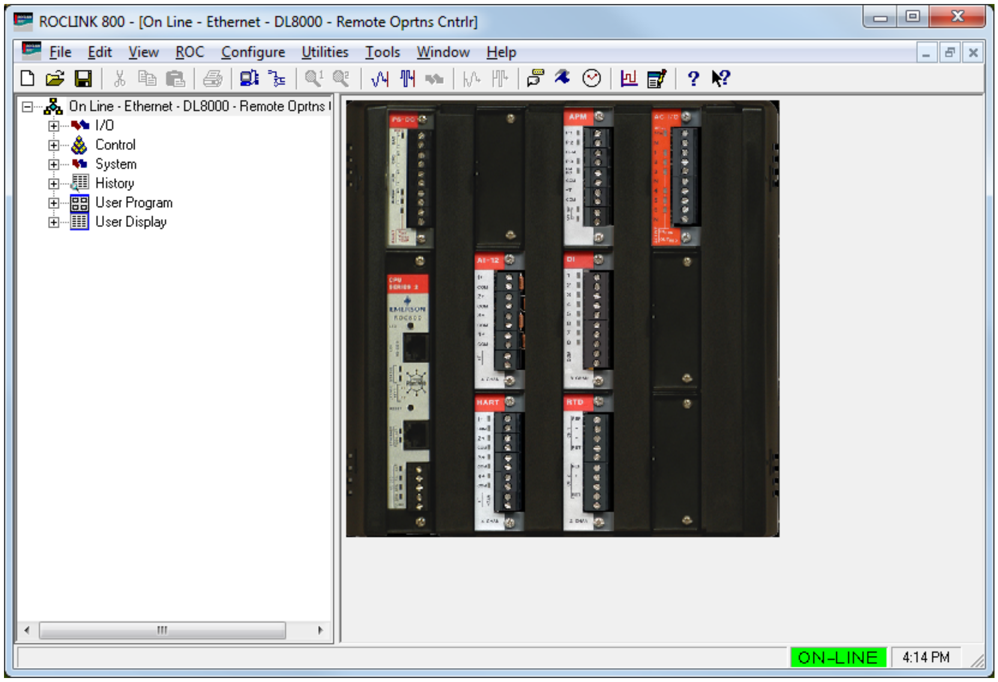
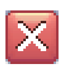


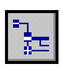
Figure 3-8. Successful Logon

3.5.5 Disconnecting from a ROC

To disconnect an online connection:



- Close the screen by clicking the lower of the two Close buttons located in the upper-right corner of the device screen.



- Click the **Disconnect** button located on the Toolbar.
- Select **File** > **Close**. This automatically closes the connection.

3.6 Troubleshooting Connection Errors

Several events can cause a connection problem:

- If the parameters ROCLINK 800 uses when establishing a communications link to your PC are incorrect, it cannot make a direct connection. Refer to *Troubleshooting ROCLINK 800 Communications*.
- If ROCLINK 800 stands idle for too long and exceeds the timeout value for a device, a communications failure can also occur. In this case, simply log back into ROCLINK 800 and use the Direct Connect or Connect features.
- If you do not have security access to the ROC, you cannot make a connection. You must configure a valid User ID and Password (using the ROC > Security option) for each user who can connect to a ROC.
- If the PC cannot establish a connection to the ROC by "pinging" the Device Address (ROC Address), ROCLINK 800 cannot make a TCP/IP connection. Refer to *Troubleshooting a TCP/IP Connection*.

3.6.1 Troubleshooting ROCLINK 800 Communications

Occasionally, you may need to alter your PC communications options when you are having problems communicating with your ROC.

1. Select the desired **Device** in the Device Directory. Right-click and select **Properties**.
2. Make sure you have specified the correct Device Address and Device Group of the ROC or with which you are trying to communicate. If you are communicating through the LOI port of the device, the universal address is **Device Address** is **240** and **Group Address** is **240**.
3. Click the **Advanced** tab. Try increasing the **Time Out** and/or **Tx Delay**.
4. Click **Apply**. Return to the **General** tab, and click **Connect**.
5. If you are still having trouble communicating, try increasing the **Number of Retries** field in the Advanced tab. Click **Apply**. Return to the **General** tab, and click **Connect**.
6. If you are still having trouble communicating, try increasing or decreasing the **Key Off Delay** field in the Advanced tab. Click **Apply**. Return to the **General** tab, and click **Connect**.
7. Check the security settings of ROCLINK 800.

3.6.2 Troubleshooting TCP/IP Connections

If you are unable to establish a connection between ROCLINK 800 and the ROC on the Ethernet port, verify that the PC is able to "ping" the ROC.

1. Launch the DOS command prompt and write a command to "**ping**" the ROC at its IP address (for example, **C:\>ping 155.177.78.111**).
2. If the Ping Statistics Reply is similar to "Packets: Sent = 4, Received = 4, Lost = 0 <0% loss>", then the PC and ROC are connecting. You may need to alter the Internet communications setting in ROCLINK 800 software. Verify all parameters on the pertinent screens. Refer to *Configuring TCP/IP Communications on the Ethernet Port (ROC800-Series)*.
3. If the Ping Statistics Reply is similar to "Packets: Sent = 4, Received = 0, Lost = 4 <100% loss>", then the PC and ROC are not connecting. Review your network, your physical connection, your router, and your PC.

3.7 Security

You control security in two ways:

- **ROCLINK 800 Security**: – Enables who can access (log on) ROCLINK 800 software and the Access Level assigned to a user.

- **Device Security** – Enables who has access to the ROC Comm Ports and the LCD.

Note: Security Access Levels enable you to control which users have access to specific ROCLINK 800 functions.

3.7.1 ROCLINK 800 Security

Use the ROCLINK 800 Security screen to set access to ROCLINK 800.

Note:

- Refer to *Device Security* for instructions on securing the ROC.
- The requirements for the Operator ID and Password fields are dependent on your selection in the **Enable Enhanced Security Features** field on the Device Security screen (**ROC > Security)**. For more information, refer to *Section 3.7.3 Enhanced Security*.

To access this screen, select **Utilities > ROCLINK 800 Security**. The ROCLINK 800 Security screen displays. Its table format enables you to define, by operator ID, password, and security level, who can log on to ROCLINK 800 and the screens which those IDs can access. You may define up to 64 different users.

Note: **Utilities > ROCLINK 800 Security** must match **ROC > Security** (Device Security) in order for users to log into ROCLINK 800.

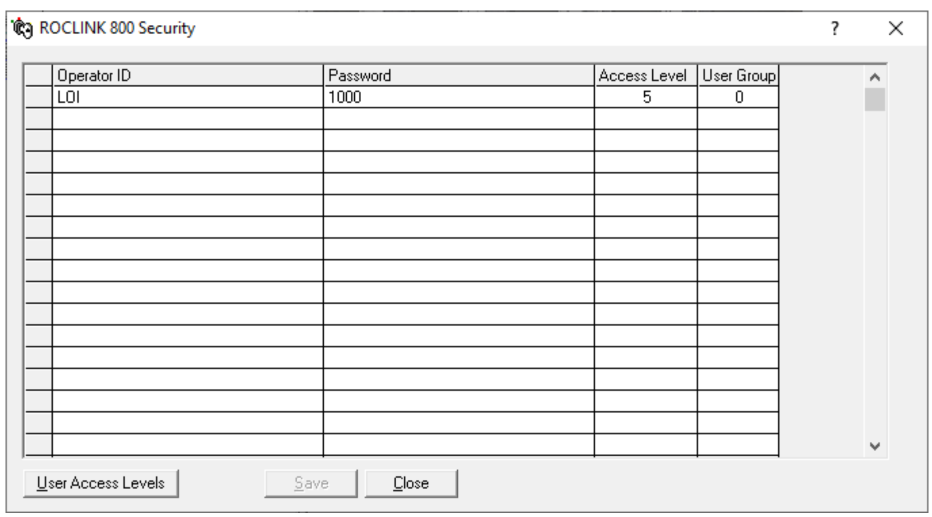


Figure 3-9. ROCLINK 800 Security

Note: The default Operator ID is **LOI**. The default Password is **1000**.

1. Select **Utilities** > **ROCLINK 800 Security**.
2. Enter an **Operator ID**. The requirements for the Operator ID field differ based on if you have selected **Enable Enhanced Security Features** (**ROC > Security**). For more information, refer to *Section 3.7.3 Enhanced Security*:

- If you **have not** selected **Enable Enhanced Security Features**, enter three alphanumeric characters for the **Operator ID**. Typically these are the initials of the person who operates the device.

  Note: Each Operator ID must be unique and **is** case-sensitive (that is, **ABC** is different from **Abc**).

- If you **have** selected **Enable Enhanced Security Features**, enter between three and 30 alphanumeric characters for the **Operator ID**.

  Note: The Operator ID is **not** case-sensitive.

3. Enter a **Password** for the Operator ID. The requirements for the Password field differ based on if you have selected **Enable Enhanced Security Features** (**ROC > Security**). For more information, refer to *Section 3.7.3 Enhanced Security*:

   - If you have **not** selected **Enable Enhanced Security Features**, enter four numeric characters (between **0000** and **9999**) to define the operator **Password**. More than one user can have the same password.

     Note: If you precede a password value with zeroes (such as **0006**), ROCLINK 800 saves that password as **6**.

   - If you **have** selected **Enable Enhanced Security Features**, enter between eight and 32 alphanumeric characters to define the operator **Password**. More than one user can have the same password.

4. Enter the desired **Access Level** for the user. **0** is the lowest (least inclusive) access level and allows access to the fewest number of screens. **5** is the highest (most inclusive) access level and allows access to all screens. Each access level permits access to screens at that level and any inherited from lower access levels. For example, an operator ID with Access Level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Security Access Levels*.

   Note: Click the **User Access Levels** button to globally all access levels.

5. Click the **Save** button.

Security Access Levels

Table 3-2 lists the system screens and their system-assigned security access levels. The **Menu Options** focus on the activity while you use the **Access Levels** to increase or decrease responsibility levels within the Menu Options.

To access this screen, select **Utilities > ROCLINK 800 Security > User Access Levels**.

Notes:

- If you enable security on any port, at least one operator ID must have the highest level of security (level 5).
- ROCLINK 800 rejects login requests if access levels are greater than device security.

Table 3-2. Security Access Levels

	Menu	Menu Option	Access Level
1	Configure	Transaction History	5
15	View Display	New	5
24	ROC	Security	5
71	Utilities	License Key Admin 107	5
72	Utilities	License Key Administrator 800	5
80	Utilities	Custom Display Editor	5
81	Utilities	Custom EFM Report Editor	4
20	ROC Display	Administrator	4
69	Utilities	Update Firmware	4
70	Utilities	Upgrade Hardware	4
74	Utilities	User Program Administrator	3
2	File	New	3
4	File	Download	3
5	File	Save Configuration	3
18	View Display	From File	3
19	View Display	From Device	3
23	ROC	Clock	3
25	ROC	Comm Ports	3
27	ROC	Information	3
28	ROC	Flags	3
29	Configure IO	AI Points	3
30	Configure IO	AO Points	3
31	Configure IO	DI Points	3
32	Configure IO	DO Points	3
33	Configure IO	PI Points	3
34	Configure IO	TC Points	3
35	Configure IO	RTD Points	3
36	Configure IO	System AI Points	3
37	Configure IO	Soft Points	3
38	Configure IO	Extended Soft Point	3

	Menu	Menu Option	Access Level
39	Configure IO	MVS Sensor	3
40	Configure IO	HART Points	3
41	Configure IO	Setup	3
42	Configure IO	Advanced Pulse Module	3
43	Configure IO	ACIO Module	3
44	Configure IO	Virtual Discrete Output	3
45	Configure Control	FST Registers	3
46	Configure Control	PID Loop	3
47	Configure Control	Radio Power Control	3
48	Configure Control	Sampler/Odorizer	3
49	Configure Control	DS800	3
50	Configure	History Segments	3
51	Configure	HistoryPoints	3
52	Configure	Opcode Table	3
53	Configure	Modbus	3
54	Configure	Rtu Network	3
55	Configure	LCD User List	3
56	Configure User Data	UD1	3
73	Utilities	Convert EFM File	3
75	Utilities	AI Calibration Values	3
76	Utilities	MVS Calibration Values	3
77	Utilities	FST Editor	3
78	Utilities	Keypad Display Editor	3
79	Utilities	Read File From Device	3
82	Utilities	Options	3
84	Tools	Data Logger	3
7	View	EFM Report	2
8	View	Calibration Report	2
22	ROC	Collect Data	2
57	Meter	Setup	2
58	Meter Setup 800	Station	2
59	Meter Setup 800	Orifice meter	2
60	Meter Setup 800	Linear meter	2
61	Meter	Calibration	2
62	Meter Calibration 800	Orifice meter	2

	Menu	Menu Option	Access Level
63	Meter Calibration 800	Linear Meter	2
64	Meter	Values	2
65	Meter Values 800	Orifice meter	2
66	Meter Values 800	Linear Meter	2
67	Meter	Plate Change	2
68	Meter	History	2
3	File	open	1
6	File	Print Configuration	1
9	View History	From Device	1
10	View History	From File	1
11	View Alarms	From Device	1
12	View Alarms	From File	1
13	View Events	From Device	1
14	View Events	From File	1
21	View	I/O Monitor	1
26	ROC	Memory	1
16	View Display	Display 1	0
17	View Display	Display 2	0
83	Utilities	Communications Monitor	0

3.7.2 Device Security

Use the Device Security screen to control who has access to the Comm Ports on a specific device. When you enable this feature, you must log in to ROCLINK 800 to use the communications port. You can enable this feature on each communications port separately.

To access the Device Security screen, select **ROC > Security**. The Device Security screen displays. Refer to *Adding and Deleting Users in Device Security*.

Note:

- Any operator ID you define in **ROC** >**Security** (which defines access to a device) **must** match an operator ID you also must define in **Utilities > ROCLINK 800 Security** (which defines access to the software). Without both components, an ID cannot log onto ROCLINK 800 **and** gain access to a ROC.
- The **Failed Login Counter** field displays the number of failed attempts to log in to the device.

- The Device Security screen changes based on in you have selected Enable Enhanced Security Features. For more information, refer to *Section 3.7.3 Enhanced Security*.

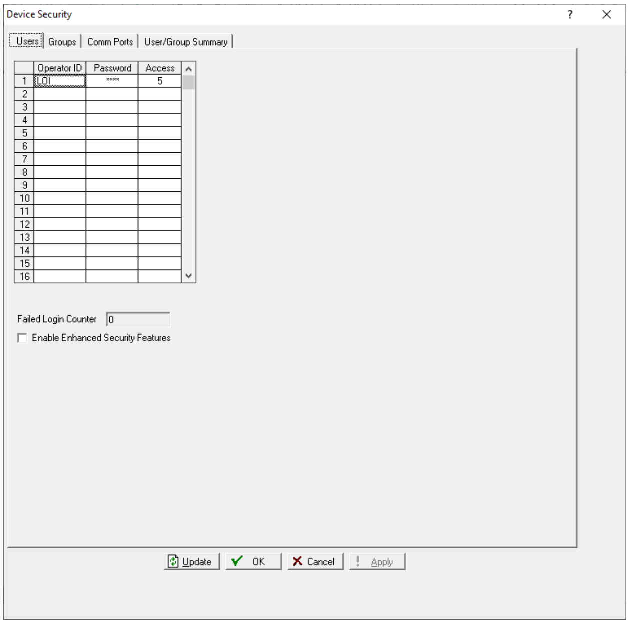


Figure 3-10. Device Security

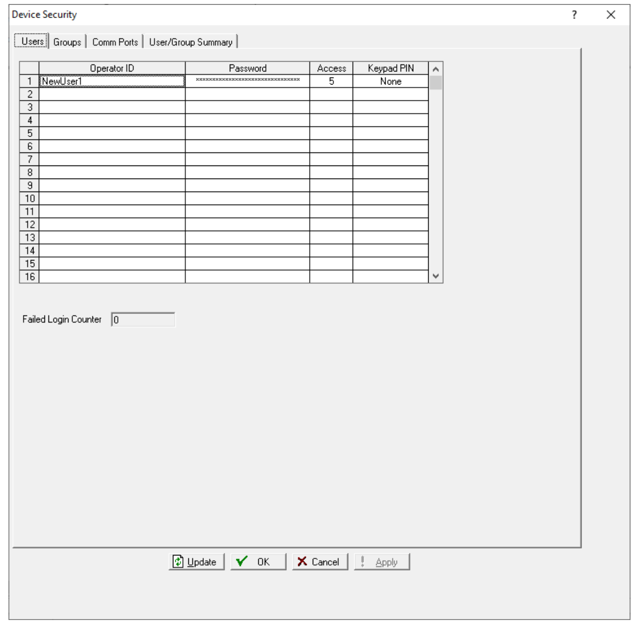


Figure 3-11. Enhanced Device Security

The default Operator ID is **LOI**; the default Password is **1000**.

1. Select **ROC** > **Security**.
2. Click an **Operator ID** field to add, edit, or remove a user. Refer to *Security Access Levels* for a full list of the access levels.

3.7.2.1 Adding and Deleting Users

This section details how to add and delete users in Device Security.

Adding a User

To add an operator ID:

1. Select **ROC** > **Security**.
2. Click on an empty cell in the table. The Device Security dialog displays.

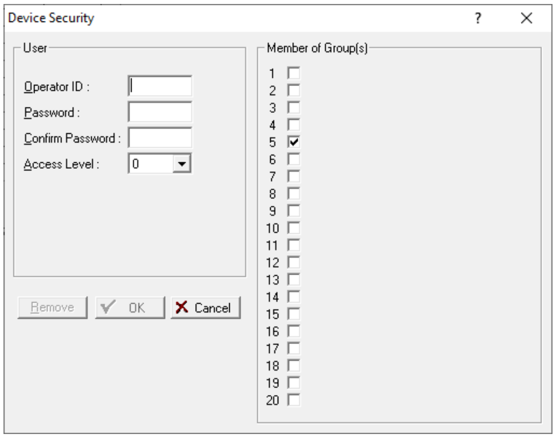


Figure 3-12. Device Security – User Table

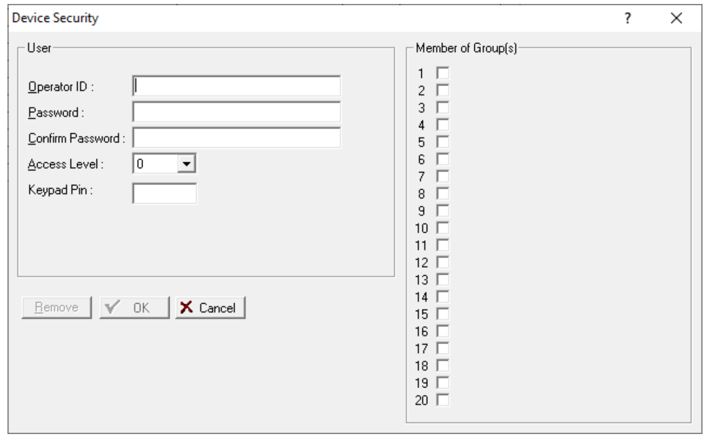


Figure 3-13. Enhanced Device Security – User Table

3. Complete the dialog as described.

Field	Description
Operator ID	Sets an Operator ID used to log into the device. The requirements for the Operator ID field differ based on if you have selected Enable Enhanced Security Features (**ROC > Security**): ▪ If you have **not** selected **Enable Enhanced Security Features**, enter three alphanumeric characters for the Operator ID. Typically these are the initials of the person who operates the device. **Note:** Each Operator ID must be unique and is case-sensitive (that is, **ABC** is different from **Abc**). ▪ If you have selected **Enable Enhanced Security Features**, enter between three and 30 alphanumeric/special characters for the Operator ID. **Note:** The Operator ID is **not** case-sensitive.
Password	Sets a Password for the Operator ID. The requirements for the Password field differ based on if you have selected Enable Enhanced Security Features (**ROC > Security**): ▪ If you have **not** selected **Enable Enhanced Security Features**, enter four numeric characters (between 0000 and 9999) to define the operator Password. More than one user can have the same password. **Note:** If you precede a password value with zeroes (such as 0006), ROCLINK 800 saves that password as 6. ▪ If you have selected **Enable Enhanced Security Features**, enter between eight and 32 alphanumeric/special characters to define the operator Password. More than one user can have the same password.
Confirm Password	Validates the password you entered in the Password field.

Field	Description
Access Levels	Sets the access level for this operator ID. **0** is the lowest access level and allows access to the fewest number of screens. **5** is the highest access level and permits access to all screens. Each access level permits access to screens at that level and any inherited from lower access levels. For example, the IDs with access level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Table 3-2*.
Keypad PIN	Sets an eight-digit numeric code for users to log into the device using the keypad. **Note:** ▪ This field **does not** apply to the DL8000. ▪ This field appears **only** if you have selected **Enable Enhanced Security Features**.
Member of Groups	Sets the groups to which this user belongs. This field corresponds to the groups the Keypad Display uses for security.

4. Click **OK** to add the user and close the dialog. The Device Security screen displays, showing the user you have just added.

Deleting a User

To delete an operator ID:

1. Select **ROC** > **Security**.
2. Click an **Operator ID** to delete.
3. Click **Remove**.
4. Click **Yes** to the confirmation dialog. The Device Security screen displays, showing that the operator ID has been removed.

3.7.2.2 Groups Tab

Select **ROC > Security > Groups** tab to establish up to 20 unique groups that Keypad Display security uses.

Note: If your application **does not** require a keypad display, you do not need to create groups.

To create a group:

1. Select **ROC** > **Security**.
2. Select the **Groups** tab. The Groups screen displays.

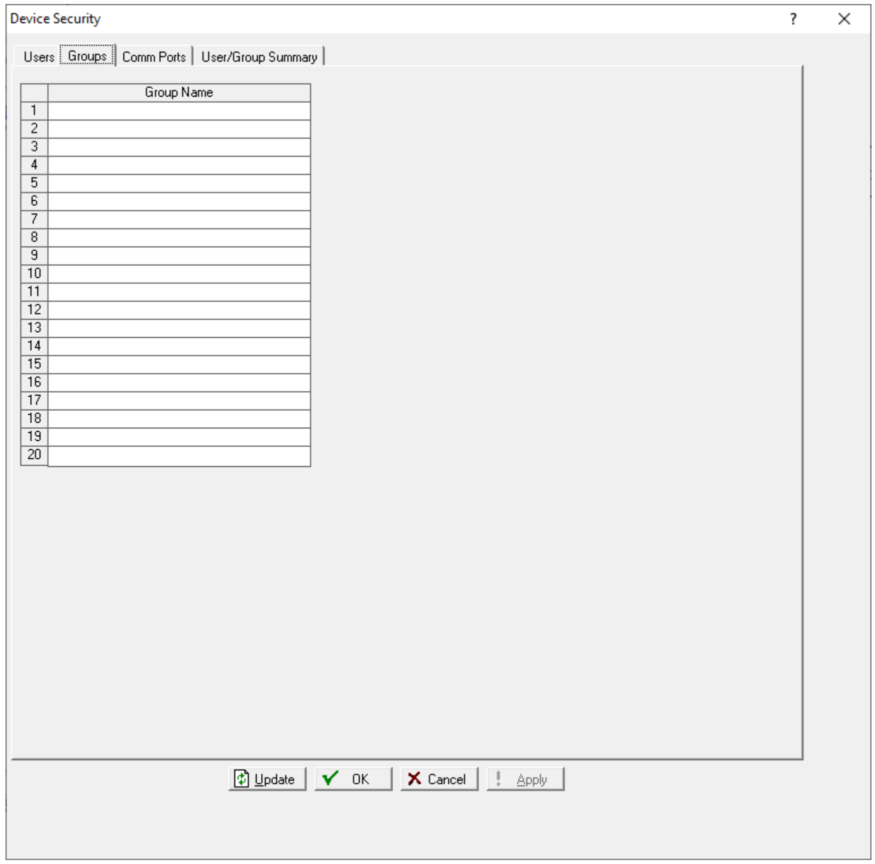


Figure 3-14. Device Security – Groups tab

3. Enter a group name (such as **Operators**, **Technicians**, or **Supervisors**) in each line.
4. Click **Apply** to save your groups.

Note: You then use the Keypad Display Editor (**Utilities** > **Keypad Display Editor**) to indicate which displays those particular groups may access.

3.7.2.3 Comm Ports Tab

When you select the Comm Ports tab, the Comm Ports screen displays:

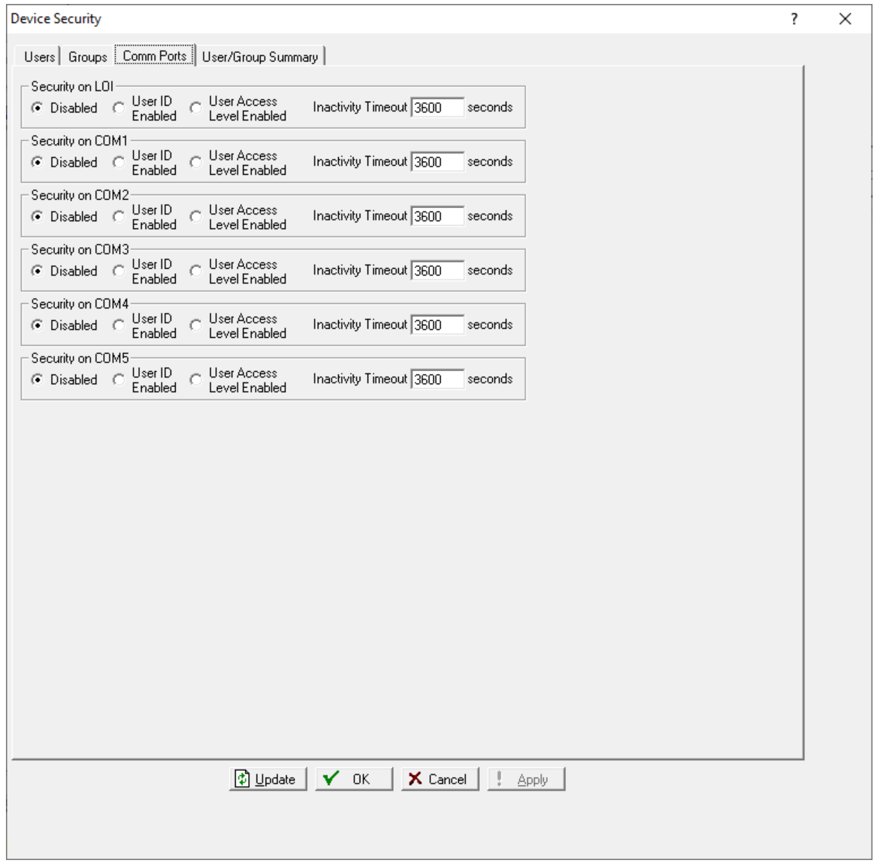


Figure 3-15. Device Security – Comm Ports tab

For each communications port, select one of the following **Security** options:

- **Disabled** – All login requests are accepted.
- **User ID Enabled** – Login requests are accepted if the Operator ID and password are valid. Upon successful login, full access is allowed.
- **User Access Level Enabled** – Login requests are accepted if the Operator ID and password are valid. Upon successful login, the user is restricted by access level. See *Security Access Levels*.

Note: If you enable security on any port, at least **one** user must have the highest level of security (level 5).

3.7.2.4 User/Group Summary Tab

The **Device Security** > **User/Group Summary** tab displays a table that summarizes the defined associations between users and groups. It reflects the users you defined on the Users tab and the groups you defined on the Groups tab.

You can also use this table to modify those associations. Click in a box to add (or remove) a user ID from a group. Click **Apply** to save any changes.

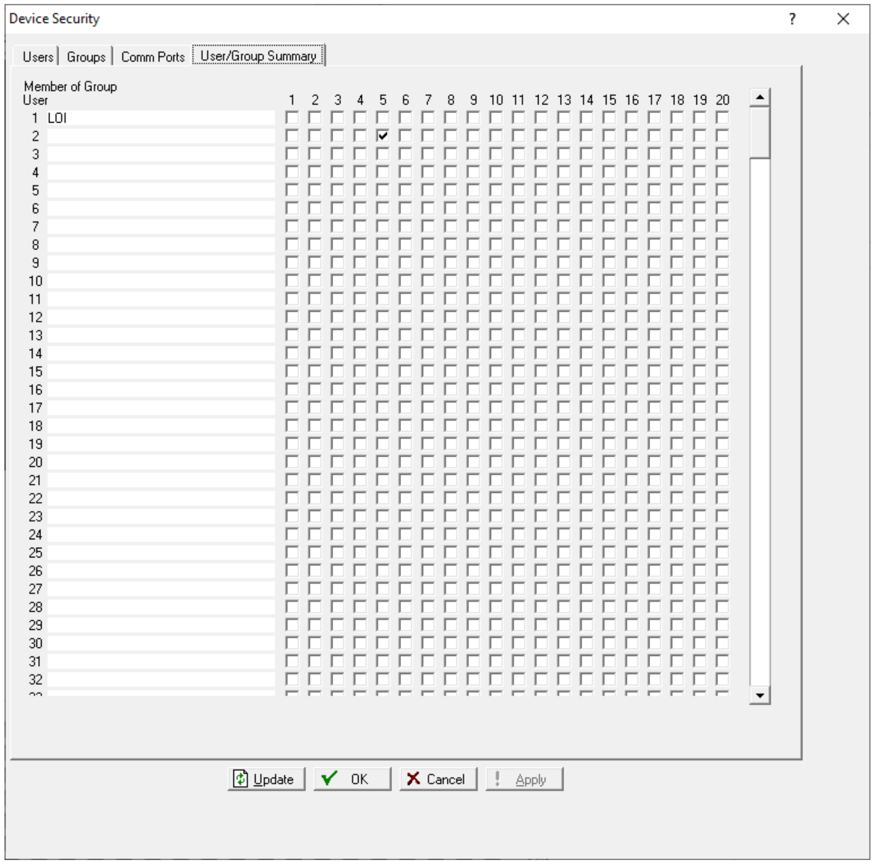


Figure 3-16. Device Security – User/Group Summary tab

3.7.3 Enhanced Security

⚠ **Caution**	**Before** opting into the new feature, confirm support in **all** software and devices communicating with the RTU or flow computer.

Opting into the new complex usernames/password format occurs at the device.

Note:

- You **must** run ROCLINK 800 as an administrator in Windows.
- You **must** log into ROCLINK 800 using an administrator-level ID.
- Once you opt into the complex usernames/passwords format, you **cannot** change back to the previous security format.

1. Select **Utilities** > **ROCLINK 800 Security**. The ROCLINK 800 Security screen displays:

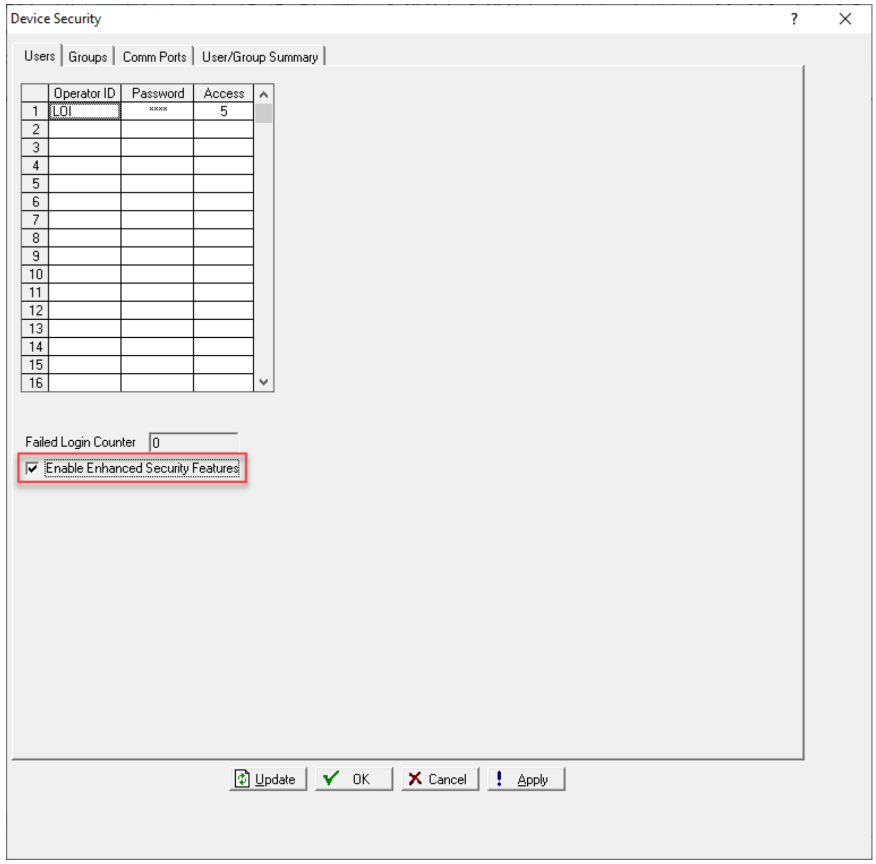


Figure 3-17. Device Security – Enable Enhanced Security Features

2. Select the **Enable Enhanced Security Features** option and click **Apply**. A warning dialog displays:

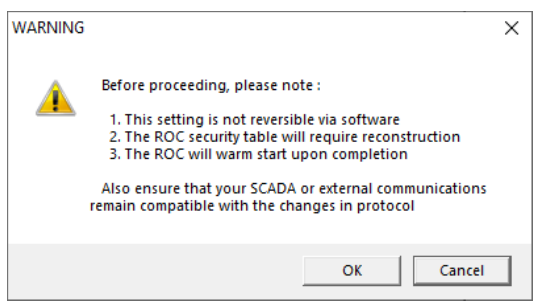


Figure 3-18. Warning Dialog

Note: Click **Cancel** (the default value) to exit this dialog and retain your current security table.

---

3. Click **OK** to opt into the new security enhancement. The Update ROC Security Logon dialog displays:

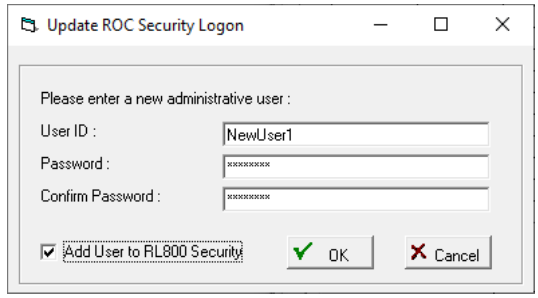


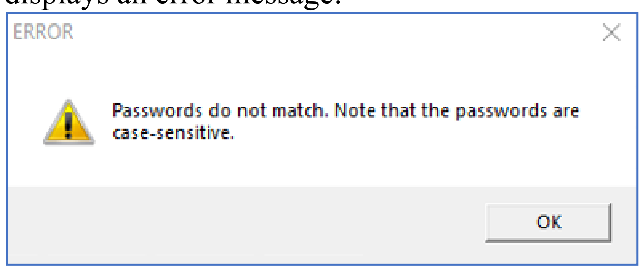
Figure 3-19. Update ROC Security Logon Dialog

Note: Click **Cancel** to exit this dialog and retain your current security table.

---

4. Define a new User ID and Password. This becomes is the **new administrative User ID**. Select the **Add User to RL800 Security** option to automatically add this administrative user ID to the ROCLINK 800 Security table.

Note: If the contents of the Password and Confirm Password fields do not exactly match (remember case-sensitivity), ROCLINK displays an error message:



Click **OK** to clear the message and re-enter the contents of both fields.

---

5. Click **OK**. When ROCLINK accepts the new administrative ID and password, ROCLINK displays a verification message:

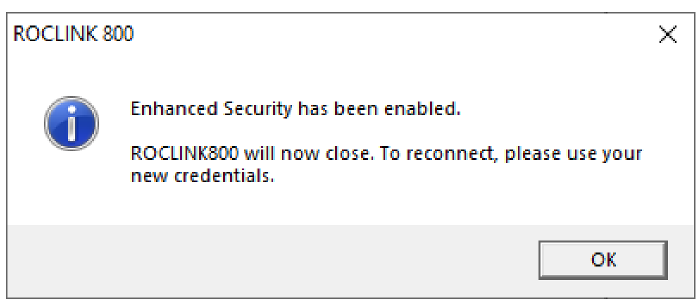


Figure 3-20. Verification Message

6. Click **OK** to close the message and exit ROCLINK 800.

3.7.3.1 After Opting In: ROCLINK 800 Security

1. Log into ROCLINK using the new administrator operator ID and password (defined in step 4 of the previous section).

2. Access the ROCLINK 800 Security screen (**Utilities > ROCLINK 800 Security**).

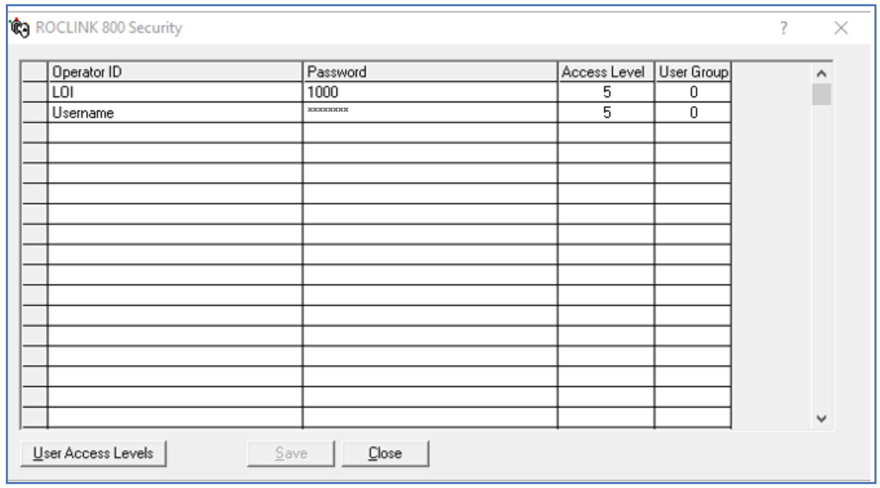


Figure 3-21. Enhanced ROCLINK 800 Security Screen

3. Define any additional operator IDs/passwords for ROCLINK 800 users.

Note: When connecting to a device that still uses the older security format, you need to close ROCLINK and reconnect to that device using the corresponding operator ID/password.

3.7.3.2 After Opting In: Device Security (IDs/Passwords)

Once you implement the new enhanced security, you then need to modify the device security table for **each** device.

Note: Once you configure a device to use the longer operator IDs/passwords, you cannot log into that device using the old (short) operator IDs/passwords.

1. Log onto a device and access its security table (**ROC > Security**):

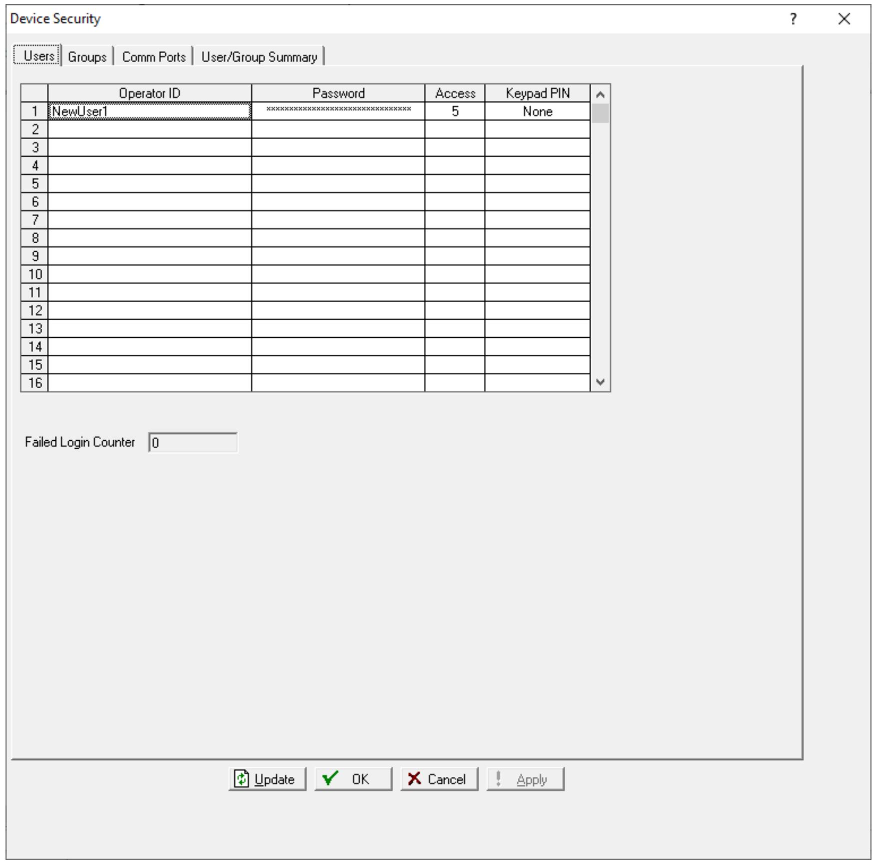


Figure 3-22. Enhanced Device Security Screen

2. Define new operator IDs (of at least **3** and no more than **30** alphanumeric/special characters) and passwords (of at least **8** and no more than **32** alphanumeric/special characters).

Note: Ensure that you define IDs and password for individual users in ROCLINK 800 security to enable them to easily log onto their device.

3.7.3.3 After Opting In: Device Security (Comm Ports)

This feature is unchanged from previous versions of ROCLINK 800, but to comply with the security directive you **must** enable security (either by User ID or User Access Level) for each comm port.

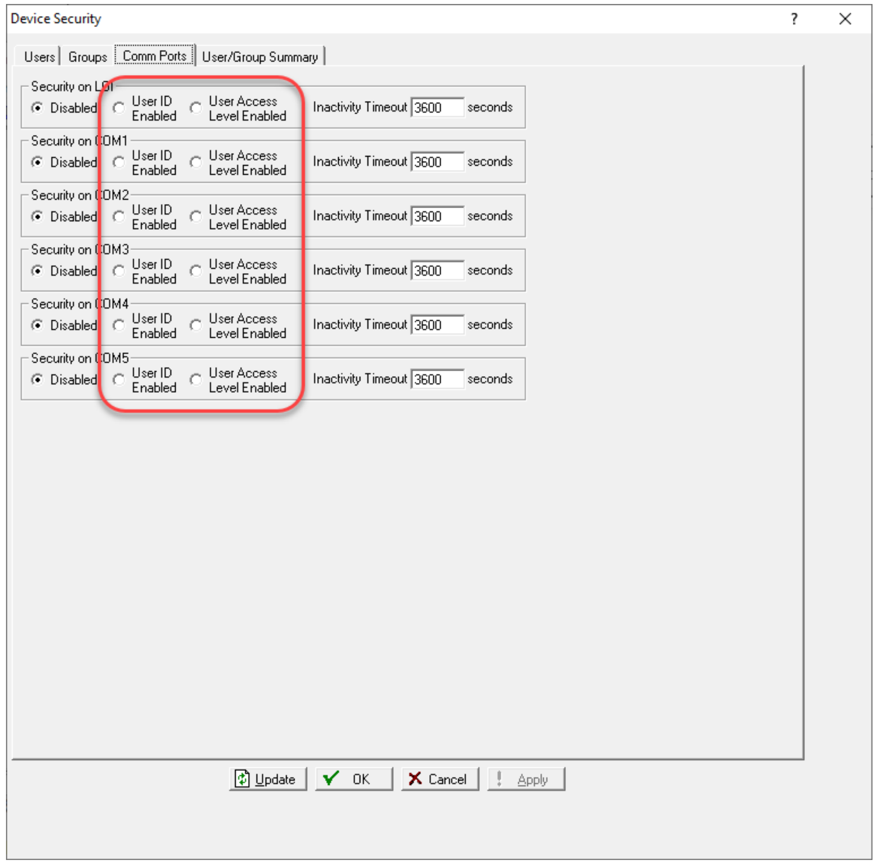


Figure 3-23. Enhanced Device Security Screen – Comm Ports tab

Chapter 4 – The File Menu

In This Chapter

Use the File Menu to print, open, close, and save configuration files. Configuration files contain all hardware and software settings for your DL8000.

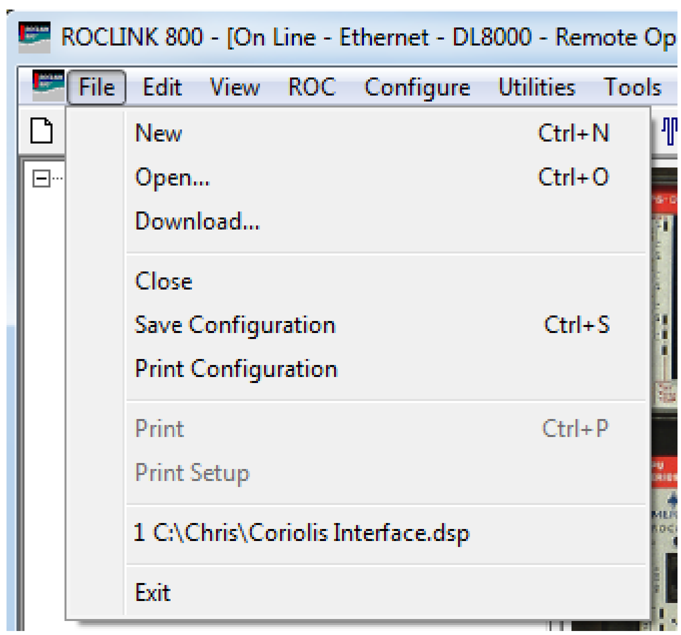


Figure 4-1. File Menu

Note: Because of the complex relationship of point types and user programs in the DL8000, you cannot currently use **File** > **New** to create a new DL8000 configuration file. However, you can save the configuration file resident in a working DL8000 and subsequently edit it.

4.1 New Configuration

The New option on the File menu allows you to create a configuration file when you are not physically connected to a ROC. However, because of the complex relationship of point types and user programs in the DL8000, it is not currently possible to create a DL8000 configuration file while you are off-line. However, you **can** save the configuration file resident in a working DL8000 and subsequently edit it. See *Saving a Configuration* (located in this chapter), for further information.

4.1.1 Configuration Checklist

For a ROC800-Series:

- ROC menu > ROCLINK 800 Security (logon)
- Device Directory > Comm Port > Properties (PC communication configurations)
- ROC menu > Security (User List and Comm Port Security)
- ROC menu > Clock
- ROC menu > Information (system variables)
- ROC menu > Comm Ports (FloBoss device communication configurations)
- Configure menu > I/O menu > AI, AO, DI, DO, DOR, PI, TC, RTD, MVS, HART, APM, ACIO, VDO and IEC62591
- Meter > Setup > Station
- Meter > Setup > Orifice Meter
- Meter > Setup > Linear Meter
- Configure menu > Control menu > PID Loop
- Configure menu > Control menu > FST Registers
- Configure menu > History Segments
- Utilities menu > FST Editor
- View menu > Display > New or from File (for custom PC displays)
- ROC menu > Flags (for saving and system variables to Flash memory)

4.1.2 Duplicating a Configuration

You can duplicate the configuration for another ROC800-Series by using these menu functions in the following order:

1. **File** > **Save Configuration** to save a device's configuration to a specified file.
2. **ROC** > **Direct Connect** (Local Port) or **Connect** (modem) to connect physically to the second unit, and then communicate.
3. **File** > **Download** loads the configuration into the unit.

After you have loaded configuration data into the second FloBoss (Step 3) and changed it as needed, you can save the configuration to its own disk file by using Step 1.

4.2 Opening a Configuration File

Use the Open option to open a configuration file stored on a PC's hard drive. Once you open the configuration file, it automatically becomes the active configuration file and you may edit the file offline. You can also load the configuration file into the device using the Download function.

To open a configuration file:

1. Start ROCLINK 800.
2. Select **File** > **Open**. The Open dialog box displays.
3. Select a configuration file name and click **Open**. The configuration file displays.

Note: ROCLINK 800 files have the .800 extension.

Note: If you receive an error when opening a configuration file, ensure that your PC's Regional Settings are configured correctly. Refer to *Installing ROCLINK 800 under Microsoft Windows 8 and Windows 7* (located in Chapter 1).

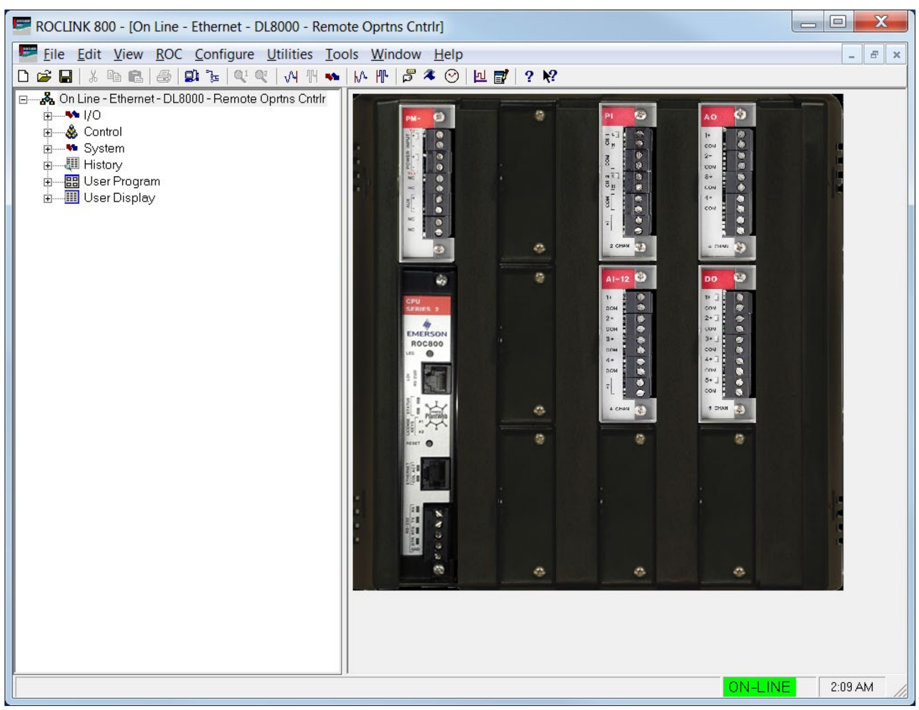


Figure 4-2. Open File Configuration

4.2.1 Configuration Tree Menu

When you open a configuration file, the Configuration Tree appears on the left-hand side of the screen. The tree hierarchically displays the parts of a configuration (such as I/O, Meter Runs, and History) that you can change.

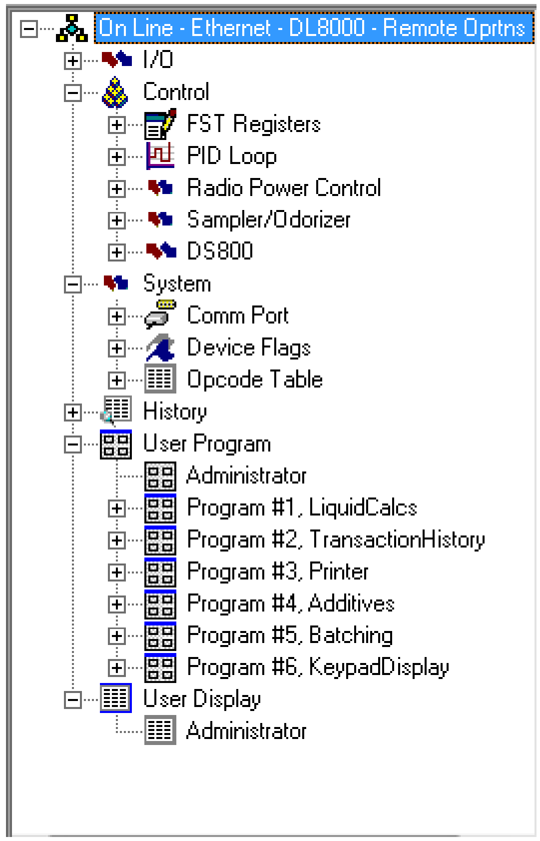


Figure 4-3. Configuration Tree Menu

Option	Description
I/O	Lists all available inputs and outputs by type.
Control	Displays the FST Registers, PID Loop, Radio Power Control, Sampler/Odorizer, and DS800 options enabled on the **ROC > Information** screen.
System	Displays Comm Port, Device Flags, and Opcode Table information.
Meter	Lists all available gas meters and all stations.
History	Displays all available History Segments and History Points.
User Program	Displays all user programs.
User Display	Accesses custom displays stored in the configuration file. The file can store a maximum of 246 displays (both custom user displays and user program displays).

From the Configuration Tree, you may change the configuration or monitor current operations. Once you are in the Configuration Tree menu, you can use the + and – symbols to display or hide various options.

Double-click the desired function in the Configuration Tree to display the associated screen. Double-clicking an icon is the same as selecting the option in the menu bar or clicking a Toolbar button.

4.2.2 Modifying an Existing Configuration File

You can make modifications to an existing configuration file offline. This allows you to share configuration files between multiple devices and customize each configuration file to account for device differences.

To modify an existing configuration file:

1. Start ROCLINK 800.
2. Select **File** > **Open**. The Open dialog box displays.
3. Select a configuration file name and click **Open**. The configuration file displays.

Note: ROCLINK 800 files have the .800 extension.

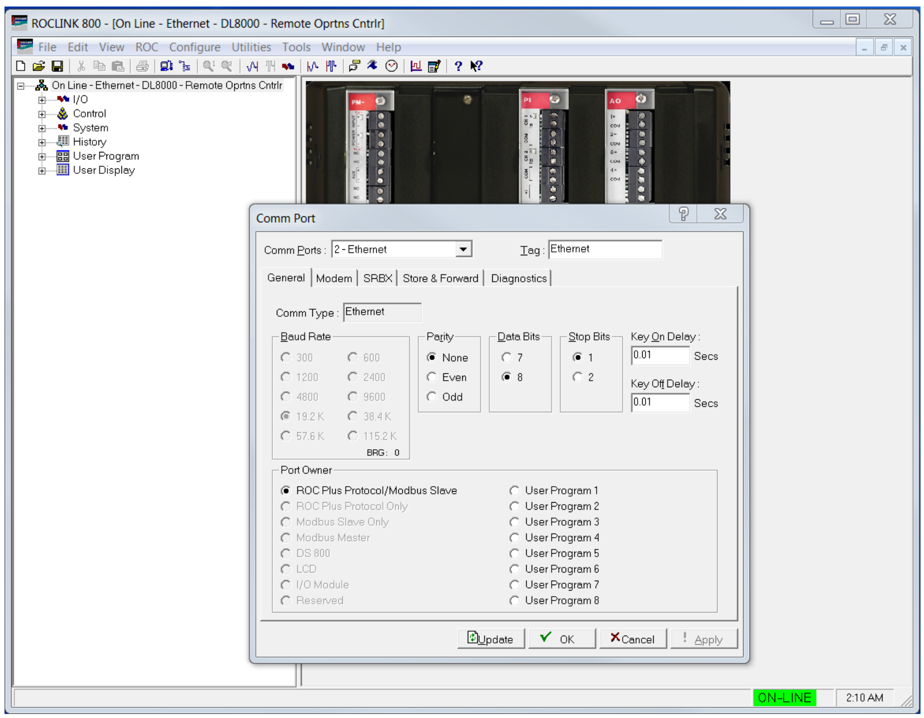


Figure 4-4. Modifying Configuration File

4.2.3 Adding Modules to an Existing Configuration File

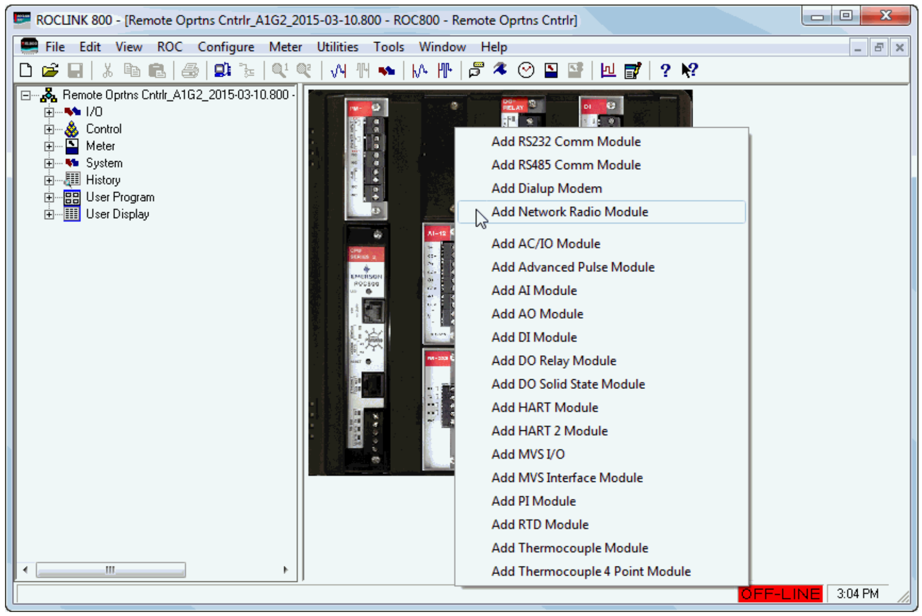
You can add modules to an existing configuration file. To modify an existing configuration file:

1. Start ROCLINK 800.
2. Select **File** > **Open**. The Open dialog box displays.

3. Select a configuration file name and click **Open**. The configuration file displays.

Note: ROCLINK 800 files have the .800 extension.

4. Right-click an empty slot to display a pop-up menu of available modules.



5. Select the appropriate module from the pop-up menu. An Add New Module dialog displays.

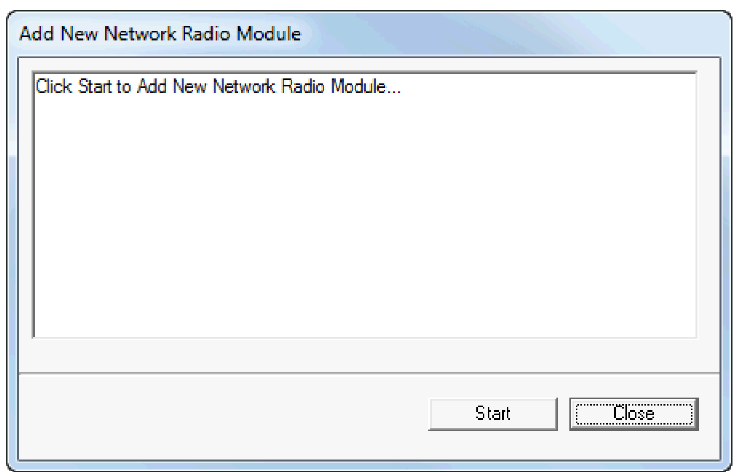


Figure 4-5. Add New Module

6. Click **Start** to add the new module TLPs to the configuration file.

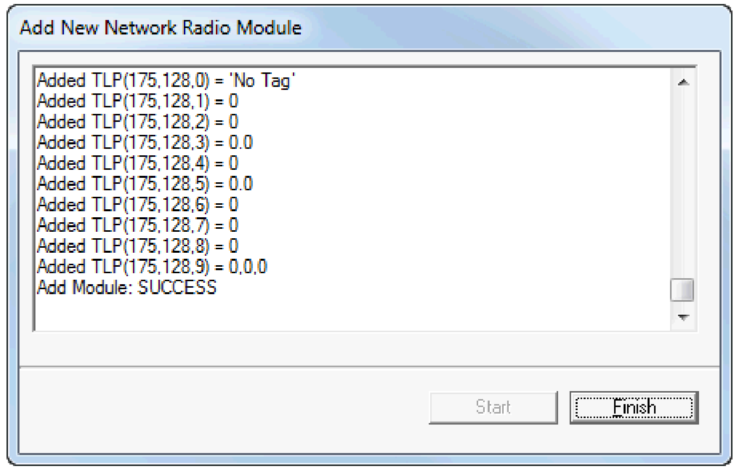


Figure 4-6. Add New Module Success

7. Click **Finish**. A dialog displays warning you that all offline and online connections must be closed to complete the operation.

⚠ **Caution**	**Any unsaved changes to other configuration files are lost when the connections are closed.**

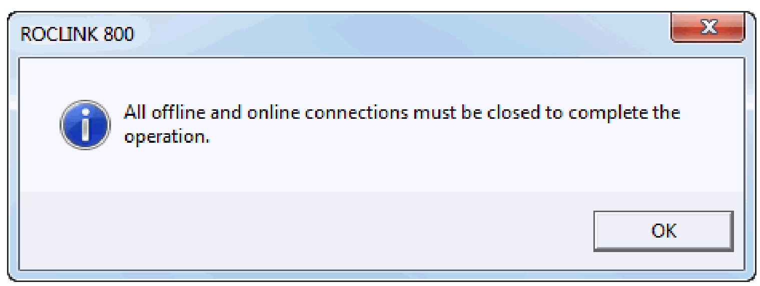


Figure 4-7. Connection Must Be Closed

8. Click **OK** to close all online and offline connections and the new module to the configuration.

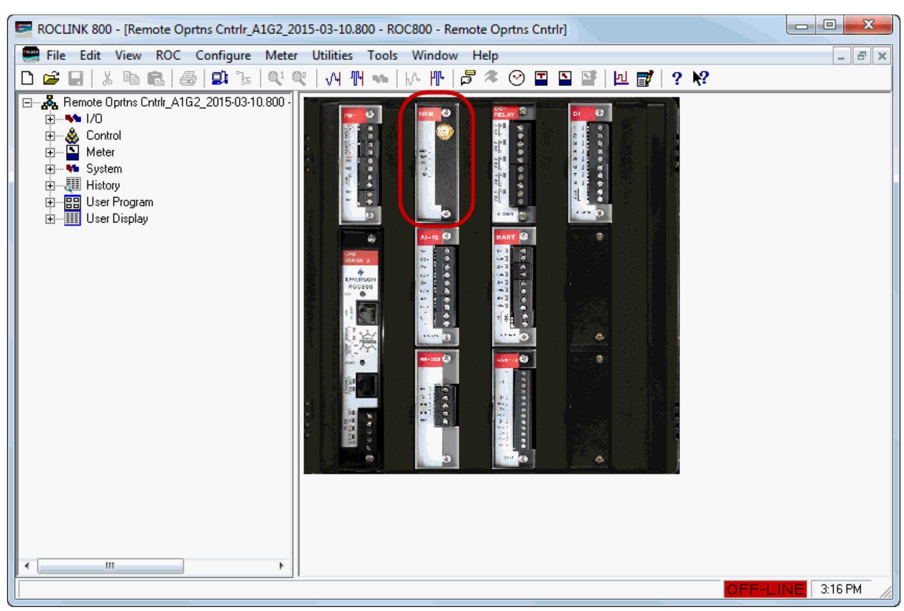


Figure 4-8. New Module Added

4.3 Downloading a Configuration

Use the Download option to download a saved configuration to a ROC.

1. Connect to the ROC.
2. Select **File > Download**. The Select Configuration File to Download dialog displays.
3. Select a configuration file. ROCLINK 800 configuration files have the extension .800.
4. Click **Open**. The Download Configuration screen displays.

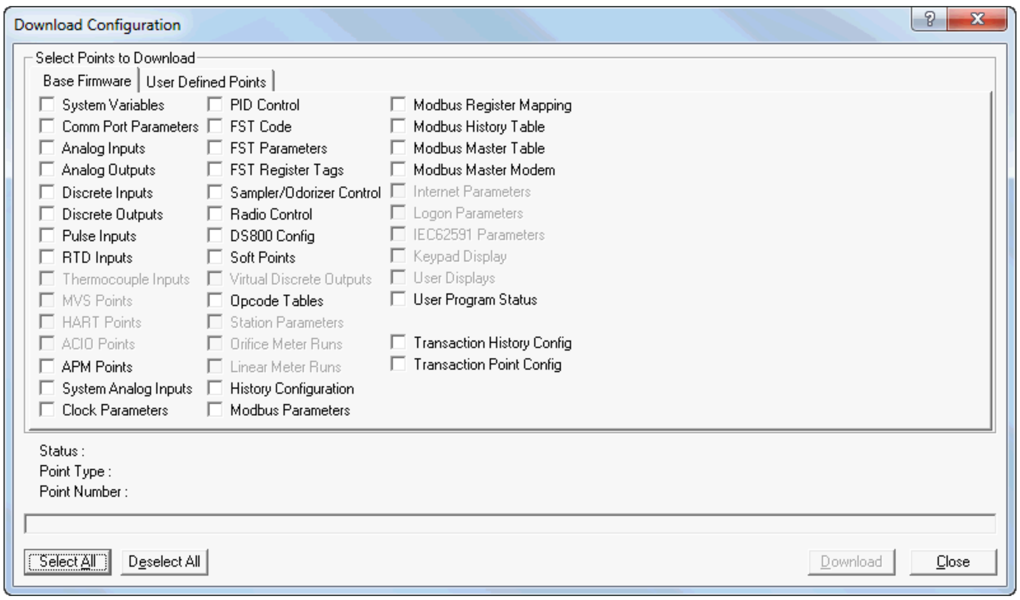


Figure 4-9. Download Configuration-Base Firmware Tab

5. Select only the configuration points you desire to download. ROCLINK 800 grays out any items not configured in your configuration.
6. Select the **User Defined Points** tab. The User Defined Points screen displays.

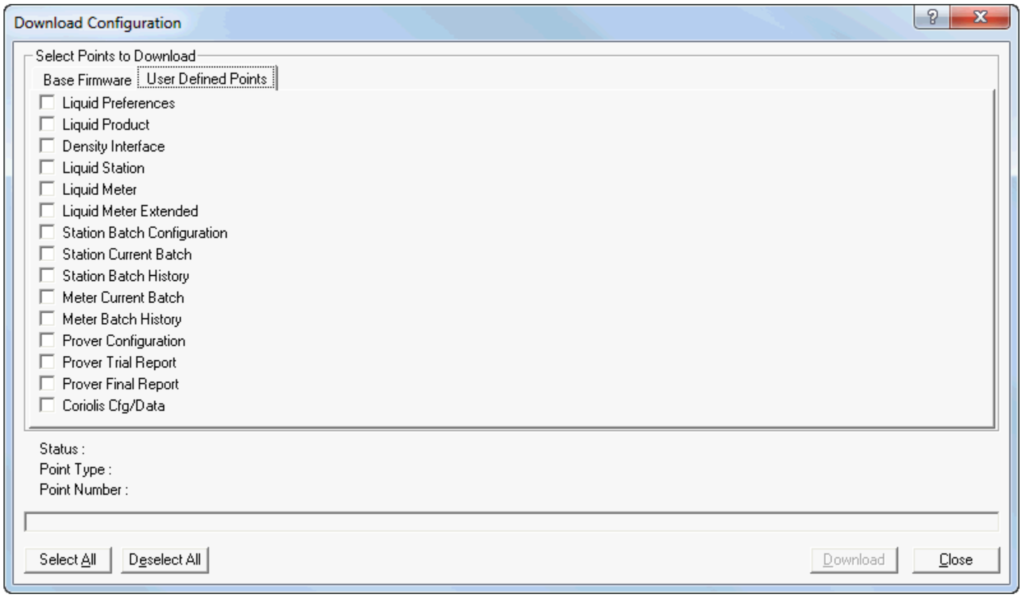


Figure 4-10. Download Configuration-User Defined Points Tab

7. Select only the User Defined Points you desire to download.
8. Click **Download**. ROCLINK 800 begins to download the configuration points you have chosen, and displays the status, point type, and point number information as the download progresses.
9. Click **OK** when the download completes.
10. Select **ROC** > **Flags** and click the **Save Configuration for Flash Memory** button.

4.4 Saving a ROC User File

In addition to keeping backup copies of the configuration file, it is also good practice to keep a backup copy of the **ROC_USER.mdb** file. This file contains the communications, security, and password settings for the device.

To create a backup copy of the file:

1. Open Windows Explorer and navigate to the folder where ROCLINK 800 software is located. Typically, this folder is C:\Program Files\ROCLINK800.
2. Create a copy of the **ROC_USER.mdb** file.
3. Paste the copy into another folder on the PC or a disk.

4.5 Saving a Configuration

The **Save Configuration** option saves the current configuration of a connected device to a disk file. This feature is useful when creating a backup, when configuring similar ROC for the first time, or when making configuration changes off-line. Once a backup configuration file is created, it can be loaded into a device using **File > Download**.

1. Select **File > Save Configuration**. The Save As dialog box appears.
2. Type the desired **File name** of the backup file.
3. Click **Save**.

ROCLINK 800 configuration files have the extension **.800**.

4.6 Printing a Configuration

Use the Print Configuration option to specify the point types that you want to print.

1. Select **File > Print Configuration**. The Print Configuration Setup screen displays.

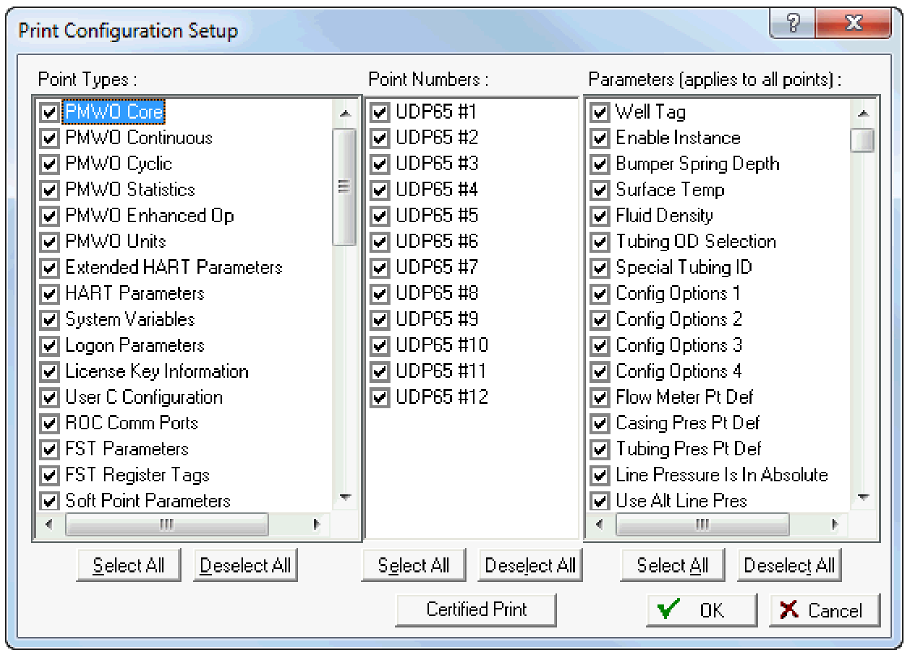


Figure 4-11. Print Configuration

2. Select the specific **Point Types** to print.

Note: Click **Select All** or **Deselect All** to select multiple point types, point numbers, or parameters. Use your mouse to select/deselect individual point types, point numbers, or parameters.

3. Select the **Point Numbers** to print.
4. Select the **Parameters** to print.

Note: Click the **Certified Print** button to automatically print all point types, point numbers, and parameters in the device. This option does not allow you to deselect any point types, point numbers, or parameters.

5. Click **OK**. ROCLINK 800 reads the configuration from the device and displays the **Print Preview** screen.

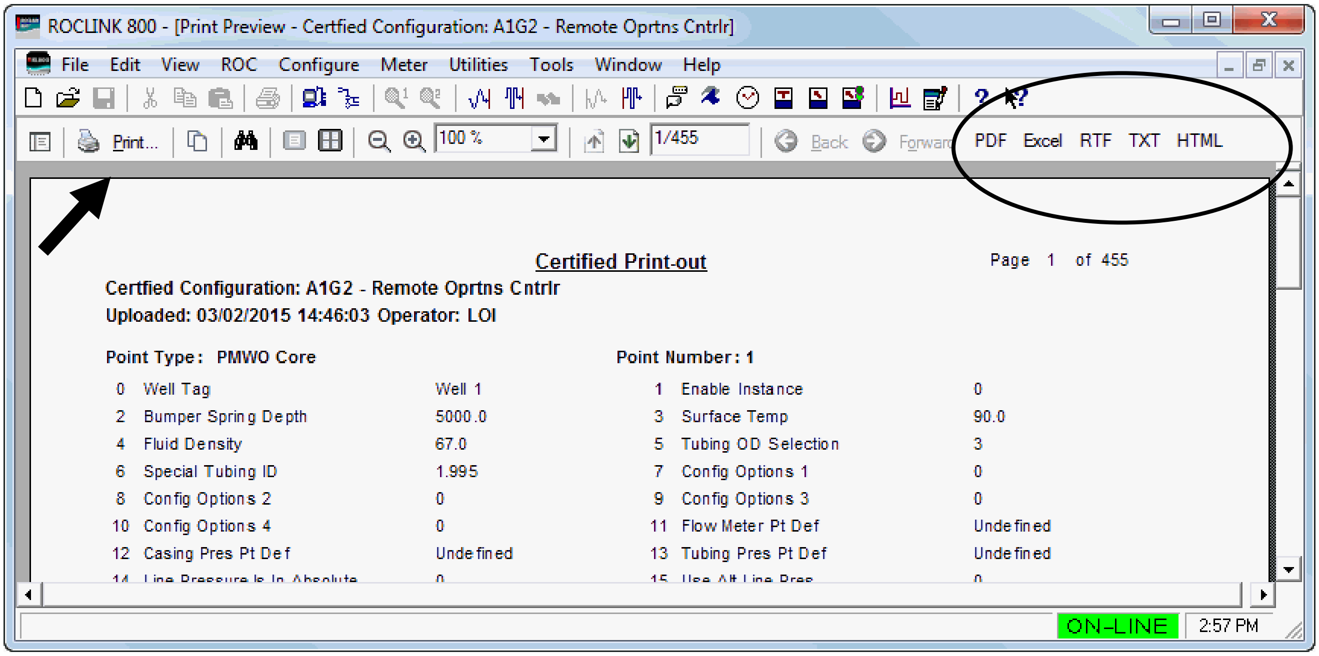


Figure 4-12. Print Preview-Certified Print

6. Use screen option buttons (located on the toolbar) to either directly print the preview or export the preview (with a file name you specify) to your PC's hard drive in one of the following formats:

Button	Result
Print	Sends file to a local printer
PDF	Converts the content to the format of an Adobe® Acrobat® file
Excel	Converts the content to the format of a Microsoft® Excel™ spreadsheet file
RTF	Converts the content to the format of a Microsoft Rich Text Format (RTF®) file
TXT	Converts the file to the format of an ASCII-compatible text file
HTML	Converts the file to the format of a hypertext markup language file.

4.7 Print

Click **Print** or select Print from the File menu to print ROCLINK 800-generated historical, event, and alarm log reports.

4.8 Print Setup

Use Print Setup to change the default printer for ROCLINK 800 information.

To change printers:

Select **File** > **Print Setup**.

Select the printer you desire to print to from the **Name** drop-down list.

4.9 Recent Files

The File menu displays the configuration files that you have recently opened or saved.

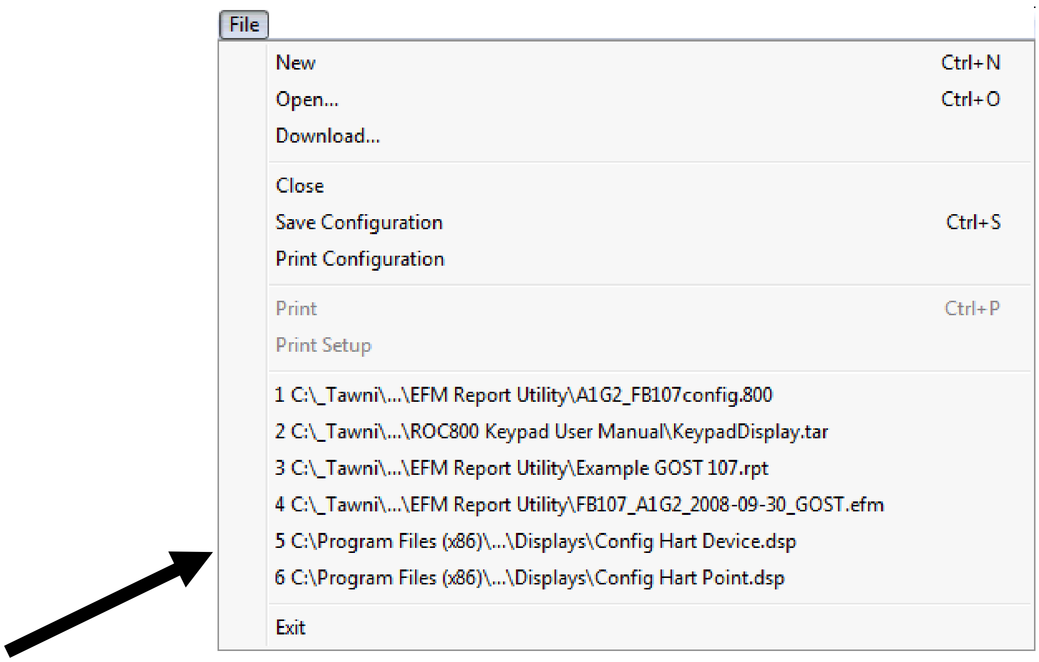


Figure 4-13. Recent Files

4.10 Close

Select **File** > **Close** to close the active screen.

Note: Because the graphic display is an active screen, selecting Close can terminate the online connection.

4.11 Exit

Select **File** > **Exit** to exit the ROCLINK 800 program. The following may occur:

- If you are currently editing a configuration file, ROCLINK 800 closes the file.
- If you are currently connected to a dial-up ROC, ROCLINK 800 issues the hang-up command to the modem.
- If you are currently online with a ROC, the connection automatically terminates.

Chapter 5 – The View Menu

In This Chapter

Use the View menu options to view the Device Directory; electronic flow measurement (EFM) reports; calibration logs; history, alarms, weights and measures, and events logs; create, view, and manage custom displays, monitor I/O; view the toolbar; and update point tags on the User Program configuration tree.

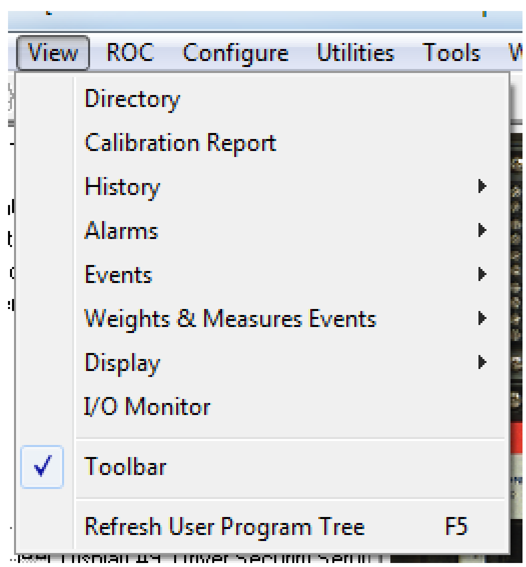


Figure 5-1. View Menu

5.1 Directory

Select **View > Directory** to replace the ROC800-Series graphic image or Configuration Tree with the Device Directory. The Device Directory displays the root level of all devices and groups configured in ROCLINK 800.

Note: You can also switch displays between the Device Directory and the online device using the **Windows** option on the ROCLINK 800 menu bar.

5.2 Calibration Reports

ROCLINK 800 enables you to create a calibration report to record the calibration procedure.

Creating Calibration Report Data

Before you can view a calibration report, you must create calibration report data. Refer to *Chapter 7, Configure*, for instructions on creating AI and RTD calibration data.

5.2.1 Viewing a Calibration Report

To view a calibration report:

1. Select **View > Calibration Report**. An Open dialog displays, listing available calibration reports.
2. Select a **Calibration Report** to view.
3. Click **Open**. The View Calibration Report screen displays.

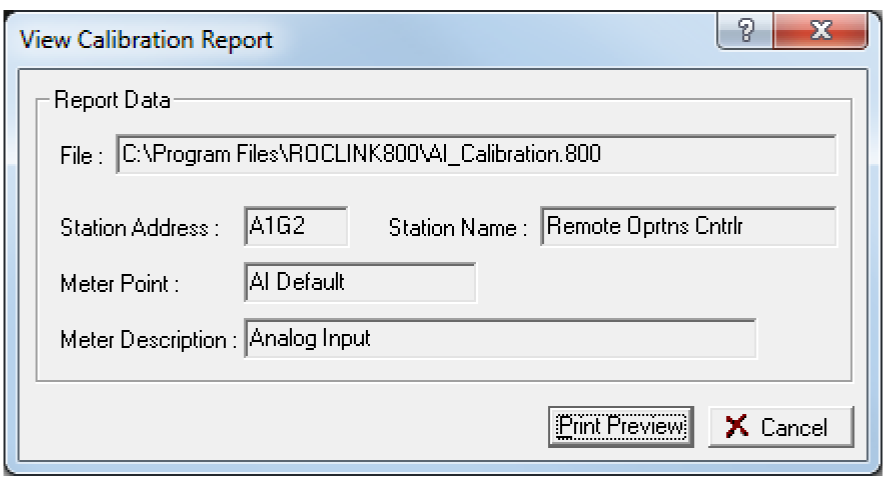


Figure 5-2. View Calibration Report

4. Click **Print Preview**. The Print Preview screen displays.

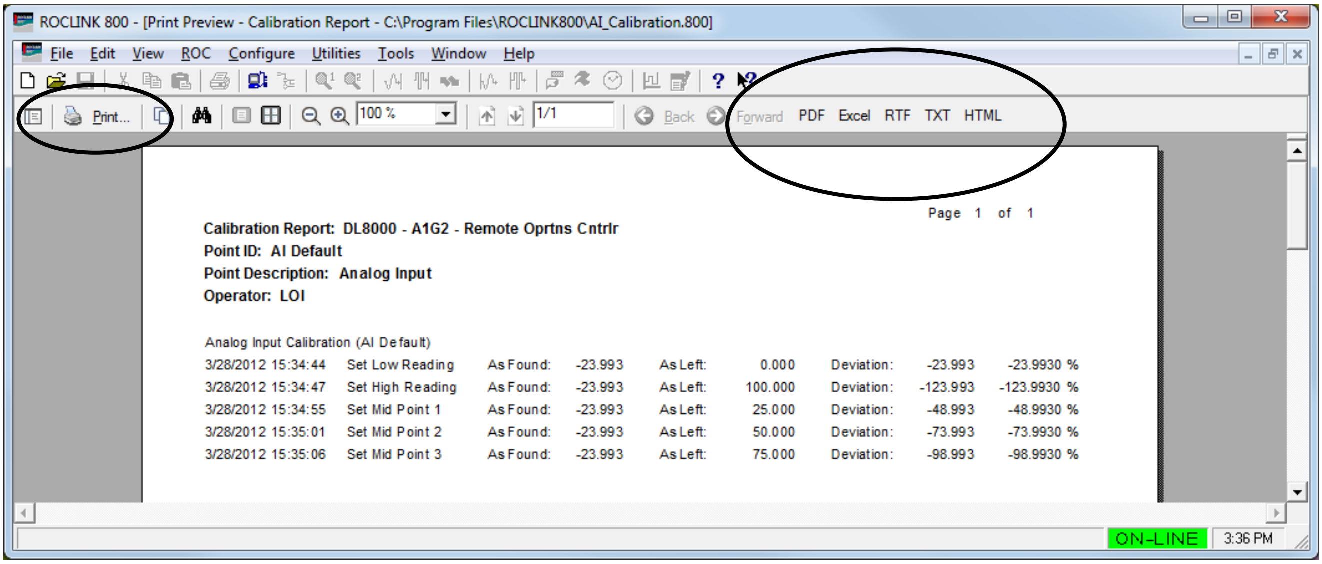


Figure 5-3. Calibration Report Print Preview

5. Click **Print** to print the report. ROCLINK 800 displays a Print window that allows you select the printer, number of copies, and other options.

You can also export the report to different formats using the PDF, Excel, RTF, TXT, and HTML buttons on the toolbar.

5.3 History Logs

The History option on the View menu option enables you to access and display the Minute, Hourly (Periodic), and Daily History logs either directly from a DL8000 to which you are connected (**From Device**) or from a previously saved file (**From File**).

Note: You **must** configure history points before you can view them. Refer to *Configure History Points* in *Chapter 7, Configure.*

Once you select the view, the system displays the log (see *Figure 5-4*):

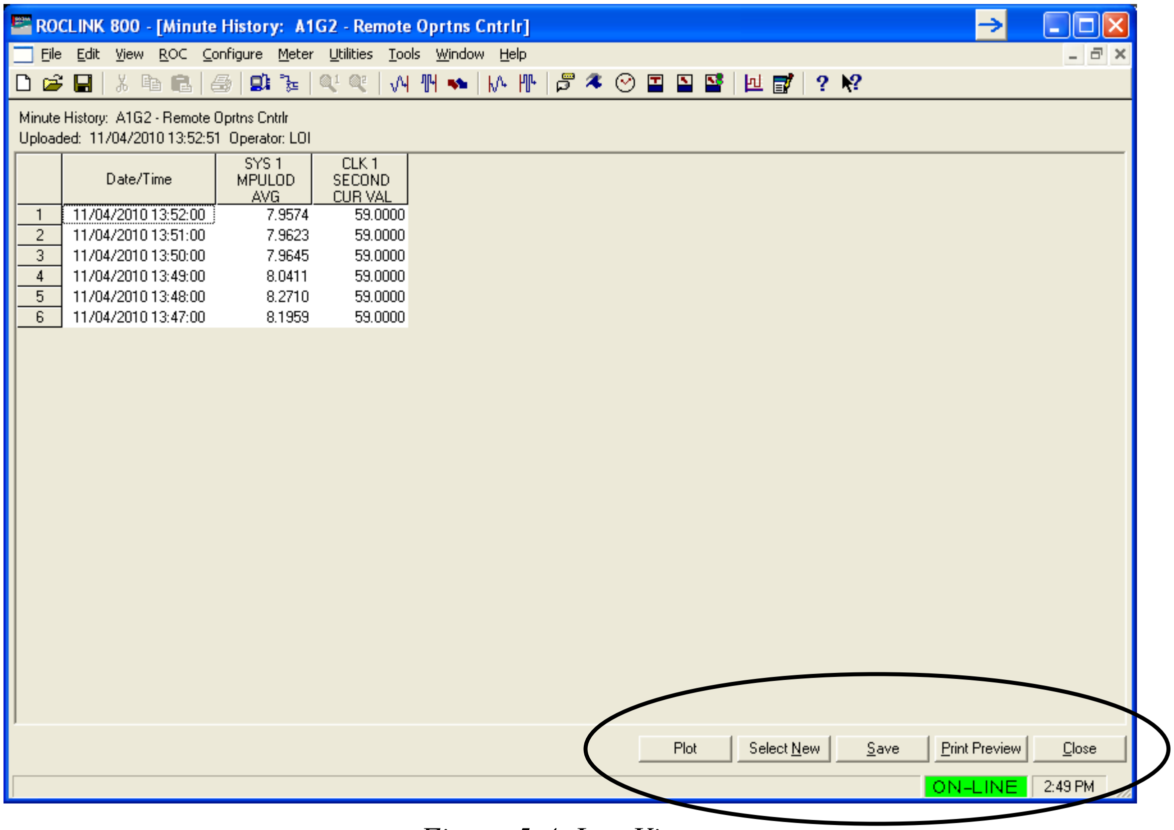


Figure 5-4. Log Viewer

ROCLINK 800 provides several option buttons you can use to manage report data:

Button	Description
Plot	Graphically displays history data based on criteria you select. Refer to *Section 5.4.3, Plotting History,* for further information.
Select New	Re-displays the Select History Points screen, which you can use to select new history values. **Note:** This option is available **only** if you are viewing data from the device.
Save	Saves the log as a file on your PC, using one of the following file name extensions based on the kind of data. ▪ **.MDB** – Minute-based history log file. ▪ **.PDB** – Hourly/Periodic-based history file. ▪ **.DAY** – Daily-based history log file. **Note:** This option is available **only** if you are viewing data from the device.
Print Preview	Displays a preview of the report data as it would appear if printed. Refer to *Print Configuration* for information on managing the print preview.
Close	Closes the display.

5.3.1 Viewing Logs from a Device

When you choose to view history logs from a connected device, ROCLINK 800 displays a dialog box. You use this dialog to specify the report contents.

1. Select **View** > **History** > **From Device**. The Select History to View screen displays:

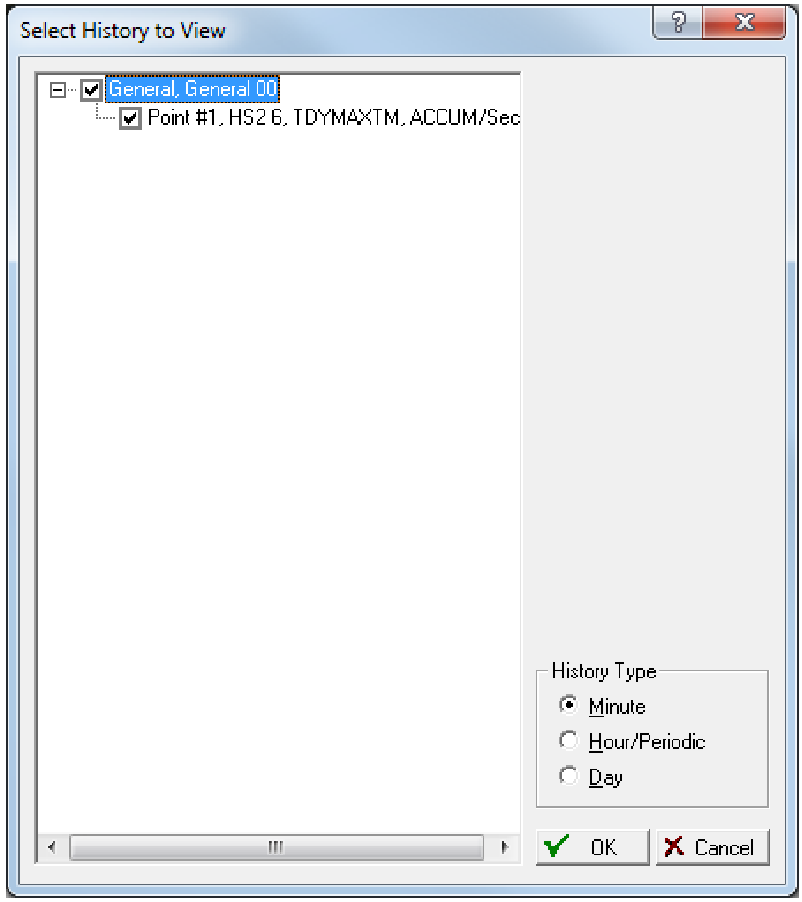


Figure 5-5. Select History to View

2. Select or de-select the **History Points** to include on the view.
3. For History views, select the **History Type** and indicate a log frequency. You can view Minute, Hourly (Hour or Periodic), or Daily (Day).
4. Click **OK**. ROCLINK 800 retrieves the data you have selected and displays it on a preview screen.

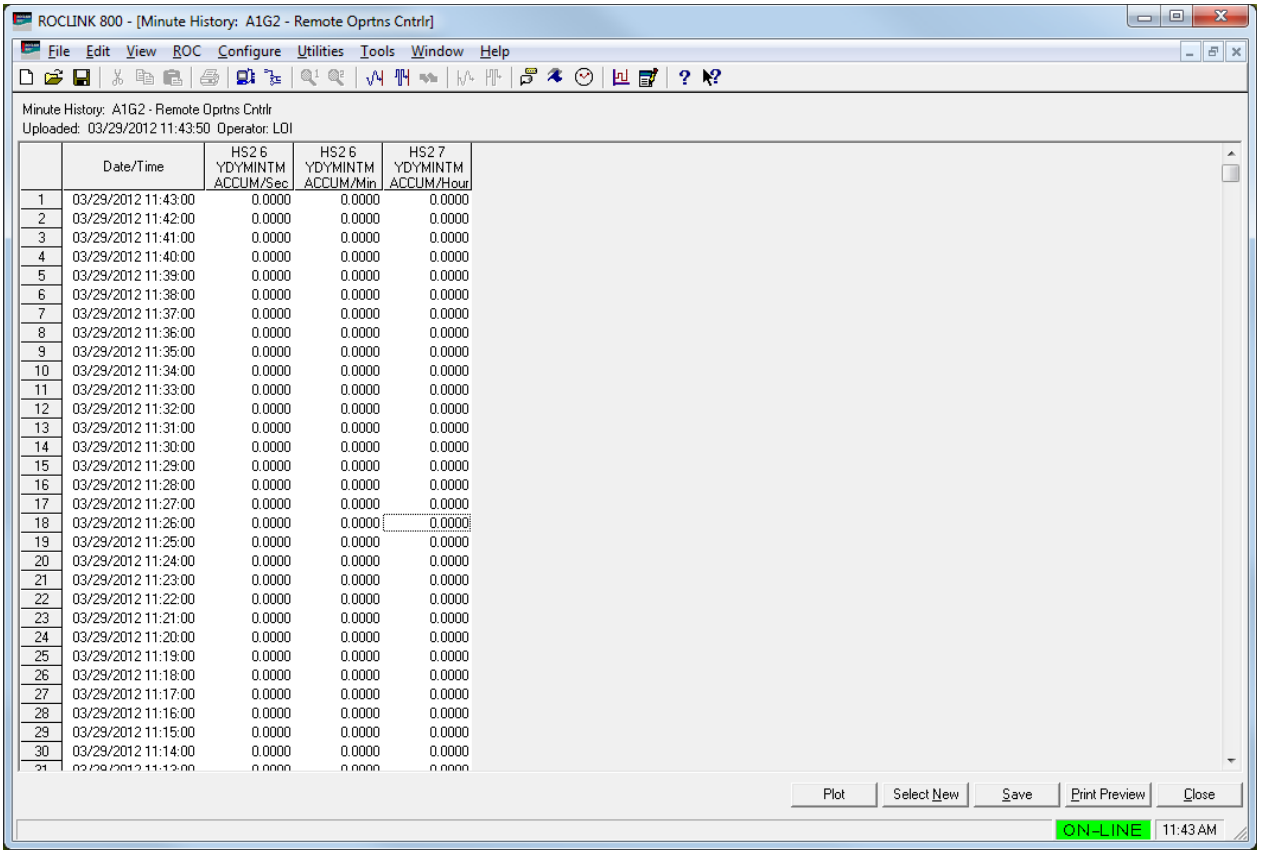


Figure 5-6. History (from device)

5. Review the report.

Note: Click **Save** to save the data to a file on your PC. You can then view history logs without being connected to the device.

6. Click **Close** to close the preview.

5.3.2 Viewing History Logs from a File

During the course of operation, the ROC creates a history log. You can save this log to a file on your PC for off-line viewing and analysis. ROCLINK 800 provides additional tools you can use to manipulate the data.

Note: You must first retrieve the history file from the device and then save the file before you can view a history log from a file.

1. Select **View** > **History** > **From File**. An Open dialog displays.
2. Select the file and click **Open**. A preview screen displays. Refer to *History, Alarm, and Event Log Reports* for valid history file name extensions.

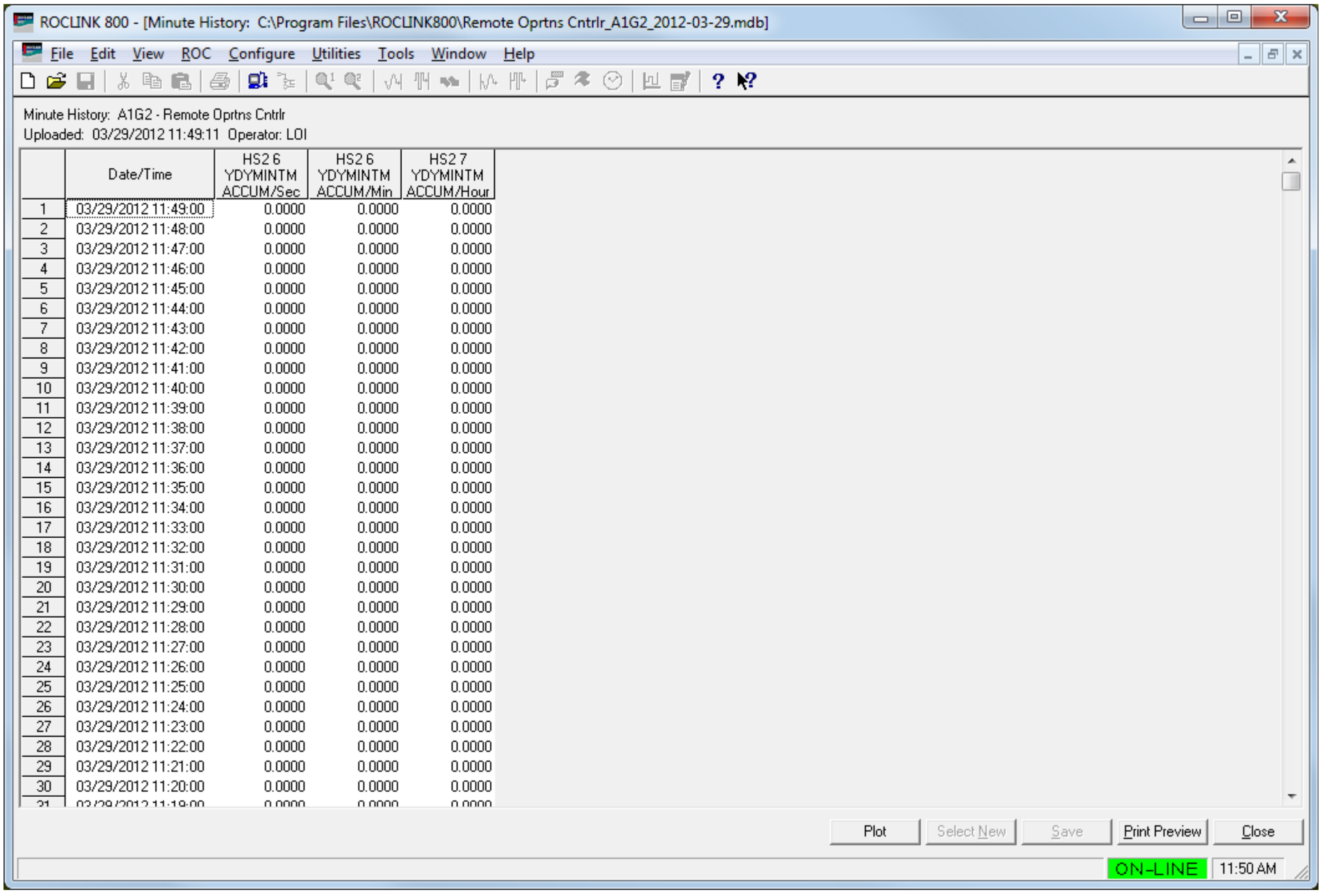


Figure 5-7. History (from file)

3. Review the file.

Note: Click **Print Preview** to print the report contents (see *Print Configuration*) or **Plot** to create a graphic display of the report contents (see *Plotting History*).

4. Click **Close**.

5.3.3 Plotting History

For history data you obtain from either a connected device or a file and display on a print preview, ROCLINK 800 provides an option that enables you to graphically display the report results.

After you select the report data, click **Plot**. ROCLINK 800 displays a graphical version of the selected data.

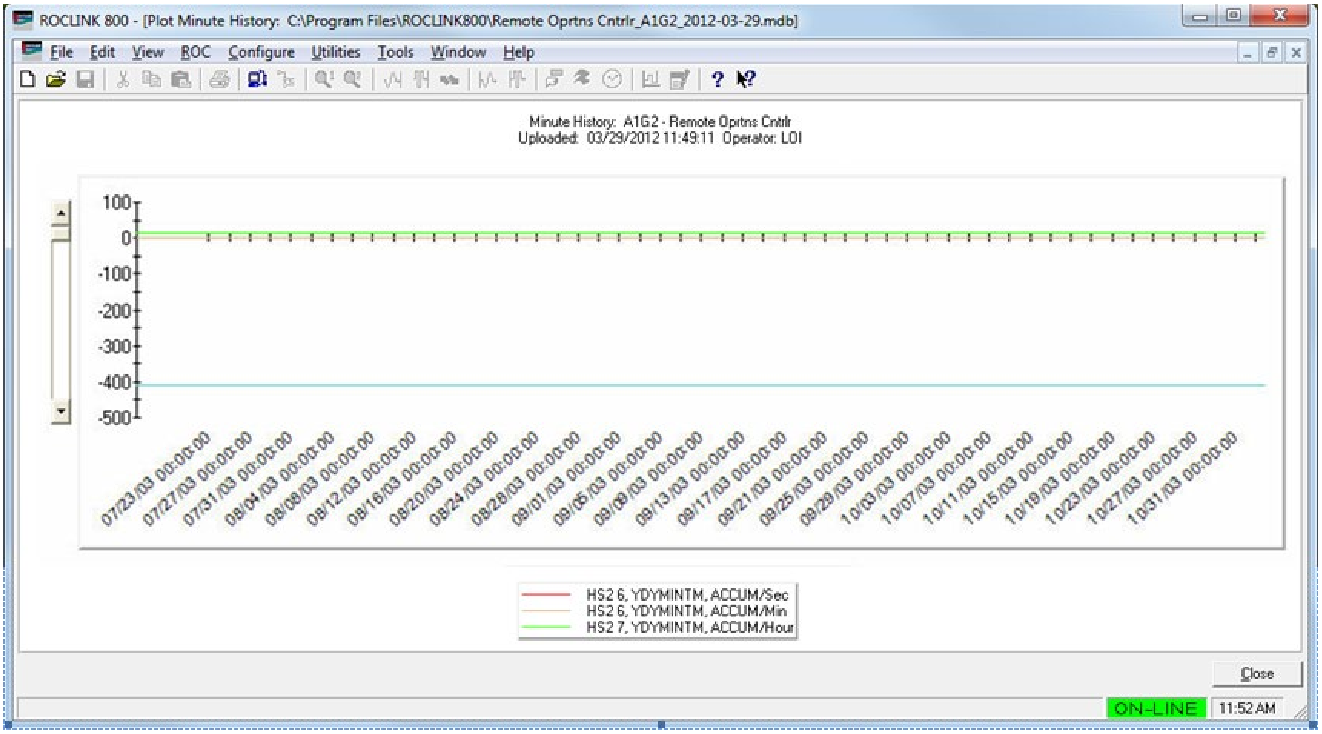


Figure 5-8. Plotting History

5.3.4 Managing Plotted History

The plot displays each series of lines as connected points of data, based on the time the data was archived and the current value at that time. The plot chart displays the type of history, device type, date, time, and the Operator ID in the header. The left (Y) axis displays the value and the bottom (X) axis displays the date and time the value was read. A legend at the bottom of the graph corresponds with the lines within the graph.

Use the scroll bar to the left of the graph to change the Y-axis.

Graphics zoom enlarges the selected area of a chart, while not necessarily showing the axes.

Axis zoom changes the minimum and maximum data values to those selected and redraws only that data with the axes.

Graphics Zoom To zoom an area of the plot:

1. Press **Ctrl** and hold down the left mouse button.
2. Drag the mouse to select zoom area and release the mouse button.
3. Press **r** to remove the effect and restore the original plot.

Axis Zoom To zoom into a particular axis of the plot:

1. Press **Shift** and hold down the left mouse button.
2. Drag the mouse to sets the zoom area and release the mouse button.
3. Press **r** to remove the effect and restore the original plot.

Scaling To scale the chart to a specific size: :

1. Press **Ctrl** and hold down both mouse buttons (or middle button on a 3-button mouse).
2. Move the mouse **down** to **increase** chart size or move the mouse **up** to **decrease** chart size.
3. Press **r** to remove the effect and restore the original plot.

Moving To move the chart::

1. Press **Shift**, and press down both mouse buttons (or the middle button on a 3-button mouse).
2. Move the mouse to change the positioning of the chart.
3. Press **r** to remove the effect and restore the original plot.

5.4 Alarm, Event, and Weights & Measurements Events Logs

The View menu option enables you to access and display the Alarm logs, the Event logs, and the Weights & Measurements logs either from the connected ROC or from a file.

Once you select the view, the system displays the log. ROCLINK 800 provides several option buttons you can use to manage report data:

5.4.1 Viewing Alarm Logs

You can view a log of all alarms on your connected ROC or from a disk file.

1. Select **View** > **Alarms** > **From Device** or **From File**. A viewer displays, showing the log:

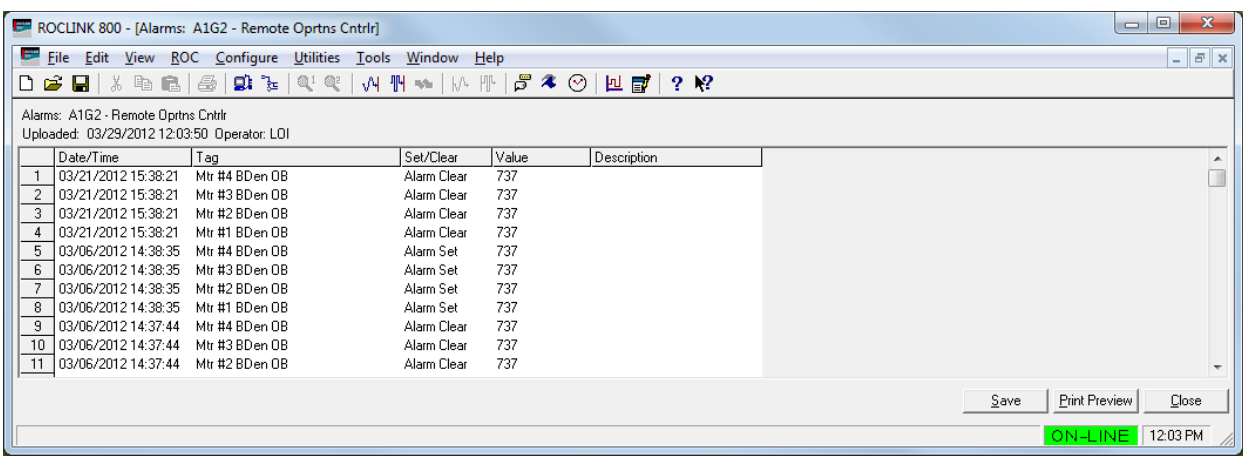


Figure 5-9. Alarm Log

2. Review the alarms preview and select an option:

Save	Saves the log as an .ALM file. **Note:** This option is available **only** if you are viewing data from the device.
Print Preview	Shows a preview of the printed version which you can send directly to a printer or convert to one of five file formats.
Close	Closes the log viewer.

3. Click **Close** to close the viewer.

5.4.2 Viewing Event Logs

You can view a log of all events on your connected ROC or from a disk file.

1. Select **View** > **Events** > **From Device** or **From File**. A viewer displays, showing the log:

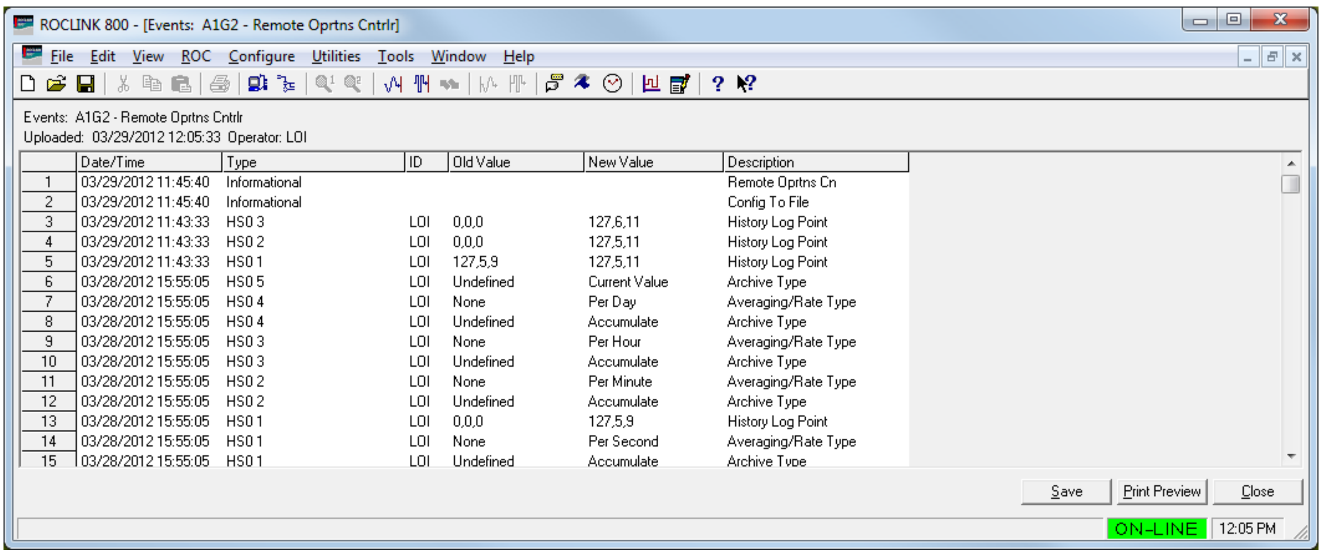


Figure 5-10. Events Log

2. Review the events preview and select an option:

Save	Saves the log as an .EVT file. **Note:** This option is available **only** if you are viewing data from the device.
Print Preview	Shows a preview of the printed version which you can send directly to a printer or convert to one of five file formats.
Close	Closes the log viewer.

3. Click **Close** to close the viewer.

5.4.3 Viewing Weight and Measure Events Logs

You can view a log of all events on your connected ROC or from a disk file.

1. Select **View** > **Events** > **From Device** or **From File**. A viewer displays, showing the log:

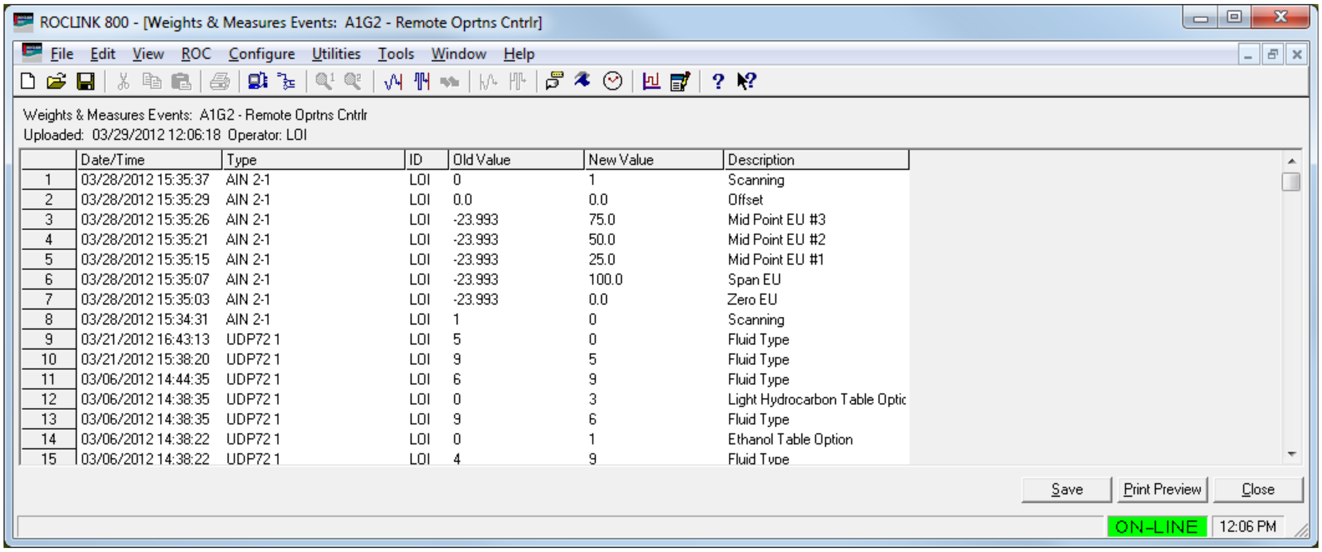


Figure 5-11. Weights & Measures Log

2. Review the weights & measures preview and select an option:

Save	Saves the log as a .WEVT file. **Note:** This option is available **only** if you are viewing data from the device.
Print Preview	Shows a preview of the printed version which you can send directly to a printer or convert to one of five file formats.
Close	Closes the log viewer.

3. Click **Close** to close the viewer.

5.5 Display Editor

You can create custom displays using ROCLINK 800's Display Editor (**View** > **Display** > **New**). Custom displays enable you to group significant data on a single screen for monitoring or control or to otherwise streamline system use.

For a complete discussion on using the Display Editor to create custom displays, refer to *Appendix B, The Display Editor*.

5.6 Display Administrator

You create and store custom displays as .DSP files on your PC. You can also download custom displays for use on your ROC. How you view these custom displays depends on where you have stored them.

5.6.1 Viewing a Custom Display

To view a custom display stored as a disk file on your PC:

1. Select **View** > **Display** > **From File**. An Open dialog displays.
2. Navigate to the folder in which you store custom displays (typically, this is the Displays folder in ROCLINK 800).
3. Select a display file (*.DSP) and click **Open**. ROCLINK 800 loads the file into the Display Editor.

5.6.2 Downloading a Custom Display

Once you have created a custom display (see *Appendix B*), you use the Display Administrator utility to download the display to your ROC.

The ROC can store a maximum of 246 displays, which includes both custom user displays (that your organization may create) and user program displays (that accompany User C programs).

To access the Display Administrator:

1. Select **View > Display > From Device > Administrator**. The Display Administrator screen displays, showing all displays currently loaded in the DL8000.

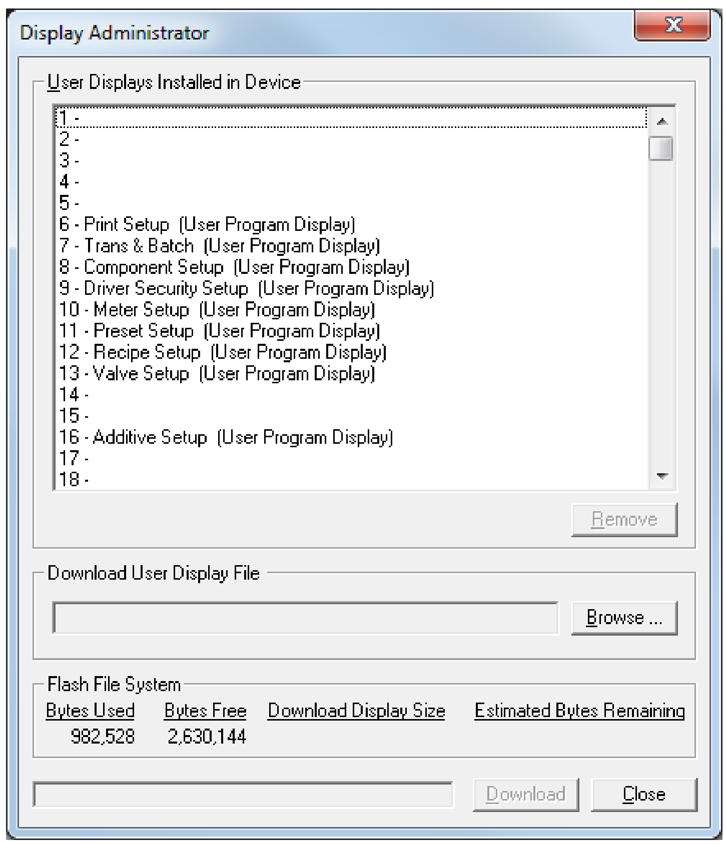


Figure 5-12. Display Administrator

2. Click an empty slot to highlight it.
3. Click **Browse** to open the Select User Display File dialog. .

4. Double-click the display file you want to download. The Display Administrator screen re-displays with the **Download** button now active.
5. Click **Download** to add the user display to the ROC.
6. ROCLINK 800 displays a verification dialog.
7. Click **Yes**. ROCLINK 800 loads the display in the designated location and displays a completion dialog.
8. Click **OK** to close the dialog. The Display Administrator screen displays, showing the display you have just added. .

Note: Use the Flash File System frame on this screen to monitor the number of bytes you have used and the number of bytes remaining.

9. Click **Close**.

5.6.3 Deleting a Custom Display

You can also remove custom display you no longer require from the ROC.

1. Select the custom display to highlight it.
2. Click **Remove**. ROCLINK 800 displays a verification dialog.
3. Click **Yes**. ROCLINK 800 displays a completion dialog.
4. Click **OK** to close the dialog.

5.7 I/O Monitor

Use I/O Monitor to view all installed and active I/O points, MVS values, and flow calculations that provide information configured in the ROC and its operating environment.

1. Select **View > I/O Monitor**. The Select Points to Monitor screen displays.

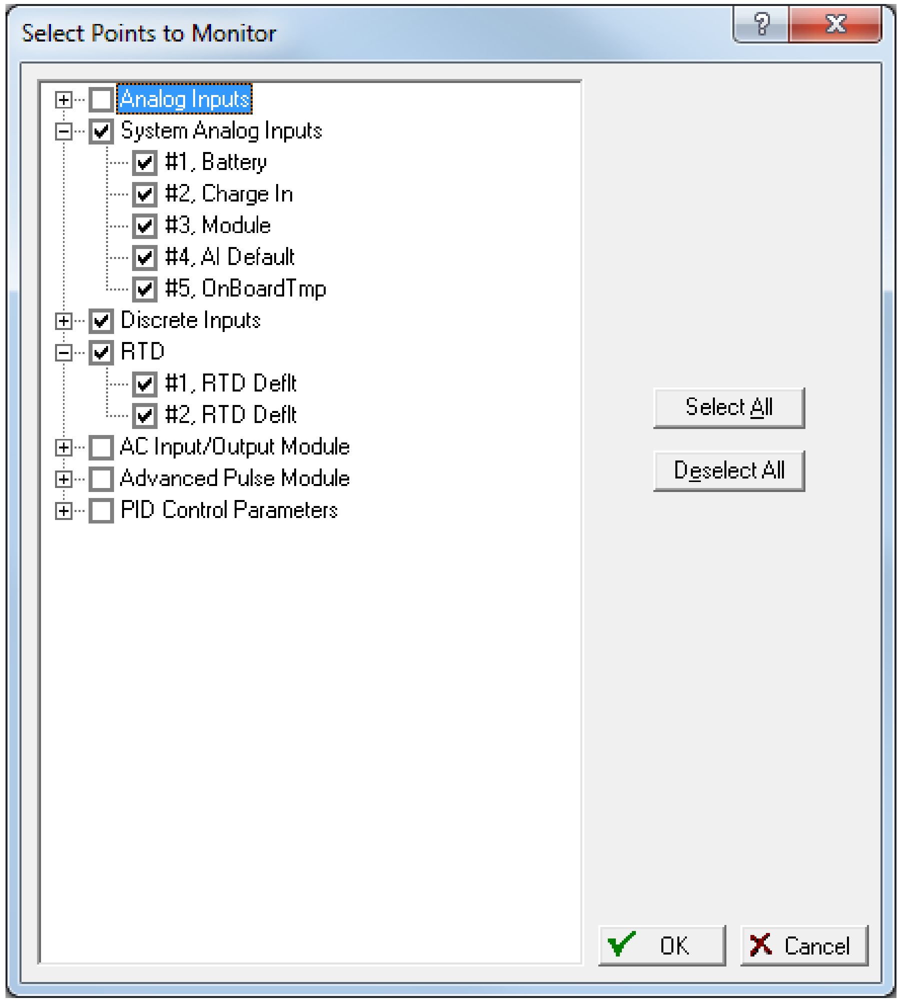


Figure 5-13. Select Points to Monitor

2. Select the points you want to monitor. Click the plus sign next to each item to expand the selection. Click **Select All** or **Deselect All** to select or deselect all points.
3. Click **OK**. ROCLINK 800 displays a screen showing the point information you have requested and automatically updates the on-screen values.

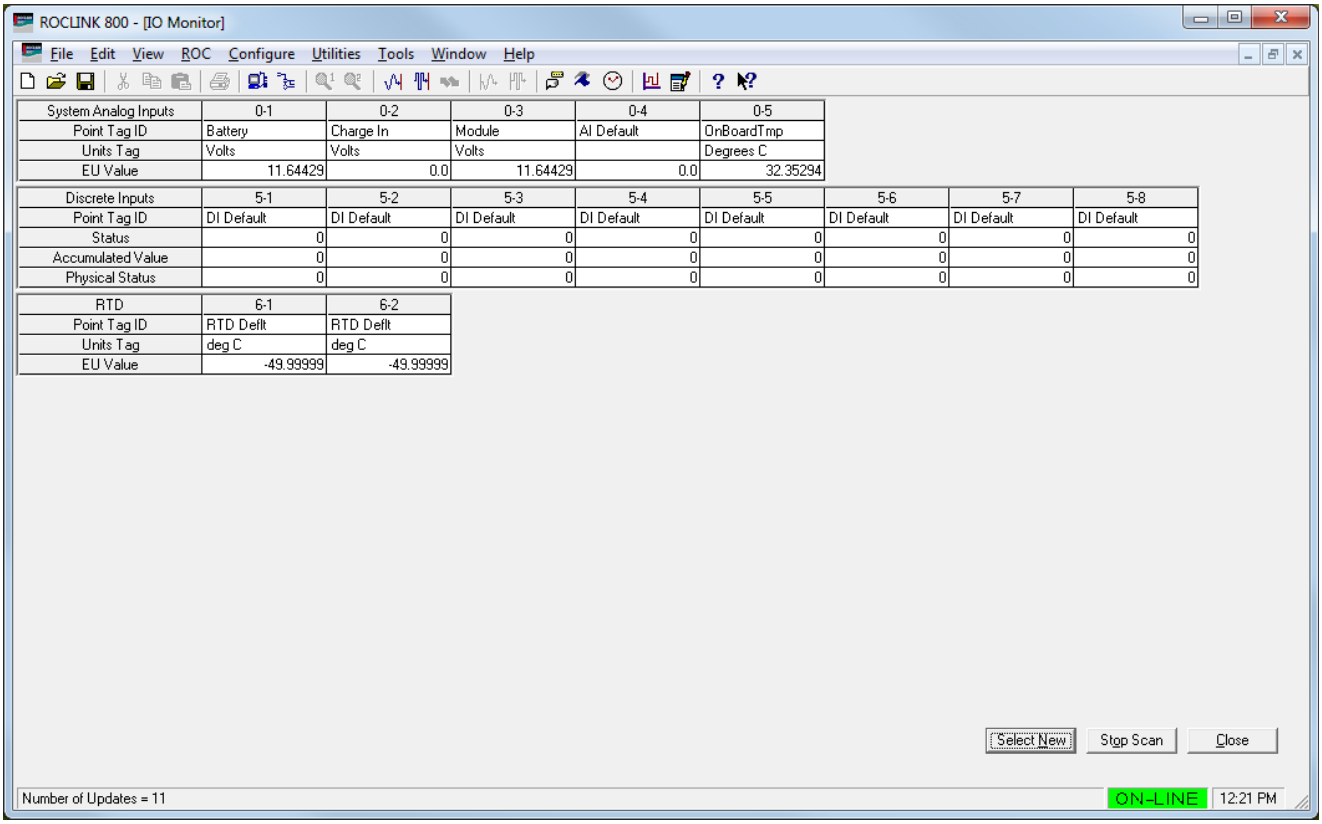


Figure 5-14. I/O Monitor

Note: Use the **Select New** button to redisplay the Select Points to Monitor screen and select other I/O points to monitor.

5.8 Toolbar

Select **View > Toolbar** to display or hide the ROCLINK 800 toolbar. A check mark appears next to the menu option when the toolbar is available.

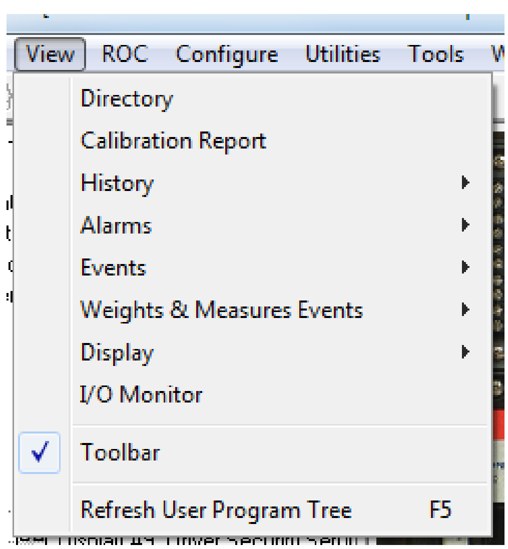


Figure 5-15. Toolbar Selected

5.9 Refresh User Program Tree

Select **View** > **Refresh User Program Tree** (or press the **F5** key on your keyboard) to refresh the listing of user programs ROCLINK 800 displays on the program tree.

Chapter 6 – The ROC Menu

In This Chapter

Use the ROC menu options to set system information for the ROC.

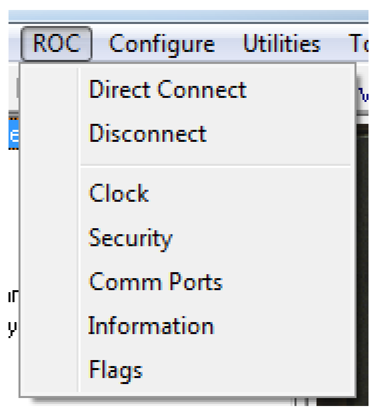
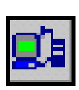


Figure 6-1. ROC Menu

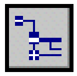
6.1 Direct Connect



Use this option (**ROC** > **Direct Connect**) to connect to the ROC via the LOI (local) port. When you select this option, ROCLINK 800 proceeds through all available connection options (ports and connection speeds) until it locates a connection that works.

You can also directly connect to the ROC by clicking the Direct Connect icon on the ROCLINK 800 menu bar.

6.2 Connect/Disconnect



Use this option (which displays as **Connect** when you are **not** connected and **Disconnect** when you **are** connected) to connect to the ROC using a specific port and connection speed. You select the preferred connection using the Device Directory.

You can also directly connect to the ROC by clicking the Connect icon on the ROCLINK 800 menu bar.

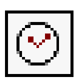
Use this option to disconnect from the ROC. You can also disconnect by clicking the Disconnect icon on the ROCLINK 800 menu bar.

6.3 Clock

The internal real-time clock provides time-stamping and control of the historical databases, Event Log, and Alarm Log.

⚠ Caution **Immediately after you connect to a ROC for the first time, set the clock to ensure proper logging of history.**

Note: The user-selectable time stamp in the ROC reflects the time either at the beginning or at the end of the period. Select **Configure** > **History Points** > **Setup** tab to adjust this preference in the History Time Stamp field.



1. Select **ROC > Clock** or click the Clock icon in the toolbar. The Clock screen displays.

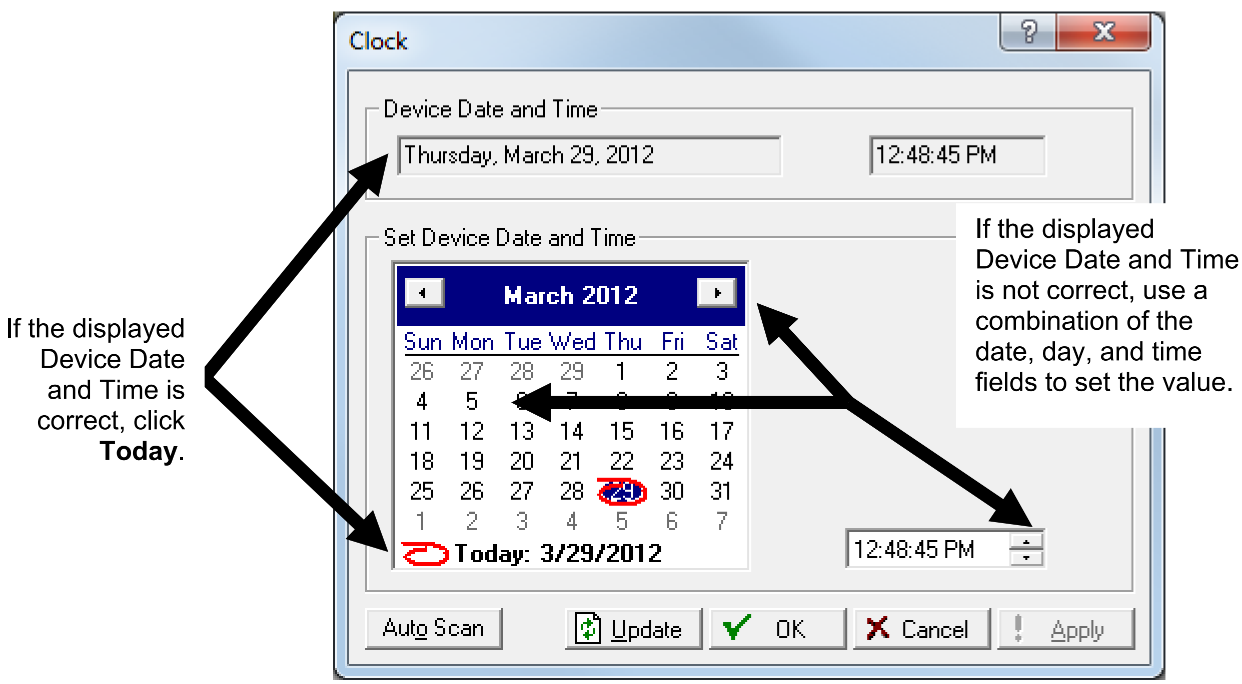


Figure 6-2. Clock

2. Set the clock.
   - If the clock in your PC **is** correct, click the circled area next to **Today** at the bottom of the calendar and click **Apply**. ROCLINK 800 uses the date and time in your PC to set the ROC clock.
   - If the PC clock **is not** correct, use a combination of the calendar (for year, month, and day) and the time (for hour, minute, and seconds) to set the time and date and click **Apply**.
3. Click **Auto Scan** to enable ROCLINK 800 to poll the device automatically. Auto scanning continues until you click **Stop Scan**.

Note: Select **Tools** > **Options** to set the time interval, in seconds, at which the Auto Scan feature polls the ROC.

4. Click **Apply**.
5. Click **OK** to close the screen.

6.3.1 Daylight Savings Time Tab

The Daylight Savings Time tab sets the clock to automatically compensate for daylight savings time.

Select **ROC** > **Clock**. The Device Information screen displays, showing the Daylight Savings Time tab.

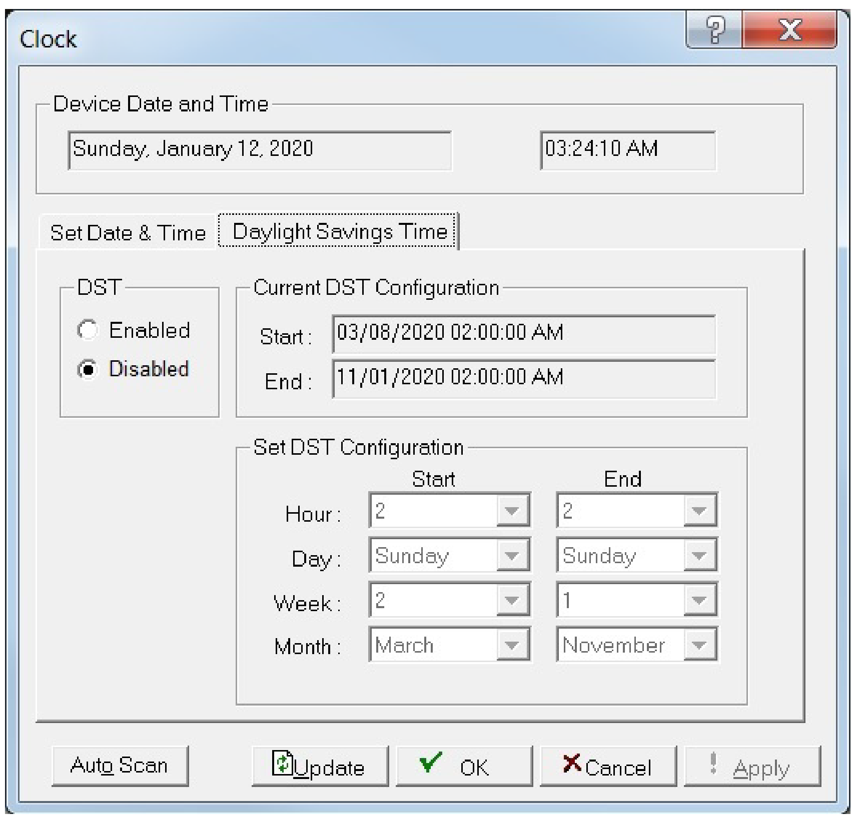


Figure 6-3. Clock, Daylight Savings Time tab

Review the following fields for your organization's values:

Field	Description
DST	Sets the clock to automatically compensate for **Daylight Savings Time** by enabling this feature.
Current DST Configuration	This **read-only** field shows the currently configured daylight savings time start and end times.
Set DST Configuration	Sets the hour, day, week, and month that the daylight savings time adjustment starts and ends.

6.4 Security

For a complete discussion of device security, refer to the *Device Security* section in *Chapter 3, Communications and Security*.

6.5 Comm Ports

For a complete discussion on configuring communications ports, refer to *Chapter 3, Communications and Security*.

6.6 Configuring Device Information

Use this option to set a number of variables — including station name, address, group, active PIDs and associated history points, and other global variables — as well as review device information that differentiates individual ROC units.

When you select **ROC** > **Information**, the Device Information screen displays with the following tabs:

Tab	Description
General	Provides basic information about the ROC.
Internet	Enables you to define Internet communication parameters.
Points	Displays maximum point information and enables you to define the number of active points.
Other Information	Displays technical ROC information such as firmware versions and boot versions.
System Configuration	Specifies the four baud rates the ROC can use at any given time.
Module Information	Displays information on programmable modules (such as the MVS I/O or APM) installed in the ROC. **Note**: This tab displays **only** if you have one of these modules installed.
Keypad Display	Provides configuration options for the ROC800-Series external keypad. **Note**: This tab displays **only** if you have an external keypad installed.

6.6.1 General Tab

The General tab provides basic information about the ROC.

1. Select **ROC** > **Information**. The Device Information screen displays, showing the General tab.

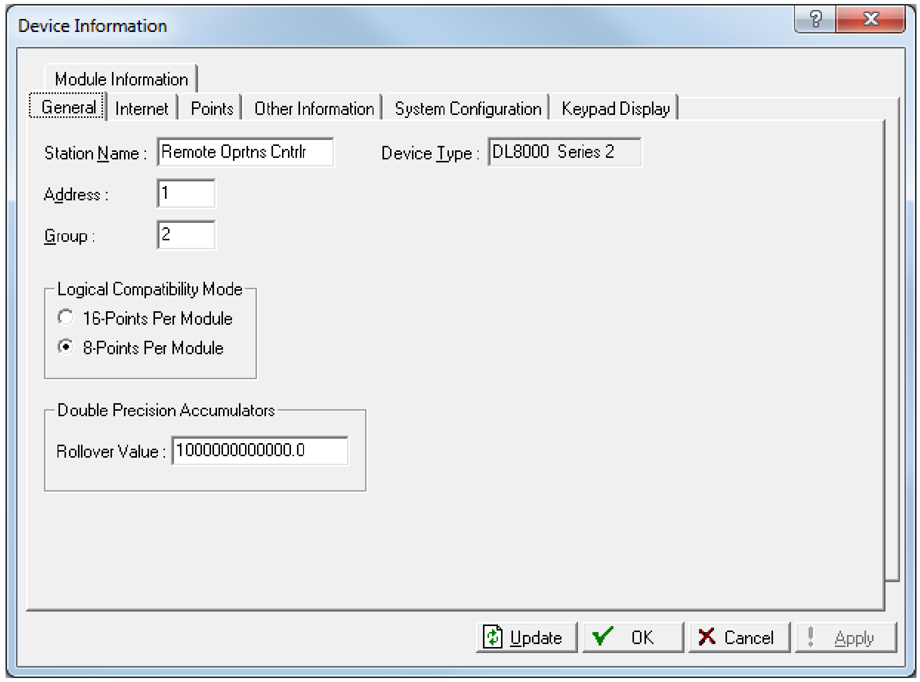


Figure 6-4. Device Information – General tab

6. Review the information on this screen.

Field	Description
Station Name	Indicates the **Station Name** to be logged in EFM Reports. You can change this value to any meaningful 20 alphanumeric string.
Device Type	This **read-only** field shows the currently attached ROC.
Address	Sets a unique address for this ROC that differentiates it from all other devices in a communication group. Valid values are **1** to **255**. **Note:** To avoid communications problems, do not use **240**.

Field	Description
Group	Sets a number that identifies a group of ROCs for communication purposes. All ROCs defined as an area in the host must have the same group. Valid values are **1** to **255**. **Note:** To avoid communications problems, do not use **240**. With ROC Protocol, the values in the Address and Group fields must match the address defined in the destination device for communications to work. You can use TCP/IP connections for Modbus RTU encapsulated in TCP/IP, Modbus TCP/IP, and ROC Plus Protocol communications. If you change the default value of the Address or Group parameters, then all Modbus RTU encapsulated in TCP/IP, Modbus TCP/IP, or ROC Plus Protocol over TCP/IP connections close, and you must re-establish a connection.
Logical Compatibility Mode	Indicates whether the ROC uses 16 or 8 logical points per module. The **default** for a Series 2 CPU is **8** points.
Double Precision Accumulators	Indicates the value at which the double precision accumulators roll over. The default value is **1,000,000,000,000.0**.

7. Click **Apply** if you change any parameters on this screen.

6.6.2 Internet Tab

The Internet tab configures addresses for Internet communications.

1. Select **ROC** > **Information** > **Internet** tab. The Internet screen displays.

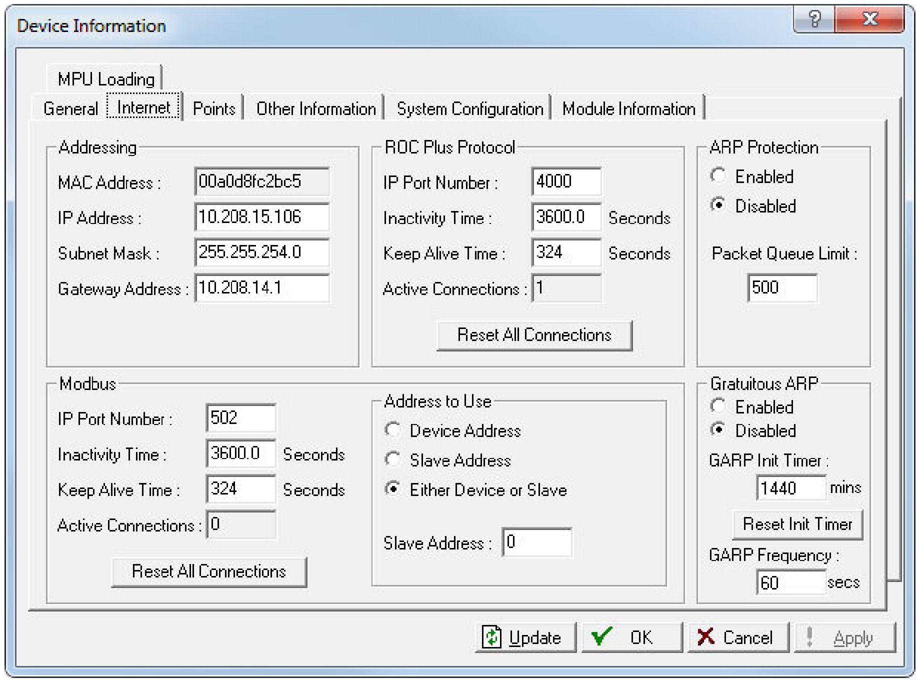


Figure 6-5. Device Information – Internet tab

8. Review the information on the screen.

Field	Description
Addressing	
MAC Address	This **display-only** field shows the Media Access Control (MAC) address for the ROC. The MAC address is factory-set.
IP Address	Sets the Internet Protocol address for this ROC. The factory-set default address is **10.0.0.2**.
Subnet Mask	Sets, if required, a value for the subnet mask portion of the IP address. The subnet mask indicates the subnet to which an IP address belongs. The factory-set default is **255.255.255.0**.
Gateway Address	Sets the gateway address for the ROC. This value identifies the network node that serves as an entrance to the network on which the ROC resides. The factory-set default is **10.0.0.1**.
Modbus or **ROC Plus Protocol**	
IP Port Number	Sets the **IP Port Number** for the Modbus or ROC Plus Protocol communications. The IP Port Number identifies the port that the ROC monitors for Modbus or ROC Plus protocol connections when communicating over a TCP/IP connection. The ROC Plus pProtocol default is **4000**. The Modbus default is **502**. Port numbers 1113 and 1131 are reserved. If you change the IP Port Number, the change takes effect immediately. If you change the default value of this parameter, all Modbus or ROC Plus communications over TCP/IP connections close, and you have to re-establish a connection.

Field	Description
Inactivity Time	Sets the time, in seconds, ROCLINK 800 waits for a valid Modbus or ROC Plus protocol message before closing the connection. The default value is **3600**. This timer is **in addition to** the security timeout. Set this field to zero (**0**) to disable the timer.
Keep Alive Time	Keeps a connection "alive" by periodically transmitting of messages (probes). Indicate, in seconds, the amount of idle time before the first probe occurs. If the other side of the connection fails to respond after ten consecutive probes, the connection is considered broken and the connection closes. The default is **0** (no messages are sent). After the first probe, ROCLINK 800 sends nine other probes, 64 seconds apart. The total Keep Alive Time is 486 seconds (9 x 64) plus the value you enter in the Keep Alive Time field.
Active Connections	This **read-only** field displays the total number of active TCP/IP connections. The Ethernet port supports up to six ROC Plus connections, six Modbus slave connections, and one Modbus Master connection **all** at the same time.
Reset All Connections	Click to close all active Modbus or ROC Plus Protocol over TCP/IP connections. This button returns to an un-pressed state when connections are successfully closed.
ARP Protection	Enables Address Resolution Protection (ARP) storm protection, which limits the number of incoming messages to the value you enter in the Packet Queue Limit field and ignores the remainder until the number of messages drops below the value you enter. The default is **Disabled**.
Packet Queue List	Indicates a limit of incoming messages. **Note**: This field is active only if you **enable** ARP Protection.
Address to Use	Indicates the protocol address to use. Valid values are **Device Address**, **Slave Address**, or **Either Device or Slave Address.**
Slave Address	Indicates, a specific address if you have chosen **Slave Address** in the Address to Use frame.
Gratuitous ARP	Enables the Gratuitous ARP functionality. A Gratuitous ARP is a broadcast to every device on the network, and enables each device to pre-update its device listings.
GARP Init Timer	Sets, in seconds, the amount of time the ROC waits after the Gratuitous ARP is activated to begin ARPing at the user-configured frequency. **Note:** This field is active only if you enable Gratuitous ARP.

Field	Description
Reset Init Timer	Click to reset the GARP Init Timer to the configured value. No ARPing will occur if you click this button (or SCADA writes to this parameter as a part of its normal polling sequence) before the GARP Init Timer expires. **Note:** This field is active only if you enable Gratuitous ARP.
GARP Frequency	Sets, in seconds, the ARP interval. The ROC repeats at this interval (frequency) until it the GARP Init Timer field is reset. **Note:** This field is active only if you enable Gratuitous ARP.

9. Click **Apply** if you change any parameters on this screen.

6.6.3 Points Tab

The Points tab displays history point information.

1. Select the **ROC** > **Information** > **Points** tab. The Points screen displays.

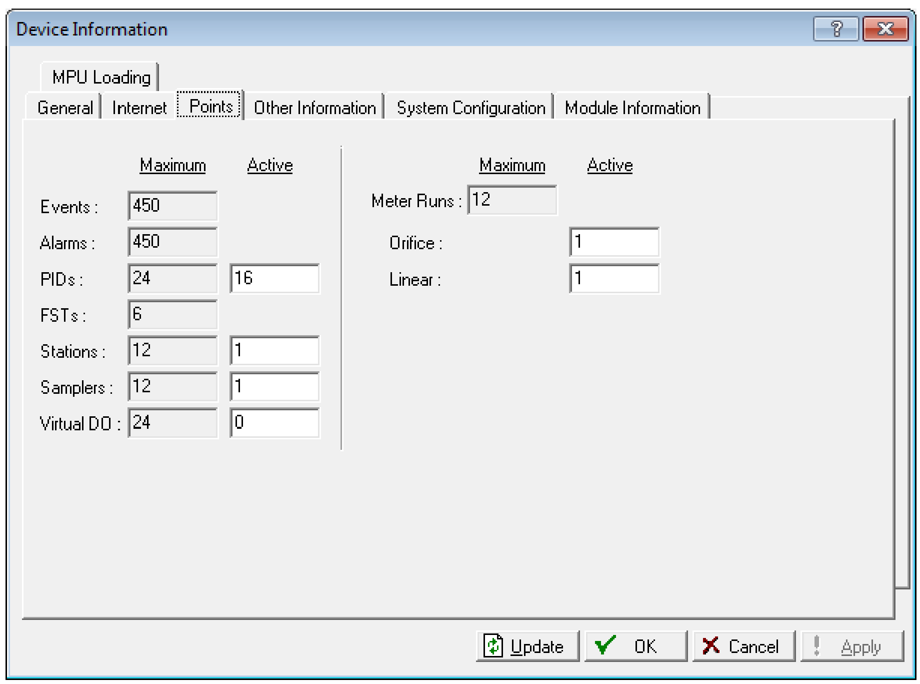


Figure 6-6. Device Information – Points tab

2. Review the information on this screen.

Field	Description
Maximum	This **read-only** field shows the **maximum** number of Events, Alarms, PIDs, FSTs, and virtual DOs allowed in the DL8000.

Field	Description
Active	Sets the number of active Events, Alarms, PIDs, FSTs, and virtual DO points on the currently attached device. **Note:** This value **cannot** exceed the value shown in the Maximum number field. To conserve processor executions, set this value to the **minimum** value your application requires.

10. Click **Apply** if you change any parameters on this screen.

6.6.4 Other Information Tab

The Other Information tab displays customer information.

1. Select **ROC** > **Information** > **Other Information** tab. The Other Information screen displays.

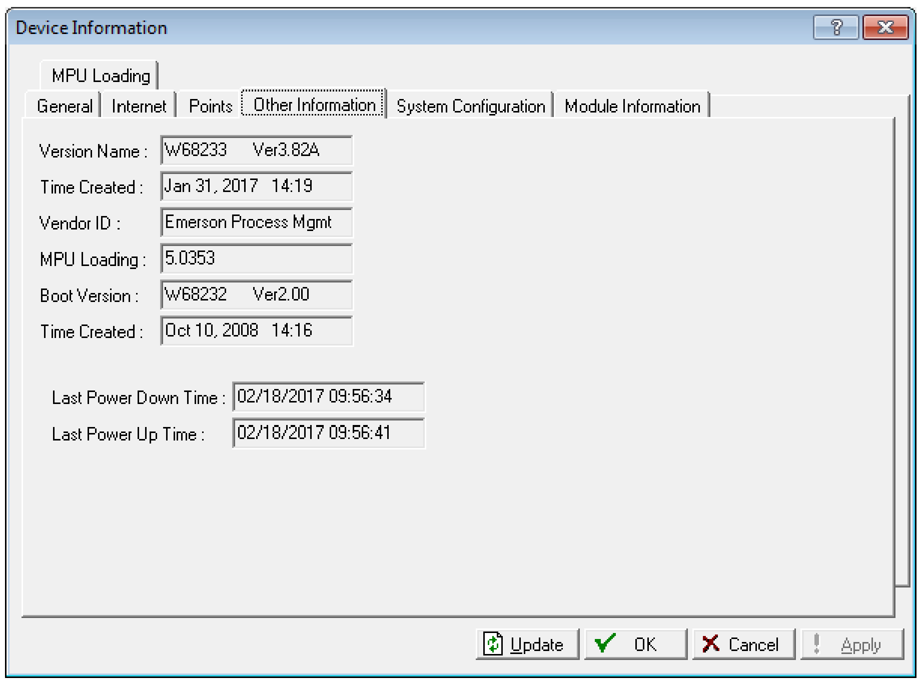


Figure 6-7. Device Information – Other Information tab

2. Review the information on this screen.

Field	Description
Version Name	This **read-only** field shows the version number for this device.
Time Created	This **read-only** field shows the date and time the firmware was created.
Vendor ID	This **read-only** field shows the vendor associated with this device.
MPU Loading	This **read-only** field shows the current percentage of system utilization. This value is updated each time the screen is refreshed.

Field	Description
Boot Version	This **read-only** field shows the version of the main startup firmware currently installed in the ROC.
Time Created (Boot)	This **read-only** field shows the date and time the boot firmware was created.
Last Power Down Time/Last Power Up Time	These **read-only** fields show the date and time when the ROC was last connected to power (**Last Power Up Time**) and when the ROC was last disconnected from power (**Last Power Down Time**).

6.6.5 System Configuration Tab

The **System Configuration** tab allows you to specify four baud rates (BPS) the ROC can use at any given time.

1. Select **ROC** > **Information** > **System Configuration** tab. The System Configuration screen displays.

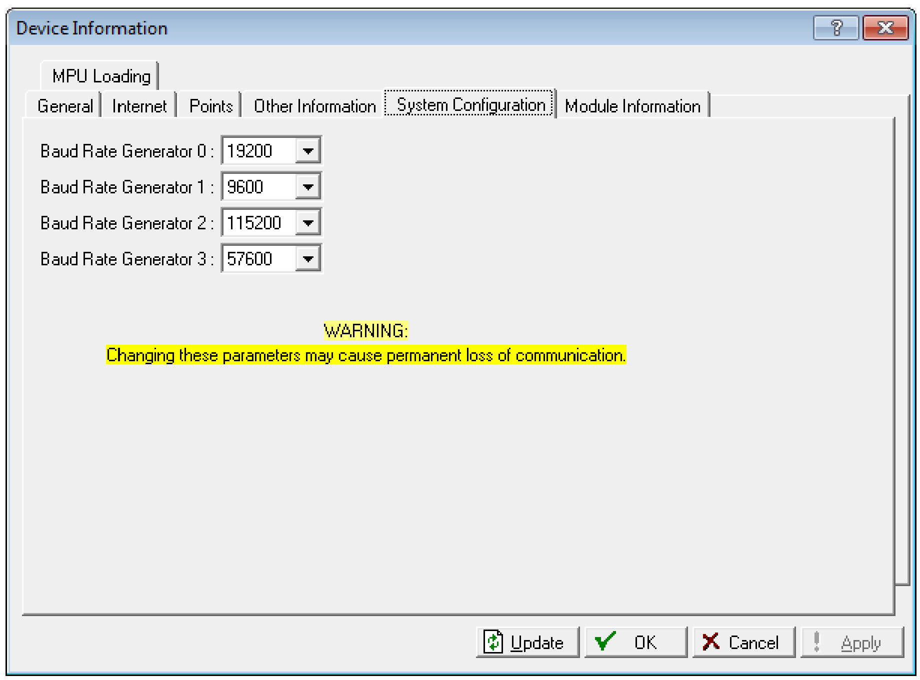


Figure 6-8. Device Information – System Configuration tab

2. Review the information on this screen.

Field	Description
Baud Rate	Sets the four baud rates the ROC can use at any given time. A **read-only** display on the Comm Ports General screen indicates which of the four baud rate generators is currently in use. **Note:** Do **not** change these baud rates unless directed to do so by Technical Support personnel.

3. Click **Apply** if you change any parameters on this screen.

6.6.6 Keypad Display Tab

The Keypad Display tab allows you to configure settings for the ROC800-Series optional Display Keypad. You can also view the current LCD Firmware Version installed.

1. Select **ROC** > **Information** > **Keypad Display** tab. The Keypad Display screen displays.

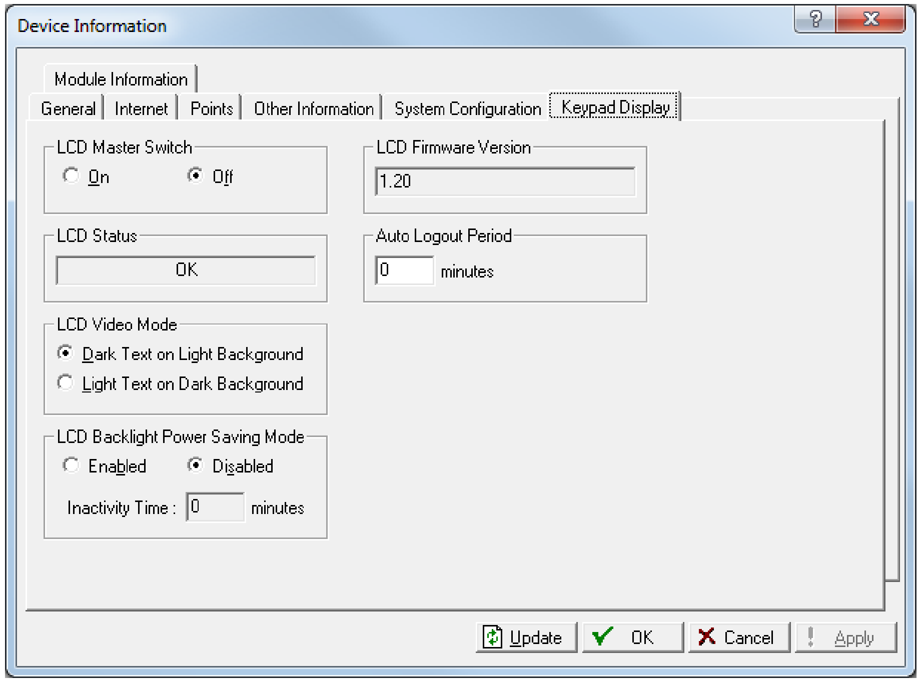


Figure 6-9. Device Information – Keypad Display

2. Review the information on this screen.

Field	Description
LCD Master Switch	Enables you to reset the Keypad Display without cycling power or performing a warm start.
LCD Status	This **read-only** field shows the status of the Keypad Display. OK displays if a keypad display is installed and has a valid configuration file. An error displays if the configuration file is invalid, no keypad display is installed, or if there is a CRC error.
LCD Video Mode	Sets the mode for the display. **Dark Text on Light Background** is the **default**. Click **Apply** to change the display mode.
LCD Backlight Power Saving Mode	Shuts off the LCD automatically after a defined amount of inactivity. The **default** is **Disabled**.
Inactivity Time	Indicates, in seconds, how long the LCD backlight remains on without activity before automatically shutting off. **Note**: This field is active **only** if you enable the LCD Backlight Power Saving Mode.

Field	Description
LCD Firmware Version	This **read-only** field shows the currently installed version of firmware for the Keypad Display.
Auto Logout Period	Indicates, in minutes, how long the display waits inactive before automatically timing out and logging out the current user.

3. Click **Apply** if you change any parameters on this screen.

6.6.7 Module Information Tab

The **Module Information** tab displays information about programmable modules (such as the HART-2, MVS I/O, or ACIO) installed in the DL8000.

1. Select **ROC** > **Information** > **Module Information** tab. The Module Information screen displays.

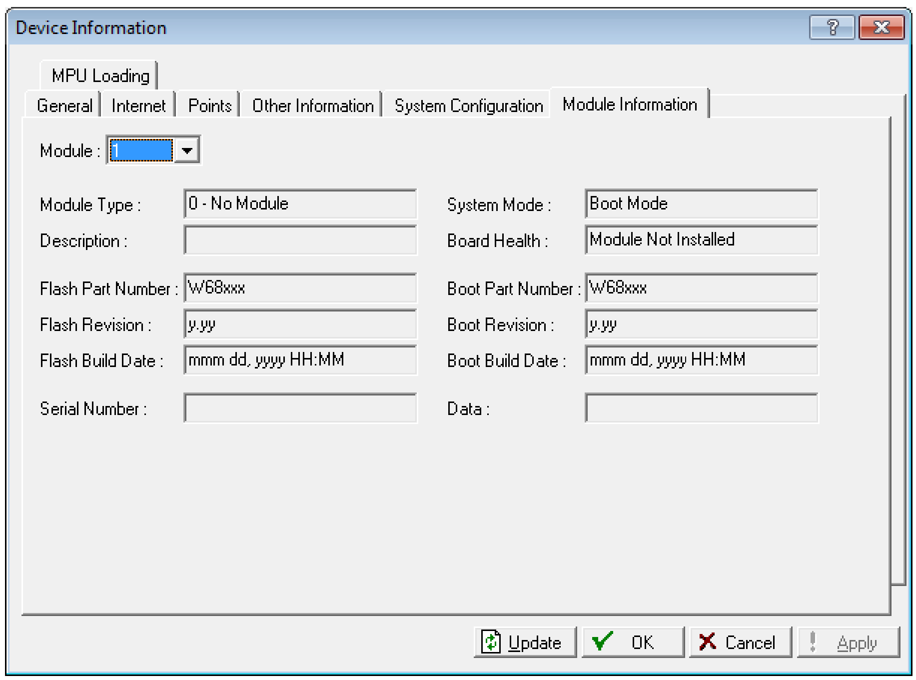


Figure 6-10. Device Information – Module Information tab

2. Review the information on this screen.

Field	Description
Module	Selects the module to view. Click ▼ to display all available slots. **Note**: To populate this screen, you **must** select a programmable module.
Module Type	This **read-only** field shows the type of module installed in the selected slot.
Description	This **read-only** field describes the currently installed module.

Field	Description
Flash Part Number	This **read-only** field shows the part number associated with the selected module.
Flash Revision	This **read-only** field shows the firmware version number for the selected module.
Flash Build Date	This **read-only** field shows the date the firmware was produced for the selected module.
Serial Number	This **read-only** field shows the serial number for the selected module.
System Mode	This **read-only** field shows the module's system mode. Valid values are: **Run Mode** – Module is functioning correctly. **Boot Mode** – No module is currently installed or module has no firmware. **Communications lost** – Module is not functioning correctly, is not running, or communications may have been lost.
Board Health	This **read-only** field shows the module's health. Valid values are: **OK** – Board is functioning correctly. **Module Not installed** – No module is currently installed. **Communications lost** – ROC has lost communications with the expanded backplane.
Boot Part Number	This **read-only** field shows the part number of the main startup (boot) firmware currently installed in the module.
Boot Revision	This **read-only** field shows the revision number for the main startup (boot) firmware currently installed in the module. **Note:** This field is not valid for communications modules.
Boot Build Date	This **read-only** field shows the build date for the main startup (boot) firmware currently installed in the module. **Note:** This field is not valid for communications modules.
Data	This **read-only** field shows additional module-specific information.

3. Click **Apply** if you change any values on this screen.

6.6.8 MPU Loading Tab

Use the MPU Loading tab to monitor the average MPU load (system utilization) over a user-configurable amount of time. You can run two MPU load diagnostics simultaneously, and set alarming for each instance separately. This allows you to obtain averages from two different time periods (such as a 10 second average and a 180 second average), and set different thresholds and alarming for each instance.

To access this screen:

1. Select **ROC** > **Information** > **MPU Loading** tab. The MPU Loading screen displays.

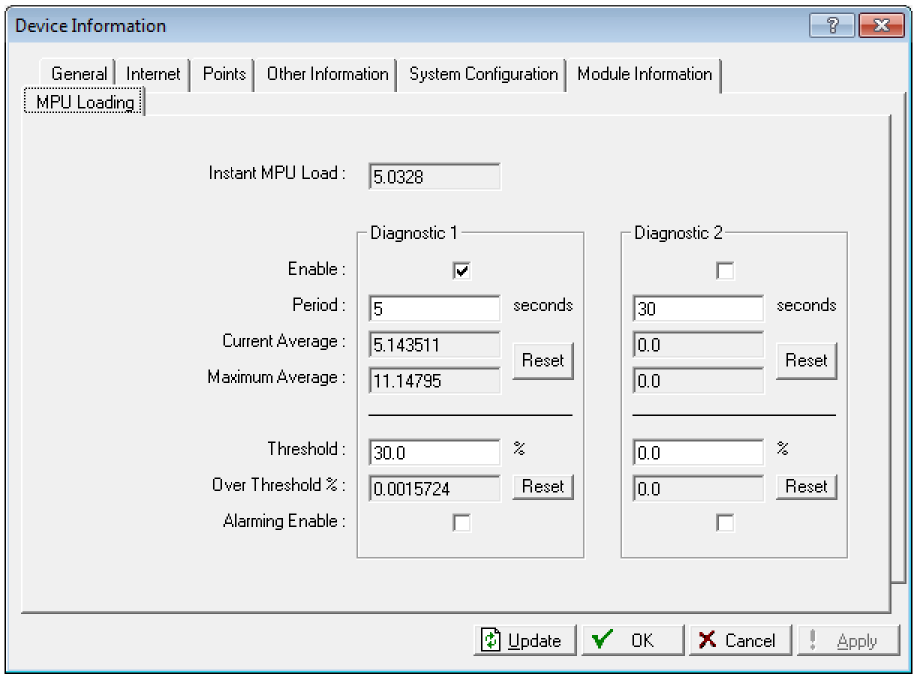


Figure 6-11. Device Information – MPU Loading tab

2. Review the information on this screen.

Field	Description
Instant MPU Load	This **read-only** field shows the current percentage of system utilization. This value is updated each time the screen is refreshed.
Enable	Enables the MPU load diagnostic to run.
Period	Sets, in seconds, the length of time on which to base averages. **Note:** This value applies to both the Current Average and Maximum Average fields.
Current Average	This **read-only** field shows the MPU load averaged over the length of time specified in the Period field. **Note:** This field updates every time you select the Update button.

Field	Description
Maximum Average	This **read-only** field shows the maximum MPU load average that occurred since the MPU diagnostic was started or reset.
Reset (Averages)	Click to clear the values in the Current Average and Maximum Average fields.
Threshold	Sets, in percent, a maximum MPU load value to monitor. If a sample is greater than the value in this field, the system updates the Over Threshold % field and raises an alarm (if alarming is enabled).
Over Threshold %	This **read-only** field shows the percentage of samples that have exceeded the value set in the Threshold field. **Note:** This value will not clear until the Reset button next to it is pressed.
Reset (Threshold)	Click to clear the value in the Over Threshold % field.
Alarming Enable	Place a check mark to enable the system to log an alarm when the current load sample exceeds the value in the Threshold field.

6.7 Flags

Use the selections on the Flags screen to perform actions that affect the overall operation of the ROC. From this screen, you can save a configuration to Flash memory and, if necessary, re-initialize the ROC.

⚠ **Caution** **Be very careful when using system flags. Selecting certain flags can lose data, change parameter values, and clear configuration memory. Be sure you understand the function of any flag before changing it.**

When you select **ROC > Flags**, ROCLINK 800 displays the Flags screen and defaults to the Flags tab (see *Figure 6-10*).

6.7.1 Flags Tab

Use the Flags tab to restart the ROC or save your configuration to flash memory.

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

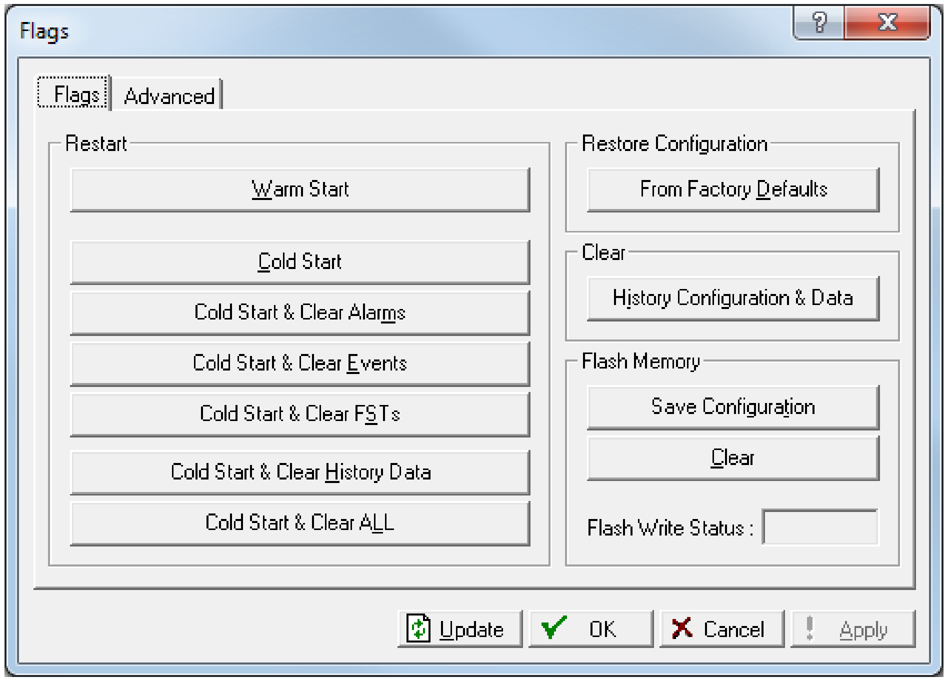


Figure 6-12. Flags – Flags tab

2. Select one of these options:

Button	Description
Warm Start	Click to begin a warm start. Following a warm start, ROCLINK 800 initializes SRAM memory. If the configuration is **valid**, databases and FSTs remain intact. If the configuration is **not valid**, ROCLINK 800 uses the last configuration saved to flash memory. To save a valid configuration, click **Save Configuration**. A user program remains on after a warm start.

Button	Description
Cold Start	Click to begin a cold start. A cold start initializes the ROC from the last valid restart configuration saved in flash memory. If the configuration memory does not have a valid configuration written to it, the process uses the factory defaults. Use a cold start if a ROC is performing erratically, when the memory appears to be corrupted, or when resetting the unit to the last saved configuration. **Note:** A cold start reloads all restart configuration data and may also clear logs, displays, and FSTs. Additionally, it may change outputs, load new accumulator values, and disable user program tasks and user data types. **Generally, do not use Cold Start on a ROC that is actively gathering data or performing control.** Save or document all required data and parameter values that could be affected before you perform a cold start. A cold star may clear logs and FSTs. If you performed a Save Configuration (which includes the FST and FST point in flash memory) before the cold start, the system reloads the saved FST in place of the cleared one.
Cold Start & Clear Alarms	Click to restore a configuration from default values stored in flash memory and clears the Alarm Log.
Cold Start & Clear Events	Click to restore a configuration from default values stored in flash memory and clears the Event Log.
Cold Start & Clear FSTs	Click to restore a configuration from default values stored in flash memory and clears all FSTs.
Cold Start & Clear History Data	Restores a configuration from default values stored in flash memory and clears all history database files.
Cold Start & Clear ALL	Click to restore a configuration from default values stored in flash memory and clears all history database files, alarm logs, event logs, and FSTs.
From Factory Defaults	See *Section 6.8.2, Returning the Device to Factory Default Settings*.
History Configuration & Data	Click to clear all history configuration **and** database files.
Save Configuration	Click to save the current configuration to flash memory. When using a ROC800-Series, most configuration settings (including calibration values and loads) are stored into flash memory as the new configuration after a cold start. All user flags are maintained at their current status during this process. Clicking **Save Configuration** temporarily suspends all incoming communications. A running FST is temporarily suspended, but restarts where it was suspended.

Button	Description
Clear	Clears flash memory.
Flash Write Status	This **read-only** field shows the status of the selected activity.

Reset (RST) Switch The ROC's CPU module provides a Reset (RST) switch that you can use to restart the ROC from the boot block of flash memory (essentially a cold start) rather than from RAM (a warm start).

For further information, refer to *Central Processing Unit (CPU*) in *Chapter 2* of the *DL8000 Preset Controller Instruction Manual* (Form A6212).

6.7.2 Returning the Device to Factory Default Settings

Sometimes it is necessary to return the ROC to the original factory default settings. The following procedure clears all saved restart configuration data contained in Flash memory. Only factory defaults are retained.

To return the device to the original factory default settings:

1. Select **ROC** > **Flags**.
2. Click **Clear** in the Flash Memory frame.
3. Click **Yes** and **OK**.
4. Click **From Factory Defaults** (in the Restore Configuration frame).
5. Click **Yes** and **OK**.

Note: You may need to re-connect as the factory default settings may be altered from the stored data.

6.7.3 Flags Advanced Tab

Use the **Advanced** tab to enable CRC checking and I/O scanning.

1. Select the **Advanced** tab. The Flags Advanced screen displays.

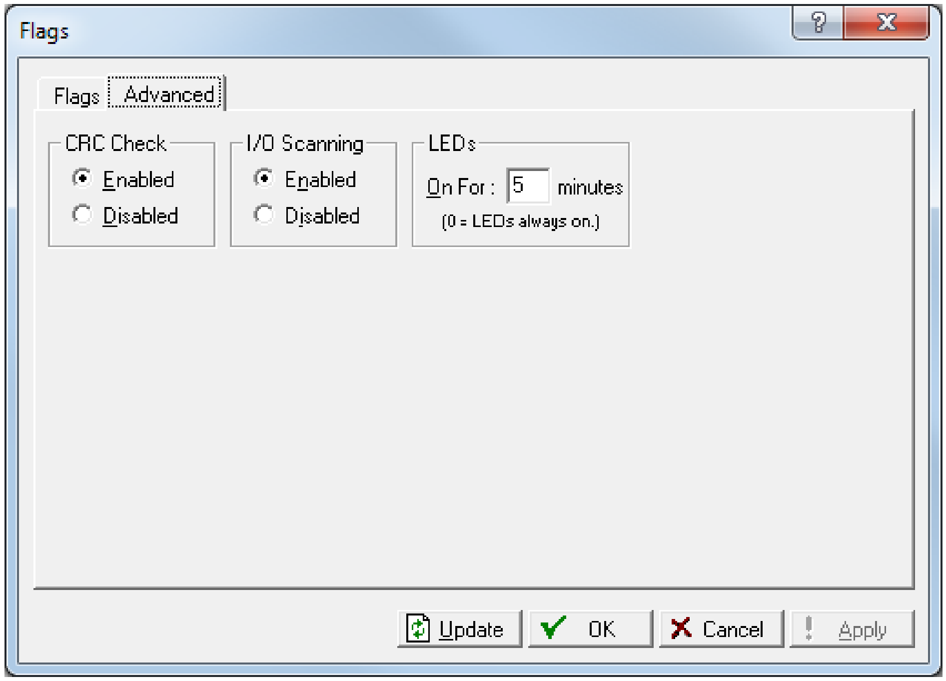


Figure 6-13. Flags – Advanced tab

Field	Description
CRC Check	Activates Cyclical Redundancy Checking (CRC) on ROC Plus protocol communications. Valid values are **Enabled** or **Disabled**. The default is **Enabled**. **Note:** The ROC800-Series does not perform CRC checks on Ethernet communications.
I/O Scanning	Enables I/O scanning on the I/O point displays. The default value is **Enabled**.
LEDs	Enables a power-saving feature for LEDs (with the exception of the LED on the Power module). This parameter controls how long the LEDs remain on after you press the LED button on the CPU module. For instance, with the **default** setting of 5 minutes, all LEDs will go off. If you press the LED button, the LEDs become active again for 5 minutes. Enter **0** (zero) in this field to allow the LEDs to always stay active.

Chapter 7 – The Configure Menu

In This Chapter

Use the Configure menu options to define points for inputs/outputs, control functions, Opcode points, history points, LCD user lists, user programs, and Modbus.

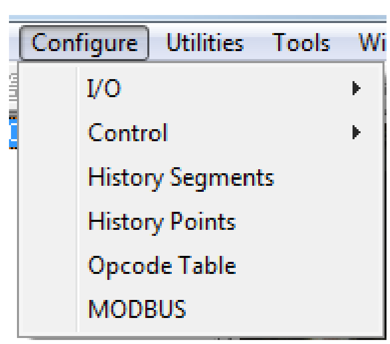
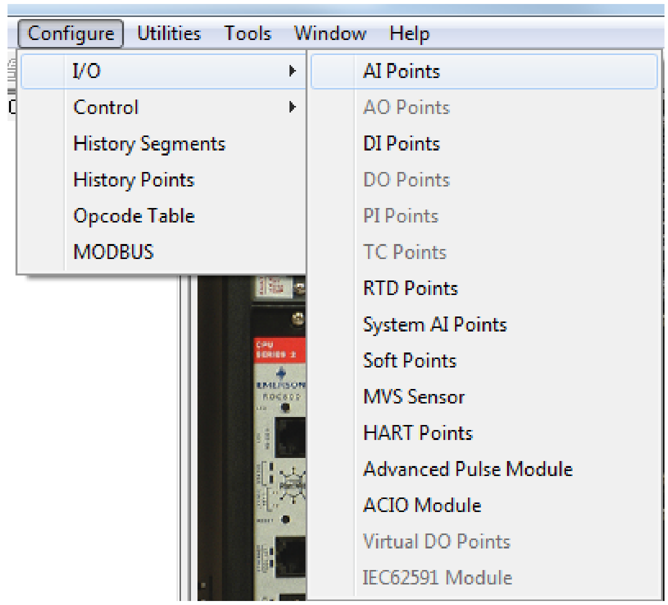


Figure 7-1. Configure Menu

7.1 Configuring I/O

The input/output (I/O) points in the DL8000 have many items that can be configured. For more information on the types of I/O available and their functions, refer to *Chapter 3* of the *DL8000 Preset Controller Instruction Manual* (part D301244X012).



Note: Options that are "grayed out" on the menu (such as **AO Points**) indicate modules which are not currently installed in the connected DL8000 and therefore not configurable.

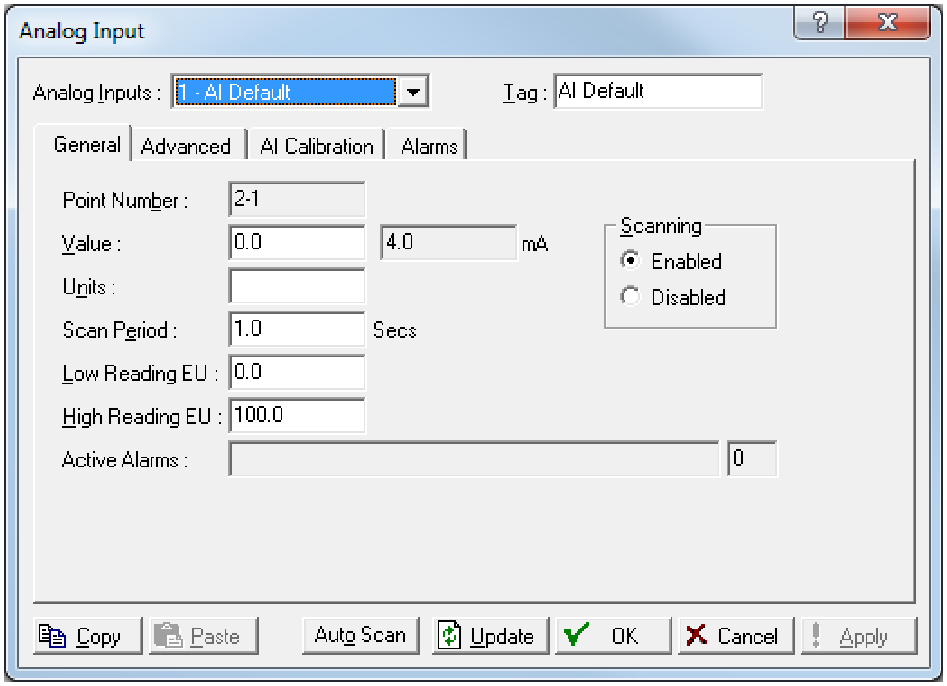
Configuring a DL8000 is a matter of establishing points and then configuring various parameters.

Each input and output has a unique point number to identify the input or output. The point number indicates the location of the point at the slot number of the I/O module and channel number in the DL8000. For example, DI 2-1 indicates the Point Number for a discrete input at module slot number two, first channel.

7.1.1 Analog Input (AI) Configuration

Analog inputs are analog signals that measurement devices (such as pressure and temperature transmitters, including RTD probes and pressure sensors) generate.

Select **Configure > I/O > AI Points**. The Analog Input screen displays.



The Analog Input screen has four tabs. Use each tab to configure a component of the input.

- Use the **General** tab to set the basic parameters for the analog input point.
- Use the **Advanced** tab to configure features, such as filtering, A/D conversions, and clipping for the selected analog input.
- Use the **AI Calibration** tab to calibrate the AI point while on-line.
- Use the **Alarms** tab to set the alarm parameters for this AI point.

Note: You enable alarming on the Alarms tab. If you enable alarming, the limit alarms (four levels, Rate, and Deadband) are configured on the Alarms tab. To conserve Alarm Log space, alarms should be enabled only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one so that no false alarms generate.

Save Configuration

After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

AI: General Tab

Select **Configure > I/O > AI Points**. The Analog Input screen displays with the General tab active. Use this tab to set the basic parameters for the analog input point.

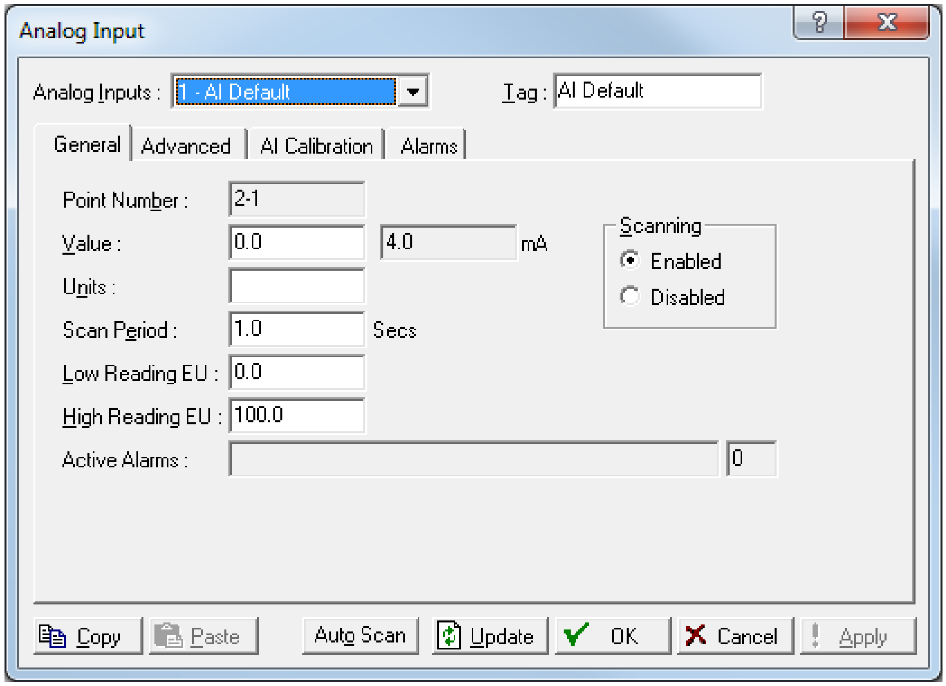


Figure 7-2. AI – General tab

Field	Description
Analog Inputs	Sets the analog input to be configured. Click ▼ to display all available analog inputs. **Note:** The selection in this field applies to **each** tab on this screen.
Tag	Provides a 10-alphanumeric character identifier associated with each point type. **Note:** The selection in this field applies to **each** tab on this screen.
Point Number	The **read-only** field shows the rack location for this point.
Value	This **read-only** field shows the value from the field device. When scanning is **disabled**, you can write to the failsafe or download value and then choose either the User Failsafe or User Download option in the Off Scan Mode frame on the Advanced tab.
Units	Shows the engineering for the I/O (such as IN H2O, PSIG, MCF, degrees F, milliamps, or volts).
Scan Period	Sets, in seconds, how frequently the system scans the input to acquire the Value when you enable scanning. Each AI updates based on its individual scan period.
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent input. For example, if a temperature transmitter is connected to the analog input with a range of – 40 to 160 degrees F, the **Low Reading EU** would be set to – 40.

Field	Description
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent input. For example, if a temperature transmitter is connected to the analog input with a range of – 40 to 160 degrees F, set this value to 160.
Active Alarms	This **read-only** field shows any alarms that are active for this point. If you enable alarming, any active limit alarms (such as Low Alarm and Rate Alarm) display. Even if you disable alarming, the Point Fail alarm (hardware reports a malfunction) and Manual (Scanning Disabled) indicators can still appear.
Scanning	Sets the scanning option for this point. Valid values: **Enabled** Automatically process the field input and display the last analog input scan in the Value field. **Disabled** Permit only manual updates of the Value field. **Note:** If you enable alarming, the ROC generates a Manual Mode alarm when scanning is disabled. If you disable scanning, you must manually enter a value to override the input.

AI: Advanced Tab

Use the Advanced tab to configure features such as filtering, A/D conversions, and clipping for the selected analog input.

Select **Configure > I/O > AI Points > Advanced** tab. The Advanced screen displays.

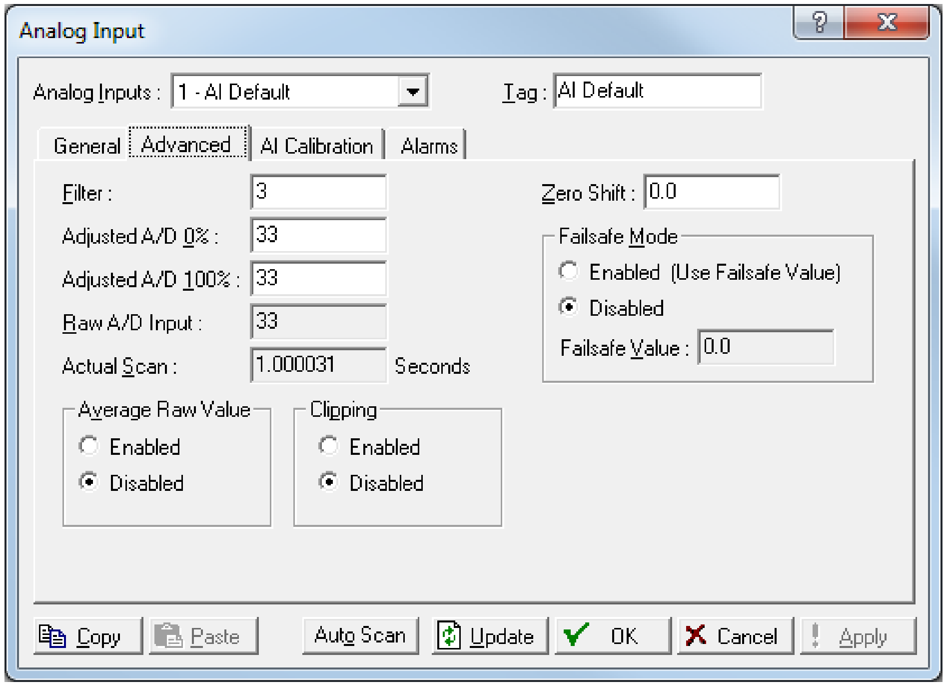


Figure 7-3. AI – Advanced tab

Field	Description
Filter	Sets the Filter percent (ENTERED_DATA) as a weighted sample using a percentage of the last value plus a percentage of the new value. The system calculates the Filtered EU Value (on the General tab) once every second, regardless of the scan period, using the formula: Filtered EU Value = (last_value x ENTERED_DATA) + (new_value x (100 - (ENTERED_DATA / 100))
Adjusted A/D 0%	Sets the calibrated Analog-to-Digital count corresponding to zero percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the **Low Reading EU** value.
Adjusted A/D 100 %	Sets the calibrated Analog-to-Digital count corresponding to 100 percent input. Use this value to convert the input to engineering units. In the Calibrate function, this value is altered to set the 100 percent input exactly at the **High Reading EU** value.
Raw A/D Input	This **read-only** field shows the current digital count directly from the Analog-to-Digital converter.
Actual Scan	This **read-only** field shows the actual amount of time, in seconds, taken to complete the entire list of tasks. This value should be the same as the value in the **Scan Period** field on the General tab if the system is not overloaded.

Field	Description
Average Raw Values	Sets whether the system averages raw values during the scan period. Valid values are **Enabled** (average and calculate the raw readings during the scan period and use the results as the Raw A/D Input during calculations) or **Disabled** (acquire instantaneous values).
Clipping	Forces the filtered EUs within a defined limit set on the Alarms tab. Valid values are **Enabled** (forces the filtered EUs to stay within a range defined by the cut off limits, set by using the LoLo Alarm and HiHi Alarm parameters defined on the Alarms tab) or **Disabled** (do not force clipping).
Zero Shift	Sets a value (if necessary) to compensate for the zero shift effect on an input.
Action on Failure	Sets the action the system performs upon alarm detection. Valid values are **Use Failsafe Value** (use the value in the Failsafe Value field) and **Use Live Value** (use the value at which the input is currently set).. **Note**: If you select **Use Failsave Value**, you must also enter a value in the **Failsafe Value** field the system uses if a restart occurs.
Failsafe Value	Indicates a value to use after a restart. **Note**: This field activates **only** if you select **Use Failsafe Value**.

AI:AI Calibration Tab

Use this tab to verify or calibrate an analog input.

The calibration routine provides Verify, Calibrate, and Zero Shift functions for AI inputs. You can calibrate differential pressure (orifice metering may be High or Low Differential Pressure, depending on the device), static pressure, or temperature readings for each meter run.

Select the **Configure > I/O > AI Points > AI Calibration** tab. The AI Calibration screen displays:

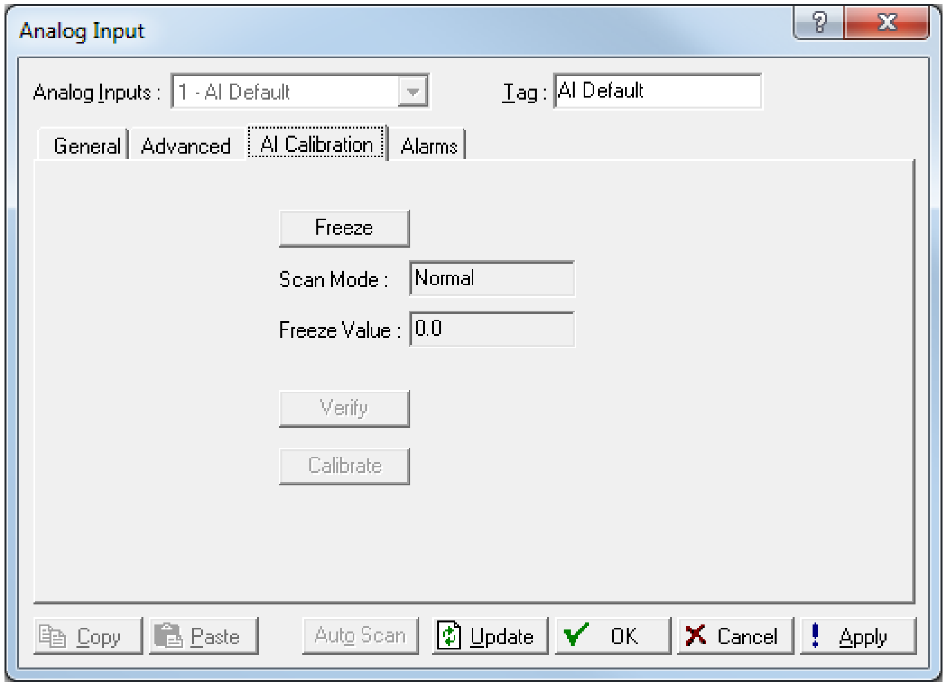


Figure 7-4. AI – Calibration tab

Notes:

- You can calibrate inputs for up to five points (zero, span, and up to three mid-points). You must define at least **two** points (zero and span) for calibration.
- If you leave the ROC idle during calibration, the ROC times out and resumes normal processing. Calibration values are restored to the previous values, an event is logged, and you must reconnect to start calibration from the beginning.
- Click **Cancel** to exit the calibration without saving the changes. The ROC retains the previous calibration settings and logs an event.

⚠ Caution **If you have an MVS transmitter, refer to *Chapter 6, Sensor/Transmitter Accessories,* in the *ROC/FloBoss Accessories Instruction Manual* (Form A4637) for the recommended way to remove or restore the device from or to working pressure during calibration. Failure to follow recommendations may damage the device.**

Field	Description
Freeze	Click to stop the system from updating analog, MVS, DVS, HART, or temperature (RTD) inputs during verification or calibration. Once you click **Freeze**, the input is frozen at the current Freeze Value.

Field	Description	
Scan Mode	This **read-only** field displays the current input status. Valid values are:	
	Manual	The system is in manual mode.
	Normal Poll	The system is functioning normally
	Input Freeze	After you click **Freeze**, input is frozen and activates **Verify** and **Calibrate**.
	Poll Mode	Sends an initial communication to a sensor to gather all the configuration data stored on that sensor.
	Off Scan	The sensor is disabled
Freeze Value	This **read-only** field shows the value received from the analog input, DVS, HART, MVS, RTD, or meter inputs when the **Update** button was last clicked. The system uses these values in ongoing processing (such as flow calculations, history logging, or control) while calibration occurs.	
Verify	Click to start the verification process.	
Calibrate	Click to begin calibration and display the Set Zero dialog.	
Update	Click to request a value update from the input to be used as the Freeze Values.	
Zero Shift/Offset/RTD Bias	Click to set adjustment factors for the input. The value is sent to the device for:	
	Zero Shift	Click to zeros the static pressure effect for the differential pressure input (Set Offset).
	Offset	Click to send the value of the live reading to set the reading as close to zero as possible for a static pressure inputs (Measured Pressure Reading).
	RTD Bias	Click to calibrate the offset (shift) of temperature throughout the RTD curve (Temperature Standard Reading).

Verifying an Analog Input

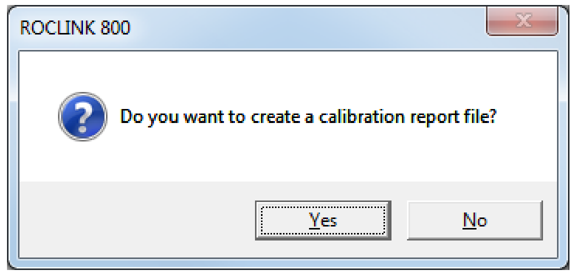
Use this process to verify that the analog input is within operating limits.

Note: If the value is incorrect, you should calibrate the input.

1. Select **Configure > I/O > AI Points**. The Analog Input screen displays.

2. From the **AI Calibration** tab, click **Freeze** to stop the values of the input from being updated during verification. ROCLINK prompts you to create a calibration report file.

Note: The **Freeze Value** field displays the value received from the input when you clicked **Freeze**. This is the value the system uses in ongoing processing (such as flow calculations and history logging) while performing calibration.



3. Click **Yes** to display a Save As dialog.

Note: If you **do not** need a calibration report, click **No** to immediately display the Calibration screen.

4. Indicate the file name for the report and click **Save**. The AI Calibration screen displays with active **Verify** and **Calibrate** buttons.

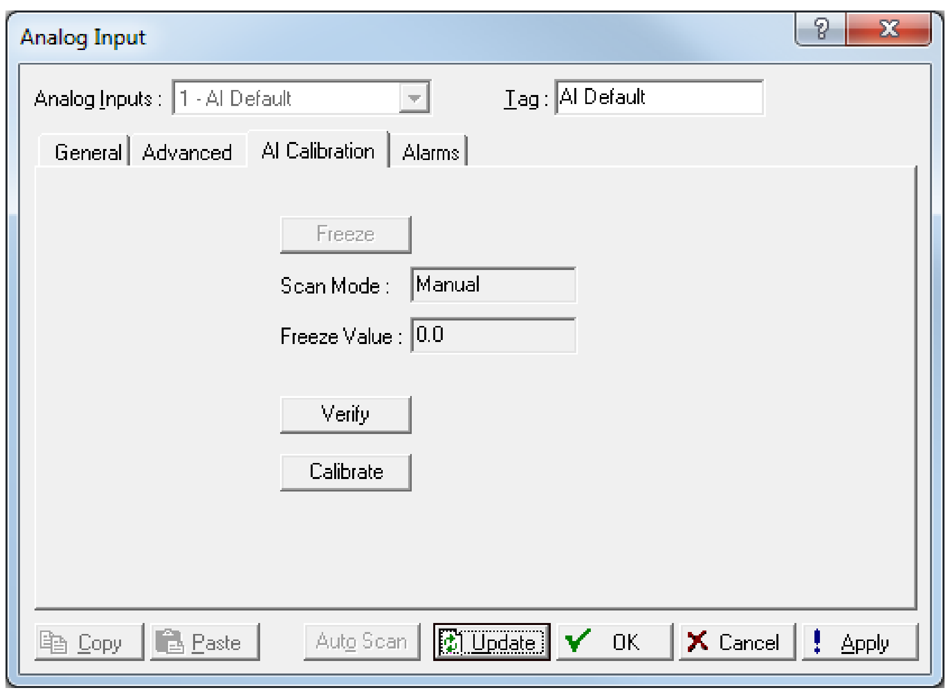


Figure 7-5. AI – AI Calibration tab

5. Review the value in the **Scan Mode** field. Valid values are **Normal** (point scanning is enabled and is updated each scan period) or **Manual** (the point is not in scanning mode).

6. Click **Verify**. A Verify dialog displays.

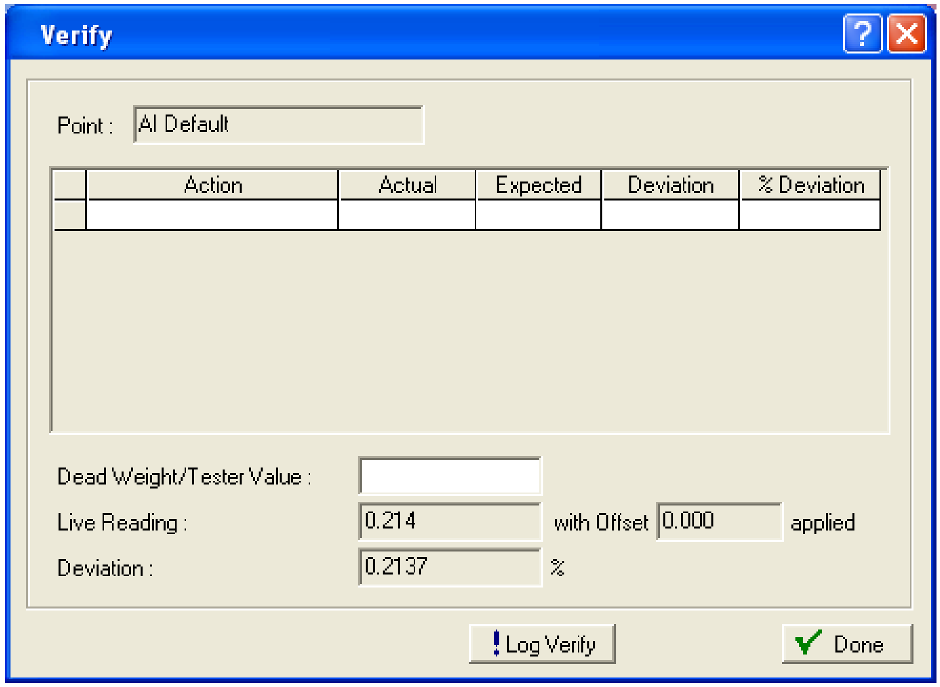


Figure 7-6. Verify

7. Complete the **Dead Weight/Tester Value** field with a value against which the test equipment verifies.

   When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it to the value in the **Live Reading** field (obtained from the temperature probe) and calculating the percentage deviation between the two values.

8. Click **Log Verify**. ROCLINK 800 completes the first log entry on the screen.

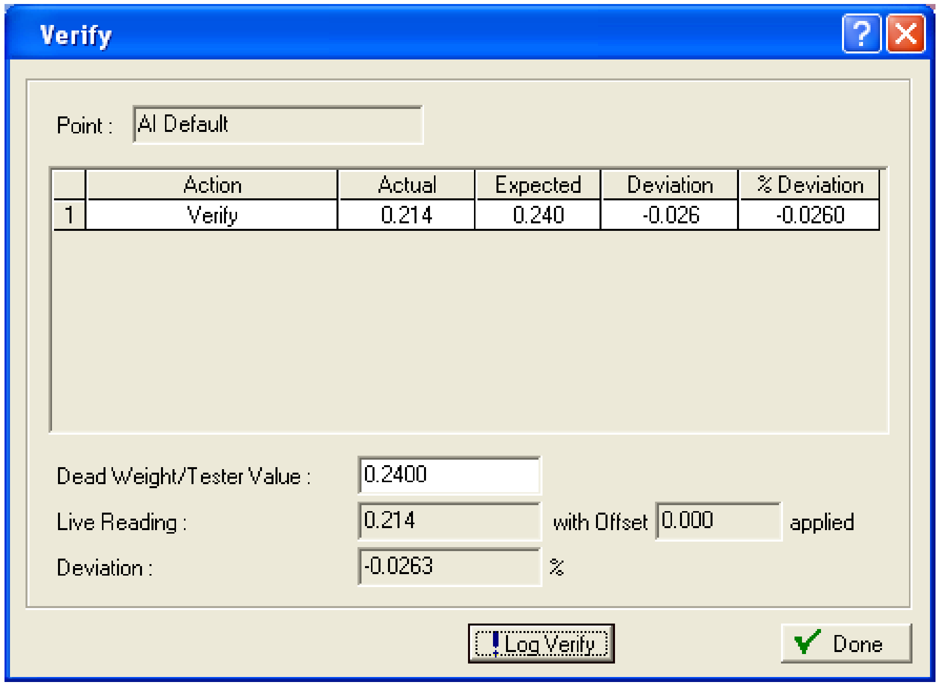


Figure 7-7. Verify – Log Entry

Field	Description
Action	Indicates the current action. Valid values are **Verify** or **Calibrate**.
Actual	Displays the value in the **Live Reading** field.
Expected	Displays the value in the **Dead Weight/Tester Value** field.
Deviation	Displays the amount of deviation between the actual and expected values.
% Deviation	Displays a percentage deviation between the Actual and Expected values.

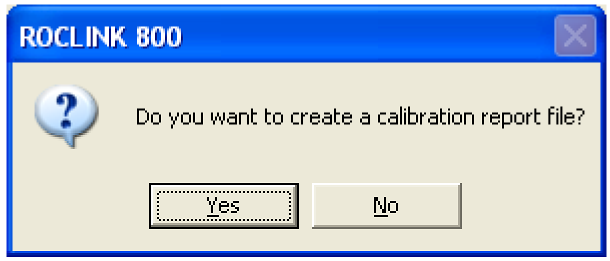
10. As the live reading value changes, click **Log Verify** as many times as necessary to establish the verification log.
11. Typically you verify the same points you calibrate. Temperature might be an example (– 100, 200, 50). For each test point, you set your test equipment to produce the expected value, enter that expected value in the **Tester Value** field, wait for live input to stabilize, and then click **Log Verify**. You can verify as many points as you want.
12. Click **Done**. The AI Calibration screen displays.
13. If your verification is satisfactory, click **OK** to close the Analog Input screen. If you need to calibrate the AI, proceed to *Calibrating an Analog Input*.

Calibrating an Analog Input

Use this process to calibrate an analog input.

1. Select **Configure** > **I/O** > **AI Points**. The Analog Input screen displays.
2. From the **AI Calibration** tab, click **Freeze** to stop the values of the input from being updated. ROCLINK prompts you to create a calibration report file.

Note: The **Freeze Value** field displays the value received from the input when you clicked **Freeze**. This is the value the system uses in ongoing processing (such as flow calculations and history logging) while performing calibration.



3. Click **Yes** to display a Save As dialog.

Note: If you **do not** need a calibration report, click **No** to immediately display the Calibration screen.

4. Indicate the file name for the report and click **Save**. The AI Calibration screen displays with active **Verify** and **Calibrate** buttons.
5. Review the value in the **Scan Mode** field. Valid values are **Normal** (point scanning is enabled and is updated each scan period) or **Manual** (the point is not in scanning mode).
6. Click **Calibrate**. A Set Zero dialog displays.

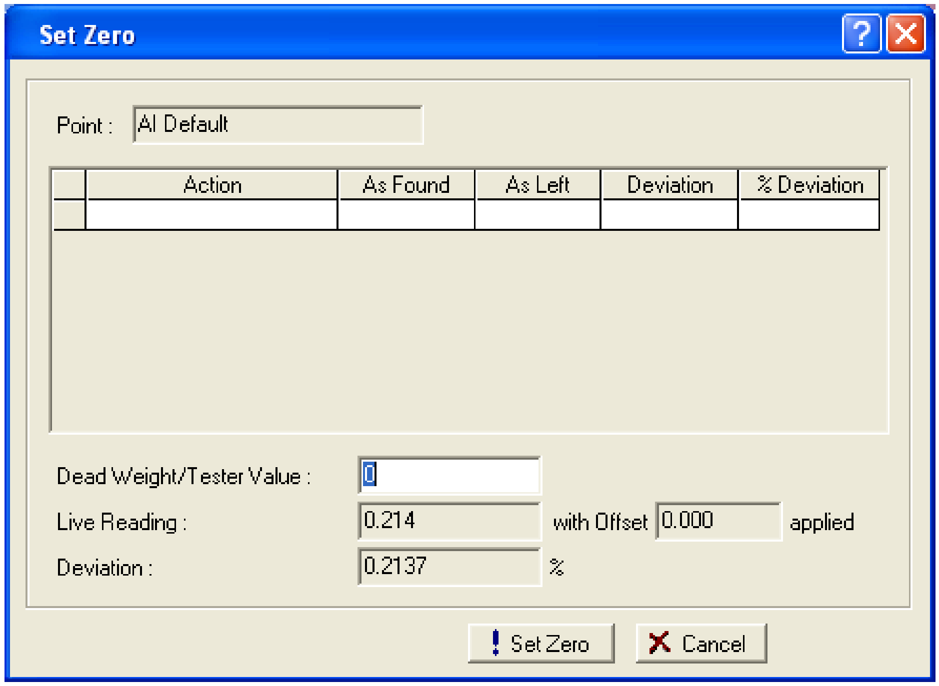


Figure 7-8. Set Zero

7. Click **Set Zero**.

   For the Set Zero entry in the calibration log, ROCLINK 800 provides **As Found** and **As Left** values and calculates the **Deviation** and **% Deviation** values (between the Dead Weight/Tester Value and the Live Reading values). ROCLINK 800 also resets the value in the Dead Weight/Tester Value field to **100** and activates the **Set Span** button.

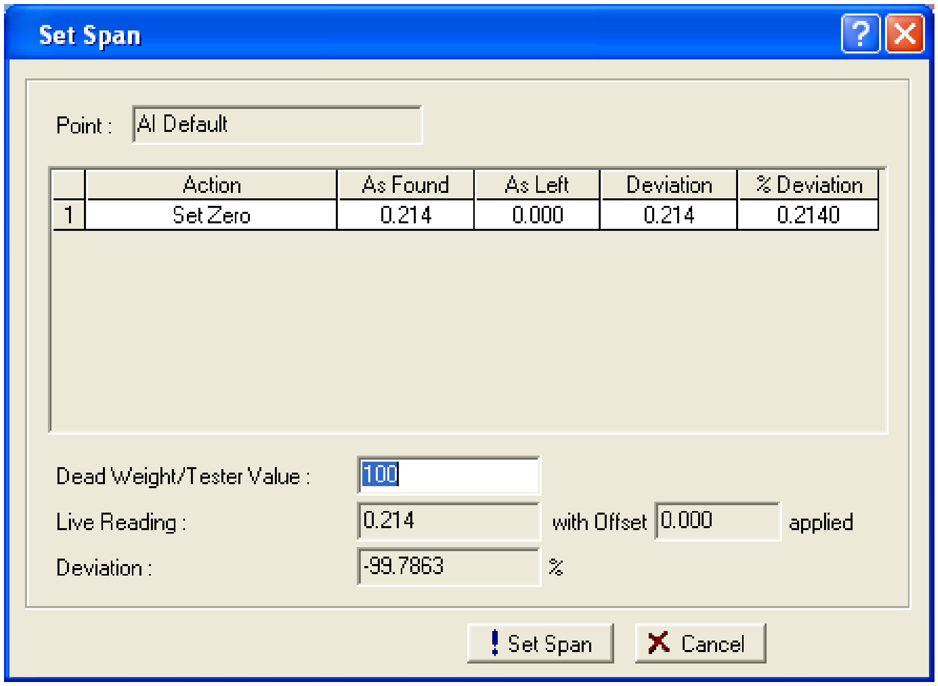


Figure 7-9. Set Zero (Log)

8. Click **Set Span**.

ROCLINK 800 completes the Set Span entry in the calibration log and activates the **Set Mid 1** button.

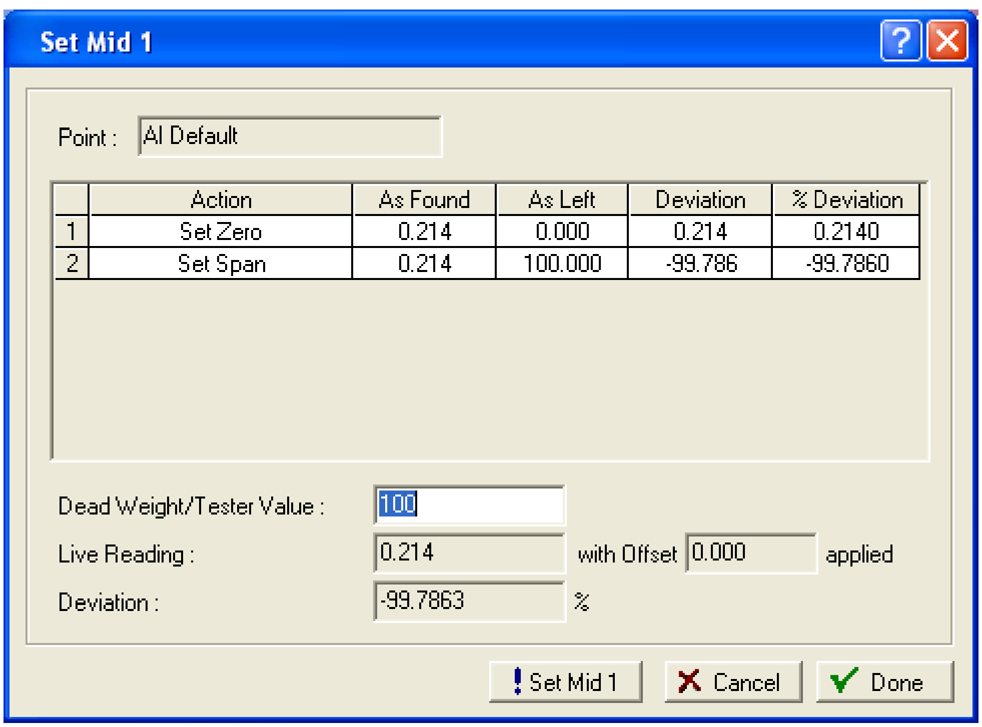


Figure 7-10. Set Span (Log)

Note: A calibration requires only two points (zero and span). Your organization determines whether additional points (midpoints 1, 2, or 3 typically at 25%, 50%, and 75% respectively) are necessary for a calibration. For this example, we set one midpoint.

9. Click **Set Mid 1**.

ROCLINK 800 completes the Set Mid 1 entry in the calibration log and activates the **Set Mid 2** button.

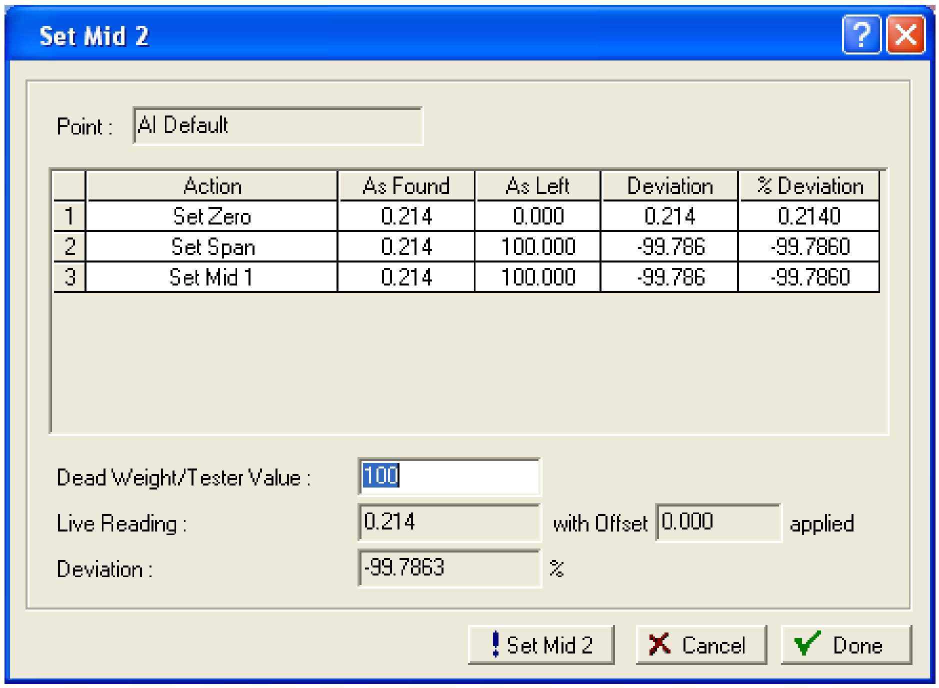


Figure 7-11. Set Midpoint 1

10. If you do not wish to configure additional midpoints, click **Done**. The AI Calibration screen displays.

When the AI Calibration screen displays, you can calibrate inputs for another AI by starting again at step 1.

AI: Alarms Tab

Use this tab to set the alarm parameters for this AI point. You also enable alarming on the tab. You **must** enable alarming to configure the limit alarms (Low, High, LoLo, HiHi, Rate, and Deadband) on this tab.

Note: To conserve alarm log space, enable alarms **only** when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each alarm to prevent the generation of false alarms.

Select the **Alarms** tab. The Alarms screen displays.

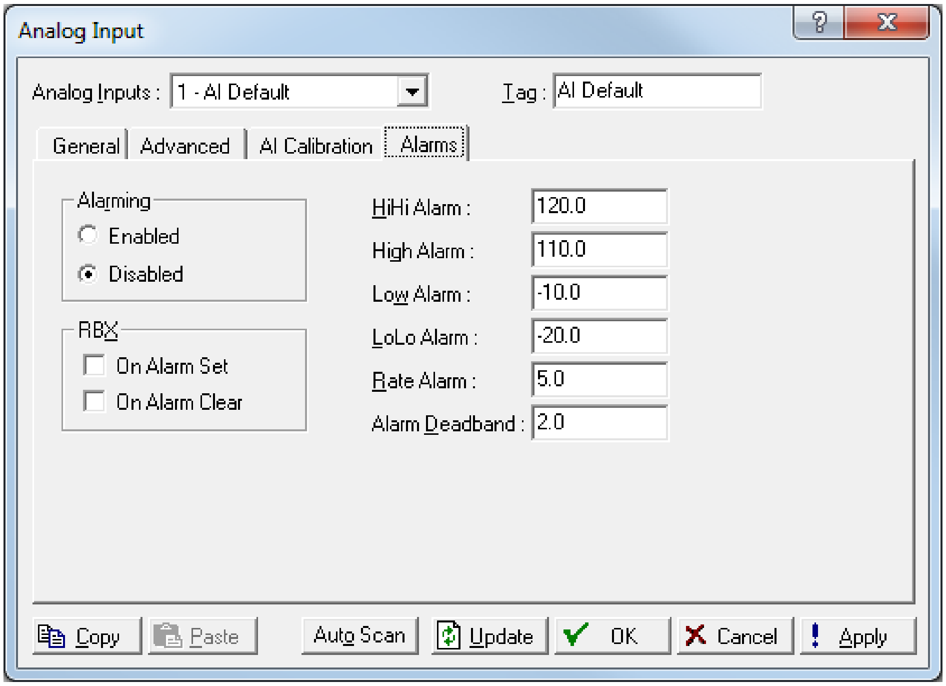


Figure 7-12. AI – Alarms tab

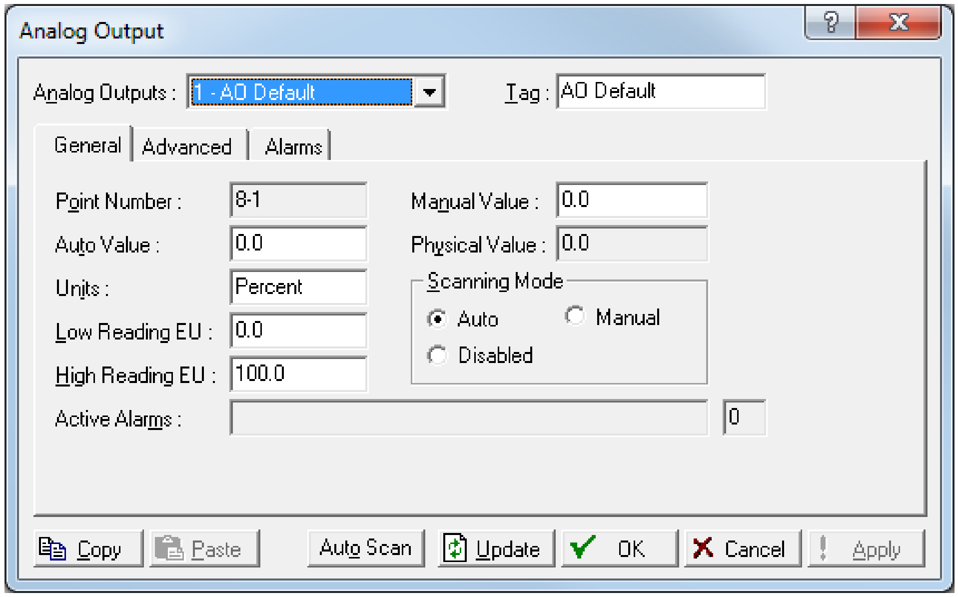
Field	Description
Alarming	Sets the alarm option for the selected point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
RBX	Sets the Spontaneous Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are **On Alarm Set** (which generates an RBX message to the host when the point **enters** an alarm condition) and **On Alarm Clear** (which generates an RBX message to the host when the point **exits** an alarm condition). **Note:** RBX alarming requires you to configure the communications port.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **HiHi Alarm**. **Note:** Typically you set the value for the HiHi Alarm higher than the value for the High Alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **High Alarm**.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.

Field	Description
LoLo Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **LoLo Alarm**. **Note:** Typically you set the value for the LoLo Alarm lower than the value for the Low Alarm.
Rate Alarm	Sets, in engineering units, a value that represents the maximum amount of change allowed in the calculated rate between updates before an alarm generates. If the change is equal to or greater than this value, an alarm occurs. **Note:** To disable this Rate Alarm without disabling the other alarms, set the value greater than the scan value of the analog input.
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limits and below the High Alarm limits. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.

7.1.2 Analog Output (AO) Configuration

Analog outputs are analog signals the ROC generates and sends to regulate equipment such as any analog device requiring proportional control.

Select **Configure > I/O > AO Points**. The Analog Output screen displays.



The Analog Output screen has three tabs. Use each tab to configure a component of the output:

- Use the **General tab** to set the basic parameters for the analog output point.
- Use the **Advanced tab** to configure features, such as on-restart power settings and RBX alarming.
- Use the **Alarms** tab to set the alarm parameters for the AO point.

Save Configuration

After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start

AO: General Tab

Select **Configure > I/O > AO Points**. The Analog Output screen displays with the General tab active. Use this tab to set the basic parameters for the analog output point.

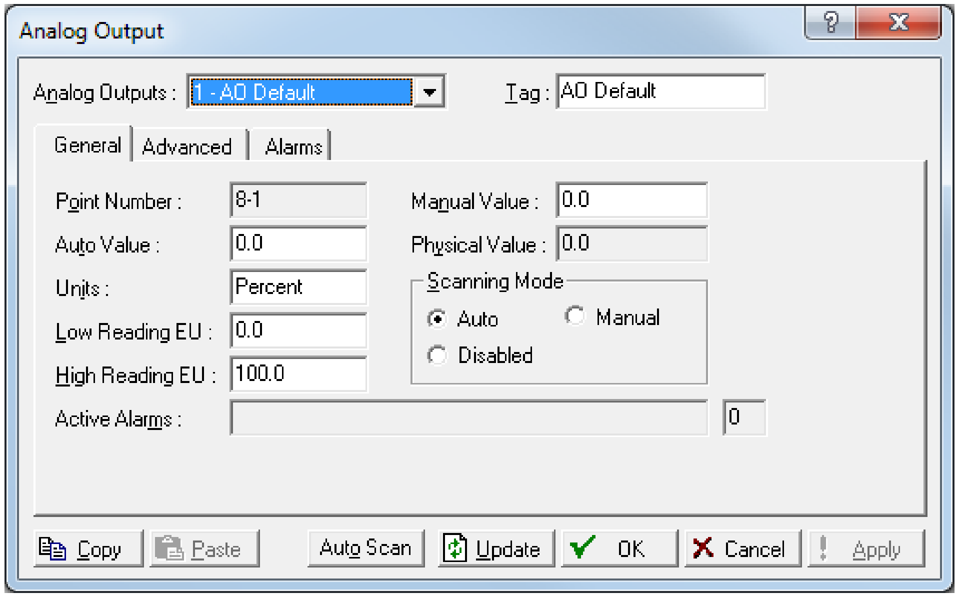


Figure 7-13. AO – General tab

Field	Description
Analog Outputs	Sets the analog output to be configured. Click ▼ to display all available analog outputs. **Note:** The selection in this field applies to **each** tab on this screen.
Tag	Provides a 10-alphanumeric characters) identifier associated with each point. **Note:** The selection in this field applies to **each** tab on this screen.
Point Number	This **read-only** field shows the rack location for this point.
Auto Value	Reads the value from the field device. When scanning is **disabled**, enter a value to override the output. If scanning is **enabled**, this field displays the last analog scan in engineering units.
Units	Sets the engineering units for the I/O (such as IN H2O, PSIG, MCF, degrees F, milliamps, or volts).
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding analog signal.
Manual Value	When the Scanning Mode is set to Manual, use **Manual Value** to enter the value instead of the Auto Value field.

Field	Description
Physical Value	The **read-only** field shows the current state of the AO. When the AO is in Manual Mode, this should reflect the Manual Value. When the AO is in Auto mode, this should reflect the Auto Value.
Scanning Mode	Sets the scanning option for this point. Valid values are **Auto** (automatically process the field input and display the last analog output scan in the Auto Value field), **Disabled** (do not permit any updates of the Auto Value or Manual Value fields), or **Manual** (enter the value in the Manual Value field). **Note:** If you enable alarming, the ROC generates a Manual Mode alarm when Scanning is Disabled.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. **Note:** A read-back error indicates the AO is driving the output to a set level, but the loop is not responding. Example: An I/P converter is connected to the A/O and set to 25%. If the I/P is not connected or an open wire occurs, a read-back error would display.

AO: Advanced Tab

Use the Advanced tab to configure features such as resetting and output values for the analog output.

Select **Configure**.> **I/O** > **AO Points** > **Advanced** tab. The Advanced screen displays.

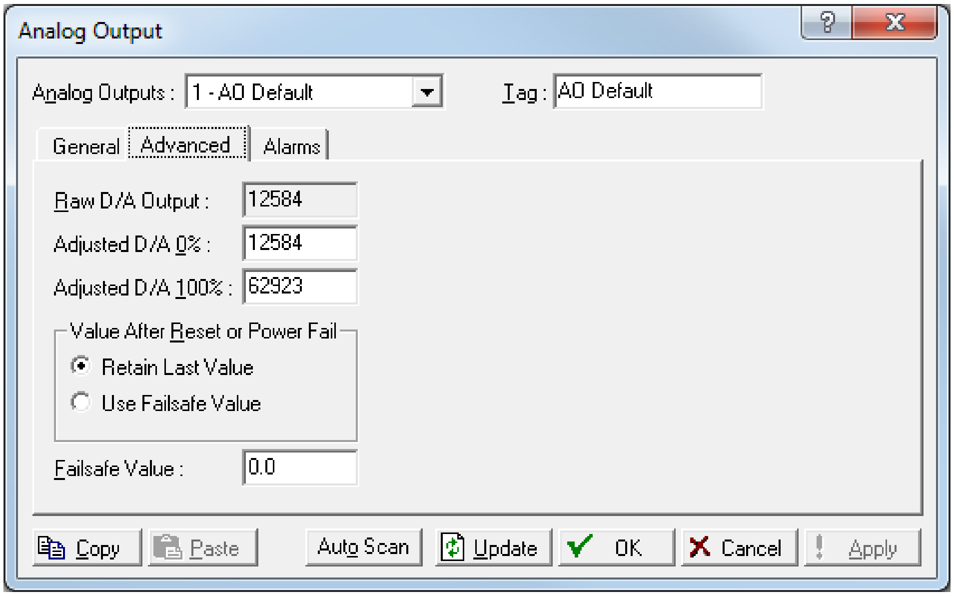


Figure 7-14. AO – Advanced tab

Field	Description
Raw D/A Output	This **read-only** field shows the current counts written to the digital-to-analog converter. The D/A value set to the AO is the raw D/A output. The default value is **0**.
Adjusted D/A 0%	Sets the count the digital-to-analog converter uses for zero percent output. This value is also used to scale the output to engineering units. The default is **0**.
Adjusted D/ A 100 %	Sets the count decoded by the digital-to-analog converter for 100 percent output. This value is also used to scale the output to engineering units.
Value After Reset or Power Fail	Sets what value the system uses on a power restart or a warm start. Valid values are **Retain Last Value** (maintain last output value) or **Use Failsafe Value** (use specified value). Retain Last Value is the **default**. **Note**: If you select **Use Failsafe Value**, you must also complete the Failsafe Value field.
Failsafe Value	If you select **Use Failsafe Value**, complete this field to indicate a value the system uses on a power restart or a warm start.

AO: Alarms Tab

Use this tab to enable or disable alarming and to indicate when RBX reporting occurs. Select **Configure** > **I/O** > **AO Points** > **Alarms** tab. The Alarms screen displays.

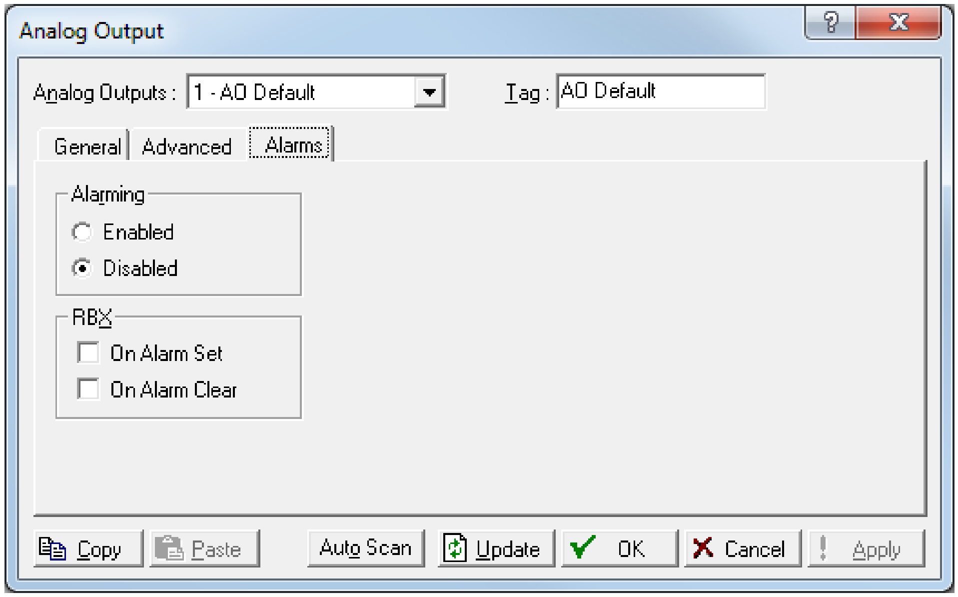


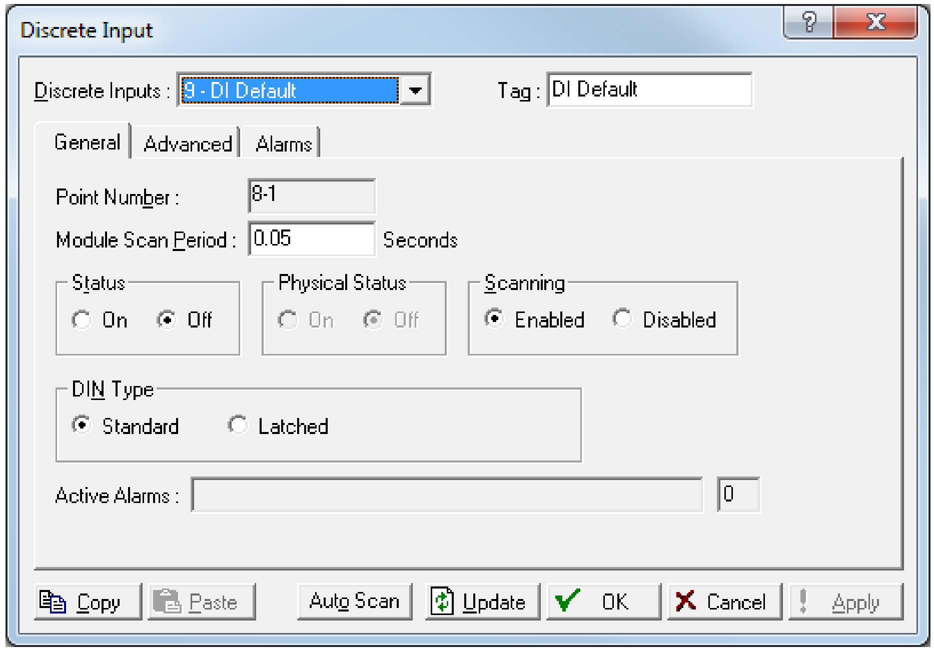
Figure 7-15. AO – Alarms tab

Field	Description
Alarming	Sets **Alarming** to generate alarms on point failure. When Alarming is Disabled, the Point Fail alarm appears in the Active Alarms field, but will not be written to the Alarm Log. To conserve Alarm Log space, enable alarms only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one so that no false alarms generate.
RBX	Sets the **RBX Alarming** option to configure Spontaneous-Report-By-Exception (SRBX or RBX) alarming for this point. Valid values are **On Alarm Set** (which generates an RBX message to the host when the point **enters** an alarm condition) and **On Alarm Clear** (which generates an RBX message to the host when the point **exits** an alarm condition). **Note:** RBX Alarming requires you to configure the communications port.

7.1.3 Discrete Input (DI) Configuration

Discrete Input (DI) modules monitor the status of relays, open collector/open drain type solid-state switches, and other two-state devices. Each DI channel can also be software configured to function as a "latched" DI, which remains in the active state until reset. Other parameters can invert the field signal and gather statistical information on the number of transitions and the time accumulated in the on or off state.

Select **Configure > I/O > DI Points**. The Discrete Input screen displays.



The Discrete Input screen has three tabs. Use each tab to configure a component of the input.

- Use the **General** tab to set the basic parameters for the DI point.
- Use the **Advanced** tab to configure features, such as filtering, input inversion, and counter values for the discrete output.
- Use the **Alarms** tab to set the alarm parameters for this DI point.

Save Configuration

After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start

DI: General Tab

Select **Configure > I/O > DI Points**. The Discrete Input screen displays with the General tab active. Use this tab to set the basic parameters for the discrete input point.

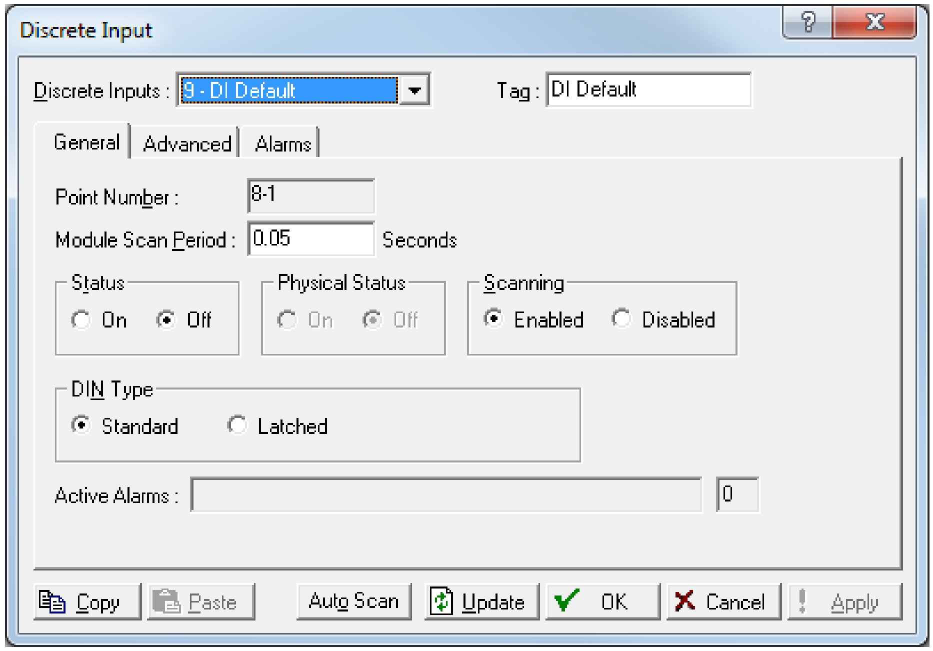


Figure 7-16. DI – General tab

Field	Description
Discrete Inputs	Sets the discrete input to be configured. Click ▼ to display all available discrete inputs. **Note:** The selection in this field applies to **each** tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note:** The selection in this field applies to **each** tab on this screen.
Point Number	This **read-only** field shows the rack location for this point.
Module Scan Period	Sets, in seconds, how frequently the system scans the input.
Status	Sets the state of the discrete input. Valid values are **On** (indicates that a contact is closed or input is on) or **Off** (indicates that a contact is open or input is off). **Off** is the **default**.
Physical Status	This **read-only** field shows the state of the hardware. **Off** normally indicates that a switch is open; **On** normally indicates that a switch is closed. This may be different from the Status if Inverting or Latching is in effect.
Scanning	Sets the scanning option for this point. Valid values are **Enabled** (automatically process the field input) or **Disabled** (do not process the input).

Field	Description
DIN Type	Sets how the DI functions. Valid values are **Standard** (follow the actual field input) and **Latched** (maintain the input status). During an active transition from off to on, Latched mode enables the DI to remain in the on state until you clear the Status parameter either manually or through the software.
Active Alarms	This **read-only** field shows any active alarms for this point. When you enable alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you disable alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to User Interface Basics.

DI: Advanced Tab

Use the Advanced tab to configure features such as filtering, input inversion, and counter values for the discrete input.

Select **Configure > I/O > DI Points > Advanced** tab. The Advanced screen displays.

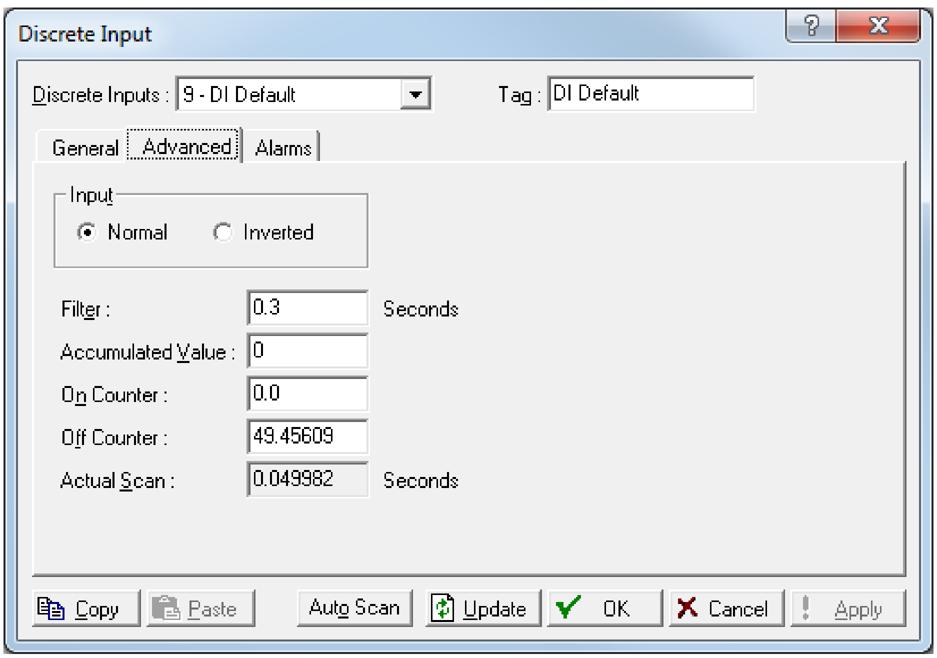


Figure 7-17. DI – Advanced tab

Field	Description
Input	Sets the state of the input. Valid values are **Normal** (field input operates normally, so that On is On) or **Inverted** (inverts the field input in the Status field so that On becomes Off and vice-versa). **Normal** is the **default**. In the Inverted state, an open circuit in the field would then be indicated as On in the Status field, and closed contacts would be indicated as Off.
Filter	Sets, in seconds, the amount of time that the discrete input must remain in the On (high) state before the device recognizes it as such. Enter a value between **0** to **255**. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition.
Accumulated Value	Counts the number of times the discrete input goes from Off to On. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator by entering the desired value or clear the accumulator by entering **0**.
On Counter	Counts the number of 50-millisecond periods when the Status parameter is in the On state. The On Counter is a 32-bit number that automatically rolls over when it reaches its maximum value. You can preset the On Counter by entering the desired value or clear the counter by entering **0**. **Note:** The On Counter does not function if you **disable** scanning.
Off Counter	Counts the number of 50-millisecond periods when the Status parameter is in the Off state. The Off Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the Off Counter by entering the desired value or clear the counter by entering **0**. **Note:** The Off Counter does not function if you **disable** scanning.
Actual Scan	This **read-only** field shows the actual amount of time in seconds that passes between scans. This number should be the same as shown for the Module Scan Period parameter if the system is not overloaded.

DI: Alarms Tab

Use the Alarms tab to configure the alarm parameters for this discrete input.

1. Select the **Alarms** tab. The Alarms screen displays.

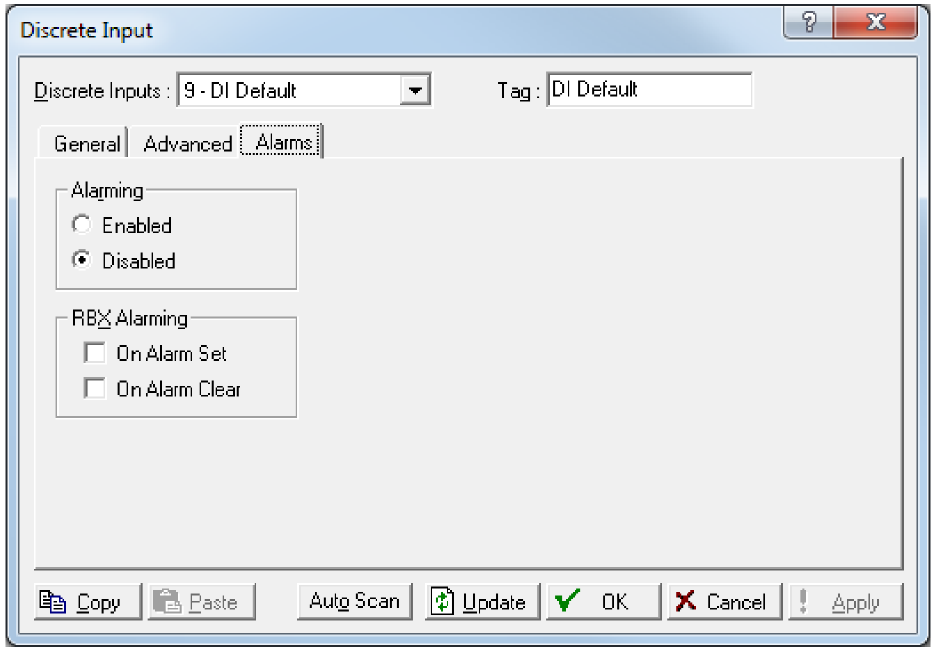


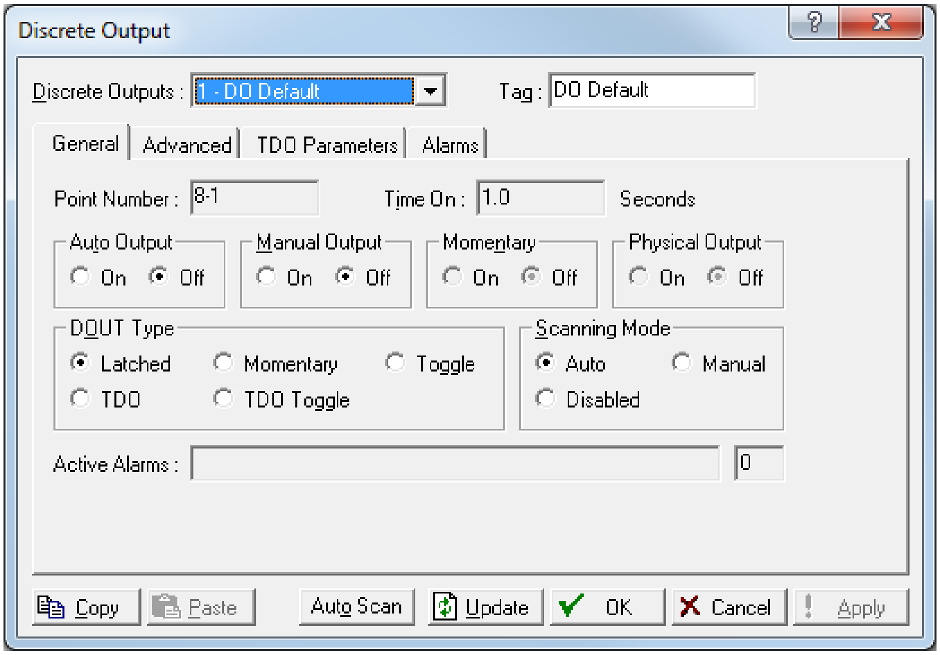
Figure 7-18. DI – Alarms tab

Field	Description
Alarming	Sets the alarm option for the selected point. Valid values are **Enabled** (generates an alarm when the point's status changes) or **Disabled** (no alarm generates). The default is **Disabled**. When you disable alarming, the Status Change alarm appears in the Active Alarms field, but is not written to the Alarms log. **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are **On Alarm Set** (which generates an RBX message to the host when the point **enters** an alarm condition) or On Alarm Clear (which Generates an RBX message to the host when the point **exits** an alarm condition): **Note:** RBX Alarming also requires you to configure the communications.

7.1.4 Discrete Output (DO) Configuration

Discrete outputs are high/low outputs used to turn equipment on and off. You can set a discrete output to send a pulse to a specified device. You can also configure a discrete output as latched, momentary, toggle, Timed Duration Output (TDO), and TDO toggle.

Select **Configure > I/O > DO Points**. The Discrete Output screen displays.



Examine the default settings and adjust the parameters to suit your application on each of the tabs.

- Use the **General** tab to set the basic parameters for the DO point.
- Use the **Advanced** tab to configure accumulated value and state for reset for the selected DO.
- Use the **TDO Parameters** tab to configure TDO parameters.
- Use the **Alarms** tab set the alarm parameters for this DO point.

Save Configuration

After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start

DO: General Tab

Select **Configure > I/O > DO Points**. The Discrete Output screen displays with the General tab active. Use this tab to configure the basic parameters for the DO point.

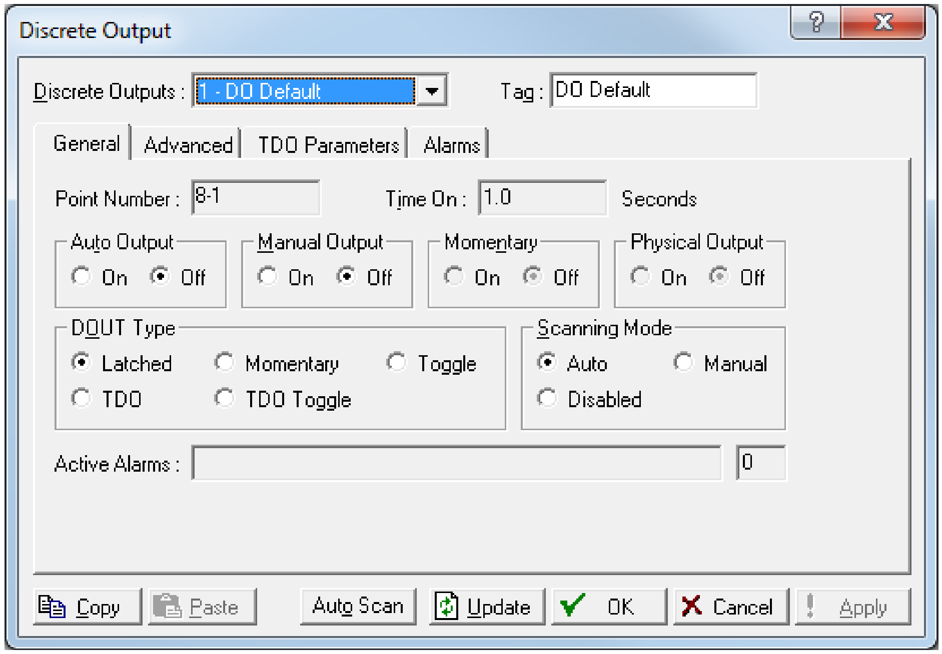


Figure 7-19. DO – General tab

Field	Description
Discrete Outputs	Sets the discrete output to be configured. Click to display all available discrete outputs. **Note:** The selection in this field applies to **each** tab on this screen.
Tag	Provides a 10-alphanumeric character identifier associated with each point. **Note:** The selection in this field applies to **each** tab on this screen.
Point Number	This **read-only** field identifies the rack location for this point.
Time On	This **read-only** field shows, in seconds, the amount of time for momentary operation. The default value is **1.0** seconds for a DO. The default value is **5** milliseconds for an ACIO DO. **Note:** In Momentary mode, this is the amount of time (in seconds) that the momentary contact is energized. In the Toggle mode, this is the time (in seconds) between switching On or Off. In the TDO and TDO Toggle modes, the TDO configuration calculates this value.
Auto Output	Indicates the state of the discrete output. Valid vaules are **Off** (the output is off or a switch is open) and **On** (the output is on or a switch is closed). The **default** is **Off**.

Field	Description	
Manual Output	Indicates the state of the discrete output. Valid values are **Off** (the output is off or a switch is open) and **On** (the output is On or a switch is closed). Select **On** and click **Apply** to force one transition of the DO.	
Momentary	This **read-only** field shows the state of the discrete output when the DOUT Type is set to **Momentary**. Valid values are **Off** (the output is off or a switch is open) and **On** (the output is on or a switch is closed).	
Physical Output	This **read-only** field shows the actual status of the output channel at the field terminations regardless of the DOUT Type selected.	
DOUT Type	Sets the function of this discrete output. Valid values are:	
	Latched	Changes on an active transition of the output (from off to on). The discrete output remains On until cleared by selecting Off in the Auto Output field.
	Momentary	Enables ROCLINK 800 to activate the discrete output for the amount of time defined in the **Time On** field.
	Toggle	Enables a square-wave output for which both the time on and time off are defined by the value in the **Time On** parameter. Time on and time off are equal. Use the TDO Parameters tab to define time-related parameters.
	TDO	Enables the discrete output to have a time duration between On and Off transitions based on time-related parameters configured in the TDO Parameters tab.
	TDO Toggle	Enables the discrete output to continuously repeat in a cycle defined by the value in the **Cycle Time** field on the TDO Parameters tab where the EU Value controls the on-time duration.

Field	Description	
Scanning Mode	Sets the scanning type to configure how the DO is scanned. Valid values are:	
	Auto	Automatically processes the field output.
	Manual	Prevents the ROC from updating the DO value; permits only manual updates of the output value. Set Manual Output to **On** and click **Apply** to override the output.
	Disabled	Prevents the ROC from updating the DO value; permits a manual process of the last output scan. Set Auto Output to **On** and click **Apply** to override the output.
	Note: If you enable alarming, the ROC generates a Manual Mode alarm when scanning is disabled.	
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear.	

DO: Advanced Tab

Use this tab to configure accumulated value and state for reset for the selected DO.

1. Select **Configure > I/O > DO Points > Advanced** tab. The Advanced screen displays.

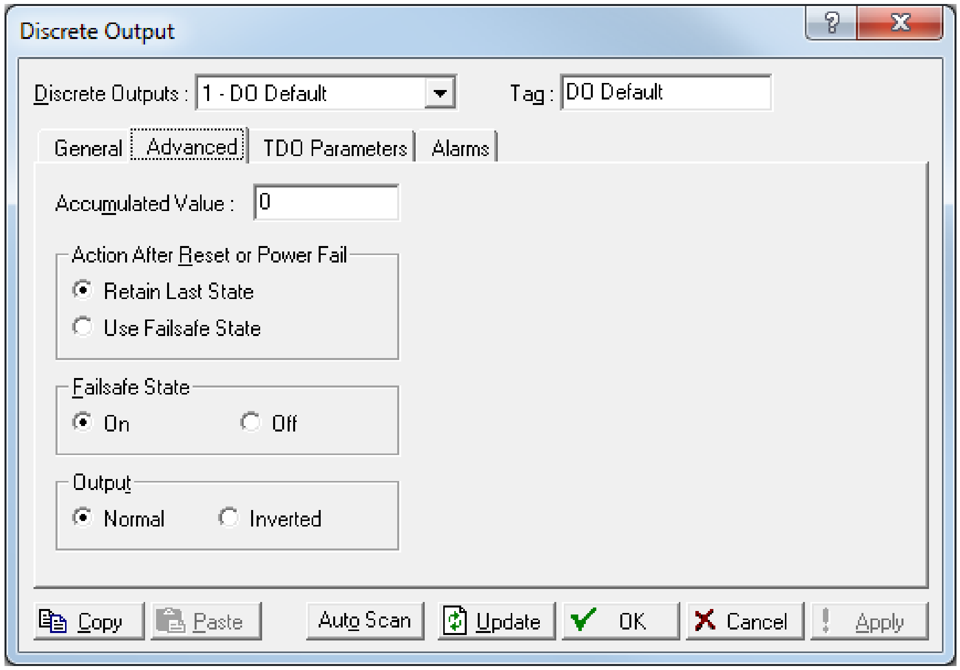


Figure 7-20. DO – Advanced tab

Field	Description
Accumulated Value	Sets a value for the accumulated number of off-to-on transitions for the discrete output. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desired value or clear it by entering zero (**0**).
Action After Reset or Power Fail	Indicates how the ROC handles the discrete output relay state on power reset or failure. Valid values are **Use Failsafe Mode** (discrete output uses value set in the Failsafe State frame: On or Off) or **Retain Last Status** (ROC retains the DO state, whether off or on). **Note**: If you use DO points as controls (as with pumps or valves), set the **Use Failsafe Mode** and the **Failsafe State** setting to ensure that the controls return to a safe state following a power reset or failure.
Failsafe State	Indicates whether the failsafe state is active following a reset due to a power restart or warn start. Valid values are **On** or **Off**. **Note**: If you select **On**, you must also indicate (on the General tab) whether the **Auto Output** or **Manual Output** is set to On or Off after a reset of the ROC.

Field	Description
Output	Indicates the state of the DO output. Valid values are **Normal** (energizes in time on) or **Inverted** (energizes in time off). Selecting Inverted inverts **all** outputs in **any** mode. **Note:** If Failsafe State is set to On **and** Inverted is On, the Failsafe State returns to Off following a reset.

DO: TDO Parameters Tab

Use this tab to configure time duration parameters for this DO point.

Notes: To correctly configure time duration DO, ensure that you have selected **TDO** in the DOUT Type field and **Auto** as the Scanning Mode on the General tab for DO.

1. Select **Configure > I/O > DO Points > TDO Parameters** tab. The TDO Parameters screen displays.

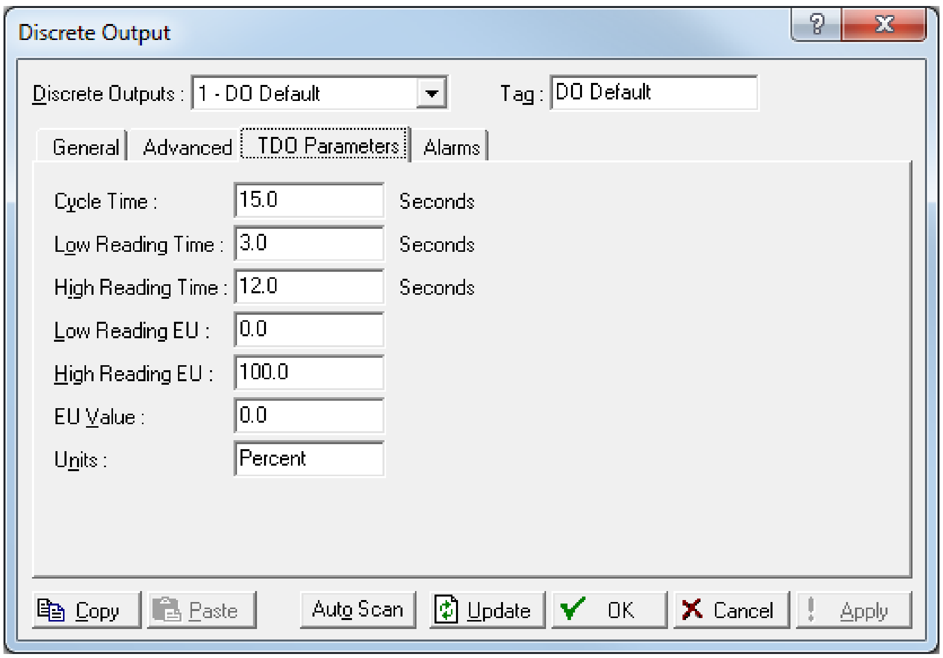


Figure 7-21. DO – TDO Parameters tab

Field	Description
Cycle Time	Sets, in seconds, the total amount of time the cycle spends in the on and off positions. The default is **15** seconds. The system uses Cycle Time to define the Off time in the TDO Toggle mode using the formula. Off Time = Cycle Time – On Time For example, a TDO is used to emulate a field instrument measuring flow. The TDO outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow. The output is repeated every 15 seconds. If the Cycle Time is less than or equal to the On Time, set the Off Time to **1** (one). Care must be taken in configuration (including other places, such as FSTs) to ensure that **the Cycle Time remains greater than the calculated On Time** for proper operation.
Low Reading Time	Sets, in seconds, the **Low Reading Time** (0% Count) that represents a zero percent output pulse width. The default is **3** seconds. This is the minimum amount of time that the TDO can be energized to move the motor. Set to a value that allows movement, but also provides good resolution of control.
High Reading Time	Sets, in seconds, the **High Reading Time** (100% Count) that represents a 100 percent output pulse width. The default is **12** seconds. This is the maximum amount of time that the TDO can be energized to move the motor. Normally, this is the amount of time it takes for the actuator to move the valve from fully open to fully closed.
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
EU Value	Current value, displayed in engineering units. In TDO Toggle mode, the EU Value controls the Time On: On Time = ((EU Value – Low Reading EU) / (High Reading EU – Low Reading EU) * (High Time – Low Time)) + Low Time

Field	Description
Units	Sets the engineering units for the discrete output (such as percentage, IN H2O, PSIG, MCF, degrees F, milliamps, and volts).

Defining the Output Pulse

To define the TDO output pulse:

1. Select **Configure > I/O > DO Points**. The Discrete Output screen displays.
2. Select a DOUT Type of **TDO** or **TDO Toggle**.
   - **TDO (Timed Duration)** – The single-pulse output can be triggered by writing to the Status or the EU Value parameter of the DO point. This can be accomplished directly, by a PID point, or by an FST.
   - **TDO Toggle** – A continuous pulse is generated with the pulse length being controlled by writing to the EU Value parameter in the DO point. This can be accomplished directly or by an FST.
3. Click the **TDO Parameters** tab.

The output pulse from the TDO function must be defined for proper engineering unit (EU) conversion. The minimum pulse width (Low Reading Time / 0% Count) and the maximum pulse width (High Reading Time / 100% Count) define the minimum and maximum On time of the output pulse. The values entered in the Low Reading Time and High Reading Time represent the number of seconds the output is On.

Example:
A TDO is used to emulate a field instrument measuring flow. The TDO outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow.

Low Reading Time (0% Count) = 3 seconds

High Reading Time (100% Count) = 12 seconds

Low Reading EU = 0

High Reading EU = 1000

DO: Alarms Tab

Use this tab to set the alarm parameter for this DO point. Select **Configure > I/O > DO Points > Alarms** tab. The Alarms screen displays.

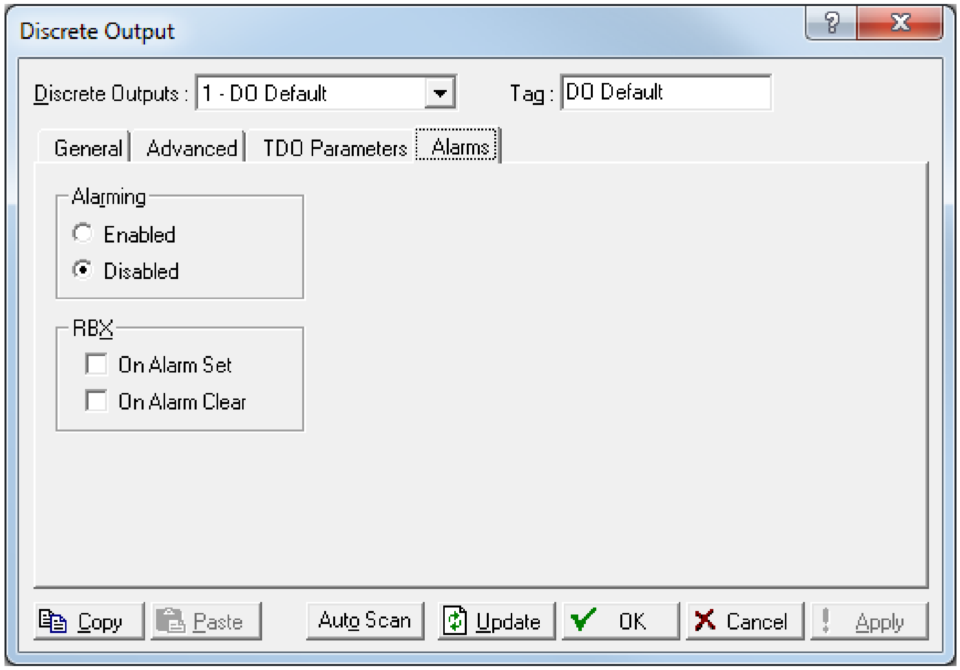


Figure 7-22. DO – Alarms tab

Field	Description
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (enables alarming) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
RBX	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are **On Alarm Set** (which generates an RBX message to the host when the point **enters** an alarm condition) and **On Alarm Clear** (which generates an RBX message to the host when the point **exits** an alarm condition). **Note:** RBX Alarming requires you to configure the communications port.

7.1.5 Discrete Output Relay (DOR) Configuration

The Discrete Output Relay (DOR) module provides the ROC800 with the ability to control various discrete output field devices.

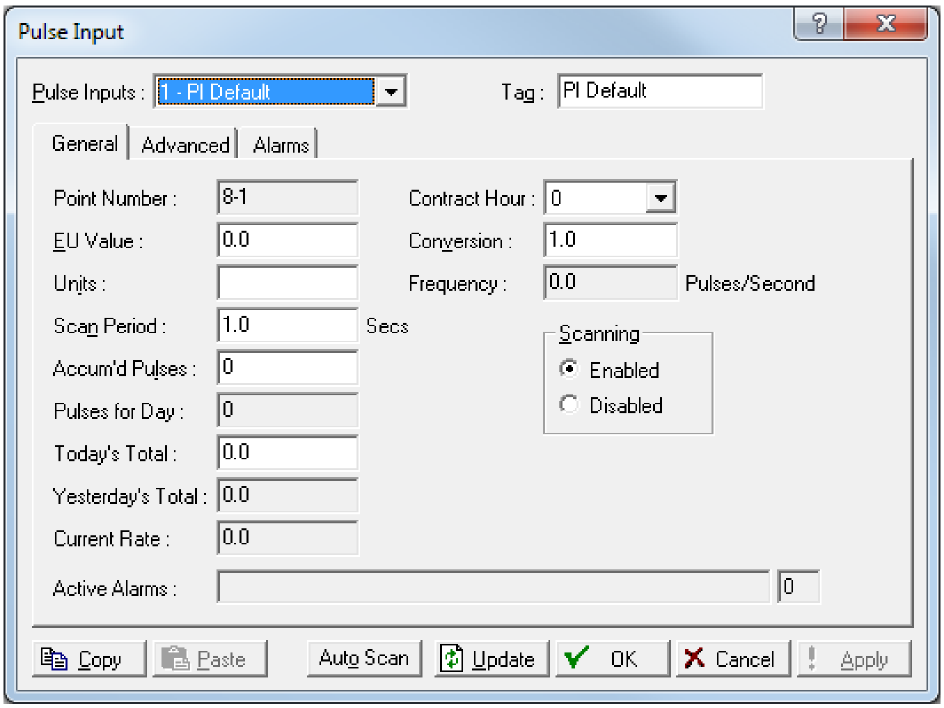
The DOR module provides six channels of discrete outputs. DOR modules use mechanical (SPST) latching relays to provide a set of normally-open dry contacts capable of switching 2 A at 32 Volts dc across the complete operating temperature. DO Relays are high/low outputs used to turn equipment on and off. You can set a discrete output to send a pulse to a specified device

You configure the DOR module as you would a DO module. The major difference occurs in how you wire the modules. For that information, refer to *Chapter 3*of the *DL8000 Preset Controller Instruction Manual* (part D301244X012).

7.1.6 Pulse Input (PI) Configuration

Pulse Input (PI) modules accept pulse trains (square wave signals) that measurement devices (such as turbine meters) generate. The pulse input accepts digital level on/off signals from an external device and accumulates the changes over a configured period of time. The PI can also determine a rate from the accumulated pulses over a configured period of time.

Select **Configure > I/O > PI Points**. The Pulse Input screen displays.



The Pulse Input screen has three tabs. Use each tab to configure a component of this input.

- Use the **General** tab to set the basic parameters for the PI point.
- Use the **Advanced** tab to configure features, such as EU Options, Rate Period, Rollover value, and Conversion for the pulse input.
- Use the **Alarms** tab to set the alarm parameters for this PI point.

Note: If you enable Alarming, configure the limit alarms (four levels, rate, and deadband) on the Alarms tab. By disabling alarms, you can prevent alarms from generating for this point. To conserve alarm log space, enable alarms only when necessary. If you do not plan to use all the alarms, check and adjust the value of each one to prevent the generation of false alarms.

Save Configuration

After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

PI: General Tab

The Pulse Input screen initially displays the General tab. Use this tab to set the basic parameters for the pulse input point. Select **Configure > I/O > PI Points**.

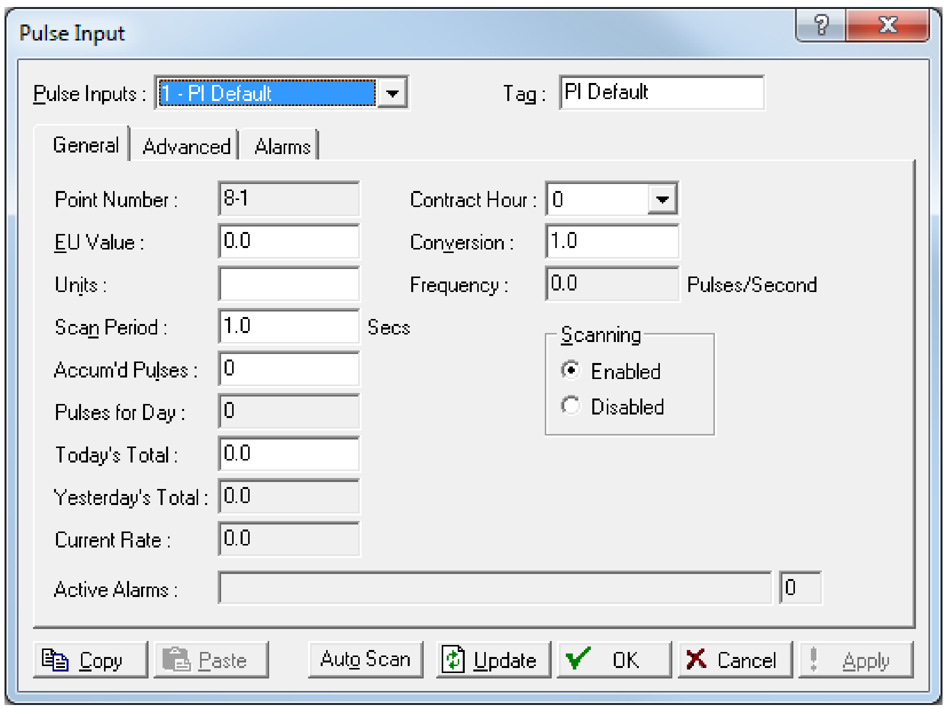


Figure 7-23. PI – General tab

Field	Description
Pulse Inputs	Sets the pulse input to configure. Click ▼ to display all available pulse inputs. **Note:** The selection in this field applies to **each** tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note:** This selection in this field applies to **each** tab on this screen.

Field	Description
Point Number	This **read-only** field shows the rack location (module slot and channel number) for this point.
EU Value	Sets the value for engineering units (EUs). The **EU Value** is dependent on how you set the EU Options on the Advanced tab. If you set up the PI as a Rate (Max Rollover), then the system assigns the Current Rate to the EU Value. If you set up the PI as an accumulator using Today's Total (Max Rollover), then the system assigns Today's Total to the EU Value. If you set up the PI as an accumulator using Running Total (Entered Rollover), then the EU Value corresponds to the accumulated pulses times the Conversion. The system compares the EU Value to the value entered for the Rollover Value. If the EU Value is greater than or equal to the entered Rollover Value, the system sets the EU Value here to zero.
Units	Sets the engineering units for the I/O (In H2O, PSIG, MCF, degrees F, milliamps, or volts).
Scan Period	Sets, in seconds, the amount of time between scans of the EU Value. The default value is **1.0** second. The system calculates this rate by counting the number of pulses during the scan interval and dividing by the time interval. To avoid highly fluctuating calculation results, typically at least 10 pulses should occur between scans at low flow conditions. For example, if a flow meter produces one pulse per second at low flow, then set the Scan Period value to a minimum of **10** seconds. **Note:** Once the system reaches the scan period, it updates the values in the Accum'd Pulses, Pulses Today, Today's Total, Yesterday's Total, and Current Rate fields.
Accum'd Pulses	Sets the number of raw counts stored in the accumulated value counter in firmware. For each scan period, the ROC determines the number of raw counts that have occurred since the last scan period and adds them to the accumulated value counter. The accumulated value rolls over to zero after reaching 16,000,000.
Pulses For Day	This **read-only** field shows the total number of pulses that the PI has received for the contract day. At the end of the contract day, the ROC zeros this field and starts over, only if being totalized in History. The Contract Hour is specified on this screen.

Field	Description
Today's Total	Displays the total EU Values accumulated for the current contract day, calculated by multiplying the conversion value by the accumulated pulses. The system resets this value to zero at the contract hour.
Yesterday's Total	This **read-only** field shows the total EU Value accumulated the previous contract day, calculated as the previous day's Today's Total value at the contract hour before being cleared.
Current Rate	This **read-only** field shows the calculated rate as of the most recent scan expressed in EUs per unit of time. You select time units using the Rate Period field on the Advanced tab. The system calculates the rate at the end of each scan period by multiplying the number of pulses received by the conversion value divided by the rate period.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear.
Contract Hour	Sets the beginning of the day for the daily counted parameters. Click ▼ to display all defined contract hours.
Conversion	Indicates a conversion factor by which the system multiplies or divides the number of pulses to determine the EU value. **Note:** You specify how the system uses this value in the Conversion field on the Advance tab.
Frequency	This **read-only** field shows, in pulses/second, the frequency of incoming pulses.
Scanning	Sets the scanning option for this point. Valid values: **Enabled** Automatically process the field input and display the last analog input scan in the Value field. **Disabled** Permit only manual updates of the Value field. **Note:** If you enable alarming, the ROC generates a Manual Mode alarm when scanning is disabled. If you disable scanning, you must manually enter a value to override the input.

PI: Advanced Tab

Use this tab to configure features, such as EU Options, Rate Period, Rollover value, and Conversion for the pulse input.

Select **Configure > I/O > PI Points > Advanced** tab. The Advanced screen displays.

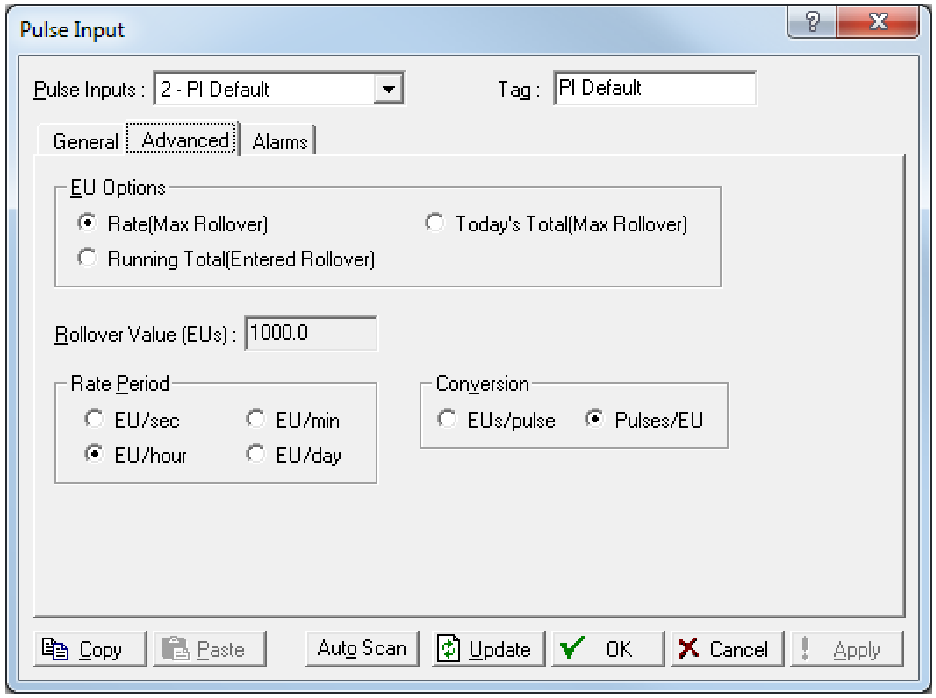


Figure 7-24. PI – Advanced tab

Field	Description	
EU Options	Sets how the system assigns the value of the engineering units (EU). Valid values are:	
	Rate (Max Rollover)	Uses the value of the Current Rate parameter (as shown on the General tab)
	Running Total (Entered Rollover)	Uses the value of Today's Total parameter (as shown on the General tab)
	Today's Total (Max Rollover)	Uses a value calculated by multiplying the accumulated pulses (shown on the General tab) by the Conversion factor. If the EU Value exceeds the Rollover value, it is cleared and starts to accumulate again from **0.**
	Note: This option **does not** clear EU values at the contract hour.	
Conversion/K Factor	Sets how ROCLINK uses the number in the Conversion field on the PI General tab.	
Rollover Value (EUs)	Sets a value in EUs (not pulses) to indicate when rollover should occur. **Note:** This field is available **only** if you select **Running Total** as an EU Options value.	

Field	Description	
Rate Period	Sets how the system calculates rates, if you selected Rate as an EU Option. Valid values are:	
	EU/sec	Calculation based on EU second totals.
	EU/hour	Calculation based on EU hourly totals.
	EU/min	Calculation based on EU minute totals.
	EU/day	Calculation based on EU daily totals.
	Note: If you select EUs/Pulse as a conversion rate and EU/min as a rate period, the system calculates Current Rate as (accumulated pulses x Conversion) ÷ (Scan Period x conversion from seconds to minutes). If you select Pulses/EU as a conversion rate and EU/hour as a rate period, the system calculates Current Rate as (accumulated pulses ÷ Conversion) ÷ (Scan Period x conversion from seconds to minutes).	
Conversion	Specifies how the number entered in the Conversion field on the PI General tab is used. Valid values are:	
	EUs/Pulse	Associates a specific number of engineering units, typically fractional parts such as 0.01, with a single pulse.
	Pulses/EU	Associates a specific number of pulses, such as 100, with one engineering unit.

PI: Alarms Tab

Use this tab to configure the alarm parameters for this PI point. You **must** enable alarming on the General tab to configure the limit alarms (Low, High, LoLo, HiHi, Rate, and Deadband) on this tab. If you disable alarming, no limit alarms generate for this point. The Point Fail alarm appears in the Active Alarms field on the General tab, but the system does not log it in the Alarms Log.

Note: To conserve alarm log space, enable alarms **only** when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one alarm to prevent the generation of false alarms

Select **Configure > I/O > PI Points > Alarms** tab. The Alarms screen displays.

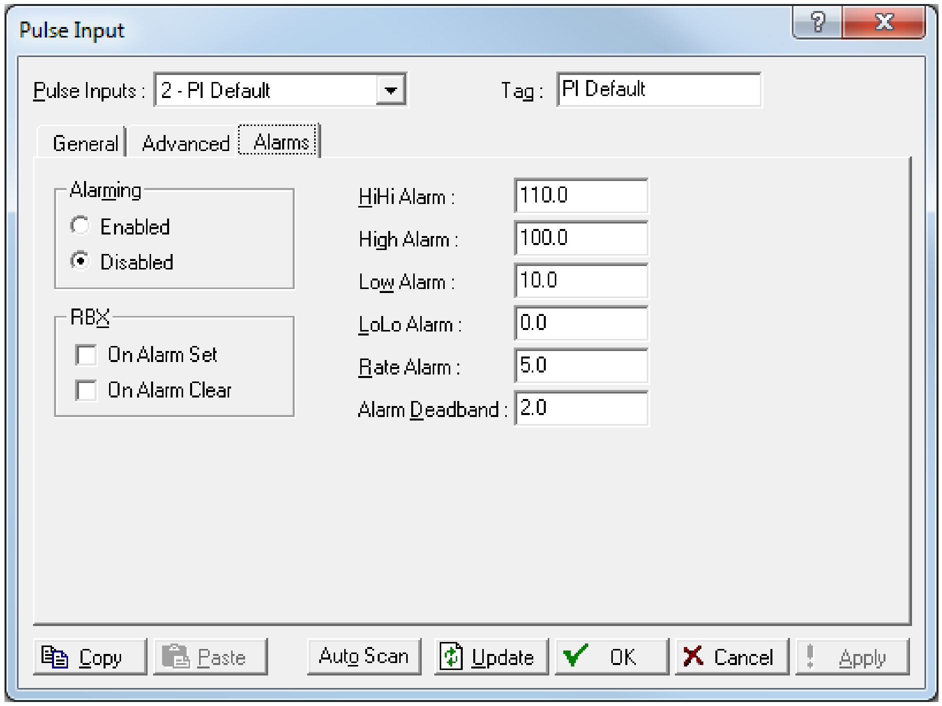


Figure 7-25. PI – Alarms tab

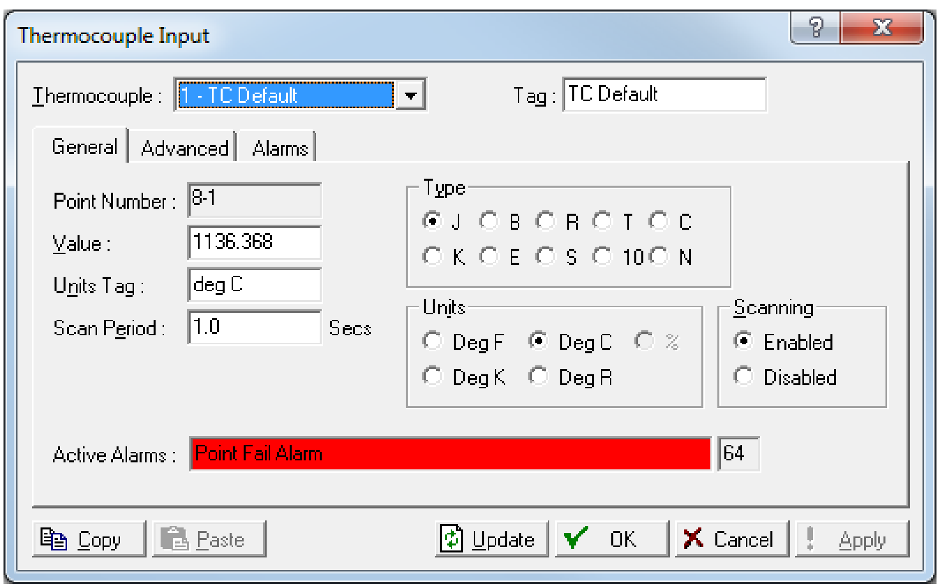
Field	Description
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (configures the limit alarms - four levels, Rate, and Deadband) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you **Enable** alarming, the system generates an alarm if you disable scanning.
RBX	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are **On Alarm Set** (which generates an RBX message when the point **enters** an alarm condition) or **On Alarm Clear** (which generates an RBX message when the point **exits** an alarm condition). **Note:** RBX Alarming requires you to configure the the communications port.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a HiHi alarm. **Note**: Typically you set the value for the HiHi alarm higher than the value for the High Alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a high alarm.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.

Field	Description
LoLo Alarm	Sets, in engineering units, a value to which the input value must fall to generate a LoLo alarm. **Note**: Typically you set the value for the LoLo alarm lower than the value for the Low Alarm.
Rate Alarm	Sets, in engineering units, a value that represents the maximum amount of change allowed in the calculated rate between updates before an alarm generates. If the change is equal to or greater than this value, an alarm occurs. **Note:** To disable the Rate alarm without disabling the other alarms, set the value greater than the scan value of the input.
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limit and below the High Alarm limit. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.

7.1.7 Thermocouple (TC) Input Configuration

Thermocouple (TC) Inputs monitor the extremely small voltage generated by a thermocouple sensor. These small voltages are converted to temperature values.

Select **Configure > I/O > TC Points**. The Thermocouple Input screen displays.



The Thermocouple Input screen has the following tabs. Use each tab to configure a component of the input.

- Use the **General** tab to set the basic parameters for the TC Input point.

- Use the **Advanced** tab to configure features, such as filtering and averaging for the selected TC point.
- Use the **Alarms** tab to set the alarm parameters for this TC point.

Save Configuration After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start

Thermocouple: General Tab

Select **Configure > I/O > TC Points > General** tab. to configure the basic parameters for the TC Input point.

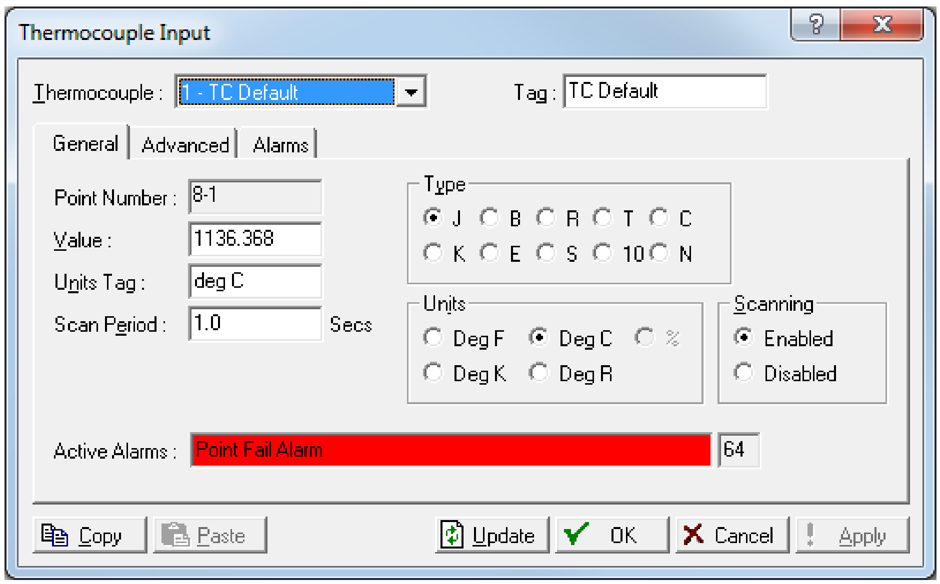


Figure 7-26. Thermocouple – General tab

Field	Description
Thermocouple	Sets the input to be configured. The inputs are listed by both number and tag. **Note:** This selection in this field applies to each tab on this screen.
Tag	Sets a 10-character string name for identification of the Point Number. **Note:** This selection in this field applies to each tab on this screen.
Point Number	Sets the value to identify the physical location of the input. The Point Number identifies the module slot. **Note:** This selection in this field applies to each tab on this screen.
Value	If Scanning is set to Disable, enter a **Value** to override the input. When Scanning is set to Enable, **Value** displays the last TC Input scan in engineering units.

Field	Description
Units Tag	Sets a name to display in configuration screens, reports and custom displays. This should be the same unit of measure as was chosen in the **Units Tag** field. If this field is blank, configuration screens, reports, and custom displays show a blank where the unit of measure should be.
Scan Period	Sets the amount of time between updates of the Filter value. All TC Inputs are updated based on their individual Scan Periods. The default value is **1** second. The minimum scan period allowed is 100 mSec.
Type	Sets the type of thermocouple sensor in use. For the values, refer to *Table 7-1. Thermocouple Input Type* values.
Units	Sets in which engineering unit (EU) the ROC calculates the temperature.
Scanning	Sets the **Scanning** option. ▪ For the input to automatically process the field input, select **Enabled** (Automatic Mode). When Scanning is set to Enabled, **Value** displays the last TC Input scan in engineering units. ▪ When Scanning is set to **Disabled** (Manual Mode), the ROC does not update the engineering unit (EU) Value. If Alarming is Enabled, an alarm generates when Scanning is set to Disabled. If Scanning is set to Disabled, enter a **Value** to override the input.
Active Alarms	This **read-only** field shows the **Active Alarms** indicating any alarms that are active for this point. When Alarming is set to Enabled, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if Alarming is Disabled, the Point Fail (hardware reports a malfunction) alarm indicator can still appear. If Alarming is set to Enabled, an alarm is generated when Scanning is disabled.

Table 7-1. Thermocouple Input Type values

TC Input Type	Accuracy/Range	25˚C	−40°C to 75° C
B	100°C to 200°C	±8°C	±16°C
	200°C to 390°C	±4°C	±8°C
	390°C to 840°C	±2°C	±4°C
	840°C to 1800°C	±1°C	±2°C
R	−50°C to 50°C	±2°C	±4°C
	50°C to 1720°C	±1°C	±2°C
S	−50°C to 50°C	±2°C	±4°C
	50°C to 1760°C	±1°C	±2°C
C	0°C to 2315°C	±0.75°C	±1.5°C
N	−270°C to −260°C	±8°C	±16°C
	−260°C to −250°C	±4°C	±8°C
	−250°C to −230°C	±2°C	±4°C
	−230°C to −150°C	±1°C	±2°C
	−150°C to 1300°C	±0.5°C	±1°C
J	−210°C to 190°C	±0.75°C	±1.5°C
	190°C to 1200°C	±0.5°C	±1°C
E	−270°C to −260°C	±3°C	±6°C
	−260°C to −225°C	±1°C	±2°C
	−225°C to −200°C	±0.75°C	±0.5°C
	−200°C to 1000°C	±0.5°C	±1°C
K	−270°C to −261°C	±5°C	±10°C
	−260°C to −246°C	±2°C	±4°C
	−245°C to −180°C	±1°C	±2°C
	−179°C to −145°C	±0.75°C	±1.5°C
	−145°C to 1372°C	±0.5°C	±1°C
T	−270°C to −261°C	±4°C	±8°C
	−260°C to −251°C	±2°C	±4°C
	−250°C to −181°C	±1°C	±2°C
	−180°C to −136°C	±0.75°C	±1.5°C
	−135°C to 400°C	±0.5°C	±1°C

Thermocouple: Advanced Tab

Select **Configure > I/O > TC Points > Advanced** tab to configure features, such as filtering and averaging for the selected TC Input.

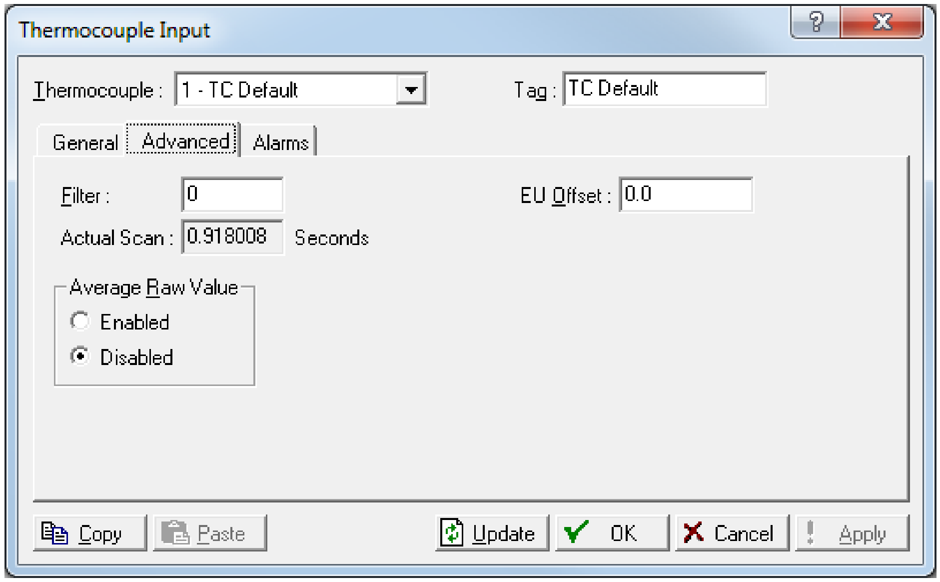


Figure 7-27. Thermocouple – Advanced tab

Field	Description
Filter	Sets a value, which is a weighted sample using a percentage of the last value, plus a percentage of the new value. The entered data is the percentage of the last value used. The filter is calculated every Scan Period by the formula: (Last Value × Entered %) + [New Value × (100 – Entered %)] = Filtered Value
Actual Scan	This **read-only** field shows the actual amount of time, in seconds, that passes between scans. This number should be the same as the Scan Period parameter if the system is not overloaded.
Average Raw Values	Sets how the system averages and calculates the raw readings during the Scan Period and use the outcome as the Raw A/D Input during EU calculations. For example: When Enabled, a TC Input point configured with a Scan Period of 1.5 seconds obtains a new value from the A/D every 100 milliseconds. During the Scan Period, 10 values are obtained from the A/D and summed together. At EU calculation, the values summed are divided by the Actual Scan Period display and are used as the Raw A/D Input. Disable this function to acquire instantaneous values.
EU Offset	Sets a bias the system adds to the EU Value, allowing you to set a zero shift that is applied to the entire temperature versus voltage curve.

Thermocouple: Alarms Tab

Select **Configure > I/O > TC Points > Alarms** tab to configure the alarm parameters for this TC point.

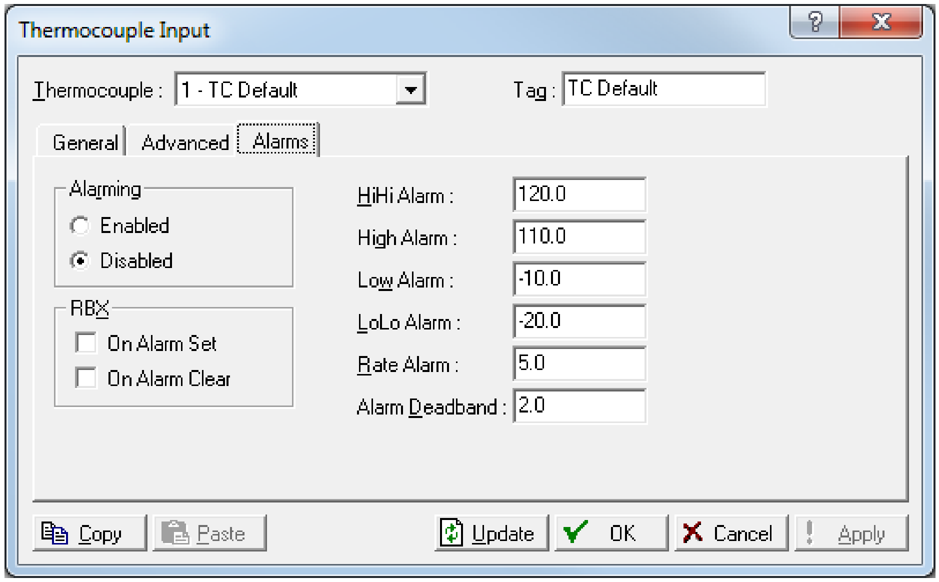


Figure 7-28. Thermocouple – Alarms tab

Field	Description
Alarming	When **Alarming** is Enabled, the limit alarms (four levels, Rate, and Deadband) are configured on the Alarms tab. When Alarming is Disabled, no limit alarms generate for this point. The Point Fail alarm appears in the Active Alarms field, but will not be logged in the Alarms Log. To conserve Alarm Log space, alarms should be enabled only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one so that no false alarms generate.
RBX	If the host computer is configured to receive field-initiated calls, you can select a Report-by-Exception (RBX) option to send a Spontaneous-Report-by-Exception (SRBX) message. ▪ **On Alarm Set** – When the point enters an alarm condition, the ROC generates a RBX message. ▪ **On Alarm Clear** – When the point leaves an alarm condition, the ROC generates a RBX message. **Note:** RBX Alarming requires the communications port to be properly configured.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a HiHi Alarm. **Note:** The HiHi Alarm value is typically set higher than the High Alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **High Alarm**.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.

Field	Description
LoLo Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **LoLo Alarm**. **Note:** The LoLo Alarm value is typically set lower than the Low Alarm.
Rate Alarm	Sets the value, in engineering units, that represents the maximum amount of change allowed between updates. If the change is equal to, or greater than this value, an alarm is generated. To disable this Rate Alarm without disabling the other alarms, the Rate Alarm value must be set greater than the Span (Range) of the TC Input.
Alarm Deadband	Sets the value, in engineering units, is an inactive zone above the Low Alarm and below the High Alarm. The purpose of the Alarm Deadband is to prevent the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This also prevents the Alarm Log from being filled with nuisance alarm trips.

7.1.8 Resistance Temperature Detector (RTD) Input Configuration

RTD Inputs are analog signals generated by RTD (Resistance Temperature Detector) probes, a device to measure temperature.

1. Select **Configure > I/O > RTD Points**. Examine the default settings and adjust the parameters to suit your application on each of the tabs in the order given below.
2. The **General** tab sets the basic parameters for the RTD Input point.
3. The **Advanced** tab enables you to configure features, such as filtering, A/D conversions, and clipping for the selected RTD Input.
4. The **RTD Calibration** tab is available on-line for calibration of the RTD point.
5. The **Alarms** tab sets the alarm parameters for this RTD point.
6. After configuring a point and clicking **Apply**, use **Flash Memory Save Configuration** in the **ROC > Flags** screen to save I/O configuration to permanent memory in case you must perform a cold start.

RTD: General Tab

Select **Configure > I/O > RTD Points > General** tab to configure the basic parameters for the RTD Input point.

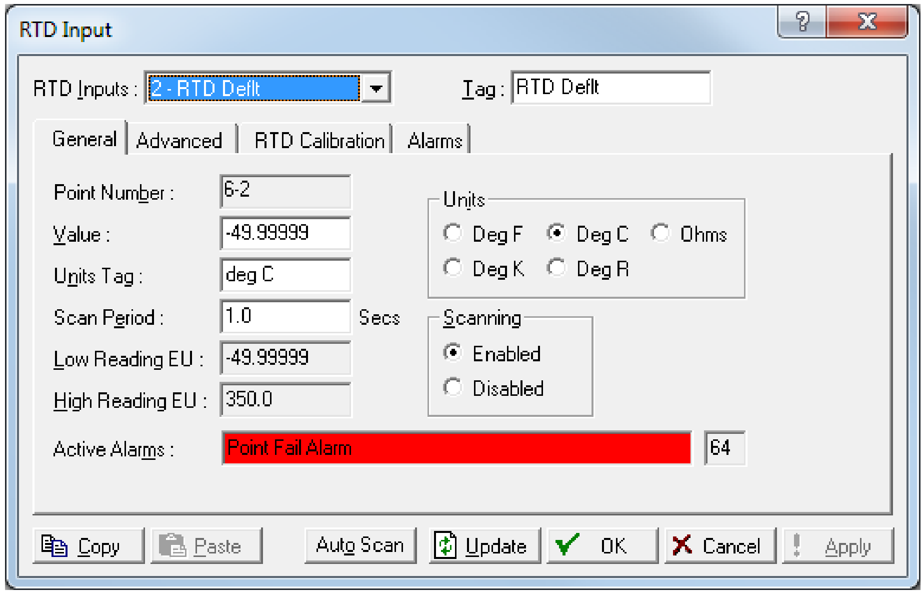


Figure 7-29. RTD – General tab

Field	Description
RTD Inputs	Sets the input to be configured. The inputs are listed by both number and tag. **Note:** This selection applies to **each** tab on this screen.
Tag	Sets a 10-character string **Tag** for identification of the point number. Any alphanumeric characters, including spaces, may be used. **Note:** This selection applies to **each** tab on this screen.
RTD Inputs	Sets the input to be configured. The inputs are listed by both number and tag. **Note:** This selection field applies to **each** tab on this screen.
Tag	Sets a 10-character string **Tag** for identification of the point number. Any alphanumeric characters, including spaces, may be used. **Note:** This selection applies to **each** tab on this screen.
Point Number	The **read-only** field identifies the physical location of the input. The Point Number identifies the module slot – channel number.
Value	If Scanning is set to Disabled, enter a **Value** to override the RTD Input. When Scanning is set to Enabled, **Value** displays the last RTD Input scan in engineering unit.
Units Tag	Sets a name to display in configuration screens, reports and custom displays. This should be the same unit of measure as was chosen in the Units field. If this field is blank, configuration screens, reports, and custom displays show a blank where the unit of measure should be.

Field	Description
Scan Period	Sets the **Scan Period** as the amount of time between updates of the Filter value. All RTD Inputs are updated based on their individual Scan Periods. The default value is **1** second. The minimum scan period allowed is 64 mSec. ROCLINK 800 will not allow a value less than 64 mSec in this field. The scan occurs in multiples of 64 mSec, such as if you enter 0.20 sec, it will scan every 0.192 sec.
Low Reading EU	Sets the value corresponding to a 0% input.
High Reading EU	Sets the value corresponding to a 100% input.
Units	Sets the engineering units (EU) in which the ROC calculates the temperature.
Scanning	Sets the **Scanning** option. ▪ For the input to automatically process the field input, select **Enabled** (Automatic Mode). When Scanning is set to Enabled, **Value** displays the last RTD Input scan in engineering units. ▪ When Scanning is set to **Disabled** (Manual Mode), the engineering unit (EU) Value is no longer updated by the ROC. If Alarming is Enabled, an alarm generates when Scanning is set to Disabled. If Scanning is set to Disabled, enter a **Value** to override the input.
Active Alarms	This **read-only** field shows the **Active Alarms** indicating any alarms that are active for this point. When Alarming is set to Enabled, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if Alarming is Disabled, the Point Fail (hardware reports a malfunction) alarm indicator can still appear. If Alarming is set to Enabled, an alarm is generated when Scanning is Disabled.

RTD: Advanced Tab

Select **Configure > I/O > RTD Points > Advanced** tab to configure features, such as filtering, A/D conversions, and clipping for the selected RTD Input.

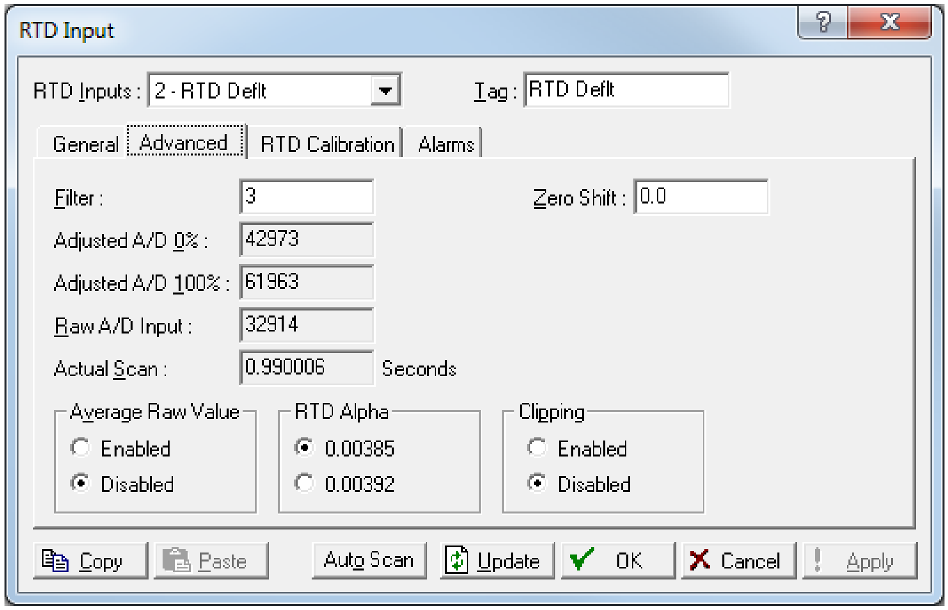


Figure 7-30. RTD – Advanced tab

Field	Description
Filter	Sets a value, which is a weighted sample using a percentage of the last value, plus a percentage of the new value. The entered data is the percentage of the last value used. The filter is calculated every scan period by the formula: (Last Value × Entered %) + (New Value × (100 – Entered %)) = Filtered Value
Adjusted A/D 0 %	This **read-only** field shows the calibrated Analog-to-Digital (A/D) reading corresponding to zero percent input. In the Calibrate function, this value is changed to set the zero percent input exactly at the Low Reading EU value to eliminate transmitter and system errors.
Adjusted A / D 100 %	This **read-only** field shows the calibrated A/D reading corresponding to 100 percent input. This value is used to convert the input to engineering units. In the Calibrate function, this value is changed to set the 100 percent input exactly at the High Reading EU value.
Raw A/D Input	This **read-only** field shows the **Raw A/D Input** displaying the current reading directly from the Analog-to-Digital converter.
Actual Scan	This **read-only** field shows the actual amount of time in seconds that passes between scans. This number should be the same as shown for the Scan Period parameter, if the system is not overloaded.

Field	Description
Average Raw Value	Sets the ROC to average and calculate the raw readings during the Scan Period and use the outcome as the Raw A/D Input during EU calculations. For example, when enabled, an RTD Input point configured with a Scan Period of 1.0 seconds obtains a new value from the A/D every 50 milliseconds. During the Scan Period, 20 values are obtained from the A/D and summed together. At EU calculation, the values summed are divided by the Actual Scan Period display and are used as the Raw A/D Input. Disable this function to acquire instantaneous values.
RTD Alpha	Sets the **RTD Alpha** of the RTD being used (0.00385 or 0.00392).
Clipping	Sets the ROC to force the Filtered EUs to stay within the range defined by the cut off limits. Set the cut off limits by using the LoLo Alarm and HiHi Alarm parameters.
Zero Shift	Sets a value if necessary to compensate for the zero shift effect on an input.

RTD: RTD Calibration Tab

Select **Configure > I/O > RTD Points > RTD Calibration** tab to select an RTD point to verify and calibrate.

Note: You can calibrate inputs at up to five points: zero, span, and up to three mid-points. You define at least and points for calibration.

The calibration routine provides Verify, Calibrate, and Zero Shift functions for RTD inputs. You can calibrate differential pressure (orifice metering may be High or Low Differential Pressure, depending on the device), static pressure, or temperature readings for each meter run.

Notes:

- During calibration, the ROC times out and resumes Normal processing if it is left idle for an extended period. Calibration values are restored to the previous values, an event is logged, and you must reconnect to start calibration from the beginning.
- Click **Cancel** to exit the calibration without saving the changes. The system retains previous calibration settings and logs an event.

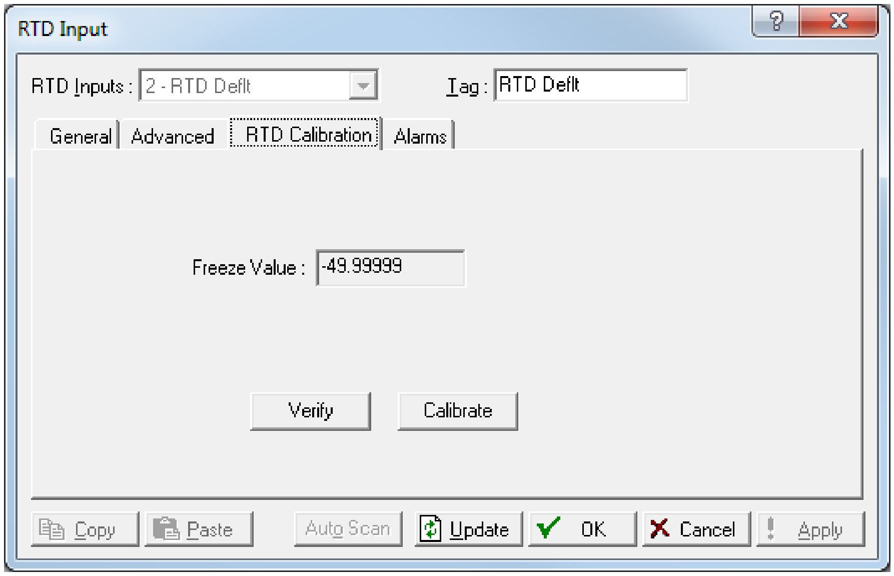


Figure 7-31. RTD – RTD Calibration tab

Field	Description	
Freeze Values	These **read-only** fields show the value received from the analog input, DVS, HART, MVS, RTD or Meter inputs when the **Update** button was last clicked. The system uses these values in ongoing processing (such as flow calculations, history logging, or control) while calibration occurs.	
Verify	Click to start the verification process.	
Calibrate	Click to begin calibration and open the Set Zero dialog opens.	
Zero Shift/Offset/RTD Bias	Click to set adjustment factors for the input. The value is sent to the device for:	
	Zero Shift	Click to zeros the static pressure effect for the differential pressure input (Set Offset).
	Offset	Click to send the value of the live reading to set the reading as close to zero as possible for a static pressure inputs (Measured Pressure Reading).
	RTD Bias	Click to calibrate the offset (shift) of temperature throughout the RTD curve (Temperature Standard Reading).
Auto Scan/Stop Scan	Click to automatically request values each second from the meter. The request continues until you click **Freeze**.	
Update Button	Click to request a value update from the input to be used as the Freeze Values.	

Verifying an RTD Input

Use this process to verify if an RTD is within the correct operating temperature limits. If the value is incorrect, calibrate the input.

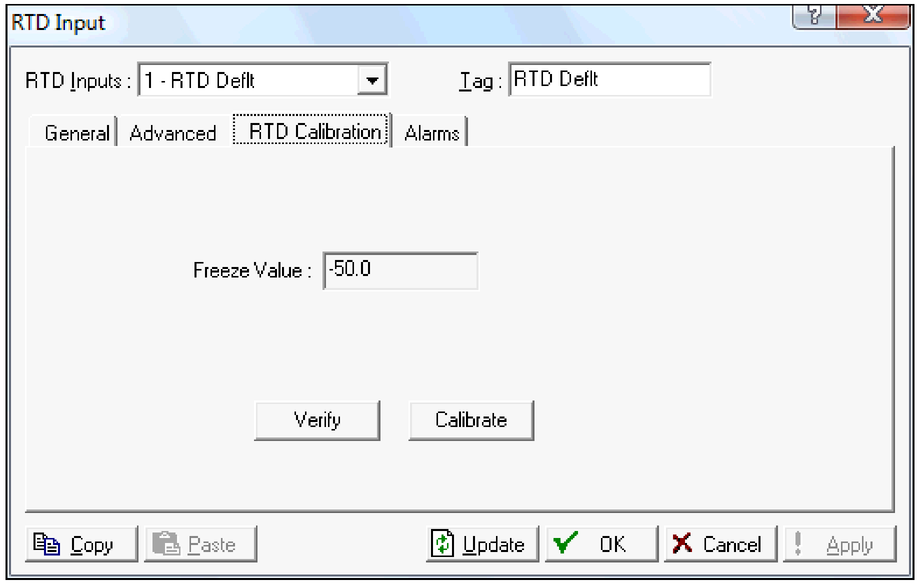


Figure 7-32. RTD Input Calibration

1. Click **Update** to request one value update from the input.

Note: The **Freeze Value** field displays the value received from the RTD input when you last clicked **Update**.

2. Disconnect the RTD sensor and connect a decade box (or comparable equipment) to the RTD terminals of the device.

Note: You can also use a pocket current source or another deadweight test input source to test this value.

3. Click **Verify**. A Verify dialog displays.
4. Complete the **Dead Weight/Tester Value** field with a value against which the test equipment verifies.
5. When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it to the value in the **Live Reading** field (obtained from the temperature probe) and calculating the percentage deviation between the two values.
6. Click **Log Verify**. ROCLINK 800 completes the first log entry on the screen.

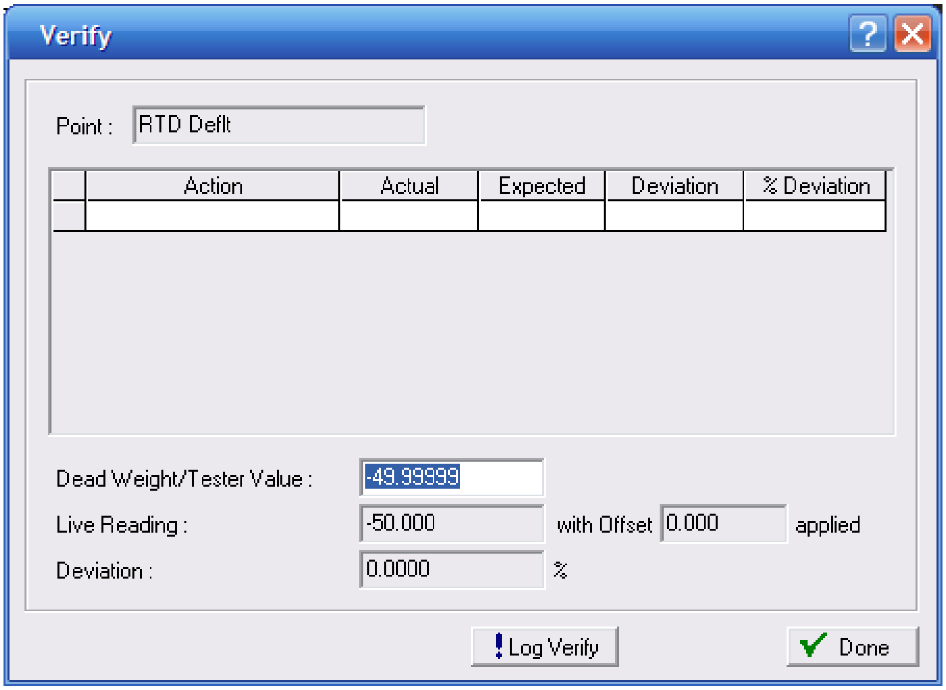


Figure 7-33. Verify

Field	Description
Action	Indicates the current action. Valid values are **Verify** or **Calibrate**.
Actual	Displays the value in the **Live Reading** field.
Expected	Displays the value in the **Dead Weight/Tester Value** field.
Deviation	Displays the amount of deviation between the actual and expected values.
% Deviation	Displays a percentage deviation between the Actual and Expected values.

7. As the live reading value changes, click **Log Verify** as many times as necessary to establish the verification log.
8. Typically you verify the same points you calibrate. Temperature might be an example (– 100, 200, 50). For each test point, you set your test equipment to produce the expected value, enter that expected value in the **Tester Value** field, wait for live input to stabilize, and then click **Log Verify**. You can verify as many points as you want.
9. Click **Done**.
10. Calibrate the input.

Calibrating an RTD Input

Use this process to calibrate an RTD.

1. Select **Configure > I/O > RTD Points > RTD Calibration** tab.
2. Select an **RTD input**.
3. Select the **RTD Calibration** tab.

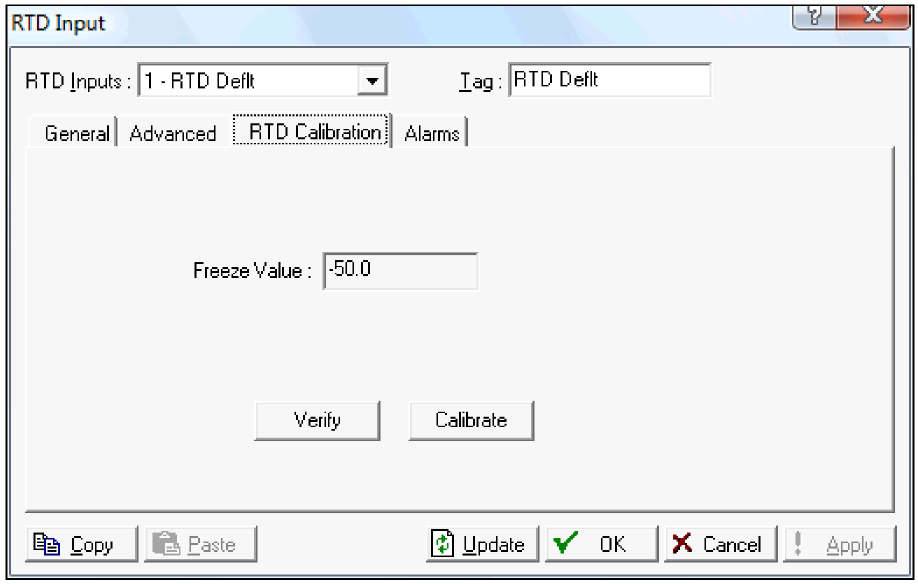


Figure 7-34. RTD Input Calibration

4. Click **Update** to request one value update from the input.

Note: The **Freeze Value** field displays the value received from the RTD input when you last clicked **Update**.

5. Disconnect the RTD sensor and connect a decade box (or comparable equipment) to the RTD terminals of the ROC

Note: You can also use a pocket current source or another deadweight test input source to test this value.

6. Click **Calibrate**. A Set Zero screen displays.

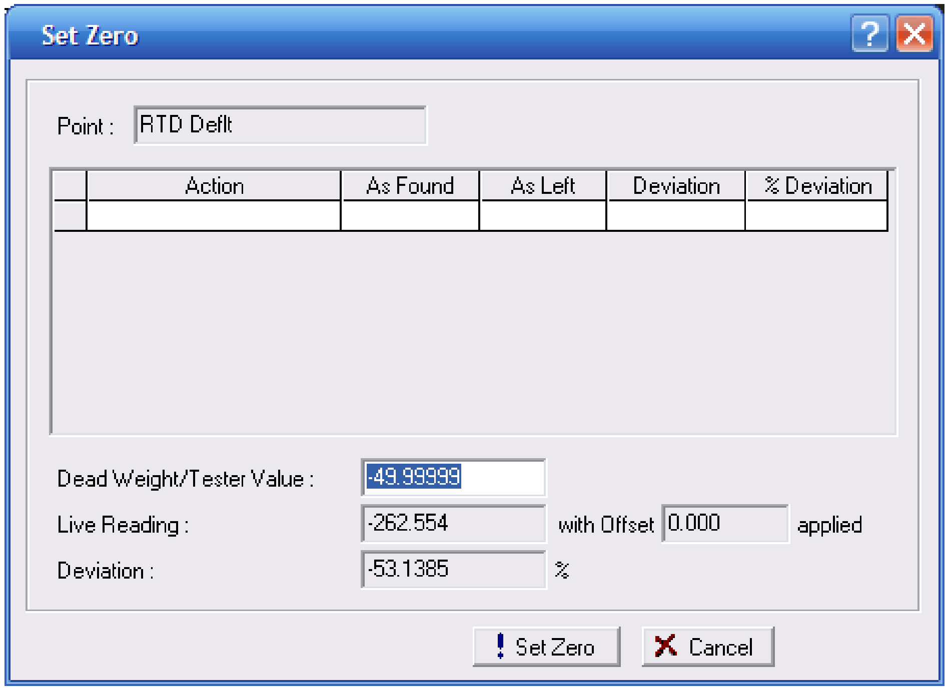


Figure 7-35. Set Zero

Note: You can click **Cancel** to exit the calibration without saving the changes. The system retains the previous calibration settings but logs the event in the event log.

7. Set test equipment to produce the expected results.

8. Complete the **Dead Weight/Tester Value** field. This value represents the low range (0%) of the instrument's measurement range.

   When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

9. Click **Set Zero** when the live reading stabilizes. ROCLINK 800 adds the first line in the calibration log, renames the screen to **Set Span**, and changes the label on the **Set Zero** button to **Set Span**.

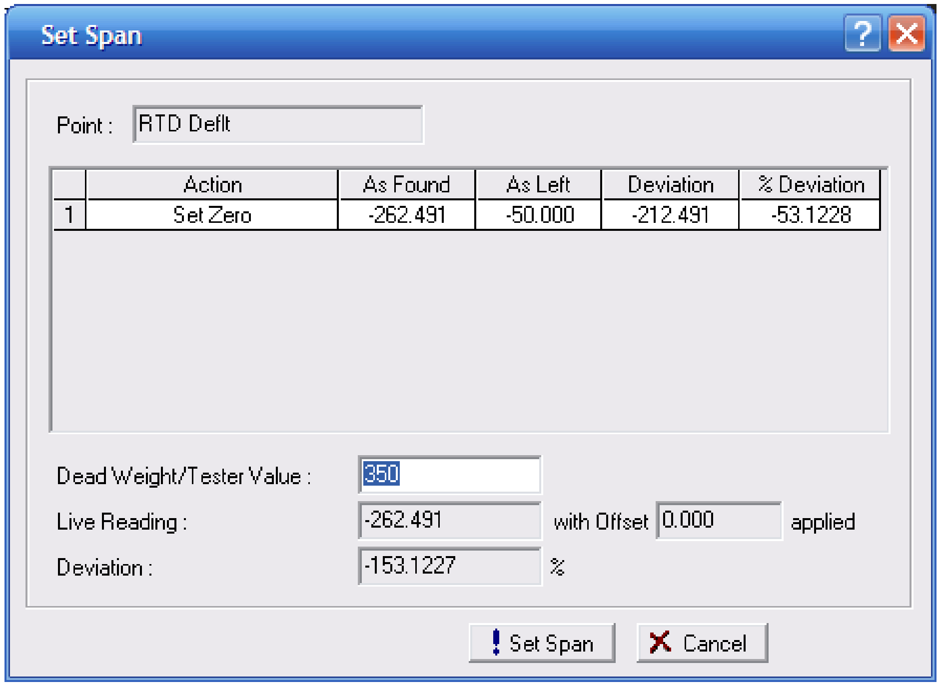


Figure 7-36. Set Span

10. Set test equipment to produce the expected results.

11. Complete the **Dead Weight/Tester Value** field with a value represents the upper limit (100% or "span") of the instrument's measurement range.

> **Note:** ROCLINK 800 provides **350** as a default span value. Edit this default as necessary.

12. When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

13. Click **Set Span** when the live reading stabilizes. ROCLINK 800 adds the next line in the calibration log, renames the screen, and changes the label on the **Span** button to **Set Mid 1**.

> **Note:** You can click **Done** at this point to complete the calibration or continue the calibration and define up to three calibration midpoints.

14. Set test equipment to produce the expected results.

15. Complete the **Dead Weight/Tester Value** field with the first midpoint calibration value (which in this example represents 50% of the instrument's range).

Note: ROCLINK 800 provides the previous midpoint value as a default value. Edit this default as necessary.

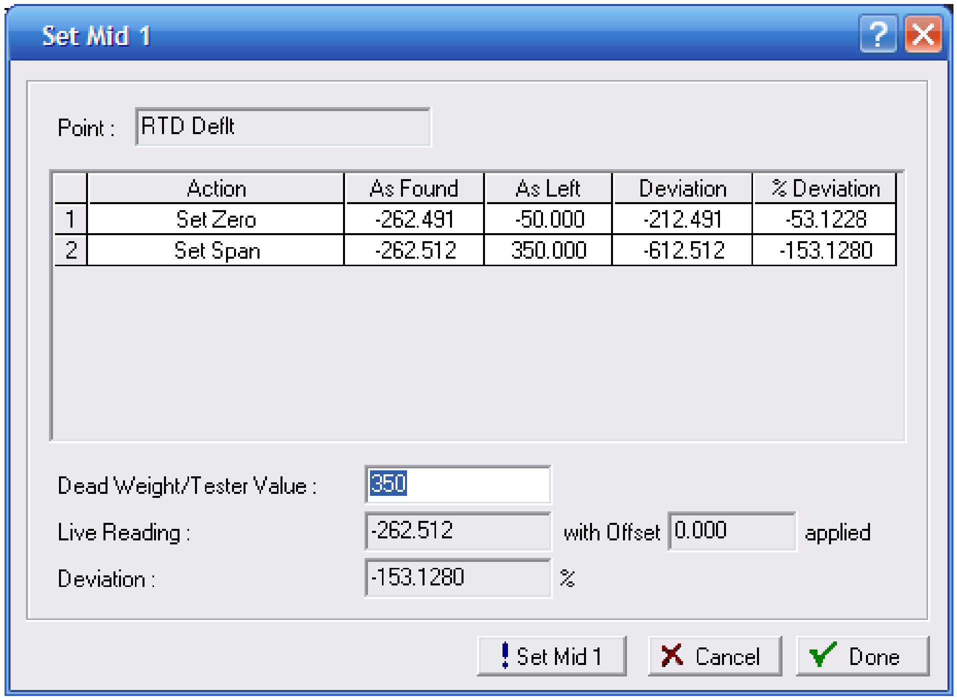


Figure 7-37. Set Midpoint 1

16. When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once per second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

17. Click **Set Mid 1** when the live value stabilizes. ROCLINK 800 adds the next line in the calibration log, renames the screen, and changes the label on the **Set Mid 1** button to **Set Mid 2**.

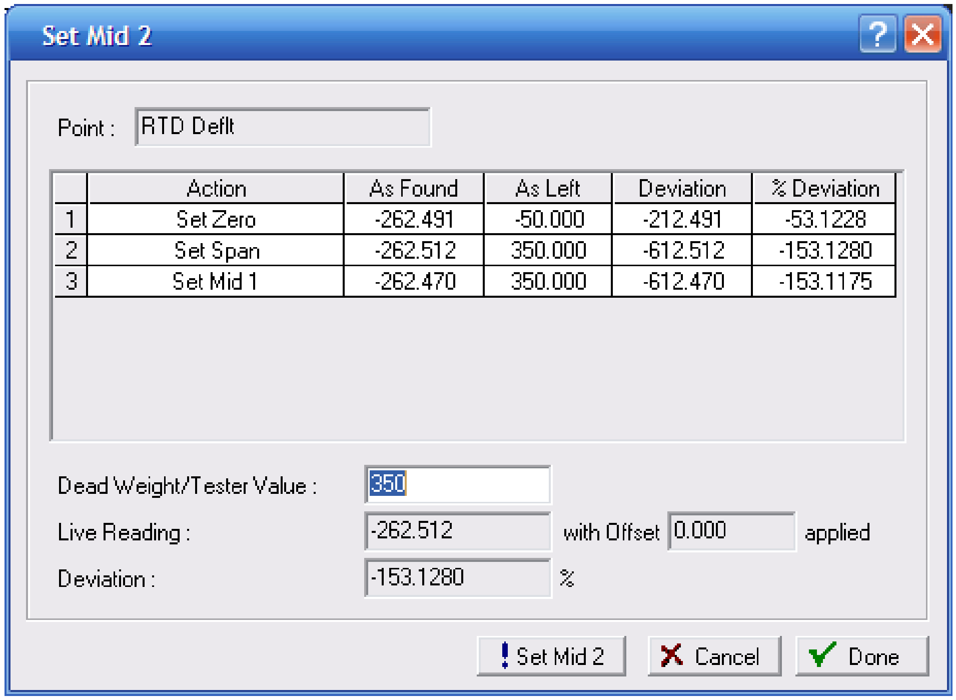


Figure 7-38. Set Midpoint 2

Note: To define up to two more midpoints, repeat steps the previous steps.

18. Click **Done** when you have sufficient calibration information. The Meter Calibration screen displays.

Note: Following a calibration, you may re-run a verification to demonstrate to the customer that the measurement results are now within contractual parameters.

RTD: Alarms Tab

Select **Configure** > **I/O** > **RTD Points** > **Alarms** tab to configure the alarm parameters for this RTD point.

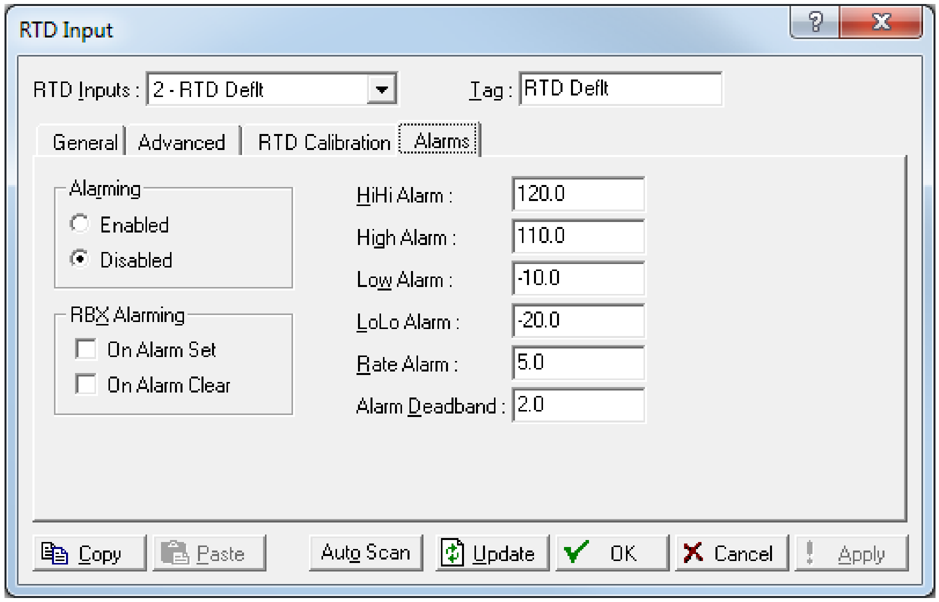


Figure 7-39. RTD – Alarms tab

Field	Description
Alarming	Sets **Alarming**, the limit alarms (four levels, Rate, and Deadband) are configured on the Alarms tab. When Alarming is Disabled, no limit alarms generate for this point. The Point Fail alarm appears in the Active Alarms field, but will not be logged in the Alarms Log. To conserve log space, alarms should be enabled only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one so that no false alarms generate.
RBX Alarming	If you configure the host computer to receive field-initiated calls, select a Report-by-Exception (RBX) option to send a Spontaneous-Report-by-Exception message. ▪ **On Alarm Set** – When the point enters an alarm condition, the ROC generates a RBX message. ▪ **On Alarm Clear** – When the point leaves an alarm condition, the ROC generates a RBX message. **Note:** RBX Alarming requires you to properly configure the communications.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **HiHi Alarm**. **Note:** The HiHi Alarm value is typically set higher than the High Alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **High Alarm**.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.

Field	Description
LoLo Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **LoLo Alarm**. **Note:** The LoLo Alarm value is typically set lower than the Low Alarm.
Rate Alarm	Sets the value, in engineering units, that represents the maximum amount of change allowed between updates. If the change is equal to or greater than this value, an alarm generates. To disable this Rate Alarm without disabling the other alarms, the Rate Alarm value can be set greater than the Span of the analog input.
Alarm Deadband	Sets the value, in engineering units, that is an inactive zone above the Low Alarm limits and below the High Alarm limits. The purpose of the Alarm Deadband is to prevent the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This also prevents the Alarm Log from being over-filled with data.

7.1.9 System Analog Input (AI) Configuration

Select **Configure > I/O > System AI Points**. System analog inputs are analog signals generated by sources within the ROC.

1. Select **Configure > I/O > System AI Points** General tab sets the basic parameters for the AI Input point. Examine the default settings and adjust the parameters to suit your application on each of the tabs.
2. The **Advanced** tab enables you to configure features, such as filtering, averaging, and clipping for the selected Input.
3. The **Alarms** tab sets the alarm parameters for this AI point.
4. After configuring a point and clicking **Apply**, use **Flash Memory Save Configuration** in the **ROC > Flags** screen to save I/O configuration to permanent memory in case you must perform a cold start.

System AI: General Tab

Select **Configure > I/O > System AI Points > General** tab to configure the basic parameters for the AI Input point.

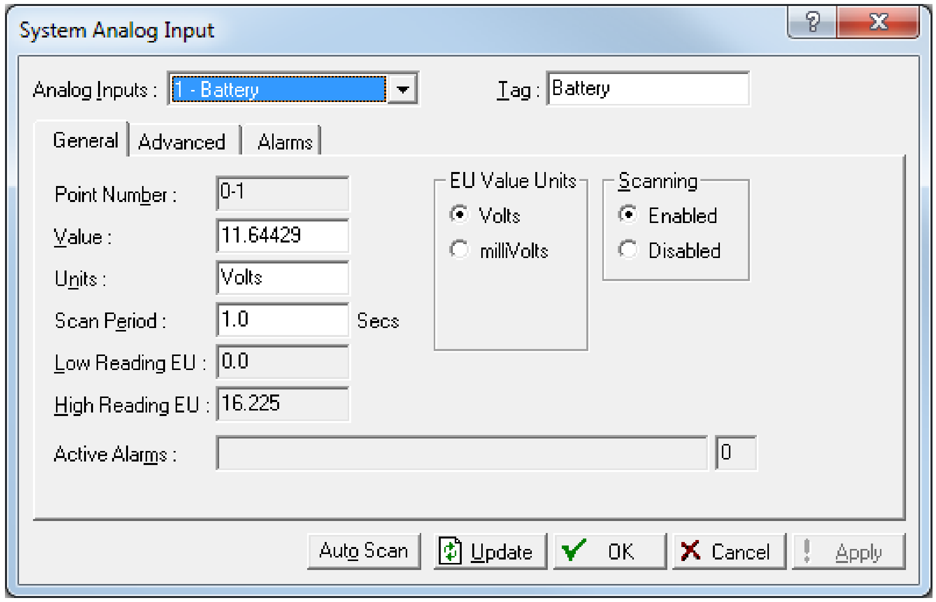


Figure 7-40. System AI – General tab

Field	Description
Analog Inputs	The DL8000 has five system analog inputs: ▪ System AI #1 = Battery. ▪ System AI #2 = Charge Voltage. ▪ System AI #3 = Module Voltage. ▪ System AI #4 = AI Default. ▪ System AI #5 = Board Temperature. **Note:** This selection in this field applies to each tab on this screen.
Tag	Sets a 10-character name for identification of the point. **Note:** This selection in this field applies to each tab on this screen.
Point Number	Because this type of input has no physical location, the **read-only** portion of the Point Number refers to module location 0. The **read-only** portion that refers to channel number is 1 to 5 for the input numbers.
Value	Sets a value to override the input if Scanning is set to Disabled. When Scanning is set to Enable, **Value** displays the last analog input scan in engineering units (EU).
Units	Sets the **Units** value. Inputs #1, #2, and #3 are in Volts. Input #5 is in Degree C.
Scan Period	Sets the amount of time between updates of the Filter value. The default value is **1** second. All System analog inputs are updated based on their individual Scan Periods.
Low Reading EU	Sets the engineering unit corresponding to zero percent input.

Field	Description
High Reading EU	Sets the engineering unit corresponding to 100 percent input.
EU Value Units	Set the system AI units to be read and written in volts, millivolts, degree F, degree C, degree K, or Degree R.
Scanning	Sets the **Scanning** option. ▪ For the input to automatically process the field input, select **Enabled** (Automatic Mode). When Scanning is set to Enabled, **Value** displays the last System AI scan in engineering units. ▪ When Scanning is set to **Disabled** (Manual Mode), the engineering unit (EU) Value is no longer updated by the ROC If Alarming is Enabled, an alarm generates when Scanning is set to Disabled. If Scanning is set to Disabled, enter a **Value** to override the input.
Active Alarms	This **read-only** field any alarms that are active for this point. When Alarming is set to Enabled, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if Alarming is Disabled, the Point Fail (hardware reports a malfunction) alarm indicator can still appear. If Alarming is set to Enabled, an alarm is generated when Scanning is Disabled.

System AI: Advanced Tab

Select **Configure > I/O > System AI Points > Advanced** tab to configure features, such as filtering, averaging, and clipping for the selected Input.

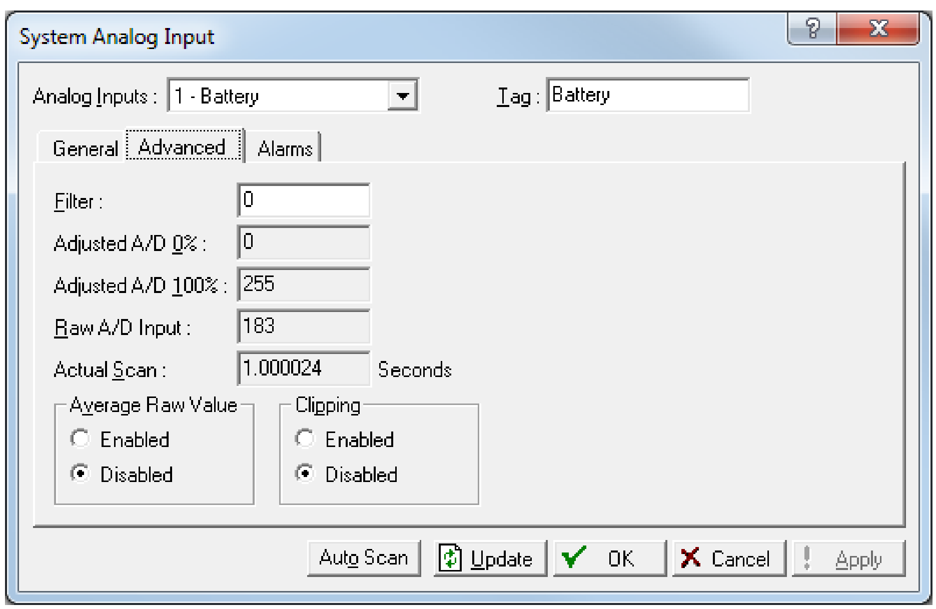


Figure 7-41. System AI – Advanced tab

Field	Description
Filter	Sets a value, which is a weighted sample using a percentage of the last value plus a percentage of the new value. The entered data is the percentage of the last value used. The Filter is calculated every Scan Period by the formula: (Last Value × Entered %) + (New Value × (100 – Entered %)) = Filtered Value
Adjusted AD 0 %	Sets the calibrated Analog-to-Digital (A/D) reading corresponding to zero percent input.
Adjusted AD 100 %	Sets the calibrated A/D reading corresponding to 100 percent input.
Raw A/D Input	This **read-only** field shows the current reading directly from the Analog-to-Digital converter.
Actual Scan	This **read-only** field shows the actual amount of time, in seconds, that passes between scans. This number should be the same as the Scan Period parameter if the system is not overloaded.
Average Raw Values	Sets the values to average and calculate the raw readings during the Scan Period and use the outcome as the Raw A/D Input during EU calculations. For example, when enabled, an analog input point configured with a Scan Period of 5 seconds obtains a new value from the A/D every second. During the Scan Period, five values are obtained from the A/D and summed together. At EU calculation, the values summed are divided by the number of samples and are used as the Raw A/D Input. Disable this function to acquire instantaneous values.
Clipping	If enabled, the software forces the Filtered EUs to stay within the range defined by the cut off limits. Select the cut off limits by using the LoLo Alarm and HiHi Alarm parameters.

System AI: Alarms Tab

Select **Configure > I/O > System AI Points > Alarms** tab to configure the alarm parameters for this AI point.

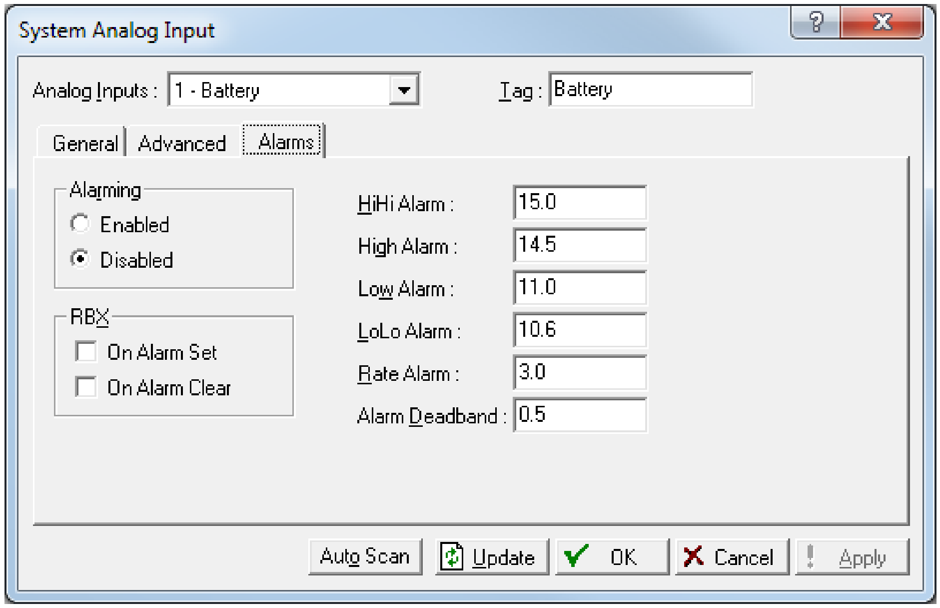


Figure 7-42. System AI – Alarms tab

Field	Description
Alarming	Sets **Alarming** for the point. If you Enable Alarming, the limit alarms (four levels, Rate, and Deadband) are configured on the Alarms tab. If you Disable Alarming, no limit alarms generate for this point. The Point Fail alarm appears in the Active Alarms field, but will not be logged in the Alarms Log. To conserve Alarm Log space, alarms should be enabled only when necessary. Even if you do not plan to use all the alarms, check and adjust the value of each one so that no false alarms generate.
RBX Alarming	If the host computer is configured to receive field-initiated calls, you can select a Report-by-Exception (RBX) option to send a Spontaneous-Report-by-Exception (SRBX) message. ▪ **On Alarm Set** – When the point enters an alarm condition, the ROC generates a RBX message. ▪ **On Alarm Clear** – When the point leaves an alarm condition, the ROC generates a RBX message. **Note:** RBX Alarming requires the communications port to be properly configured.
HiHi Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **HiHi Alarm**. **Note:** The HiHi Alarm value is typically set higher than the High Alarm.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **High Alarm**.

Field	Description
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.
LoLo Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **LoLo Alarm**. **Note:** The LoLo Alarm value is typically set lower than the Low Alarm.
Rate Alarm	Sets the value, in engineering units, that represents the maximum amount of change allowed between updates. If the change is equal to or greater than this value, an alarm is generated. To disable this Rate Alarm without disabling the other alarms, the Rate Alarm value can be set greater than the Span of the analog input.
Alarm Deadband	Sets the value, in engineering units, that is an inactive zone above the Low Alarm limits and below the High Alarm limits. The purpose of the Alarm Deadband is to prevent the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This also prevents the Alarm Log from being over-filled with data.

7.1.10 Soft Points

Softpoints are global data storage areas that any ROC application can use. A softpoint may store the results of a specified calculation from an FST or an intermediate result of a specified value an FST acquires. Softpoints consist of a ten-character identifier (tag), one integer value (16-bits from 0 to 65,535), and up to 20 floating point values. The ROC supports up to 32 softpoints.

Softpoints consist of:

- 1 tag (10 character string)
- 20 floats (floating point values)
- 10 longs (32-bit)
- 10 shorts (16-bit)
- 10 bytes (8-bit)

Select **Configure > I/O > Soft Points**. The Soft Point screen displays.

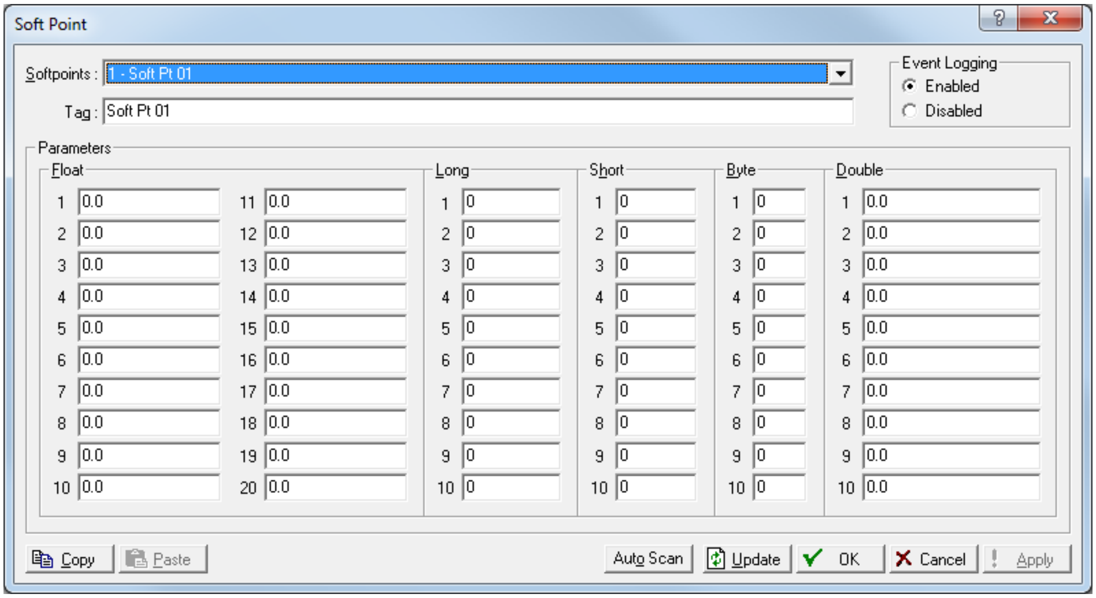


Figure 7-43. Soft Points

Note: After you successfully configure a softpoint, access the Flags screen (**ROC > Flags**) and click **Save Configuration**. This saves a configuration (and any associated softpoints) to permanent memory in case you must perform a cold start.

Field	Description
Softpoints	Sets the softpoint to configure. Click ▼ to display all available softpoints.
Tag	Sets a 10-character identifier for the softpoint.
Float and Data #1 through #20	Sets up to 20 parameters (**Data #1** to **Data #20**) to provide storage for IEEE floating point values for the softpoint.
Long	Sets long parameters to provide storage for 32-bit unsigned integer values.
Short	Sets short parameters to provide storage for 16-bit unsigned integers.
Byte	Sets byte parameters to provide storage for 8-bit unsigned values.
Double	Sets up to 10 parameters (**Data #1** to **Data #10**) to provide storage for double precision point values for the softpoint.
Event Logging	Select to enable (Enabled) logging of events for changes to the soft point parameters or select Disabled to not log Soft Point events.

7.1.11 Multi-Variable Sensor (MVS) Configuration

The MVS Sensor setup screens provide you with an interface to a multi-variable sensor, a device that measures temperature, static pressure, and differential pressure.

Because of the graphical interface, you can use the Configure option on the ROCLINK 800 menu (**Configure > I/O > MVS Sensor**), click on the MVS module graphic, or use the configuration tree.)

Note: If you change a parameter on the MVS screens, click **Write** to update the sensor configuration.

⚠ **Caution** **If you attempt to write data to a 4088 with the Security Switch in the ON position, ROCLINK saves the new transmitter information but is unable to write the new values to the transmitter. If you change the value in the Address field, communications fail between ROCLINK and the transmitter. Enter the transmitter address previously used in ROCLINK to regain communications. Changes made to all other fields revert to the values stored in the transmitter.**

MVS: General Tab

The Multi-Variable Sensor (MVS) screens provide you with an interface to configure a multi-variable sensor.

Note: If you have a dual-variable sensor (DVS) attached to the MVS module, you configure it as part of the MVS module.

1. Select **Configure > I/O > MVS Sensor**. The Multi-Variable Sensor screen displays, showing the General tab.

   Note: You can also access this screen by clicking the TLP Browse button on the graphic interface's I/O Points screen.

If you change a parameter, click **Write**.

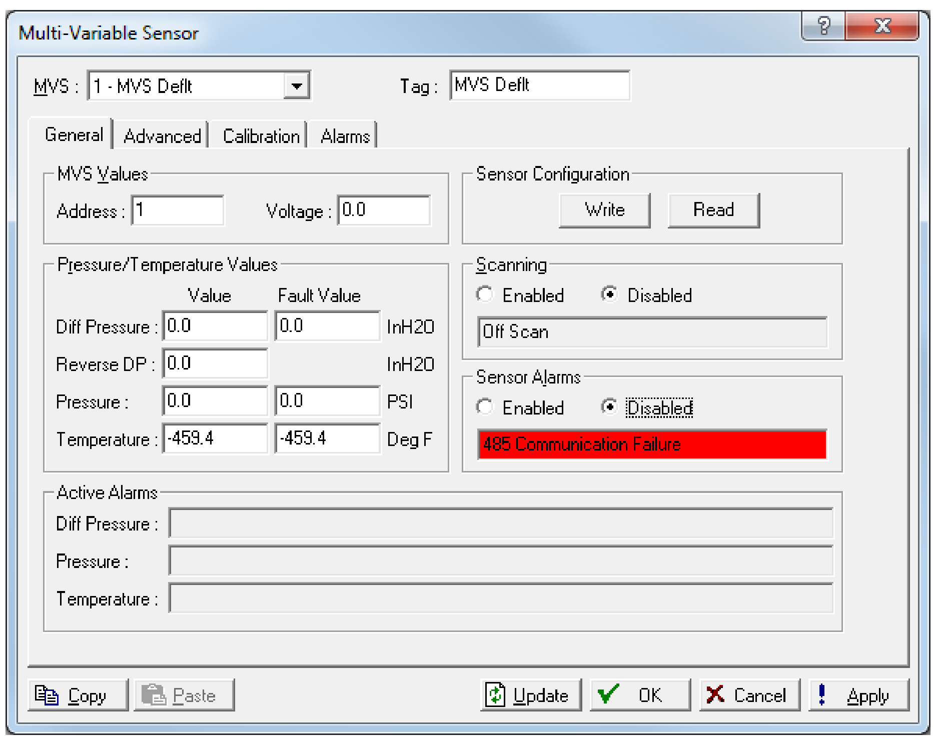


Figure 7-44. MVS Sensor – General tab

Note: If you change any values on this tab – or on the Advanced, Calibration, or Alarms tabs – **other** than the MVS or Tag fields, you must click **Write** in the Sensor Configuration field to apply those changes to the sensor configuration.

Field	Description
MVS Sensor	Sets the MVS sensor to configure. Each MVS has a unique address number to differentiate it from other MVS units, because MVS sensors can be multi-dropped.
Tag	Sets the ten-character identifier that resides in the MVS. **Note:** This selection in this field applies to each tab on this screen.
Address	Sets the unique address for this device used in the device communications protocol. The default address is **1**. If the MVS is used in the multi-drop mode, each MVS must have a unique address. Use Address **240** to poll the sensor to determine the address of the connected sensor. This is similar to polling a using Address and Group **240**. When Address **240** is used, the sensor responds with its address by updating the Address field.
Voltage	This **read-only** field shows the voltage input to the sensor. If the MVS interface version (as shown on the Advanced tab's Sensor Interface Version field) is 6 or greater, this field should read approximately **5**, which is the voltage to the microcontroller in the sensor. If the MVS interface version is less than **6**, this field shows the input voltage to the sensor. **Note:** For proper operation, the input voltage to the sensors with versions less than 6 **must** be at least 10.5 volts dc.
Sensor Configuration	Click **Write** to update the sensor with the current values on the screen or click **Read** to read the sensor's current configuration data and process variables.

Field	Description
Pressure / Temperature Values and Fault Values	These **read-only** fields show scaled differential pressure readings from the sensor. The units display as either InH_2O or kPa. The scaled Differential Pressure (**Reverse DP**) reading is from the sensor times a negative "1" for flow in the reverse direction. The scaled absolute Pressure (**Static Pressure**) reading from the sensor displays in either PSI or kPa. The scaled process **Temperature** reading from the sensor displays in either degrees Fahrenheit or degrees Celsius, based on global settings (**ROC > Information**). Enter **Fault Values** if you desire for the MVS to return to the values you configure upon on failure of the sensor, an input point, or communications.
Scanning	Sets whether the input communicates with the MVS sensor. Valid values: **Enabled** — Allow communications to the MVS sensor. **Disabled** — The system does not update information from the sensor. **Note:** The Scanning text field displays scanning status messages. Additionally, the system generates an alarm when you **Disable** scanning.
Sensor Alarming	Sets the alarm conditions of the sensor or any alarms that are active for this point. Valid values are **Enabled** (display any active failed alarms, such as point fail or sensor fail) or **Disabled** (do not display alarms). **Note:** When you enable sensor alarms, the system displays any loss of communications to the sensors by displaying an RS-485 Communications Failure. If you disable scanning, an Off Scan Mode alarm displays.
Active Alarms	These **read-only** fields indicate any alarms that are active for this point. If you **Enable** alarming, any active limit alarms (such as Low Alarm and Rate Alarm) appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear

MVS: Advanced Tab

Use the MVS Advanced screen to configure how the ROC retains information on failure, what it uses as a reference temperature, and how it reports pressure.

1. Select the **Advanced** tab. The Advanced screen displays.

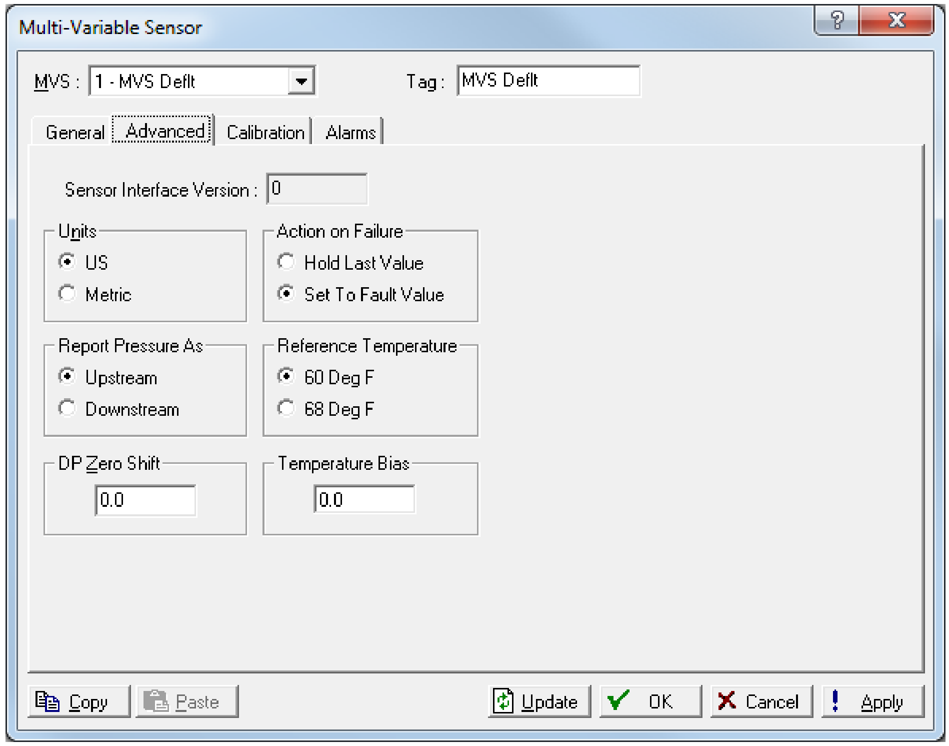


Figure 7-45. MVS Sensor – Advanced tab

Note: If you change any values, click **Write** on the General tab to save the configuration.

Field	Description
Sensor Interface Version	This **read-only** field shows the version of the sensor interface firmware for the sensor.
Units	Sets the engineering units for the process variable. If you change this value, click **Write** to update the configuration.
Action on Failure	Sets how the sensor retains values on failure of the sensor, an input point, or communications. Valid values are **Hold Last Value** (retains the last values before the failure) or **Set to Fault Value** (returns to the configured fault values). **Note:** See the Alarms tab for the Fault Value.
Report Pressure As	Sets the location of the static pressure tap in relation to the orifice and normal flow. Valid values are **Upstream** or **Downstream**. **Upstream** is the default. If you select **Downstream**, the system subtracts the Diff Pressure (DP) (in PSI) from the Static Pressure (SP) reading to obtain a Downstream Pressure measurement for archiving. For Downstream operation, adjustments to the calibration procedure may be required when setting the Span value. **Note:** If you change this value, click **Write** on the General tab to save the configuration.

Field	Description
Reference Temperature	Sets a reference temperature the sensor uses when reporting differential pressure. The default value is **60** °F (15.6 °C). The system uses this value only when you change the Units selection or when you select the Downstream option is selected in Metric units. **Note:** If you change this value, click **Write** on the General tab to save the configuration.
Zero Shift	Sets a value if necessary to compensate for the zero shift effect on an input.

MVS: Calibration Tab

Use this tab to calibrate the MVS points.

Notes:

- You can calibrate sensors at up to five points: zero, span, and up to three mid-points. You must define **at least** zero and span points for calibration.
- During calibration, the ROC times out and resumes Normal processing if it is left idle for an extended period. Calibration values are restored to the previous values, an event is logged, and you must reconnect to start calibration from the beginning.
- Click **Cancel** to exit the calibration without saving the changes. The previous calibration settings are retained. An Event is also logged.

Caution **If you have an MVS transmitter, refer to *Chapter 6, Sensor/Transmitter Accessories,* in the *ROC/FloBoss Accessories Instruction Manual* (Form A4637) for the recommended way to remove or restore the device from or to working pressure during calibration. Failure to follow recommendations may damage the device.**

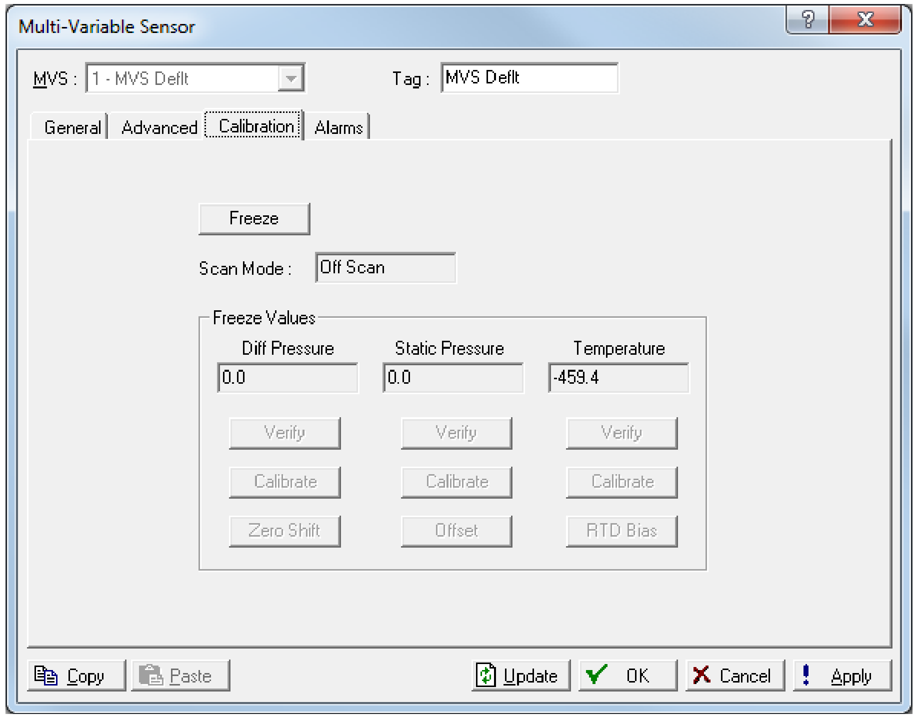


Figure 7-46. MVS Sensor – Calibration tab

Field	Description
Freeze	Click to stop the system from updating analog, MVS, DVS, HART, or temperature (RTD) inputs during verification or calibration. Once you click **Freeze**, the input is frozen at the current Freeze Values.
Scan Mode	This **read-only** field displays the current input status. **Normal Poll** indicates the system is functioning normally. After you click Freeze, the software changes to **Input Freeze** for the verification or calibration process and activates all buttons in the Freeze Values frame. **Poll Mode** is the initial communication to a sensor to gather all of the configuration data that is stored on the sensor. **Off Scan** indicates that the sensor is disabled.
Diff Pressure, Static Pressure, Temperature	These **read-only** fields show the values for the differential pressure, static pressure, and temperature received from the analog, MVS, or temperature (RTD) input. The system uses these values in ongoing processing (such as flow calculations, history logging, or control) while calibration occurs.
Verify	Click to start the verification process.
Calibrate	Click to begin calibration and open the Set Zero dialog opens.

Field	Description	
Zero Shift/Offset/RTD Bias	Click to set adjustment factors for the input. The value is sent to the device for:	
	Zero Shift	Click to zeros the static pressure effect for the differential pressure input (Set Offset).
	Offset	Click to send the value of the live reading to set the reading as close to zero as possible for a static pressure inputs (Measured Pressure Reading).
	RTD Bias	Click to calibrate the offset (shift) of temperature throughout the RTD curve (Temperature Standard Reading).
Auto Scan/Stop Scan	Click to automatically request values each second from the meter. The request continues until you click **Freeze**.	
Update Button	Click to request a value update from the input to be used as the Freeze Values.	

Verifying an MVS

Use this process to verify an MVS is within the operating or contractual limits. If the value is incorrect, calibrate the input. You can verify the differential pressure, static pressure, and the temperature of an MVS sensor.

1. Select **Configure > I/O > MVS Sensor**. The Multi-Variable Sensor screen displays.
2. Select the **Calibration** tab. The Calibration screen displays.
3. Select an **MVS** input point to calibrate.
4. Click **Update** to request one value update from the input.
5. Click **Freeze** to stop the values of the input from being updated during verification or calibration.

   Note: The **Freeze Value** field displays the value received from the MVS input when you last clicked **Update** and is the value the system uses in ongoing processing (such as flow calculations and history logging) while performing calibration.

   Review the value in the **Scan Mode** field. Valid values are **Normal Poll** (point scanning is enabled and is updated each scan period), **Off Scan** (the point is not in scanning mode), or **Input Freeze** (points are frozen).
6. If you are calibrating a temperature input, disconnect the MVS or DVS sensor and connect a decade box (or comparable equipment) to the terminals of the ROC

Note: You can also use a pocket current source or another deadweight test input source to test this value.

7. Click **Verify**. A Verify dialog displays.
8. Complete the **Dead Weight/Tester Value** field with a value against which the test equipment verifies.

   When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it to the value in the **Live Reading** field (obtained from the temperature probe) and calculating the percentage deviation between the two values.
9. Click **Log Verify**. ROCLINK 800 completes the first log entry on the screen.

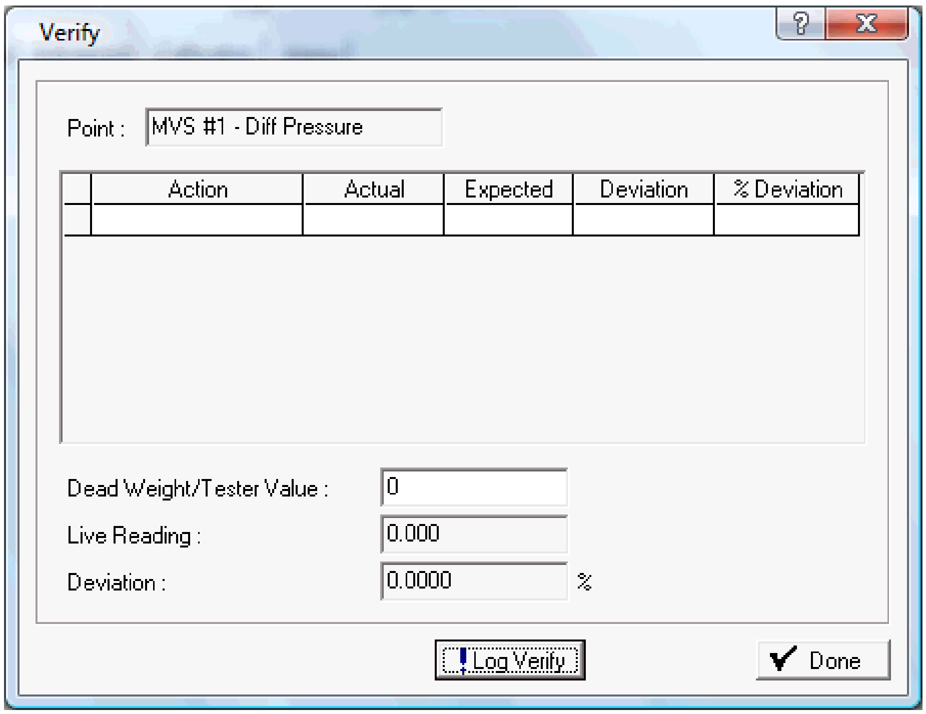


Figure 7-47. Verify

Field	Description
Action	Indicates the current action. Valid values are **Verify** or **Calibrate**.
Actual	Displays the value in the **Live Reading** field.
Expected	Displays the value in the **Dead Weight/Tester Value** field.
Deviation	Displays the amount of deviation between the actual and expected values.
% Deviation	Displays a percentage deviation between the Actual and Expected values.

10. As the live reading value changes, click **Log Verify** as many times as necessary to establish the verification log.

11. Typically you verify the same points you calibrate. Temperature might be an example (– 100, 200, 50). For each test point, you set your test equipment to produce the expected value, enter that expected value in the **Tester Value** field, wait for live input to stabilize, and then click **Log Verify**. You can verify as many points as you want.

12. Click **Done**.

13. Calibrate the input if required.

Field	Description
Point	Identifies the point (differential pressure, static pressure, or temperature) being verified.
Action - Verify Fields	Shows the activity being performed as well as various values: ▪ **Actual** – Displays the current **Live Reading** value from the sensor. ▪ **Expected** – Displays the expected value as entered in the **Dead Weight/Tester Value** field. ▪ **Deviation** – Displays the difference between the expected value and the actual value. (Deviation = Expected – Actual.) ▪ **% Deviation** – Displays a percentage deviation between the Actual and Expected values. **Note:** Click **Log Verify** to add lines to this screen.
Dead Weight/Tester Value	Sets the expected value against which the system tests and calibrates. **Note:** This is the Expected value in the Action field.
Live Reading with Offset applied	This **read-only** field shows the current reading from the sensor. If you have configured an offset, the value appears in the Offset applied field.
Deviation and % Deviation	This **read-only** field shows the deviation between the Actual and Expected values, such as the difference between the live pressure or temperature reading and the measured pressure or temperature reading. (%Deviation = Deviation [(Span EU – Zero EU) x 100%]). Use this value to determine the need for calibration or adjustment.
Log Verify	Click to write the displayed data to the Event Log.

Calibrating an MVS

You can calibrate the differential pressure, static pressure, and temperature inputs of an MVS. ROCLINK allows you to perform either a five-point calibration on an MVS205 or 4088B or a two-point

calibration on a 3095 or 4088A. The five-point calibration consists of setting the zero point, span, and up to three mid points.
The two-point calibration process consists of setting the zero point and the span. To calibrate an MVS:

Notes:

- You cannot calibrate a 4088 if the Transmitter Security switch on the device is enabled.
- The 4088 provides range checking on the input values. The calibration process fails if the input values deviate more than 10% from the expected values.
- If you have a 4088B and click **Cancel** at any time during the calibration process, you must start the calibration process over from the beginning.

1. Select **Configure > I/O > MVS Sensor > Calibration tab**. The MVS Calibration screen displays.

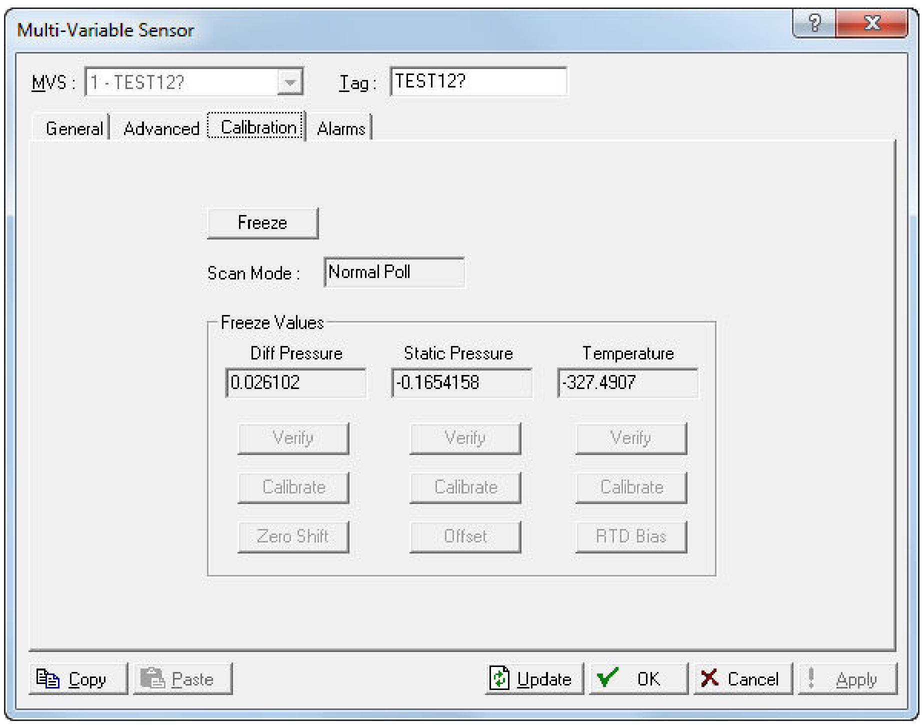
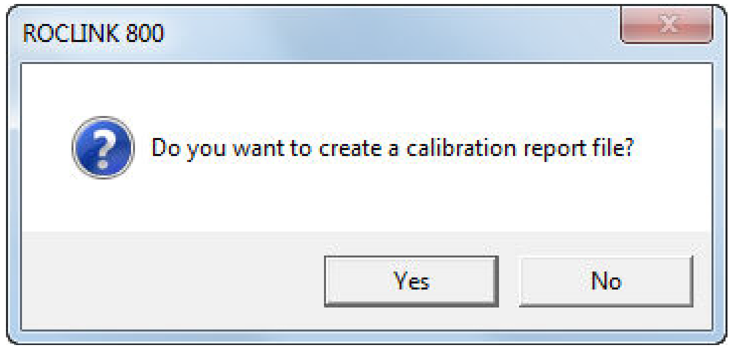


Figure 7-48. MVS Calibration

2. Click ▼ in the MVS drop down box to select an MVS sensor to calibrate.
3. Click **Update** to request one value update from the input.
4. Click **Freeze** to stop the input values from being updated during verification or calibration. ROCLINK asks you if you want to create a calibration report file.

Note: The **Freeze Value** field displays the value received from the MVS of DVS input when you last clicked Update and is the value the system uses in ongoing processing (such as flow calculations and history logging) while performing calibration.



5. If you click **Yes**, enter a file name and location to save the file, and click **Save**. The MVS screen displays with the values frozen, the Scan Mode field is set to **Input Freeze**, and the **Verify** and **Calibrate** buttons are activated.

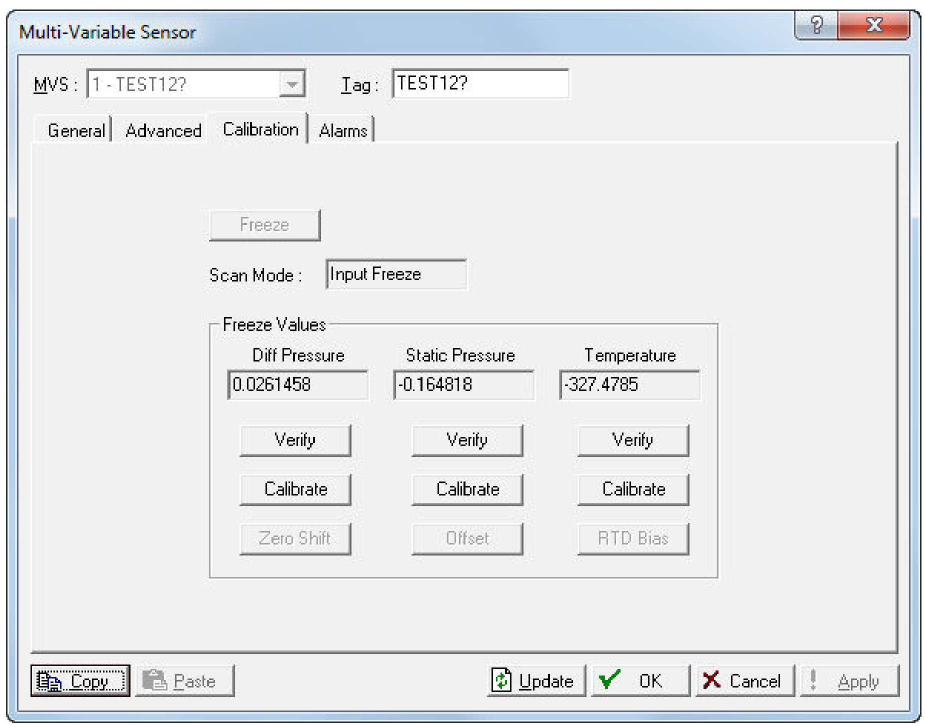


Figure 7-49. Input Freeze

6. If you are calibrating a temperature input, disconnect the MVS sensor and connect a decade box (or comparable equipment) to the terminals of the device.

Note: You can also use a pocket current source or another deadweight test input source to test this value.

7. Click **Calibrate** in the column of the input type you want to calibrate (Diff Pressure, Static Pressure, Temperature). A Set Zero dialog box displays.

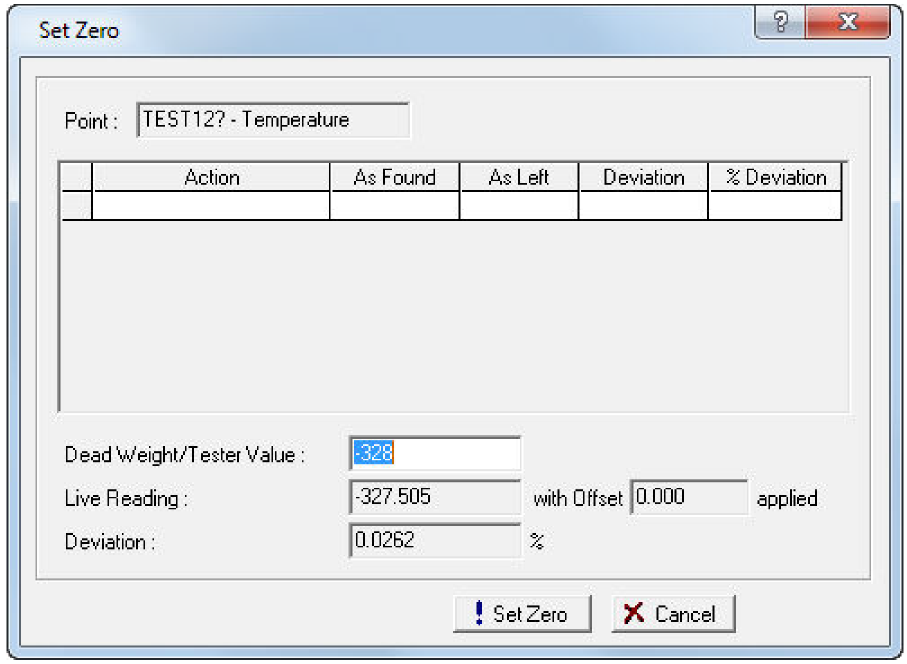


Figure 7-50. Set Zero Calibration

8. Enter a value in the **Dead Weight/Tester Value** field.

9. Click **Set Zero** to set a zero value. Note that ROCLINK 800 changes the screen name and button name to **Set Span**.

   For the Set Zero entry in the calibration log, ROCLINK 800 records the **As Found** and **As Left** values and calculates the **Deviation** and **% Deviation** values (between the Dead Weight/Tester Value and the Live Reading values).

10. Enter a value in the **Dead Weight/Tester Value** field for the span and click **Set Span** to set a span value and record the values in the calibration log.

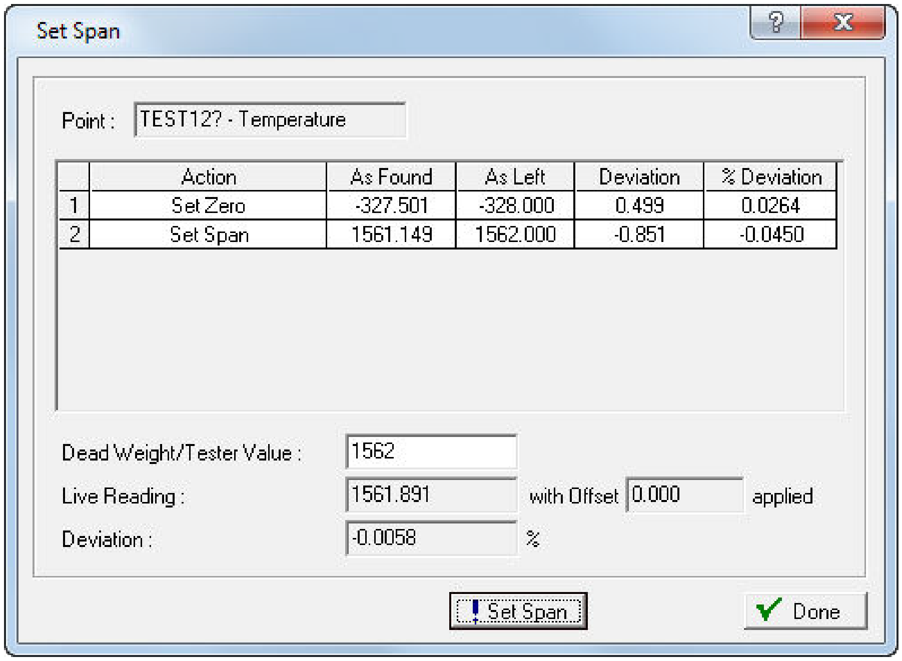


Figure 7-51. Set Span Calibration

11. **If you are calibrating a 3095, 4088A, or you do not wish to configure midpoints**, click **Done**.

    If you are calibrating an MVS205 or 4088B and wish to configure midpoints, enter a value in the **Dead Weight/Tester Value** field and click click **Set Mid 1** to define the first midpoint value. You can define up to three midpoints (typically at 25%, 50%, and 75%). Click **Done** when you finish configuring midpoints.

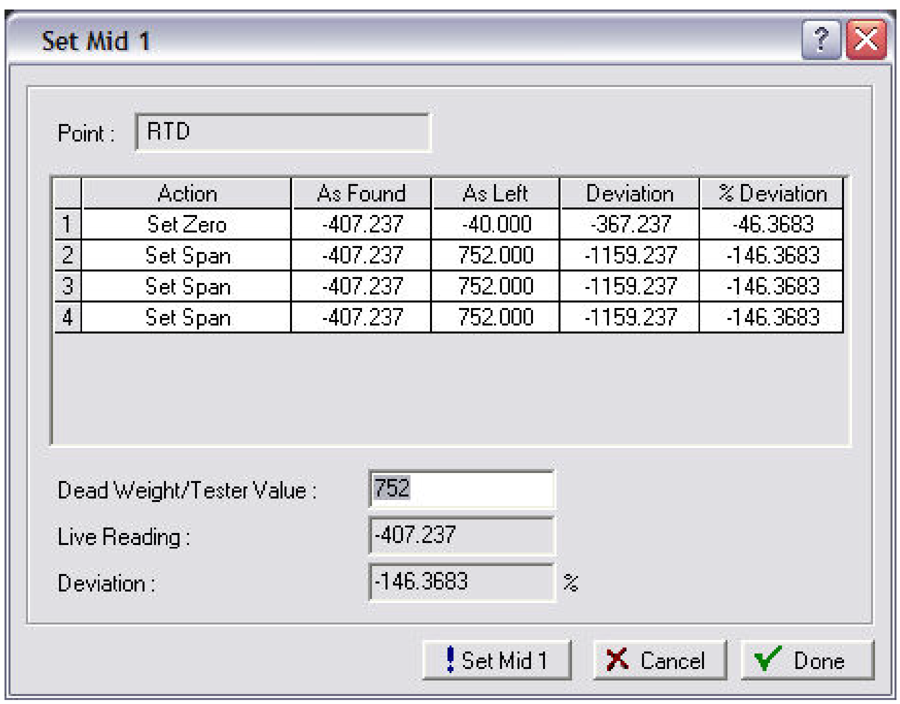


Figure 7-52. Set Mid Points

12. If the calibration results indicate that you need to adjust the sensor, click **Zero Shift/Offset/RTD Bias** (depending on the point you are adjusting). The system displays a Set Zero (Offset) screen.

Note: If calibration fails, check the communication wiring, entered values, and applied pressure.

Field	Description
Point	Identifies the point (differential pressure, static pressure, or temperature) being verified.
Calibration Fields	Shows the activity being performed as well as various values:
Action	Indicates the current action. Valid values are **Set Zero**, **Set Span**, **Set Mid 1**, **Set Mid2**, or **Set Mid3**.
As found	Shows the sensor's initial value.
As Left	Shows the sensor's value after calibration
Deviation	Shows the difference between the As Found value and the As Left value.
% Deviation	Shows the difference between the As Found and As Left values as a percentage.
Set Zero	Calibrate the zero value (0% of range) for the in differential pressure (orifice only), static pressure, or temperature. Set the Dead Weight/Tester Value (in engineering units). This should correspond with the Low Reading EU (0% Count) and is the low value for the input. This is the input desired for the test value and is the actual value expected by the test equipment being calibrated against. For example: When calibrating temperature for an RTD input, enter the degree value associated with the resistance set up in the decade box or other equipment.
Set Span	Calibrate the span value (100% of range) for differential pressure (orifice only), static pressure, or temperature. Set the Dead Weight/Tester Value (in engineering units). This should correspond with the High Reading EU (100% Count) and is the high value to the input (the top end of the expected operating range). For static pressure on an absolute-pressure device, remember to add in the actual atmospheric pressure, for example, 300 + 14.73.

Field	Description
Set Midpoints	If desired, calibrate midpoint 1 (such as 25% of range) for the differential pressure (orifice only), static pressure, or temperature, otherwise click the Done button. Midpoints allow you to specify the low, middle, and high calibration point between the zero and span endpoints. Set the Dead Weight/Tester Value (in engineering units). If desired, calibrate Midpoint 2 (such as 50% of range) for the Differential Pressure (orifice only), Static Pressure, or Temperature. Set Midpoint 2 allows you to specify the middle calibration point between the Zero and Span endpoints. If desired, calibrate Midpoint 3 (such as 75% of range) for the Differential Pressure (orifice only), Static Pressure, or Temperature. Set Midpoint 3 allows you to specify a third point between the Zero and Span endpoints. **Note:** You can calibrate Midpoints in any order from low to high or high to low.

Sending the Differential Pressure Zero Shift (Offset)

After you have calibrated differential pressure, click **Zero Shift** to zero the static pressure effect for the differential pressure input if required.

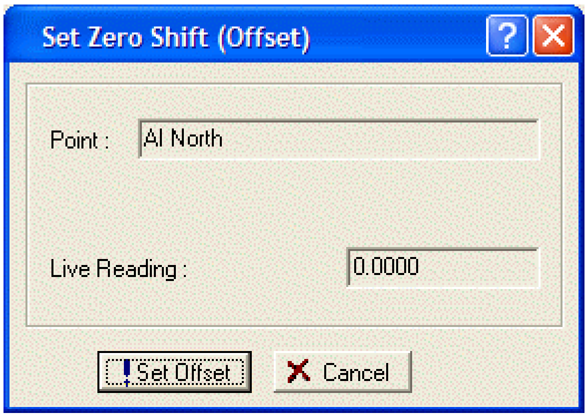


Figure 7-53. Set Zero Shift (Offset)

1. After you have calibrated differential pressure, click **Zero Shift** to zero the static pressure effect for the differential pressure input if required.
2. Apply the typical line pressure to both the high and low side of the sensor.
3. Click **Set Offset** to send the value to the live reading to get the reading as close to zero as possible.

4. Click **Done** or **Cancel** to close the dialog.

Sending the Static Pressure Offset

Sets the **Offset** to send the value of the live reading to get the reading as close to zero as possible for a static pressure inputs.

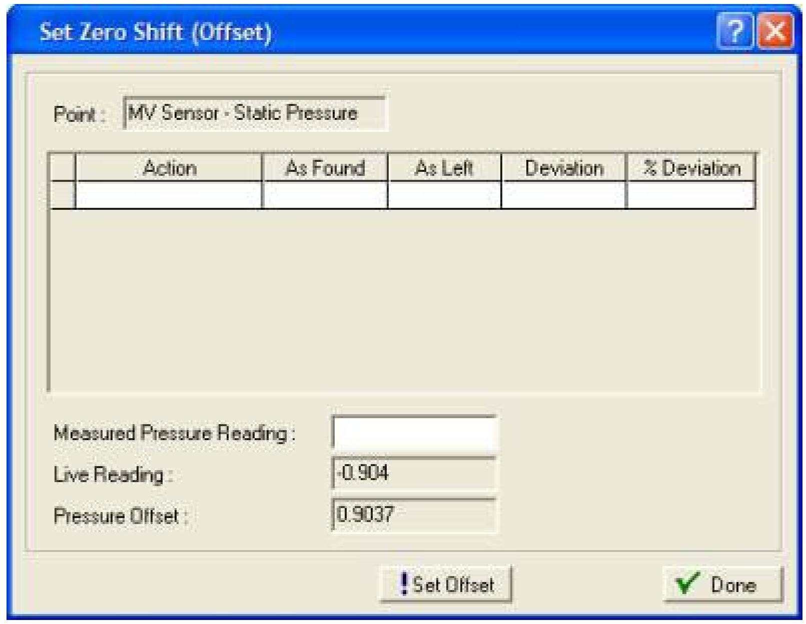


Figure 7-54. Set Zero Shift (Offset)

1. After you have calibrated static pressure, click **Offset** to calibrate the offset (shift) of static pressure if required.
2. Enter a value for the **Measured Pressure Reading**, which is the pressure as read from a calibrated pressure sensor.
3. Click **Set Offset** to send the value to the live reading to get the reading as close to the measured reading as possible.
4. Click **Done** to close the dialog.

Field	Description	
Zero Shift/Offset/RTD Bias	Click to set adjustment factors for the input. The value is sent to the device for:	
	Zero Shift	Click to zeros the static pressure effect for the differential pressure input (Set Offset).
	Offset	Click to send the value of the live reading to set the reading as close to zero as possible for a static pressure inputs (Measured Pressure Reading).
	RTD Bias	Click to calibrate the offset (shift) of temperature throughout the RTD curve (Temperature Standard Reading).

Field	Description
Measured Pressure Reading	Sets the pressure as read from a calibrated pressure sensor. **Note:** This field displays **only** for **static pressure** points.
Pressure Offset	This **read-only** field shows the difference between the live pressure reading and the measured pressure reading that ROCLINK 800 applies to the pressure value. **Note:** This field displays **only** for static pressure points.

Sending the Temperature RTD Bias

Calibrate the offset (shift) of temperature throughout the RTD curve if required.

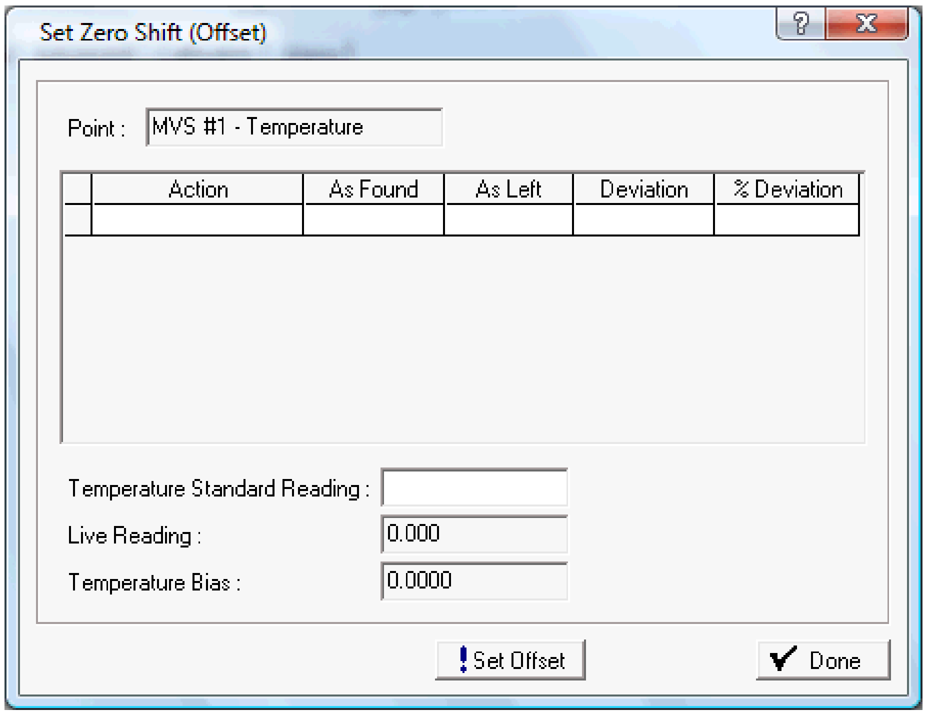


Figure 7-55. Temperature RTD Bias

1. After you have calibrated the temperature input, click **RTD Bias** to calibrate the offset (shift) of temperature throughout the RTD curve if required.
2. Enter a value for the **Temperature Standard Reading**, which is read from a calibrated temperature probe.
3. Click **Set Offset** to send the value to the live reading to get the reading as close to the measured reading as possible.
4. Click **Done** to close the dialog.

Field	Description
Temperature Standard Reading	Sets the temperature as read from a calibrated temperature probe. **Note:** This field displays **only** for temperature points.
Temperature Bias	This **read-only** field shows the difference between the live temperature reading and the entered standard temperature reading that ROCLINK 800 applies to the temperature value. **Note:** This field displays **only** for temperature points.

MVS: Alarms Tab

Use this tab to establish limits for differential pressure, pressure, temperature, and RBX alarms.

1. Select the **Alarms** tab. The Alarms screen displays.

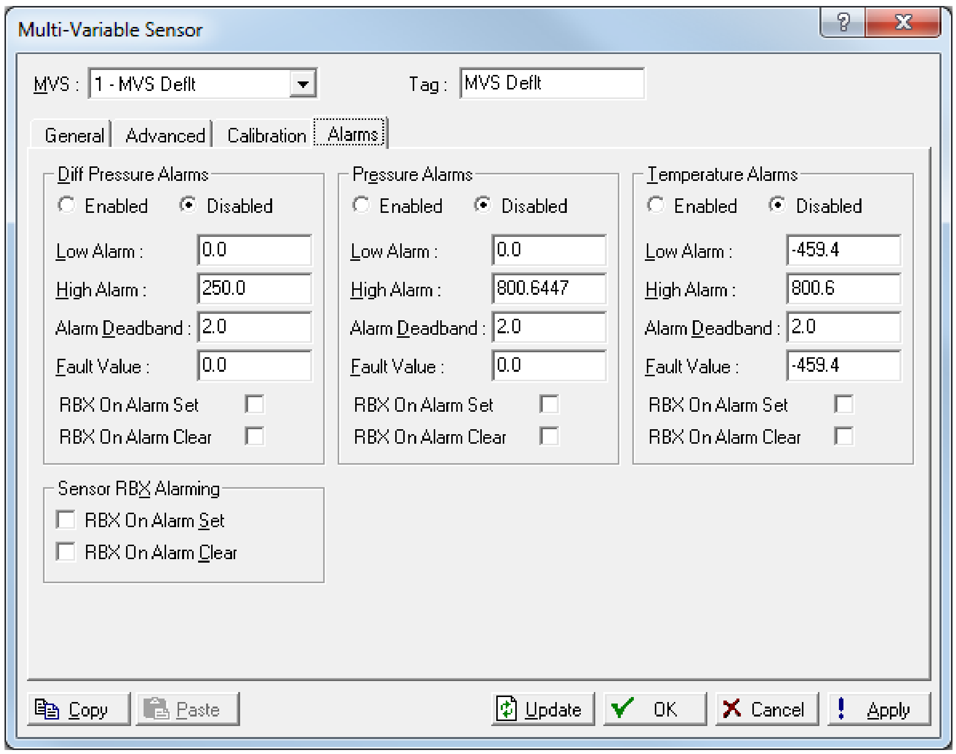


Figure 7-56. MVS Sensor – Alarms tab

Note: If you change any values, click **Write** to save the configuration.

Field	Description
Enabled/Disabled	Sets whether, for the particular input, alarms are active. Valid values are **Enabled** (configure alarms using the set parameters) or **Disabled** (do not generate an alarm, regardless of configuration). The system logs alarms to the alarm log. To conserve log space, enable alarms only when necessary. **Note:** If you disable an alarm, the system does not generate an alarm for this point, regardless of the alarm configuration. Alarm statuses display in the **read-only** Status field on the General tab.
Low Alarm	Sets, in engineering units, a limit value to which the input value must fall to generate a **Low Alarm**.
High Alarm	Sets, in engineering units, a value to which the input value must rise to generate a **High Alarm**.
Alarm Deadband	Sets, in engineering units, an inactive zone above the Low Alarm limits and below the High Alarm limits. The Alarm Deadband prevents the alarm from being set and cleared continuously when the input value is oscillating around the alarm limit. This prevents the Alarm Log from being over-filled with data.
Fault Value	Sets the point's value on failure. If a point fails and you have previously set the value on the Advanced tab's Action on Failure field to **Set to Fault Value**, the system uses the value entered in this field as the EU value for that point. **Note:** Fault Values are only used in Modify Limits.
Sensor RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: ▪ **On Alarm Set** – Generates an RBX message to the host when the point enters an alarm condition. ▪ **On Alarm Clear** – Generates an RBX message to the host when the point leaves an alarm condition.

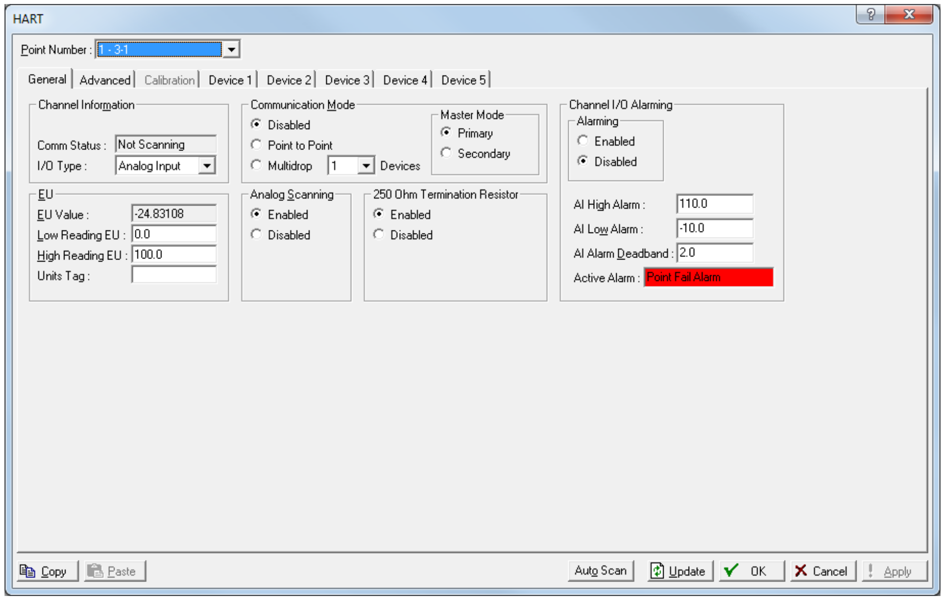
7.1.12 HART Input Configuration

The Highway Addressable Remote Transmitter (HART®) module enables the ROC800-Series to process input from field-based HART devices. Depending on your need, you can configure the HART module either as an analog input or analog output.

Series 1/Series 2 HART Modules

An earlier version ("Series 1") of the HART module is still in use. Switches on the Series 1 module's printed circuit board enable you to manually select analog input or output configurations. Series 2 HART modules use a software-selectable switch. Refer to the *ROC800-Series HART® Module* technical specifications (*ROC800:HART*) for specific physical and operational differences. As appropriate, this section notes any differences for the Series 1 HART module.

Select **Configure > I/O > HART Points**. The HART screen displays, showing the General tab by default.



The HART screen can have as many as eight tabs. Use each tab to configure a component of the module's operation.

- The **General** and **Advanced** tabs set parameters for the channel. Each HART module can support up to four channels.
- The **Calibration** tab enables you to calibrate the HART analog input.
- The **Device** tabs (1 through 5) set parameters specific to the devices in that channel. When you configure the module in analog output mode, each channel can support one device. When you configure the module in analog input mode, each channel can support up to five devices.

Save Configuration After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

HART: General Tab

Select **Configure > I/O > HART Points**. The HART screen displays with the General tab active. Use this tab to configure parameters for the channel.

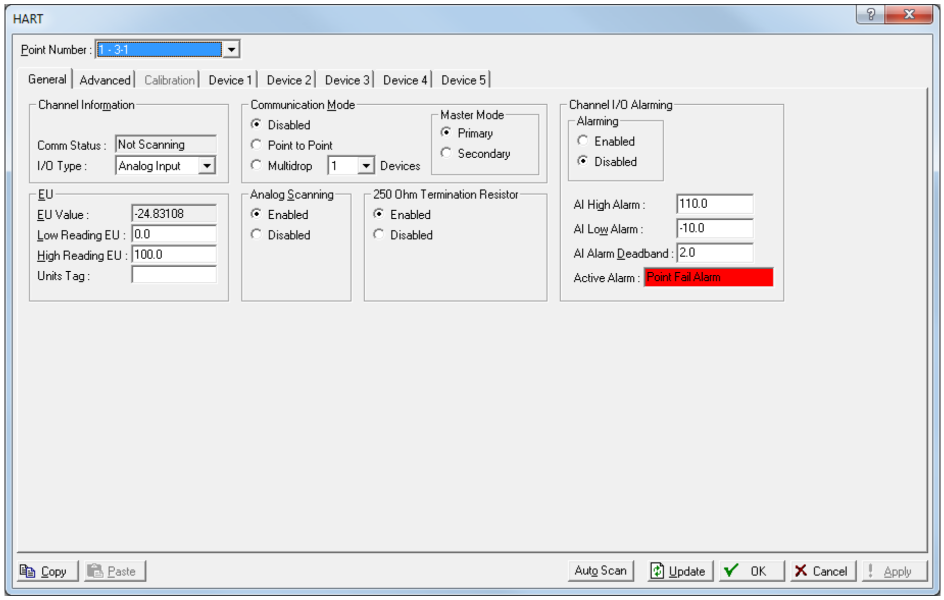


Figure 7-57. HART AI – General tab

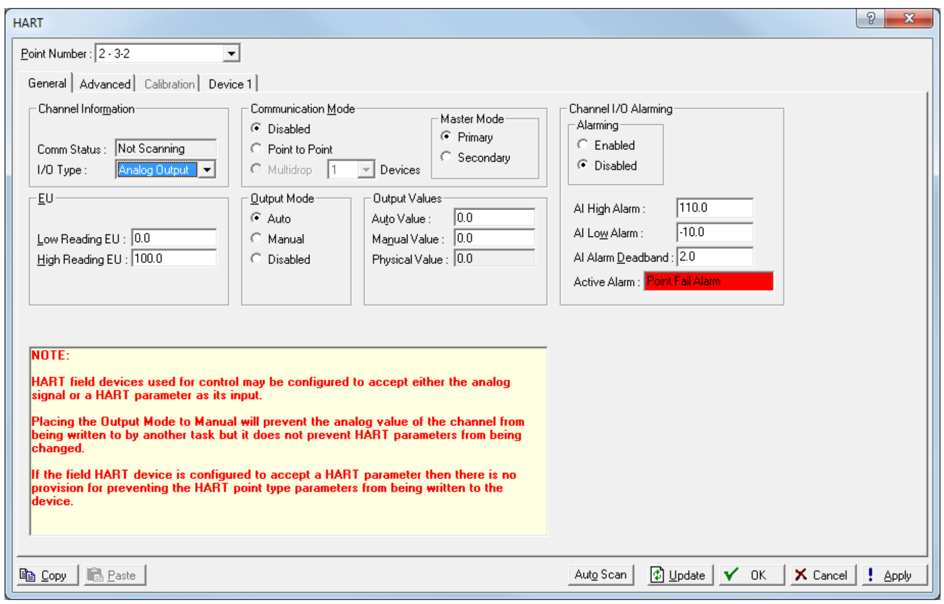


Figure 7-58. HART AO – General tab

Field	Description
Point Number	Identifies the channel and its physical location. The first number indicates the total number of installed HART points (based on the sum of all installed HART modules) in the ROC. The last two numbers indicate the point's location on a specific HART module. Click ▼ to display all available HART points. For example, **1 – 1-1** indicates the first point located on the HART module placed in slot #1 in the ROC chassis. **6 – 2-2** indicates the sixth HART point, located on the HART module placed in slot #2 in the ROC chassis. **Note:** This selection in this field applies to each tab on this screen.
Channel Version	This **read-only** field shows the version of firmware present in the HART module for this channel. **Note**: This field displays **only** if you have a Series 1 HART module installed.
Comm Status	This **read-only** field shows the status of the communications channel. **Scanning** indicates the channel is currently scanning the device(s). **Not Scanning** indicates the device is currently off-line or not communicating. **Dual Master** indicates that the channel has another master connected. Examples of other masters include a **Hand-Held Communicator** and a device that is configured to be in **Burst mode**. When in Dual Master, the ROC is not scanning the device, which allows communications between the other master and the devices. When the hand-held communicator finishes communicating with the HART device (or Burst mode was turned off in the device), normal HART module scanning automatically resumes. **Note:** The HART module does not support Burst mode. The device should not be configured in Burst mode when connected to the ROC If a device is in Burst mode, use a hand-held communicator to turn off Burst mode.
I/O Type	Click ▼ to configure the HART module as an analog input or analog output. **Note**: The Series 1 HART module requires you to manually change switches on the module itself. Refer to *Chapter 4* in the *ROC800-Series Remote Operations Controller Instruction Guide* (part D301217X012).

<table>
<tr><th>Field</th><th colspan="2">Description</th></tr>
<tr><td rowspan="4">Communication Mode</td><td colspan="2">Sets the communication mode for the point. Valid values are:</td></tr>
<tr><td>Disabled</td><td>Stop all HART communication; no changes occur unless you manually enter them.</td></tr>
<tr><td>Point to Point</td><td>Enables the channel to communication with one HART device per channel and the analog signal is still representative of the measured variable.</td></tr>
<tr><td>Multidrop</td><td>Enables the channel to communications with the specified number of devices (maximum of five) that you connect to each channel in parallel. Each HART device in multi-drop mode requires 4mA and does not represent any measured variable value. With all four channels in multidrop mode, the ROC800 can support a maximum of twenty HART devices. The ROC superimposes digital communications on the analog signal that you use for powering the HART devices.
Note: Multidrop is not a valid option if you select Analog Output as an I/O Type.</td></tr>
<tr><td>Master Mode</td><td colspan="2">Sets sequencing to ensure that two masters can communicate with one slave device. Primary indicates that this HART point has priority in communications; any point set to Secondary must wait until the Primary communication has completed.</td></tr>
<tr><td>EU Value</td><td colspan="2">Sets the engineering units value of the analog input or analog output.
Note: This field does not display if you select Analog Output as the I/O Type.</td></tr>
<tr><td>Low Reading EU</td><td colspan="2">Sets the value in engineering units that corresponds to zero percent input.</td></tr>
<tr><td>High Reading EU</td><td colspan="2">Sets the value in engineering units that corresponds to 100 percent input.</td></tr>
<tr><td>Units Tag</td><td colspan="2">Provides a 10-character descriptor for the engineering units.
Note: This field does not display if you select Analog Output as the I/O Type.</td></tr>
<tr><td>Analog Scanning</td><td colspan="2">Sets analog scanning options. Valid values are Enabled (automatically process the field input) and Disabled (stop processing the field input).
Note: This field displays only if you select Analog Input as the I/O Type.</td></tr>
</table>

Field	Description
Output Mode	Identifies where the system obtains the output value. Valid values are **Auto** (system uses the value in the Auto Value field of the Output Value frame), **Manual** (system uses the value in the Manual Value field of the Output Value frame), or **Disabled** (system does not use a value). **Note**: This field displays **only** if you select **Analog Output** as the I/O Type.
250 Ohm Termination Resistor	Indicates whether the software activates a 250Ω termination resistor for the HART module. Valid only for the Series 2 HART module. **Note**: This field displays **only** if you select **Analog Input** as the I/O Type.
Output Values	Sets the actual output value the system uses, based on the setting in the Output Mode field. The system uses the value you enter in the **Auto Value** field if you also select **Auto** in the Output Mode field. The system uses the value you enter in the **Manual Value** field if you also select **Manual** in the Output Mode field. The Physical Value field is a read-only field that displays the actual value being sent. **Note**: These fields display **only** if you select **Analog Output** as the I/O Type.
Alarming	Sets alarming on the channel. Select **Enabled** to activate alarming or **Disabled** to prevent alarming. **Disabled** is the **default**.
AI High Alarm	Sets the high point for the channel alarm.
AI Low Alarm	Sets the low point for the channel alarm.
AI Alarm Deadband	Sets a deadband for the channel alarm.
Active Alarm	This **read-only** field shows any active alarms.

HART: Advanced Tab

Select **Configure > I/O > HART Points> Advanced** tab to configure parameters for the channel. Each HART module supports up to four channels.

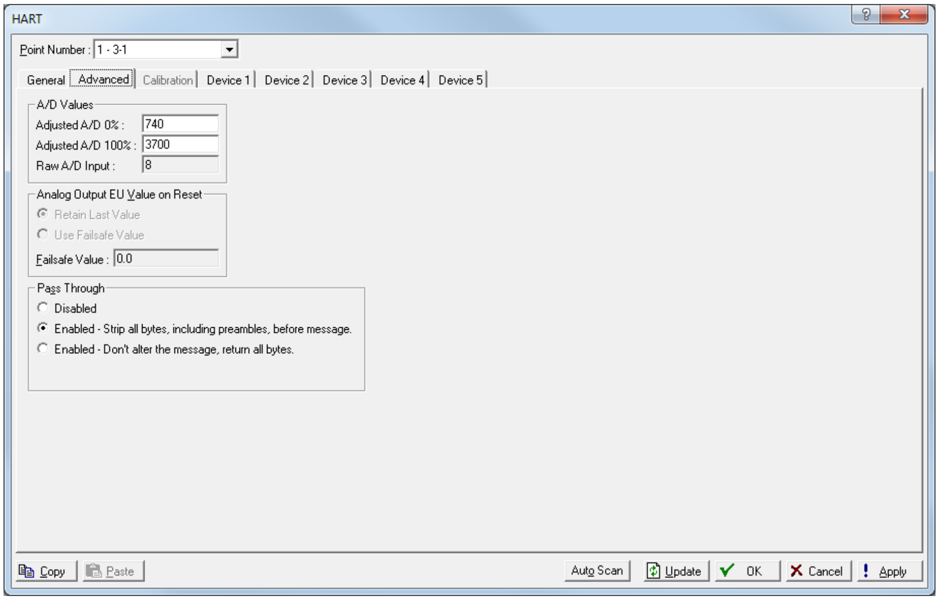


Figure 7-59. HART – Advanced tab

Field	Description
Adjusted A/D 0% or **Adjusted D/A 0%**	Sets a value to adjust the calibrated Analog-to-Digital (for AIs) or Digital-to-Analog (for AOs) reading to zero percent input. In the Calibrate function, this value is altered to set the zero percent input exactly at the Low Reading EU value to eliminate transmitter and system errors. **Note**: This is a **read-only** field for the Series 1 HART module.
Adjusted A/D 100% or **Adjusted D/A 100%**	Sets a value to adjust the calibrated Analog-to-Digital (for AIs) or Digital-to-Analog (for AOs) reading corresponding to 100 percent input. This system uses this value to convert the input to engineering units. In the Calibrate function, this value is altered to set the 100 percent input exactly at the High Reading EU value. **Note**: This is a **read-only** field for the Series 1 HART module.
Raw A/D or D/A Input	This **read-only** field shows the current reading directly from the Analog-to-Digital (for AIs) or Digital-to-Analog (for AOs) converter.
Analog Output EU Value on Reset	Indicates the value the system uses on reset. When you select **Retain Last Value**, use the last EU value for the channel after a reset or a warm start. If you select **Use Failsafe Value**, enter a value to use after a reset or warm start.

Field	Description
Pass Through	Sets how communications pass from a host device through the ROC and on to the HART devices. The communications must be in ROC Plus protocol (typically for Opcode 120 requests). Valid values are **Disabled** (no pass through occurs), **Enabled – Strip** (strip all preamble bytes in HART protocol) or **Enabled – Don't** (leave the entire message intact). For the Series 1 HART Module, the Timeout field enables you to enter, in milliseconds, the amount of time the system pauses between the end of the pass through communication and the restarting of polling of the HART device.

HART: Calibration Tab

Select **Configure > I/O > HART Points > Calibration** tab to calibrate a HART channel that is acting as an analog input HART inputs support a two-point calibration routine.

Note: You can access and run Calibration **only** when the channel is in **Point to Point** mode or the device poll mode is **Skip This Device**.

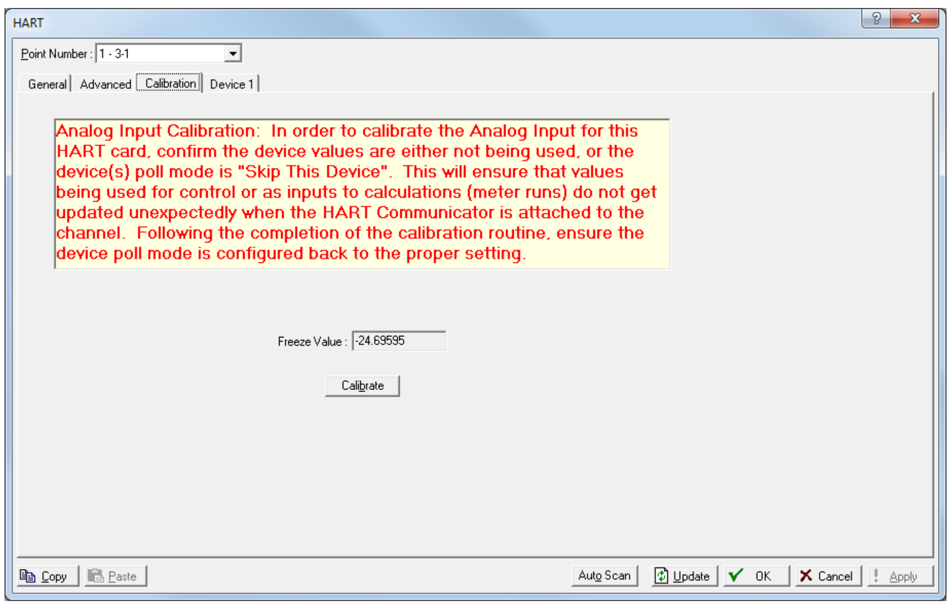


Figure 7-60. HART – Calibration tab

Field	Description
Freeze Value	This **read-only** field shows the value received from inputs when the **Update** button was last clicked. The system uses these values in ongoing processing (such as flow calculations, history logging, or control) while calibration occurs.
Calibrate	Click to begin calibration and displays the Set Zero dialog.

Calibrating a HART Input

Use this process to calibrate an HART that is outside the temperature limits.

1. Select a HART **Point Number** to calibrate.
2. Verify that the **Communication Mode** on the **General** tab is set to **Point-to-Point**.
3. Click the **Device** tab and verify that the **Poll Mode** is set to **Skip This Device**.
4. Click the **Calibration** tab.

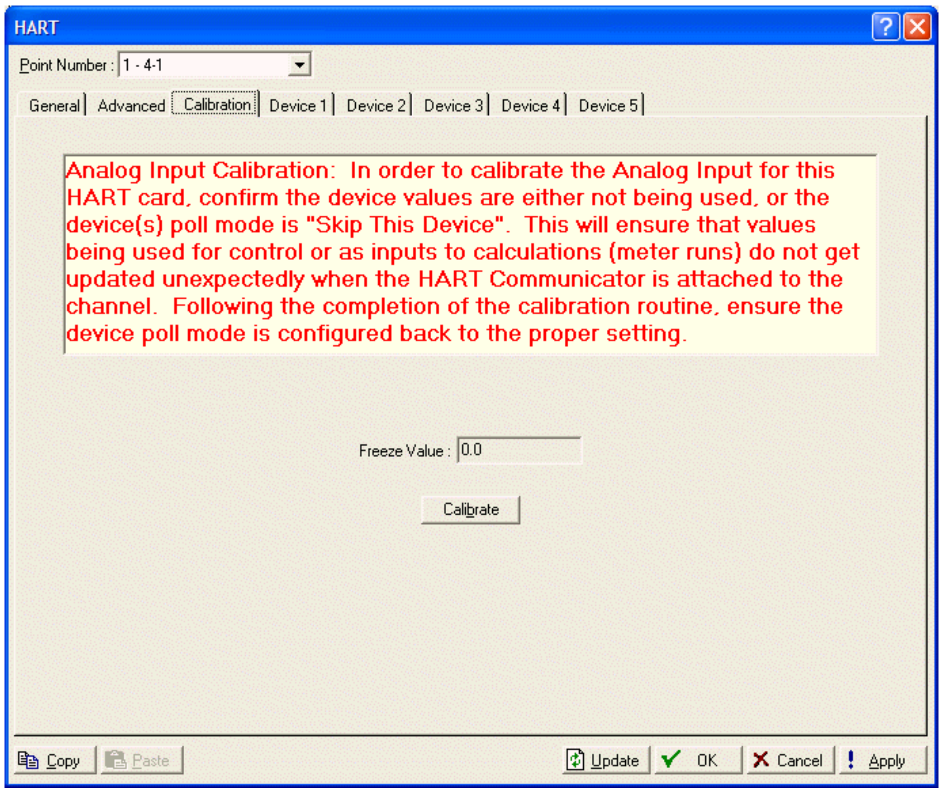


Figure 7-61. HART Input Calibration

5. Click **Calibrate.** A Set Zero screen displays.

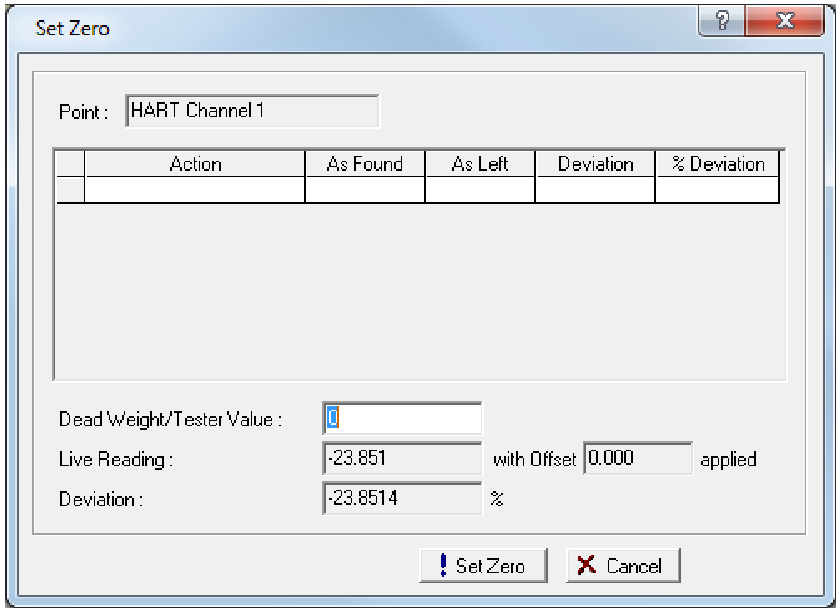


Figure 7-62. Set Zero

Note: You can click **Cancel** to exit the calibration without saving the changes. The system retains the previous calibration settings but logs the event in the event log.

6. Complete the **Dead Weight/Tester Value** field. This value represents the low range (0%) of the instrument's measurement range.

   When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

7. Click **Set Zero** when the live reading stabilizes. ROCLINK 800 adds the first line in the calibration log, renames the screen to **Set Span**, and changes the label on the **Set Zero** button to **Set Span**.

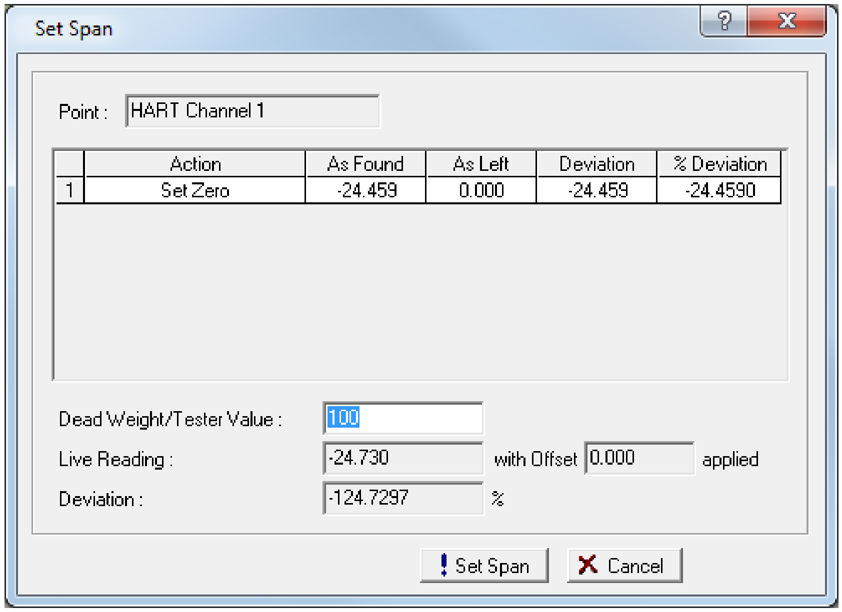


Figure 7-63. Set Span

8. Set test equipment to produce the expected results.
9. Complete the **Dead Weight/Tester Value** field with a value represents the upper limit (100% or "span") of the instrument's measurement range.

   When you enter a value in the **Dead Weight/Tester Value** field, ROCLINK immediately begins comparing it once each second to the value in the **Live Reading** field (obtained from the static pressure sensor) and calculating the percentage deviation between the two values.

   For the Set Zero entry in the calibration log, ROCLINK 800 records the **As Found** and **As Left** values and calculates the **Deviation** and **% Deviation** values (between the Dead Weight/Tester Value and the Live Reading values).
10. Click **Set Span** when the live reading stabilizes.
11. Click **Done**.

When the Calibration tab displays, the calibration routine is complete.

Note: Following a calibration, you may re-run a verification to demonstrate to the customer that the measurement results are now within contractual parameters.

HART: Device Tab

Select **Configure > I/O > HART Points > Device** tabs to configure parameters specific to the devices in that channel. Each channel in analog output mode can support one device. Each channel in analog input mode can support up to five devices.

If you select **Point to Point** as the communications mode on the General tab, the Device 1 tab presents device information. If you select **Multidrop** as the communications mode, each Device tab corresponds to the HART Tag (Point Number) defined for the ROC to poll.

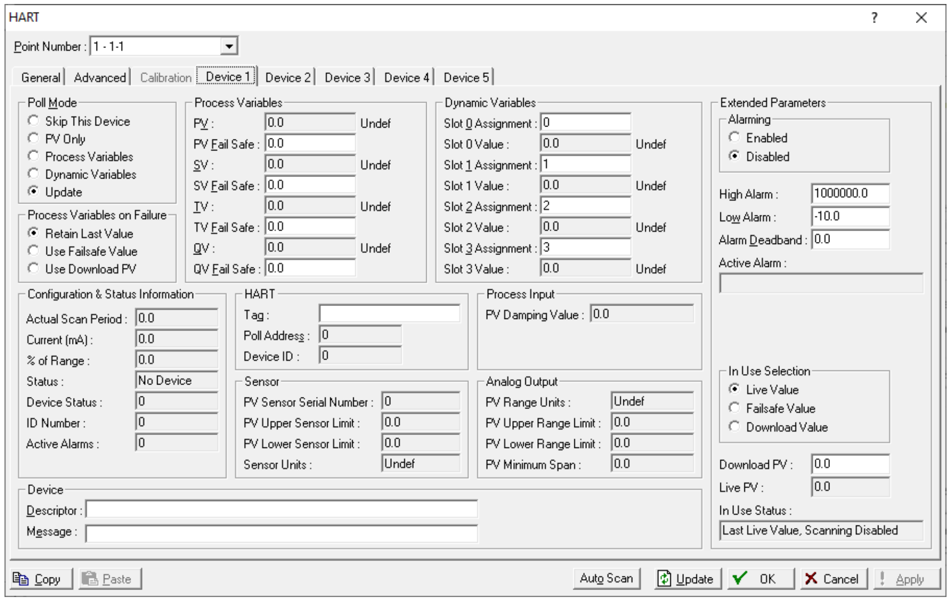


Figure 7-64. HART – Device tab

Field	Description	
Poll Mode	Sets the polling behavior for this device. Valid values are:	
	Skip this Device	Removes this device from the polling sequence
	PV Only	Poll only the Primary Variable value.
	Process Variables	Poll values for all of the Process Variables (primary, secondary, tertiary, and quaternary.
	Dynamic Variables	Poll only the values for the four Slot Variables.
	Update	Updates the device's static information. Static information includes transmitter ranges, units, tag, descriptor, PV limits, and ranges.
Process Variables on Failure	Sets the values to use after a failure if you have set the value in the In Use Selection frame to **Live Value**. Valid values are:	
	Retain Last Value	Use the last values for the process variables.
	Use Failsafe Value	Use the value entered as the Failsafe Value.

Field	Description
	Use Download PV — Use the value entered in the Download PV field in the Extended Parameters frame; the other process values use their failsafe values.
Actual Scan Period	This **read-only** field shows the actual amount of time in seconds that passes between scans.
Current (mA)	This **read-only** field shows the current, in milliamps, reported by the device.
% of Range	This **read-only** field shows the percentage of the range currently being reported by the device.
Status	This **read-only** field shows the state of the device. This field displays either **No Device**, **Communicating**, or **Comm Error**.
Device Status	This **read-only** field shows the response status code from the device. Refer to the documentation from the transmitter manufacturer for more information.
ID Number	This **read-only** field shows a 3-byte globally unique address of the device.
Active Alarms	This **read-only** field shows any alarms that are being sent from the device. These are not entered in the Alarm Log.
Descriptor	Provides up to 16 alphanumeric characters of information (in addition to the device Tag) to more specifically describe the device.
Message	Defines a message (up to 32 alphanumeric characters in length) sent to and stored in the device.
PV	This **read-only** field shows the value of the Primary Process Variable.
PV Fail Safe	Sets the value to use as the Primary Variable, after a failure if you select **Use Failsafe Value** in the Process Variables on Failure frame.
SV	This **read-only** field shows the value of the Secondary Process Variable.
SV Fail Safe	Sets the value to use as the Secondary Variable after a failure if you select **Use Failsafe Value** in the Process Variables on Failure frame.
TV	This **read-only** field shows the value of the Tertiary Pocess Variable.
TV Fail Safe	Sets the value to use as the Tertiary Variable after a failure if you select **Use Failsafe Value** in the Process Variables on Failure frame.
QV	This **read-only** field shows the value of the Quaternary Process Variable.
QV Fail Safe	Sets the value to use as the Quaternary Variable after a failure if you select **Use Failsafe Value** in the Process Variables on Failure frame.

Field	Description
Tag	Sets the name for the HART device to identify it throughout the configuration. The tag should be 10 characters or less. When in Multidrop mode, the tag must be unique for every device.
Poll Address	This **read-only** field shows the address used for this HART device. In Point to Point mode, the Poll Address is 0. In Multidrop mode, the system uses addresses between 1 and 5.
Device ID	This **read-only** field shows the coded ID that reflects the manufacturer of the device, the device type, and the device ID.
PV Sensor Serial Number	This **read-only** field shows the serial number of the sensor.
PV Upper Sensor Limit	This **read-only** field shows the upper limit on the sensor.
PV Lower Sensor Limit	This **read-only** field shows the lower limit on the sensor.
Sensor Units	This **read-only** field shows the units of measure for the upper and lower sensor limits.
Slot Assignment (0 through **3)**	Sets the value (0, 1, 2, or 3) to determine which variable in that slot to request.
Slot Value (0 through **3)**	These **read-only** fields show the value (0, 1, 2 or 3) of the variable requested from that slot. The **read-only** units defined in the device displays to the right of this field.
PV Damping Value	This **read-only** field shows the damping value reported by the device for the Primary Variable.
PV Range Units	This **read-only** field shows the units of measure for the analog output minimum span and upper and lower range limits.
PV Upper Range Limit	This **read-only** field shows the maximum value in the analog output range.
PV Lower Range Limit	This **read-only** field shows the minimum value in the analog output range.
PV Minimum Span	This **read-only** field shows the minimum sensor span.
Alarming	Activates alarms for this device. Valid values are **Enabled** (active alarms) or **Disabled** (prevent alarms for this device). The **default** is **Disabled**.
High Alarm	Sets a high value limit for alarms for this device.
Low Alarm	Sets a low value limit for alarms for this device.
Alarm Deadband	Sets a deadband
Active Alarm	This **read-only** field shows any current alarms for this device.

Field	Description	
In Use Selection	Indicates the value the system uses for the primary value while in operation. Valid values are:	
	Live Value	Use the value from the device. If device fails, use value specified in PV Fail Safe field.
	Failsafe Value	Sets PV value to the value entered in the PV Fail Safe field.
	Download Value	Sets PV value to the value entered in the Download PV field.
Download PV	Sets a specific value the system uses if you select **Use Download PV** in the Dynamic Variables on Failure frame.	
Live PV	This **read-only** field shows the live primary variable for the device.	
In Use Status	This **read-only** field shows the current In-use settings.	

7.1.13 Alternating Current I/O (ACIO) Configuration

The Alternating Current I/O module (ACIO) enables the ROC to control various AC output field devices and to monitor various AC input field values. The ROC809 supports up to nine ACIO modules. The ROC827 can support up to 27 ACIO modules.

Field	Description
ACIO Channel Number	Sets the channel on the ACIO module that you desire to configure. **Note:** This selection in this field applies to **each** tab on this screen.
ACIO Tag	Sets the **Tag**, which includes up to 10 characters to identify the Point being defined in the I/O screen. Any alphanumeric characters, including spaces, may be used. **Note:** This selection in this field applies to **each** tab on this screen.
ACIO Channel Mode	This **read-only** field shows the DIP switch on the ACIO module is positioned Output mode or Input mode. The ACIO module has one bank of six DIP switches, which controls the input/output status of each of the six channels. Placing a switch in the ON position sets the corresponding channel to output mode. Placing a switch in the OFF position sets the channel to input mode. Dual-color light-emitting diodes (LEDs) indicate the current status for each channel. Red means AC is being output. Green means AC has been detected on an input channel. **Note:** This selection in this field applies to each tab on this screen.

Field	Description
ACIO Power In	This **read-only** field shows if the AC power is currently present at the AC IN channel. **Note:** This selection in this field applies to each tab on this screen.

ACIO (Discrete Output): General Tab

In output mode, the module provides up to six channels for switching discrete AC. Each channel uses a solid-state normally open relay rated at 1.5 Amps. Any AC switched out is directly related to the AC switched in. You can configure the module as latched, toggled, momentary, or Timed Duration Outputs (TDOs). Other parameters report the approximate load, overcurrent conditions, and AC input status. Discrete outputs can be configured to either retain the last value on reset or a user-specified fail-safe value.

Select **Configure > I/O > ACIO Module > General** tab to configure the basic properties for the Alternating Current I/O module discrete output.

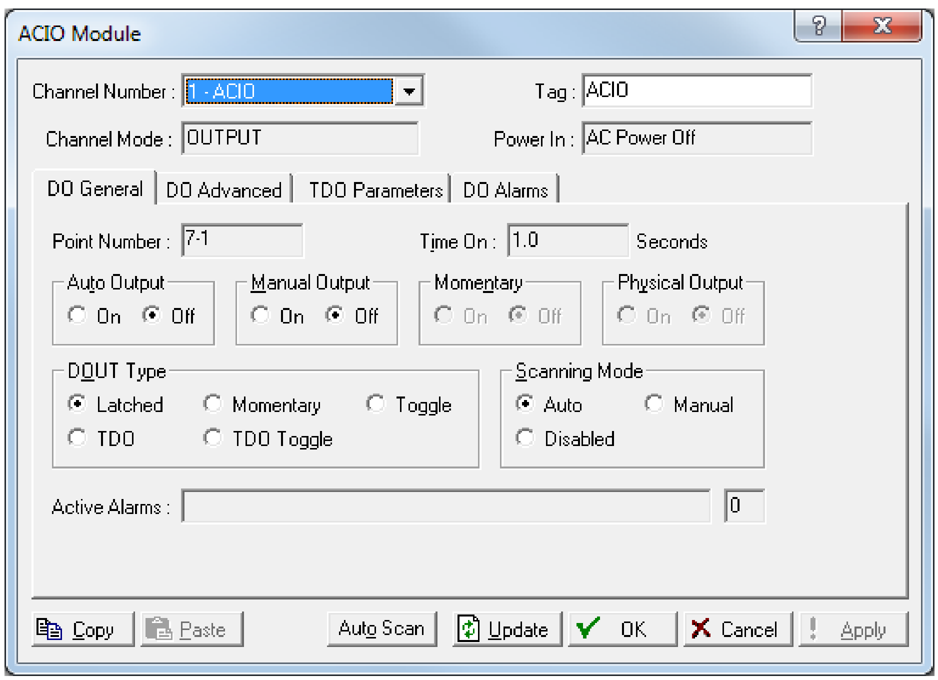


Figure 7-65. ACIO (Discrete Output) – General tab

Field	Description
Discrete Outputs	Sets the discrete output to be configured. The outputs are listed by both Point Number and Tag. **Note:** This selection in this field applies to each tab on this screen.

Field	Description
Time On	Sets, in seconds, the amount of time for momentary operation. The default value is **1** second for a DO. The default value is **5** milliseconds for an ACIO DO. **Note:** In Momentary mode, this is the amount of time (in seconds) that the momentary contact is energized. In the Toggle mode, this is the time (in seconds) between switching On or Off. In the TDO and TDO Toggle modes, the TDO configuration calculates this value.
Auto Output	Indicates the state of the discrete output. **Off** indicates that the output is Off or that a switch is open; **On** indicates that the output is On or that a switch is closed.
Manual Output	This field indicates the state of the discrete output. Off indicates that the output is Off or that a switch is open; On indicates that the output is On or that a switch is closed. Select **On** and click **Apply** to force one transition of the DO.
Momentary	This **read-only** field shows the state of the discrete output when the DOUT Type is set to Momentary. **Off** indicates that the output is Off or that a switch is open; **On** indicates that the output is On or that a switch is closed.
Physical Output	This **read-only** field shows the actual status of the output channel at the field terminations regardless of the DOUT Type selected.

Field	Description	
DOUT Type	Sets the function of this discrete output. Valid values are:	
	Latched	Changes on an active transition of the output (from off to on). The discrete output remains On until cleared by selecting Off in the Auto Output field.
	TDO or Time Duration	Enables the discrete output to have a time duration between On and Off transitions based on time-related parameters configured in the TDO Parameters Tab.
	Momentary	Enables ROCLINK 800 to activate the discrete output for the amount of time defined in the **Time On** field.
	Toggle	Enables a square-wave output for which both the time on and time off are defined by the value in the **Time On** parameter. Time on and time off are equal. Use the TDO Parameters Tab to define time-related parameters.
	TDO Toggle	Enables the discrete output to continuously repeat in a cycle defined by the value in the **Cycle Time** field on the TDO Parameters Tab where the EU Value controls the on-time duration.
Scanning or Scanning Mode	Sets the scanning type to configure how the DO is scanned. Valid values are or **Auto** (automatically process the last output scan) or **Disabled** (permit only manual updates of the output). **Manual** (manually permit a process of the last output scan). **Note:** If you enable alarming, the ROC generates a Manual Mode alarm when scanning is disabled. ▪ For the output to automatically process the field output, select **Auto**. ▪ When Scanning Mode is set to **Disabled** or **Manual**, the DO is no longer updated by the ROC ▪ When the Scanning Mode is set to **Manual**, set **Manual Output** to On and click **Apply** to override the output. ▪ When Scanning Mode is set to **Disabled**, set **Auto Output** to On and click **Apply** to override the output.	

Field	Description
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear.

ACIO (Discrete Output): Advanced Tab

Select **Configure > I/O > ACIO Module > Advanced** tab to configure the advanced properties for the Alternating Current I/O module discrete output.

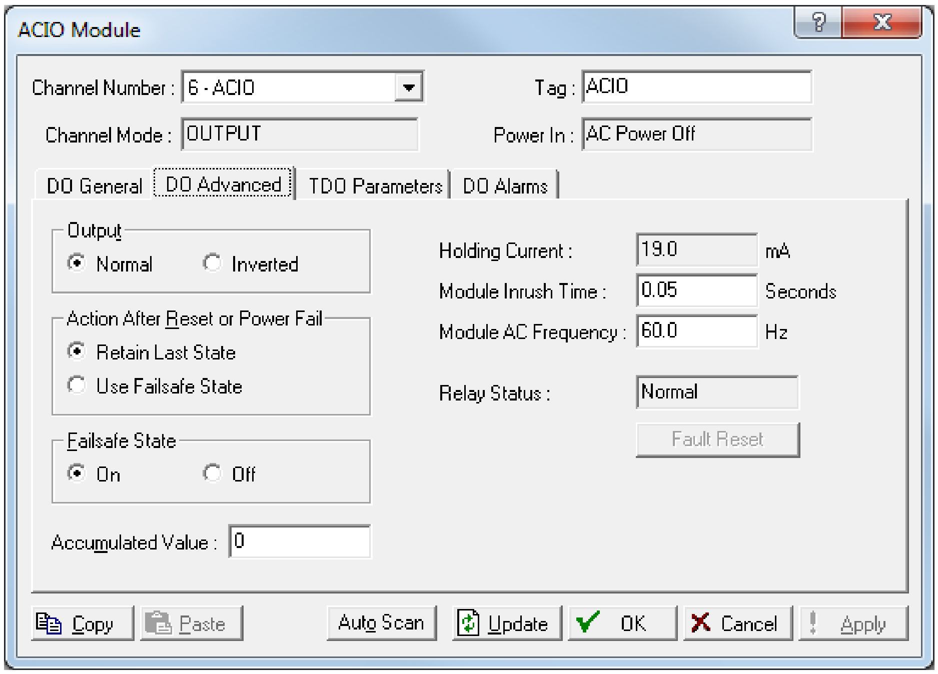


Figure 7-66. ACIO (Discrete Output) – Advanced tab

Field	Description
Output	Set to **Inverted** or **Normal** to define the action of the discrete output value. Normal output energizes in Time On and Inverted output energizes in off time. **Note:** Selecting Inverted inverts **all** outputs in any mode. If you set **both** Failsafe State **and** Inverted to On, the Failsafe State returns to Off on a reset.

Field	Description
Action After Reset or Power Fail	Sets the Action After Reset or Power Fail parameter to determine the value for the output after a reset or power failure. The DO can retain the last values before the reset or power failure. If **Use Failsafe State** is selected, you must specify whether the **Auto Output** or **Manual Output** is set to On or Off after a reset of the ROC, such as a power restart or a warm start. **Note**: If you use ACIO points as controls (as with pumps or valves), set the **Use Failsafe Mode** and the **Failsafe State** setting to ensure that the controls return to a safe state following a power reset or failure.
Failsafe State	Sets the Action After Reset or Power Fail parameter to determine the value for the output after a reset or power failure. The DO can retain the last values before the reset or power failure. If u**se Failsafe State** is selected, you must specify whether the **Auto Output** or **Manual Output** is set to On or Off after a reset of the ROC, such as a power restart or a warm start.
Accumulated Value	Sets a value for the accumulated number of off-to-on transitions for the discrete output. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desire value or clear it by enter zero (**0**).
Holding Current	This **read-only** field shows the current approximate load value of the output in milliamps.
Module Inrush Time	Sets devices you connect to the ACIO module to draw more than 1.5A(rms) for the number of seconds you specify. This parameter assumes 60hz AC.
Module AC Frequency	Sets the frequency of the AC input to ensure the correct functionality of fault detection.
Relay Status	This **read-only** field shows the current status of the output: ▪ **Normal** – The relay is healthy. ▪ **Fault** – A fault condition has occurred on this channel, the channel has been shut down and may not be re-enabled without first resetting this parameter ▪ **Failure** – A relay failure has been detected. This is a physical failure. This module must be repaired by the factory.
Fault Reset	Click to reset the output after a fault.

ACIO (Discrete Output): TDO Parameters Tab

Select **Configure > I/O > ACIO Module > TDO Parameters** tab to configure the Timed Duration Output parameters for the Alternating Current I/O module discrete output.

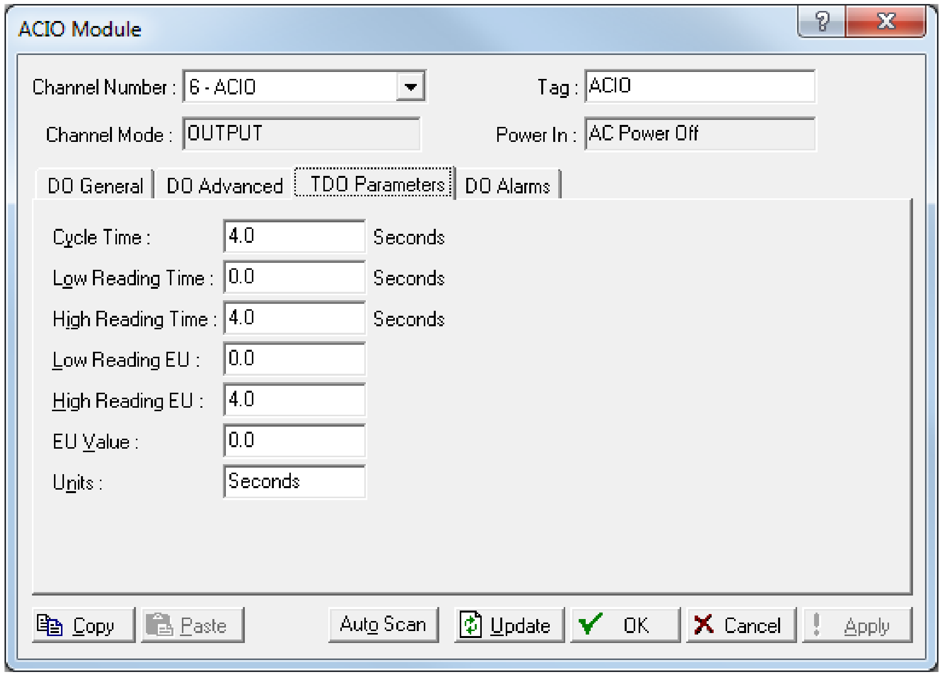


Figure 7-67. ACIO (Discrete Output) – TDO Parameters tab

Field	Description
Cycle Time	Sets, in seconds, the total amount of time the cycle spends in the on and off positions. The default is **15** seconds. The Cycle Time entry is used to define the OFF time in the TDO Toggle mode. The OFF time is calculated by the formula: Off Time = Cycle Time – On Time For example, a TDO is used to emulate a field instrument measuring flow. The TDO outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow. The output is repeated every 15 seconds. If the Cycle Time is less than, or equal to the On Time, the OFF time is set to one. Care must be taken in configuration (including other places, such as FSTs) to ensure that **the Cycle Time remains greater than the calculated On Time** for proper operation.
Low Reading Time	Sets the **Low Reading Time** (0% Count) in seconds that represents a zero percent output pulse width. The default is **3** seconds. This is the minimum amount of time that the TDO can be energized to move the motor. Set to a value that allows movement, but also provides good resolution of control.

Field	Description
High Reading Time	Sets the **High Reading Time** (100% Count) in seconds that represents a 100 percent output pulse width. The default is **12** seconds. This is the maximum amount of time that the TDO can be energized to move the motor. Normally, this is the amount of time it takes for the actuator to move the valve from fully open to fully closed.
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
EU Value	Current value, displayed in engineering units. In TDO Toggle mode, the EU Value controls the Time On: On Time = ((EU Value – Low Reading EU) / (High Reading EU – Low Reading EU) * (High Time – Low Time)) + Low Time
Units	Sets the engineering units for the discrete output (such as percentage, IN H2O, PSIG, MCF, degrees F, milliamps, and volts).

ACIO (Discrete Output): DO Alarms Tab

Select **Configure > I/O > ACIO Module > DO Alarms** tab to configure the alarm properties for the Alternating Current I/O module discrete output.

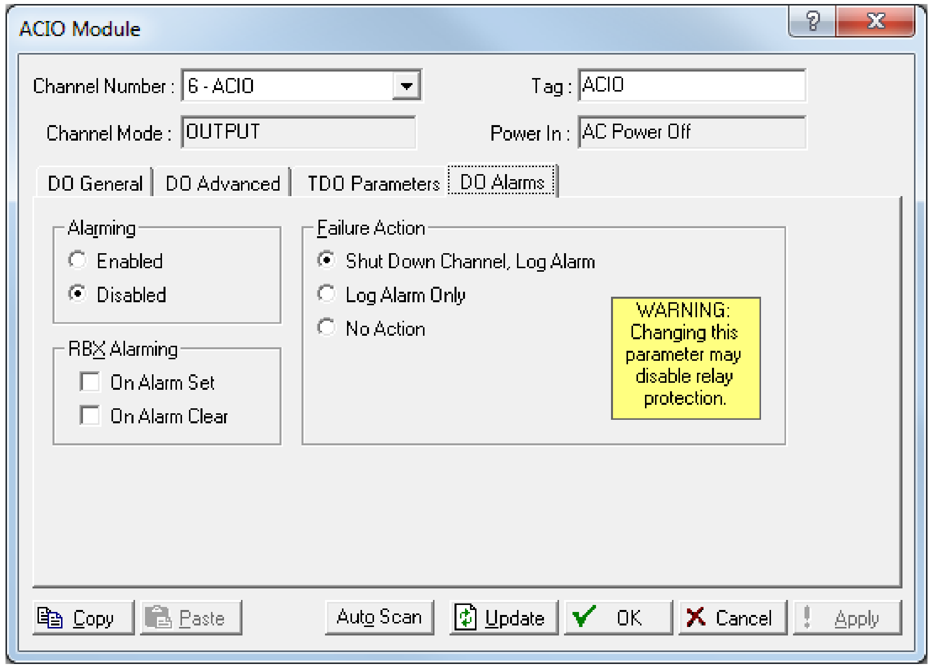


Figure 7-68. ACI (Discrete Output) – DO Alarms tab

Field	Description
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (enables alarming) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: ▪ **On Alarm Set** - Generates an RBX message to the host when the point enters an alarm condition. ▪ **On Alarm Clear** - Generates an RBX message to the host when the point leaves an alarm condition. **Note:** SRBX Alarming requires the communications port to be configured.
Failure Action	Sets the action to perform upon alarm detection: ▪ **Shut Down Channel, Log Alarm** – Shuts down the DO and logs an alarm event. ▪ **Log Alarm Only** – Leaves the DO in alarm state and logs an alarm event. ▪ **No Action** – No action performed upon alarm detection.

ACIO (Discrete Input): DI General Tab

You can configure each channel as an AC input/detector. Each channel can detect the presence of an AC signal between 90 and 265 Vrms at 47 to 63 Hz. In discrete input mode the module monitors the status of various AC sources. Each channel can also be software-configured to function as a latched DI, which remains in active state until reset. Other parameters can invert the field signal and gather statistical information on the number of transitions and the time accumulated in the on or off state. The fastest time that each channel within the module can be read is 50 times per second.

Select **Configure > I/O > ACIO Module > DI General** tab to configure the basic properties for the Alternating Current I/O module discrete input.

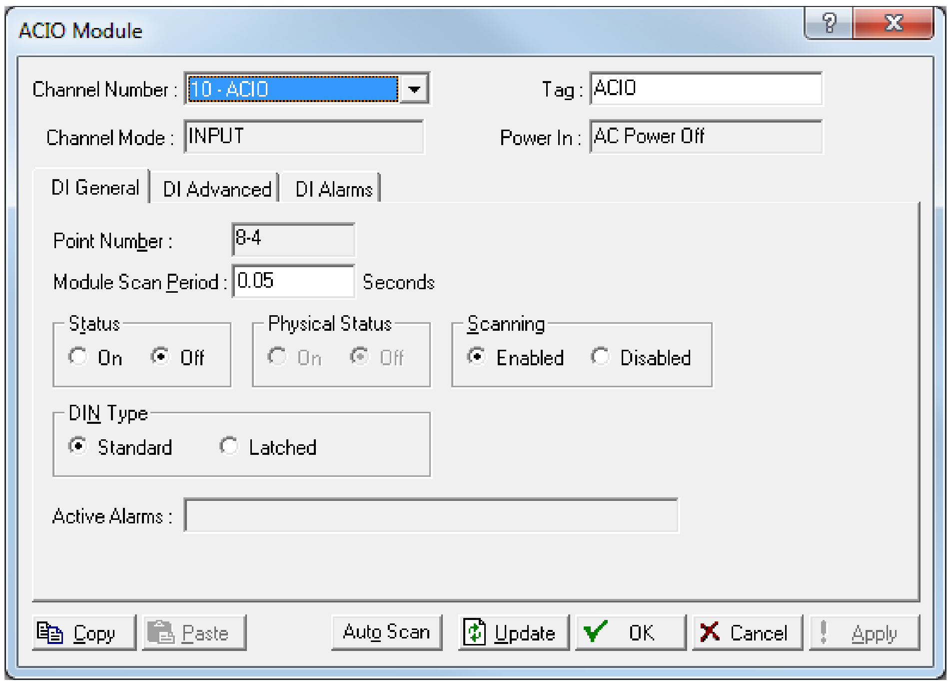


Figure 7-69. ACIO (Discrete Input) – DI General tab

Field	Description
Point Number	This **read-only** field identifies the rack location for this point.
Scan Period	Sets, in seconds, how frequently the system scans the input.
Status	Sets the state of the discrete input. Valid values are **On** (indicates that a contact is closed or input is on) or **Off** (indicates that a contact is open or input is off).

Field	Description	
Physical Status	This **read-only** field shows the state of the hardware. **Off** normally indicates that a switch is open; **On** normally indicates that a switch is closed. This may be different from the Status if Inverting or Latching is in effect.	
Scanning	Sets the scanning option for this point. Valid values:	
	Enabled	Automatically process the field input.
	Disabled	Do not process the input.
DIN Type	Sets how the DI functions. Valid values are:	
	Standard	Follow the actual field input.
	Latched	Maintains the input status. For example, in an active transition from off to on, the DI remains in the on state until you clear the Status parameter either manually or through the software.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear. Refer to User Interface Basics.	

ACIO (Discrete Input): DI Advanced Tab

Select **Configure > I/O > ACIO Module > DI Advanced** tab to configure the advanced properties for the Alternating Current I/O module discrete input.

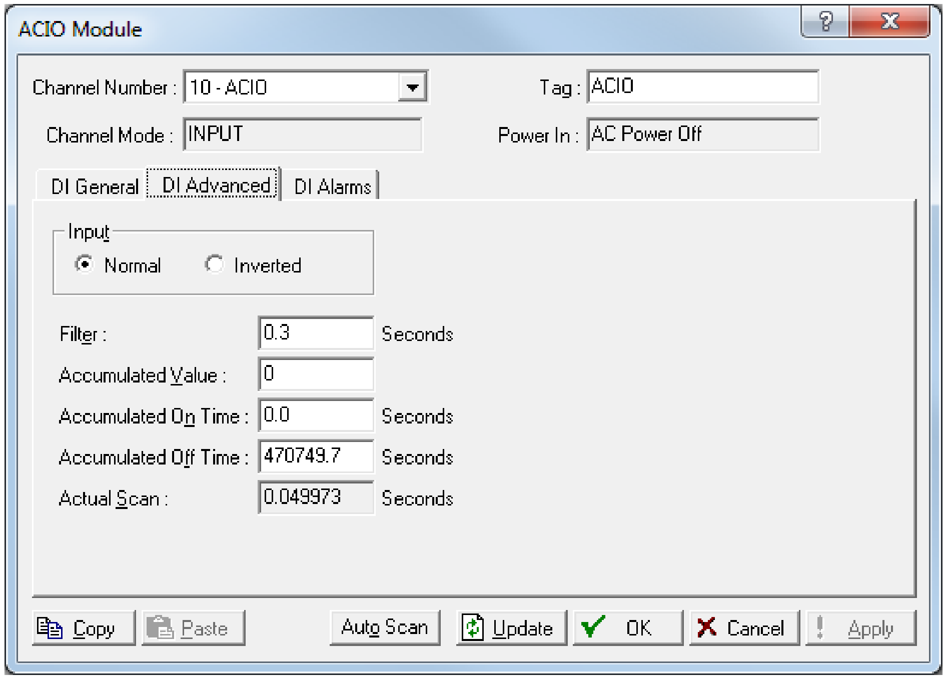


Figure 7-70. ACIO (Discrete Input) – DI Advanced tab

Field	Description
Input	Sets the state of the input. Valid values are **Normal** (field input operates normally, so that On is On) or **Inverted** (inverts the field input in the Status field so that On becomes Off and vice-versa). In the Inverted state, an open circuit in the field would then be indicated as On in the Status field, and closed contacts would be indicated as Off.
Filter	Sets, in conjunction with the Filter Intervals field, the amount of time that the discrete input must remain in the On (high) state before the device recognizes it as such. Enter the **Filter** value as a valid between **0** to **255**. The discrete input returns to the Off state immediately upon detection of the On to Off transition; there is no filtering for this transition.
Accumulated Value	Counts the number of times the discrete input goes from Off to On. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator by entering the desired value or clear the accumulator by entering **0**.

Field	Description
On Counter	Counts the number of 50-millisecond periods when the Status parameter is in the On state. The On Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the On Counter by entering the desired value or clear the counter by entering **0**. **Note:** The On Counter does not function if you **disable** scanning.
Off Counter	Counts the number of 50-millisecond periods when the Status parameter is in the Off state. The Off Counter is a 32-bit number that automatically "rolls over" when it reaches its maximum value. You can preset the Off Counter by entering the desired value or clear the counter by entering **0**. **Note:** The Off Counter does not function if you **disable** scanning.
Actual Scan	This **read-only** field shows the actual amount of time in seconds that passes between scans. This number should be the same as shown for the Scan Period parameter if the system is not overloaded.

ACIO (Discrete Input): DI Alarms Tab

Select **Configure > I/O > ACIO Module > DI Alarms** tab to configure the alarm properties for the Alternating Current I/O module discrete input.

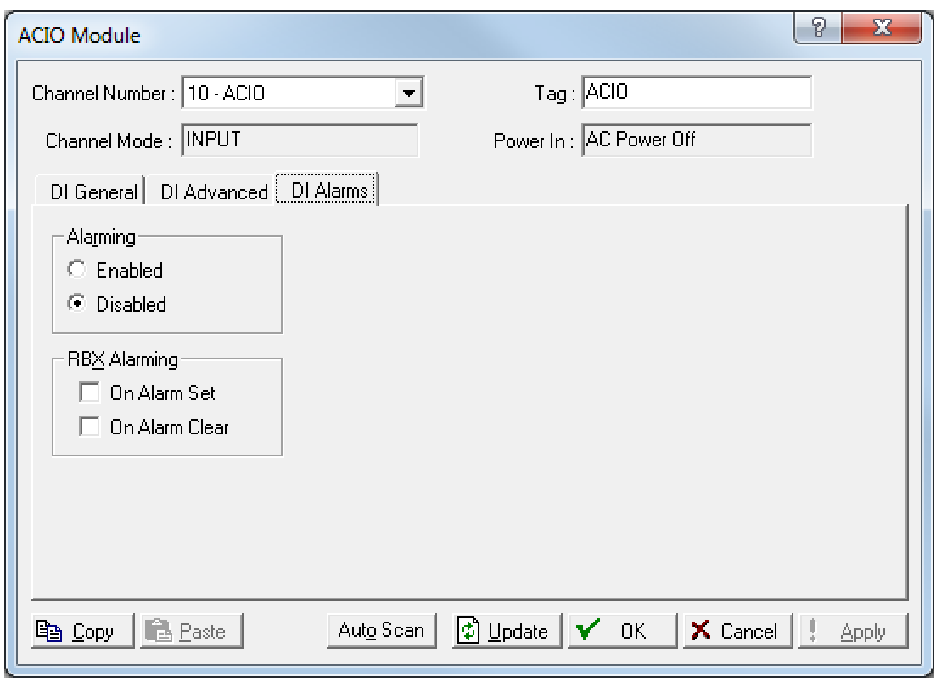


Figure 7-71. ACIO (Discrete Input) – DI Alarms tab

Field	Description
Alarming	Generate alarms on point status change. When Alarming is **Disabled**, the Status Change alarm appears in the Active Alarms field but is not written to the Alarm Log. **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you Enable alarming, the system generates an alarm if you disable scanning.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: ▪ **On Alarm Set** – Generates an RBX message to the host when the point **enters** an alarm condition. ▪ **On Alarm Clear** – Generates an RBX message to the host when the point **leaves** an alarm condition. **Note:** RBX Alarming also requires the communications port to be properly configured for RBX Alarming.

7.1.14 Advanced Pulse Module (APM) Configuration

The optional Advanced Pulse Module (**APM**) for the DL8000 allows you to implement pulse-based I/O calculations and control for applications. The APM detects and counts pulses with advanced customizable pulse I/O.

You can configure the APM to function as:

- Simple four-point pulse input.
- Advanced pulse input or densitometer with API checking.
- Pulse output.
- Interface with third-party proving applications.

Custom APM Modes

Many configurations of the APM are possible. You can use the APM to provide generic pulse input, pulse output, densitometer support, and turbine meter support.

Pulse Inputs You can configure up to four generic pulse inputs on channels 1 through 4. When APM is used as a generic four pulse input module, API fidelity checking is not available. The pulse inputs are **read-only**, non-resettable pulse accumulation counters.

Pulse Outputs APM can support one pulse output on channel 4 (PI-4/PO) that represents the current flow as a frequency or as a pulse per engineering unit of accumulated product. A hardware switch configures this channel and the status (PI or PO) displays in the Configuration fields. You can configure the pulse output to support the indication of total by an external counter using API integrity checking Level D.

Densitometer

APM supports densitometer frequency inputs (Solartron models) on channel 3 that provides a frequency in the range of 0 to 10 KHz as a pulse input.

API Standards

APM also supports dual pulse chronometry for use in small volume provers. You can select API levels A through E and Marker Pulse for pulse integrity checking. API alarms occur if any of the API level checking has failed, such as a phase alarm or same channel alarm. ROCLINK also supports Marker Pulses. API standards are in accordance with the American Petroleum Institute *Manual of Petroleum Measurement Standards Chapter 5.5*, August 1987.

Note: Level D checking requires a mechanical counter be present.

Pulse Counting between Detector Switch Trips

You can configure pulse counts to occur on a single pulse input and not on a pair of pulses. If communication is lost during a prove, the proving application is notified of this condition to signify that the pulse accumulations are invalid.

Master Meter Provers

APM supports master meter provers in that the APM can accept a software detector switch simulation to start and stop pulse counting. APM accumulates whole pulses between the software detector switch triggers for both the meter being proved and the master meter.

Note: While pulse interpolation is not required for the master meter proving, interpolated pulses are always provided.

Detector Switches

APM support two detector switches that gate the accumulation of pulses during a prove. APM recognizes a detector switch trigger at any change in state of a detector switch. APM starts the accumulation of whole pulses between detector switches at the first detector switch transition and stops the accumulation at the second detector switch transition. APM implements a detector switch filter time so as to not misinterpret "noise" after a detector switch transition as another transition. The APM displays the pulse counts and the interpolated pulse counts.

Examples of APM configurations include:

	Ch 1	Ch 2	Ch 3	Ch 4	Detector 1 & 2
Config 1	PI	PI	PI	PI	Always Present
Config 2	PI	PI	PI	PO	Always Present
Config 3	PI	PI	Densitometer Input	PI	Always Present
Config 4	PI	PI	Densitometer Input	PO	Always Present
Config 5	PI	PI	API Pair 2	–	–
–	**Ch 1 and Ch 2**		**Ch 3**	**Ch 4**	**Detector 1 & 2**
Config 6	API Pair 1		PI	PI	Always Present

Config 7	API Pair 1	Densitometer Input	PI	Always Present
Config 8	API Pair 1	Densitometer Input	PO	Always Present
–	**Ch 1 and Ch 2**	**Ch 3 and Ch 4**		**Detector 1 & 2**
Config 9	API Pair 1	API Pair 2		Always Present

APM Switches The Advanced Pulse Module has several switches you can set for specific actions.

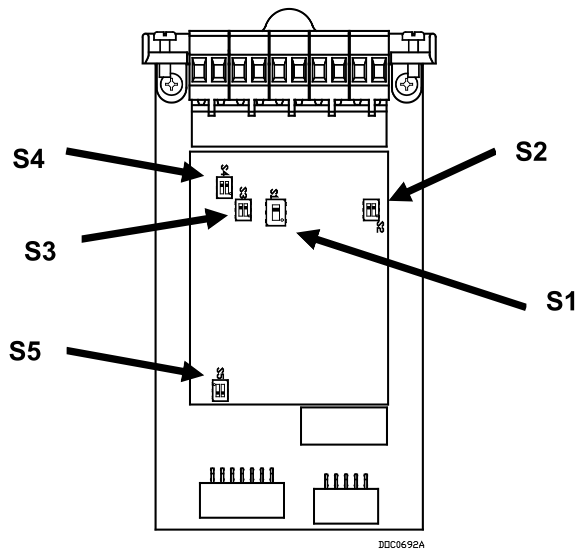


Figure 7-72. APM Switches

Table 7-2. APM Hardware Switches

Switch Number	Left/Right Side [1]	Channel	Channel	Switch Position [1]
S1	–	1 = Standard PI	–	Up
S1	–	1 = Densitometer	–	Down
S2	Left	1 = In [2]	1 = Out [3]	Up
S2	Right	2 = In	2 = Out	Up
S3 [4]	Left	3 = In	3 = Out	Up
S3	Right	4 = In	4 = Out	Up
S4	Left	Detector switch 2 = In	Detector switch 2 = Out	Up
S4	Right	Detector switch 1 = In	Detector switch 1 = Out	Up
S5	Left	4 = Pulse Output	–	Up
S5	Left	4 = Pulse Input	–	Down
S5 [5]	Right	–	–	–

[1] Descriptors (up/down/right/left) assume that module terminal blocks face upward and daughter board is visible.
[2] **In** = Pull-up resistor is in the circuit.
[3] **Out** = Pull-up resistor is not in the circuit.
[4] If S1 is down, this switch is non-functional.
[5] Right side of switch 5 currently not used.

APM: Pulse Input Tab

Select **Configure > I/O > Advanced Pulse Module**. The Pulse Input tag displays by default. Use this tab to configure the pulse input parameters for the Advanced Pulse Module point. You can configure up to four generic pulse inputs on channels 1 through 4. API fidelity checking is not available when you use the APM as a generic four pulse input module.

You can configure the module as a two point pulse input for two pulse pairs. The pulse inputs are **read-only**, non-resettable pulse accumulation counters.

APM supports a Micro Motion (formerly Solartron) densitometer on channel 3 that provides a frequency in the range of 0 to 10 KHz as a pulse input.

The four pulse input channels have a number of applications. When used with dual pulse turbine meters, then you can use the APM to create two API 5.5, level B, C, D, and E compliant pairs, while Level (Pair) also supports API Level A. Both levels support marker pulses.

Channel 3 can provide the hardware filtering to support the frequency input from a Micro Motion (formerly Solartron) 7835/7845 densitometer. This hardware filtering is switched into channel 3 by a hardware switch located on the module.

Channel 4 can be designated as either a pulse input or a pulse output.

The pulse input can support up to 5-kilohertz inputs. When connected as pulse inputs, the APM module processes the PI signals from pulse-generating devices and provides a calculated rate and an accumulated pulse total. The PI is most commonly used to interface to relays or open collector/open drain type solid-state devices.

The pulse input can interface to either self-powered or ROC-powered devices with signals up to 5 kilohertz. With the pull-up resistor "in," the PI supports externally powered open collector and open drain devices as well as externally powered contact closure devices. If the pull-up resistor is "out," then pulse inputs supports 0 to 3 volts dc through 0 to 12 Volts dc sourced square wave input signals. Refer to *Table 7-2, APM Hardware Switches*.

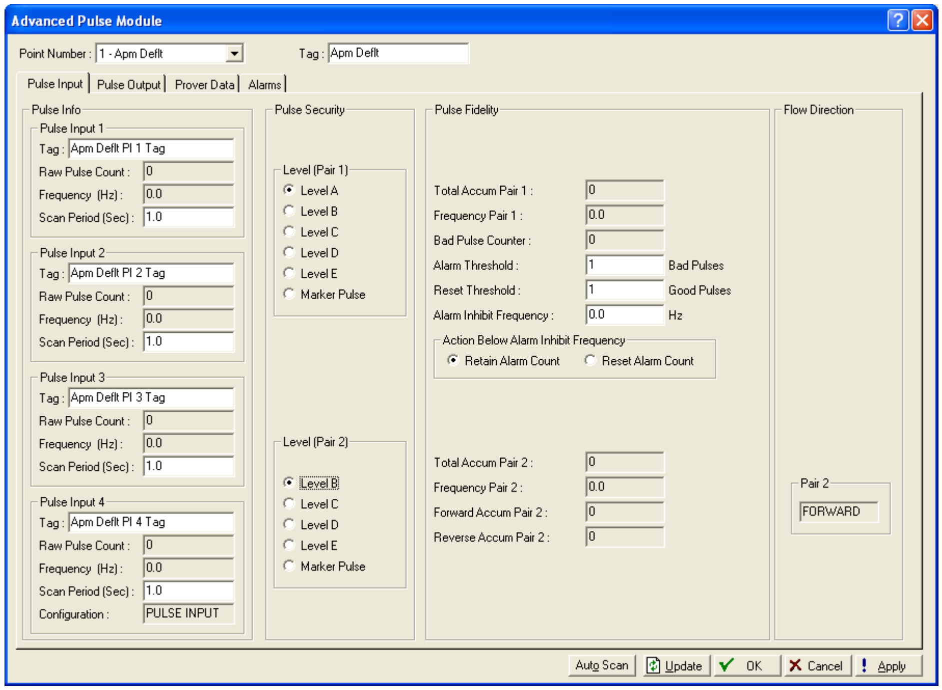


Figure 7-73. APM – Pulse Input tab

Note: This screen displays various fields based on the options you select. Consequently, it is not possible for one screen image to display all options.

Field	Description
Point Number	Sets the Advanced Pulse Module Point Number to configure. **Note:** This selection applies to **each** tab on this screen.
Tag	Sets a 10-character alphanumeric identifier for each point. **Note:** This selection applies to **each** tab on this screen.

Field	Description
Pulse Info (Pulse Input 1 through **Pulse Input 4)**	
Tag	Sets a 20-character identifier for the pulse input being configured.
Raw Pulse Count	This **read-only** field shows the raw number of pulses.
Frequency	This **read-only** field shows, in hertz, the frequency of incoming pulses.
Scan Period	Sets the time period, in seconds, in which the system evaluations the parameters associated with the pulse input.
Configuration	This **read-only** field shows the configuration (Pulse Input or Pulse Output) of the terminal for channel 4. **Note:** For the APM to function as a pulse output on channel 4, you must manually set the S3 switch. Refer to *Table 7-2, APM Hardware Switches*.
Pulse Security Level (Pair 1 and 2)	The APM supports different field devices based on various hardware switch settings. You can "pair" pulse inputs for use with API 5.5 compliant Pulsed Data Fidelity and Integrity algorithms. Pulse Input 1 and Pulse Input 2 share the Pulse Fidelity Level (Pair 1) configuration. Likewise, Pulse Input 3 and Pulse Input 4 share the Pulse Fidelity Level (Pair 2) configuration. Options for pulse fidelity checking (integrity security) are Level A through Level E for Level (Pair 1) and Level B through Level E for Level (Pair 2). API standards are in accordance with the American Petroleum Institute *Manual of Petroleum Measurement Standards Chapter 5.5*, August 1987. Both levels also support Marker Pulse options for Pulse Fidelity.
Level A	This level of fidelity checking requires a dual pulse train and two Pulse Inputs. Level A performs continuous monitoring, detection, and corrections of errors as it compares one pulse train against the other. Continuous comparison of the pulse trains for missing pulses as well as simultaneous pulses occurs. In the event of missing pulses, the system simulates the missing pulses and adds them to the pulse accumulations. The system detects simultaneous interfering pulses but does not include them toward the total pulse count. If you enable alarming, the same channel alarm count increments in the event of missing pulses, the phase alarm count increments in the event of simultaneous pulses, and the total alarm count increments in both cases. You can use the alarm threshold to set a lower frequency limit below which alarms based on these bad pulses do not generate.

Field	Description
Level B	This level of fidelity checking requires a dual pulse train. Two pulse inputs enable Level B to perform continuous monitoring, detecting, and warning of errors (alarming), as it compares one pulse train against the other. Continuous comparison of the pulse trains for the number, frequency, phase, and sequence occur. Level B security provides warning of transients and other spurious influences and protection against functional errors and failures. Simultaneous interfering pulses are detected and indicated. If the pulses delivered are lost or gained on either channel (PI1/PI2 or PI3/PI4), a differential counter API warning occurs. Refer to the discussion of the Alarms tab. If the frequency of the pulses falls below 101 Hz, the APM defaults to a simulated Level C until the frequency increases above 111 Hz.
Level C	This level of fidelity checking requires a dual pulse train. Two pulse inputs enable Level C to automatically detect and warn when errors occur, as it compares one pulse train against the other at approximately one-second intervals. Comparison of the pulse trains occurs automatically but not continuously. Level C security provides protection against functional errors and failures. If the pulses delivered become numerically out of step, a differential counter API warning occurs. Refer to the discussion of the Alarms tab.
Level D	This level of fidelity checking uses only a single pulse train and requires only one pulse input. Level D allows manual detection of errors, as the results of the pulse train calculations are compared by an operator against a mechanical readout (user supplied) at specified intervals. The manual error monitoring is at specified intervals by methods of comparison and provides amplification and frequency limiting, pulse shaping, and common mode inference rejection. The readout is visually checked against an independent totalizing system. Level D security provides protection against functional errors and failures.
Level E	This level of fidelity checking uses only a single pulse train and individual pulses using one pulse input. Level E is a straightforward totalizer system. The pulses are counted, but the system does not perform error detection; integrity depends solely on the quality of the equipment. Level E provides amplification and frequency limiting, pulse shaping, and common mode inference rejection. The system does not provide built-in provisions for error monitoring.

Field	Description
Marker Pulse	This level of fidelity checking adds an option to the level checking for each pair, Check Pulse Verification. When set, the first pulse input of the pair is the standard pulse input and the second input of the pair is the check pulse input. You configure the check pulse as a configurable number of standard pulses, on a repeating basis. There are two additional accumulators, the first is an accumulation of standard pulses that updates at the time the system receives the check pulse. For example, if the system receives the check pulse every 500 pulses, this accumulator updates to 500, 1000, 1500, and so forth. The second accumulator is the difference between the expected standard pulses at the check pulse and the actual number. For example, if the system receives the check pulse every 500 pulses and the system receives the check pulse at 499, this accumulator would read –1. If the system receives the next pulse at 1002, it would then read 2. An alarm bit is available and set when the difference between the expected and actual standard pulses exceeds a user configured deadband. You can also trigger a reset, resetting the two accumulators and restarting the check pulse verification upon the first check pulse the system receives.
Pulse Fidelity	The Level options you select define which of the following fields display.
Total Accum Pair (1 and 2)	This **read-only** field shows the accumulated number of pulses (forward and backward) through the API level checks for pulse pair 1 and 2. **Note**: This field displays **only** when you select Level **A**, **B**, or **C** for pair 1 or 2.
Frequency Pair (1 and 2)	This **read-only** field shows, in pulses/second, the frequency of incoming pulses on Pair 1 or Pair 2. These values assume the API level is set the same for both pairs under the Pulse Security frame.

Pulse Security	2-Pulse Inputs	4-Pulse Inputs
Level A	2000 Hz	N/A
Level B	4000 Hz	2000 Hz
Level C	8000 Hz	4500 Hz
Level D/E	9000 Hz	5500 Hz

Note: This field displays **only** when you select Level **A**, **B**, or **C** for pair 1 or 2.

Field	Description
Forward Accum Pair (1 and **2)**	This **read-only** field shows the accumulated number of forward pulses through the API level checks for pulse pair 1 and 2. **Note**: This field displays **only** when you select Level **B** or **C** for pair 1 or 2.
Reverse Accum Pair (1 and **2)**	This **read-only** field shows the accumulated number of reverse pulses through the API level checks for pulse pair 1 and 2. **Note**: This field displays **only** when you select Level **B** or **C** for pair 1 or 2.
Bad Pulse Counter	This **read-only** field shows the number of bad pulse pairs the system receives before setting the API Pair 1 alarm status when using API Level A. **Note**: This field displays **only** when you select Level **A** for pair 1.
Alarm Threshold	Sets the number of bad pulse pairs the system can receive before setting the API Pair 1 alarm status when using API Level A. **Note**: This field displays **only** when you select Level **A** for pair 1.
Reset Threshold	Sets the number of good pulse pairs the system can receive before clearing the API Pair 1 alarm status. **Note**: This field displays **only** when you select Level **A** for pair 1.
Alarm Inhibit Frequency	Sets a frequency below which the pair 1 alarm status no longer sets. Existing alarms clear either if you select **Reset Alarm Count** in the Action Below Alarm Inhibit Frequency frame **or** if the number of good pulse pairs the system receives falls below the good pulse threshold for Pair 1. **Note**: This field displays **only** when you select Level **A**.
Action Below Alarm Inhibit Frequency	Indicates whether the number of bad pulse pairs contributing towards the Pair 1 bad pulse threshold and the existing alarm bits clear when the frequency falls below the low frequency cutoff for pair 1. Valid values are **Retain Alarm Count** (does not clear the alarm) and **Reset Alarm Count** (clears the alarms). **Note**: This field displays **only** when you select Level **A**.
Flow Pulses per Marker Pulse (Pair 1 and **2)**	Sets the number of flow pulses to expect between each marker pulse. The default is **1000**. **Note**: This field displays **only** when you select **Marker Pulse** for pair 1 or 2.
Alarm Pulse Deadband	Sets the deviation of flow pulses from expected pulses at a marker pulse that must occur before the system triggers the Marker Pulse alarm. The default is **5**. **Note**: This field displays **only** when you select **Marker Pulse** for pair 1 or 2.

Field	Description
Flow Pulse Accum at Marker Pulse	This **read-only** field shows the accumulation of flow pulses, updated whenever the system receives a marker pulse. **Note**: This field displays **only** when you select **Marker Pulse** for pair 1 or 2.
Flow Pulses Drift from Expected	This **read-only** field shows the drift from expected flow pulse value, updated whenever the system receives a marker pulse. **Note**: This field displays **only** when you select **Marker Pulse** for pair 1 or 2.
Reset Marker Pulse Values	Click to reset the flow pulse accumulation and flow pulse drift for pair 1 or pair 2. Applies only when using Marker Pulse level checking. **Note**: This button displays **only** when you select **Marker Pulse** for pair 1 or 2.
Flow Direction (Pair 1 and **2)**	This **read-only** field shows the direction of flow. Direction of flow is based on 180 degrees out of phase for the first and second pair of pulses. Forward indicates less than 180 degrees; Reverse indicates more than 180 degrees. The Forward and Reverse designators assume 90 degrees out-of-phase. **Note**: This field displays **only** if you select Level **B** for pair 1 or 2.

APM: Pulse Output Tab

Select **Configure > I/O > Advanced Pulse Module > Pulse Output** tab to configure the pulse output parameters for the APM point. The output signal occurs by switching a NPN transistor. The transistor output can also be an open collector or have the pull-up resistor included with a switch. This transistor can provide up to a 300 hertz signal, switching up to 200 milliamps at maximum of a nominal 24 Volts dc.

APM supports one pulse output on channel 4 (PI-4/PO) representing the current input flow rate as a frequency or as a pulse per engineering unit of accumulated product. A hardware switch configures this channel and the status (PI or PO) displays in the Configuration fields.

Note: For the APM to function as a pulse output on channel 4, the S3 switch on the APM module must be manually set with the pull-up out. Refer to *Table 7-2, APM Hardware Switches*.

You can configure the pulse output to support the indication of total by an external counter using API integrity checking Level D.

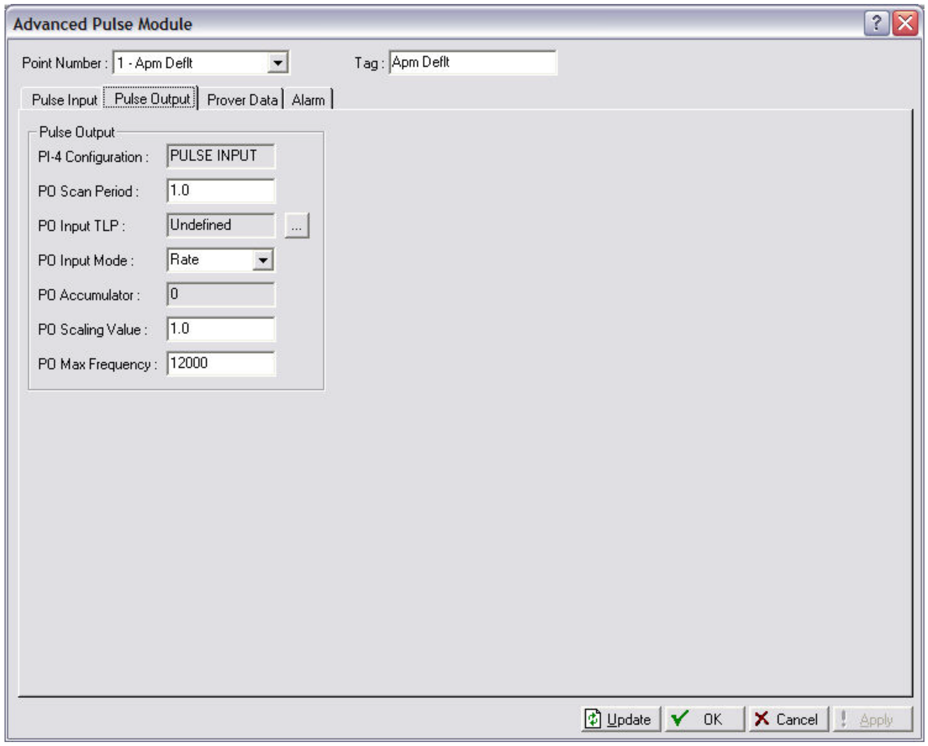


Figure 7-74. APM – Pulse Output tab

Field	Description
PI-4 Configuration	This **read-only** field shows the configuration of the PI-4/PO terminal of the APM. A hardware switch configures this value. **Note:** For the module to support a pulse output on channel 4, you must manually set the left S5 switch in the up position. Refer to *Table 7-2, APM Hardware Switches*.
PO Scan Period	Sets, in seconds, how often the firmware evaluates the inputs to determine how many pulses to send out. All other output pulses are at a 50% duty cycle.
PO Input TLP	Sets the value of the input TLP. The value is depends on you configure the PO Input mode (as a rate or an accumulation). Click the TLP button to set the input to be used in calculating the output pulses.
PO Input Mode	Sets the interpretation of the Input TLP. Valid values are **Rate** (calculates the integrated rate by multiplying the time and rate to determine the quantity, and then by subtracting the new accumulated value from the old accumulated value to determine the pulse output value) or **Accumulation** (sets a constant accumulation value against which you can define a PO Scaling Value for adjustments, so that the old value minus the new value represents the accumulated change value or the pulse output value).

Field	Description
PO Accumulator	This **read-only** field shows the accumulated number of pulses sent out.
PO Scaling Value	Sets the value the system applies to the accumulated pulse value based on the value in the PO Input Mode field.
PO Max Frequency	Sets the maximum number of pulses per second that can be output by the pulse output (in Hz). If the calculated number of pulses exceeds this value, those pulses are placed in the buffer. For example, if you set the PO Max Frequency to 20, no more than 20 pulses are sent out within the Scan Period time.

APM: Prover Data Tab

Select **Configure > I/O > Advanced Pulse Module > Prover Data** tab to configure the proving related parameters so the ROC can interface with an external (user supplied) prover application.

The APM module can accept a hardware or software detector switch simulation to start and stop counter pulses. APM accumulates whole pulses between the software detector switch triggers for meters being proved. Hardware detector switches are used for displacement provers and software detector switches are used for master meters.

In all configurations, high-speed interrupt driven detector switch inputs are supported for use in proving applications. These inputs are designed for use with normally closed contact relays, drives with interrupt-based close-to-open solid-state switch transitions, and other two-state devices. You can wire the detector input channels with individually wired detector switches or detector switches that are wired in series from the prover on the same cable.

APM supports detector switch inputs that gate the accumulation of pulses during a prove. APM recognizes a detector switch trigger at any change in state of a detector switch. APM starts the accumulation of whole pulses between detector switches at the first detector switch transition and stops the accumulation at the second detector switch transition. APM implements a detector switch filter time so as to not misinterpret "noise" after a detector switch transition as another transition.

Proving occurs on a single pulse input and not on a pair of pulses. APM module supports a "reset" to signal the APM module that it needs to clear the old totals and get ready to count pulses. If communication is lost during a prove, the proving application is notified of this condition to signify that the pulse accumulations are invalid.

Note: The APM module always calculates the pulse interpolation value for the pulse between detectors. Pulse interpolation standards are in accordance with the American Petroleum Institute *Manual of Petroleum Measurement Standards Chapter 4.6*, May 1999.

During a meter proving operation, detector inputs start and stop the accumulated pulse counts, a positive-to-negative transition on either detector input generates a time-stamped interrupt with the 30-megahertz on-board processor. This interrupt is used in the pulse accumulation between the detectors as well as the pulse interpolation calculations for use with small volume provers.

When a displacement prover is used, the installed prover device uses the detector switch pulse count to acquire the whole (full) meter count pulses and interpolated pulses. Pulse interpolation determines if a trip occurred before or after a trip per the American Petroleum Institute's *Manual of Petroleum Measurement Standards Chapter 4 - Proving Systems, Section 6 - Pulse Interpolation*.

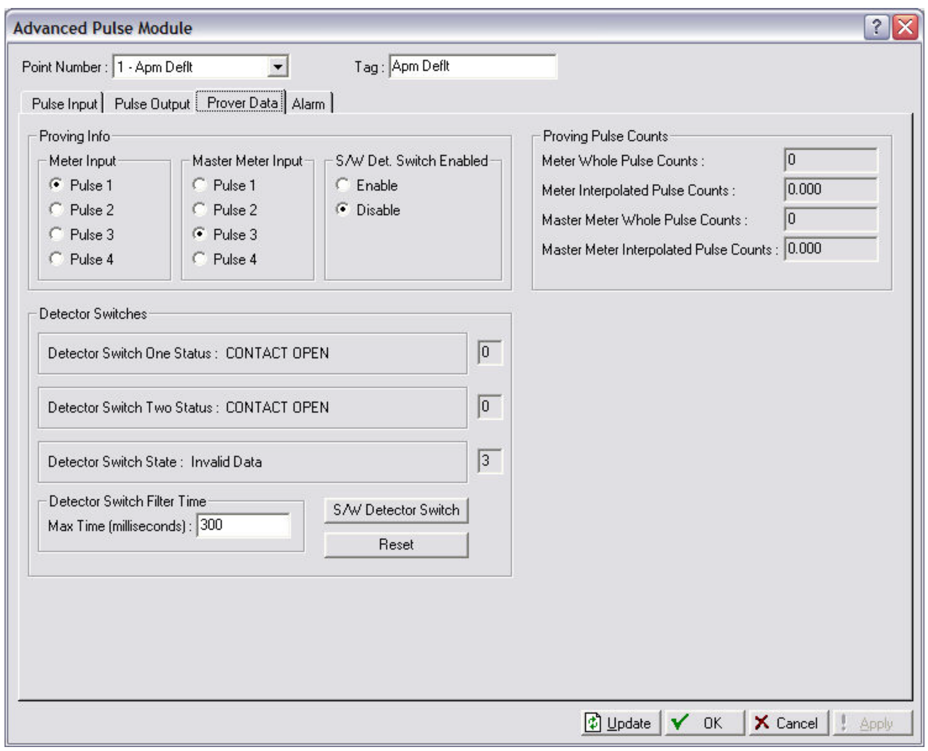


Figure 7-75. APM – Prover Data tab

Field	Description
APM DET and SW LEDs	Indicates, using light-emitting diodes (LEDs) on the APM module, the current status for each channel of the module. The DET and SW LEDs indicate the status of the detector switches: ▪ **Both LEDs blink simultaneously** – APM has no firmware resident in the module. Refer to *Update Firmware*. ▪ **LEDs toggle blink** – APM is in the process of programming the flash memory. Do not remove the module or power down the ROC. ▪ **Both LEDs are solid** – APM is in the process of erasing the flash memory. Do not remove the module or power down the ROC. ▪ **LEDs blink independently** – APM is transmitting or receiving pulses on the detector switches.
Meter Input	Sets the pulse input to use for the Meter Prove. Hardware detector switches are used for displacement provers. This is the pulse to view at the meter gate to acquire the count.
Master Meter Input	Sets the pulse input to use for the Master Meter Prove. Select this option when you are using another meter to provide the pulse counts and not an actual displacement prover. Software detector switches are used for master meters, so the Master Meter Input is only valid if the S/W Det. Switch Enabled field is set to Enable.
S/W Det Switch Enabled	Sets the proving for use with a Master Meter or tank prover. APM supports two detector switches which gate the accumulation of pulses.
Detector Switch Status	This **read-only** field shows the current physical open or closed contact status of the detector switch. Options include **Contact Open** or **Contact Closed**.
Detector Switch State	This **read-only** field shows the current state of the detector switch indicating what the trip is doing: ▪ **Reset** has been received and the APM is expecting a detector switch transition. ▪ **Counting** indicates a detector switch transition has occurred and the APM is currently counting whole pulses. ▪ **Complete** indicates another detector switch transition has occurred and the Prove Run is complete. All values will be stored until the next reset. The values in the Proving Pulse Counts frame are valid to use in calculations. ▪ **Invalid Data** indicates the accumulator does not contain valid values. This can be either at a power up or if you lost communication during a prove and the accumulators have been reset to zero.

Field	Description
Detector Switch Filter Time	Sets, in milliseconds, the time allotted after a detector switch triggers but before the next trigger occurs. This is a de-bounce filter for the detector switches to ensure that any "noise" is filtered out and is not read as another detector switch trigger. This is the maximum filter time for how long the trip waits before the pulses are read again.
S/W Detector Switch	Sets to start and stop the software detection switch from counting pulses for a Master Meter or tank prove. Once the APM receives a trigger, the APM automatically resets to idle. Click **Reset** before starting a Master Meter prove. **Note:** Use **only** if the S/W Detector Switch is **Enabled**.
Reset Button	Notifies the APM to clear values in the Proving Pulse Counts frame and prepare to read the trip counter pulses. All accumulated pulse values and alarms are cleared. Accumulation of whole pulses starts at the first detector switch transition and stops at the second detector switch transition.
Meter Whole Pulse Counts	This **read-only** field shows the actual number of whole pulses accumulated between detector switches for a Meter Input. Click **Reset** to clear this value.
Meter Interpolated Pulse Counts	This **read-only** field shows the actual number of interpolated pulses accumulated between detector switches for a given pulse input. Click **Reset** to clear this value.
Master Meter Whole Pulse Counts	This **read-only** field shows the actual number of whole pulses accumulated between detector switches for a Master Meter Input. Click **Reset** to clear this value.
Master Meter Interpolated Pulse Counts	This **read-only** field shows the actual number of interpolated pulses accumulated between detector switches for a given pulse input. Click **Reset** to clear this value.

Starting a Prove for a Displacement Prover

To start a prove when using a displacement prover:

1. Select the **Point Number** of the Advanced Pulse Module.
2. Select the **Pulse** to use in the **Meter Input** field.
3. Set the **Max Time** for the **Detector Switch Filter**.
4. Click **Apply**.
5. Click **Reset**.

Starting a Prove for a Master Meter

To start a prove when using a master meter:

1. Select the **Point Number** of the APM.

2. Select the **Pulse** to use in the **Master Meter Input** field.
3. Select **Enable** in the **S/W Det. Switch Enabled** field.
4. Set the **Max Time** for the **Detector Switch Filter**.
5. Click **Apply**.
6. Click **Reset**.
7. Click **S/W Detector Switch**.

APM: Alarms Tab

Select **Configure > I/O > Advanced Pulse Module > Alarms** to configure the alarming parameters for the Advanced Pulse Module point.

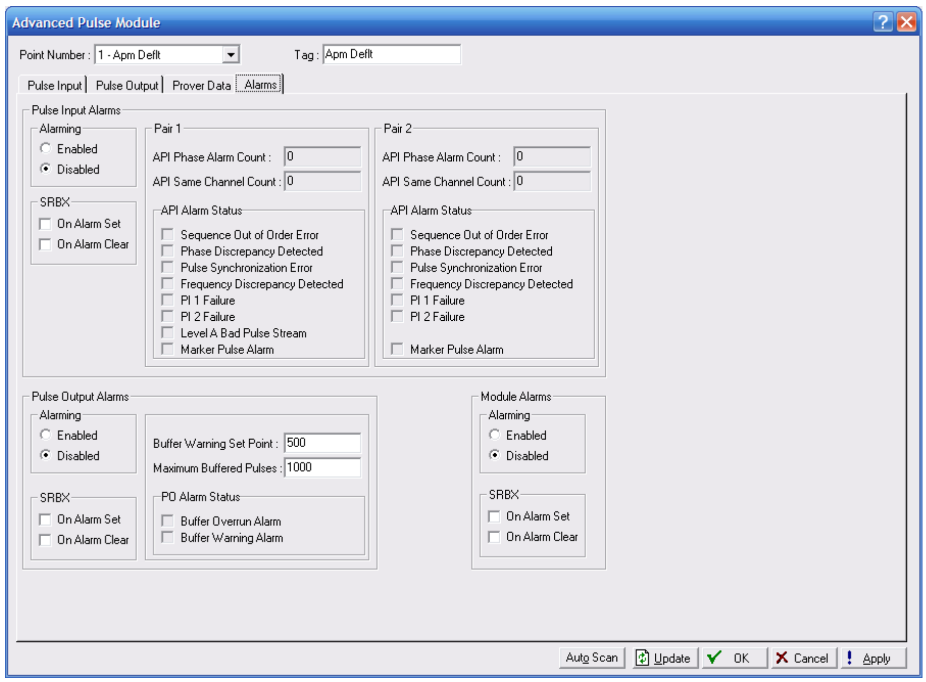


Figure 7-76. APM – Alarms tab

Field	Description
PI Alarming	Sets **Alarming** for this point. If **Alarming** is set to Enabled, alarms are written to the Alarm Log. These are the API pulse fidelity alarms when performing dual pulse integrity checking on a pair of pulses. Specifically sequenced out of order, phase discrepancy, pulse synchronization, frequency discrepancy, and pulse failure alarms. These alarms are all dependent on what level of security is being used.

Field	Description
PI SRBX	Sets the **SRBX Alarming** option to configure Spontaneous-Report-By-Exception (SRBX) alarming for this point. ▪ **On Set** – The point enters an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. ▪ **On Clear** – The point leaves an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. **Note:** SRBX Alarming requires the communications port to be configured.
API Alarm Status	API Level Alarm Status indicating the failure error for the alarm. **Note:** These are updated in real time
API Phase Alarm Count	This **read-only** field shows the total number of phase alarms.
API Same Channel Count	This **read-only** field shows the total number of the same channel alarms.
Pulse Output Alarms	PO alarms safeguard against the loss of too many pulse counts. Certain devices cannot read the pulse counts as fast as they are produced; thus, loosing pulse counts. The APM module buffers and tracks pulse counts to ensure the pulse count values read are the same as the actual pulse counts that are output. The buffer fields enable you to determine how many lost pulses can occur before an alarm is triggered. When enabled, enter a value in the **Buffer Warning Set Point** field. This is the maximum buffered pulses allowed before the buffer warning alarm is triggered. The value in the **Maximum Buffered Pulses** field is the maximum buffered pulses allowed. If the number of pulses requested to send out exceeds the Maximum Number of Buffered Pulses an alarm occurs and you essentially lose any pulses greater than the value set in this field.
PO Alarming	Sets **Alarming** for this point. If Alarming is set to Enabled, alarms are written to the Alarm Log. These alarms are for the pulse output of the APM and are used when the PO begins to buffer pulses. There are two alarms, a buffer warning and a buffer overflow. When the warning alarm is present, it indicates that the buffer is being filled and it has passed a user specified set point. If the overflow has occurred, indicates that the buffer is filled up and pulses are being lost.

Field	Description
PO SRBX	Sets the **SRBX Alarming** option to configure Spontaneous-Report-By-Exception (SRBX) alarming for this point. ▪ **On Set** – The point enters an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. ▪ **On Clear** – The point leaves an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. **Note:** SRBX Alarming requires the communications port to be configured.
PO Alarm Status	This **read-only** field shows the type of alarm for a pulse output.
Buffer Warning Set Point	Sets the maximum buffered pulses allowed before the buffer warning alarm is triggered. This must be less than the Maximum Buffered Pulses allowed.
Maximum Buffer Pulses	Sets the **maximum buffered pulses** allowed. If the number of pulses requested to send out exceeds the Maximum Number of Buffered Pulses an alarm occurs and you essentially lose any pulses greater than the value set in this field.
APM Module Alarming	Sets **Alarming** for this point. If **Alarming** is set to Enabled, alarms are written to the Alarm Log. These are module only alarms. In other words, alarms which are related to the module as a whole. Currently only one alarm is available, which is a point fail alarm. If there is a malfunction with the APM, specifically a loss of communication between the module and the device, then this alarm will be set.
Module SRBX	Sets the **SRBX Alarming** option to configure Spontaneous-Report-By-Exception (SRBX) alarming for this point. ▪ **On Set** – The point enters an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. ▪ **On Clear** – The point leaves an alarm condition, the ROC generates a Spontaneous-Report-by-Exception message to the host. **Note:** SRBX Alarming requires the communications port to be configured.
PO Alarm Status	This **read-only** field displays the type of alarm for a pulse output.

APM: EU Data Tab

Select **Configure > I/O > Advanced Pulse Module > EU data** to configure the engineering units (EU) for each pulse input, set the module contract hour, and view totals.

Note: This tab applies only to channels with Pulse Security set to Level E. You configure Pulse Security on the Pulse Input tab.

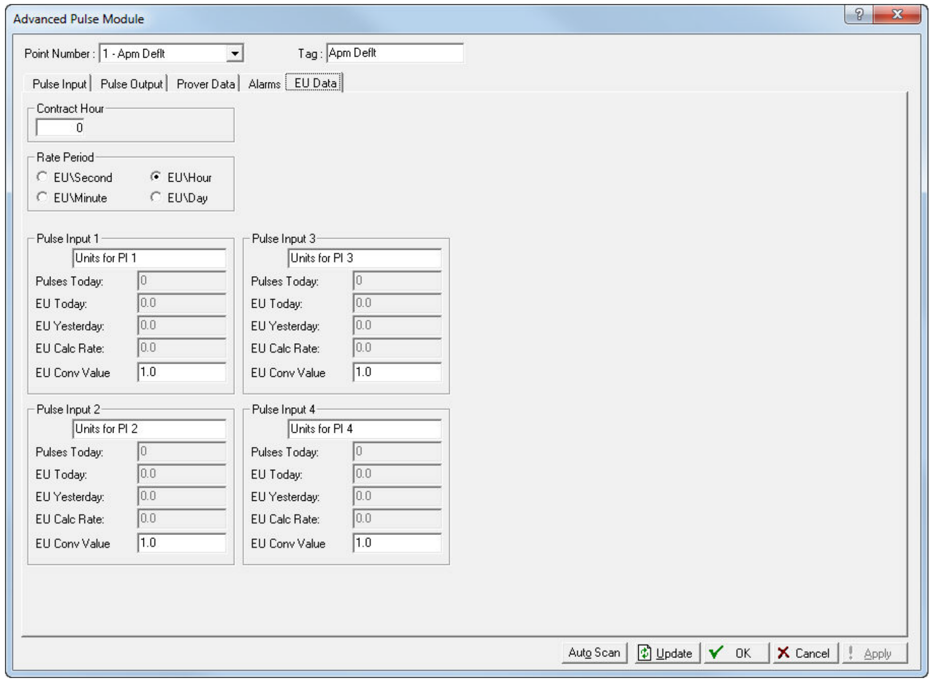


Figure 7-77. APM – EU Data tab

Field		Description
Contract Hour		Sets the channel on the ACIO module that you desire to configure. **Note:** This selection in this field applies to **each** tab on this screen.
Rate Period		Sets how the system calculates rates. Valid values are:
	EU/Sec	Calculation based on EU second totals.
	EU/Min	Calculates based on EU minute totals.
	EU/Hour	Calculation based on EU hourly totals.
	EU/Day	Calculation based on EU day totals.
		Note: The system calculates Current Rate as (accumulated pulses ÷ conversion) ÷ (scan period x conversion to correct time).
Pulse Input 1-4		Sets a short (20-alphanumeric characters) identifier for the engineering units used for each pulse input.
	Pulses Today	This read-only field displays the total number of pulses that the PI has received for the contract day. At the end of the contract day, it zeros and starts over, only if being totalized in History. The Contract Hour is specified on this screen.

Field	Description
EU Today	Displays the total EU Values accumulated for the current contract day, calculated by multiplying the conversion value by the accumulated pulses. The system resets this value to zero at the contract hour.
EU Yesterday	This read-only field shows the total EU Value accumulated the previous contract day, calculated as the previous day's Today's Total value at the contract hour before being cleared.
EU Calc Rate	This read-only field shows the calculated rate as of the most recent scan expressed in EUs per unit of time. You select time units using the Rate Period field on the Advanced tab. The system calculates the rate at the end of each scan period by dividing the number of pulses received by the conversion value divided by the rate period.
EU Conv Value	Sets a conversion factor that the system divides the number of pulses by to determine the rate.

7.1.15 Virtual Discrete Output (VDO) Configuration

Virtual DO points do not require an output to an I/O module. Virtual DOs are like a soft point or FST register but for a discrete on or off event. You configure the number of virtual DO points you desire in ROC > Information > Virtual DO Points field. You configure a Virtual DO to reference an FSTs to indicate a status without a physical I/O card present. Other applications include using Virtual DO with the Foundation Fieldbus user program to link FF application block inputs and outputs to points in the ROC.

Select **Configure > I/O > Virtual DO Points**. The Virtual Discrete Output screen displays. Examine the default settings and adjust the parameters to suit your application on each of the tabs.

- Use the **General** tab sets the basic parameters for the DO point.
- Use the **Advanced** tab enables you to configure accumulated value and state for reset for the selected DO.
- Use the **TDO Parameters** tab allows configuration of TDO parameters.
- Use the **Alarms** tab sets the alarm parameters for this DO point for a DL8000.

Save Configuration After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

Virtual DO: General Tab

The Discrete Output screen initially displays the General tab. Use this tab to configure the basic parameters for the DO point. Select **Configure > I/O > DO Points**.

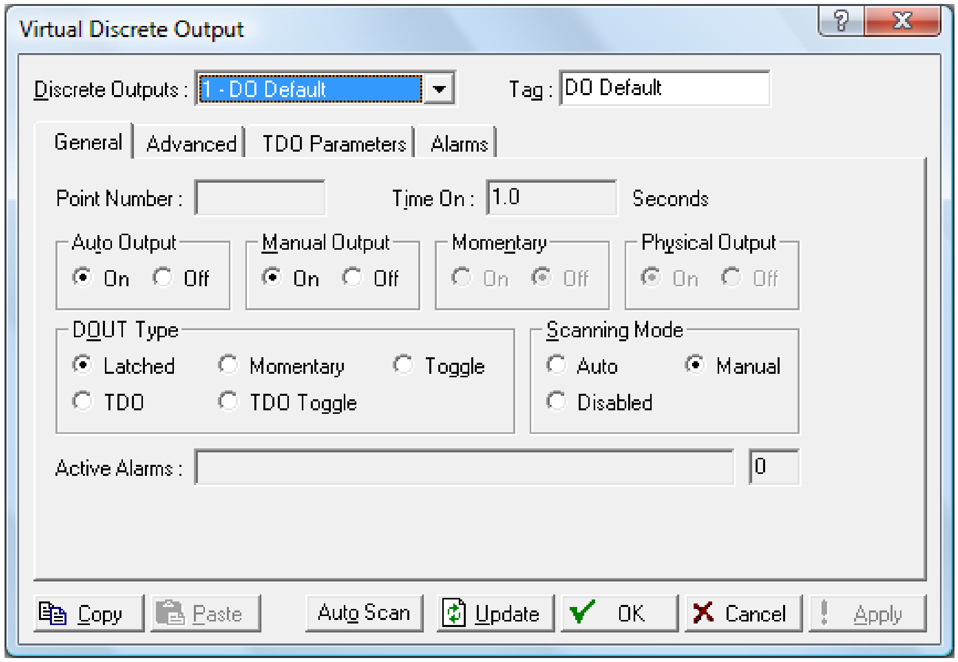


Figure 7-78. Virtual DO – General tab

Field	Description
Discrete Outputs	Sets the discrete output to be configured. The outputs are listed by both Point Number and Tag. **Note:** This selection applies to **each** tab on this screen.
Tag	Sets a short (10 alphanumeric characters) identifier for the point. **Note:** This selection applies to **each** tab on this screen.
Point Number	This **read-only** field shows the rack location for this point.
Time On	Sets, in seconds, the amount of time for momentary operation. The default value is **1** second for a DO. The default value is **5** milliseconds for an ACIO DO. **Note:** In Momentary mode, this is the amount of time (in seconds) that the momentary contact is energized. In the Toggle mode, this is the time (in seconds) between switching On or Off. In the TDO and TDO Toggle modes, the TDO configuration calculates this value.

Field	Description	
Auto Output	Indicates the state of the discrete output. **Off** indicates that the output is Off or that a switch is open; **On** indicates that the output is On or that a switch is closed.	
Momentary	This **read-only** field indicates the state of the discrete output when the DOUT Type is set to Momentary. **Off** indicates that the output is Off or that a switch is open; **On** indicates that the output is On or that a switch is closed.	
Manual Output	This field indicates the state of the discrete output. Off indicates that the output is Off or that a switch is open; On indicates that the output is On or that a switch is closed. Select **On** and click **Apply** to force one transition of the DO.	
Physical Output	This **read-only** field indicates the actual status of the output channel at the field terminations regardless of the DOUT Type selected.	
DOUT Type	Sets the function of this discrete output. Valid values are:	
	Latched	Changes on an active transition of the output (from off to on). The discrete output remains On until cleared by selecting Off in the Auto Output field.
	TDO or Time Duration	Enables the discrete output to have a time duration between On and Off transitions based on time-related parameters configured in the TDO Parameters Tab.
	Momentary	Enables ROCLINK 800 to activate the discrete output for the amount of time defined in the **Time On** field.
	Toggle	Enables a square-wave output for which both the time on and time off are defined by the value in the **Time On** parameter. Time on and time off are equal. Use the TDO Parameters Tab to define time-related parameters.
	TDO Toggle	Enables the discrete output to continuously repeat in a cycle defined by the value in the **Cycle Time** field on the TDO Parameters Tab where the EU Value controls the on-time duration.

Field	Description
Scanning or Scanning Mode	Sets the scanning type to configure how the DO is scanned. Valid values are or **Auto** (automatically process the last output scan) or **Disabled** (permit only manual updates of the output). **Manual** (manually permit a process of the last output scan). **Note:** If you enable alarming, the ROC generates a Manual Mode alarm when scanning is disabled. ▪ For the output to automatically process the field output, select **Auto**. ▪ When Scanning Mode is set to **Disabled** or **Manual**, the DO is no longer updated by the ROC ▪ When the Scanning Mode is set to **Manual**, set **Manual Output** to On and click **Apply** to override the output. ▪ When Scanning Mode is set to **Disabled**, set **Auto Output** to On and click **Apply** to override the output.
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (enables alarming) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
Active Alarms	This **read-only** field shows any active alarms for this point. When you **Enable** alarming, the limit alarms (such as Low Alarm and Rate Alarm) that are active appear. Even if you **Disable** alarming, the Point Fail (hardware reports a malfunction) alarm and Manual (Scanning Disabled) indicators can still appear.

Virtual DO: Advanced Tab

Use this tab to configure accumulated value and state for reset for the selected DO.

1. Select **Configure > I/O > Virtual DO Points > Advanced** tab. The Advanced screen displays.

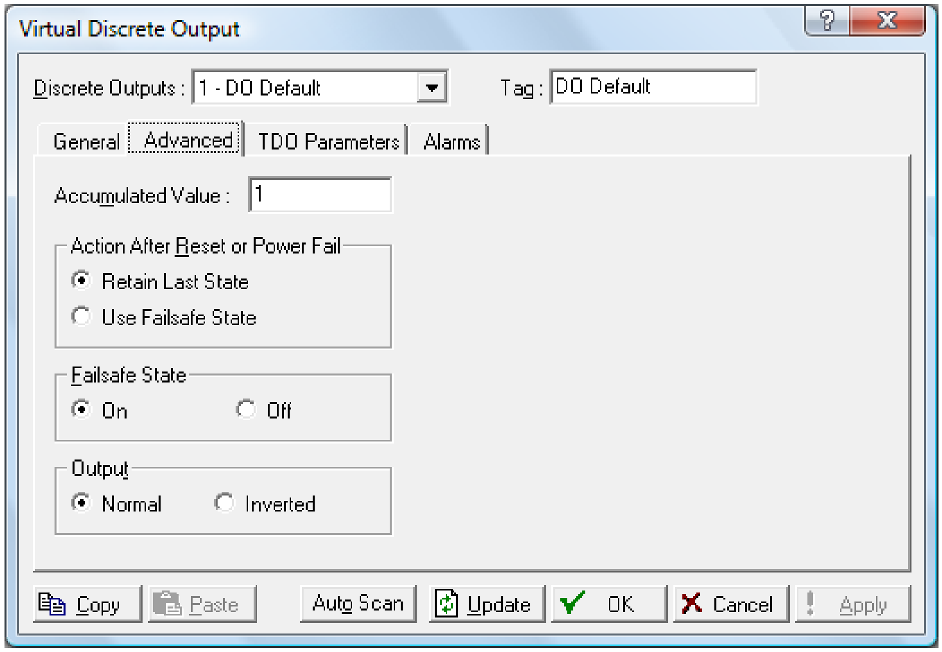


Figure 7-79. Virtual DO – Advanced tab

Field	Description
Accumulated Value	Sets a value for the accumulated number of off-to-on transitions for the discrete output. The accumulator is a 32-bit number with a maximum count of 4,294,967,295. You can preset the accumulator to a desire value or clear it by enter zero (**0**).
Action After Reset or Power Fail	Indicates how the ROC handles the discrete output state on resets or power failures. Valid values are **Retain Last State** (ROC retains the DO state, whether off or on) or **Use Failsafe State** (output uses value set in the Failsafe State frame, On or Off). The default is **Retain Last State**. **Note**: If you use virtual DO points as controls (as with pumps or valves), set the **Use Failsafe Mode** and the **Failsafe State** setting to ensure that the controls return to a safe state following a power reset or failure.
Failsafe State	Specifies, if you select the **Use Failsafe State** option, whether the system sets the virtual directo output on or off following a reset or power failure. The default is **On**. is selected, specify whether the **Auto Output** or **Manual Output** is set to On or Off after a reset of the ROC, such as a power restart or a warm start.
Output	Indicates whether the virtual DO is normal or inverted. The default is **Normal**.

Virtual DO: TDO Parameters Tab

Use this tab to configure time duration parameters for this DO point.

Note: This tab **does not** display if you choose **Latched** in the DOUT Type field on the General tab.

1. Select **Configure** > **I/O** > **Virtual DO Points** > **TDO Parameters** tab. The TDO Parameters screen displays.

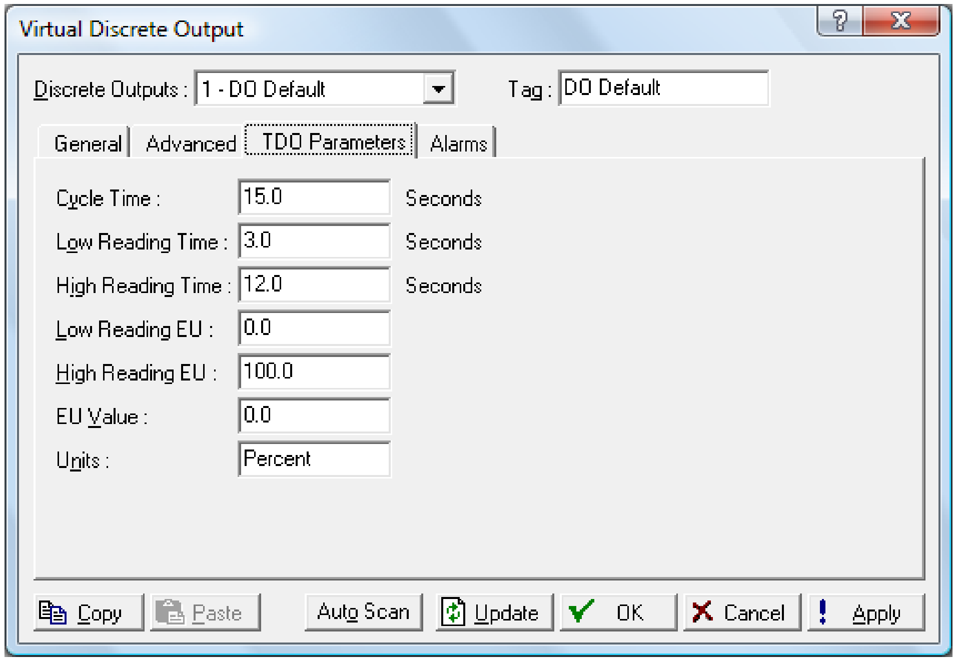


Figure 7-80. Virtual DO – TDO Parameters tab

Field	Description
Cycle Time	Sets, in seconds, the total amount of time the cycle spends in the on and off positions. The default is **15** seconds. The Cycle Time entry is used to define the OFF time in the TDO Toggle mode. The OFF time is calculated by the formula: Off Time = Cycle Time – On Time For example, a TDO is used to emulate a field instrument measuring flow. The TDO outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow. The output is repeated every 15 seconds. If the Cycle Time is less than, or equal to the On Time, the OFF time is set to one. Care must be taken in configuration (including other places, such as FSTs) to ensure that **the Cycle Time remains greater than the calculated On Time** for proper operation.

Field	Description
Low Reading Time	Sets the **Low Reading Time** (0% Count) in seconds that represents a zero percent output pulse width. The default is **3** seconds. This is the minimum amount of time that the TDO can be energized to move the motor. Set to a value that allows movement, but also provides good resolution of control.
High Reading Time	Sets the **High Reading Time** (100% Count) in seconds that represents a 100 percent output pulse width. The default is **12** seconds. This is the maximum amount of time that the TDO can be energized to move the motor. Normally, this is the amount of time it takes for the actuator to move the valve from fully open to fully closed.
Low Reading EU	Sets the engineering unit (EU) for the low reading to zero percent output (low end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
High Reading EU	Sets the engineering unit (EU) for the high reading to 100 percent output (or high end of the EU range). Based on the EU range determined in part by this parameter, the EU value is converted to a corresponding signal.
EU Value	Current value, displayed in engineering units. In TDO Toggle mode, the EU Value controls the Time On: On Time = ((EU Value – Low Reading EU) / (High Reading EU – Low Reading EU) * (High Time – Low Time)) + Low Time
Units	Sets the engineering units for the discrete output (such as percentage, IN H2O, PSIG, MCF, degrees F, milliamps, and volts).
TDO Time On	The TDO Parameters tab allows configuration of TDO parameters when one of the DOUT Types TDO (Timed Duration) or TDO Toggle is selected in the discrete outputs screen. The Time On field is located on the general discrete outputs tab. The Time On field is calculated from the entered EU Value and the previous definitions of Low Reading Time, High Reading Time, Low Reading EU, and High Reading EU entered in the TDO Parameters screen. The calculation formulas are:

EU Span = High Reading EU Value – Low Reading EU

Count Span = High Reading Time (100% Count) – Low Reading Time (0% Count)

$$\text{On Time} = \frac{\text{Entered EU Value} \times \text{Count Span}}{\text{EU Span}} + \text{Low Reading Time (0\% Count)}$$

Defining the Output Pulse

To define the TDO output pulse:

1. Select **Configure** > **I/O** > **DO Points** or **DO Relay Points** or **Virtual TDO**.
2. Select a DOUT Type of **TDO** or **TDO Toggle** in the discrete outputs dialog.
   - **TDO (Timed Duration)** – The single-pulse output can be triggered by writing to the Status or the EU Value parameter of the DO point. This can be accomplished directly, by a PID point, or by an FST.
   - **TDO Toggle** – A continuous pulse is generated with the pulse length being controlled by writing to the EU Value parameter in the DO point. This can be accomplished directly or by an FST.
3. Click the **TDO Parameters** tab.

The output pulse from the TDO function must be defined for proper engineering unit (EU) conversion. The minimum pulse width (Low Reading Time / 0% Count) and the maximum pulse width (High Reading Time / 100% Count) define the minimum and maximum ON time of the output pulse. The values entered in the Low Reading Time and High Reading Time are the number of seconds the output is ON.

Example:
A TDO is used to emulate a field instrument measuring flow. The TDO outputs a pulse width of 3 seconds for no flow and a pulse width of 12 seconds for 1000 MCF per day flow.

Low Reading Time (0% Count) = 3 seconds

High Reading Time (100% Count) = 12 seconds

Low Reading EU = 0

High Reading EU = 1000

Virtual DO: Alarms Tab

Select **Configure > I/O > Virtual DO Points > Alarms** tab to configure the alarm parameters for this DO point.

1. Select the **Alarms** tab. The Alarms screen displays.

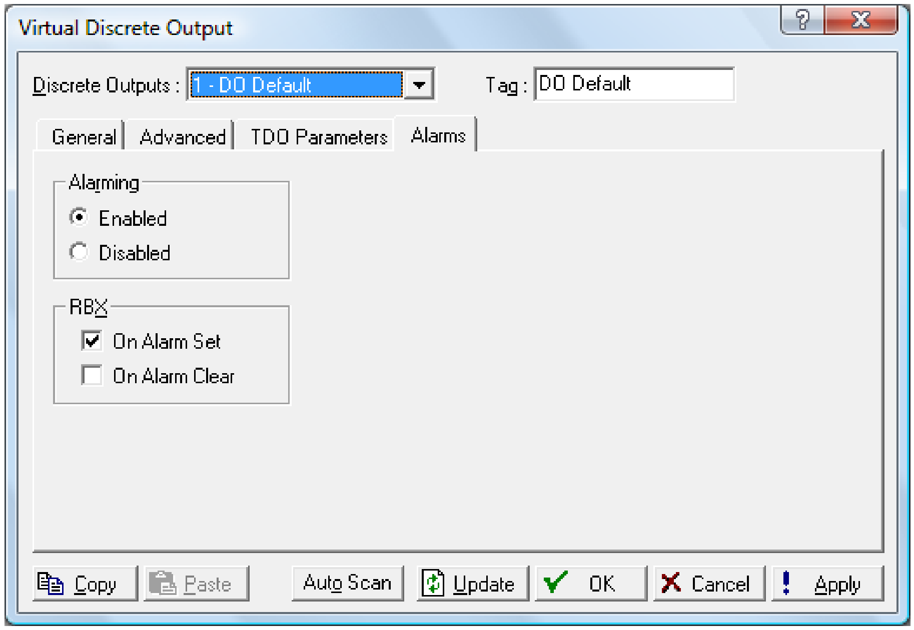


Figure 7-81. Virtual DO – Alarms tab

Field	Description
Alarming	Sets the alarm option for this point. Valid values are **Enabled** (enables alarming) or **Disabled** (does not generate limit alarms). **Note:** The Point Fail alarm may appear in the Active Alarms field, but is not logged in the Alarms file. If you enable alarming, the system generates an alarm if you disable scanning.
RBX Alarming	Sets the Spontaneous-Report-by-Exception (SRBX or RBX) alarming for this point. Valid values are: ▪ **On Alarm Set** - Generates an RBX message to the host when the point enters an alarm condition. ▪ **On Alarm Clear** - Generates an RBX message to the host when the point leaves an alarm condition. **Note:** SRBX Alarming requires the communications port to be configured.

7.2 Control Menu

Use the Control menu options to configure FST Registers, Radio Power Control, DS800, Sampler/Odorizer, and PID Loops.

7.2.1 FST Registers

Use the FST Registers screen to configure FST registers and add timers and other execution controls.

Select **Configure** > **Control** > **FST Registers**. The FST Registers screen displays.

The FST Registers screen has two tabs. Use each tab to configure a component of the FST.

- Use the **General** tab to configure and enable the FST registers.
- Use the **Advanced** tab to add timers, execution controls, and other features to the FSTs.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save I/O configuration to permanent memory in case you must perform a cold start.

Field	Description
FST	Sets the FST sensor to configure. Click ▼ to display all available FSTs. **Note:** The selection in this field applies to each tab on this screen.
Tag	Sets the ten-character identifier for the FST. **Note:** The selection in this field applies to each tab on this screen.

FST Registers: General Tab

The FST Registers screen initially displays the General tab. Use this tab to enable and configure the FST registers.

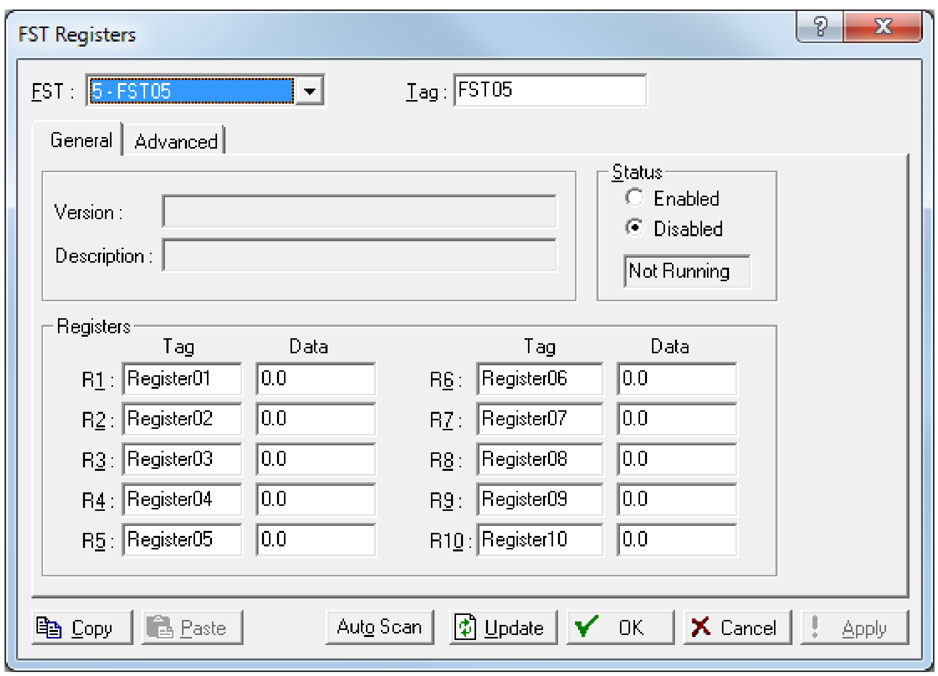


Figure 7-82. FST Registers – General tab

Field	Description
Version	This **read-only** field shows the version (if assigned) of the FST on download.
Description	This **read-only** field shows the description (if assigned) of the FST on download.
Status	Sets the current state and enables you to start or stop the FST. Valid values are **Enabled** (FST is active) or **Disabled** (FST is not active). **Note:** If you change the value in this field, click **Apply**.
Registers #1 to #10	Provides up to 10 storage points for FST floating point values. Use FST registers to store calculated or manually-entered values. You can also those values from one FST to another. For example, an FST can write values to the registers and also read the values stored in the FST Register storage points. Registers may be read from, or written to, any FST configured for the ROC

FST Registers: Advanced Tab

Select **Configure > Control > FST Registers > Advanced** tab to add timers, execution controls, and other features to the FSTs.

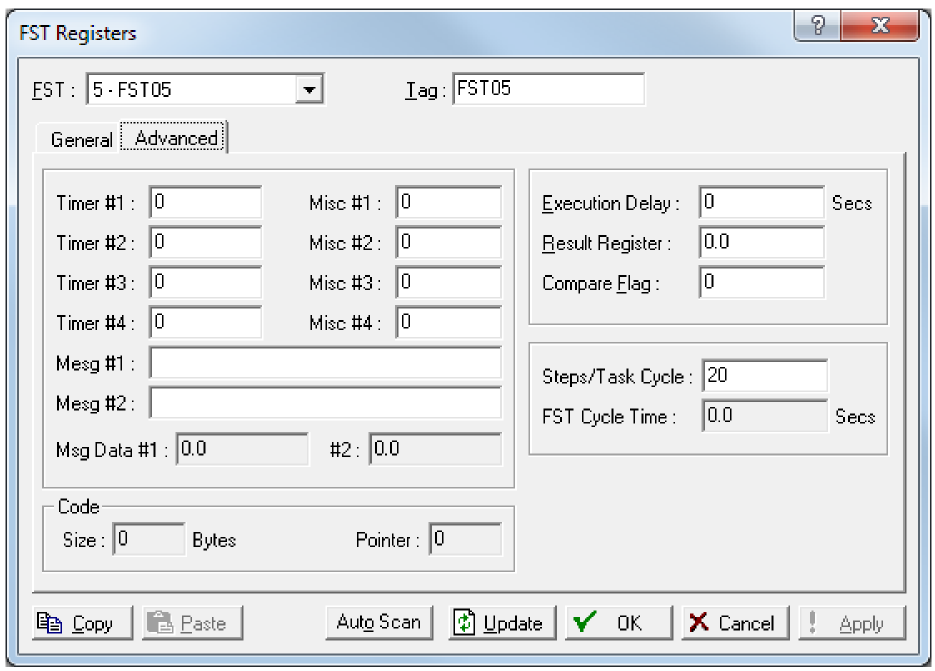


Figure 7-83. FST Registers – Advanced tab

Field	Description
Timer #1 through #4	Sets up to four countdown timers that signal certain periods or times have elapsed. You set the time, and the FST updates the time. These four timers, when set to values greater than **0**, decrement by 1 every cycle time. The scan period determines the cycle times. Cycle time equals:
Misc #1 to #4	Sets up to four unsigned 8-bit integers (with valid values from 0 to 255) the FST can use for global storage.
Mesg #1 and Mesg #2	Provides two 30-character fields for storing messages that display in the FST Message area.
Msg Data #1 and Msg Data #2	Displays any values associated with the messages.
Execution Delay	Sets a period, in seconds, between the execution of successive FST command steps. The default is **0** seconds. The **minimum** delay is **0.1**.
Results Register	Sets a special-purpose register that stores the floating point result from the most currently executed command. The Result Register (RR) may also be known as the Signal Value Analog (SVA).
Compare Flag	Sets a special-purpose 8-bit register that stores an integer representing the numbers 0 through 255. The logic commands manipulate the Compare Flag. The Compare Flag may also be known as the Signal Value Discrete (SVD).
FST Steps/Task Cycle	Sets the number of tasks (steps) that you desire the FST to complete in the amount of time set in the FST Cycle Time (in seconds) field, which is configured in the FST Editor Monitor Display.
FST Cycle Time	This **read-only** field shows, in seconds, the amount of time in which an FST will cycle as set in the FST Editor Monitor Display.
EVT Command - Log Events	Set in which log the FST Event (EVT) command creates a file. Select in Standard Event Log to record the event in the main Events Log. Select in Weights & Measures Event Log to record the event in the Weights & Measures Event Log if the register is related to a weight or measurement event.
Code Size Bytes	This **read-only** field shows the number of bytes the FST uses.
Code Pointer Byte	This **read-only** field shows the pointer byte for the FST. **Note:** Use FST Monitor within the FST Editor to monitor these operations.

7.2.2 Proportional, Integral, and Derivative (PID)

Proportional, Integral, and Derivative (PID) controls enable you to provide smooth and stable operation for feedback control loops that employ a regulating device, such as a control valve or a motor. The typical use for PID is to control a process variable to a setpoint.

PID is the most common control methodology in process control. PID is a continuous feedback loop that keeps the process flowing normally by taking corrective action whenever any deviation from the desired value (setpoint) of the process variable (rate of flow, temperature, voltage, and such) occurs. An "error" occurs when an operator manually changes the setpoint or when an event (such as a valve opening or closing) or a disturbance changes the load, thus causing a change in the process variable.

The PID controller receives signals from sensors and computes corrective action to the actuators from a computation based on the error (proportional), the sum of all previous errors (integral) and the rate of change of the error (derivative).

Enabling PID Loops

Before you can configure a PID loop, you must first enable the ROC to recognize them.

1. Select **ROC > Information**. The Device Information screen displays.
2. Select the **Points** tab. The Points screen displays.
3. Complete the **PIDs Active** field with the number of PIDs you want to configure.

   Note: The **read-only** Maximum field shows the maximum number of PIDs you can define.

4. Click **Apply** to save the value and then **OK** to close the Device Information screen and return to the ROCLINK 800 menu.

PID Overview

Select **Configure > Control > PID Loop**. In a given PID point, two separate PID loops are available: Primary and Override. In Primary Only mode, the Override Control loop is disabled, leaving only the Primary Control loop active.

The PID control loop can use either one analog output or two discrete outputs to control the regulating device. If discrete output control is to be used, one DO will provide open/forward control and the other DO provides close/reverse control.

Each active PID loop acquires the Process Variable input and calculates the change in output required to maintain its Setpoint. If Override Control is enabled, the calculation result that is applied to the output depends upon whether the High or Low Override Type Select is chosen.

If the output type is analog, the selected change in output is added to the current value of the output. If the output type is discrete, the change in output is sent to one of the two discrete outputs. The magnitude of the correction determines the amount of time that an output is energized. If the correction is positive, it is routed to the open/forward DO. If the correction is negative, it is sent to the close/reverse DO.

One application of Override PID control allows pressure control to Override flow control when the pressure exceeds a Setpoint value. For example: The output of the Primary flow control loop would be selected until the pressure input approaches the Override Setpoint of 700 PSIG. As the pressure input approaches its Setpoint, the pressure loop tries to close the valve and take over control at the point when the output calculated by the pressure loop is less than the output calculated by the flow loop. Control returns to the Primary flow control loop, when the change in output required to maintain the Override Setpoint no longer outweighs the flow loop's attempts to maintain its Setpoint.

Through the use of an FST, you may implement a switchover algorithm. When the input exceeds a predetermined switchover value, the FST can switch the mode to Override only. When the FST determines that the input value is no longer in a critical range, the PID mode can be switched back to Primary only.

PID Loop: General Tab

Select **Configure > Control > PID Loop**. The PID Loop screen initially displays the General tab. Use this screen to configure general PID loop parameters.

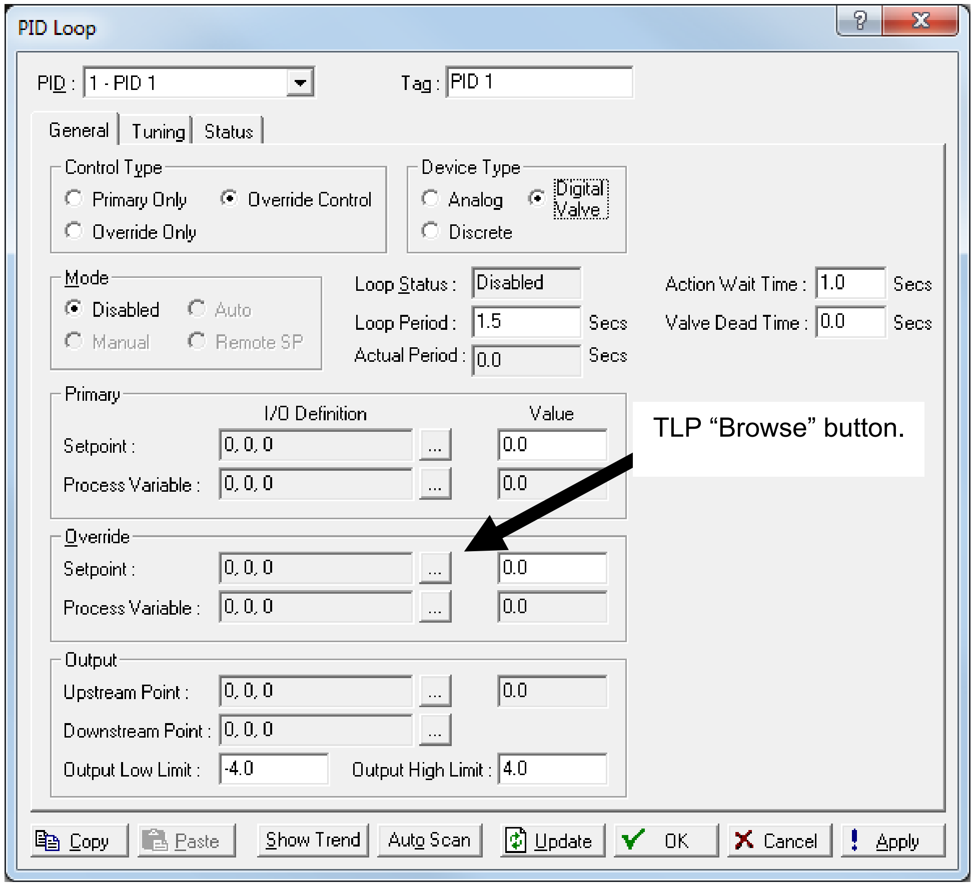


Figure 7-84. PID – General tab

Field	Description
Tag	Sets the ten-character identifier for the PID. **Note:** This selection applies to **each** tab on this screen.
PID	Sets the PID point to configure. Click ▼ to display all available PIDs. **Note:** This selection applies to **each** tab on this screen.

Field	Description
Control Type	Sets the control type for PID loop. Valid values are: ▪ **Primary Only** – Sets the Primary loop as the only active loop. The system uses the output the Primary loop calculates to adjust the control output. ▪ **Override Only** – Sets the Override loop as the only active loop. The system uses the output the Override loop calculates to adjust the control output. **Note:** This control type is used mainly for tuning the Override loop or when loop selection is controlled by an FST or other logic external to the PID algorithm. ▪ **Override Control** – Sets both the Primary and Override loops as active. The system compares the outputs from the two loops and uses either the lesser or greater of the two outputs (based on the selection in the Override Type Select field) to adjust the control output.
Output Type	Sets the output type for the PID loop. Valid values are **Analog** (the system writes the PID output to the assigned analog output point EU value) or **Digital Valve** (the system writes the PID output to the assigned ACIO or DO point EU value). **Note**: The **Discrete** option is **not** supported in the DL8000 because it does not fail in a "safe" state.
Mode	Sets the **Mode** for the PID Loop: ▪ **Disabled** – No loops are active and the PID output parameter is not written to the assigned control output. ▪ **Manual** – No loops are active and the system writes the PID output parameter to the assigned control output, allowing you to adjust the output as required. ▪ **Auto** – PID loops are active as configured under Control Type; you enter the setpoint of the loops and the system automatically sends any change in the calculated output to the configured output point. ▪ **Remote SP** – PID loops are active as configured under Control Type. The Setpoint of the loops are read from the Setpoint I/O Definition.
Loop Status	Indicates which loop (Primary or Override) is currently selected or disabled.

Field	Description
Loop Period	Sets, in seconds, the period of time between executions of the PID algorithm. This is the amount of time between executions from the beginning of one execution to the beginning of the next. **Note:** If you select Override Control, both loops executed in this time period.
Actual Period	This **read-only** field shows the actual amount of time (in seconds) from the beginning of the last execution of the loop to the beginning of the current execution of the loop.
Primary Setpoint	Set an input using the TLP Browse button or enter a **Value** for controlling the Primary PID loop's Process Variable. **Note:** This field **does not** display if you select **Override Only** as a Control Type.
Primary Process Variable	Click the TLP Browse button to select a process variable for the Primary PID Loop or enter a value to use for comparison to the Primary Setpoint.
Override Setpoint	Set an input using the TLP Browse button or enter a Value for controlling the Override PID loop's Process Variable. **Note:** This field **does not** display if you select Primary Only as a Control Type.
Override Process Variable	Click the TLP Browse button to select a process variable for the Override PID Loop or enter a value to use for comparison to the Primary Setpoint.
Output Point	Click the TLP Browse button to select an analog output point for the loop. **Note:** This field displays **only** if you select **Analog** as an Output Type on the General tab.
DO Open Point	Click the TLP Browse button to select a discrete output open point for the loop. The DO Open Point and DO Close Point values, respectively, open or close the valve or other device. You must configure these values as TDO (Time Duration Output) discrete output mode. **Note:** This field displays **only** if you select **Discrete** as the Device Type.
DO Close Point	Click the TLP Browse button to select a discrete output close point for the loop. The DO Open Point and DO Close Point values, respectively, open or close the valve or other device. You **must** configure these values as TDO (Time Duration Output) discrete output mode. **Note:** This field displays **only** if you select **Discrete** as the Device Type.

Field	Description
Upstream Point	Click the TLP Browse button to select an upstream point for the loop. **Note:** This field displays **only** if you select **Digital Valve** as the Device Type.
Downstream Point	Click the TLP Browse button to select a downstream point for the loop. **Note:** This field displays **only** if you select **Digital Valve** as the Device Type.
Output Low Limit	Sets the low limit for the analog or discrete output. If a change in output causes the current value to drop below this value, the system sets the output to this value.
Output High Limit	Sets the high limit for the analog or discrete output. If a change in output causes the current value to rise above this value, the system sets the output to this value.
Action Wait Time	Indicates, in seconds, the delay between the initial request and the action. **Note**: This field displays **only** if you select **Digital Valve** as a Device Type.
Valve Dead Time	Indicates, in seconds, the time between the energization of a valve and its activity. **Note**: This field displays only if you select **Digital Valve** as a Device Type.
Show Trend / Hide Trend	Click **Show Trend** to display a graphical representation of the PID output and process variable in reference to the set point over time. Use the graph to assist in tuning the control loop. When you hover over the trend line, the number on the left updates indicating the SP, PV, and Output at the point in time. Click **Pause** to stop the update and **Continue** to restart the scanning.

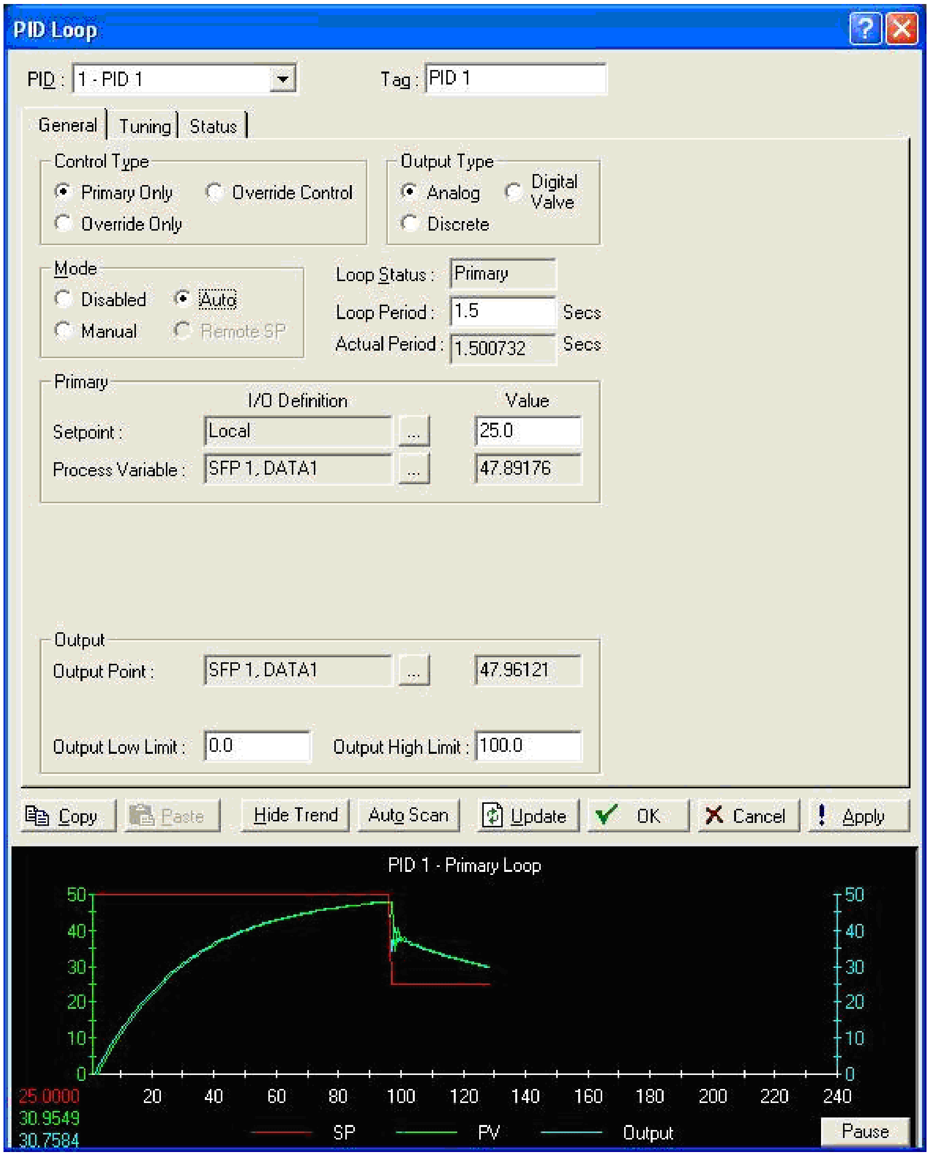


Figure 7-85. PID Loop - Show Trend/Hide Trend

PID Loop: Tuning Tab

Select **Configure > Control > PID Loop > Tuning** tab to set Tuning parameters for the PID Loop.

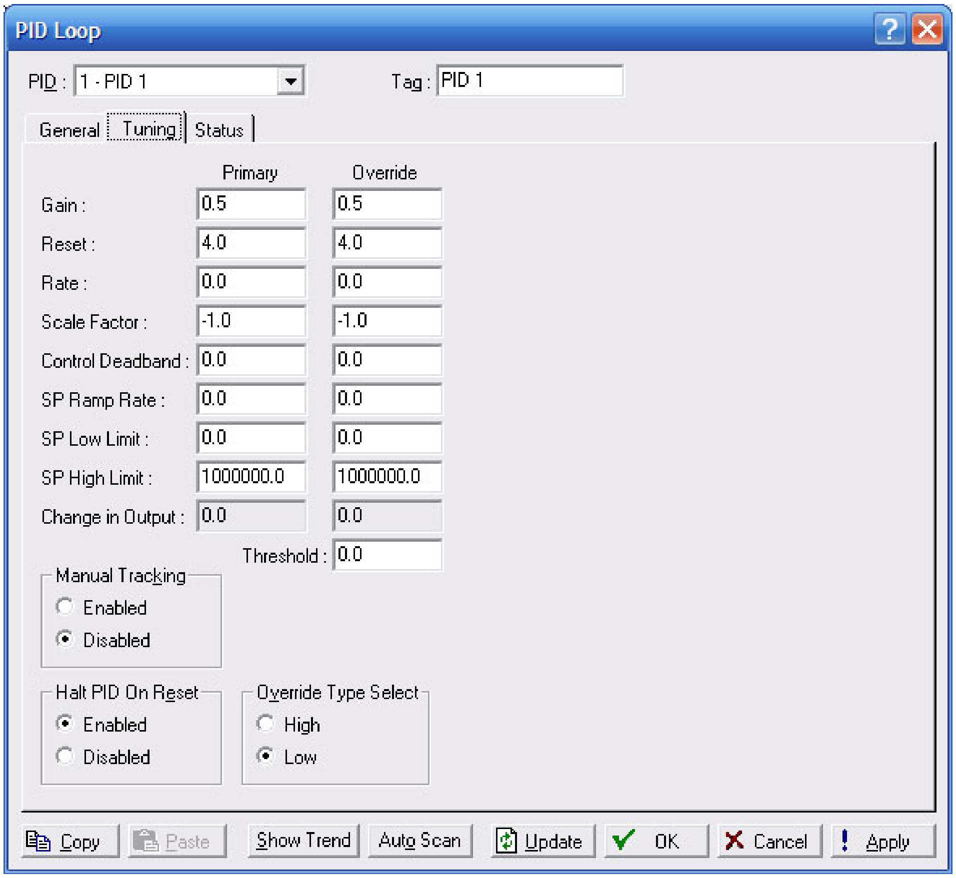


Figure 7-86. PID Loop – Tuning tab

Field	Description
Gain	This option is not supported in the DL8000.
Override Type Select	Sets the control output for the Override Type. Valid values are **High** (system selects as the control output the higher of the Primary Output Change value or the Override Output Change value) or **Low** (system selects as the control output the lesser of the Primary Output Change value or the Override Output Change value).
Reset	Sets integral gain or reset as the ratio of the change in output to the change in the integral of the error with respect to time. This value is in terms of repeats per minute. Typically calculated as either (Primary Process Variable – Primary Setpoint) or (Override Process Variable – Override Setpoint).
Rate	This option is **not** supported in the DL8000.
Scale Factor	Sets values representing the ratio of the output span to input (Process Variable) span. The sign of the number specifies the action of the loop output: negative for reverse action or positive for direct action.

Field	Description
Primary Control Deadband	Sets a "window" around the setpoint for the Primary PID. When the process variable is within this window, the system does not recalculate a change in output. If you enter **5**, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output.
Override Control Deadband	Sets a "window" around the setpoint for the Override PID. When the process variable is within this window, the system does not recalculate a change in output. If you enter **5**, the deadband is a region of 5 units above and 5 units below the setpoint in which the process variable can move without affecting the output.
Primary SP Ramp Rate	Sets the maximum rate at which the Primary PID setpoint can ramp to a new value. Maximum rate is in EU per minute where engineering units are the units of the process variable.
Override SP Ramp Rate	Sets the maximum rate at which the Override PID setpoint can ramp to a new value. Maximum rate is in EU per minute where engineering units are the units of the process variable.
SP Low Limit	Sets the **SP Low Limit** as the lowest allowed value for the Setpoint.
SP High Limit	Sets the **SP High Limit** as the highest allowed value for the Setpoint.
Change in Output	This **read-only** field shows the calculated change in output from the associated loop. You define these values on the **Inputs/Outputs** tab. **Note:** If you select **Primary Only** as a Control Type, the Override Output Change field **does not** display. If you select **Override Only** as a Control Type, the Primary Output Change field **does not** display.
Threshold	Sets the threshold to prevent premature selection of the Override loop. If the Override process variable is outside of this threshold on the safe side of the Override setpoint, the system always Sets the Primary loop. However, if the Override process variable is within the threshold of the Override setpoint or is on the unsafe side of that setpoint, the system can select the Override loop. **Note:** If you set the override Threshold to **0.0**, the system uses the high/low value of the Override Type Select field (defined on the General tab) to select the appropriate change, regardless of the error in the Override loop.

Field	Description	
Manual Tracking	Sets how the system tracks setpoint and process variable values in moving between Auto and Manual Modes (defined on the General tab). Valid values are **Enabled** (sets the Primary loop's setpoint equal to the process variable when the PID point is in Manual mode) or **Disabled** (does not equalize these values). This is typically used to eliminate a value "bump" when transferring from Manual to Auto mode.	
Halt PID on Reset	Sets the status of the PID control loop following a power restart or a warm start. Valid values are **Enabled** (activate the PID loop) or **Disabled** (do not activate the PID loop).	
	Enabled	Do not activate the PID loop.
	Disabled	Activate the PID loop.
Override Type Select	Sets the control output for the Override Type. Valid values are **High** (system selects as the control output the higher of the Primary Output Change value or the Override Output Change value) or **Low** (system selects as the control output the lesser of the Primary Output Change value or the Override Output Change value).	

PID Loop: Status Tab

Select **Configure > Control > PID Loop > Status** tab to view the Status of the Primary and Output values.

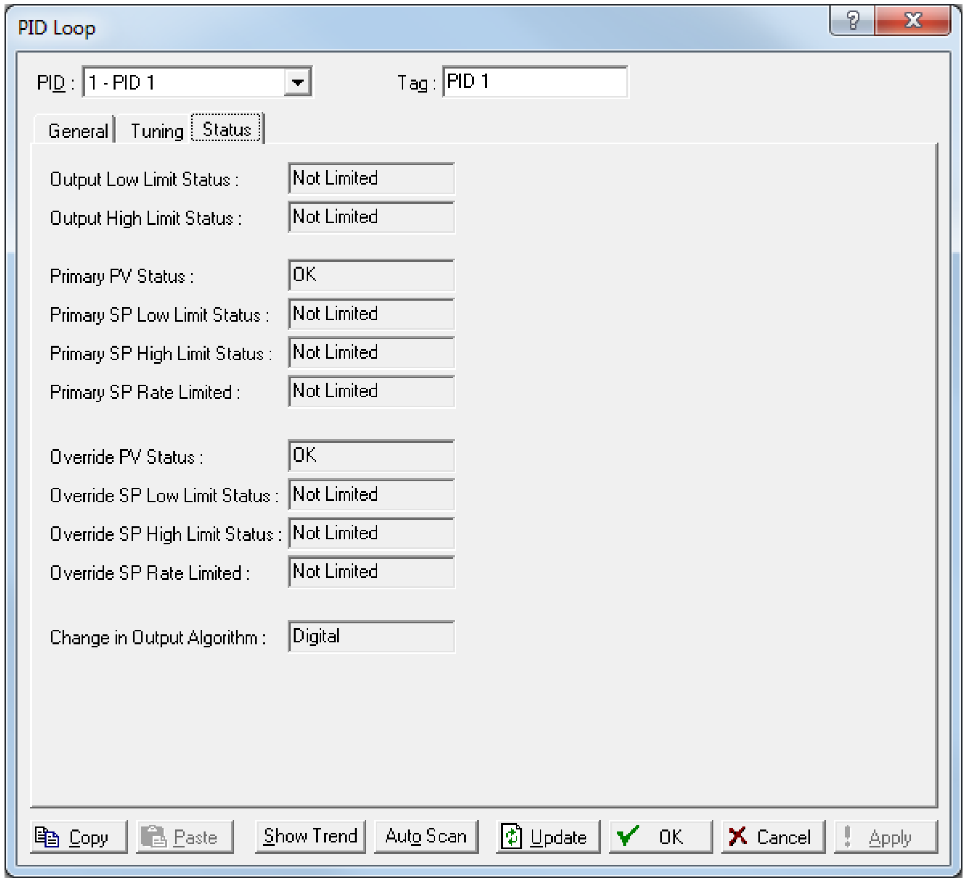


Figure 7-87. PID Loop – Status tab

Field	Description
Output Low Limit Status	This **read-only** field shows, when a PID loop is enabled, whether the output of the Primary PID loop has been clipped by the low output limit. Valid values are **Limited** or **Not Limited**.
Output High Limit Status	This **read-only** field shows, when a PID loop is enabled, whether the output of the Primary PID loop has been clipped by the high output limit. Valid values are **Limited** or **Not Limited**.
Primary PV Status	This **read-only** field shows, when a PID loop has been enabled, the status of the Primary loop's Process Variable data. Valid values are **OK**, **Questionable Data**, or **Invalid TLP**.
Primary SP Low Limit Status	This **read-only** field shows whether the setpoint of the Primary PID loop has been clipped by the low Setpoint limit. Valid values are **Limited** or **Not Limited**.
Primary SP High Limit Status	This **read-only** field shows whether the setpoint of the Primary PID loop has been clipped by the high Setpoint limit. Valid values are **Limited** or **Not Limited**.

Field	Description
Primary SP Rate Limited	This **read-only** field shows whether the setpoint of the Primary PID loop is currently being limited by the maximum Setpoint change rate (as defined by the SP Ramp Rate on the Tuning tab).
Override PV Status	This **read-only** field indicates the status of the Override loop's Process Variable data. Valid values are **OK**, **Questionable Data**, or **Invalid TLP**.
Override SP Low Limit Status	This **read-only** field shows whether the setpoint of the Override PID loop has been clipped by the low Setpoint limit. Valid values are **Limited** or **Not Limited**.
Override SP High Limit Status	This **read-only** field shows whether the setpoint of the Override PID loop has been clipped by the high Setpoint limit. Valid values are **Limited** or **Not Limited**.
Override SP Rate Limited	This **read-only** field shows whether the setpoint of the Override PID loop is currently being limited by the maximum Setpoint change rate (as defined by the SP Ramp Rate on the Tuning tab).
Change in Output Algorithm	This **read-only** field shows the algorithm the system uses for the PID. Valid values are **Standard** (*Change in Output = SF x PG x (errCng + (IG x ALP x err) + (DG x △RPC))* or **Digital** (*Change in Output = SF x IG x err),* where: SF = user-entered Scale Factor PG = user-entered Proportional Gain IG = user-entered Integral Gain DG = user-entered Derivative Gain errCng = Error Change (error – last error) ALP = Actual Loop Periop, measured in minutes Err = error (Process Variable – Setpoint) △RPC = Delta Rate of Process Variable Change (Rate of PV Change – Last Rate of PV Change)

Example PID Configuration

The following example describes how to configure a PID point and associated inputs and outputs to implement flow control with pressure override to protect against over-pressuring the line.

In this example, the Primary process variable (Primary PV) is the volumetric flow rate per day obtained from an orifice meter run point. The system obtains the Override process variable (Override PV) from the static pressure value from an MVS or analog input. Both the Primary and Override loops require you to define a setpoint (the value at which you wish to control the loop). The example describes the process for setting up either discrete or analog control for the control output.

If a **4 to 20 mA signal** to an **I/O converter** controls the control valve:

- Configure an analog output with the appropriate Low and High Reading EU (engineering units). The units can either be in terms of the valve position (0 to 100%) or in terms of flow capacity (0 to 1000 MCF/Day).

- Set the Output Type on the PID screen to Analog.
- On the Inputs/Outputs tab, define an output point TLP using as an analog input, the desired Logical Number, and EU Value parameter.

If a **motorized actuator on the valve** controls the control valve:

- Configure two discrete output points for the open and close contacts as TDO (Time Duration Output) DOUT types. Set the Low Reading Time to the minimum amount of time (in seconds) the TDO can be energized to move the motor. Set the High Reading Time to the amount of time (in seconds) the TDO must be energized for full travel. Set the Low and High Reading EU values. The units can either be in terms of the valve position (0 to 100%) or in terms of flow capacity (0 to 1000 MCF/Day).
- Set the Output type on the PID screen to Discrete. Under DO Open Point and DO Close Point, select a TLP with Point Type of **Discrete Outputs**, the desired logical number, and EU Value parameter.
- Configure the PID point with a Control Type of Override Control. This causes available fields to appear on the PID screen to enter the I/O definition of the process variable and setpoint for both the Primary and Override loops. Select a TLP with Point Type of Orifice Meter Run Values, the desired Logical Number, and a parameter of Flow Rate Per Day for the Primary process variable. For the Override process variable, select a TLP with Point Type of MVS, the desired Logical Number, and a parameter of SP Reading. Leave the Setpoint I/O Definition undefined, because you enter the values. The setpoint for the Primary loop is the desired amount of flow per day. The setpoint for the Override loop is the pressure value where control should switch to the override loop. Set the Loop Period in seconds, typically one-fourth of the time required for the actuator to move the valve from fully open to fully closed.
- On the Tuning tab, select the Override Type Select of Low. This selects the lower of the change in outputs from the primary and secondary loops. As the pressure approaches the Override setpoint, the pressure (Override) loop pinches back the output. At the point that the pressure loop requests an output change less than the flow (primary) loop, the output from the pressure loop is selected and controls the valve. Set the Scale Factor for each of the Primary and Override loops as (span of output)/(span of input).

Both loops have scale factors, which permit the control action to close the valve when the process variable is above the setpoint. With the scale factor set according to the above formula, the initial settings for gain, reset, and rate produce stable control (under most circumstances). Gain controls the magnitude of the initial change in output for a given change in the process variable (or setpoint). Reset controls the magnitude of the change in output based on the continuing difference between the process variable and the setpoint over time. You can then adjust these values to produce the desired control actions.

7.2.3 Radio Power Control

Note: This option is **not** commonly used in the DL8000.

Select **Configure > Control > Radio Power Control** to conserve battery power to a radio or any other communicating device.

Radio power is controlled either by the DTR signal or by a discrete output. Because there are separate Radio Control points for COM1 and COM2, radio power cycling for COM1 can be configured differently from that for COM2, including independent timer values and separate output controls using the Output Definitions options.

For each Radio Power Control point, the power cycling can be configured to automatically change three times a day. During each of these three periods, called Zone 1, Zone 2, and Zone 3, the ON and OFF times can be set up to operate at various intervals to conserve battery power. The figure below is a graphical depiction of how the power control operates within each time "zone."

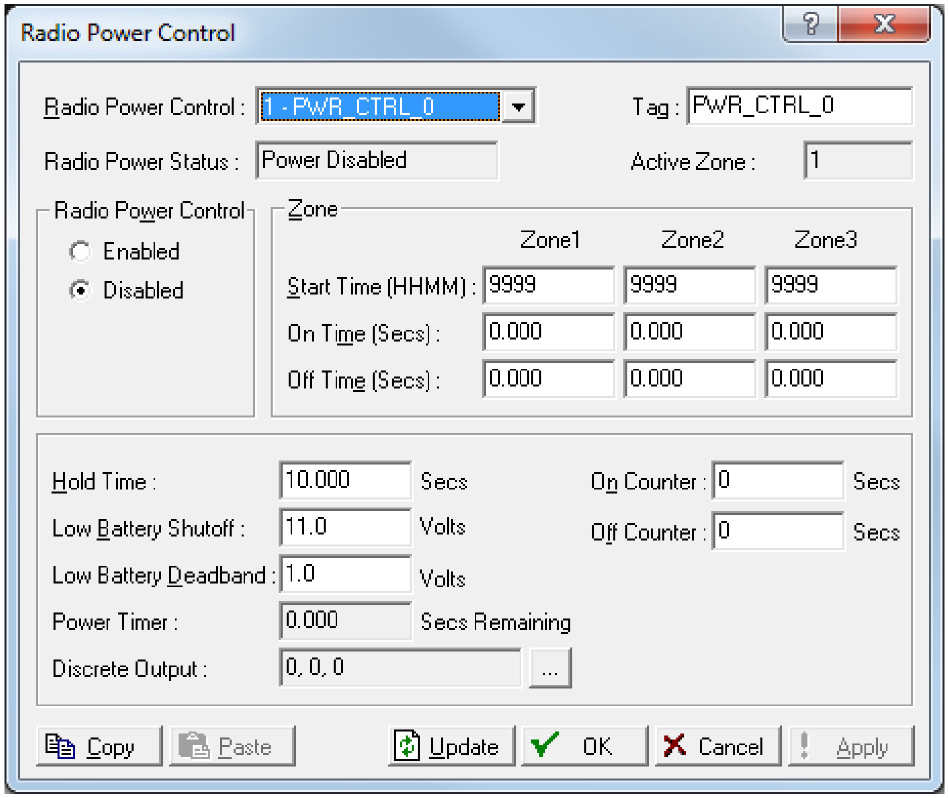


Figure 7-88. Radio Power Control

During the ON time:

- The power output DO is switched to **ON**. DTR signal for the Comm Port is activated.
- Communications may occur.

During the OFF time:

- The power output DO is set to **OFF**. DTR signal for the Comm Port is in-activated.
- Communications may not occur.

If communications occur during the ON time, the ON time is extended by the Hold Time. The DO and DTR signal remains ON and receive interrupts remain enabled for the duration of the Hold Time.

When you **Enable** the Radio Power Control parameter, radio power cycling is activated. The Low Battery Shutoff parameter allows power cycling to be automatically disabled whenever the input voltage to the ROC falls below the specified threshold.

To use Radio Power Control, select **Configure > Radio Power Control**.

After configuring the Radio Control points, click **Apply**. Save the configuration to programmable memory using the **Flash Memory Save Configuration** function in the **ROC > Flags** screen.

Field	Description
Radio Power Control Point	Selects a point to configure.
Tag	Sets a 10-character name to identify this point with its respective comm port.
Radio Power Status	Indicates the current status of the Power Control function of Power Enabled (On), Power Disabled (Off), or RBX.
Active Zone	This **read-only** field shows which zone is currently activated for determining the Start Time, On Time, and Off Time. Some of the On Time is also used by the radio during power-up initialization of the receiver, causing part of the On Time to be unavailable for receiving requests.
Radio Power Control	Enables or disables the Radio Power Control function.
Zone	Sets the **Zone** parameters to indicate when Radio Power Control is active and inactive for various Zones. **Start Time** in hours and minutes (HHMM) that the respective Zone begins. Time is expressed in local time, 24-hour clock. For example: "1500" under Zone 2 means that the associated On Time and Off Time are used beginning at 3:00 p.m. The Zone is active unit the start time for the next zone is encountered. **On Time** during a control cycle when the output is in the ON state. **Off Time** during a control cycle that the output is in the OFF state. **Note:** The On Time and Off Time alternate throughout the period the zone is active.
Hold Time	Sets the time that the output remains ON after detection of communications activity in Seconds or Minutes depending on the Time Units mode. This value applies to all Zones. When communications occur during the On Time, the On Time is extended by the Hold Time. The DTR signal and discrete output remain in the ON state. If a Spontaneous-Report-by-Exception (SRBX) message needs to be sent to the host computer, the radio power will be turned on for the Hold Time allowing the SRBX message to be transmitted. The Hold Time should be configured for a length of time long enough to allow the ROC to receive a response back from the host.

Field	Description
Low Battery Shutoff	Sets a value that specifies the voltage at which Power Control is automatically disabled. The voltage being sensed is the System AI Battery Input voltage (0 to 1). The Low Battery Shutoff parameter allows power cycling to be automatically disabled whenever the input voltage to the ROC falls below the specified threshold. The default value is 11 volts. Radio Power Control is automatically enabled again when the input voltage rises up to this value.
Low Battery Deadband	Sets the value to add to the Low Battery Shutoff to determine when the Radio Power Control function is enabled again and allows the DO to turn on when needed.
Power Timer	This **read-only** field shows the amount of time (On Time, Off Time, or Hold Time) that the Radio Control is currently using. The value is the number of seconds or minutes remaining.
Discrete Output	Sets which DO point to use to power the radio.
On Counter	Sets the value to indicate the cumulative time that the Power Control has been in the ON state in seconds or minutes.
Off Counter	Sets the value to indicate the cumulative time that the Power Control has been in the OFF state in seconds or minutes.

7.2.4 Sampler/Odorizer

Note: This option is **not** currently supported in the DL8000.

7.3 History Segment Configuration

Select **Configure > History Segments**. The number of History Points available in each Segment is determined by the History Segment Configuration screen. Once the History Segment has been configured, you may configure the History Points in each Segment.

Note: Assign only **one** station per history segment.

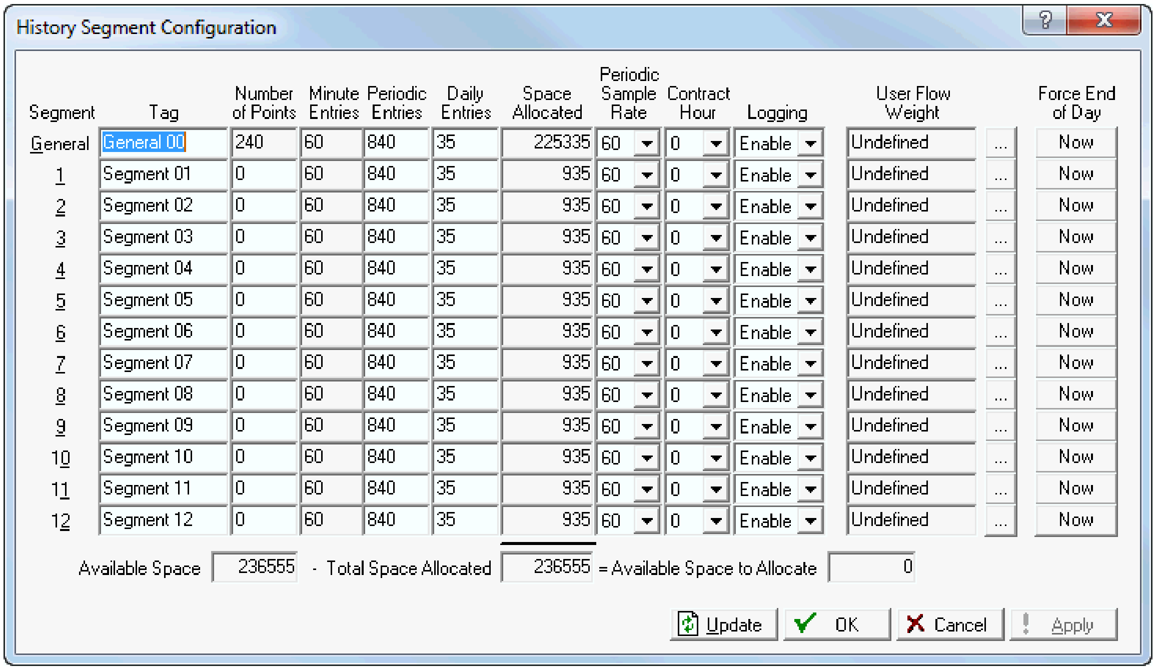


Figure 7-89. History Segments

For a DL8000, you can distribute history points among history segments 1 through 13 and the General History Segment. For each history segment, you can configure the number of periodic history values archived, the frequency of archiving the periodic values, the number of daily values archived, and the contract hour for each Segment. The number of minute values is fixed at 60. Additionally, you can enable or disable logging and force the logging of daily values on a per Segment basis. In addition, you can enable or disable logging and force the logging of a daily value on a per-segment basis.

In history segments 1 through 13, the number of points in the segment is configurable. The maximum total number of points available for all history points in all segments is 240, but may be less depending on the number of periodic and daily values configured. The number of points in the general history segment is determined by the system, based on remaining memory. All history points in a segment share the same time stamps, with one time stamp allotted for each of the minute, periodic, and daily logs available in that segment.

You can tie history segments 1 through 13 to meter stations by configuring the history segment under **Meter > Setup > Station**. This allows the history segment to inform the station when the contract hour has occurred so that the station can maintain daily and monthly accumulations, and to retrieve the appropriate flow dependency and flow weighting factors. This also allows the station to inform the history segment that a configuration parameter has changed, and therefore periodic values need to be logged, per API Section 21.1.

Once you configure the history segment you can configure the points in each segment.

Field	Description
Tag	Sets a name for each segment that identifies the group of historical points to be archived there.
Number of Points	Sets the number of history points required for segments 1 through 10 for a DL8000 Series1 or 1 through 13 for a DL8000 Series 2. For a DL8000 Series 1 device, the maximum number of **200** points is based on 60 minute values, 840 periodic values logged hourly (35 days x 24 hours per day) and 35 daily values for a total of 187,000 history values. Each Segment also has storage allotted for the time stamp values with a default of 935 time stamps per Segment (60 minute times stamps + 840 periodic time stamps + 35 daily time stamps) x 11 Segments for a total of 10,285 time stamp values. The 197,285 Available Space shown on the ROCLINK 800 History Segment Configuration screen indicates the total of history and time stamp values. Space Allocated = (Number of Points + 1) x (Minute Entries + Periodic Entries + Daily Entries) For a DL8000 Series 2 device, the maximum number of **240** points is based on 60 minute values, 840 periodic values logged hourly (35 days x 24 hours per day) and 35 daily values for a total of 187,000 history values. Each Segment also has storage allotted for the time stamp values with a default of 935 time stamps per Segment (60 minute times stamps + 840 periodic time stamps + 35 daily time stamps) x 14 Segments for a total of 13,090 time stamp values. ***The 197,285 Available Space shown on the ROCLINK 800 History Segment Configuration screen indicates the total of history and time stamp values.*** Space Allocated = (Number of Points + 1) x (Minute Entries + Periodic Entries + Daily Entries)
Minute Entries	This **read-only** field displays the number of entries in the minute log for this segment.
Periodic Entries	Sets the desired number of points in the Periodic (hourly) log. The Number of Entries (in the Periodic log) multiplied by the Periodic Sample Rate (minutes) will give the number of minutes before the periodic log begins to write over itself.
Daily Entries	Sets the desired number of **Daily Entries** in the Daily log.

Field	Description
Space Allocated	This **read-only** field displays how many history and time stamp entries are currently allocated by this segment.
Periodic Sample Rate	Setss the **Periodic Sample Rate** (minutes). This indicates how often a time-stamped value will be written to the Periodic Log. If this Segment is tied to a meter Station, an entry will also be written whenever a configuration change is made to a Station or meter that is part of that Station. All options for Periodic Sample Rates are evenly distributed into 60, and logging will be synchronized with the top of the hour.
Contract Hour	Sets the time when the daily values are logged. If this segment is tied to a meter station, this will also be the **Contract Hour** for the station and will be the time that daily and monthly (if it is the first of the month) accumulations will be reset. Additional entries will be made if Force End of Day is exercised for this segment.
Logging	Sets to enable or disable logging for all history points in the segment. Select **User** to indicate that the segment if for user program history.
User Flow Weight	Sets the input point from which to acquire the weight by which history points of the appropriate archive type within this segment will be averaged. This is typically a dynamic value, such as an accumulator or flowrate. **Notes**: ▪ This field applies **only to liquid meters**. Typical gas meter run history configurations do not make use of this feature. ▪ When using the Liquid Meter history configuration wizard for the ROC800L, this field will be automatically populated. ▪ **Only** history points with an Archive Type of **Avg - User Weighted** are averaged using this value. If no history points are configured or planned to be configured with this archive type, the User Flow Weight selection should be left undefined.
Force End of Day	Sets each segment to force logging of entries in the daily log for all history points in the segment.
Available Space	This **read-only** field shows the total number of history and time stamp entries possible. The maximum number of entries is **236,555**.
Total Space Allocated	This **read-only** field shows the number of history and time stamp entries allocated to all the segments.
Available Space to Allocate	This **read-only** field shows the number of entries unallocated. This number is the Available Space minus the Space Allocated.

7.4 History Point Configuration

The History options allow you to copy and store to the historical database data values and calculated variables stored in the current value database. You configure the historical database to log only the values that need to be logged. The system logs values in the standard (minute, hourly, daily) time base of the ROC, unless you use FST control. By using the FST Editor utility, you can use an FST to control the period under which the data is logged.

Note:

- Configure the History Points for each meter run to allow the EFM Report utility to properly access data.
- Configure gas meter history in segments 1-12 so that a segment number corresponds to a station number (that is, meter history for station 1 is in segment 1, and so on). This allows configuration changes to trigger archive records in accordance with API 2.1 guidelines.

Field	Description
Archive Type	Sets the **Archive Type** to specify how the logged value is calculated; included are some special purpose types for FST control. ▪ **Disabled/ Undefined** – Point not configured. ▪ **Avg – Flow Dependant Linear** – Discards samples when there is no measurable flow and performs a straightforward (linear) average of the remaining samples to compute the minute and hour values. This is the default method for calculating the average for the flow input and is the simplest and most commonly used method. For **differential** meters with analog input values, no flow conditions are defined as the differential pressure meter input less than or equal to the Low Flow Cutoff. For **pulse** meters with a pulse input values, no flow conditions are defined as the no flow time elapsing without receiving a pulse. A linear average of all samples is performed if there is no flow during the logging period. ▪ **Avg – Flow Dependant Formulaic** – Discards samples for periods when there is no flow (like the Flow-Dependent Linear method), but when calculating the average, this method typically takes the square root of each sample before averaging the samples together and then squares the result. This formulaic method typically produces a slightly lower value than the linear method.

Field	Description
	▪ **Avg – Flow Weighted Linear** – Determines a relative "weight" for each sample (without discarding any samples) by first multiplying the sample by a flow value (see below) and then calculates a linear average by dividing the sum of the flow-weighted sample by the sum of the flow values. This results in minute and hourly values that are more reflective of short periods of high flow. **Note:** The flow value used when calculating the relative weight for each sample is based on your meter type: **DP Meter** = Square root of the differential pressure measured during the sample period **Turbine/Auto-Adjust Meter** = Uncorrected volume flow rate measured during the sample period **Coriolis Meter** = Mass flow rate measured during the sample period ▪ **Avg – Flow Weighted Formulaic** – Combines the flow-weighting action with the formulaic averaging technique, both of which were described previously. ▪ **Avg – User Weighted** – Other flow weighted averaging archive types will weigh values against the gas flow from the associated gas meter run.Ave – User Weighted allows for the creation of flow weighted averages using any arbitrary user selected input point as the weighting factor. This technique multiplies a one-second sample of the configured User Flow Weight TLP (Configure>History Segments) by a one-second sample of the value and then divides the answer by the total accumulation over the time period (minute, hour or day).History points using this method will have a value of zero if no flow is accumulated during the time period, and therefore no weight. **Note:** This archive type is used only with liquid meters.Typical gas meter run history configurations do not make use of this feature. ▪ **Avg – Linear** – Averages one-second samples to compute minute, periodic, and daily values. ▪ **Accumulate/Second** – Sums one-second samples of a per second rate value over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/second.

Field	Description
	▪ **Accumulate/Minute** – Converts the one-second samples of a per minute rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/minute. ▪ **Accumulate/Hour** – Converts the one-second samples of a per hour rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/hour. ▪ **Accumulate/Day** – Converts the one-second samples of a per day rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/day. ▪ **Current Value** – Logs a snapshot of the current sampled value. ▪ **Totalize** – Logs the difference between the current value at the end of the period and the current value at the last logging interval. ▪ **Minimum Value –** Archive the minimum value read. ▪ **Maximum Value –** Archive the maximum value read. ▪ **FST Time - Minute** – Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note:** The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format MM: DD: HH:MM. The FST determines which index in the periodic archive to write to independently of the current index for the segment. ▪ **FST Time - Second** – Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note:** The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format DD: HH:MM:SS. The FST determines which index in the periodic archive to write to independently of the current index for the segment. ▪ **FST Data** – Allocates space for the FST to write values to the periodic archive using the WDB command. **Note:** The number of periodic entries in the segment determines the number of

Field	Description
	values that can be written. The FST determines which index in the periodic archive to write to independently of the segment's current index. ▪ **User Program Time** – This Archive Type should only be used as instructed in the respective user program documentation. ▪ **User Program Data** – This Archive Type should only be used as instructed in the respective user program documentation. You may enter a **User Description** of the selected Archive Point for identification purposes. Once you have determined what archive type to use, set the archive point by clicking the TLP Browse button that displays at the right-hand side of each Archive Point field. This displays a Select TLP dialog you use to configure the associated TLP.
Archive Point	Sets the point to enter in history. Click the TLP Browse button to display a Select TLP dialog you use to define the point type, logical number, and parameter to be archived.
Point Tag	This **read-only** field displays the name of the **Tag** associated with the Archive Point you selected.
User Description	Sets a description of the history point that you are storing. For example, you may enter Units or Engineering Units.
Current Value	This **read-only** field shows the last historical value recorded.
Last Daily Value	This **read-only** field shows the last daily historical value recorded.

7.4.1 History

The **Configure > History Points** option allows you to setup the History Points for any numeric parameter in the ROC to archive and to select which archiving method to use for each parameter.

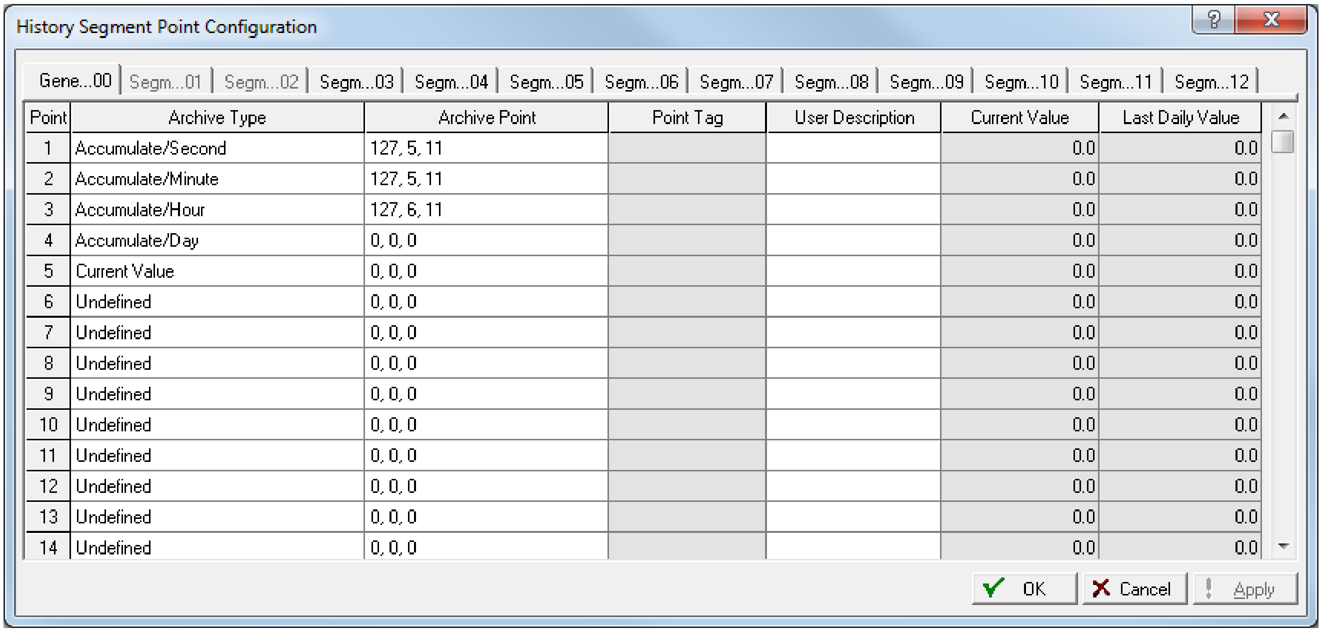


Figure 7-90. History Segment Point Configuration – General tab

The historical database can be configured to log only the values that you require to be logged. The values are logged in the standard (minute-hourly-periodic-daily) time base of the ROC, unless FST control is used. By using the FST Editor utility, the period at which the data is logged can be placed under FST program control. Periodic history can be configured for 1 to 6 minutes, 10 minutes, 15 minutes, 30 minutes, or in 60-minute frequencies.

The ROC maintains the following types of historical databases:

- Minimum/Maximum (Min/Max) Database.
- Minute Database.
- Periodic (Hourly) Database.
- Hourly Database.
- Daily Database.

The Min/Max Database is for viewing only and cannot be saved to a disk file.

Note: The time stamp used for standard logging of historical values reflects the time at the end of the period, not at the beginning. For example, data collected from 8:00 to 9:00 is time-stamped 9:00.

History values can be collected from the ROC via ROCLINK 800 or other third-party host systems. From the **View > History** selection, you can view history directly from the device or from a previously saved disk file.

The required History Points for AGA3 and AGA7 calculation methods are not pre-configured. You should begin the configuration of an AGA calculated Meter Run by configuring those points. Make sure that the History Points for each Meter Run are configured to allow the EFM Report utility to properly access data. Refer to *Section 7.4.3, Configuring History for EFM Reporting*.

Several options are available for the type of history values archived (Archive Type). Linear averaging is available for all parameters. Meter run and Station parameters may be averaged using one of the four averaging techniques recommended in API Section 21.1 (flow dependent linear, flow dependent formulaic, flow weighted linear, and flow weighted formulaic).

Parameters that represent a rate (engineering units/time period) may be accumulated (integrated) to give total values when the time period of the rate is specified. Parameters that represent an accumulated total can be totalized to give total values by taking the difference between the value at the end of the current logging period and the value at the end of the previous logging period. Finally, the current value of any parameter can be logged at the end of each logging period.

Note: In previous products, the totalize Archive Type was intended to be used for parameters that return to zero at contract hour. The Totalize Archive Type is intended to be used for parameters that represent on-going accumulators.

Field	Description
Archive Type	Sets the **Archive Type** to specify how the logged value is calculated; included are some special purpose types for FST control. ▪ **Disabled/ Undefined** – Point not configured. ▪ **Avg – Flow Dependant Linear** – Discards samples when there is no measurable flow and performs a straightforward (linear) average of the remaining samples to compute the minute and hour values. This is the default method for calculating the average for the flow input and is the simplest and most commonly used method. For **differential** meters with analog input values, no flow conditions are defined as the differential pressure meter input less than or equal to the Low Flow Cutoff. For **pulse** meters with a pulse input values, no flow conditions are defined as the no flow time elapsing without receiving a pulse. A linear average of all samples is performed if there is no flow during the logging period.

Field	Description
	▪ **Avg – Flow Dependant Formulaic** – Discards samples for periods when there is no flow (like the Flow-Dependent Linear method), but when calculating the average, this method typically takes the square root of each sample before averaging the samples together and then squares the result. This formulaic method typically produces a slightly lower value than the linear method. ▪ **Avg – Flow Weighted Linear** – Determines a relative "weight" for each sample (without discarding any samples) by first multiplying the sample by a flow value (square root of the differential pressure measured during the sample period) and then calculates a linear average by dividing the sum of the flow-weighted sample by the sum of the flow values. This results in minute and hourly values that are more reflective of short periods of high flow. ▪ **Avg – Flow Weighted Formulaic** – Combines the flow-weighting action with the formulaic averaging technique, both of which were described previously. ▪ **Avg – Linear** – Averages one-second samples to compute minute, periodic, and daily values. ▪ **Accumulate/Second** – Sums one-second samples of a per second rate value over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/second. ▪ **Accumulate/Minute** – Converts the one-second samples of a per minute rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/minute. ▪ **Accumulate/Hour** – Converts the one-second samples of a per hour rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/hour. ▪ **Accumulate/Day** – Converts the one-second samples of a per day rate value to a per second rate and sums them over the logging interval to compute the archived value. Select this archive type when the History Point being archived is a rate in EUs/day. ▪ **Current Value** – Logs a snapshot of the current sampled value. ▪ **Totalize** – Logs the difference between the current value at the end of the period and the current value at the last logging interval.

Field	Description
	▪ **Minimum Value –** Archive the minimum value read. ▪ **Maximum Value –** Archive the maximum value read. ▪ **FST Time - Minute** – Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note:** The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format MM: DD: HH:MM. The FST determines which index in the periodic archive to write to independently of the current index for the segment. ▪ **FST Time - Second** – Allocates space for the FST to write time-stamps to the periodic archive using the WTM command. **Note:** The number of periodic entries in the segment determines the number of time-stamps that can be written. The value takes the format DD: HH:MM:SS. The FST determines which index in the periodic archive to write to independently of the current index for the segment. ▪ **FST Data** – Allocates space for the FST to write values to the periodic archive using the WDB command. **Note:** The number of periodic entries in the segment determines the number of values that can be written. The FST determines which index in the periodic archive to write to independently of the segment's current index. ▪ **User Program Time** – This Archive Type should only be used as instructed in the respective user program documentation. ▪ **User Program Data** – This Archive Type should only be used as instructed in the respective user program documentation. You may enter a **User Description** of the selected Archive Point for identification purposes. Once you have determined what archive type to use, set the archive point by clicking the TLP button that displays at the right-hand side of each Archive Point field. This displays a Select TLP dialog you use to configure the associated TLP.
Archive Point	Sets the point to enter in history. Click the TLP Browse button to display a Select TLP dialog you use to define the point type, logical number, and parameter to be archived.

Field	Description
Point Tag	This **read-only** field shows the name of the **Tag** associated with the Archive Point you selected.
User Description	Sets a description of the history point that you are storing. For example, you may enter **Units** or **Engineering Units**.
Current Value	This **read-only** field shows the last historical value recorded.
Last Daily Value	This **read-only** field shows the last daily historical value recorded.

7.4.2 Undefining a History Point

To undefine a history point:

1. Select **Configure** > **History Points**. When the History Segment Point Configuration screen displays, click **Wizard**. The Meter History Configuration Wizard screen displays.
2. Select the **point** to delete.
3. Click **Undefine History**.
4. Click **Yes** in the confirmation prompt.

7.5 Opcode Table

Use the Opcode table to group data being polled for more efficient communications. You can assign parameters from different point types to the Opcode table data points, which can substantially reduce the number of polls from a host computer.

Note: Use of the term "opcode" in this context **does not** refer to the operator identification codes in ROC protocols.

1. Select **Configure** > **Opcode Table**. The Opcode Table Settings screen displays.
2. Review the fields for your organization's values.
3. Click **Apply** if you change any parameters on this screen.

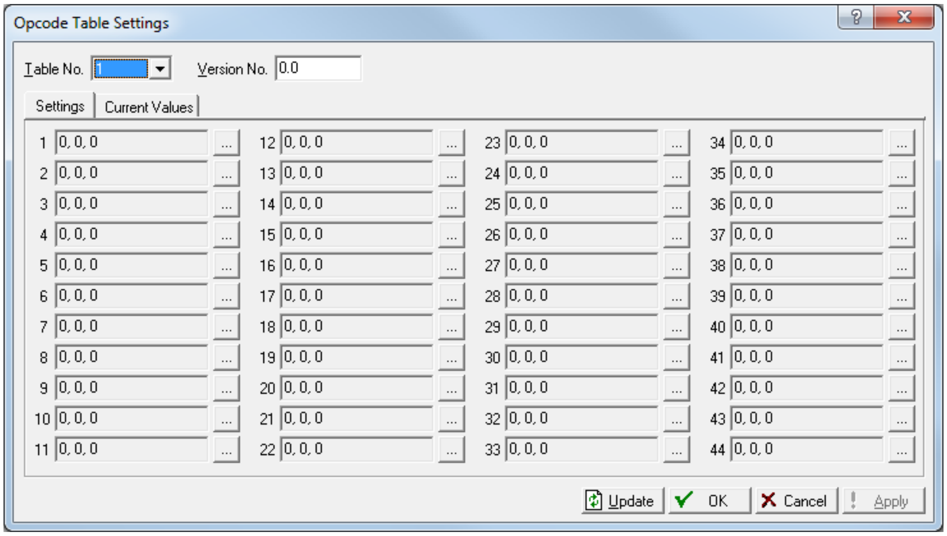


Figure 7-91. Opcode Table Settings

Field	Description
Table No.	Selects an Opcode table.
Version No.	Associates a version number with the Opcode table. By default, the version number (a floating point number) is one less than the number of the Opcode table. **Note:** If you change the configuration of data points, update the version number of the table.
Data	Assigns a value to each Opcode data point. Click the TLP Browse button to display a Select TLP dialog. Use the dialog to map values into the Opcode table data point. If a host computer asks for a specific Opcode data point, the ROC returns the value that is referred by the mapped TLP.

7.6 Modbus Communications

This section describes how to configure the ROC to communicate using the Modbus protocol and integrate the ROC and Modbus devices into the same host/slave system.

The DL8000 can act as a slave or a host device and does not require a user program.

The Modbus Master mode of operation, which is enabled by selecting the correct port owner designation in the **ROC > Comm Ports** screen, allows the DL8000 to simulate a Master device that can poll other Modbus devices for data and stores the data in TLP locations within the DL8000. The TLPs can be virtually any location within the ROC, such as softpoints, FST Registers, User Program TLPs, and point types (AGA or I/O). You can map Modbus Registers to any TLP with the correct data types and conversions configurations.

The DL8000 can also send commands to set outputs and write data to a Slave device. COMM1, COMM2, COMM3, COMM4, and COMM5 support Modbus Host in the DL8000. Modbus Host is not supported on the LOI (Local Port). For more information on Modbus Master configuration and functionality, refer to the discussion of the Modbus Master Table tab.

In Slave mode, the data link between the Host device and the DL8000 can use any of the communications ports. When using a dialup modem, you can only designate communications to switch between ROC or Modbus Slave. The Ethernet port can always recognize Modbus messages. The system limits Modbus TCP/IP slave connections to six.

Note: For more information about Modbus communications on the Ethernet port, refer to *Chapter 3, Section 3.4.1, Configuring TCP/IP Communications on the Ethernet Port*.

Any serial or modem communications port configured with a Port Owner of ROC Plus Protocol/Modbus Slave (**ROC > Comm Ports**) automatically determines if the incoming communication request is in ROC Protocol or Modbus Protocol. The ROC responds using the same protocol as the incoming request.

The Ethernet communications port automatically determines if the incoming communications request is in ROC Protocol, Modbus RTU encapsulated in TCP/IP, or Modbus TCP/IP Protocol. The ROC responds using the same protocol as the incoming request.

7.6.1 Modbus Configuration

Use this option to set basic Modbus communication parameters. The General tab sets the basic communication parameters. The Scale Values tab allows you to enter eight low and high floating-point scale values with one low and high integer values for converting floating-point numbers to a scaled integer. Select **Configure > MODBUS**. The Modbus Configuration screen displays.

Use the following tabs to configure a Modbus component.

- Use the **General** tab to configure Modbus communication parameters.
- Use the **Scale Values** tab to convert floating point numbers to scaled integers.
- Use the **Master Table** tab to map Modbus registers to specific TLP numbers.
- Use the **Master Modem** tab to configure the ROC to communicate to multiple Slave devices through modems and phone lines.
- Use the **Registers tab** to map Modbus registers to specific TLP numbers.

- Use the **History Table** tab to configure the Periodic and Daily history values, Event records, and Alarm records for retrieval through Modbus Protocol, using Function Code 03.

Note: After you configure a point and click **Apply**, click **Flash Memory Save Configuration** (on the **ROC > Flags** screen) to save the configuration to permanent memory in case you must perform a cold start.

Modbus: General Tab

The Modbus Configuration screen initially displays the General tab. Use this tab to configure basic Modbus communication parameters.

1. Select **Configure** > **MODBUS**. The Modbus Configuration screen displays.
2. Review the fields for your organization's values.

Note: This screen initially displays with **Local Port** as the default comm port. The example screen uses the RS-485 choice so that all the possible fields on this screen display.

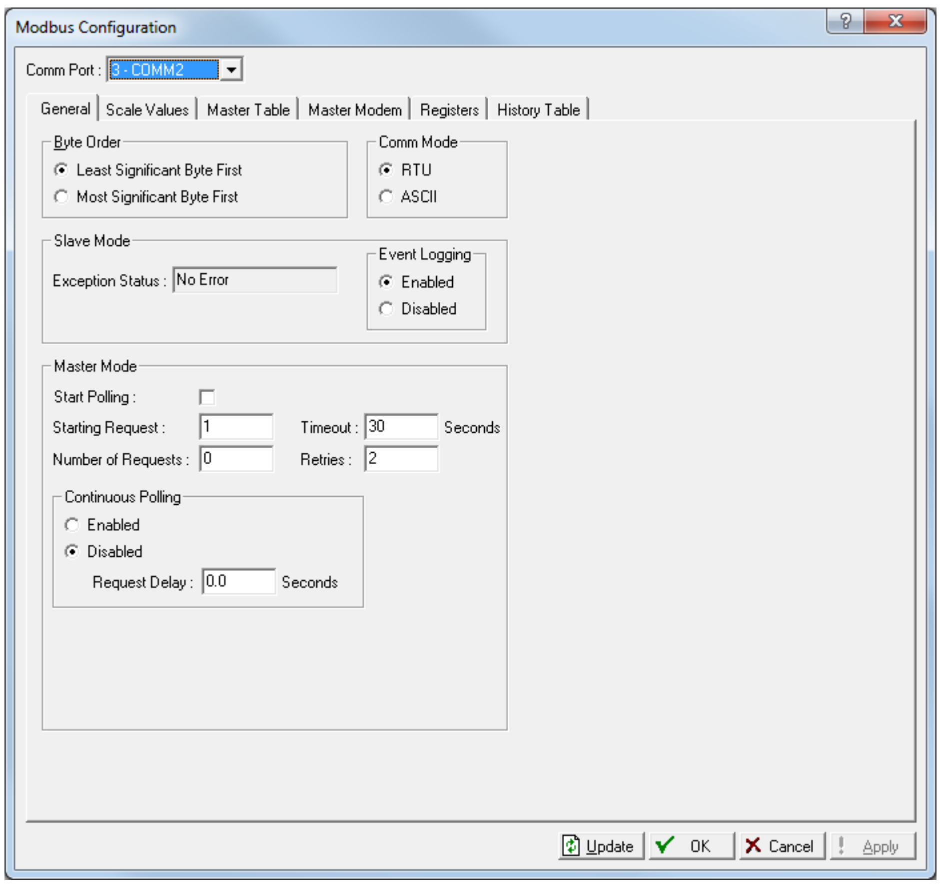


Figure 7-92. Modbus Configuration – General tab

Field	Description
Comm Port	Selects a comm port to configure. Click ▼ to display all defined comm ports. **Note:** This screen's Master Mode frame **does not** display if you select either **Local Port** or **LCD Port** as a comm port option.
Comm Mode and Modbus Type	Sets the communications mode for the selected comm port. The Modbus protocol supports two modes of transmission, **ASCII** and **RTU**. **RTU** is the default. **Note:** You must configure all devices in the same communications network with the same mode of transmission. Additionally, In either ASCII or RTU mode, the transmitting device places the Modbus message into a frame that has a known beginning and ending point. ▪ **ASCII** – **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange mode represents each 8-bit byte of data as two ASCII characters that are the hexadecimal representation of the value. This allows the messages to be read with the use of a dumb terminal, but uses twice as many characters as the RTU mode. Each character sent is composed of a start bit, 7 or 8 data bits, and one or two stop bits with Even, Odd, or No parity. ASCII mode uses Longitudinal Redundancy Checking (LRC) error checking. ▪ **RTU** – **R**emote **T**erminal **U**nit mode allows for greater character density and better data throughput than ASCII for the same baud rate. Each message is transmitted in a continuous stream. Data is sent in 8-bit binary characters. RTU mode uses Cyclic Redundancy Check (CRC) error checking. By default, RTU is enabled. In either mode, ASCII or RTU, a Modbus message is placed by the transmitting device into a frame that has a known beginning and ending point.

ASCII Message Framing					
Begin of Frame	Address	Function	Data	LRC Error Check	End
:	2 Chars	2 Chars	N Chars	2 Chars	CRLF
RTU Message Framing					
Begin of Frame	Address	Function	Data	CRC Error Check	End
T1-T2-T3-T4	1 Byte	1 Byte	N * 1 Byte	2 Bytes	T1-T2-T3-T4

Field	Description
Byte Order	Sets the order of data bytes in a transmission or requests, which can be reversed. This only affects the Data field of a Modbus message and has no effect on the data bytes for Function Codes 01, 02, and 05. Valid values are **Least Significant Byte First** (places the Least Significant Byte first; this is the default value) and **Most Significant Byte First** (places the Most Significant Byte first).
Exception Status	This **read-only** field shows the error message for the last Modbus message received. **Note:** This field applies only in Slave mode.
Event Logging	Sets whether the system writes to the Event log all parameter changes made via Modbus. Valid values are **Enabled** (logs all events) or **Disabled** (does not log events). **Enabled** is the default.
Start Polling	Controls whether the system begins a Modbus Master polling sequence. The default is off. The system clears this field when the polling sequence completes. **Note:** You must have previously selected **Modbus Master** as the port owner on the Comm Port screen (**ROC > Comm Ports**). The ROC begins polling at the value defined in the Starting Request field and proceeds through the entries in the table.
Starting Request	Sets a beginning value from which the Modbus Master polling sequence begins. This number corresponds to a line number on the Modbus Master Table associated with this comm port.
Number of Requests	Sets the total number of requests the Modbus Master makes for this polling sequence. This value specifies the total number of lines in the Master tables on which to execute the polls. The default value **0** prevents the polling from occurring. **Note:** You can define up to three Modbus Master tables for this comm port. The tables are contiguous. If you indicate more requests that are on a single table, the system accesses the second or third table to complete the request.
Timeout	Sets the amount of time, in seconds, that the Master (Host) waits to receive a valid message after the ROC or sends a request to a device. **Note:** Do not enter **0** (zero) in this field.
Retries	Sets the number of times (after the initial try) that the Master ROC attempts to establish communications with the specified device before reporting a timeout error. Valid values are between **0** and **25**; the default is **2**.

Field	Description
Modbus Continuous Polling	Indicates whether the system continually executes the Modbus Master polling sequence. Valid values are **Enabled** (polling occurs continually) or **Disabled** (polling occurs only as requested). **Note:** Use the **Request Delay** field to schedule the continual polling.
Request Delay	Sets a delay time, in seconds, between polling request sequences. This field is valid **only** when you enable Continuous Polling. **Note:** The system considers each line in a Modbus Master Table as a request.

Modbus: Scale Values Tab

Use the Scale Values tab to define eight low and high floating-point scale values, each with a low and high integer values, used to convert floating-point numbers to a scaled integer.

The system uses integer scale values and the float scale values in conjunction with one another whenever you use the Convert Code 1 through 8. In older Modbus devices, the system exchanged data without applying scaling using raw A/D counts sent between devices.

Scaling factors allow values to be exchanged between Modbus, emulating raw, unscaled values. For example, a 4 to 20 mA loop might have a raw A/D value in which 4 mA equaled 800 counts and 20 mA equaled 4095 counts. At midrange (12 mA), the raw A/D count would be 2448. If this AI signal was representative of a 0 to 250 pound pressure, 4 mA would equal 800 counts (or 0 PSIG), 20 mA would equal 4095 counts (or 250 PSIG), and midrange at 12 mA would equal 2448 counts (or 125 PSIG).

Convert Codes 1 to 8 support both reads and writes.

1. Select **Configure** > **MODBUS** > **Scale Values** tab. The Scale Values screen displays.

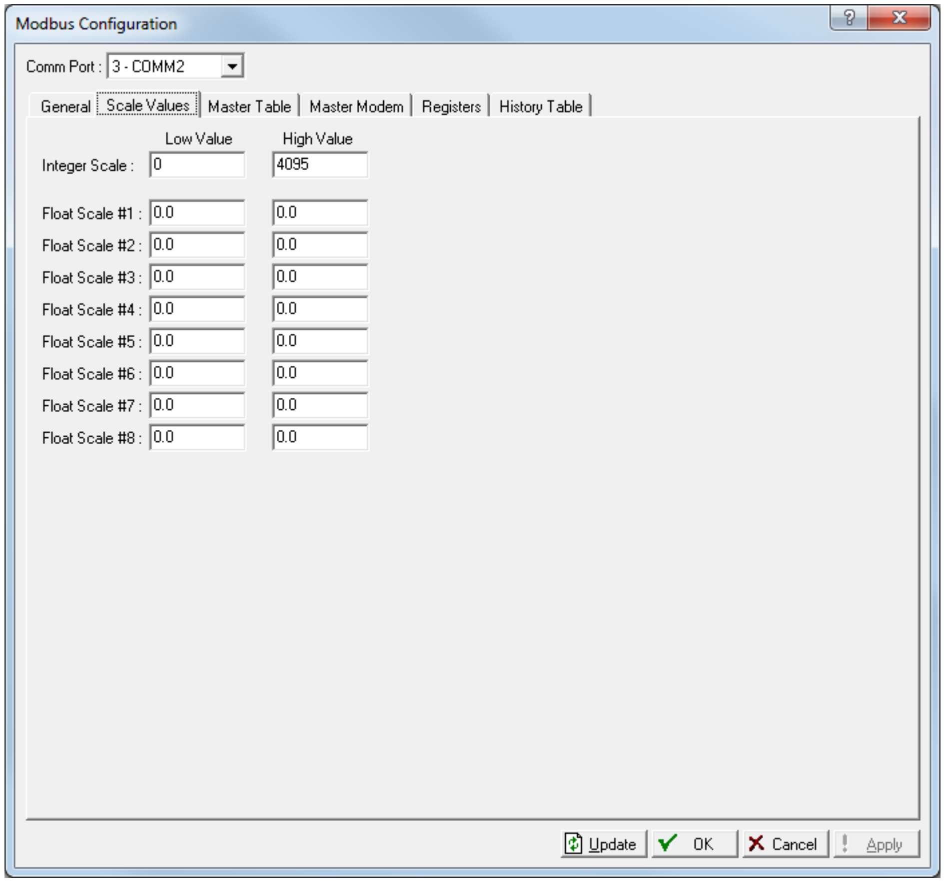


Figure 7-93. Modbus Configuration – Scale Values tab

Field	Description
Integer Scale - Low and High Values	Sets values the system uses to scale analog I/O to integer values with an implied decimal point. The **Low Value** determines the low integer scaling that represents the data and the **High Value** represents the highest integer value used to scale the data. The **High Value** and **Low Value** fields are signed integers and can range from – 32768 to 32767.
Float Scale #	Scales data in conjunction with the Low and High Integer Scale values. Provide high and low values for each float scale #. For host systems that do not accept floating-point numbers, you can specify eight sets of floating-point ranges for values. This allows the host to read and set floating-point values (such as PID setpoints, softpoint values, and flow values) as integer values. The system converts floating-point values to integers by configuring a register or range of registers with the Conversion field set in the Modbus Registers definition configuration to a Convert Code from 1 to 8.

Field	Description
	The system uses the following equations to convert **floating point values to integers**: ▪ Float Range = High Value Float Scale – Low Value ▪ Float Scale (for example, 100.0 = 120.0 – 20.0) ▪ Integer Range = High Value Integer Scale – Low Value Integer Scale (for example, 6000 = 7000 – 1000) ▪ Adjusted Reading = Float Reading – Low Value Float Scale (for example, 50.0 = 70.0 – 20.0) ▪ Integer = [(Integer Range x Adjusted Reading) Float Range] + Low Integer Scale (for example, 3500 = [(6000 x 50.0) 100.0] + 1000) The system uses the following equations to convert **integers to floating point values**: ▪ Float Range = High Value Float Scale – Low Value ▪ Float Scale (for example, 100.0 = 120.0 – 20.0) ▪ Integer Range = High Value Integer Scale – Low Value Integer Scale (for example, 6000 = 7000 – 1000) ▪ Adjusted Integer = Integer Sent – Low Value Integer ▪ Scale (for example, 3000 = 4000 – 1000) ▪ Float Value = [(Adjusted Integer x Float Range) Integer Range] + Low Float Scale (for example, 70.0 = [(3000 x 100) 6000] + 20)

Modbus: Master Table Tab

The Modbus Master mode of operation allows a ROC to simulate a master device that can poll other devices for data and to store that data within the ROC in any valid TLP. The ROC can also send commands to set outputs and write data to a slave device.

You can configure the Modbus Master functionality on the EIA-232 (RS-232), EIA-485 (RS-485), Ethernet (COMM1) and modem communications ports (COMM1 to COMM5).

Each command can transmit or receive up to 240 bytes of data. ROCLINK 800 supports Modbus function codes 1, 2, 3, 4, 5, 6, 15, and 16. Function codes 1 to 4 **request** data from slaves, while function codes 5, 6, 15, and 16 **transmit** data to a slave device.

Each master request you configure uses data read from or written to registers defined in the Modbus Registers table. When using Modbus function codes 1 to 4, the ROC reads data from a slave device and writes it to the TLP specified in the Modbus Registers table. When using Modbus function codes 5, 6, 15, and 16, the ROC reads data from the TLP specified in the Modbus Registers table and writes it to the slave device.

You can use an FST or User C program to schedule Modbus master requests. Enable the comm port on the Comm Port screen (**ROC > Comm Ports**). Set the Start Polling option on the Modbus General screen (**Configure > MODBUS > General**) if continuous polling is desired. Alternately, you can manage, enable, or disable master polling using a control application. Using FSTs, the ROC can dial other Modbus slave devices at regular intervals.

Select **Configure** > **MODBUS** > **Master Table** tab. The Master Tables screen displays.

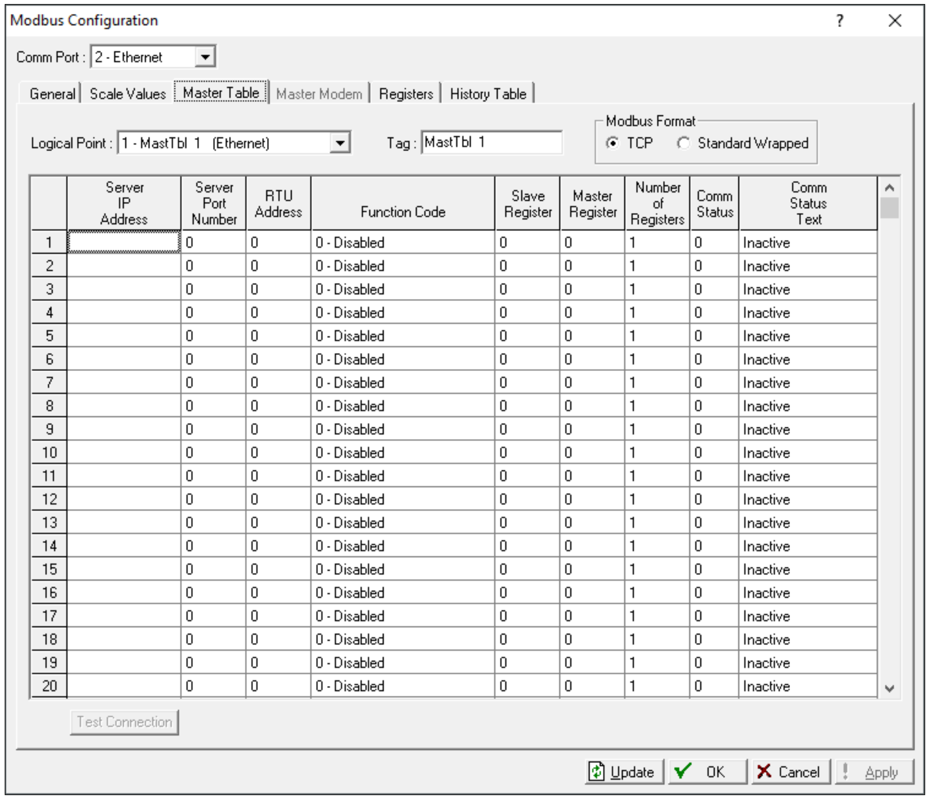


Figure 7-94. Modbus Configuration - Master Table

Field	Description
Logical Point	Sets the logical point of the communication port. **Note:** You can configure the Modbus Master functionality on the EIA-232 (RS-232), EIA-485 (RS-485), and modem communications ports (COMM1 to COMM5). The LOI (Local Port) ports does not support Modbus Master communications.

Field	Description	
Modbus Format	Sets the format of Modbus messages sent from this device. Possible options are: **Note:** This field displays **only** if you select the Ethernet port in the Comm Port drop-down list.	
	TCP	Adds a 6 byte header to Modbus messages, and then encapsulates it for transmission over TCP/IP. This is the default. The header consists of the following: ▪ A 2 byte transaction ID that increments for each packet sent. ▪ A 2 byte protocol ID. The protocol ID for Modbus is 0. ▪ A 2 byte indicator of the packet length.
	Standard Wrapped	Encapsulates Modbus messages for transmission over TCP/IP. **Note**: Use this option **only** with legacy devices that do not support the additional header added with the TCP format.
Server IP Address	Specifies the IP address of the device to be polled. **Note:** This field displays **only** if you select the Ethernet port in the Comm Port drop-down list.	
Server Port Number	Specifies the IP port number of the device to be polled. **Note:** This field displays **only** if you select the Ethernet port in the Comm Port drop-down list.	
Tag	Sets a 10-character alphanumeric identifier for the master table.	
RTU Address	Sets the RTU address for the slave device to be queried.	
Function Code	Sets the Modbus function code to be sent to the slave device. Select the field and click ▼ to display all valid function codes.	
Slave Registers	Sets the starting register number from which data is drawn from the slave device.	
Master Registers	Sets the starting register number into which data is stored on the master device.	
Number of Registers	Sets the total number of registers to poll.	
Comm Status	This **read-only** field shows the status of the query. Refer to *Table 7-4*.	

Table 7-3. Status of Host Request or Command

Status	Description
0	Inactive or Start of Transmission
1	Receive Timeout Error
2	Received Address Check
3	Received Function Number Check
4	Number of expected bytes Check
5	Receiving Slave Response
6	CRC or LRC Check
7	CRC or LRC Check
8	Valid Slave Response
128	Write Device Data Error
129	Access Device Data Error
130	Host Function Table Error
131	Transmit Timeout Error
144	Transmit or Receive Buffer Overflow
145	Invalid Function Number in Request

Modbus: Master Modem Tab

Select **Configure > MODBUS > Master Modem** tab to display the Master Modem screen. As a Modbus Master, the ROC may have to communicate to multiple slave devices through modems and phone lines. The Modbus Master Modem screen provides the necessary parameters to configure the modems and map RTU Addresses to phone numbers.

COMM1 through COMM5 support Modbus master functionality; the LOI (Local Port) does not.

This communications point associates a Modbus Slave RTU Address to their respective phone numbers (Connect Command). Up to six different Modbus Slaves can be dialed up through one communications port. The ROC will retry three times to establish a connection with a slave.

Configuring a Modbus Host

To configure a Modbus host:

1. Configure **ROC > Comm Ports**. The Comm Port screen displays**.**
2. Define the **Modbus Registers** within the host by mapping them to TLPs. Define Modbus Registers that will "hold" the information that will be transmitted and received by the Host.
3. Define the polling sequence to designate with which Modbus devices (**RTU Addresses**) are communicated and what **Slave Registers** will be read to and which **Master Registers** (Host) will be written out by the Host.

4. Select **Configure** > **MODBUS** and configure Modbus to format the data correctly.
5. Select **Configure** > **Modbus** > **Master Modem** tab.
6. Initiate polling by setting the **Modbus Master Modem** parameters.

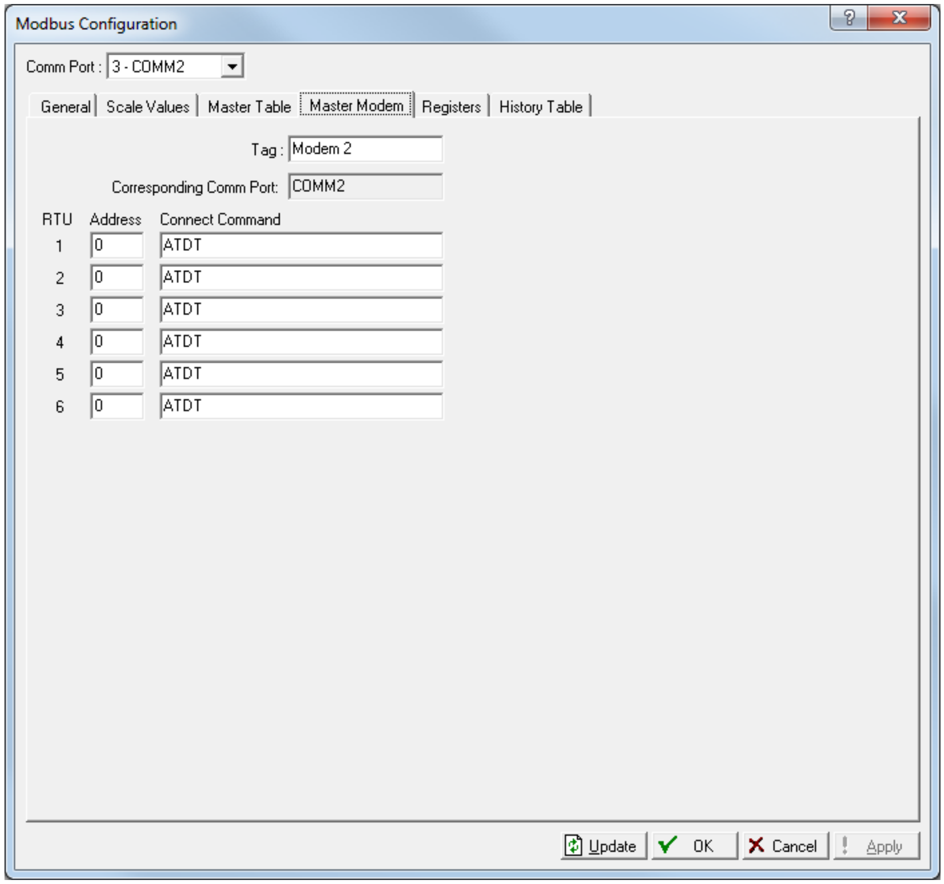


Figure 7-95. Modbus Configuration - Master Modem tab

Field	Description
Tag	Sets a 10-character identifier for the master modem.
Corresponding Comm Port	Sets the communications port with which to associate the master modem port.
RTU Address	Sets the **RTU Address** of the slave device to be associated with the Connect Command. Up to six different Modbus slave devices can be dialed up through one communications port.
Connect Command	Sets the **Connect Command** (telephone number) to be sent to the slave device.

Only COMM1 to COMM5 support Modbus Master functionality; the LOI (local Port) port does not.

Modbus: Registers Tab

Use Modbus Register tables to map Modbus registers to specific TLP numbers. You can map one line in the Modbus Register table to more than one register or TLP pair by using either Point Indexing or Parameter Indexing.

- **Point Indexing** maps the starting register to the selected TLP. Subsequent registers (through the ending register) map to the same point type and parameter and increment the **point logical** number.
- **Parameter Indexing** maps the starting register to the selected TLP. Subsequent registers, (through the ending register) map to the same point type and point logical number and increment the **parameter** number.

Point Indexing Example

When using **Point Indexing** the configuration of:

Starting Register	Ending Register	Device Parameter(s)	Indexing	Conversion
100	103	AIN, 4-1, EU	Point	0

specifies four registers (100, 101, 102, and 103) that are mapped to a group of analog input (AIN) values in engineering units (EU) starting at the analog input in the fourth module location, first position (4-1).

- Register 100 = EU of AIN point in location 4-1.
- Register 101 = EU of AIN point in location 4-2.
- Register 102 = EU of AIN point in location 4-3.
- Register 103 = EU of AIN point in location 4-4.

Parameter Indexing Example

When using **Parameter Indexing** the configuration of:

Starting Register	Ending Register	Device Parameter(s)	Indexing	Conversion
109	114	FST 1, R1	Parameter	1

specifies six registers (109, 110, 111, 112, 113, and 114) that are mapped to a group of FST 1 parameters starting at FST Register 1.

- Register 109 = Register 1 of FST Point Number 1.
- Register 110 = Register 2 of FST Point Number 1.
- Register 111 = Register 3 of FST Point Number 1.
- Register 112 = Register 4 of FST Point Number 1.
- Register 113 = Register 5 of FST Point Number 1.
- Register 114 = Register 6 of FST Point Number 1.

Use conversion code 1 (Float to Integer, Float Scale 1) to convert the floating point value to an integer before the response message returns to the host. Once you map a register, you can reference it in any Modbus request, providing the data type of the TLP is appropriate for the Function Code.

Notes:

- If the native ROC data type does not meet the requirements of the Modbus host device, conversion codes are available to convert the data to the required data type. Refer to *Table 7-6, Modbus Convert Codes*.
- You can select to have the mapping apply to all ROC communication ports or on a selected port only.

When a device receives a Modbus request, it searches for the referenced register(s). If it finds a register number match, it builds a response based on the device point type and parameter configured in the table. If the device cannot find a register number match, it returns an error message.

1. Select **Configure** > **MODBUS** > **Registers** tab. The Modbus Registers screen displays.
2. Review the fields for your organization's values.

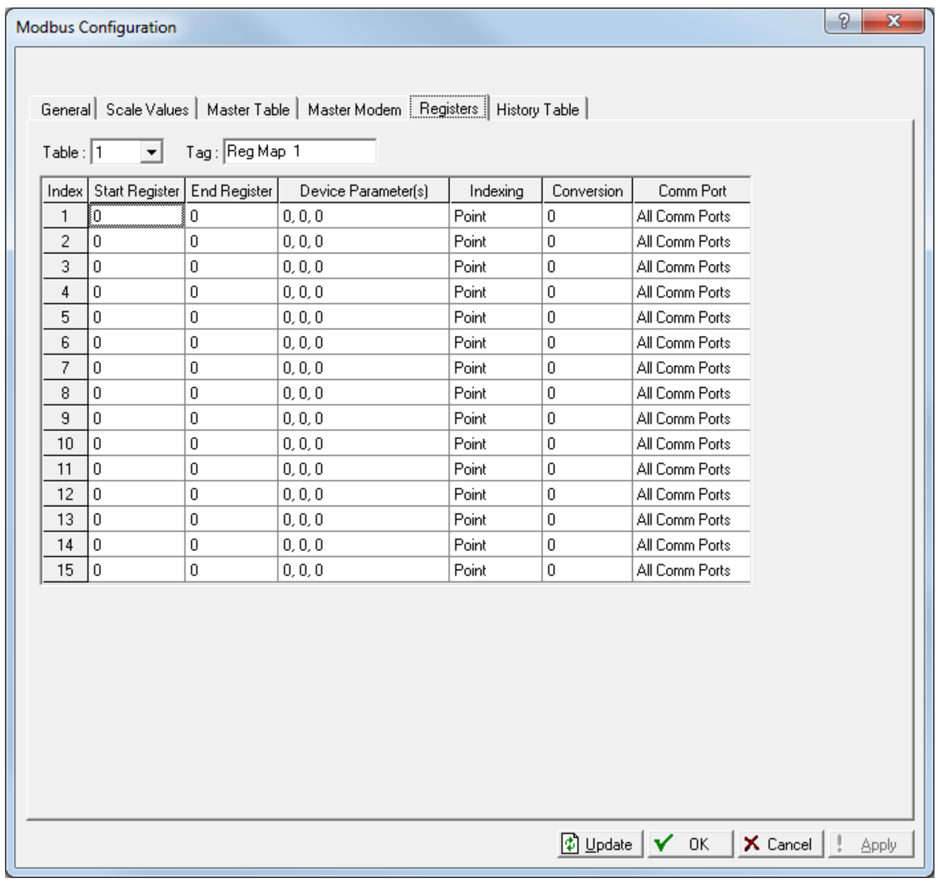


Figure 7-96. Modbus Configuration – Registers tab

Field	Description
Table	Selects a table to which you map registers. Each table entry can define multiple registers by using either Point Indexing or Parameter Indexing. By making the registers continuous (when the Start Register address of a new line is one greater than the End Register address of the previous line) you can create a continuous data table for Modbus Function Codes 3, 4, or 16 up to the limit of 240 bytes per request. This type of data table allows access to all its data with one request. Map Periodic (Hourly) or Daily History Index registers to the TLP for the Periodic Index (Point Type 124, Parameter 5) or Daily Index (Point Type 124, Parameter 6)..
Tag	Sets a 10-character alphanumeric identifier for this table.
Modbus Function Codes	Sets a Modbus function. Valid values (and meanings) are:

Code	Meaning	Action
01	Read Logic Coil Status	Obtain current status (ON/OFF) of a group of logic coils (outputs).
02	Read Discrete Input Status	Obtain current status (ON/OFF) of a group of discrete inputs.
03	Read Output Registers (Holding)	Obtain current binary value in one or more holding registers.
04	Read Input Registers	Obtain current binary value in one or more input registers.
05	Force Single Logic Coil	Force logic coil to a state of ON or OFF. Acknowledge Alarm or Event request.
06	Preset Single Holding Register	Place a specific binary value into a holding register.
15	Force Multiple Logic Coils	Force a series of consecutive logic output coils to defined ON or OFF states.
16	Preset Multiple Holding Registers	Place specific binary values into a series of consecutive holding registers.

Field	Description
Start Register	Sets the first data register in the address span. Any number from 0 to 65535 is valid. You can duplicate register numbers as long as you assign them to **separate** communication ports. Number the tables from smallest to largest. In certain Modbus Host devices, the register 40101 is actually transmitted as "100". The value "100" should be placed in this field as the ROC uses the actual number sent by the Host. For example, the Host device requests the Starting Register 500 through Ending Register 700. The Starting Register is 400 and the Ending Register is 700. All register numbers requested by the Host (500 through 700) are valid and would be responded to because the requested register numbers match or fall in between the Starting Register and Ending Register numbers (400 through 700).
End Register	Sets the last register in the address span. Compute the value for this field by adding the total number of registers used to the Start Register number and subtracting 1.
Device Parameter	Defines the parameter of the point types to set or to acquire. Be aware of the different data types (Character, Integer, Long, Float) and the size of the data types. Use the Select TLP button to select parameters. This field indicates the type of data associated with an address (defined by the Start Register through the End Register). When the host requests a valid range of register numbers, the function code tells the slave what to do and between which registers (Start Register through End Register).
Indexing	Sets a block of register values as successive Logical Point Numbers or Parameters without having to define each separately. Valid values are **Point Indexing** or **Parameter Indexing**. **Point Indexing** maps the Start Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Point Type and Parameter and increment the point Logical Number. **Parameter Indexing** maps the Start Register to the selected Device Parameter. Subsequent registers, through the End Register, are mapped to the same Point Type and point Logical Number, and increment the Parameter Number.

Field	Description
Conversion	Sets the type of conversion performed (if any) on data before it is either sent to the Host or written to the ROC The conversions are used to allow for differences in data types between the Master and Slave devices. Conversion Codes affect Function Codes 3, 4, 6, 8, and 16.
Comm Port	Sets the comm port affected by the register. Register numbers should be unique for any given communications port. Registers may be duplicated, as long as they are assigned to separate ports. If a register number is duplicated within the port, the first occurrence is used.

Modbus: History Table Tab

Use this tab to configure the Modbus History. Select **Configure** > **MODBUS** > **History Table** tab. The History Table screen displays.

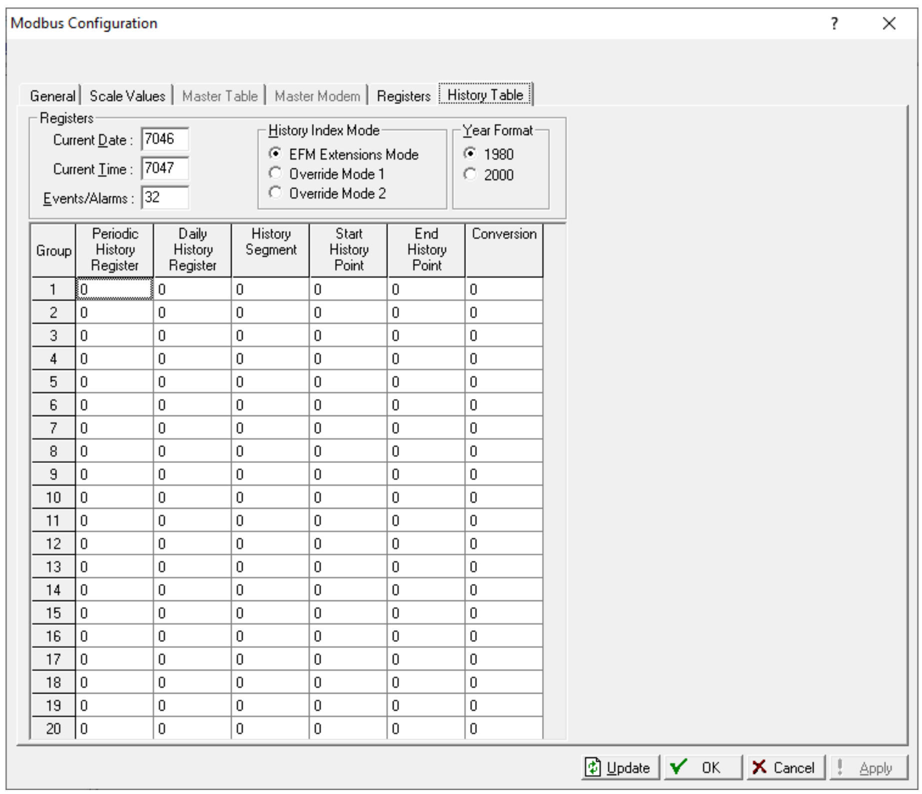


Figure 7-97. Modbus Configuration - History Table tab

The Modbus History Table allows the Periodic and Daily history values, Event records, and Alarm records to be configured for retrieval through Modbus Protocol, using Function Code 03. Three registers are defined to retrieve the current date in the ROC, the current time in the ROC, and the Event/Alarm records. The Modbus History Table also allows the Periodic and Daily registers to be defined for up to twenty groups of History Points.

Note: Before you configure the Modbus History, configure the **Configure > History Segments** and **Configure > History Points**.

The **Event Registers** and **Alarm Registers** are Modbus Register Numbers used to acquire the **Current Date** value, **Current Time** value, and **Event Log** and **Alarm Log**. Enter registers or use the defaults. Using the defaults is highly recommended. The Current Date and Current Time values identify the current date and time from the ROC and may be most useful when you desire the date and time as floating point numbers in the format of DDMMYY and HHMM. For more information on the Modbus retrieval of the Event Log and Alarm Log, refer to *Section 7.6.4, Modbus Events & Alarms*.

Select **Configure > Modbus > History**. Communications functionality allows the Periodic (Hourly) and Daily history values and Event/Alarm records to be retrieved through Modbus protocol using Function Code 03.

Each historical record contains a time and date stamp with all history archives or values for which the Register Number is configured.

The Modbus Function Code 03 and the History Archive Register are used to collect the archived data. Two separate Modbus registers indicate the current Periodic (Hourly) and Daily history index. These can be configured on the Modbus Registers screen as the Periodic (Hourly) History Index Register and the Daily History Index Register for the Segment being referenced (subtract 1 to get the last archived value). These indexes identify the current history archive at which data is about to be logged.

When the ROC receives a Function Code 03 request referencing the Periodic History Index (commonly Register 7161) or Daily History Index (commonly Register 7160), the value returned is interpreted as an index into the specified History Log. The Host reads the indexes and then compares the index to the last polled history index that the Host maintains and decides whether to request history.

If the Host decides to request history, the reply message contains the date and time stamp and historical values configured for the specified Register for that index.

The response message contains two floating-point values for the time and date stamp of the history archive and floating point values for each of the defined History Points for that History Archive Register.

The date stamp for history uses the current year and does **not** figure the number of years since 1980. For example, if the current year is 2007, the year (YY) for the date stamp would be 07.

History collection is mapped on the Modbus History Table.

Field	Definition
Current Date	Sets the register number to acquire the current date. The default is **7046**.
Current Time	Sets the register number to acquire the current time. The default is **7047**.
Events/Alarms	Sets the Modbus Register Number to acquire the most current **Event** and **Alarms Log entry**. The default is **32**.
History Index Mode	Sets the **History Index Mode**. Internally, the History Index is stored as the location in the historical database where the next record will be written, accounting for rollover based on the total number of records configured. It is a zero-based index. For example, if there are 35 daily entries configured, valid indexes are **0** to **34**. The History Index Mode allows you to modify the History Index value and history record returned as follows: ▪ **EFM Extensions Mode** – History Index will be returned as one less than the internal History Index, accounting for rollover (the index to the most recent data record written). History data will be returned for the index requested. For example, if there are 35 daily entries, valid indexes are 0 to 34. If the internal index is 5, 5 represents the index where the next record will be written. A request for the current index will return 4 (one less) and a request for data at index 4 will return the last record written at index 4. ▪ **Override Mode 1** – History Index will be returned as stored internally in the historical database (index to the next record to be written) and history data values will be returned for the index requested. For example, if there are 35 daily entries, valid indexes are 0 to 34. If the internal index is 5, 5 represents the index where the next record will be written. A request for the current index will return 5 and the host must request data at index 4 to get the most recent record.

Field	Definition
	▪ **Override Mode 2** – History Index will be returned as stored internally in the historical database (index to the next record to be written), but the history values returned will be for one less than the index requested, accounting for rollover. For example, if there are 35 daily entries, valid indexes are 0 to 34. If the internal index is 5, 5 represents the index where the next record will be written. A request for the current index will return 5, but a request for history values at index 5 will actually return values at index 4. In addition, this mode will return history values at the last valid index if an index of greater than or equal to the number of records is requested. For example, if there are 35 daily entries, valid indexes are 0 to 34. A request for history values at index 35, 36, 37, and so on will return history values at index 34.
Year Format	Sets the reference date for time stamp conversion for Modbus EFM Events & Alarms. Valid values are **1980** and **2000**.

Table 7-4. Modbus History, Event, and Alarm Functionality

Function Code	Register Field	Data Field	Description
05	32 – Event/Alarm Register	Ignored	After Events and Alarms have been returned, there must be an acknowledgment made so that the same Events and Alarms are not returned on the next request.
03	703 – Daily History	Daily History Archive Register Index (0 to 34)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.
03	704 – Hourly History	Hourly or Periodic History Archive Register Index (0 to 839)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.
03	X – Extended History	Extended History Archive Register Index (0 to Max)	Response contains two floating point values for the time and date stamp of the history archive (time stamp = HHMMSS and date stamp = MMDDYY) and floating point values for each of the defined History Points for that History Archive Register.

1. The Hourly (periodic) Index, Daily Index, Event, and Alarm Log data fields are used to address a history index number.

Function Code	Register Field	Data Field	Description

2. The Event and Alarm Log record consists of the bytes shown in *Table 7-8, Modbus Event and Alarm Log Contents*. A breakdown of the bit map in Byte 1-2 is given in *Table 7-9, Event & Alarm Change Bit Map Contents*.

Field	Description
Group	Sets a contiguous group of history points from a single segment. You can access the values through a Modbus function code 03 request for a user-defined Modbus register. Twenty groups are available.
Periodic and Daily History Registers	Sets the Modbus Register Number to acquire the group of history points defined in the Start History Point and End History Point fields. One Register (commonly Register 704) can retrieve periodic data and another Register (commonly Register 703) can retrieve daily data for the Group of History Points. The time Period for the Periodic history is set on the **Configuration > History Segment** configuration screen (if the Period is set as 60, this will be Hourly history).
History Segment	Sets a segment from which the ROC acquires the history. Make sure you configure this segment through the **Configure > History Segments** screen. The General Segment displays on this table as **0**.
Starting History Point	Sets the starting history point (first retrieved history point) for a group of points, you define in the Register Number field. You must complete both this field and the Ending History Points field. The value in the Ending History Points field must be different and larger than this value.
Ending History Point	Sets the ending history point (last retrieved history point) for a group of points, as defined in the Register Number field. You must complete both this field and the Starting History Points field, and the value in the Starting History Points field must be different and smaller than this value.
Conversion	Sets the type of data conversion (if any) before the data returns to the host or is written to the ROC Conversions allow the unit's floating point values to transmit or receive as integer values. *Table 7-9, Event & Alarm Change Bit Map Contents* lists the Convert Codes.

7.6.2 Modbus Conversion Codes

Modbus conversion codes convert data into a format that is compatible to a Modbus device.

Use the Conversion field (located on either the Modbus Registers or Modbus History screen) to specify the type of conversion you require, if any, on the data before it is either sent to the host/slave or written to the ROC. Conversions account for differences in data types between the master and slave devices.

Conversion codes 65 to 72 allow a 4-byte IEEE formatted floating-point number to be sent or received in two Modbus registers with the byte orders configurable. A check is made to ensure that an even number of registers is requested, that the Start Register number does not begin in the middle of a register pair, and that the number of registers does not exceed the number of registers you configure.

Modbus Convert Codes

The Modbus Conversion field corresponds to every register or range of registers set up. The Conversion field parameter specifies the type of conversion required, if any, on the data before it is sent to the master or before it is written to the ROC.

The conversions are used to allow integer values to be transmitted and received instead of floating-point values. The conversions only affect Function Codes 02, 03, 04, 06, and 16. The following table describes the type of conversion to take place on the register or range of registers:

Table 7-5. Modbus Convert Codes

Convert Code	Description	Slave Function	Definition
0	No Conversion	N/A	N/A
1	Float to Signed Integer, Float Scale 1	3,4	The Float to Signed Integer conversion changes the ROC floating point data to a two-byte signed integer for transmission. The number of the Conversion Code specifies which floating point scaling value is to be used for the conversion.
2	Float to Signed Integer, Float Scale 2	3,4	
3	Float to Signed Integer, Float Scale 3	3,4	
4	Float to Signed Integer, Float Scale 4	3,4	
5	Float to Signed Integer, Float Scale 5	3,4	
6	Float to Signed Integer, Float Scale 6	3,4	
7	Float to Signed Integer, Float Scale 7	3,4	
8	Float to Signed Integer, Float Scale 8	3,4	

Conversion codes 1 through 8, Float to Signed Integer are calculated as:

Integer = [(Integer Range x Adj Reading)]/Float Range] + Low Integer Scale

Where:

Float Range = High Float Scale — Low Flow Scale

Integer Range = High Integer Scale — Low Integer Scale

Adj Reading = Float Reading — Low Flow Scale

Convert Code	Description	Slave Function	Definition
9	Any Type to Signed Long with 1 Implied Decimal Place	3,4,6,16	Value within ROC is multiplied by 10.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 12).
10	Any Type to Signed Long with 2 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 123).
11	Any Type to Signed Long with 3 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 1000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 1234).
12	Any Type to Signed Long with 4 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 10000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 12345).
13	Any Type to Signed Long with 5 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 123456).
14	Any Type to Signed Long with 6 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 1000000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 1234567).
15	Any Type to Signed Long with 7 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 10000000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 12345670).
16	Any Type to Signed Long with 8 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100000000.0 and converted to a signed 32 bit integer. (A value of – 1.234567 would be sent as – 123456700).
17	Any Type to Signed Long with 1 Implied Decimal Place	3,4,6,16	Value within ROC is multiplied by 10.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 12).
18	Any Type to Signed Long with 2 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 123).
19	Any Type to Signed Long with 3 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 1000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 1234).
20	Any Type to Signed Long with 4 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 10000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 12345).
21	Any Type to Signed Long with 5 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 123456).
22	Any Type to Signed Long with 6 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 1000000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 1234567).

Convert Code	Description	Slave Function	Definition
23	Any Type to Signed Long with 7 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 10000000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 12345670).
24	Any Type to Signed Long with 8 Implied Decimal Places	3,4,6,16	Value within ROC is multiplied by 100000000.0 and converted to a signed 32 bit integer. (A value of 1.234567 would be sent as 123456700).
25	Any Type to Float, No Scaling	3,4,6,16	Changes any ROC data type (except an ASCII tag) to a four-byte floating point without scaling. The conversion is typically performed using a type cast. This is for both transmitting and receiving.
26	Any Type to Signed Short Integer	3,4,6,16	Changes any ROC data type (except an ASCII tag) to a two-byte signed short integer. This is for both transmitting and receiving.
27	Any Type to Signed Long Integer	3,4,6,16	Changes any ROC data type (except an ASCII tag) to a four-byte signed long integer. This is for both transmitting and receiving
28	Any Type to Unsigned Short Integer	3,4,6,16	Changes any ROC data type (except an ASCII tag) to a two-byte unsigned signed short integer. This is for both transmitting and receiving.
29	Any Type to Unsigned Long Integer	3,4,6,16	Changes any ROC data type (except an ASCII tag) to a four-byte unsigned long integer. This is for both transmitting and receiving.
30 to 36	No Conversion	N/A	N/A
37	Unsigned Byte to Packed Bit	3,4,6,16	Response is identical that for a function 1 or 2 request. All registers in the range requested must be unsigned integer 8 values and have a conversion code of 37
38 to 40	No Conversion	N/A	N/A
41	Any Type to Signed Short Implied 1	3,4,6,16	Value within ROC is multiplied by 10.0 and converted to a signed 16 bit integer. (A value of – 0.12345 would be sent as – 1).
42	Any Type to Signed Short Implied 2	3,4,6,16	Value within ROC is multiplied by 100.0 and converted to a signed 16 bit integer. (A value of – 0.12345 would be sent as – 12).
43	Any Type to Signed Short Implied 3	3,4,6,16	Value within ROC is multiplied by 1000.0 and converted to a signed 16 bit integer. (A value of – 0.12345 would be sent as – 123).
44	Any Type to Signed Short Implied 4	3,4,6,16	Value within ROC is multiplied by 10000.0 and converted to a signed 16 bit integer. (A value of – 0.12345 would be sent as – 1234).
45	Any Type to Signed Short Implied 5	3,4,6,16	Value within ROC is multiplied by 100000.0 and converted to a signed 16 bit integer. (A value of – 0.12345 would be sent as – 12345).
46	Any Type to Signed Short Implied 6	3,4,6,16	Value within ROC is multiplied by 1000000.0 and converted to a signed 16 bit integer. (A value of – 0.01234567 would be sent as – 12345).
47	Any Type to Signed Short Implied 7	3,4,6,16	Value within ROC is multiplied by 100000.0 and converted to a signed 16 bit integer. (A value of – 0.0012345 would be sent as – 12345).

Convert Code	Description	Slave Function	Definition
48	Any Type to Signed Short Implied 8	3,4,6,16	Value within ROC is multiplied by 1000000.0 and converted to a signed 16 bit integer. (A value of – 0.0001234567 would be sent as – 12345).
49	Any Type to Unsigned Short Implied 1	3,4,6,16	Value within ROC is multiplied by 10.0 and converted to an unsigned 16 bit integer. (A value of 0.1234567 would be sent as 1).
50	Any Type to Unsigned Short Implied 2	3,4,6,16	Value within ROC is multiplied by 100.0 and converted to an unsigned 16 bit integer. (A value of 0.1234567 would be sent as 12).
51	Any Type to Unsigned Short Implied 3	3,4,6,16	Value within ROC is multiplied by 1000.0 and converted to an unsigned 16 bit integer. (A value of 0.1234567 would be sent as 123).
52	Any Type to Unsigned Short Implied 4	3,4,6,16	Value within ROC is multiplied by 10000.0 and converted to an unsigned 16 bit integer. (A value of 0.1234567 would be sent as 1234).
53	Any Type to Unsigned Short Implied 5	3,4,6,16	Value within ROC is multiplied by 100000.0 and converted to an unsigned 16 bit integer. (A value of 0.1234567 would be sent as 12345).
54	Any Type to Unsigned Short Implied 6	3,4,6,16	Value within ROC is multiplied by 1000000.0 and converted to an unsigned 16 bit integer. (A value of 0.01234567 would be sent as 12345).
55	Any Type to Unsigned Short Implied 7	3,4,6,16	Value within ROC is multiplied by 10000000.0 and converted to an unsigned 16 bit integer. (A value of 0.001234567 would be sent as 12345).
56	Any Type to Unsigned Short Implied 8	3,4,6,16	Value within ROC is multiplied by 100000000.0 and converted to an unsigned 16 bit integer. (A value of 0.0001234567 would be sent as 12345).
57	Any Type to Signed Long 0, 1, 2, 3	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 0-1-2-3. Note: 0 = Byte MSB and Byte 3 = LSB
58	Any Type to Signed Long 1, 0, 3, 2	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 1-0-3-2. Note: 0 = Byte MSB and Byte 3 = LSB
59	Any Type to Signed Long 2, 3, 0, 1	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 2-3-0-1. Note: 0 = Byte MSB and Byte 3 = LSB
60	Any Type to Signed Long 3, 2, 1, 0	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 3-2-1-0. Note: 0 = Byte MSB and Byte 3 = LSB
61	Any Type to Unsigned Long 0, 1, 2, 3	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 0-1-2-3. Note: 0 = Byte MSB and Byte 3 = LSB
62	Any Type to Unsigned Long 1, 0, 3, 2	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 1-0-3-2. Note: 0 = Byte MSB and Byte 3 = LSB

Convert Code	Description	Slave Function	Definition			
63	Any Type to Unsigned Long 2, 3, 0, 1	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 2-3-0-1. Note: 0 = Byte MSB and Byte 3 = LSB			
64	Any Type to Unsigned Long 3, 2, 1, 0	3,4,6,16	Response is similar to dual register floating point conversions. Dual register: byte order 3-2-1-0. Note: 0 = Byte MSB and Byte 3 = LSB			
65 to 72	IEEE Floating Point Number	3,4,16	Conversion Codes 65 to 72 allow a four-byte IEEE 754 formatted floating point number to be sent or received in two Modbus registers with the byte orders configurable. Since these conversions require two registers. A check is made to ensure that an even number of registers is requested, that the starting register number does not begin in the middle of a register pair, and that the number of registers does not exceed the number of registers configured.			
			Byte 0	**Byte 1**	**Byte 2**	**Byte 3**
			seee eeee	emmm mmmm	mmmm mmmm	mmmm mmmm
			Where s = sign bit, e = exponent bit, m = mantissa bit **Note**: Each conversion code is listed individually below.			
65	IEEE Floating Point Number	3,4,16	Places byte 0 and byte 1 in register XXXXXX and places byte 2 and byte 3 in register XXXXXX + 1.			
			Register XXXXXX		byte 0, byte 1	
			Register XXXXXX + 1		byte 2, byte 3	
66	IEEE Floating Point Number	3,4,16	Places byte 0 and byte 1 in register XXXXXX and places byte 2 and byte 3 in register XXXXXX + 1. Same as conversion code 65 regardless of MSB 1st flag.			
			Register XXXXXX		byte 0, byte 1	
			Register XXXXXX + 1		byte 2, byte 3	
67	IEEE Floating Point Number	3,4,16	Places byte 0 and byte 1 in register XXXXXX and places byte 2 and byte 3 in register XXXXXX + 1.			
			Register XXXXXX		byte 0, byte 1	
			Register XXXXXX + 1		byte 2, byte 3	
68	IEEE Floating Point Number	3,4,16	Places byte 0 and byte 1 in register XXXXXX and places byte 2 and byte 3 in register XXXXXX + 1. Same as conversion code 67 regardless of MSB 1st flag.			
			Register XXXXXX		byte 1, byte 0	
			Register XXXXXX + 1		byte 3, byte 2	
69	IEEE Floating Point Number	3,4,16	Places byte 2 and byte 3 in register XXXXXX and places byte 0 and byte 1 in register XXXXXX + 1.			
			Register XXXXXX		byte 2, byte 3	
	v		Register XXXXXX + 1		byte 0, byte 1	
70	IEEE Floating Point Number	3,4,16	Places byte 2 and byte 3 in register XXXXXX and places byte 0 and byte 1 in register XXXXXX + 1. Same as conversion code 69 regardless of MSB 1st flag.			
			Register XXXXXX		byte 2, byte 3	

Convert Code	Description	Slave Function	Definition	
			Register XXXXXX + 1	byte 0, byte 1
71	IEEE Floating Point Number	3,4,16	Places byte 3 and byte 2 in register XXXXXX and places byte 1 and byte 0 in register XXXXXX + 1.	
			Register XXXXXX	byte 3, byte 2
			Register XXXXXX + 1	byte 1, byte 0
72	IEEE Floating Point Number	3,4,16	Places byte 3 and byte 2 in register XXXXXX and places byte 1 and byte 0 in register XXXXXX + 1. Same as conversion code 71 regardless of MSB 1st flag.	
			Register XXXXXX	byte 3, byte 2
			Register XXXXXX + 1	byte 1, byte 0
73	Double 01, 23, 45, 67, Disregard MSB flag	3,4,6,16	Places byte 0 and byte 1 in register XXXXXX, places byte 2 and byte 3 in register XXXXXX + 1, places byte 4 and byte 5 in register XXXXXX + 2, and places byte 6 and byte 7 in register XXXXXX + 3. This places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 0, byte 1
			Register XXXXXX + 1	byte 2, byte 3
			Register XXXXXX + 2	byte 4, byte 5
			Register XXXXXX + 3	byte 6, byte 7
74	Double 23, 01, 67, 45, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 2, byte 3
			Register XXXXXX + 1	byte 0, byte 1
			Register XXXXXX + 2	byte 6, byte 7
			Register XXXXXX + 3	byte 4, byte 5
75	Double 45, 67, 04, 23, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 4, byte 5
			Register XXXXXX + 1	byte 6, byte 7
			Register XXXXXX + 2	byte 0, byte 1
			Register XXXXXX + 3	byte 2, byte 3
76	Double 67, 45, 23, 04, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 6, byte 7
			Register XXXXXX + 1	byte 4, byte 5
			Register XXXXXX + 2	byte 2, byte 3
			Register XXXXXX + 3	byte 0, byte 1
77	Double 10, 32, 54, 76, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	

Convert Code	Description	Slave Function	Definition	
			Register XXXXXX	byte 1, byte 0
			Register XXXXXX + 1	byte 3, byte 2
			Register XXXXXX + 2	byte 7, byte 6
			Register XXXXXX + 3	byte 5, byte 4
78	Double 35, 10, 76, 54, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 3, byte 2
			Register XXXXXX + 1	byte 1, byte 0
			Register XXXXXX + 2	byte 7, byte 6
			Register XXXXXX + 3	byte 5, byte 4
79	Double 54, 76, 10, 32, Disregard MSB flag	3,4,6,16	Places byte 0 and byte 1 in register XXXXXX, places byte 2 and byte 3 in register XXXXXX + 1, places byte 4 and byte 5 in register XXXXXX + 2, and places byte 6 and byte 7 in register XXXXXX + 3. This places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 5, byte 4
			Register XXXXXX + 1	byte 7, byte 6
			Register XXXXXX + 2	byte 1, byte 0
			Register XXXXXX + 3	byte 3, byte 2
80	Double 76, 54, 32, 10, Disregard MSB flag	3,4,6,16	Places an 8-byte double value into four 2-byte registers to allow double values to be transmitted. Ignores the Byte Order field in the Modbus Configuration screen.	
			Register XXXXXX	byte 7, byte 6
			Register XXXXXX + 1	byte 5, byte 4
			Register XXXXXX + 2	byte 3, byte 2
			Register XXXXXX + 3	byte 1, byte 0
81	ASCII	3,4,6,16	Breaks an ASCII string parameter into multiple 2-byte registers. Number of registers id dependent upon the size of the string. Supports strings of 3, 7, 10, 12, 20, 30, and 40 bytes. Odd sized strings are padded with a space character.	
82 to 255	No conversion	N/A	N/A	

7.6.3 Modbus Events and Alarms

To view the Modbus Event Log and Alarm Log, select **Configure > Modbus**. Select the **History Table** tab. The History Table displays.

The record formats for the event log and alarm log are the same size and have similar contents. The first word in a record is a bit map in which bit 9 indicates if the log record is an Event (1) or an Alarm (0). The meanings of the other bits are specific to either the Event or the Alarm Log records. Refer to *Table 7-11, Event & Alarm Change Bit Map Contents*.

The ROC supports the Modbus with EFM extensions method for retrieving alarms and events. When the ROC receives a Function Code 03 request referencing defined Events and Alarms Register (usually 32), the ROC begins to collect records from first the Event Log and then the Alarm Log, starting where the last poll left off. The ROC collect records until **either** there are not any more new events, alarms, **or** it collects the maximum of 12 records. The ROC sends the information back to the Host, which in return replies with Function Code 05, referencing the same Events and Alarms Register, indicating that the points have been received and that the Host is ready for the next 12 records.

The following paragraphs detail how ROCLINK 800 places event log and alarms log information in Modbus event and alarm messages and how (or what) is generated upon the event or alarm condition.

Normal Event Record

A normal event record has the format:

Bit Map		Register		Time as float				Date as float				Old Value as float				New Value as float			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

System Text Events

When you set the System Command Change Bit (bit 7) in the Operator Change Bit Map of the Event, it sets the Register number for all System Command Change events will be set to the Event/Alarm Register number (default is **32**).

Bit Map		Register		Time as float			Date as float					Code	Text						
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

ROCLINK 800 uses this format for the following event codes:

- 144 Initialization Sequence
- 146 Initialize From Defaults
- 147 ROM CRC Error
- 148 Database Initialization
- 150 Program Flash
- 248 Text Message
- 249 Download Configuration
- 250 Upload Configuration
- 251 Calibration Timeout
- 252 Calibration Cancel
- 253 Calibration Success

FST Events

For FST events, the code is the FST number (1 to 6). Unused will be set to zero.

Bit Map		Register		Time as float				Date as float				Code		Unused		Value as float			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Time-related System Events The time is the number of seconds since April 1, 1970. Unused will be set to zero.

Bit map		Register		Time as float				Date as float				Code		Unused		Time as time_t			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Events are formatted as:

- 145 All Power Removed
- 200 Clock Set

Alarms Use the Alarms table to determine the alarming source. The Register number for all unmapped Alarms will be set to the Event/Alarm Register number (default is **32**).

Follows is a normal alarm record format:

Bit map		Register		Time as float				Date as float				Value as float				Unused			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Unmapped Parameter Alarms If the alarming point is not mapped to a Modbus Register, identifying the point using the following table. The TLP will be the source TLP of the alarm. The type will be set to 1

Bit Map		Register		Time as float				Date as float				Value as float				TLP			Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

FST Alarms If the Alarm is an FST Alarm, ROCLINK 800 uses the following format. The FST Number is the source FST Number that generated the alarm. Unused is set to zero and the type is set to 2.

Bit Map		Register		Time as float				Date as float				Value as float				FST#	Unused		Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

User Text Alarms A User Text alarm uses the following format. Text is filled in with seven bytes of User Text and the Type will be set to 3.

Bit Map		Register		Time as float				Date as float				Text							Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

User Value Alarms If the alarm is a User Value Alarm, the following format will be used. Unused will be set to zero and the Type will be set to 4.

Bit Map		Register		Time as float				Date as float				Value as float				Unused			Type
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Reading Events and Alarms Register

The Modbus request to read the Event Log and Alarm Log uses the standard read Function Codes 03 or 04 and the Register Number defined in the History Access configuration. In this request, the number of Registers is included to maintain format compatibility, but is ignored by the receiving ROC.

Twenty bytes are returned for each event and alarm in the response. Up to 12 events and alarms can be returned in a single response. If no events and alarms have occurred since the last collection, the response contains 0 data bytes.

For the date stamp in the events and alarms returned, the year (YY) is really the number of years since 1980. For example, if the current year is 2007, the year (YY) for the date stamp would be 27.

Following is an example of a request for events and alarms with the history access event/alarm register defined as 32 (0x0020 hex).

Table 7-6. Host Event/Alarm Request Example Message

Message Field	Device Address	Function Code	Register Offset	Num Reads (ignored)		Error Check	
Bytes	1	1	2	2		2	
TX Order			MS LS	MS	LS	LS	MS
Value	01H	03H	00H 20H	00H	01H	CRC-16	

The following example shows a response returning three events and alarms.

Table 7-7. Event/Alarm Response Example Message

Message Field	Device Address	Function Code	Byte Count	Data		Error Check
Bytes	1	1	1	(20 bytes per event or alarm)		2
TX Order				Integers — MS	LS	LS MS
				Floats — Selectable		
Value	01H	03H	3CH	CRC-16		

Acknowledging Events and Alarms

After the host has correctly received event and alarm data, it transmits an acknowledgement message to the ROC to clear these events and alarms from the Modbus buffer.

Until it receives that acknowledgement message, the ROC continues to send the same event and alarm records to the host. The Modbus acknowledgement (to clear the Event Log and Alarm Log buffer) uses Function Code 05 and the Register Number defined in the History Access configuration. In this request, the data value is always one (1).

Table 7-8. Event & Alarm Acknowledgement Response Example Message

Message Field	Device Address	Function Code	Register		Data		Error Check	
Bytes	1	1	2		2		2	
TX Order	MS	LS	MS	LS	MS	LS	MS	LS
Value	01H	05H	00H	20H	FFH	00H	CRC-16	

Table 7-9. Modbus Events & Alarms Log Contents

Byte	Contents of Event Log Record	Contents of Alarm Log Record
1 to 2	Operator change (Event Log) bit map (16-bit integer). See *Table 7-7, Event & Alarm Changes Bit Map Contents.*	Alarm change bit map (16-bit integer). See *Table 7-7, Event & Alarm Changes Bit Map Contents.*
3 to 4	Modbus Register number of variable (16-bit integer)	Modbus Register number of variable (16-bit integer)
5 to 8	Time Stamp (HHMMSS; 32-bit floating point)	Time Stamp (HHMMSS; 32-bit floating point)
9 to 12	Date Stamp (MMDDYY; 32-bit floating point)	Date Stamp (MMDDYY; 32-bit floating point)
13 to 16	Previous value of variable (32-bit floating point)	Current (alarmed) value of variable (32-bit floating point)
17 to 20	Current (New) value of variable (32-bit floating point)	Unused at the current time (zero filled when transmitted to the Master)

Table 7-10. Event & Alarm Change Bit Map Contents

Bit	Operator Change Bit Map	Alarm Change Bit Map
0	Fixed value – change to an EU value on an I/O point in Manual Mode	Not Used
1	Zero scale – change to the 0% Adjusted on an AO or AI	Not Used
2	Full scale – change to the 100% Adjusted on an AO or AI	Not Used
3	Operator entry work value – change to any parameter other than those described	Not Used
4	Boolean fixed bit – change to Status in DO or DI	Not Used
5	Fixed/variable flag – change to Manual Mode for an I/O point	Manual Alarm
6	Table entry change – change to Modbus Function Tables	Status Change Alarm
7	System command change – events logged by system (Power up)	No Flow Alarm
8	Not Used	Point Fail Alarm
9	Operator change (Event Log) identifier bit	0 for Alarm
10	Low Low Limit – change to Low Low Alarm parameter	Low Low Alarm
11	Low Limit – change to Low Alarm parameter	Low Alarm
12	High Limit – change to High Alarm parameter	High Alarm
13	High High Limit – change to High High Alarm parameter	High High Alarm
14	Rate of Change Limit – change to Rate Alarm parameter	Rate Alarm
15	Not Used	Set/Clear Alarm (1 = Set or 0 = Clear)

Chapter 8 – The Utilities Menu

In This Chapter

Use the options on the Utilities menu to update firmware, manage software licenses, convert EFM files, manage user programs, set ROCLINK 800 security, view AI, RTD, and MVS calibration values, access the FST Editor, and monitor communications.

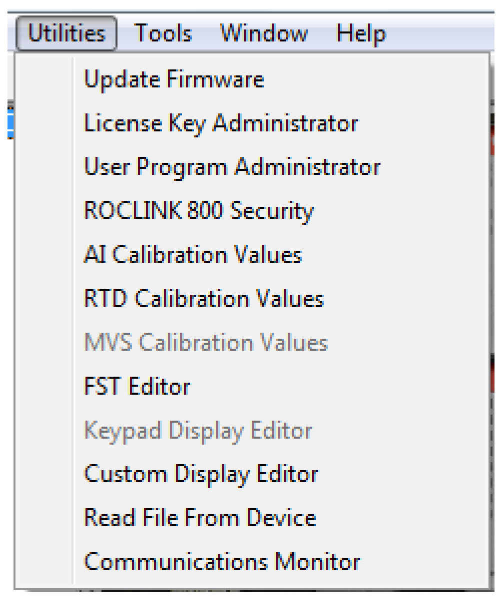


Figure 8-1. Utilities Menu

Note: For information on the FST Editor and writing FSTs, refer to the *Function Sequence Table (FST) User Manual* (part D301058X012).

8.1 Update Firmware

Select **Utilities** > **Update Firmware** to display the Update Firmware screen:

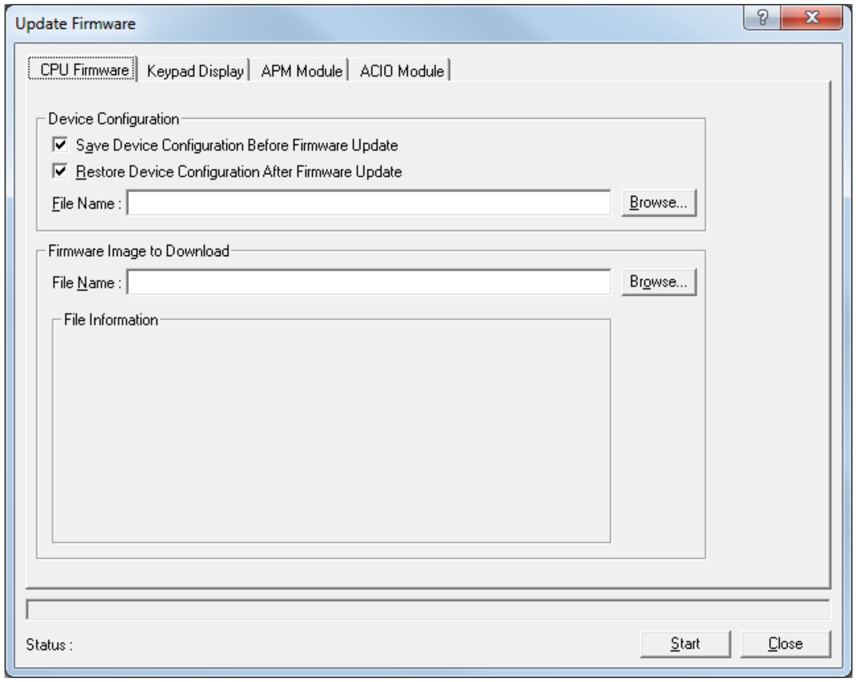


Figure 8-2. Update Firmware

8.1.1 CPU Firmware Tab

Use the Update Firmware tab to update the ROC's internal software ("firmware") that is stored in the CPU module's flash ROM.

Notes:

- This option **does not** update the ROCLINK 800 software.
- Firmware **cannot** be updated over an Ethernet connection.

⚠ Caution **During the update, this option disables measurement and control. It is a good practice to preserve the contents of the event and alarm logs (saved to a file) BEFORE you update any firmware. You CANNOT reload event logs or alarm logs.**

1. Create a backup copy of the firmware update disk or download the firmware file from the Remote Automation Solutions website (*http:// www.EmersonProcess.com/Remote*).
2. Read the README text file included with the firmware update.
3. Select **Utilities > Update Firmware**. The Update Firmware screen displays.

Note: By default, the system selects the Device Configuration options **Save Device Configuration Before Firmware Update** and **Restore Device Configuration After Firmware Update.** This saves your current configuration, calibration, communication settings, and FSTs to the file name you specify.

4. Click **Browse** to select or specify a file name the system uses to save and restore the system configuration file. The default file location is C:\Program Files\ROCLINK800. The default file extension is **.800**.

Note: You can also save the configuration to flash memory using the **Save Configuration** button on the Flags screen **(ROC > Flags > Save Configuration)**.

5. In the Firmware Image to Download frame, click **Browse** to specify the location of the update firmware code.

Note: The ROC800-Series uses the file extension ***.dli**. You can obtain firmware updates either from your factory representative or from the Remote Automation Solution SupportNet website (*www.EmersonProcess.com/Remote/Emerson/support/support_index.html*). Regardless of source, you must store the firmware update files on your PC **before** you can apply them.

6. Once you select a firmware upgrade, ROCLINK 800 completes the lower portion of the Firmware Image to Download frame with information related to that upgrade. Review the information to make sure you want to apply that upgrade.

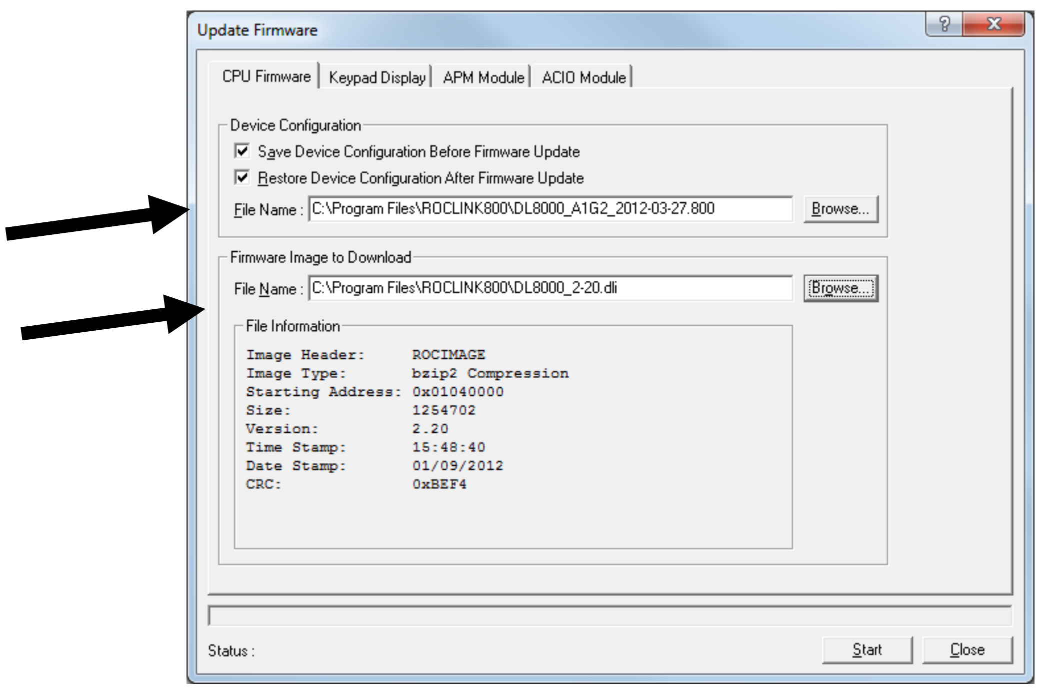


Figure 8-3. Update Firmware – CPU Firmware tab

7. Click **Start**. The system displays a confirmation dialog box.

8. Click **Yes** to confirm the update.

Note: The loading process typically takes several minutes. Do **not** disturb the ROC during this time.

When firmware load completes, a dialog box displays.

9. Click **OK** to accept the dialog box.

   ROCLINK 800 automatically loads the configuration files into the ROC (if you selected the Restore Device Configuration option) and records the actions in the event log.

   When the backup reload completes, a "Reconnect to Device Completed" message displays in the Status field at the bottom of the Update Firmware screen. ROCLINK 800 also adds an "Updated" flag to the information displayed in the Firmware Image to Download frame. You can also verify the upgrade on the Device Information screen (**ROC** > **Information** > **Revision Info**).

10. If you saved the configuration to flash memory, ROCLINK 800 performs a cold start to reload the configuration.

Note: If you selected the **Restore Device Configuration After Firmware Update** option on the Update Firmware screen, this step is not required.

11. Check the configuration and FSTs. If they are not correct, reload them (using **File** > **Download**) from the files you created in Step 4.

12. Save the configuration (using **ROC** > **Flags** > **Save Configuration**) to permanent memory.

The **Utilities** > **Update Firmware** > **CPU Firmware** tab initially displays the CPU tab. Use this tab to view the currently installed firmware version, save a current configuration before downloading a new configuration, download a new firmware image, and restore a configuration after updating the firmware.

8.1.2 Additional Update Firmware Tabs

Depending on the configuration of your DL8000, one or more additional tabs may display on the Update Firmware screen. These additional tabs enable you to update the firmware for the selected hardware. The additional tabs may include:

- **ACIO Module** – Updates the firmware for the Alternating Current I/O (ACIO) module.

- **APM Module** – Updates the firmware for the Advanced Pulse Module (APM).
- **CPU Backplane** – Updates the firmware for the ROC827 CPU backplane.
- **Expanded Backplane** – Updates the firmware for the ROC827 expanded backplane.
- **Keypad Display** – Updates the firmware for the optional Keypad Display.
- **MVS Module** – Updates the firmware for the optional Multi-Variable Sensor module.

The process for updating firmware for these additional components is the same as the process for updating the CPU firmware. However, the additional Update Firmware screens identify the firmware level currently installed and monitor the available flash space remaining:

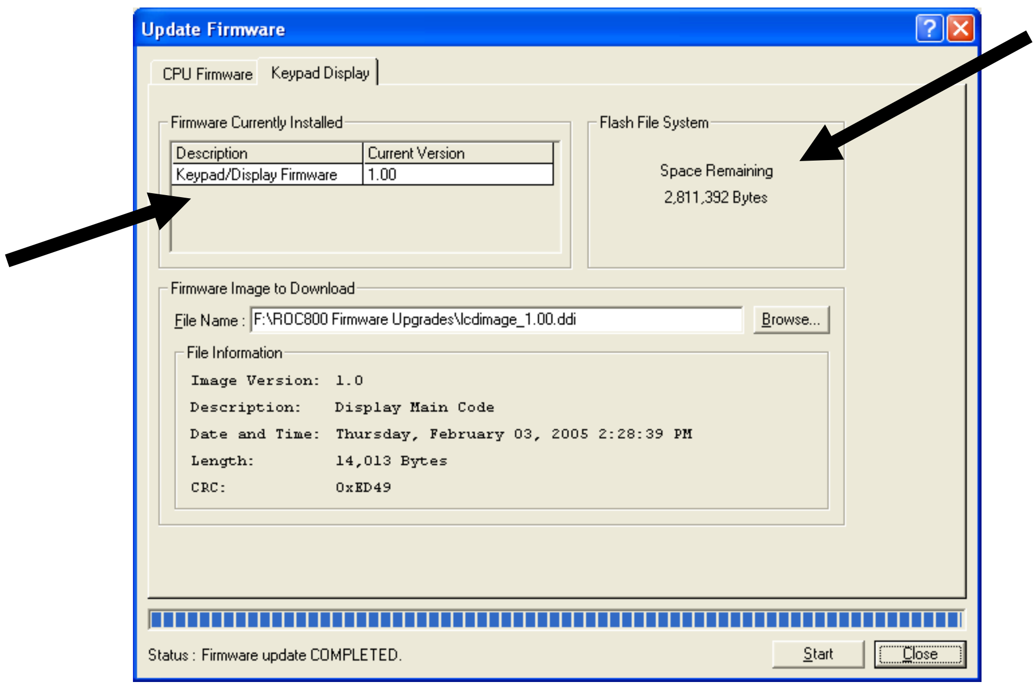


Figure 8-4. Update Firmware Example

Note: The upgrade file may have either a **.dli** or a **.ddi** file type. This is normal.

8.2 License Key Administrator

Use the License Key Administrator screen to view and manage information on any software licenses currently installed on the ROC 800-Series. Some applications require that you install a license in the CPU to run the application. These licenses are typically housed on a license key, which you insert in a specific location on the CPU (see *License Keys* in *Chapter 2* of the *DL8000 Preset Controller Instruction Manual* (Form A6212).

Select **Utilities** > **License Key Administrator**. The License Key Administrator screen displays.

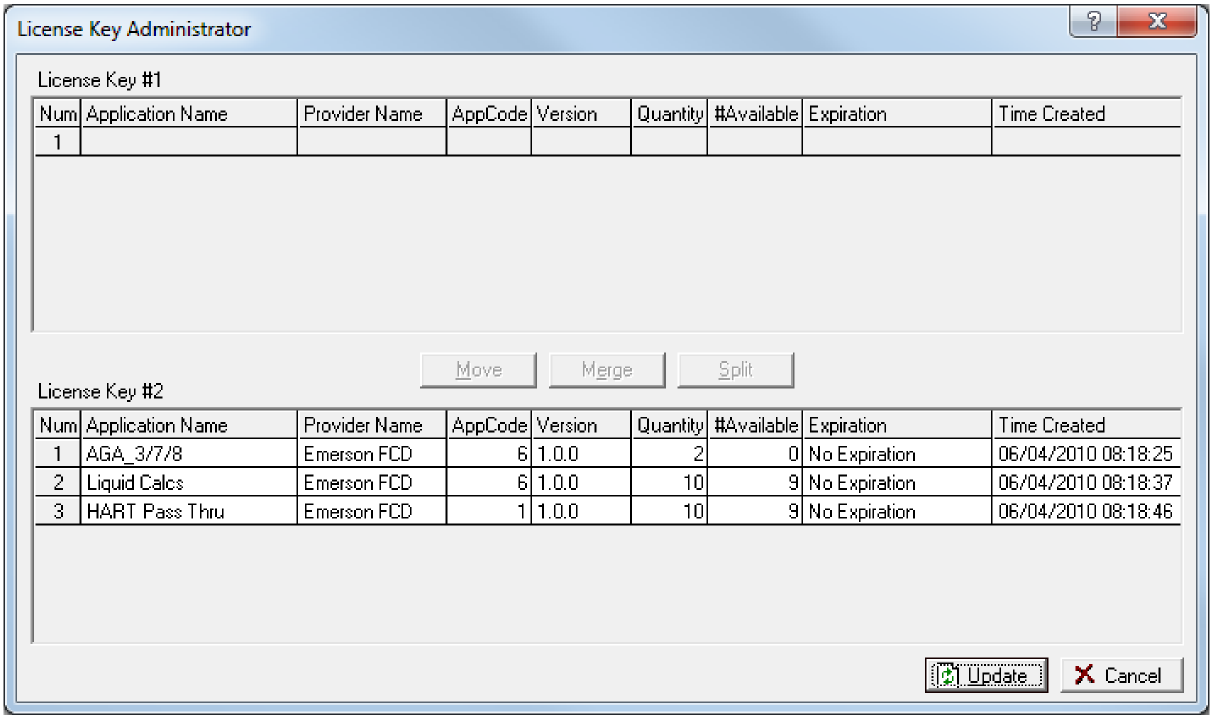


Figure 8-5. License Key Administrator

A DL8000 CPU can contain up to two license keys. The upper and lower portions of this screen indicate whether keys are installed and what licenses are present on each key. *Figure 8-5* shows that the key installed in slot 2 contains a Liquid Calcs license and an AGA license.

8.2.1 Managing Licenses

You can also use this screen to manage licenses. For example, your organization may have obtained AGA licenses for your DL8000. Place the license key with the AGA licenses in an empty slot in the CPU and use this utility to transfer a license to the DL8000.

1. Select **Utilities** > **License Key Administrator**. The License Key Administrator screen displays.

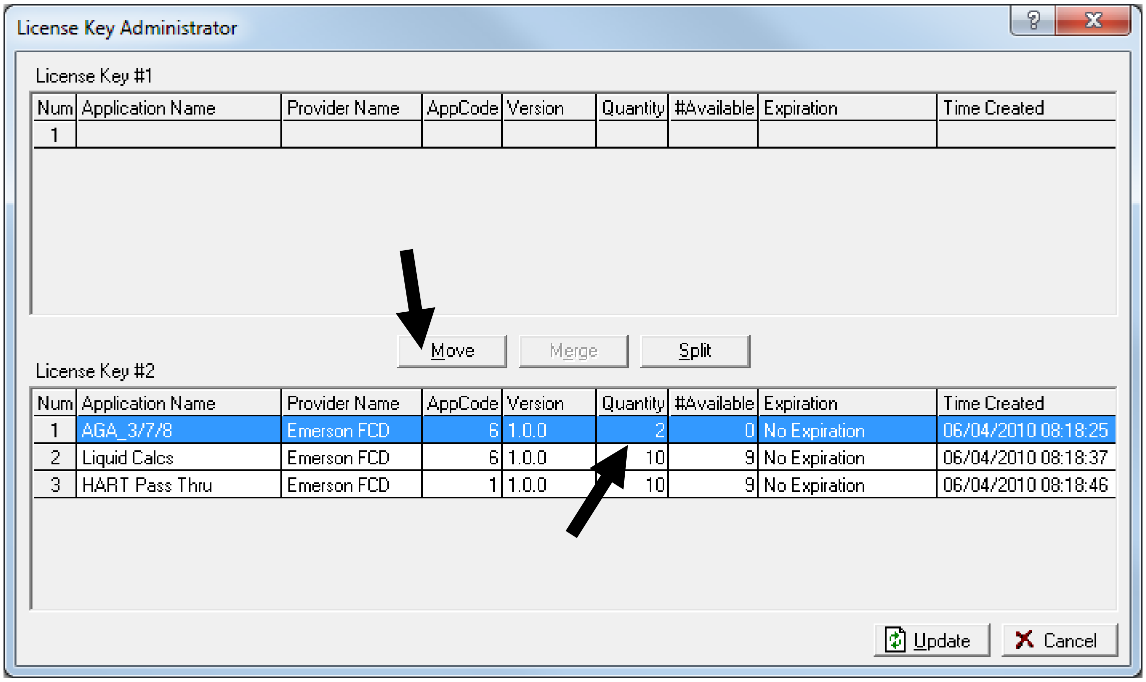


Figure 8-6. License Key Administrator

The AGA licenses are on the second license key. To move an AGA license to key #1:

2. Select the license to move. The **Move** and **Split** buttons activate. Note that the Quantity field indicates there are two AGA licenses.
3. Click **Split.** The AGA license splits into two individual licenses.

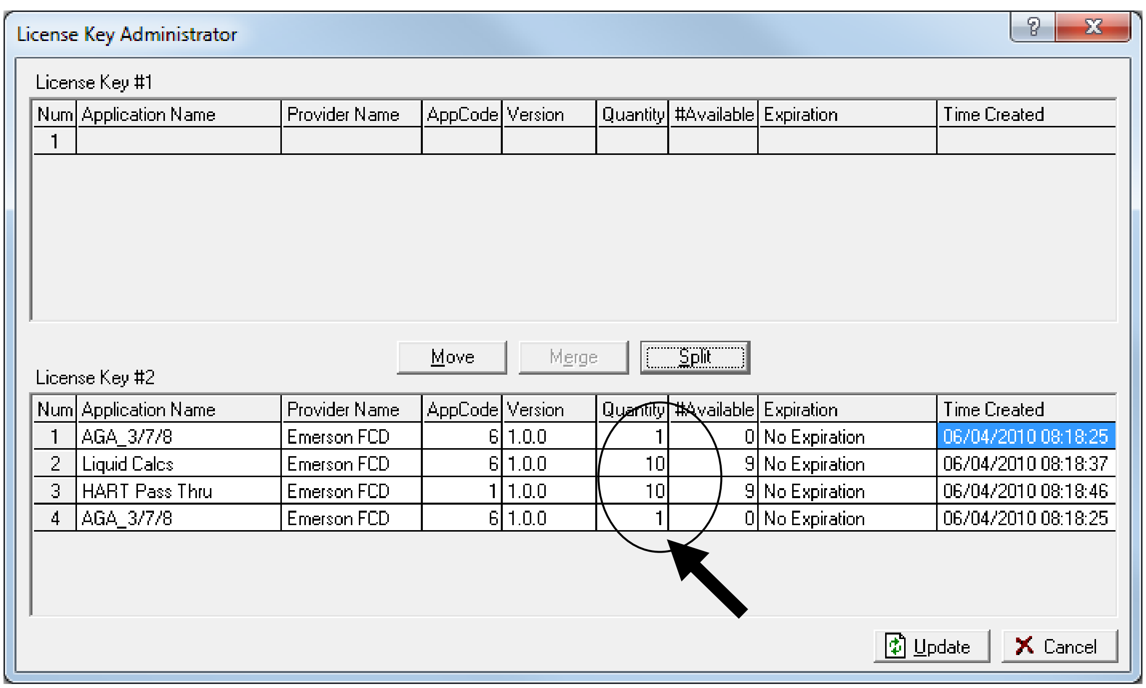


Figure 8-7. Split Licenses

4. Select one of the AGA licenses. The **Move** and **Merge** buttons activate, indicating available actions.
5. Click **Move**. The selected AGA license moves to key #1.

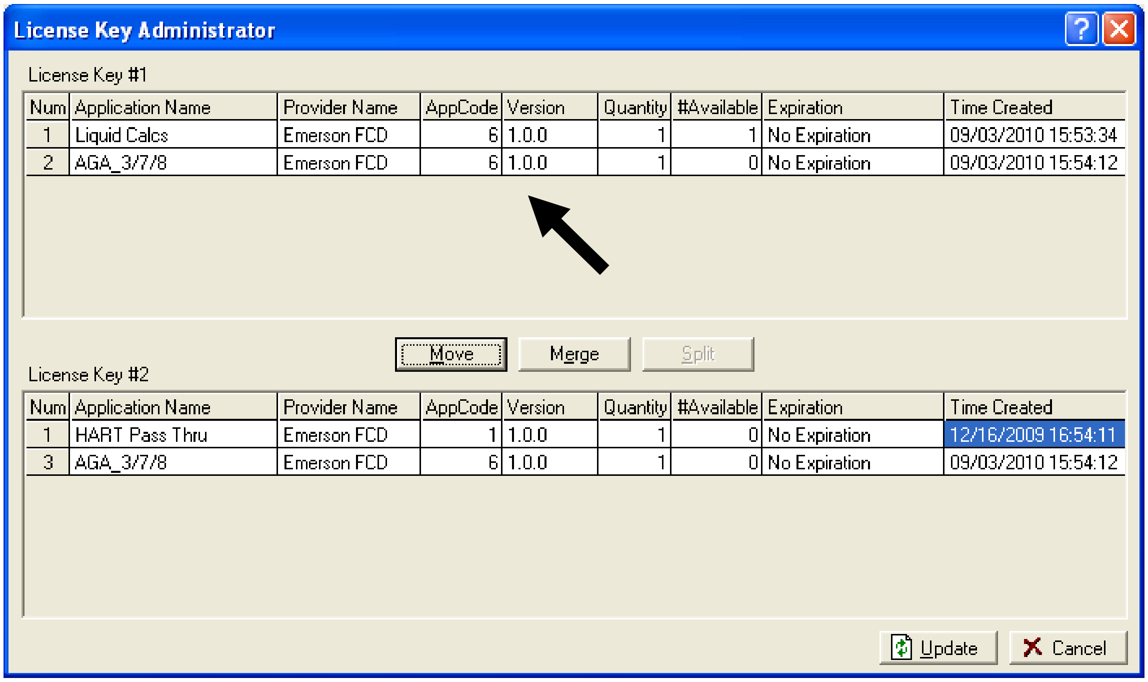


Figure 8-8. Moved License

6. You can now remove the second license key or leave it in place, as your organization requires.

8.3 User Program Administrator

User programs provide the DL8000 with extended functions and applications (such as gas chromatograph support or GOST calculations). Use this option to download, start, stop, and remove user programs.

Note: Extensive documentation covering configuration and usage information accompanies each user program.

Select **Utilities** > **User Program Administrator**. The User Program Administrator screen displays.

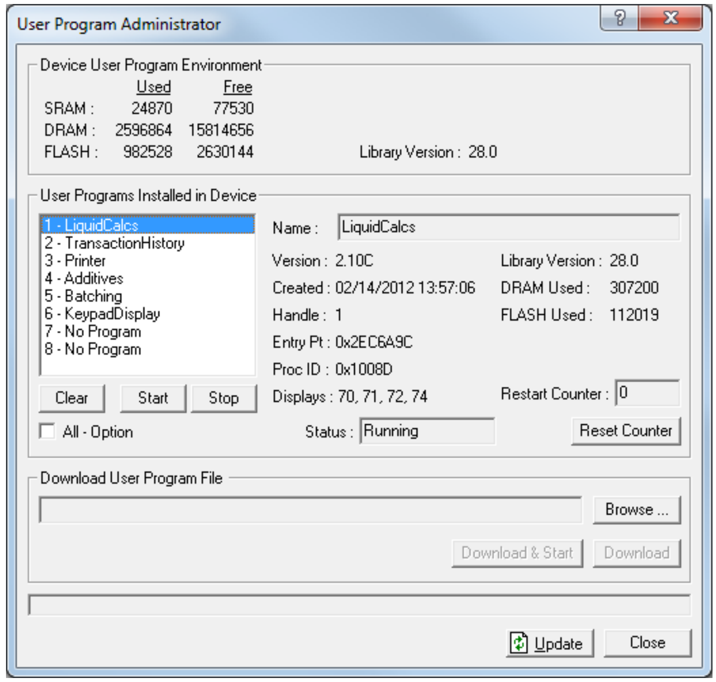


Figure 8-9. User Program Administrator

Field	Description	
Device User Program Environment	These **read-only** fields show the amount of used and available memory. The user program that you intend to load must be able to access the memory location.	
User Programs Installed in Device	Displays any currently installed user programs. If you select a currently installed program, the system completes the User Programs Installed in Device frame with information detailing specific information about that user program.	
Clear	Click to delete the selected user program from memory.	
Start	Click to start the selected user program.	
Stop	Click to stop the selected user program from running.	
All - Option	Select to perform the same action (Clear, Start, or Stop) on every user program.	
Status	This **read-only** field indicates the status of the selected program. Valid values are:	
	Empty	No program installed.
	Loaded	Program loaded but not running.
	Running	Program loaded and active.
	License Not Found	Program requires a license to operate.
Reset Counter	Click to clear the value that indicates how many times the user program has been restarted.	

Field	Description
Download User Program File	Identifies the program file to be downloaded to the ROC. Click **Browse** to locate the file you desire to download. When you select a user program file, the system completes the lower portion of the screen with configuration information detailing for the user program.
Download & Start	Click to download **and** start the user program running.
Download	Click **Download** to download but **not** start the user program. **Note:** If you download several programs, they may need to be started in a particular order. Use this button to download without starting the programs.
Update	Click to update values on the screen.
Close	Click to close the screen.

8.3.1 Downloading a User Program

Note: As of the publication date of this manual, Remote Automation Solutions has not published any downloadable user programs for the DL8000. As we release user programs, refer to the documentation accompanying those programs for directions on downloading and configuring the programs.

8.3.2 MPU Loading Threshold

To maximize the performance of your ROC800 device, always verify the performance of specific application combinations before using them in the field to ensure the MPU load typically remains **below** 85% with peak MPU loading levels **below** 95%.

To check the current MPU load at any time, select **ROC** > **Information > Other Information** and review the value in the MPU loading field.

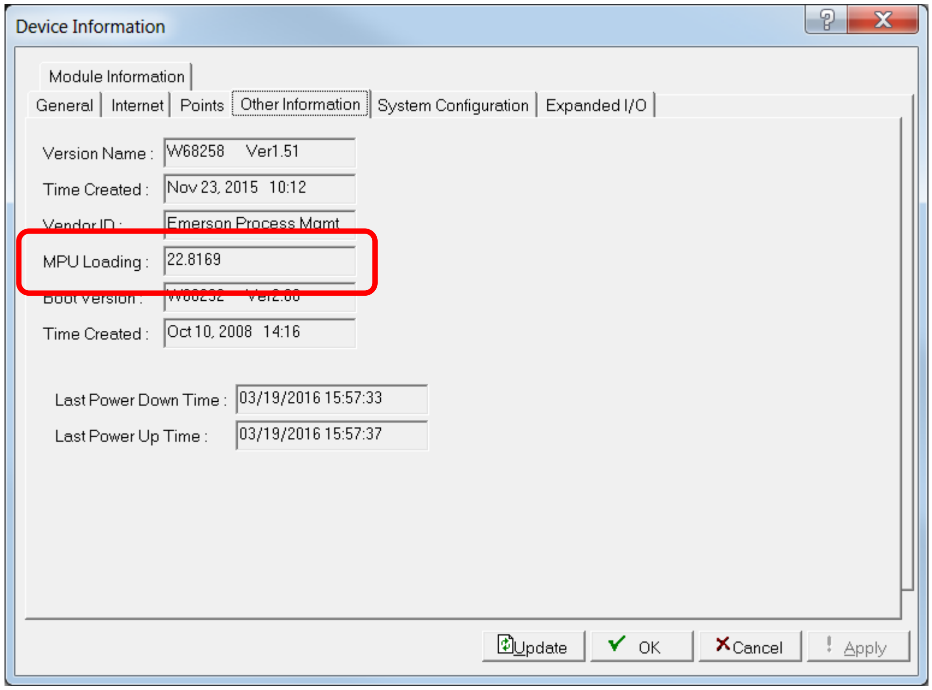


Figure 8-10. MPU Loading

8.4 ROCLINK 800 Security

Use the ROCLINK 800 Security screen to set access to ROCLINK 800.

Note:

- This section focuses on security related to software. For device-related security, refer to *Security* in *Chapter 3*.
- The requirements for the Operator ID and Password fields are dependent on your selection in the **Enable Enhanced Security Features** field on the Device Security screen (**ROC > Security)**. For more information, refer to *Section 3.7.3 Enhanced Security*.
- The ROCLINK 800 Security table can be a mix of the older username/password format and the new complex username/password formats.

To access this screen, select **Utilities** > **ROCLINK 800 Security**. The ROCLINK 800 Security screen displays.

Figure 8-11. ROCLINK 800 Security

Its table format enables you to define, by operator ID, password, and security level, who can log on to ROCLINK 800 and the screens that those IDs can access. You may define up to 64 different users.

Note: The default Operator ID is **LOI**. The default password is **1000**.

Caution **The settings you define in Utilities > ROCLINK 800 Security must match the settings you define in ROC > Security (Device Security) in order for users to log onto ROCLINK 800.**

8.4.1 Defining Access

1. Select **Utilities** > **ROCLINK 800 Security**. The ROCLINK 800 Security screen displays:

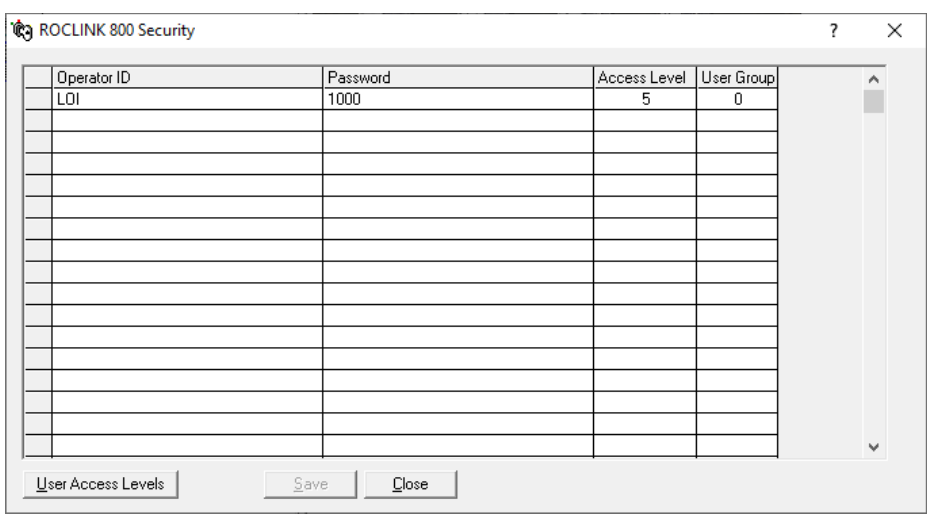


Figure 8-12. ROCLINK 800 Security

2. Enter an **Operator ID** used to log into ROCLINK 800. The requirements for the Operator ID field differ based on if you have

selected **Enable Enhanced Security Features** (**ROC > Security**). For more information, refer to *Section 3.7.3 Enhanced Security*:

- If you **have not** selected **Enable Enhanced Security Features**, enter three alphanumeric characters for the **Operator ID**. Typically these are the initials of the person who operates the device.

  Note: Each Operator ID **must** be unique and is case-sensitive (that is, **ABC** is different from **Abc**).

- If you **have** selected **Enable Enhanced Security Features**, enter between three and 30 alphanumeric/special characters for the **Operator ID**.

  Note: The Operator ID is **not** case-sensitive.

3. Enter a **Password** for the Operator ID. The requirements for the Password field differ based on if you have selected **Enable Enhanced Security Features** (**ROC > Security**):

   - If you **have not** selected **Enable Enhanced Security Features**, enter four numeric characters (between **0000** and **9999**) to define the operator **Password**. More than one user can have the same password.

     Note: If you precede a password value with zeroes (such as **0006**), ROCLINK 800 saves that password as **6**.

   - If you **have** selected **Enable Enhanced Security Features**, enter between eight and 32 alphanumeric/special characters to define the operator **Password**. More than one user can have the same password.

4. Enter the desired **Access Level** for the user. **0** is the lowest (least inclusive) access level and allows access to the fewest number of screens. **5** is the highest (most inclusive) access level and allows access to all screens. Each access level permits access to screens at that level and any inherited from lower access levels. For example, an operator ID with Access Level 3 can access screens with levels 0, 1, 2, and 3. Refer to *Table 8-1, Security Access Levels*.

   Note: Click **User Access Levels** to display a User Access Levels dialog that shows all menu options and their access levels.

5. Click **Save**.

Security Access Levels

The Security Access Levels table lists the system screens and their system-assigned security access levels. The Menu Options focus on the activity while you use the Access Levels to increase or decrease responsibility levels within the Menu Options.

To access this screen, select **Utilities > ROCLINK 800 Security > User Access Levels**.

Note: ROCLINK 800 rejects login requests if access levels are greater than device security. Additionally, if you enable security on any port, at least one operator ID must have the highest level (level 5) of security.

Table 8-1. Security Access Levels

	Menu	Menu Option	Access Level
1	Configure	Transaction History	5
15	View Display	New	5
24	ROC	Security	5
71	Utilities	License Key Admin 107	5
72	Utilities	License Key Administrator 800	5
80	Utilities	Custom Display Editor	5
81	Utilities	Custom EFM Report Editor	4
20	ROC Display	Administrator	4
69	Utilities	Update Firmware	4
70	Utilities	Upgrade Hardware	4
74	Utilities	User Program Administrator	3
2	File	New	3
4	File	Download	3
5	File	Save Configuration	3
18	View Display	From File	3
19	View Display	From Device	3
23	ROC	Clock	3
25	ROC	Comm Ports	3
27	ROC	Information	3
28	ROC	Flags	3
29	Configure IO	AI Points	3
30	Configure IO	AO Points	3
31	Configure IO	DI Points	3
32	Configure IO	DO Points	3
33	Configure IO	PI Points	3
34	Configure IO	TC Points	3
35	Configure IO	RTD Points	3
36	Configure IO	System AI Points	3
37	Configure IO	Soft Points	3
38	Configure IO	Extended Soft Point	3

	Menu	Menu Option	Access Level
39	Configure IO	MVS Sensor	3
40	Configure IO	HART Points	3
41	Configure IO	Setup	3
42	Configure IO	Advanced Pulse Module	3
43	Configure IO	ACIO Module	3
44	Configure IO	Virtual Discrete Output	3
45	Configure Control	FST Registers	3
46	Configure Control	PID Loop	3
47	Configure Control	Radio Power Control	3
48	Configure Control	Sampler/Odorizer	3
49	Configure Control	DS800	3
50	Configure	History Segments	3
51	Configure	HistoryPoints	3
52	Configure	Opcode Table	3
53	Configure	Modbus	3
54	Configure	Rtu Network	3
55	Configure	LCD User List	3
56	Configure User Data	UD1	3
73	Utilities	Convert EFM File	3
75	Utilities	AI Calibration Values	3
76	Utilities	MVS Calibration Values	3
77	Utilities	FST Editor	3
78	Utilities	Keypad Display Editor	3
79	Utilities	Read File From Device	3
82	Utilities	Options	3
84	Tools	Data Logger	3
7	View	EFM Report	2
8	View	Calibration Report	2
22	ROC	Collect Data	2
57	Meter	Setup	2
58	Meter Setup 800	Station	2
59	Meter Setup 800	Orifice meter	2
60	Meter Setup 800	Linear meter	2
61	Meter	Calibration	2
62	Meter Calibration 800	Orifice meter	2

	Menu	Menu Option	Access Level
63	Meter Calibration 800	Linear Meter	2
64	Meter	Values	2
65	Meter Values 800	Orifice meter	2
66	Meter Values 800	Linear Meter	2
67	Meter	Plate Change	2
68	Meter	History	2
3	File	open	1
6	File	Print Configuration	1
9	View History	From Device	1
10	View History	From File	1
11	View Alarms	From Device	1
12	View Alarms	From File	1
13	View Events	From Device	1
14	View Events	From File	1
21	View	I/O Monitor	1
26	ROC	Memory	1
16	View Display	Display 1	0
17	View Display	Display 2	0
83	Utilities	Communications Monitor	0

8.5 Analog Input (AI) Calibration Values

Use this option to review all the calibration values for a specific analog input point.

1. Select **Utilities > AI Calibration Values**. The AI Calibration screen displays.

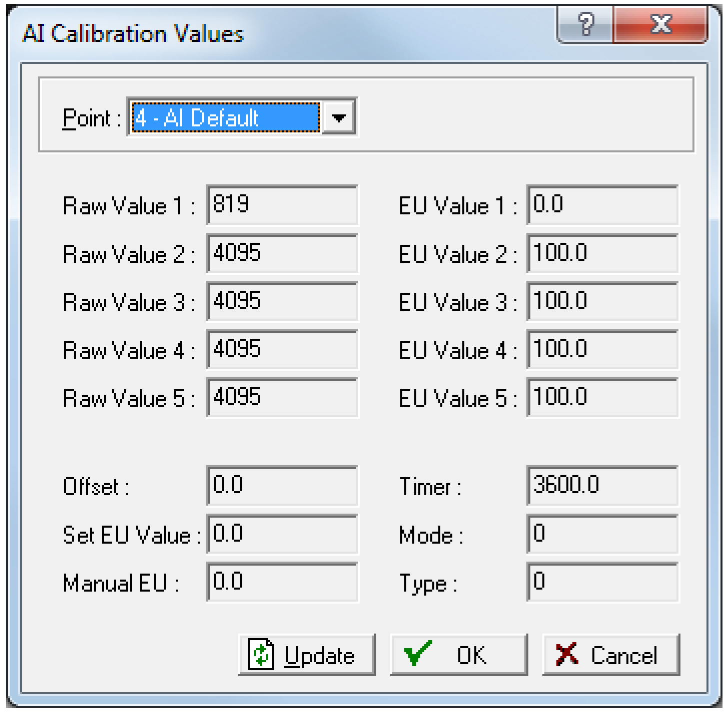


Figure 8-13. AI Calibration Values

Field	Description
Point	Click ▼ to select an AI point.
Raw Value (1 - 5)	These **read-only** fields show the calibrated raw A/D input, where **Value 1** is the lowest calibrated input and **Value 5** is the highest calibrated input.
Offset	This **read-only** field shows the **zero shift** adjustment value for a differential pressure input. This value is an offset to the calibrated EU Values, and compensates for the effect of working static pressure on a DP transmitter that was calibrated at atmospheric pressure.
Set EU Value	This **read-only** field shows the Tester Value specified for the last calibration.
Manual EU	This **read-only** field shows the Live Reading for the last calibration.
EU Value (1 - 5)	These **read-only** fields show the five calibration settings in Engineering Unit values, converted from the raw values, based on the low reading EU and the high reading EU defined for the point. Value #1 is the zero value, value #5 is the span value, and values 2, 3, and 4 are midpoint values.
Timer	This **read-only** field shows the last inactivity count-down in seconds (typically starting from 3600 seconds) that occurred during the last calibration session. Had the countdown reached 0, time-out would have taken place, automatically ending the calibration mode.

Field	Description
Mode	This **read-only** field shows the status of the calibration. Valid values are: **0** = Use Current Calibration **1** = Start Calibration **2** = Calibrate **3** = Restore Previous Calibration **4** = Stop Calibration
Type	This **read-only** field shows the currently set calibration value. Valid values are: **0** = Inactive (no value) **1** = Zero **2** = Span **3** = Midpoint 1 **4** = Midpoint 2 **5** = Midpoint 3 **6** = Zero Shift

8.6 RTD Input Calibration Values

Select **Utilities** > **RTD Calibration Values** to view all the calibration values for a specific RTD input point.

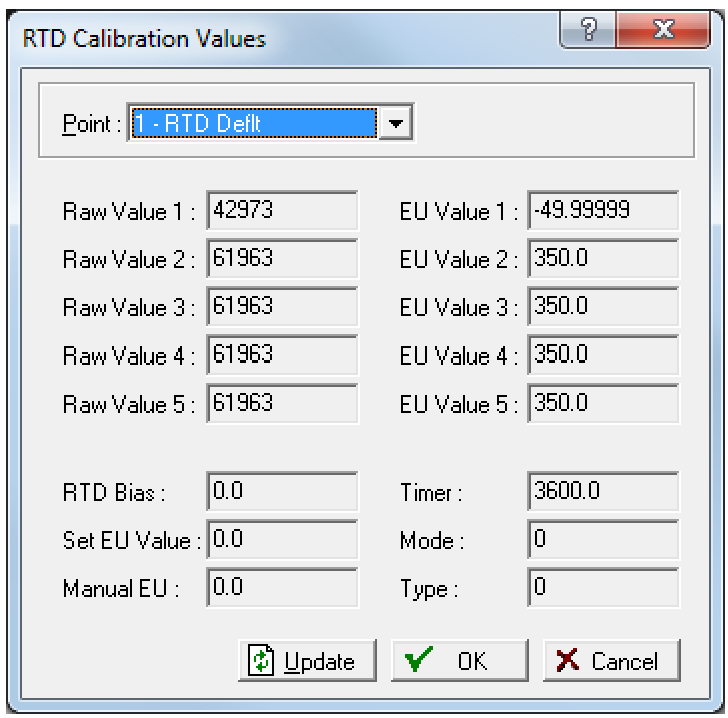


Figure 8-14. RTD Input Calibration Values

Field	Description
Point	Click ▼ to select an RTD point.
Raw Value (1 - 5)	These **read-only** fields show the calibrated raw values, where Raw Value 1 is the lowest calibrated raw A/D input and Raw Value 5 is the highest calibrated raw A/D input.

Field	Description
RTD Bias	This **read-only** field shows the Press Effect is the Zero Shift or RTD Bias adjustment value (applies only to points configured as the Differential Pressure input to a Meter Run) or temperature input.
Set EU Value	This **read-only** field shows the Tester Value specified for the last calibration value that was set.
Manual EU	This **read-only** field shows the Manual EU Live Reading for the last calibration value that was set.
EU Value (1 - 5)	These **read-only** fields show the five calibration settings in engineering unit values, converted from the raw values, based on the Low Reading EU and High Reading EU defined for the point. EU Value 1 is the Zero value and EU Value 5 is the Span value. The rest are midpoint values.
Timer	This **read-only** field shows, in seconds, the last inactivity count-down (typically starting from 3600 seconds) that occurred during the last calibration session. Had the countdown reached 0, time-out would have taken place, automatically ending the calibration mode.
Mode	Indicates the calibration mode. Valid values are: **0** = Use Current Calibration **1** = Start Calibration **2** = Calibrate **3** = Restore Previous Calibration **4** = Stop Calibration
Type	Indicates the calibration value currently being set. Valid values are: **0** = Inactive (no value) **1** = Zero **2** = Span **3** = Midpoint 1 **4** = Midpoint 2 **5** = Midpoint 3 **6** = Unused

8.7 MVS Input Calibration Values

Use this option to display a screen that shows all the current calibration values for MVS sensor points.

Select **Utilities > MVS Calibration Values > Calibration** tab. The MVS Calibration Values screen displays.

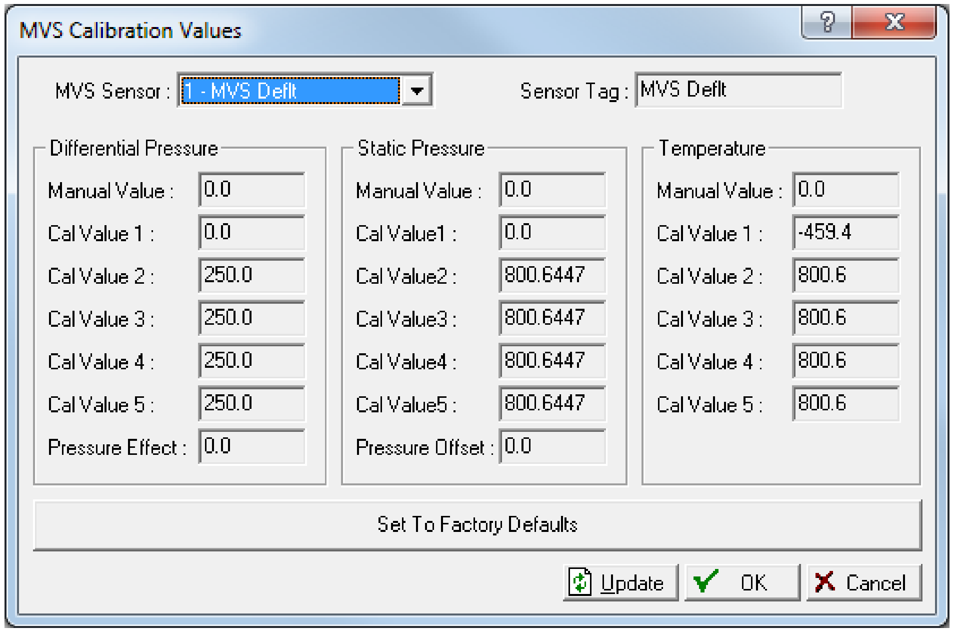


Figure 8-15. MVS Calibration Values

Field	Description
MVS Sensor	Click ▼ to select an MVS sensor.
Sensor Tag	This **read-only** field shows the label associated with the selected MVS sensor.
Differential Pressure	
Manual Value	This **read-only** field shows the value of the input at the last meter Freeze.
Cal Value (1 – 5)	These **read-only** fields show the differential pressure calibration values the selected MVS sensor currently uses.
Pressure Effect	This **read-only** field shows the adjustment factor for pressure.
Static Pressure	
Manual Value	This **read-only** field shows the value of the input at the last meter Freeze.
Cal Value (1 – 5)	These **read-only** fields show the static pressure calibration values the selected MVS sensor uses.
Pressure Offset	This **read-only** field shows the adjustment factor for pressure.
Temperature	
Manual Value	This **read-only** field shows the value of the input at the time of the last meter "Freeze."
Cal Value (1 – 5)	these **read-only** fields show the temperature calibration values the selected MVS sensor currently uses.

Field	Description
Set To Factory Defaults	Click to return the MVS calibration values to their original values and reset the MVS. **Note:** You must answer **Yes** to a verification dialog before the reset occurs. When the reset completes, a verification dialog box displays. This resets the MVS address to the default value of 1 and the Sensor Tag to **MV Sensor**.

8.8 FST Editor

ROCLINK 800's Function Sequence Table (FST) utility provides an instruction list programming language you can use to define and perform a set of specific actions when a set of conditions exists. For complete documentation on this option, refer to the *Function Sequence Table (FST) User Manual* (part D301058X012).

8.9 Keypad Display Editor

Note: This option is currently unavailable in the DL8000.

8.10 Custom Display Editor

The custom display options in ROCLINK 800 allow you to create customized ROC display files (*.DSP) and load them to a ROC. The ROC can store up to 246 displays (including both custom user displays you create and user program displays that accompany user programs).

⚠ **Caution** **You should be familiar with Visual Basic before attempting to create custom displays.**

Refer to *Appendix B, Display Editor*, for a complete discussion of creating customer displays.

8.11 Read File from Device

Use the **Read File From Device** option to extract saved files from the device's flash file system. The DL8000 creates these files during normal operation (that is, saving report files or creating constant logs).

1. Select **Utilities** > **Read File from Device**. The Read File From Device screen displays:

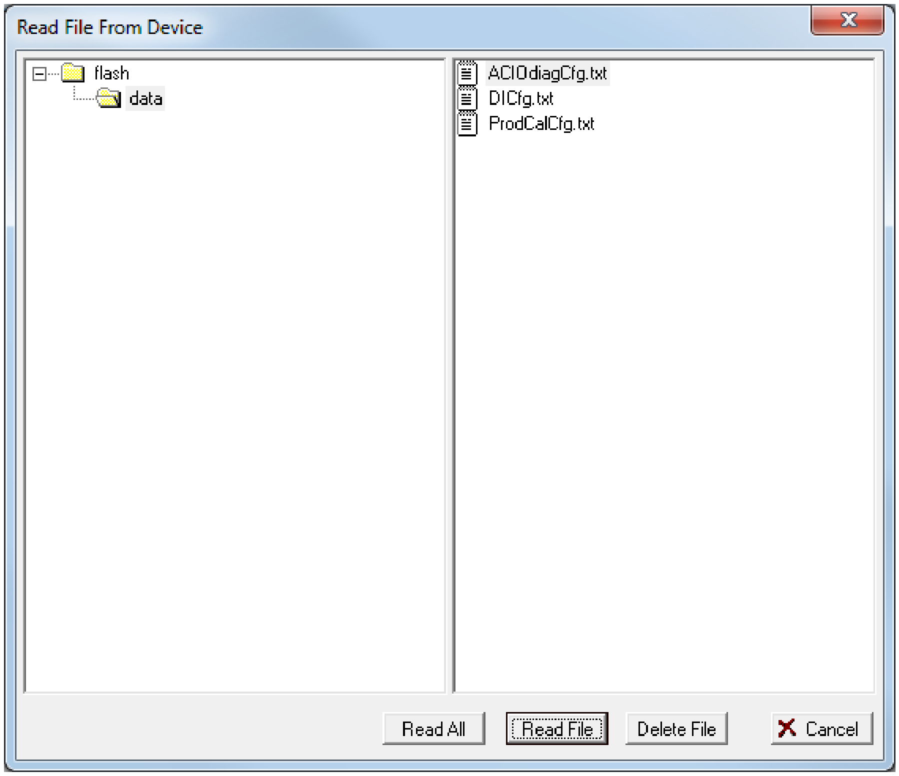


Figure 8-16. Read File From Device

2. Select a file to read and click **Read File**.

Note: You can also click **Read All** to select all files listed.

3. The system displays a "Save As" dialog. Indicate the location where you want the .txt file to reside and click **Save**. When the save completes, the system displays a completion dialog:

4. Click **OK**. The Read File From Device screen redisplays.

8.12 Communications Monitor

Select **Utilities** > **Communications Monitor** and perform an operation to display the data bytes (in hexadecimal format) sent and received from the ROCLINK 800 during that operation.

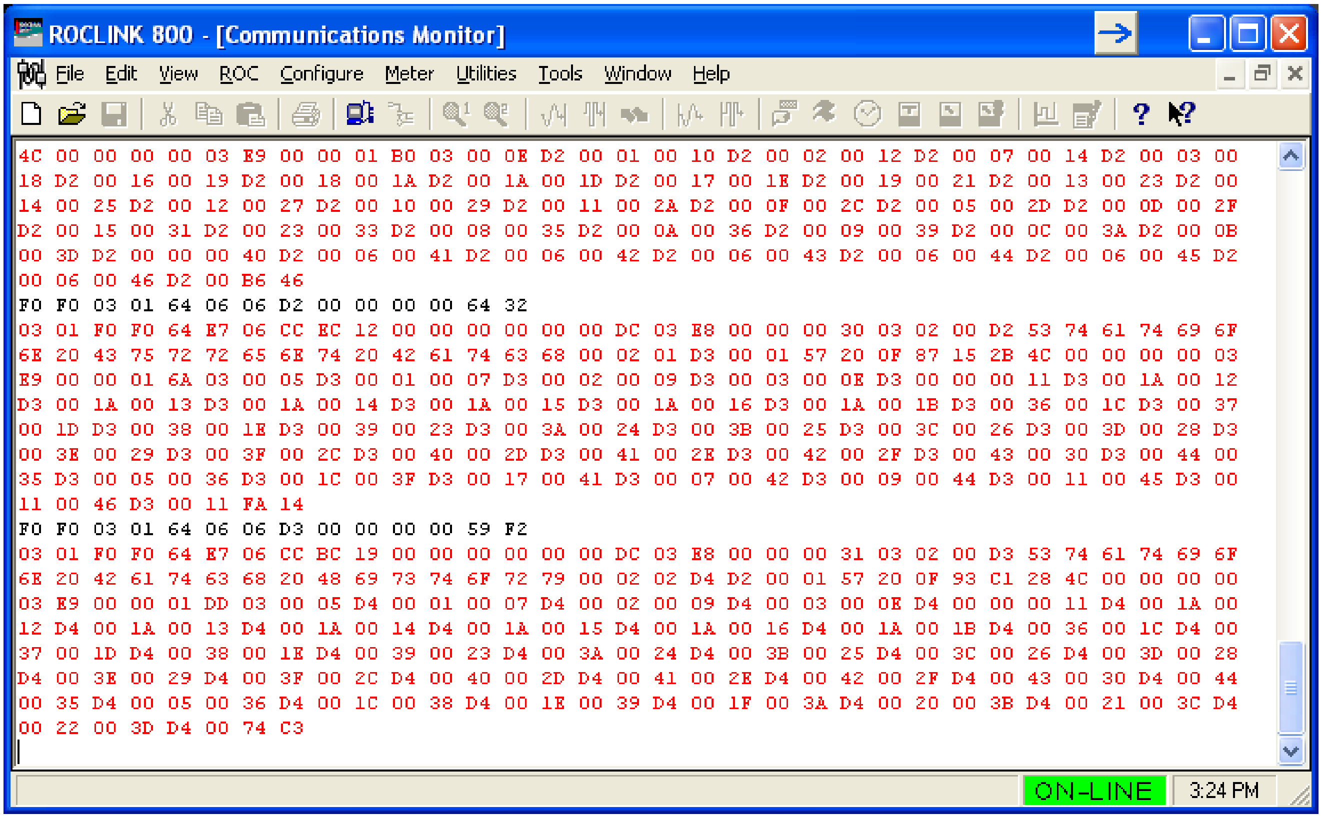
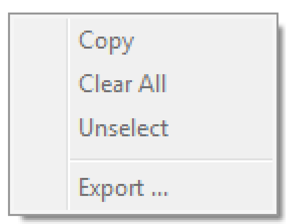


Figure 8-17. Communications Monitor

The system shows bytes sent in black and bytes received in red. Data received since the last good response (and before a request) are shown in aqua.

Right-click on the display to display a menu that enables you to **Copy** highlighted data, **Clear All** data, **Unselect**, or **Export** the data to several formats.



You can paste copied data in a file for analysis.

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Chapter 9 – The Tools Menu

Use the Tools menu to configure how your Point Type (T), Logical Number (L), and Parameter (P) options display and to customize your toolbars.

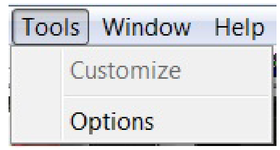
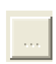


Figure 9-1. Tools Menu

Note: The Customize option is currently unavailable with the DL8000.

9.1 Options

ROCLINK 800 enables you to display TLP selections either as text or numbers.



When the Browse button (shown on left) is associated with a TLP, click the Browse button to display the Select TLP dialog (see *Figure 9-2*).

Use the Select TLP dialog to assign specific inputs and outputs to parameters. ROCLINK 800 uses Point Type (T), Logical Number (L), and Parameter (P) to define point locations.

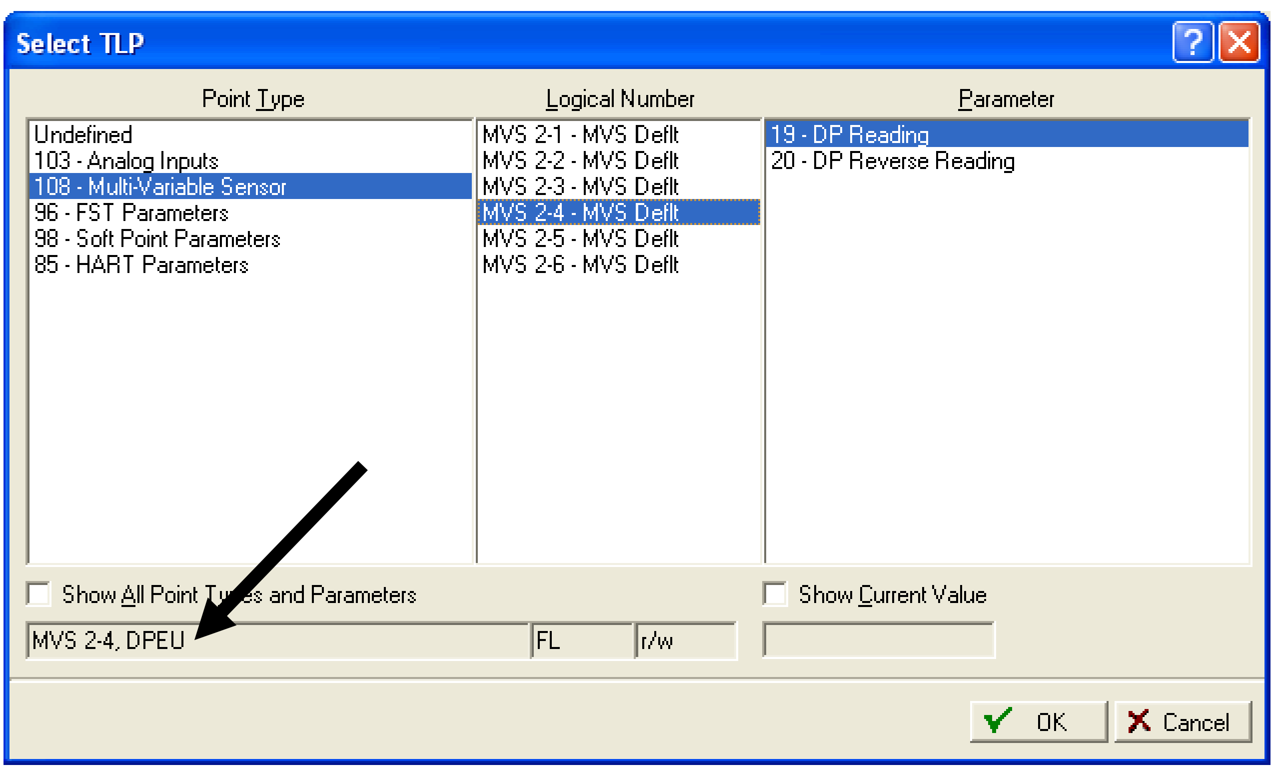


Figure 9-2. Textual TLP Display

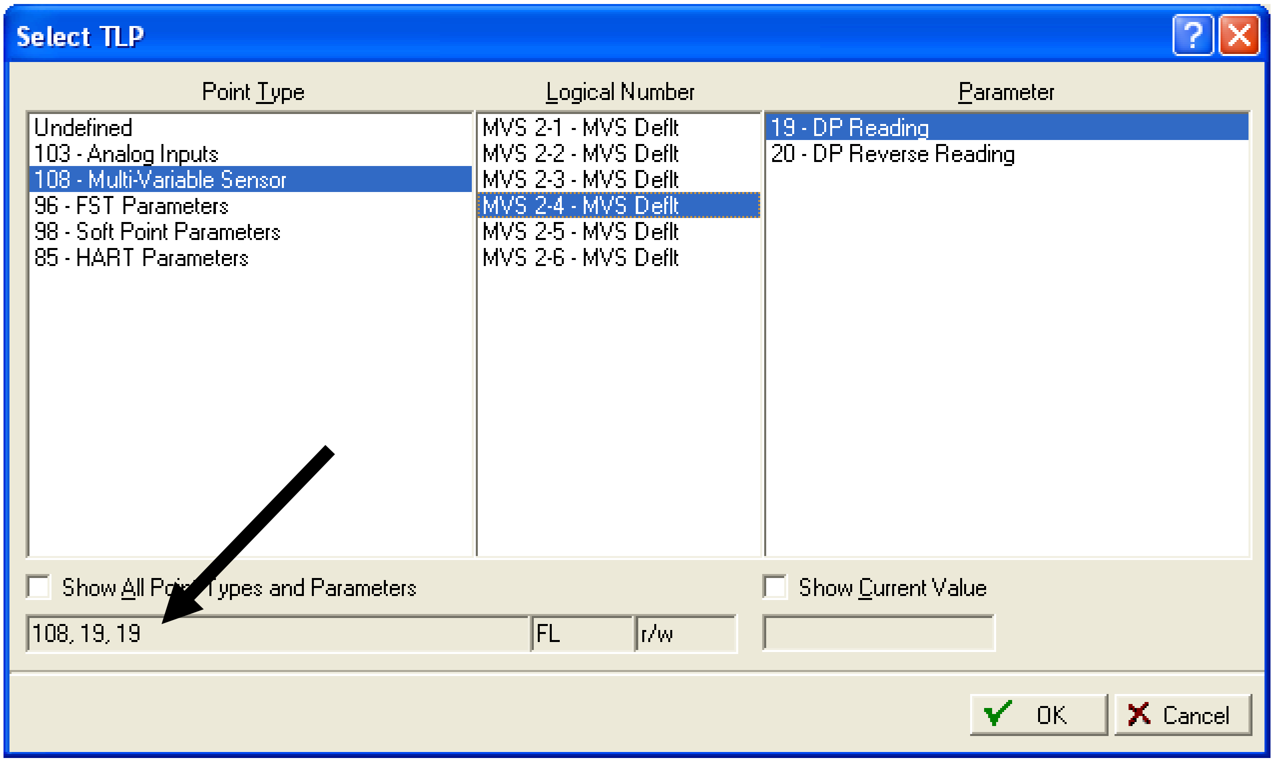


Figure 9-3. Numeric TLP Display

To select how TLP values display, select **Tools > Options.** The Options dialog displays.

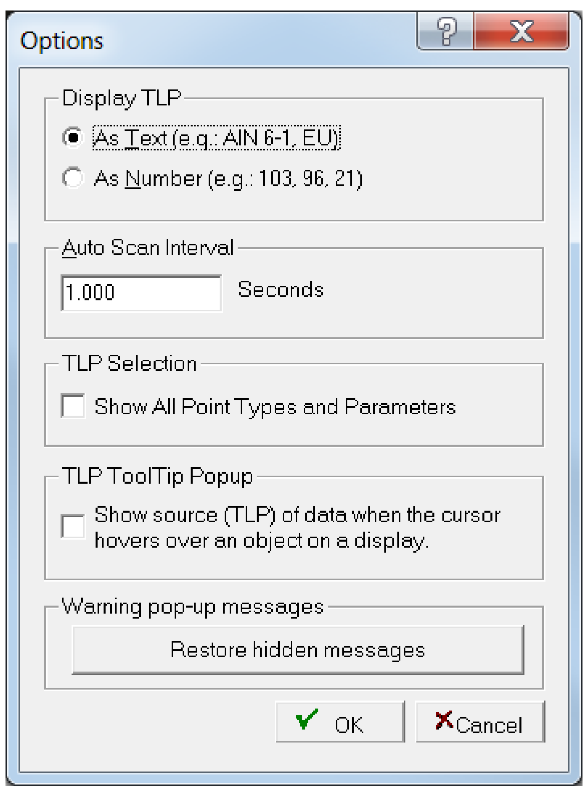


Figure 9-4. Options

Field	Description
Display TLP	Displays values on the Select TLP screen as either text or numbers. For example, the TLP for Register 2 of FST 1 could display as either **FST 1, R2** or **96, 0, 3**.
Auto Scan Interval	Sets, in seconds, the time interval at which the Auto Scan feature (present on numerous ROCLINK 800 screens) polls a ROC.
TLP Selection	Select to display **all** TLP options if the TLP does not pertain to the option you are configuring.
TLP ToolTip Popup	Select to display a context-sensitive TLP source data detailing the selection when you hover over it.

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Chapter 10 – The Windows Menu

In This Chapter

Use the Windows menu to configure how your screens display and to sets the ROCLINK screen you desire to view.

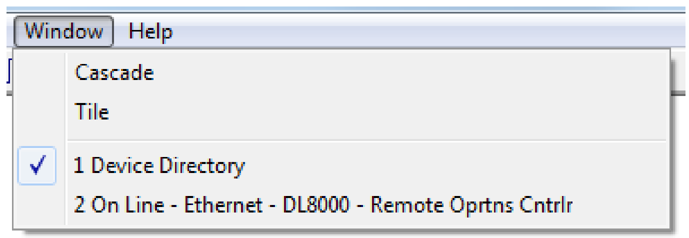

Figure 10-1. Windows Menu

10.1 Cascade

Select **Window** > **Cascade** to view all open ROCLINK 800 windows in a Cascade view.

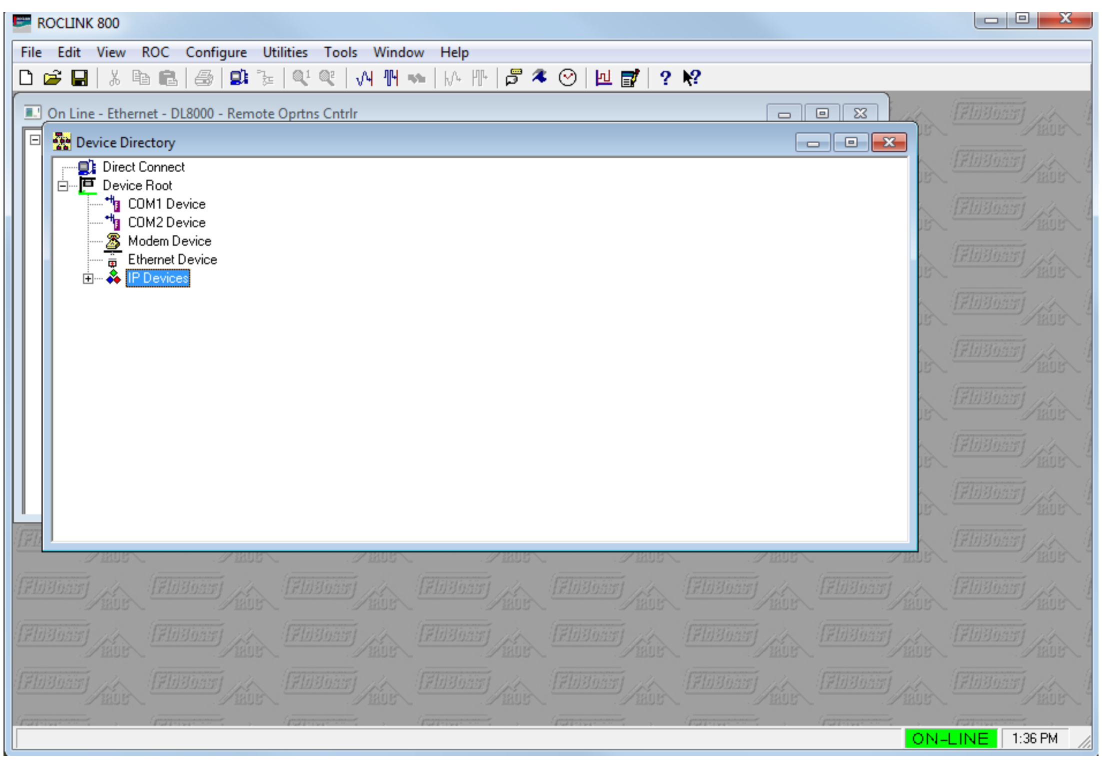

Figure 10-2. Cascade

Button	Description
	Minimizes the size of the window and places it at the bottom of the screen.
	Maximizes the size of the window to fill the screen area.
	Restores the original size of the window.
	Closes a window.

10.2 Tile

Select **Window** > **Tile** to view all open ROCLINK 800 windows in a Tile view.

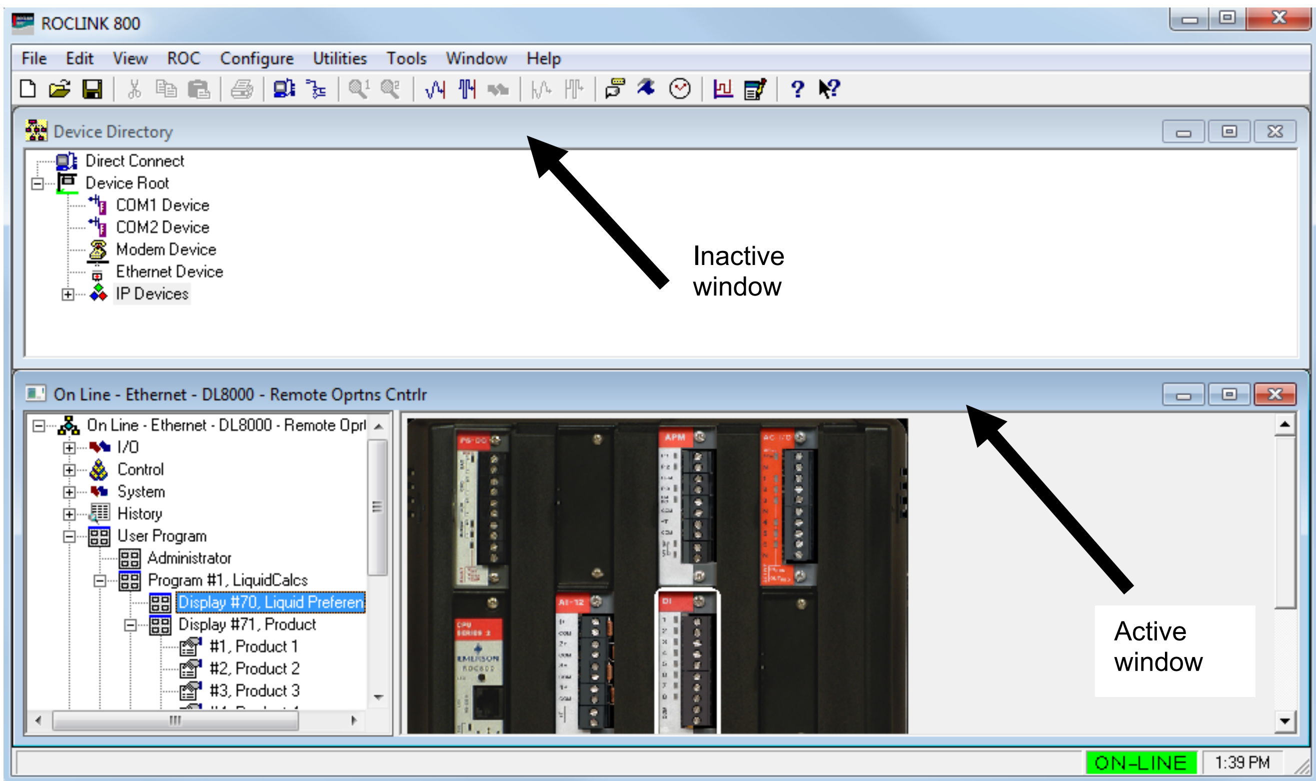

Figure 10-3. Tile

Note the difference in color intensity of the title bars: the system highlights the title bar for the currently active window.

10.3 Active View

To switch between active views in ROCLINK 800, select **Window** and select one of the options in the lower portion of the menu. A check mark appears next to the active view. A view must be active before you can alter information on that screen.

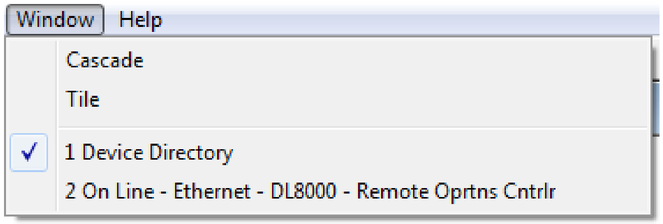

Figure 10-4. Active View

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Chapter 11 – The Help Menu

In This Chapter

Use the Help menu to access the on-line help system and view the About ROCLINK 800 screen.

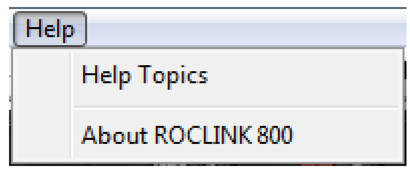


Figure 11-1. Help Menu

11.1 Help Topics

ROCLINK 800 has a comprehensive help system. To access help, click **Help Topics** on the Help menu. To display context-sensitive help on a specific issue, select the item, parameter, field, or button, and press **F1**.

When you select **Help > Help Topics**, you display the ROCLINK 800 main help screen:

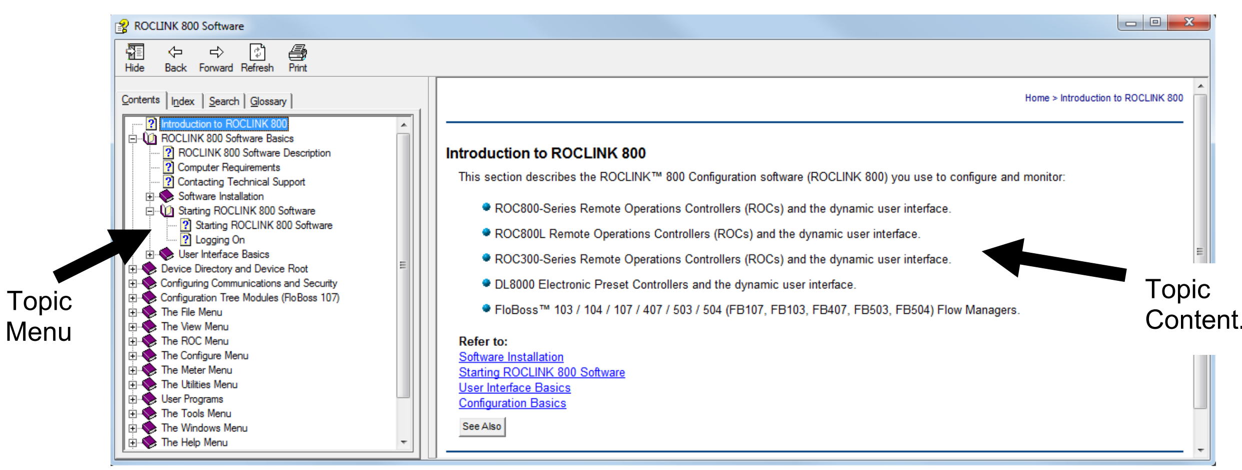


Figure 11-2. ROCLINK 800 Software Help

A table of contents for all help topics appears on the left of the help topic contents. The Help Topics consist of parameter names and menu options. Note that some topic names have been abbreviated. For example: analog input functions appear with "AI" in front of the name, such as in AI Alarms, AI Scanning, or AI-analog inputs.

11.2 About ROCLINK 800

Select **Help** > **About ROCLINK 800** to display the **About ROCLINK 800** dialog.

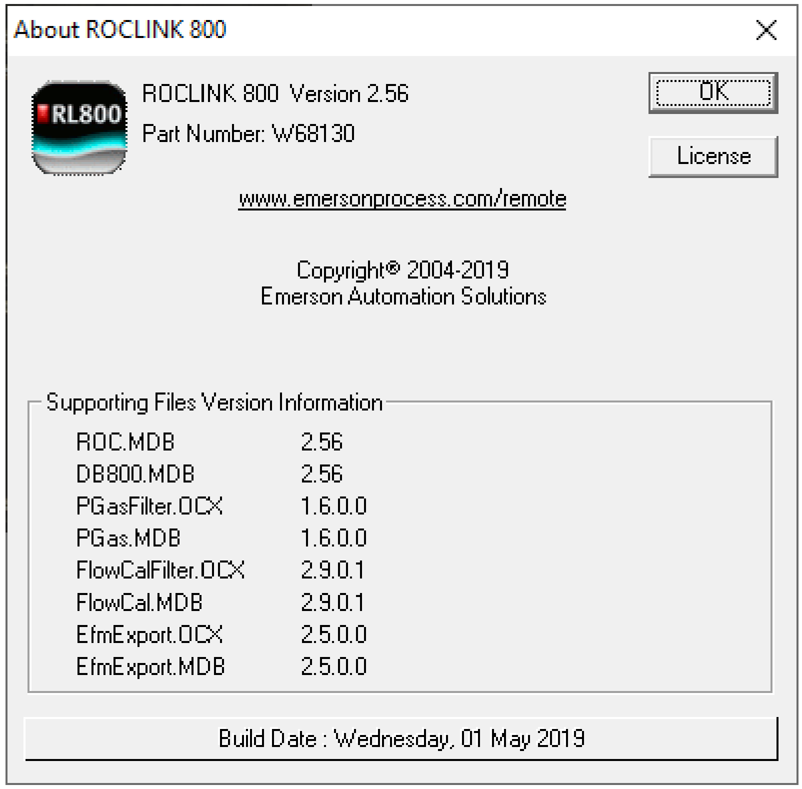


Figure 11-3. About ROCLINK

This dialog displays a variety of information, including the version number, license agreement, creation (software build) date, and version information for supporting files. Click **OK** to close the dialog.

Note: *Figure 12-3* represents the current version as of the publication date of this manual. Newer versions may be available. Consult with your LBP.

Appendix A – Glossary

Note: This is a generalized glossary of terms. Not all the terms may necessarily correspond to the particular device or software described in this manual. For that reason, the term "ROC" is used to identify all varieties of Remote Operations Controllers (including ROC800-Series, ROC800L, DL8000, FloBoss™ 107, and FloBoss™ 100-Series). Refer to *Measurement Units, Symbols, and Abbreviations* (Form A6302) for additional information.

A

A/D	Analog to Digital signal conversion.
ABS	Acrylonitrile Butadiene Styrene.
ADC	Analog to Digital Converter. Used to convert analog inputs (AI) to a format the flow computer can use.
AGA	American Gas Association. A professional organization that oversees the AGA3 (orifice), AGA5 (heating value), AGA7 (turbine), AGA8 (compressibility), AGA9 (Ultrasonic), and AGA11 (Coriolis) gas flow calculation standards. See http://www.aga.org.
AWG	American Wire Gauge.
AI	Analog Input.
AO	Analog Output.
Analog	Analog data is represented by a continuous variable, such as an electrical current signal.
AP	Absolute Pressure.
API	American Petroleum Institute. See http://www.api.org.
Area	A user-defined grouping of database entities.
ASCII	American (National) Standard Code for Information Interchange.
Attribute	A parameter that provides information about an aspect of a database point. For example, the alarm attribute is an attribute that uniquely identifies the configured value of an alarm.

B

BMV	Base Multiplier Value, used in AGA7 (turbine) calculations.
BPS	Bits Per Second, associated with baud rate.
BTU	British Thermal Unit, a measure of heat energy.
Built-in I/O	I/O channels that are fabricated into the ROC and do not require a separate option. Also called "on-board" I/O.

C

C1D2	Class 1, Division 2 hazardous area
CMOS	Complementary Metal Oxide Semiconductor, a type of microprocessor used in a ROC.
Coil	Digital output, a bit to be cleared or set.

COL	Ethernet Packet Collision.

C (continued)

COM	Communications port on a personal computer (PC).
COMM	Communications port on a ROC used for host communications. . **Note**: On FloBoss 500-Series and FloBoss 407s, COMM1 is built-in for RS-232 serial communications.
Comm Module	Module that plugs into a ROC to provide a channel for communications via a specified communications protocol, such as EIA-422 (RS-422) or HART.
CF	Compare Flag; stores the Signal Value Discrete (SVD).
Configuration	Refers either to the process of setting up the software for a given system or the result of performing this process. The configuration activity includes editing the database, building schematic displays and reports, and defining user calculations. Typically, the software setup of a device that can often be defined and changed. Can also mean the hardware assembly scheme.
Configuration Tree	In ROCLINK 800, the graphical display that appears when a configuration file opens. It is a hierarchical branching (“tree-style”) method for navigating within the configuration screens.
CPU	Central Processing Unit.
CRC	Cyclical Redundancy Check error checking.
Crosstalk	The amount of signal that crosses over between the receive and transmit pairs, and signal attenuation, which is the amount of signal loss encountered on the Ethernet segment.
CSA	Canadian Standards Association. See http://www.csa.ca.
CSMA/CD	Carrier Sense Multiple Access with Collision Detection.
CTS	Clear to Send modem communications signal.

D

D/A	Digital to Analog signal conversion.
DB	Database.
dB	Decibel. A unit for expressing the ratio of the magnitudes of two electric signals on a logarithmic scale.
dBm	Power ratio in decibels (dB), referenced to one milliwatt (mW), also known as dBmW.
DCD	**Data Carrier Detect** modem communications signal. In addition, **Discrete Control Device** – A discrete control device energizes a set of discrete outputs for a given setpoint and matches the desired result against a set of discrete inputs (DI).
DCE	Data Communication Equipment.
Deadband	A value that is an inactive zone above the low limits and below the high limits. The purpose of the deadband is to prevent a value (such as an alarm) from being set and cleared continuously when the input value is oscillating around the specified limit. This also prevents the logs or data storage location from being over-filled with data.
Device Directory	In ROCLINK 800, the graphical display that allows navigation through the PC Comm Ports and ROC Comm Ports setup screen.
DI	Discrete Input.
Discrete	Input or output that is non-continuous, typically representing two levels (such as on/off).
DMM	Digital multimeter.
DO	Discrete Output.
Download	The process of sending data, a file, or a program from a PC to a ROC.

DP	Differential Pressure.

D (continued)

DRN	Distributed RTU Network, in which two or more remotely distributed RTU devices (RRTUs) are wirelessly connected in a peer-to-peer network to share data.
DRTU	A primary component of the Distributed RTU Network, consisting of a FB107 chassis housing a focused functionality CPU and a Network Radio module (NRM). The DRTU collects process variables from one or more wellheads and transmits the signals throughout the designed network.
DSR	Data Set Ready modem communications signal.
DTE	Data Terminal Equipment.
DTR	Data Terminal Ready modem communications signal.
Duty Cycle	Proportion of time during a cycle that a device is activated. A short duty cycle conserves power for I/O channels, radios, and so on.
DVM	Digital voltmeter.
DVS	Dual-Variable Sensor. A device that provides static and differential pressure inputs to a ROC.

E

EDS	Electronic Static Discharge.
EEPROM	Electrically Erasable Programmable Read-Only Memory, a form of permanent memory on a ROC.
EFM	Electronic Flow Metering or Measurement.
EIA-232 (RS-232)	Serial Communications Protocol using three or more signal lines, intended for short distances. Concerning RS232D and RS232C, the letters C or D refer to the physical connector type. D specifies the RJ-11 connector where a C specifies a DB25 type connector.
EIA-422 (RS-422)	Serial Communications Protocol using four signal lines.
EIA-485 (RS-485)	Serial Communications Protocol requiring only two signal lines. Can allow up to 32 devices to be connected together in a daisy-chained fashion.
EMF	Electro-Motive Force.
EMI	Electro-Magnetic Interference.
ESD	Electro-Static Discharge.
EU	Engineering Units. Units of measure, such as MCF/DAY.

F

FCC	Federal Communications Commission. See http://www.fcc.gov.
Firmware	Internal software that is factory-loaded into a form of ROM. In a ROC, the firmware supplies the software used for gathering input data, converting raw input data values, storing values, and providing control signals.
FlashPAC module	ROM and RAM module for a ROC300-Series unit that contains the operating system, applications firmware, and communications protocol.
Flash ROM	A type of read-only memory that can be electrically re-programmed. It is a form of permanent memory (requires no backup power). Also called Flash memory.
FloBoss	A microprocess-based device that provides flow calculations, remote monitoring, and remote control. A FloBoss is a type of ROC.
FM	Factory Mutual.
Force	Write an ON/OFF, True/False, or 1/0 value to a coil.

F (continued)

FOUNDATION™ Fieldbus	An open architecture for information integration, managed by the Fieldbus Foundation (www.fieldbus.org).
FPV	Compressibility Factor.
FSK	Frequency Shift Keypad.
FST	Function Sequence Table, a type of user-written program in a high-level language designed by Emerson Process Management’s Flow Computer Division.
Ft	Foot or feet.

G

GFA	Ground Fault Analysis.
GHz	Gigahertz, 10^9 cycles per second
GND	Electrical ground, such as used by the ROC’s power supply.
GP	Gauge Pressure.

H

H1	A Foundation Fieldbus protocol operating at 31.25 kbit/s that interconnects field devices (such as sensors or I/O devices).
HART	Highway Addressable Remote Transducer.
Holding Register	Analog output number value to be read.
HSE Protocol	High Speed Ethernet protocol; a communications protocol operating at 100 Mbit/s used to integrate high-speed controllers (or servers) connected via Ethernet.
Hw	Differential pressure.
Hz	Hertz.

I, J

IC	Integrated Circuit. Also, Industry Canada (more recently known as Measurement Canada), an organization that grants custody transfer approvals on certain ROC units.
ID	Identification.
IEC	Industrial Electrical Code or International Electrotechnical Commission. See http://www.iec.ch.
IEEE	Institute of Electrical and Electronic Engineers. A professional organization that, in conjunction with the International Standards Organization (ISO), establishes and maintains the Open System Interconnection (OSI) reference model and an international standard for the organization of local area networks (LANs). Refer to http://www.ieee.org.
IMV	Integral Multiplier Value, used in AGA3 (orifice) calculations.
Input	Digital input, a bit to be read.
Input Register	Input numeric value to be read.
Local Port	Also LOI; the serial EIA-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.
I/O	Input/Output.
I/O Module	Module that plugs into an I/O slot on a ROC to provide an I/O channel.

IRQ	Interrupt Request. Hardware address oriented.
ISO	International Standards Organization. See http://www.iso.ch.
IV	Integral Value.

K

KB	Kilobytes.
kHz	KiloHertz.

L

LCD	Liquid Crystal Display.
LDP	Local Display Panel, a display-only device that plugs into ROC300-Series units (via a parallel interface cable) used to access information stored in the ROC.
LED	Light-Emitting Diode.
Logical Number	The point number the ROC and ROC Plus protocols use for I/O point types are based on a physical input or output with a terminal location; the point numbers for all other point types are “logical” and are simply numbered in sequence.
LNK	Ethernet has linked.
LOI	Local Operator Interface (or Local Port). Refers to the serial EAI-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.
LPM	Lightning Protection Module; a device that provides lightning and power surge protection for ROCs.
LRC	Longitudinal Redundancy Checking error checking.

M

m	Meter.
mA	Milliamp(s); one thousandth of an ampere.
MAC Address	Media Access Control Address; a hardware address that uniquely identifies each node of a network.
Manual mode	For a ROC, indicates that the I/O scanning has been disabled.
MAU	Medium Attachment Unit.
MCU	Master Controller Unit.
Modbus	A popular device communications protocol developed by Gould-Modicon.
MPU	Micro-Processor Unit.
mm	Millimeter.
MMBTU	Million British Thermal Units.
msec	Millisecond, or 0.001 second.
MVS	Multi-Variable Sensor. A device that provides differential pressure, static pressure, and temperature inputs to a ROC for orifice flow calculations.
mV	Millivolts, or 0.001 volt.
mW	Milliwatts, or 0.001 watt.

N

NAP	Network Access Point; the point in the distributed RTU network at which ROCLINK 800

NEC	National Electrical Code.
NEMA	National Electrical Manufacturer's Association. See *http://www.nema.org*.

N (continued)

Node	A basic structural component of the Distributed RTU Network. A node (usually a FB107 chassis housing a focused-functionality CPU and a Network Radio module) provides a data collection point that wirelessly transmits data throughout the designed network.
NRM	Network Radio module; a module used in both the FloBoss 107 and ROC00-Series based devices to wirelessly transmit information throughout the distributed RTU network.

O

OH	Off-Hook modem communications signal.
Off-line	Accomplished while the target device is not connected (by a communications link). For example, “off-line configuration” refers to configuring an electronic file that is later loaded into a ROC.
Ohms	Units of electrical resistance.
On-line	Accomplished while connected (by a communications link) to the target device. For example, “on-line configuration” refers to configuring a ROC800-Series unit while connected to it, so that you can view the current parameter values and immediately load new values.
Opcode	Type of message protocol the ROC uses to communicate with the configuration software, as well as host computers with ROC driver software.
Operator Interface	Also LOI or Local Port; the serial EIA-232 (RS-232) port on the ROC through which local communications are established, typically for configuration software running on a PC.
Orifice meter	A meter that records the flow rate of gas through a pipeline. The flow rate is calculated from the pressure differential created by the fluid passing through an orifice of a particular size and other parameters.

P, Q

Parameter	A property of a point that typically can be configured or set. For example, the Point Tag ID is a parameter of an Analog Input point. Parameters are normally edited by using configuration software running on a PC.
PC	Personal Computer.
Pf	Flowing pressure.
P/DP	Pressure/Differential Pressure.
PI	Pulse Input.
PID	Proportional, Integral, and Derivative control feedback action.
PIT	Periodic Timer Interrupt.
PLC	Programmable Logic Controller.
Point	Software-oriented term for an I/O channel or some other function, such as a flow calculation. Points are defined by a collection of parameters.
Point Number	The physical location of an I/O point (module slot and channel) as installed in the ROC.
Point Type	Defines the database point to be a specific type of point available to the system. The point type determines the basic functions of a point.
Preset	Number value previously determined for a register.
PRI	Primary PID control loop.

Protocol	A set of standards that enables communication or file transfers between two computers. Protocol parameters include baud rate, parity, data bits, stop bit, and the type of duplex.
PSTN	Public Switched Telephone Network.
PT	Process Temperature.
PTT	Push-to-Talk signal.
Pulse	Transient variation of a signal whose value is normally constant.
Pulse Interface module	A module that provides line pressure, auxiliary pressure, and pulse counts to a ROC.
PV	Process Variable or Process Value.

R

Rack	A row of slots on a ROC into which I/O modules can be plugged. Racks are given a letter to physically identify the location of an I/O channel (such as “A” for the first rack). Built-in I/O channels are assigned a rack identifier of “A” while diagnostic I/O channels are considered to be in “E” rack.
RAM	Random Access Memory. RAM is used to store history, data, most user programs, and additional configuration data.
RBX	Report-by-exception. RBX always refers to Spontaneous RBX in which the ROC contacts the host to report an alarm condition.
RR	Results Register; stores the Signal Value Analog (SVA).
RFI	Radio Frequency Interference.
RI	Ring Indicator modem communications signal.
ROC	Remote Operations Controller microprocessor-based unit that provides remote monitoring and control.
ROCLINK 800	Microsoft® Windows®-based software used to configure functionality in ROC units.
ROM	Read-only memory. Typically used to store firmware. Flash memory.
Rotary Meter	A positive displacement meter used to measure flow rate, also known as a Roots meter.
RTC	Real-Time Clock.
RTD	Resistance Temperature Detector.
RTS	Ready to Send modem communications signal.
RTU	Remote Terminal Unit.
RTV	Room Temperature Vulcanizing, typically a sealant or caulk such as silicon rubber.
RS-232	Serial Communications Protocol using three or more signal lines, intended for short distances. Also referred to as the EIA-232 standard.
RS-422	Serial Communications Protocol using four signal lines. Also referred to as the EIA-422 standard.
RS-485	Serial Communications Protocol requiring only two signal lines. Can allow up to 32 devices to be connected together in a daisy-chained fashion. Also referred to as the EIA-485 standard.
RX or RXD	Received Data communications signal.

S

SAMA	Scientific Apparatus Maker’s Association.
SCADA	Supervisory control and data acquisition; referring to a computer system that monitors and controls oil and gas pipeline systems.

S (continued)

Script	An uncompiled text file (such as keystrokes for a macro) that a program interprets in order to perform certain functions. Typically, the end user can easily create or edit scripts to customize the software.
Soft Points	A type of ROC point with generic parameters that can be configured to hold data as desired by the user.
SP	Setpoint, or Static Pressure.
SPI	Slow Pulse Input.
SPK	Speaker.
SRAM	Static Random Access Memory. Stores data as long as power is applied; typically backed up by a lithium battery or supercapacitor.
SRBX	Spontaneous Report-By-Exception. SRBX always refers to Spontaneous RBX in which the ROC contacts the host to report an alarm condition.
SVA	Signal Value Analog. Stored in the Results Register, it is the analog value that is passed between functions in an FST.
SVD	Signal Value Discrete. Stored in the Compare Flag, it is the discrete value that is passed down the sequence of functions in an FST.
System Variables	Configured parameters that describe the ROC; set using ROCLINK software.

T

T/C	Thermocouple Input.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TDI	Time Duration Input.
TDO	Time Duration Output.
Tf	Flowing temperature.
TLP	Type (of point), Logical (or point) number, and Parameter number.
TX or TXD	Transmitted Data communications signal.
Turbine meter	A device used to measure flow rate and other parameters.

U

Upload	Send data, a file, or a program from the ROC to a PC or other host.
USB	Universal Serial Bus, a serial bus standard used to connect devices.

V-Z

V	Volts.

Appendix B – The Display Editor

In This Chapter

The custom display option in ROCLINK 800 software allows you to create customized displays or load a display from a file. The ROC can store up to 246 displays (including both custom user displays you create and user program displays that accompany user programs).

Caution **You should be familiar with Visual Basic before attempting to create custom displays.**

You can add fields to monitor flow, I/O points, and other TLPs. Select **View** > **Display > New**. A blank Display Editor screen displays.

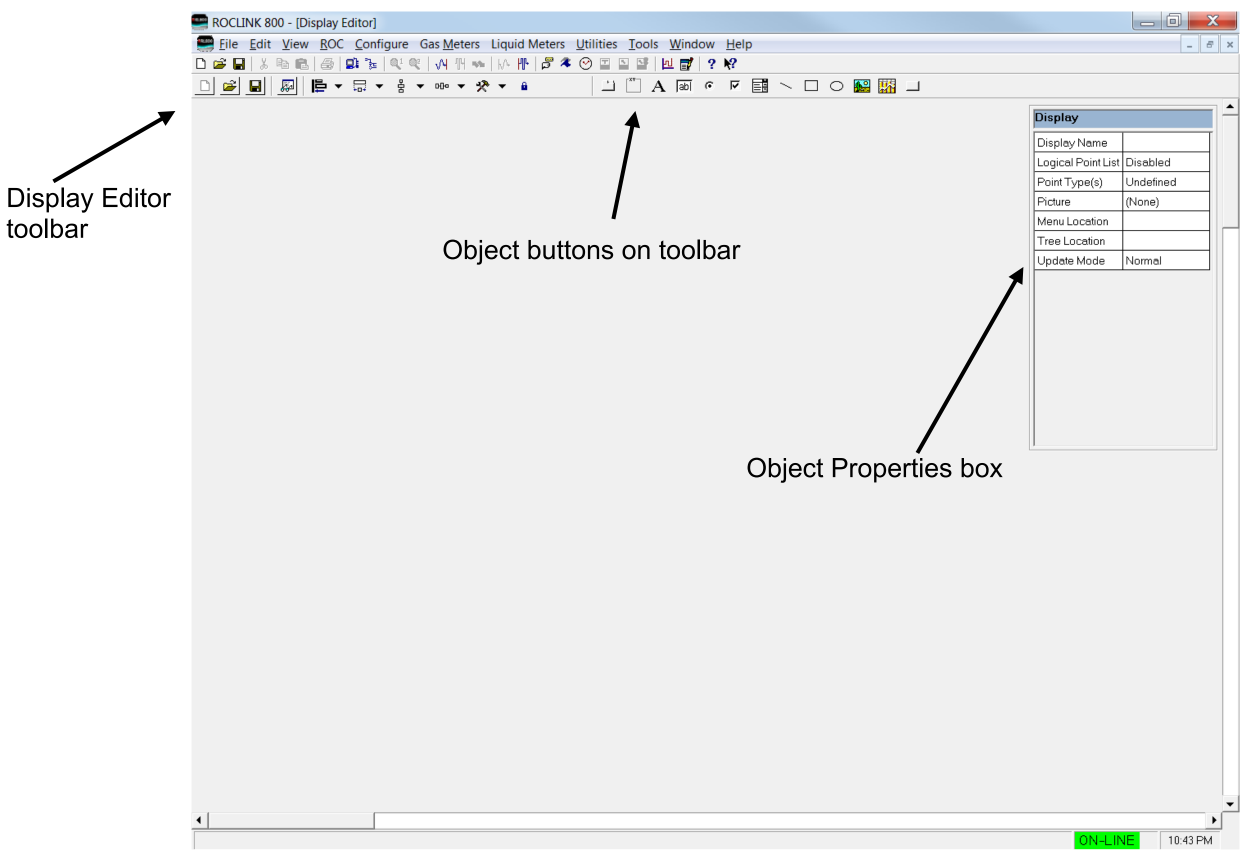


Figure B-1. Display Editor

By adding objects (tabs, fields, labels, text, etc.) to the display, you can incorporate "live" data as well as images and other information you wish to convey. One use of custom displays is to graphically represent the application that a ROC monitors and controls. Another use is to monitor the ROC, giving you to opportunity to change commonly used parameters from a single screen.

Each custom display has parameters specific to the entire display that you are creating. By default, the system places the Display object properties box at the upper right of the screen in a pop-up window. A similar object properties box displays for each object you add to the display.

⚠ Caution

When creating a custom display with multiple iterations that includes writable ROC800 HART-2 parameters, the system writes HART-2 values for all logicals to logical one. This means that the value for logical one is overwritten when the system writes each additional logical value. For example, if the value of logical one is 3, the current value of logical two is 5, and the new value of logical two is 7, the system overwrites the value in logical one (3) with the new value of logical two (7) and does not update the current value of logical two (5).

You can avoid this issue by creating a custom display with a single iteration that includes the fields for all logicals on a single screen. By manually assigning the TLP values for each field, the system writes all values to the correct logicals.

Drag and drop the object buttons from the toolbar to the Display Editor screen and set the associated parameters. Each option has parameters associated with it depending on the type of option you have selected and you can customize the parameters in the object properties box.

Note: Custom displays developed with ROCLINK for Windows are not compatible with ROCLINK 800 Configuration software.

Sections B.1 and *B.2* discuss the process of creating a new custom display and of adding and arranging objects on that display.

B.1 Creating a New Custom Display

To create a new display:

1. Select **View** > **Display** > **New**. A blank Display Editor screen displays.

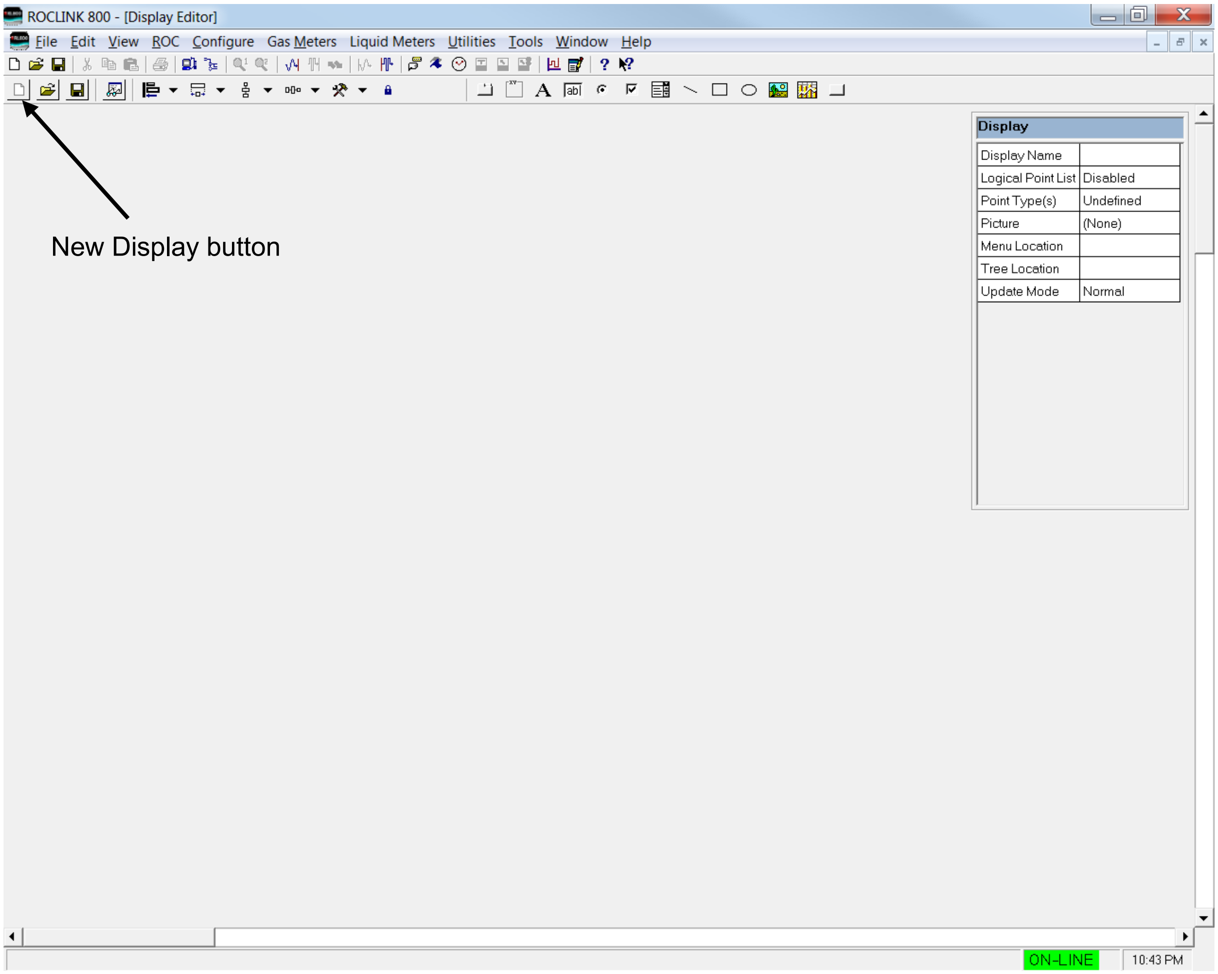


Figure B-2. Display Editor (blank)

Note: You can also click the **New Display** button (at the extreme left of the Display Editor toolbar) to create a new display.

2. Specify the properties for the new custom display:

Field	Description
Display Name	Names the display. Although you can enter up to 50 characters for a display name, a maximum of 10-20 characters should be sufficient to uniquely identify the display.
Logical Point List	Indicates whether the display is unique or one of several iterations. Click ▼ (which appears when you click the field) to display the values. Valid values are **Disabled** (screen is unique) or **Enabled** (number of screens equals the number of logicals). The default is **Disabled**. **Note**: The number of screens is based of the number of logicals for the first point type selected in the Point Type field.

Field	Description
Point Type(s)	Sets, if you **enable** the Logical Point List option, the point type(s) whose logicals track the iteration of the display. Click **…** (which appears when you click the field) to display the Select Point Type(s) screen. Use that screen to associate one or more point types with this Logical Point List.
Picture	Identifies a graphic used for the background of the display. Click **…** (which appears when you click the field) to display a Select Picture File screen. Use that screen to associate an image with the display.
Menu Location	Allows you to hide, replace, or rename a menu selection in the ROCLINK 800 menu. This option applies **only** to displays physically residing in the ROC.
	Hide Hides a menu selection in the Meter, View, or ROC menu. Requires the syntax H:menuname.submenuname (as in **H:Meter.Plate Change**).
	Replace Replaces a screen in the Meter menu with the current custom display. Requires the syntax R:menuname.submenuname (as in **R:Meter.Setup**).
	Rename Replaces a menu in the Meter, View, or ROC menu with the current display using the indicated name. Requires the syntax N:menuname.submenuname: newsubmenuname (as in **N:Meter.Calibration:Coriolis Cal**).
	Note: Use a comma to hide, replace, or rename multiple features, as in **N:Meter.Calibration:Coriolis Cal,N:Meter,Calibration:Central Cal**.
Tree Location	Currently unavailable.
Update Mode	Sets when the system updates data on this screen. Valid values are **Normal** (system does not update the screen content) or **AutoScan** (system updates the screen content based on the interval you specify in the Auto Scan Update Interval field on the Options screen (**Tools** > **Options**). The default value is **Normal**. **Note**: If you include dynamic content on your custom display, you may want the system to refresh that content for the most current values.

3. Add display content to the custom display. You can **either** drag an object from the toolbar and place it on the custom display **or** place the cursor on the display where you want the object, right-click, and select from the pop-up menu. Refer to *Section B.2, Adding Custom Display Objects,* for a description of each object and its properties.

- Add as many objects to the screen as you need. You can place objects anywhere on the Display Editor screen. Use a frame with a label to logically group certain options (such as option buttons or check boxes) to ensure that others know the use context for the options.
- For each object you enter, complete that object's Properties box. Each object's Properties box has different items, and you can edit those properties at any time.
- Move and re-shape objects within the display as necessary. To modify an object's placement or shape:
  - Click and drag on the control squares to change the size of the object.
  - Press **Shift + arrow keys** to change an object's size. Press **Shift +Alt + arrow keys** for smaller changes.
  - Press **Ctrl + arrow keys** to move an object to the desired position. Press **Ctrl + Alt + arrow keys** for smaller moves.
  - Select the **Align Lefts** icon to align all selected objects to the furthest left point in the group.
  - Select the **Size to Widest** icon to change the width of all selected objects to the width of the widest element.
  - Select the **Make Vertical Spacing Equal** icon to evenly adjust the vertical spacing between all the selected objects.
  - Select the **Make Horizontal Spacing Equal** icon to evenly adjust the horizontal spacing between all the selected objects.
  - Remove objects by selecting the object and pressing **Delete**.

4. Click the **Test** icon to verify that the completed custom display works correctly.

5. Click the **Save Display to File** icon to save the completed and tested custom display. ROCLINK 800 displays use the suffix .DSP (as in *TestScreen.dsp*).

B.2 Adding Custom Display Objects

The right-hand side of the Display Editor toolbar (see *Figure B-3*) includes a number of buttons for custom objects.

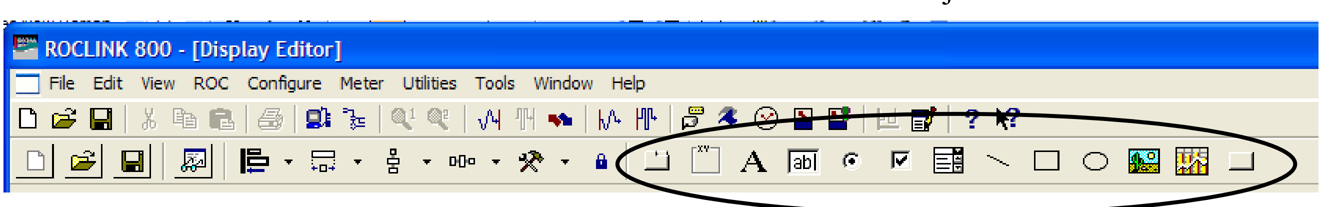


Figure B-3. Custom Display Objects

Tab Control

Adds an twelve-tab image, which you can size appropriately and edit to fewer tabs. You can then drag and drop objects onto each tab.

This object has the following properties:

TabControl(0)	
Tabs	12
Caption 1	Tab 1
Caption 2	Tab 2
Caption 3	Tab 3
Caption 4	Tab 4
Caption 5	Tab 5
Caption 6	Tab 6
Caption 7	Tab 7
Caption 8	Tab 8
Caption 9	Tab 9
Caption 10	Tab 10
Caption 11	Tab 11
Caption 12	Tab 12
Allow Data Entry	Yes
Visible	Yes
Tab Order	0

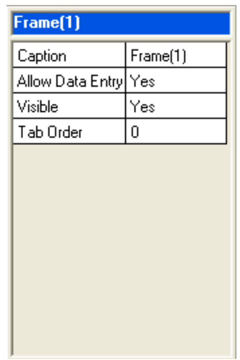
Property	Description	
Tabs	Sets the number of tabs (up to 12) on the screen. Click ▼ (which displays when you click in the field) to specify the number of tabs.	
Caption 1 through **12**	Sets a label or caption for each tab. The size of the tab increases to accommodate the text.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Editing is permitted based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible.

	Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Frame

Adds an organizing frame, which you use to group similar user selections. Once a frame is in place, drag and drop objects onto the frame.

This object has the following properties:

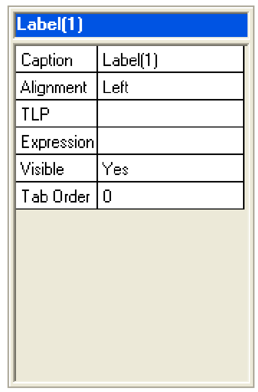


Property	Description	
Caption	Sets a label or caption for the object. The default is **Frame(1)**; the system uniquely names each object until you rename it.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Editing is allowed based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions

	under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Label

Adds labels to identify objects. This object has the following properties:

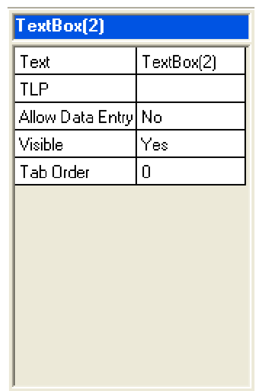


Property	Description
Caption	Sets a label or caption for the object. The default is **Label(1)**; the system uniquely names each object until you rename it.
Alignment	Indicates where the label text displays. Click ▼ (which displays when you click in the field) to display the valid values: **Left** (text is flush left), **Right** (text is flush right), or **Center** (text is centered).
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.
Expression	Associates the object with a Visual Basic expression. Click **…** (which displays when you click in the field) to display an Expression Builder window which you use to define the expression. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values: **Yes** Object is always visible. This is the **default**. **No** Object is not visible. **Expression** Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which

		you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Text Box

Adds a data entry field. This object has the following properties:

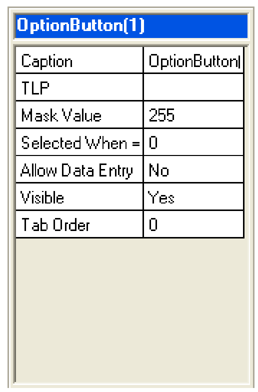


Property	Description	
Text	Sets text that appears in the object. You can enter as many characters as necessary. Use the control squares to change the size of the text box. The default is **TextBox(1)**; the system uniquely names each object until you rename it.	
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	

Property	Description	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Option Button

Adds a radio button to limit input to a single selection. This object has the following properties:

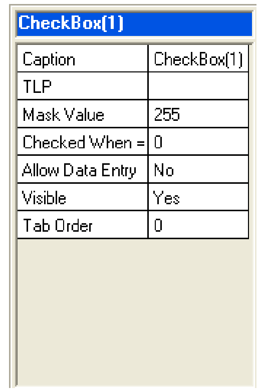


Property	Description
Caption	Sets a label or caption for each object. The default is **OptionButton(1)**; the system uniquely names each object until you rename it.
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.
Mask Value	Identifies individual bits of an 8-bit integer ROCLINK uses when calculating the value to be compared to the value specified in the **Selected When** or **Checked When** fields. ROCLINK performs a mathematical AND comparing this masked value and the value in the Selected When or Checked When field and activates the button or box if the values are equal. The default value is **255**.

Property	Description	
Selected When =	Specifies the value at which the option button activates. Works in conjunction with the value in the **Mask Value** field.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
Property	**Description**	
Visible (continued)	**Expression**	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Check Box

Adds a check box for multiple selections. This object has the following properties:

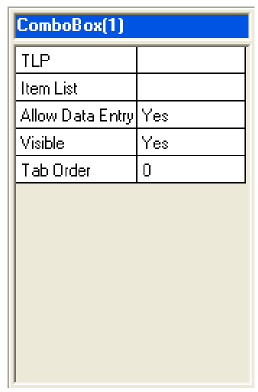


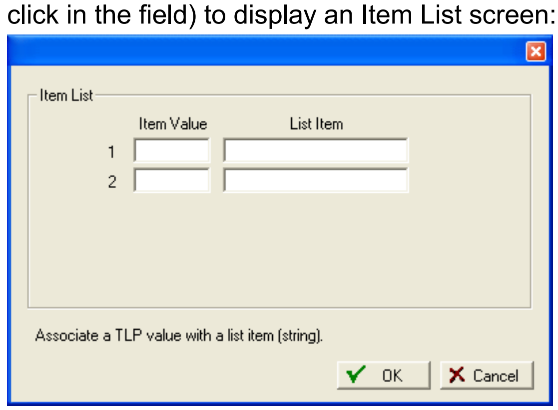
Property	Description	
Caption	Sets a label or caption for the object. The default is **CheckBox(1)**; the system uniquely names each object until you rename it.	
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the associated TLP.	
Mask Value	Identifies individual bits of an 8-bit integer ROCLINK uses when calculating the value to be compared to the value specified in the **Selected When** or **Checked When** fields. ROCLINK performs a mathematical AND comparing this masked value and the value in the Selected When or Checked When field and activates the button or box if the values are equal. The default value is **255**.	
Checked When =	Specifies the value at which the checkbox activates. Works in conjunction with the value in the **Mask Value** field.	
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing.
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.

	Expression Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.

Combo Box

Adds a list of options that opens when you click ▼. This object has the following properties:

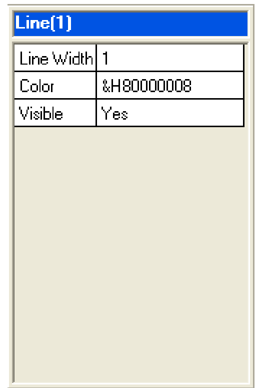


Property	Description
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to select the associated TLP.
Item List	Enables you to build a drop-down list of up to 30 selectable items. Click **…** (which displays when you click in the field) to display an Item List screen:  Use this screen to add items to the drop-down menu. ROCLINK 800 expands the list as you add items.

Property	Description	
	Item Value	Associates the label in the drop-down menu with a value in the designated TLP.
	List Item	Sets the label that appears in the drop-down menu.
Allow Data Entry	Sets whether the user can edit the object. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Allows editing. This is the **default**.
	No	Does not allow editing
	Expression	Allows editing based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the data entry is allowed. Refer to *Section B.4, Adding an Expression to an Object.*
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

Line

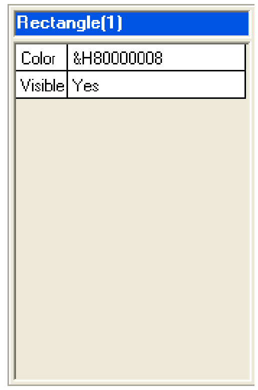
Adds a line to mark borders between objects. This object has the following properties:



Property	Description	
Line Width	Sets the thickness of the line. The default is **1**.	
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*

Rectangle

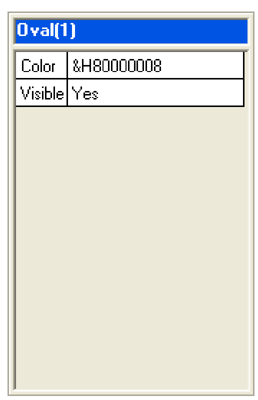
Adds a rectangle to mark borders between objects. This option has the following properties:



Property	Description	
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object*

Oval

Adds an oval to mark borders between objects. This object has the following properties:

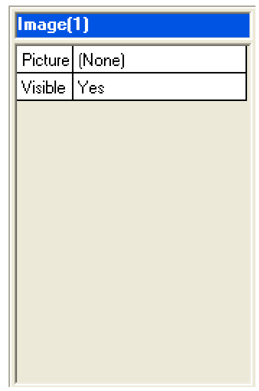


Property	Description
Color	Sets the color of the object. Enter a hexadecimal color value or click in the field to display a Color screen, which you use to assign a color to the object.

Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*

Image

Adds an image (.JPG, .BMP, .PNG, .GIF, or other graphic formats) from a file. This object has the following properties:



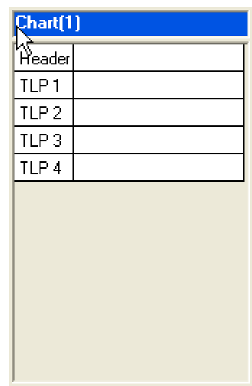
Property	Description	
Picture	Sets an image (.JPG, .BMP, .GIF, or other graphic formats) to display with the object. Click in the field to display a Select Picture File screen which you use to indicate the appropriate image. The default is **None**.	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*

Chart

Adds a chart to represent data graphically.

Note: You can view real-time data by configuring what figures display on the chart. After you configure the chart, view the display and select **Auto-Scan**. The chart displays the collected data in real-time. You cannot save the chart data to system memory.

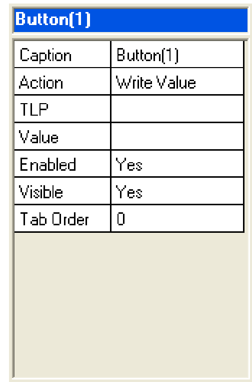
This option has the following properties:



Property	Description
Header	Sets a title for the object.
TLP 1 through **4**	Associates up to four TLPs with the chart. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the TLPs.

Button 

Adds a button to the screen. This object has the following properties:



Property	Description	
Caption	Sets a label or caption for the object. The default is **Button(1)**; the system uniquely names each object until you rename it.	
Action	Associates an activity with the button. **Write Value** is the only action currently associated with this control. The system writes the value identified in the Value property	
TLP	Associates the object with a TLP. Click **…** (which displays when you click in the field) to display a Select TLP screen you use to define the TLP.	
Value	Opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section 5.6.4, Adding an Expression to an Object.*	
Enabled	Indicates whether the button is active. Valid values are:	
	Yes	Object is always active. This is the **default**.
	No	Object is not active.
	Expression	Selection is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*

Property	Description	
Visible	Indicates whether the object appears in the final version of the display. Click ▼ (which displays when you click in the field) to display the valid values:	
	Yes	Object is always visible. This is the **default**.
	No	Object is not visible.
	Expression	Visibility is based on a Visual Basic expression. This option opens an Expression Builder window which you use to determine the conditions under which the object is visible. Refer to *Section B.4, Adding an Expression to an Object.*
Tab Order	Sets the object-to-object order the cursor follows on the custom display when you press the Tab key. **Note**: For greatest efficiency, use the **Set Tab-Key Order** option (accessed through the Other Tools button on the toolbar) to set this sequence when you have finished defining **all** the objects on the custom display.	

B.3 Managing Custom Display Objects

The left-hand side of the Custom Display toolbar (see *Figure B-4*) provides utilities you use to manage the objects placed on the custom display.

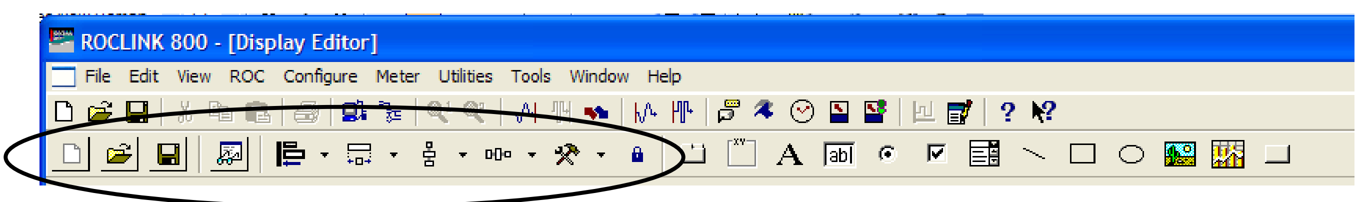


Figure B-4. Object Management Tools

New Display

Creates a new custom display file.

Open Display File

Opens an existing custom display file. Click this button to display an Open screen that shows all available .DSP files in the default ROCLINK 800 directory. If you store .DSP files elsewhere, use this screen to navigate to that location and select a file.

Save Display to File

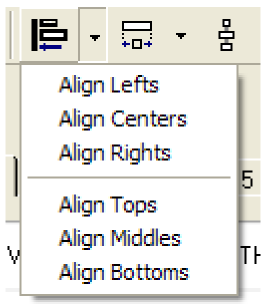
Saves the current display. Click this button to display a Save As screen that shows the .DSP files in the default ROCLINK 800 directory. If you store .DSP files elsewhere, use this screen to navigate to that location and save the display file.

Test

Closes edit mode for the custom display and shows the custom display as defined. If any errors exist, the system displays appropriate error messages.

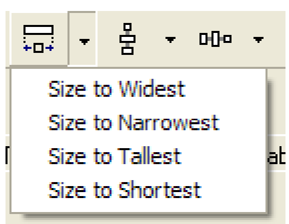
Align Lefts

Aligns selected objects to the left. Click ▼ to display a drop-down menu that provides more specific alignment options:



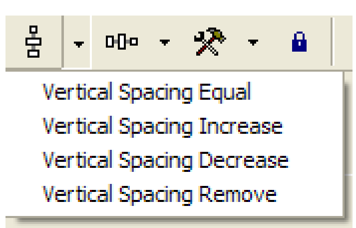
Size to Widest

Adjusts the size of the selected objects to the width of the widest object. Click ▼ to display a drop-down menu that provides more specific sizing options:



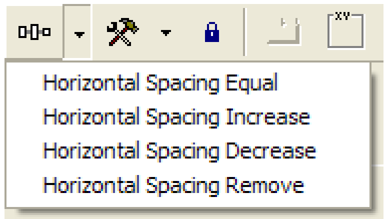
Make Vertical Spacing Equal

Equalizes the vertical spacing between the selected objects. Click ▼ to display a drop-down menu that provides more specific spacing options:



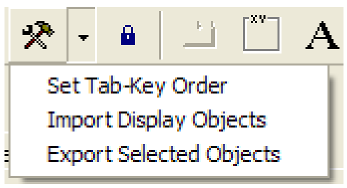
Make Horizontal Spacing Equal

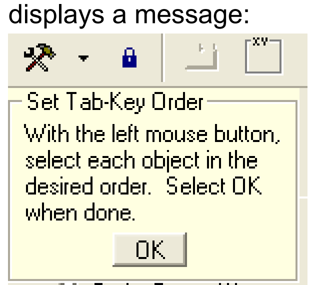
Equalizes the horizontal spacing between the selected objects. Click ▼ to display a drop-down menu that provides more specific spacing options:



Other Tools

Provides additional object-management tools. Click ▼ to display a drop-down menu that provides more specific spacing options:



Option	Description
Set Tab-Key Order	Allows you to specify the object-to-object sequence for the cursor on the custom display when you press Tab. When you click this option, the system displays a message: 
Import Display Objects	Allows you to import another custom display into the current custom display. Use this to quickly duplicate custom displays or build similar custom displays. When you click this option, the system displays an Import screen that you use to select the .DSP file to import.
Export Display Objects	Allows you to save the current custom display. When you click this option, the system displays a Save As screen. Use it to save the .DSP file to the default (or other) ROCLINK 800 directory.

Lock Controls

Restricts the movement of objects on the custom display. This control is helpful when you want to make minor changes to the custom display without accidentally modifying the location of objects.

B.4 Adding an Expression to an Object

Some custom display objects—tab, label, button, text box, option, check box, combo box, line, circle, square, and image—allow you to add Visual Basic expressions that cause the display to change under specific conditions.

The Expression Builder screen enables you to quickly build and test a Visual Basic expression to provide customized functioning. For example, you could set a frame's Visible property to Expression and then specify the conditions (such as a particular TLP value) under which the frame displays. Until that value occurs, the frame does not appear on the custom display.

⚠ Caution **We strongly suggest prior experience in Visual Basic programming if you want to create display element expressions.**

To add an expression:

1. Click an object's property that includes **Expression** as an option.
2. Click ▼ and select **Expression**.
3. Click **…** (which displays as part of the Expression option). The Expression Builder screen displays:

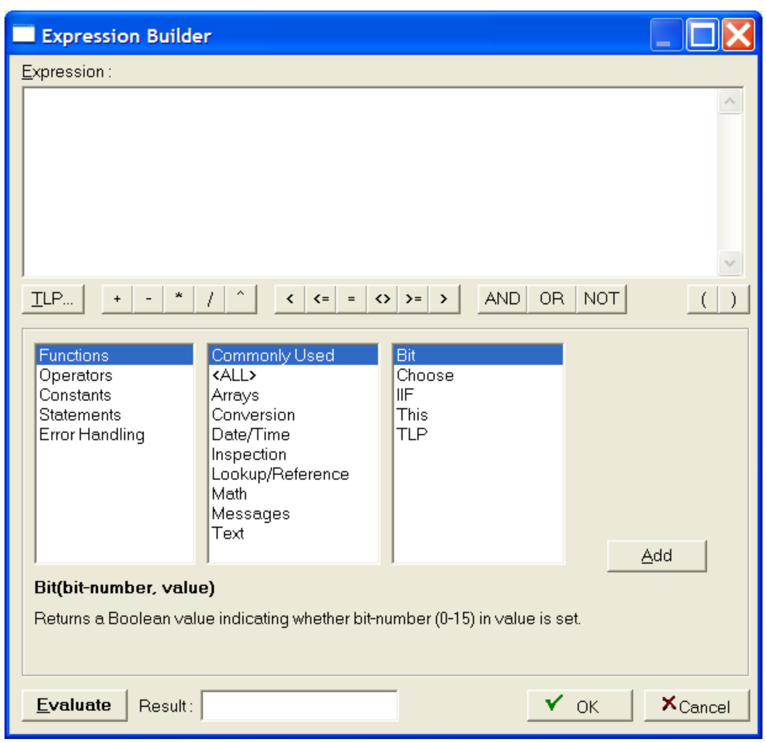


Figure B-5. Expression Builder

Note: If you are skilled in Visual Basic or already know the specific expression you want to add, you can enter the desired expression directly in the upper (Expression) box on this screen.

4. Build an expression using the buttons immediately under the Expression box and/or the three boxes in the center of the screen. Click **Add** to include each expression component to the screen.

Note: Based on your selected expression category, ROCLINK 800 changes the options displayed in the other two boxes to help you in the building process. Additionally, ROCLINK 800 displays definitions and explanations at the bottom of the screen.

5. When your expression is complete, click **Evaluate**. ROCLINK 800 checks your expression for errors. Correct any errors.
6. Click **OK** when your expression is complete. The Display Editor screen displays.

Note: At this point it is **strongly** recommended that you save the custom display to save the expression.

B.5 Editing a Custom Display from a File

Once you have created a custom display, you save the display as a **.DSP** file you can later edit. Click **Save Display to File** on the Display Editor toolbar and indicate the name and location for the saved display.

To edit a saved display, select **View** > **Display** > **From File**. An Open screen displays. Select the .DSP file and click **Open**. ROCLINK 800 opens that display.

If **Edit** is **not** included in the buttons displayed at the bottom of the ROCLINK 800 screen, you need to change the attributes of the .DSP file. Using Window's Explorer, access the directory that houses your .DSP files (typically C:\Program Files\ROCLINK800\Displays, if you accepted defaults during system installation). If you store your .DSP files in another location, access that directory. Locate the .DSP file and left-click the file to display a pop-up menu. Select **Properties**. A window similar to this one should appear:

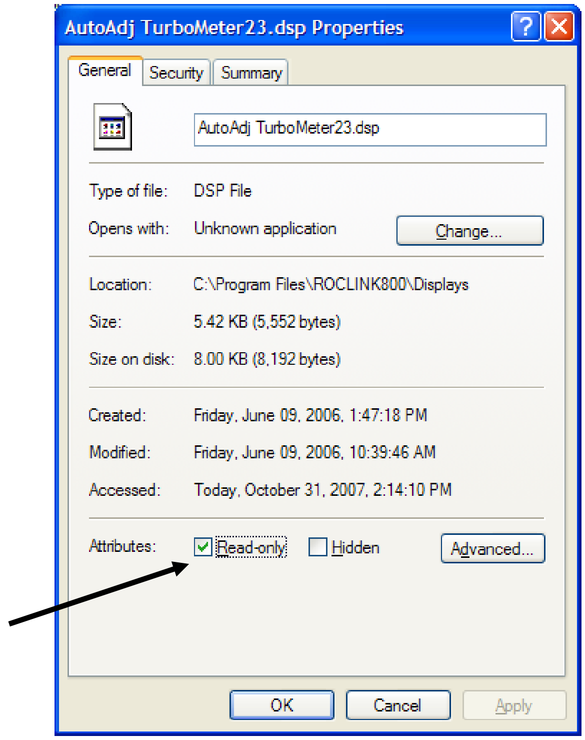


Figure B-6. Properties

Uncheck the **Read-only** Attributes box and click **Apply**. You can now edit the .DSP file.

Appendix C – Alarm Processing

In This Chapter

This appendix describes how the preset processes alarms.

Note: Check any alarm with "Meter X" in its name for **each** meter.

C.1 Overview

The preset continuously checks for various alarm conditions. Depending on the configuration, when the preset detects a condition, it processes an alarm. How the preset responds to alarm conditions is called an "action" or "severity." The following table shows alarm severities and their descriptions.

Table C-1. Alarm Severities

Alarm Severity Id	Description
Severity 0	Off
Severity 1	Illuminate Alarm Led & Display Message
Severity 2	Illuminate Alarm Led & Display Message & Stop Batch
Severity 3	Illuminate Alarm Led & Display Message & Stop Batch & Close contact
Severity 4	Illuminate Alarm Led & Display Message & Stop Batch & Close contact & Lock Batch

Some alarms remain fixed at a particular severity (from 1 to 4) and are not user-configurable. Other alarms have parameters you use to configure the alarm severity. Refer to *Chapter 3, Point Types* in the *Preset Protocol Specifications Manual* (part D301254X012).

Following are general considerations for alarm processing:

- No alarm occurs if you configure an alarm as severity 0 (**Alarm Off).**
- If you configure a safety circuit alarm action as "**Alarm Off**" and set the safety circuit input to some TLP value (other than 0,0,0), the system reads the associated safety circuit input and makes its status available in the "Safety circuit Status [63,0,98]" parameter, in the Dynamic Data display (if configured) or through the TAS **Request Status** and **Enhanced request Status** commands. However, the preset does not process any alarm based on the status of these discrete inputs.

- While the preset maintains an internal list of all active alarms, a power reset loses all details for active alarms.
- The preset uses the TLPs Alarm Bitmap [63,0,47] and Alarm Bitmap 2 [63,0,48] to maintain an alarm bit map for independent alarms. One bit per alarm is allocated; if the alarm is active, the respective bit is 1.
- The preset maintains TLPs for group alarms for different meters (for example, a low flow alarm for meter X writes to the low flow alarm bitmap [TLP 63,0,110]). For a discussion of the alarm bit map for individual alarms and group alarms, refer to *Appendix C* in the *DL8000 Preset Controller Instruction Manual* (part D301244X012).
- In the event of a power reset or an overwrite by a user program, the preset checks alarm bits for all alarms maintained in the alarm bit map TLPs at boot. If any alarms were active before power reset or overwrite, the preset re-activates those alarms without generating any alarm logs. However, since the preset loses alarm detail (such as date and time when each alarm occurred), it cannot sort all alarms in chronological order.

Note: All logs are in English, as described in *Appendix C* of the *DL8000 Preset Controller Instruction Manual* (part D301244X012).

- While multiple alarms can be active at one time, only one can be the current alarm [63,0,111]. The preset determines the current alarm based on the following priorities:

  1. Chronologically oldest alarm with severity 4.
  2. Chronologically oldest alarm with severity 3.
  3. Chronologically oldest alarm with severity 2.
  4. Chronologically oldest alarm with severity 1.

- When an operator resets an alarm, the alarm ID stored in Current Alarm ID [63,0,111] is reset

C.2 Group Alarms (Meters and Additive Alarms)

The preset monitors individual alarms for meter-specific alarms (that is, for each meter and for each type of alarm). Similarly, the preset monitors component-specific alarms based on the number of components [63,0,21]. For additive alarms, monitoring is based on the number of configured additives [63,0,100].

The following tables present the individual alarms and their actions, conditions, bit assignments, and pertinent logging activities.

Flow Rate Too Low Meter X Alarm

Action	Configurable [63,0,17] to be any alarm severity (0 to 4)
Condition	Occurs if the currently indicated volume flow rate [73,X,27] falls below the minimum allowable flow rate [75,X,2] to a non-zero value for the specified meter for a duration equal to or more than the configured low flow time [63,0,38]. The system scans for this alarm from the time the preset begins delivery until the component reaches the Final Stop zone.
Bit	Uses TLP [63,0,110] to store the status of Low Flow alarm. Uses the bits (starting from LSB) for Meter 1 onwards. Bit 0 is used for Meter 1
Logging	Uses the description ***Low Flow XX*** where X is the number of the meter raising the low flow alarm

Flow Rate Too High Meter X Alarm

Action	Configurable [63,0,18] to be any alarm severity (0 to 4)
Condition	Occurs if the currently indicated volume flow rate [73,x,27] is higher than the maximum allowed flow rate [75,x,3] for the specified meter for for a duration equal to or more than the configured high flow time [63,0,40]. The system scans for this alarm from the time the preset begins delivery until the component reaches the Final Stop zone.
Bit	Uses TLP [63,0,116] to store the alarm status. Uses the bits starting from LSB for Meter1 onwards. Bit 0 is used for Meter1
Logging	Uses the description ***High Flow XX*** where X is the number of the meter raising the high flow alarm

Time-Out – No Flow Detected Meter X Alarm

Action	Configurable [63,0,44] to be any alarm severity (0 to 4)
Condition	Occurs if the currently indicated volume flow rate [73,X,27] equals zero for a duration equal to or more than the configured no flow time-out time [63,0,45]. The system scans for this alarm from the time the preset begins delivery until the component reaches the Final Stop zone.
Bit	Uses TLP [63,0,117] to store the alarm status. Uses the bits starting from LSB for Meter1 onwards. Bit 0 is used for Meter1.
Logging	Uses the description ***No Flow XX*** where X is the number of the meter raising the flow alarm.

Valve Control Failure Meter X Alarm

Action	Configurable [63,0,240] to be any alarm severity (0 to 4)
Condition	Occurs when the current flow rate exceeds the current target flow rate by the allowed tolerance limit ([63,0,97 for sequential and [75,X,47] for inline) **and** the valve cannot lower the flow rate within the tolerance limit within 10 seconds. **Note**: This alarm occurs **only** for standard digital valves and analog valves. The system scans for this alarm from the time the preset begins delivery until the component reaches the Final Stop zone.
Bit	Uses TLP [63,0,241] to store the status of digital and analog valve control fail alarm. Uses the bits starting from LSB for Meter 1 onwards. Bit 0 is used for Meter 1
Logging	Uses the description ***Vlv Closure fail XX*** where **X** is the number of the meter whose valve is unable to control the flow rate (causing the flow rate to overshoot the upper limit of the tolerance band).

Valve Fail Meter X Alarm

Action	Configurable [63,0,220] to be any alarm severity (0 to 4)
Condition	Occurs (in flow control batching status) when the command is issued to close the valve and the flow rate through the associated meter does not reduce to zero in the configured valve close time [63,0,221]. This alarm is particularly useful when, during batch loading, the batch stops due to an alarm or operator intervention and the valve fails or is not able to stop the flow. **Note**: The system does not use this alarm for normal valve closure because of the delivery of components or batch presets.
Bit	Uses TLP [63,0,222] to store the alarm status. Uses the bits starting from LSB for Meter 1 onwards. Bit 0 is used for Meter 1
Logging	Uses the description ***Valve fail XX*** where **X** is the number of the meter for which flow control valve failure has occurred (flow rate is not becoming zero), raising the alarm. Value: Flowrate though the meter when the alarm is raised

Unable to Close Valve Meter X Alarm

Action	Not configurable; alarm severity of 4
Condition	Occurs when the current component being delivered has entered into the Final Stop zone or more (current zone for the current component being delivered from [69,X,11]). If the delivered component – gross [69,X,25], net std [69,X,27], or mass [69,X,28], based on the delivery type – is greater than the Component Preset quantity [69,X,19] by the Over Run Limit quantity [63,0,41], then the system raises this alarm and immediately closes the pump. The valve may be unable to close due to: ▪ Line pressure which is unusually low close to the end of a batch (that is, flow control valves that operate with off-line pressure close more slowly when there is low line pressure). ▪ The low flow stop quantity is too small (that is, unable to lock in at the low flow rate before the preset quantity has been delivered).
Bit	Uses TLP [63,0,121] to store the alarm status. Uses the bits starting from LSB for Meter1 onwards. Bit 0 is used for Meter1
Logging	Uses the description ***UT Cl.Valve XX*** where **X** is the number of the meter on which flow control valve failure occurred and raised the alarm

Valve Closed Early (Under Flow) Meter X Alarm

Action	Configurable [63,0,42] to any alarm severity (0 to 4). Also called the Under Flow alarm.
Condition	Occurs when the valve closed normally (that is, valve closed without any alarm or operator stop and closed according to the normal shut-down process) during the delivery of component in the batch and the flow rate becomes zero. If the delivered component – gross [69,X,25], net std [69,X,27] or mass [69,X,28] based on the delivery type – is less than the Component Preset quantity [69,X,19] by more than Under Flow Limit quantity [63,X,43] then this alarm occurs This alarm does not occur for operator-directed intermediate batch or due to any alarm.
Bit	Uses TLP [63,0,122] to store the alarm status. The bits starting from LSB are used for Meter1 onwards. Bit 0 is used for Meter1
Logging	Uses the description ***Under Flow XX*** where **X** is the number of the meter through which the flowing component has been under-delivered, raising the alarm.

Unauthorized Flow Meter X Alarm

Action	Not configurable; severity 4. Disable this alarm by setting Unauthorized Flow Quantity [63,0,46] to **0**.
Condition	Occurs when the meter is unauthorized [63,0,133] and incremental gross volume delivered [73,X,30] is greater than or equal to unauthorized flow quantity [63,0,46]. **Note**: The Liquid Calc program continuously updates all the totals. If you **enable** (set to **1**) the Internal Unauth Flow Reset parameter [63,0,15], then the system resets the internal un-authorized total (maintained for the alarm) to zero when a new batch is authorized. This prevents false triggering of the Un-authorized flow alarm. The internal un-authorized total (maintained for the alarm) is also reset to zero when alarm is reset.
Bit	Uses TLP [63,0,120] to store the alarm status. The bits starting from LSB (bit 0) are used for Meter1 onwards
Logging	Uses the description ***UnAuth Flow XX*** where **X** is the number of the meter number raising the alarm. Value: Un-auth quantity delivered (when alarm is raised).

Overflow Preset Limit Alarm

Action	Not configurable
Condition	Whenever the batch delivery is in progress and the batch delivered quantity is more than the batch preset quantity (or the remaining quantity is negative, indicating overflow) by an amount greater than Over Run Limit quantity [63,0,41] then this alarm occurs and the pump (if on) stops immediately. To disable this alarm, set the Overflow Quantity to **0**.
Bit	Uses bit 3 of Alarm Priority Register 1 TLP [63,0,47] to store the alarm status.
Logging	Uses the description ***Over Flow Preset***

Unable to Ramp Down Meter X

Action	Configurable [63,0,35] to be any alarm severity (0 to 4). Not specific to a particular value or meter.
Condition	Occurs when the preset attempts to reduce the flow rate to a lower desired flow rate (other than zero target flow rate) and is unable to reduce the flow rate to this lower target flow rate value [63,0,63 or 75,X,46] (in the tolerance band specified by the current flow-rate Error Limit [63,0,97 or 75,X,47]) within the Ramp down time [63,0,34]. The system starts the unable to ramp down alarm timer if the target flow rate changes to a lower non-zero value and the current flow rate is greater than the new target flow rate. The system scans for this alarm from the time the preset begins delivery until the component reaches the Final Stop zone.
Bit	Uses TLP [63,0,123] to store the alarm status. Uses bits starting from LSB for Meter1 onwards. Bit 0 is used for Meter1
Logging	Uses the description ***UT RampDown XX*** where **X** is the number of the meter raising the alarm.

Additive Alarm X Alarm	
Action	Not configurable; severity 4
Condition	The Additive program sets the additive bitmap [64,0,60] when an additive alarm condition exists. When the bit transition from 0 to 1 for the additive is scanned by the alarm module, then the alarm occurs and the system updates the current alarm [63,0,111] to reflect the same. **Resetting the Alarm**: As a severity 4 alarm, can only be reset by the operator in Program mode. Resetting the alarm also resets the Additive bit [64, 0, 60].
Bit	Uses TLP [64,0,60] to store the alarm status. Uses the bits starting from LSB for Additive1 onwards. Bit 0 is used for Additive 1
Logging	Uses the description ***Additive X R*** where **X** is the additive number raising the alarm and **R** is the reason code for this additive fail.

The following table shows the reason code for additive fails and its meaning for additive alarms.

Table C-2. Additive Alarms

Code	Description	Applicable for method
F	Feedback count error: Occurs if the feedback pulses received differs from the ideal feedback pulse count by amount more than additive error limit [63,0,103]. This alarm is disabled for Mechanical injection if Additive feedback count [67,X,04] is zero.	Mechanical Handshake
T	Feedback Timeout error: Occurs if one feedback pulse is not received within the time [in seconds] set in parameter additive feedback count [67,X.04]. This alarm is disabled for Handshake injection if Additive feedback count [67,X,04] is zero.	Handshake
U	Unauthorized additive flow: Raised if preset receives unauthorized additive pulses and it is more than configured pulses [67,X,29] within configured time [67,X,44]. **Note**: Unauthorized flow is not totalized if the feedback is not configured	Control
L	Low additive: Occurs if the additive injected in a batch falls below the configured product/additive ratio [67,X,20] any point during the injection process. This condition is checked only after the additive per 1000 error limit [63,X,184] is crossed	Control
H	High additive: Occurs if the additive injected in a batch is more than the configured product/additive ratio [67,X,21] any point during the injection process. This condition is checked only after the additive per 1000 error limit [63,X,184] is crossed	Control

Unable to Maintain Blend X Alarm

Action	Not configurable; severity 4
Condition	Occurs only when tolerance allowed parameter [63,0,94] is configured as **No** and when the batch ends normally (when normal shutdown flag is true as explained below), so that all the components (including flushing) have finished, the batch has not been aborted, and there is no active alarm with a severity greater than 1 (Info). Occurs if the component percentage error for any component is **more** than the configured percentage blend tolerance parameter [63,0,148]. The system calculates the component percentage error as the percentage of deviation of the actual component delivered with respect to the *configured* component percentage: *Component Percentage deviation =* *Abs (Actual Component Percent - Configured Component Percent)* where: *Actual Component Percent =* *(Gross or Net STD or mass Component delivered qty x 100) /* *Gross or Net Qty or Mass delivered for the batch [including flush]* **Notes**: ▪ Gross or net STD or mass quantities are taken according to the delivery type configured [63,0,29]. ▪ Component delivered quantity includes the flush delivered also if it is the primary component [63,0,33]. Configured Component Percentage is as in Recipe [68,X,1 to 68,X,4]. **Normal shutdown flag**: Check the alarm if it is normal shutdown, as determined by the status of the normal shutdown condition flag. This flag is true when the batch starts or re-starts. The flag is false when the program moves out of flow control batching status due to any raised alarm, a batch stop request by keypad, or a TA command. The alarm is scanned even if the component is halted in the lock zone or batch cannot be re-started because the batch remaining quantity is less than the minimum preset. **Note**: The alarm is **not** scanned if only one component is configured in the recipe and that component is the same as primary component **OR** if there is only one component in the recipe and flushing is disabled.
Bit	Uses bit 0 of Alarm Priority Register 1 TLP [63, 0, 47] to store the alarm status
Logging	Uses the description ***Blend Fail X*** where **X** is the number of the component whose blend ratio is outside permissible tolerance

Comm Fail X Alarm	
Action	Not configurable; severity 4. To disable, set the Time-out channel X parameter [63,0,152 to 63,0,155] to **0**. This alarm is also disabled if you install a non-communication module in the Comm port (that is, the value of Comm type parameter [95,x,5] is not **10** (RS-232), **11** (RS-485), or **15** (Ethernet).
Condition	Occurs if the device operating mode [63,0,36] is set to **Auto** and the appropriate communication port [63,0,32; 63,0,49; 63,0,139; or 63,0,149] is configured for Modicon Modbus, DL6000 protocol, or Brooks protocol (that is, for automation system communications). Occurs if comm port 2 is set to **2** (for the DL6000 protocol) or **3** (for the Brooks protocol) and the preset does not receive a valid query (with its communications address) for the configured time-out time (in seconds) on this port. Occurs if comm port 2 is set to **1** (for Modicon Modbus) and Modbus successful message time [95,X,39] lags behind the current device clock time by more than Time-out channel X [63,0,152 to 63,0,155].
Bit	Uses TLP [63,0,156] to store the alarm status. Uses the bits starting from LSB for LOI onwards. Bit 2 is used for Comm 2, Bit 3 for Comm 3, Bit 4 for Comm 4, Bit 5 for Comm 5. Bits 0, 1, 6 and 7 are not used
Logging	Uses the description ***Comm Fail X*** where **X** is the number of the comm port raising the alarm. Value: Time elapsed since when no valid frame is received on the port when the alarm is raised

Temperature Failure Alarm X	
Action	Configurable [63,0,181] to be any alarm severity (0 to 4).
Condition	Occurs if the current temperature is out of range (that is, either below the minimum allowable component temperature [63,0,157] or above the maximum allowable component temperature [63,0,158]). The temperature value of the component flowing through a meter is scanned from temperature value [73,X,25] in the liquid turbine Point type. **Min & Max values**: The system tracks minimum and maximum temperature values for all the components using the meters available in the system [63,0,20]. The minimum and maximum values along with the timestamp indicating the time of occurrence are kept in the Component point type in TLPs [69,X,44 to 69,X,47]. These values update only if a batch is authorized as found from status flags [63,0,19]. The component flowing through the meter is found from the active components TLP [63,0,47] and the meter used by the active component [69,X,07] must be the same as this meter. The minimum and maximum values are tracked for current batch. These values reset to zero when a new batch is authorized. So, these values are the minimum and maximum temperature of the component for each batch.
Bit	Uses TLP [63,0,59] to store the alarm status. Uses bits starting from LSB for Meter 1 onwards. This alarm is scanned whenever the alarm controller module executes and is scanned at all the times based on the configured alarm severity
Logging	Uses the description ***Temp Fail X*** where **X** is the number of the meter raising the alarm

Temperature Failure Alarm X	
Temperature Drift Alarm X	
Action	Configurable [63,0,224] to be any alarm severity (0 to 4). Alarm is disabled if the TLP for Temperature Probe 1 [75,X,31] or Temperature Probe 2 [75,X,32] points to a TLP which is not of float data type or is undefined (that is, 0,0,0)
Condition	The preset continuously reads the temperature from two inputs (dual probes) measuring the temperature at the same point. These inputs directly give the temperature readings. These inputs could be two different RTD inputs. Configure the TLPs from which to read the temperature as Temperature Probe 1 [75,X,31] and Temperature Probe 2 [75,X,32]. Such that: *Percentage difference between readings from two temp probes =* <u>*(Reading from Probe 1 ~ Reading from Probe 2) x 100.0*</u> *Reading from Probe 1 or Probe 2 whichever is lower* If at any time the percentage difference between the readings from the two different temperature probe inputs is more than maximum permissible temperature drift [63,0,225] this alarm occurs.
Bit	Uses TLP [63,0,226] to store the alarm status. Uses the bits starting from LSB for Meter 1 onwards
Logging	Uses the description ***Temp Drift X*** where **X** is the number of the meter raising the alarm.

Internal Temperature Failure Alarm	
Action	Configurable [63,0,227] to be any alarm severity (0 to 4).
Condition	Occurs if the internal temperature of the device casing is above the maximum allowable device temperature [63,0,229]. The temperature value of the device casing is read from system analog input point type from the EU value parameter [109,4,12].
Bit	Uses bit 5 of Alarm Priority Register 1 [63,0,47] to store the alarm status.
Logging	Uses the description ***Intl Temp Fail***

Pressure Failure Alarm X

Action	Configurable [63,0,182] to be any alarm severity (0 to 4).
Condition	Occurs if the current pressure is out of range (that is, either **below** the minimum allowable component pressure [63,0,160] or **above** the maximum allowable component pressure [63,0, 161]). The system scans the static pressure value [73,X,24] in the liquid turbine point type to determine the current pressure. **Min & Max values**: The system tracks minimum and maximum pressure values for all the components using the meters available in the system [63,0,20]. The minimum and maximum values along with the timestamp indicating the time of occurrence are kept in the Component point type in TLPs [69,X,48 to 69,X,51]. These values update only if batch is authorized as found from status flags TLP [63,0,119]. The component flowing through the meter is found from the active components TLP [63,0,147] and the meter used by the active component i.e. TLP [69,X,7] must be same as this meter. The minimum and maximum values will be tracked for current batch. These values reset to zero when a new batch is authorized. So, these values give the minimum and maximum pressure of the component for each batch
Bit	Uses TLP [63,0,162] to store the alarm status. Uses the bits starting from LSB for Meter 1 onwards
Logging	Uses the description **Pres Fail X** where X is the number of the meter raising the alarm

Density Failure Alarm X

Action	Configurable [63,0,183] to be any alarm severity (0 to 4).
Condition	Occurs if the current density is out of range (that is, **below** the minimum allowable component density [63,0,163] or **above** the maximum allowable component density [63,0,164].The density value of the component flowing through a meter is scanned from the observed density value TLP [73, X, 18] in liquid turbine Point type. The meter being used by the component is read from TLP [69, X, 7]. **Min & Max values**: The system tracks minimum and maximum density values for all the components using the meters available [63,0,20]. The minimum and maximum values, along with the timestamp indicate the time of occurrence, are kept in the Component point type (TLPs [69,X,52] to [69,X,55]). These values update only if the batch is in progress and the meter is authorized [63,0,133] for the component [69,X,7]. The system tracks minimum and maximum values for the current batch and resets these values to zero when a new batch is authorized. So these value give the minimum and maximum density for the component for each batch.
Bit	Uses TLP [63,0,165] to store the alarm status. Uses the bits starting from LSB for Comp 1 onwards
Logging	Uses the description ***Dens Fail X*** where **X** is the number of the component raising the alarm.

Pulse Security Alarm

Action	Not configurable; severity 4 (primary).
Condition	Occurs when you have configured flow meter input pulses [73,X,20] as [141,X,17] or [141,X,19] and the following condition arises: ▪ When you configure flow meter input pulses [73,X,20] as API Pulse Counts Pair 1 [141,X,17], check the sum of API Phase Alarm Count Pair 1 [141,X,30] and API Same Channel Alarm Count Pair 1 [141,X,31]. If this sum is more than the allowed maximum of bad pulses [64,X,37], this alarm occurs. ▪ When you configure flow meter input pulses [73,X,20] as API Pulse Counts Pair 2 [141,X,19], check the sum of API Phase Alarm Count Pair 2 [141,X,32] and API Same Channel Alarm Count Pair 1 [141,X,33]. If this sum is more than the allowed maximum of bad pulses [64,X,37], this alarm occurs. **Bad pulse count** [75,x,57] can be reset by two ways depending on the configuration of the bad pulse count reset option [64,X,38]. If reset option is configured as Accumulate then reset Bad pulse count [75,X,57] only after alarm resets and if it is configured as reset on batch authorization then reset bad pulse count on batch authorization. 0 = Accumulate until alarm is raised 1 = Reset on every batch authorization **Resetting of Alarm:** Alarm must be reset by supervisor in Program mode or by giving command by TAS in auto-operating mode
Bit	Uses TLP [63,0,254] to store the alarm status. Uses the bits starting from LSB are used for Meter 1 onwards
Logging	Uses the description ***Pulse Security XX*** where **X** is the number of the meter raising the alarm

Block Valve Fail Alarm

Action	Not configurable; severity 4 (primary)
Condition	Occurs if the block valve feedback does not match the expected position of the block valves. Block valves are used during side stream blending or sequential blending. If you configure block valve feedback, then the preset checks the expected status of block valve against block valve feedback from digital input.
Bit	Uses TLP [64,0,29] to store the alarm status. Uses the bits starting from LSB for Comp 1 onwards. TLP [69,0,21] stores the block valve feedback error for particular component where each bit represents one block valve of that component.
Logging	Uses the description ***BV Fail XXXX*** where X is the number of the component raising the alarm.

Power Failure Alarm

Action	Configurable [63,0,56] to be any alarm severity (0 to 4).
Condition	Occurs only at every power failure condition, notifying you that a reset has occurred because of power failure
Bit	Uses bit 19 of Alarm Priority Register 1 [63,0,47] to store alarm status.
Logging	Uses the description ***Power failure***
Note:	For Temperature, Pressure, and Density failure alarms, consider implementing component-based backup values for each parameter. In case the live value goes out of the range or the sensor does not provide the correct value, then the backup values must be used. The configured alarm severity also determines when to use the backup value for a parameter.

Configuration Corrupted Alarm

Action	Not configurable; severity 4 (primary)
Condition	Occurs when the range check of all configuration parameters is done and current value of any configuration parameter is outside the allowed range. **Resetting of Alarm**: Alarm must be reset by the supervisor in Program mode or by giving command by TAS in auto operating mode. However, it can be cleared only when all out-of-range parameters are resolved to a valid range. Viewing out of range parameters: An operator using Program mode can view the list of the out-of-range parameters. These appear as a group of six parameters from Out of range Parameter 1 [63,0,201] to Out of range Parameter 6 [63,0,206]. To view more than six parameters, use the Scroll Down or Scroll Up key. One page can only display 6 corrupt parameters.
Bit	Uses bit 1 of Alarm Priority Register 1 [63,0,47] to store alarm status
Logging	Uses the description ***Config corrupted.*** Event logs are generated for all the corrupt configuration parameters

OUP Configuration Corrupted Alarm

Action	Not configurable; severity 4 (primary)
Condition	Occurs for programs other than the Preset program. When other programs boot, they set or reset the user program specific config corrupt bit in User Program Config Status [63,0,114]. **Note**: TLP [63,0,114] is for internal system use **only**. If no configuration parameter within point type of other user program is corrupt then other user program will reset its config corrupt bit, otherwise if any configuration is corrupt or invalid then it sets this bit. When all the configuration parameters within point type of other user program are valid then only config corrupt bit is reset by the other user program. The program raises this alarm if it finds a status of 1 for any of config corrupt bits in User Program Config Status [63,0,114]. This alarm occurs for the configuration of the following programs, if that program is running: ▪ Additive program ▪ Printer program ▪ Transaction History program After the alarm occurs, if the value of user program config status [63,0,114] changes but a config corrupt status bit for some user programs sets, then a new alarm set log generates in which the value field indicates the current corrupt config status of other user programs **Resetting of Alarm:** The alarm has to be reset by the supervisor in Program mode or by giving command by TAS in auto operating mode. It can be cleared only when all the user program specific config corrupt bits in User Program Config Status [63,X,114] are reset to 0. **Viewing out of range parameters:** The event logs are logged by other user program in events log for all the parameters whose value is corrupt. The out of range parameters in the other user programs cannot be viewed in group of six parameters from Out of range Parameter 1 to Out of range Parameter 6 [63,0,201 to 63,0,206], which is possible only for parameters within the Preset program's point types.
Bit	Uses bit 21 of Alarm Priority Register 1 [63,0,47] to store the alarm status.
Logging	Uses the description ***Oup Conf corrupt.*** Value is set equal to mask of config corrupt bits as in User Program Config Status [63,0,114] which raised the alarm

Parameter Restored Alarm

Action	Not configurable; severity 1 (Info). Alarm has one important difference from the normal info type alarms: it automatically resets after a configurable time parameter (Restored Alarm Auto Reset Time [63,0,207]). This is informational only because the system has already taken the rectifying action
Condition	Occurs when someone tries to modify the value of a configuration parameter. If the new value is found to be out of range, the system restores the old parameter value. Restoration of the old value is required even if transaction is authorized. **Resetting of alarm:** This alarm clears automatically either when the operator presses the Reset key or after configurable time (determined by the parameter Restored Alarm Auto Reset Time [63,0,207]). **Viewing restored parameters:** All out-of-range parameters which have been restored back to the old value are logged into system as text message type user event logs.
Bit	Uses bit 2 of Alarm Priority Register 1 [63,0,47] to store the alarm status.
Logging	Uses the description ***Param. Restored***

OUP Parameter Restored Alarm

Action	Not configurable; severity 1 (Info) Alarm has one important difference from the normal info type alarms: it automatically resets after a configurable time parameter (Restored Alarm Auto Reset Time [63,0,207]). This is informational only because the system has already taken the rectifying action
Condition	Occurs when someone tries to modify the value of a configuration parameter. If the new value is found to be out of range, the system restores back the old value of the parameter. The restoration of the old value is required even if the transaction is authorized. This is configuration parameter restored alarm raised for user programs other than Preset user program. On booting, Preset user programs reset config restore bits of all other user programs in User Program Config Status [63,0,114]. The user program specific config restore bit in User Program Config Status [63,0,114] is set by other user program when any configuration parameter in their point type is restored. **Note**: TLP [63,0,114] is for internal system use **only**. The preset program raises this alarm if it finds **1** as the status of any of config parameter restored bits in User Program Config Status [63,0,114]. This alarm occurs for the configuration of following user programs, if user program is running: ▪ Additive user program ▪ Printer user program ▪ Transaction history user program After the alarm is raised, if value of user program config status [63,0,114] changes but config parameter restored status bit for some user programs is set, then the alarm auto reset timer restarts. A new alarm set log generates in which the value field indicates the current corrupt parameter restored status of other user programs. **Scanning frequency**: This alarm continuously scans. **Resetting of Alarm:** This alarm clears automatically after configurable param restored alarm auto reset time [63,0,207] or by pressing the Reset key. Preset user program will also reset config restore bits of all other user programs in User Program Config Status [63,X,114] **Viewing restored parameters:** All out-of-range parameters which have been restored back to their old values are logged into system as text message type user event logs
Bit	Uses bit 22 of Alarm Priority Register 1 [63,0,47] to store alarm status
Logging	Uses the description ***Oup Param Rest***

System Alarm – Check Log

Action	Configurable [63,0,146] to be any alarm severity (0 to 4).
Condition	Occurs when the alarm index in system parameters point type [91,0,14] is different from the previous alarm index [63,0,6] maintained in batch point type. The alarm index maintained in batch point type [63,0,111] updates whenever any alarm logs for Preset specific alarms are logged into the alarms log only if Preset alarming [63,0,11] is enabled [1]. Both alarm index parameters will rollover to 0 when it is has value equal to Maximum alarms [91,0,9]. So, system alarm will be raised for all alarms, apart from the Batching user program, which are logged into the alarms log. The system alarm is generated when alarm set type log is added by system or non-preset user program in the alarms log. **Resetting of alarm:** The supervisor must check the alarms log generated for system level alarms. reset the cause of the system level alarm, and then reset the alarm. This alarm must always be explicitly reset even if it is configured with info severity. **Notes**: ▪ The program does not check whether the actual cause of the system alarm is removed. ▪ If the alarm severity is configured as Info, then the alarm does not reset automatically, since the batching program does not track the actual cause of the system alarm
Bit	Uses bit 7 of Alarm Priority Register 1 [63,0,47] to store alarm status.
Logging	Alarm log is generated on alarm set and reset by the system indicating reason. No preset program generates an alarm log

NaN Found Alarm

Action	Not configurable; severity 4 (Primary)
Condition	Occurs when the system detects a Not a Number (NaN) total. When the Batching program starts, the system reads all the totals (all totals present in the Batching and in the Liquid Calc programs) from static memory (from TLPs) and loads them into the dynamic memory. This includes the number of meters [63,0,20], the number of components [63,0,21], and the number of recipes [63,0,26] configured. At this point, all the totals are checked for Not a Number (NaN) condition. If any total is found to be NaN, then this alarm occurs. If this total is present in the Batching program then it is also reset to 0 before raising the alarm. The same check is also done for the meter totals when configuration for number of meters is changed. The meter run totals present in liquid calc user program are read regularly to update the various totals maintained by Batching user program. Before using the new reading of the meter run totals it is checked for NaN and if it is found as NaN then this alarm is raised. All the float type configuration parameters are also checked for NaN conditions. This check is done at system boot and whenever the value of these parameters changes. If any float parameter is found to be NaN, this alarm occurs. **Viewing NaN Parameters**: All totals found to be NaN are logged into system as text message type user event logs in TLP format
Bit	Uses bit 17 of Alarm Priority Register 1 [63,0,47] to store alarm status.
Logging	Uses the description ***NaN Found*.** When a NaN condition occurs, it generates a non-fatal log. If any of the totalizers is found to be a NaN, the log entry is ***GetValue NaN Totalizer.cpp TT-LL-PPP*.** If any float type configuration is found to be a NaN, the log entry is ***isDataValid NaN DatabaseManager.cpp TT-LL-PPP***.

Instantaneous Blend X Alarm

Action	Configurable [63,0,218] to be any alarm severity (0 to 4).
Condition	Occurs if comp ratio error percentage of any stream is more than blend tolerance limit [63,0,148] for duration more than the configured Instantaneous blend alarm delay [63,0,214]
Bit	Uses bit 16 of Alarm Priority Register 1 [63,0,47] to store alarm status.
Logging	Use the description ***Inst Blend XX*** where **X** is the number of the component for which the blend deviation is out of permissible limits

Meter Factor Deviation X Alarm

Action	Configurable [63,0,223] to be any alarm severity (0 to 4). To disable this alarm, set the maximum permissible meter factor deviation parameter [63,0,209] to **0**.
Condition	Occurs if the calculated value of the maximum meter factor deviation is higher than the maximum permissible meter factor deviation [63,0,209]. The system computes meter factor deviations for all the components present in the recipe (having non-zero configured comp ratios [68,X,1 to 68,X,4]) and verifies them before authorizing a new transaction. It does **not** check meter factor deviation for the flush component, if flush component is not one of recipe components. Flush component is not checked because it is entirely delivered at single target flow rate, i.e. stop rate. It is checked for the component for which Meter Factor/K-factor Option [69,X,74] is set as Meter Factor Curve with a Single K-factor [=1]. It computes the maximum deviation between adjacent Meter Factor/K-factor configuration [69,X,75; 69,X,77; 69,X,79; 69,X,81; 69,X,83; 69,X,85; 69,X,87; 69,X,89; 69,X,91; 69,X,93; 69,X,95; 69,X,97] for configured number of Points of Meter factor Linearization [63,0,109] and up to consecutively increasing Flowrate/Frequency set points [69,X,76; 69,X,78; 69,X,80; 69,X,82; 69,X,84; 69,X,86; 69,X,88; 69,X,90; 69,X,92; 69,X,94; 69,X,96; 69,X,98]. Such that: *Meter factor deviation =* *(current meter factor – adjacent meter factor) / current meter factor* The Industry Canada certification demanding overall meter factor deviation percentage should be restricted to 2%. To satisfy this need an additional check is added to this alarm to check overall meter factor deviation. There will be a “Master Meter factor” [TLP ID: 69, X, 105] and “Master Meter factor deviation %” ” [TLP ID: 69, X, 106] for each component. This additional check in meter factor deviation alarm will be done as follows – Low Limit= Master MF - [Master MF * Master MF %/100] High Limit = Master MF + [Master MF * Master MF %/100] If any of the meter factor not within range of Low and High limit then the recipe verification fails and meter factor deviation alarm is raised. If this alarm is raised and severity is more than info type [1] then recipe verification fails, but it remains at “Select Recipe” batching state only. So, if there is Meter Factor deviation found by any of the method (adjacent or Overall meter factor deviation) the Meter factor deviation alarm will be raised. **Resetting of alarm:** Once this alarm is raised after recipe verification, this alarm cannot get reset automatically after changing the configuration and clearing the alarm condition, even though it is configured as info type. It has to be reset by the operator. However, if you configure the alarm as info type (1) then it resets automatically when the next recipe verification occurs.
Bit	Uses bit 4 of Alarm Priority Register 1 [63,0,47] to store alarm status.

Meter Factor Deviation X Alarm

Logging	Uses the description ***MF Deviation XX*** where **X** is the component number for which the maximum meter factor deviation is more than permissible limit. For example, if an alarm condition exists for the component 1 and 3 simultaneously, then description is ***MF Dev 13***.

Linearization X Alarm

Action	Configurable [63,0,219] to be any alarm severity (0 to 4). To disable this alarm, set the number of points of meter factor linearization parameter [63, 0, 109] to be less than or equal to **1**.
Condition	Occurs if the flow rate set point equals zero or is less than the previous flow rate set point for this component. The system checks linearization of Flowrate/Frequency setpoints for all the components present in the recipe being verified before authorization. It checks the consecutive and successively increasing non-zero Flowrate/Frequency set points [69,X,76; 69,X,78; 69,X,80; 69,X,82; 69,X,84; 69,X,86; 69,X,88; 69,X,90; 69,X,92; 69,X,94; 69,X,96; 69,X,98] up to configured number of Points of Meter factor Linearization [63,0,109]. **Resetting of alarm:** Once this alarm is raised after recipe verification, this alarm cannot reset automatically after changing the configuration and clearing the alarm condition, even though it is configured as info type. It **must** be **manually** reset. However, if the alarm is configured as severity 1 (info) then it resets automatically when the next recipe verification occurs.
Bit	Uses bit 6 of Alarm Priority Register 1 [63,0,47] to store the alarm status.
Logging	Uses the description ***Linear Fail XXXX*** where **X** is the number of the component number for which the linearization point flow rate set-point is in error. For example, if an alarm condition exists for the component 1 and 3 simultaneously then the description is ***Linr Fail 13***.

Storage Memory Full Alarm

Action	Configurable [61,0,130] to alarm severity 0 (Off) or 1 (Lock Mode). This alarm acts as a primary alarm in any given condition unless you disable it, and has the following default settings: ▪ Configured for Lock Mode (all versions). ▪ Configured for Free Running mode, with no transaction yet archived, maximum transactions stored is not zero, and stored batch is equal to maximum number of stored batches (version 2.0 onwards) ▪ Configured for Free Running mode, with history retention feature enabled and oldest transaction is not older than configured days (version 2.20 onwards).
Condition	Occurs in two either of two situations: ▪ At recipe verification but **before** transaction authorization, the system checks if the number of transactions [61,0,122] currently stored is at the maximum number of stored transactions [61,0,121]. ▪ At preset verification but **before** batch authorization, the system checks if the number of batches [61,0,128] currently stored is at the maximum number of stored batches [61,0, 27]. **Resetting of alarm:** The operator must manually reset this alarm (since it is a primary alarm) using Program mode.
Bit	Uses bit 20 of Alarm Priority Register 1 [63,0,47] to store alarm status.
Logging	Uses the description ***Stor Mem Full***

Storage Memory Pre-full alarm

Action	Not configurable; severity 1 (informational type)
Condition	The alarm gives a pre-warning that archive storage memory used in the batch and/or transaction segment equals or exceeds the configured percentage [64,0,0] of total allocated archive storage memory. The alarm occurs if: ▪ The archive memory used by the transactions stored [61,0,122] equals or exceeds the configured storage memory alarm percentage [64,0,0] of memory allocated [61,0,120 and 61,0,121] for transaction segment. ▪ The archive memory used by the batches stored [TLP ID: 61, 0, 128] equals or exceeds the configured storage memory alarm percentage [TLP ID: 64, 0, 0] of memory allocated [TLP ID: 61, 0, 126 and 61, 0, 127] for batch segment. If alarm condition does not exist and the alarm was raised previously, the system resets the alarm since it is severity 1.
Bit	Uses bit 23 of Alarm Priority Register 1 [63,0,47] to store the alarm status. **Resetting of alarm:** Operator can reset this alarm without using Program mode. The immediate action to be taken after this alarm gets raised is to “upload the transaction and batch records from archived history segments to the TA system”
Logging	Uses the descriptions ***Sto Mem Pre Full-T*** (when a transaction exceeds the configured alarm percentage) ***Sto Mem Pre Full-B*** (when a batch segment exceeds the configured alarm percentage)

Archive Error Alarm

Action	Not configurable; severity 4 (Primary)
Condition	Occurs when Legal Record [64,0,39] is set to **Print out** or **History** and Archive Error TLP [61,0,252] sets. **Resetting of alarm**: Alarm resets when operator presses Reset key; no archive error is set.
Bit	Uses bit 24 of Alarm Priority Register 1 [63,0,47] to store alarm status
Logging	Uses the description ***Archive Error***

Print Error Alarm

Action	Alarm can have two different severities (1 or 4) based on Legal Record [64,0,39] and the type of print error
Condition	Occurs when Legal Record [64,0,39] set to "Print out" or "History" and Print Error TLP [60, 0, 25] sets. If Legal record is configured as Print out and Primary print error (bit 4 in [60, 0, 25]) is set then raise alarm with severity 4. If Legal record is configured as History or Print out and Secondary print error (bit 5 in [60, 0, 25]) is set then raise alarm with severity 1 (Informational).
Bit	Uses bit 25 of Alarm Priority Register 1 [63,0,47] to store alarm status. **Resetting of alarm:** If alarm is severity 1 (Info), alarm resets when operator presses Reset key. If alarm is severity 4 (Primary), alarm resets only if the operator presses Reset key **and** no Print error exists
Logging	Uses the description ***Print Error***

Data Error Alarm (available in version 2.x on; implemented for OIML/MID)

Action	Not configurable; severity 4 (Primary)
Condition	Occurs if any bit is set in Data Error [64,0,40] for any of the following reasons: ▪ When the Batching program starts, the system reads all totals (totals present in the Batching and Liquid Calc programs) from static memory (TLP) and loads them into dynamic memory. This occurs for the number of meters [63,0,20], the number of components [63,0,21], and the number of recipes [63,0,26] configured. At this point, the system scans all the totals for Not a Number (NaN) or an Infinity condition. If the system finds a NaN/Infinity condition in a total, then it sets the appropriate bit in Data Error [64,0,40]. If this total is present in the Batching program then the system resets this total to 0 before raising the alarm. ▪ The same check also occurs for meter totals when configuration for number of meters is changed; for component totals when number of components is changed; and for recipe totals when number of recipes is changed. ▪ The system routinely reads meter run totals present in the Liquid Calc program to update the various totals the Batching program maintains. Before using the new reading of the meter run totals, the system checks for NaN/Infinity conditions; if it finds totals with NaN/Infinity conditions then it sets the appropriate in Data Error [64,0,40]. ▪ The system checks all the float type configuration parameters for NaN/Infinity condition. This check occurs at boot and whenever values of these parameters change. If any of the float parameter is found to be NaN/Infinity, then the system sets a bit in Data Error [64,0,40]. ▪ If a data error condition found in Liquid Cal point types then Batching sets the appropriate bit in Data Error. After calculating totalizers and FWA parameters, Batching and Additive programs check for NaN/Infinity conditions. If a condition is found, the programs set the appropriate bit in Data Error **Resetting of Alarm**: Alarm resets when operator presses Reset key at Alarm reset screen. Batching resets all bits in Data Error [64,0,40]. If the condition still exists then this alarm re-displays.
Bit	Uses bit 17 of Alarm Priority Register 1 [63,0,47] to store alarm status
Logging	Uses the description ***Data Error Found***

Keypad Display Comm Fail Alarm

Action	Configurable (using the Keypad Display Comm Fail Alarm, [64,0,42]) to be any alarm severity (0 to 4).
Condition	Occurs when Keypad Display Comm Fail Alarm [64,0,42] is enabled and board health status is **Uninstalled**. **Resetting of alarm:** If alarm is configured as severity 1 (Info) it resets automatically when board health becomes **Installed**. For other severities, alarm does not automatically reset.
Bit	Uses bit 26 of Alarm Priority Register 1 [63,0,47] to store alarm status
Logging	Uses the description ***K & D Com. Fail***

Calc Boundary Alarm

Action	This alarm has configurable alarm severity, configured using **InputsOutOfBound Alarm Action** [64,0,63].
Condition	This alarm occurs when the Liquid Calcs program sets bit 1 of the Calculation Alarm Status parameter [70, 0, 24] to 1. The meter based calculation alarms [73, X, 111] have the following parameters: ▪ Bit 0 – Temperature Out of Bounds ▪ Bit 1 – Pressure Out Of Bounds ▪ Bit 2 – Observed Density Out Of Bounds ▪ Bit 3 – Base Density Out Of Bounds ▪ Bit 4 – Convergence Error ▪ Bit 5 – Refined Product Alarm ▪ Bit 6 – Alpha Out Of Bounds ▪ Bit 7 – CTL / CPL Out Of Bounds Set the first bit (bit 0) of the Calculation Alarm Status parameter [70,0,24] if bit 4 or bit 7 (CTL/CPL is out of bounds) of the Meter-based Calculation Alarms parameter [73,X,111] is set. Set the second bit (bit 1) of the Calculation Alarm Status parameter if any bit **other than** bit 4 or bit 7 of the Meter-based Calculation Alarm parameter is set. Bit 1 then notifies the batching program that something is out of bounds for the calculation standards but is not necessarily a reason to terminate the batch.
Bit	Bit 27 of Alarm Priority Register 1 [TLP ID: 2047] stores the status of this alarm.
Logging	The alarm log generates when the Calculation Boundary Alarm occurs.

Safety Circuits

Action All eight safety circuits are configurable to be any alarm severity (0 to 4).

- **Circuit 1 alarm action** [63,0,65]: alarm action for safety circuit 1 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 2 alarm action** [63,0,67]: alarm action for safety circuit 2 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 3 alarm action** [63,0,69]: alarm action for safety circuit 3 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 4 alarm action** [63,0,71]: alarm action for safety circuit 4 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 5 alarm action** [63,0,73]: alarm action for safety circuit 5 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 6 alarm action** [63,0,75]: alarm action for safety circuit 6 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 7 alarm action** [63,0,77]: alarm action for safety circuit 7 input. The default value is "Display and Stop batch and Close contact"
- **Circuit 8 alarm action** [63,0,79]: alarm action for safety circuit 8 input. The default value is "Display and Stop batch and Close contact"

Condition Each of the eight safety circuit inputs is configurable with its own alarm and configurable alarm actions (through the Safety Circuit Type parameter [64,0,10; 64,0,11; 64,0,12; 64,0,13; 63,0,81; 63,0,82; 63,0,83; and 63,0,84]), and each is configurable as either side-independent or side-specific.

By default, safety circuits 1 through 4 are side-independent; safety circuits 5 and 7 are scanned when loading takes place on side 1; and safety circuits 6 and 8 are scanned when loading takes place on side 2.

The safe state of all the safety circuits is **Closed** (1). When a change of state from **Closed** (1) to **Open** (0) occurs and an alarm action for the corresponding safety circuit does not occur, then the particular safety circuit alarm occurs.

If you configure any safety circuit alarm action as "Alarm Off" and set the safety circuit input to any value other than undefined [0,0,0], then the system reads the associated safety circuit input and makes its status available using the Safety Circuit Status parameter [63,0,98].

When a transaction is authorized, if **all** safety circuit inputs *(*scanned for the transaction swing arm side [64,0,27] on which loading may occur*)* are in **safe** (high) state, then the permissive LED [62,0,3] on the keypad display is turned **on**. If **any** of the defined safety circuit inputs *(*scanned for the transaction swing arm side [64,0,27] on which loading may occur*)* are in an **unsafe** (low) state, then the permissive LED on the keypad display is turned **off**.

If a transaction is not authorized, the system considers the status of all the safety circuit inputs before turning on/off the permissive LED. If any safety circuit input is undefined (set to [0,0,0]) then the system considers it as safe.

Bit	Uses TLP [63,0,47] to storm the alarm status. Uses bit 8 to bit 15 to store alarm status of safety circuits 1 through 8.
Logging	Uses the description ***Safety Ckt X***, where **X** is the number of the safety circuit. If the action of the safety circuit alarm is not set to **Off**, then whenever a safety circuit moves to un-safe state and then back to a safe state the system logs it. The description uses the format: ▪ ***#1*** [63,0,66]: alarm message for safety circuit 1 [63,0,85], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#2*** **[**63,0,68]: alarm message for safety circuit 2 [63,0,86], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#3*** [63,0,70]: alarm message for safety circuit 3 [63,0,87], using any TLP. When an input is configured, the Preset processes it according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#4*** **[**63,0,72]: alarm message for safety circuit 4 [63,0,88], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#5*** [63, 0,74]: alarm message for safety circuit 5 [63, 0, 89], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#6*** [63,0,76]: alarm message for safety circuit 6 [63,0,90], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#7*** [63,0,78]: alarm message for safety circuit 7 [63,0,91], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”. ▪ ***#8*** [63,0,80]: alarm message for safety circuit 8 [63,0,92], using any TLP. The Preset processes the configured input according to the alarm parameters. **0,0,0** (the default value) indicates “not used”.

You configure safety circuits 1 through 8 as either side-independent or side-specific, using the **Circuit 1 Type** parameter [64,0,10]. The type of safety circuit dictates how the preset processes the circuit, as show on the following table. The default value is **0** (check the safety circuit independently of loading arm side).

Table C-3. Safety Circuit Processing

Safety Circuit Type	Preset Processing
0	If the safety circuit's alarm action is not **Off**, the preset checks independently of the swing-arm side.
1	If the safety circuit's alarm action is not **Off**, the preset checks **only** when the current swing-arm side is **1**. (This provides flexibility for swing-arm applications, when each side has its own ground circuit.)
2	If the safety circuit's alarm action is not **Off**, the preset checks **only** when the current swing-arm side is **2**. (This provides flexibility for swing-arm applications, when each side has its own ground circuit.)

Following are defaults for each circuit type:

- "*Circuit 2 type*" [64,0,11] (0 to 2): Default value is **0** (check safety circuit independently of loading arm side).
- "*Circuit 3 type*" [64,0,12] (0 to 2): Default value is **0** (check safety circuit independently of loading arm side) .
- "*Circuit 4 type*" [64,0,13] (0 to 2): Default value is 0 (check safety circuit independently of loading arm side.
- "*Circuit 5 type*" [63,0,81] (0 to 2): Default value is 1 (check safety circuit when side is 1) .
- "*Circuit 6 type*" [63,0,82] (0 to 2): Default value is 2 (check safety circuit when side is 2).
- "*Circuit 7 type*" [63,0,83] (0 to 2): Default value is 1 (check safety circuit when side is 1).
- "*Circuit 8 type*" [63,0,84] (0 to 2): Default value is 2 (check safety circuit when side is 2) .

The system scans all the safety circuits (if you configure the respective digital input) when batch starts or restarts and up to the point when the blend flowrate equals 0. Even if the safety circuit alarm action is set as **Off**, the system updates the circuit state to the safety circuit status [63,0,98]. However, the system raises the safety circuit alarm **only** if the safety circuit's alarm action is **not** set to **Off**.

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Appendix D – Configuring the DL8000 Programs

In This Chapter

The user programs for the DL8000 Preset Controller (“DL8000”) consist of the following: Liquid Calculations, Transaction History, Printing, Additives, Batching, and the Keypad Display. The software gives the DL8000 the ability to perform liquid flow calculations and corrections, batch control, additive control, and printing data. The standard features make it ideal for fiscal measurement, custody transfer, batching, and meter history.

The user program displays associated with the DL8000 include:

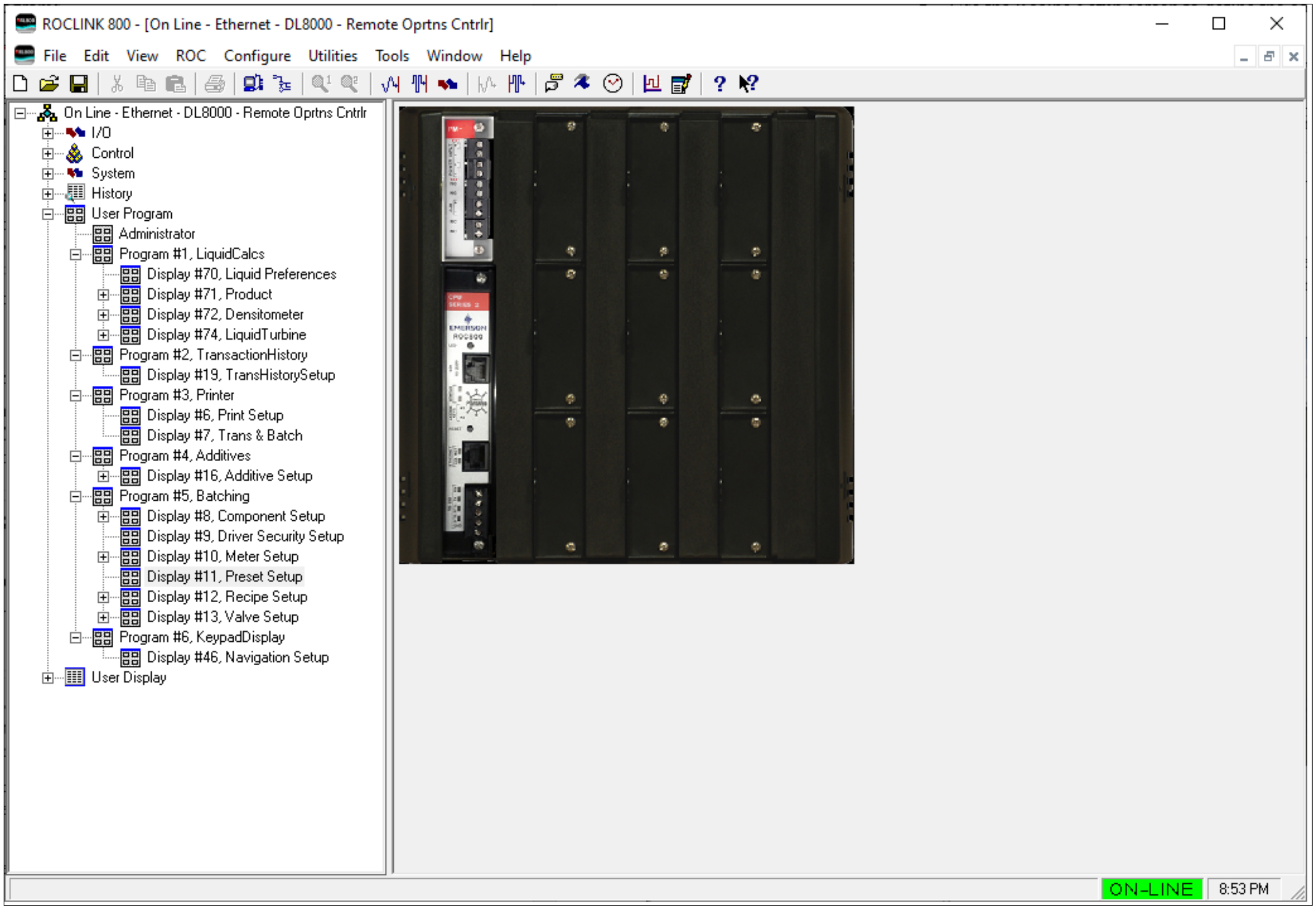


Figure D-1. DL8000 User Program Displays

Note: This appendix discusses the user programs in the sequence they appear in ROCLINK 800. However, it is advisable to configure the **Liquid Calcs** user program (*Section D.1*) **first** and the **Batching** program (*Section D.5*) **second**. Configure the remaining programs in the order your organization deems appropriate.

The DL8000 software measures all of the recognized API hydrocarbon groups.

- **Group A** – Crude Oils.
- **Group B** – Refined Products (Gasoline, Jet Fuel, Diesel Fuel).
- **Group C** – Special Applications.
- **Group D** – Lubricating Oils.
- **Group E** – Light Hydrocarbons.
- **Group F** – Ethanol.
- **Group G –** Petroleum 1952. Refer to *Appendix E – Miscellaneous Procedures* for details.

The DL8000 is a microprocessor-based controller that provides the functions required for a variety of field automation applications, including liquid measurement. It monitors, measures, and controls equipment in a plant or remote environment. The DL8000 is ideal for any application requiring flow computation; Proportional, Integral, and Derivative (PID) control loops; logic sequencing control; and up to six liquid meter runs.

Factory installed liquid measurement user programs provide the American Petroleum Institute (API) calculations in accordance with Manual for Petroleum Measurement Systems (MPMS). The DL8000 user programs perform the following functions:

You configure your organization's preset specifications using one ROCLINK 800-specific and a sequence of DL8000-specific screens.

Note: **Only** Version **1** of the DL8000 program requires you to load the programs and copy the displays to your PC before you configure the DL8000.

In the **LiquidCalcs** program:

- Use the Densitometer screen (and its *General* and *Inputs* tabs) to indicate the specific type of densitometer, density calculation factors, input values, and constant values for specific types of densitometer.
- Use the Liquid Preferences screen to define display units for process inputs, process outputs, and process variables.
- Use the Liquid Turbine screen (and its *Liquid Turbine* and *Volume Correction* tabs) to define inputs, base temperature, and density options.
- Use the Product screen (and its *Product Definition* and *Fluid Properties* tabs) to define a product and its associated fluid properties.

In the **Transaction History** program:

- Use the Transaction History Setup screen (and its *View Batch History, View Transaction History,* and *Configure History* tabs) to define how and what the DL8000 displays as historical data.

In the **Printer** program:

- Use the Print Setup screen to define the format of printed DL8000 output.

In the **Additives** program:

- Use the Additive Setup screen to define general additive characteristics and additive I/O, and view additive totals.

In the **Batching** program:

- Use the Component Setup screen to define component characteristics and values for K-factors and meter factors, and to view both running and batch totals.
- Use the Driver Security screen to define up to 32 driver IDs. In stand-alone mode, the system uses IDs to verify that loading can continue.

- Use the Meter Setup screen to define maximum and minimum flow rates, TLP values for temperature probes, and to view totals and batch and transaction data.
- Use the Preset Setup screen (and its *General Setup, Alarm Setup,* and *Current Data* tabs) to define general preset characteristics, alarms, and data formats.

Note: You must use this screen's General tab to define values for Unit Type (sequential or inline) and Valve Type (digital or 2-stage).

- Use the Recipe Setup screen to define the components and additives associated with each recipe.
- Use the Valve Setup screen to define input values for 2-stage valve parameters.

Note: If you use digital valves, you define input values through the ROCLINK 800 PID Loop screen (**Configure** > **Control** > **PID Loop**).

In the **Keypad Display** program:

- Use the Navigation Display screen (and its *Display Properties, PINs,* and *Dynamic Data* tabs) to define how the keypad displays data, define operator Personal Identification Numbers (PINs), and define custom loading screens.

In the **DL8000**:

- Use the Comm Port screen (**ROC** > **Comm Ports**) to assign the LCD as COMM2 owner.

You access the Comm Port screen from the ROCLINK 800 main menu, and the program-specific screens from the ROCLINK 800 configuration tree.

D.1 Liquid Calcs

Use this program and its component screens to define liquid calculation parameters.

D.1.1 Liquid Preferences

Use this screen to define global measurement units for process inputs, process outputs, process variables, and mass units.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #1, LiquidCalcs**.
3. Double-click **Display #70, Liquid Preferences**. The screen displays:

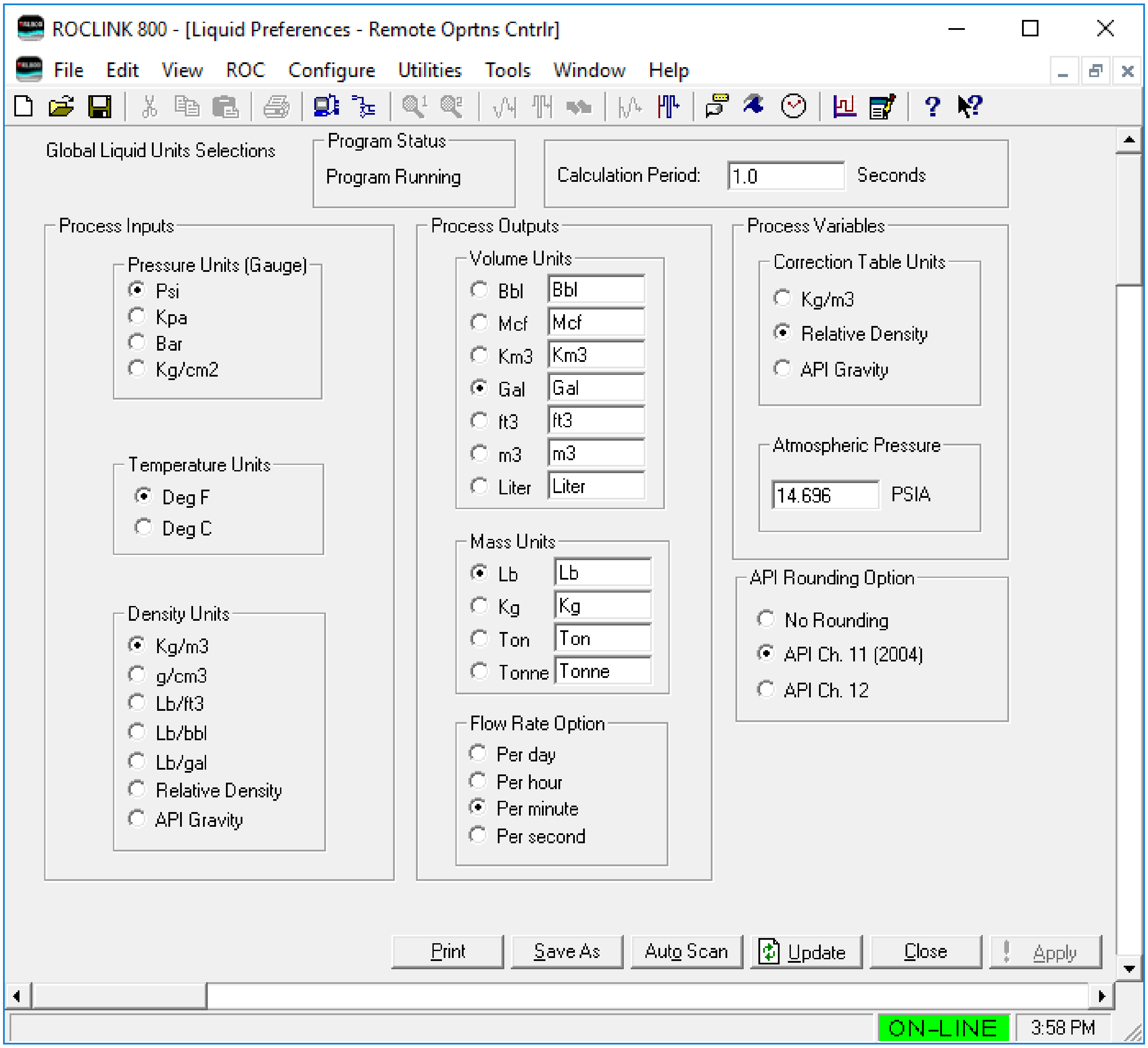


Figure D-2. Liquid Preferences Screen

Note: The Program Status field at the top of the screen should indicate that the program is running. If it does not, restart the program.

4. Review and change as necessary the values in the following fields:

Field	Description
Calculation Period	Sets how frequently the program performs liquid calculations. Valid values are **0.25** to **1** second. The **default** value is **1.0**.
Process Inputs	Set pressure, temperature, and density input units.
Pressure Units (Gauge)	Sets a gauge-based pressure unit for process inputs.

Field	Description
Temperature Units	Sets a temperature unit for process inputs. Valid selections are Deg F and Deg C. The default is Deg F. The units of measurement for temperature apply to all input values and temperature flow weighted averages. The exception is the base temperature, which is a selection at the station level, so it is possible to have an input temperature in Deg C with a base temperature of 60 Deg F. **Note**: If you select User Selected in the Base Temperature field (Liquid Turbine > Volume Correction Tab), the units of measurement that you select in the Temperature Units field (Deg F or Deg C) must match the units of measurement in the Base Temperature field (Liquid Turbine > Volume Correction Tab).
Density Units	Sets a density unit for process inputs. **Note**: These unit selections affect the Densitometer Type options on the General tab of the Densitometer screen.
Process Outputs	Set volume and flowrate output units.
Volume Units	Sets a volume unit for process outputs.
Mass	Sets a mass unit value for process variables.
Flow Rate Option	Sets a flowrate option for process outputs.
Process Variables	Set process variable units.
Correction Table Units	Sets the density units for the volume correction table.
Atmospheric Pressure	Sets the value of the atmospheric pressure (absolute) at the metering location. The value must be greater than zero,and is expressed in the configured pressure units.
API Rounding Option	Sets the rounding option used by the system for calculations. Possible options are: ▪ **No Rounding** – No rounding is performed on intermediate or final calculated variables, and values display in full double precision. ▪ **API Ch. 11 (2004)** – Calculation outputs are rounded according to API 11 (2004). ▪ **API Ch. 12** – Calculation outputs are rounded according to API 12.

5. Click **Apply** to save any changes you have made to this screen.
6. Click **Close** to display the Directory Tree.
7. Proceed to *Section D.1.2* to configure the Product screen.

D.1.2 Product

Use this screen and its tabs to define a liquid product and its associated fluid properties.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #1, LiquidCalcs**.
3. Double-click **Display #71, Product**.
4. Double-click **#1, Product 1**. The screen displays:

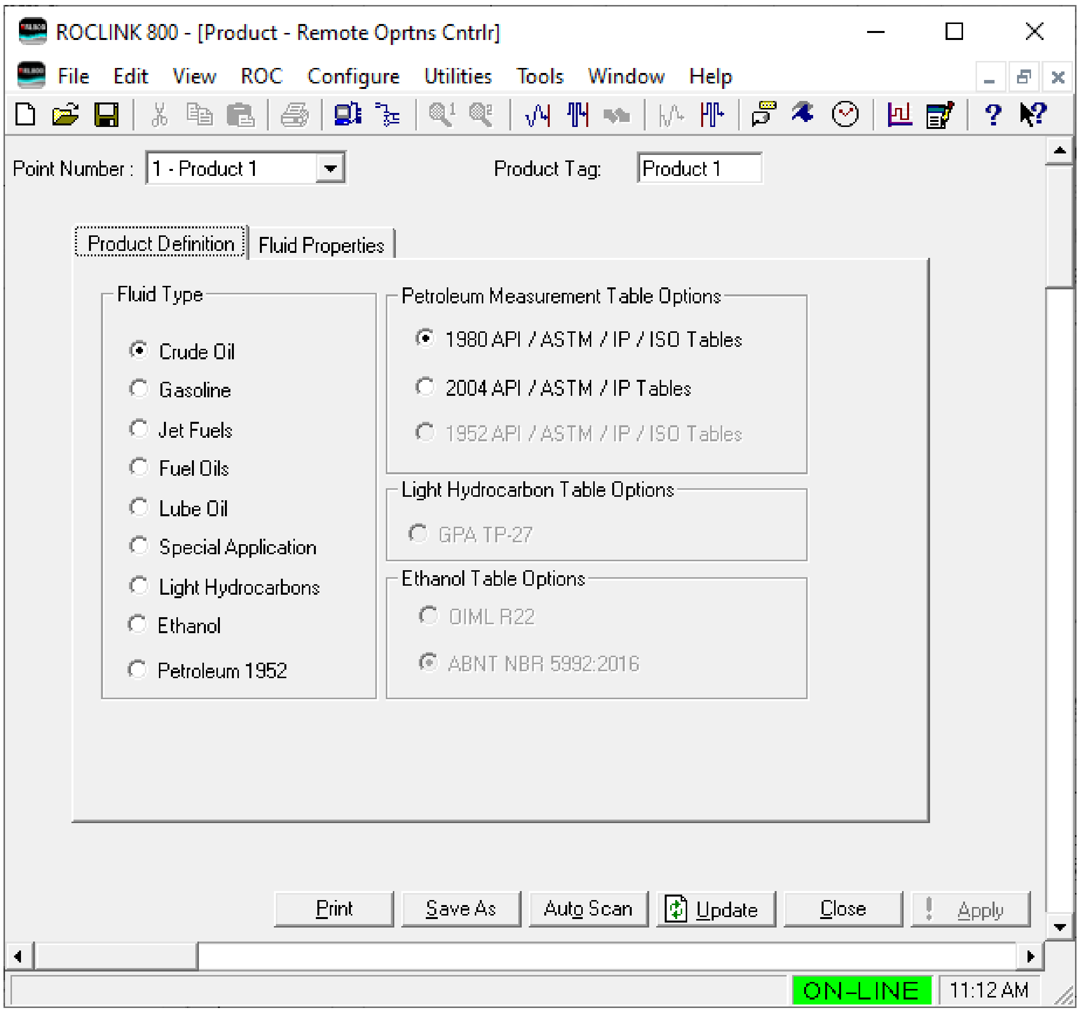


Figure D-3. Product Screen

Note: The Product screen has a tab format. *Sections D.1.2.1* and *D.1.2.2* discuss the requirements for each Product screen tab.

D.1.2.1 Product – Product Definition Tab

Use this tab (which displays when you access the Product screen) to provide general information for up to five products.

1. Select the **Product Definition** tab on the Product screen. The Product Definition screen displays:

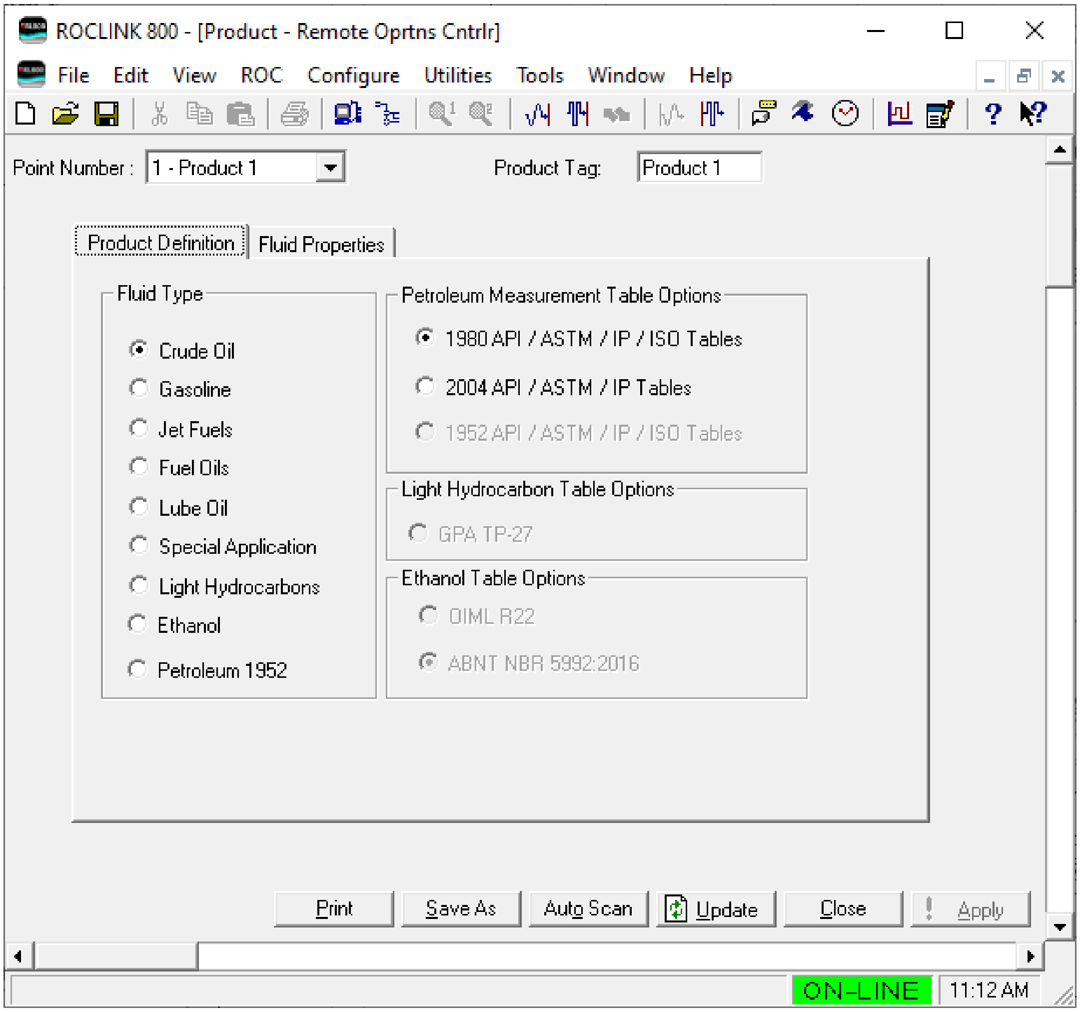


Figure D-4. Product, Product Definition tab

2. Review the values in the following fields:

Field	Description
Point Number	Indicates the specific product you want to define. Click ▾ to display additional products for this screen.
Product Tag	Provides a short description (up to 10 alphanumeric characters) for the selected product. **Note**: The program uses this description on subsequent program screens.
Fluid Type	Sets the specific type of fluid associated with this product. **Crude Oil** is the **default**.
Petroleum Measurement Table Options	Indicates the petroleum measurement table option associated with the selected type of fluid.

Field	Description
Light Hydrocarbon Table Options	Indicates the light hydrocarbon measurement table option associated with the selected type of fluid. This option is available **only** if you select **Light Hydrocarbons** as the **Fluid Type**.
Ethanol Table Options	This **read-only** field indicates the Ethanol measurement table used in calculations.

3. Click **Apply** to save any changes you have made to this screen.
4. Proceed to *Section D.1.2.2* to define fluid properties.

D.1.2.2 Product – Fluid Properties Tab

Use this tab to set up compressibility and density options for the selected fluid.

2. Select the **Fluid Properties** tab on the Product screen. The Fluid Properties screen displays.

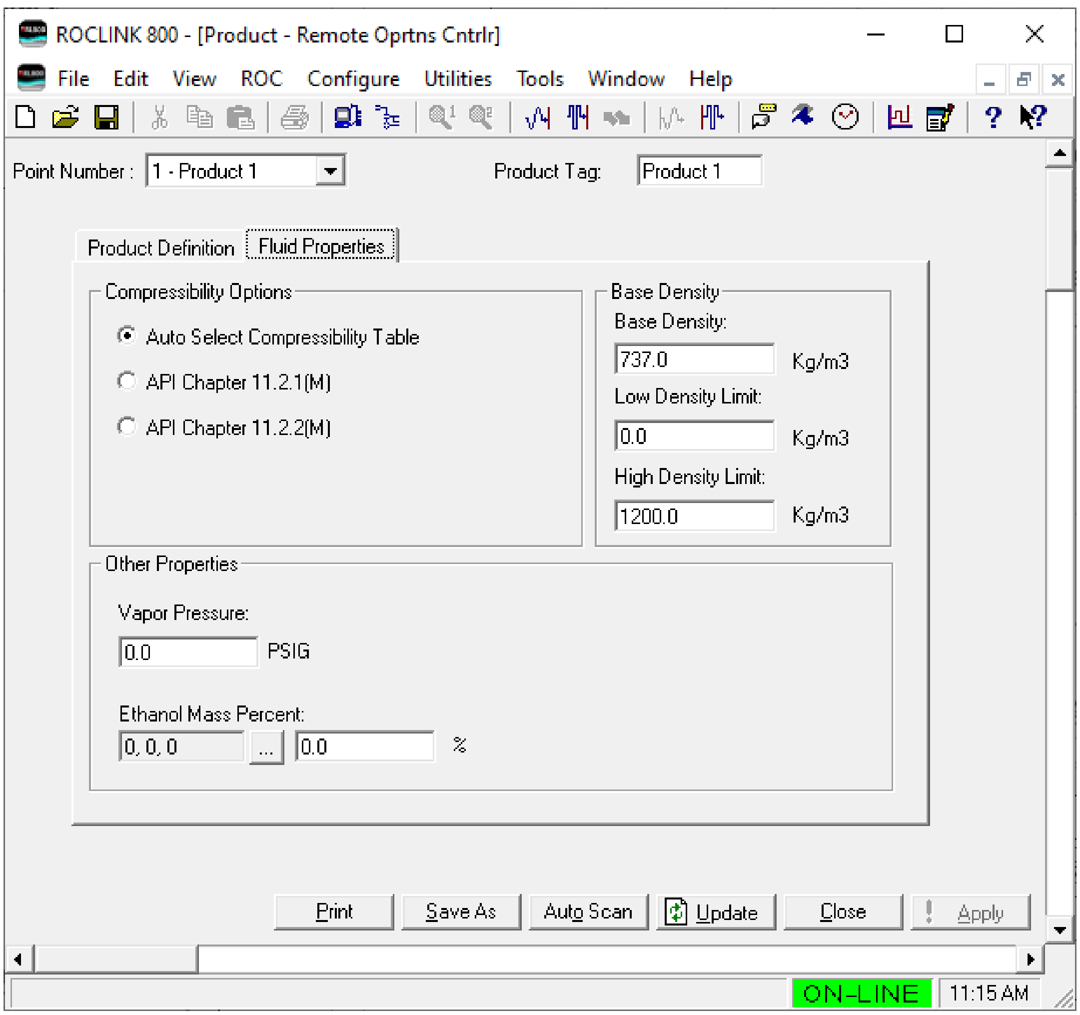


Figure D-5. Product, Fluid Properties tab

3. Review the values in the following fields:

Field	Description
Compressibility Options	Indicates the compressibility options the program uses for the indicated product. This option is currently **not** available.
Base Density	Sets a base density for the indicated product.
Low Density Limit	Sets a low density limit for the indicated product.
High Density Limit	Sets a high density limit for the indicated product.
Vapor Pressure	Set the Vapor Pressure for the current Fluid Type product in the pressure units you set. The vapor pressure is the equilibrium vapor pressure (bubble point) of the fluid at the flowing temperature. The equilibrium pressure is the minimum pressure at which bubbles of gas appear in a liquid. For liquids with equilibrium vapor pressure less than atmospheric pressure (0 psig or 14.696 psia), this value will be set to 0.0, which includes all fluid types except light hydrocarbons. The user program calculates the pressure correction factor (CPL) as a function of the pressure difference between the flowing pressure and this pressure.
User Entered Alpha (x 10^3)	Sets the coefficient of thermal expansion factor for use in calculation of the correction of the effect for temperature on a liquid (CTL). This number displays with an implied multiplier of 1000. **Note:** This option is only available if you select Special as the Fluid Type on the Product Definition tab.
Ethanol Mass Percent	Sets the percentage, by mass, of ethanol in the product. This value, along with the flowing temperature, is used to determine the fluid's density and the volume correction. **Note**: This option is only available if you select Ethanol as the Fluid Type on the Product Definition tab.

4. Click **Apply** to save any changes you have made to this screen.

5. Click **Close** to display the Directory Tree.

6. Proceed to *Section D.1.3* to configure the Densitometer screen.

D.1.3 Densitometer

Use this screen and its tabs to specify a broad range of densitometer-specific parameters.

To access this screen:

1. From the Directory Tree, double-click **User Program.**

2. Click **Program #1, LiquidCalcs**.
3. Double-click **Display #72, Densitometer**.
4. Double-click **#1, Density 1**. The screen displays:

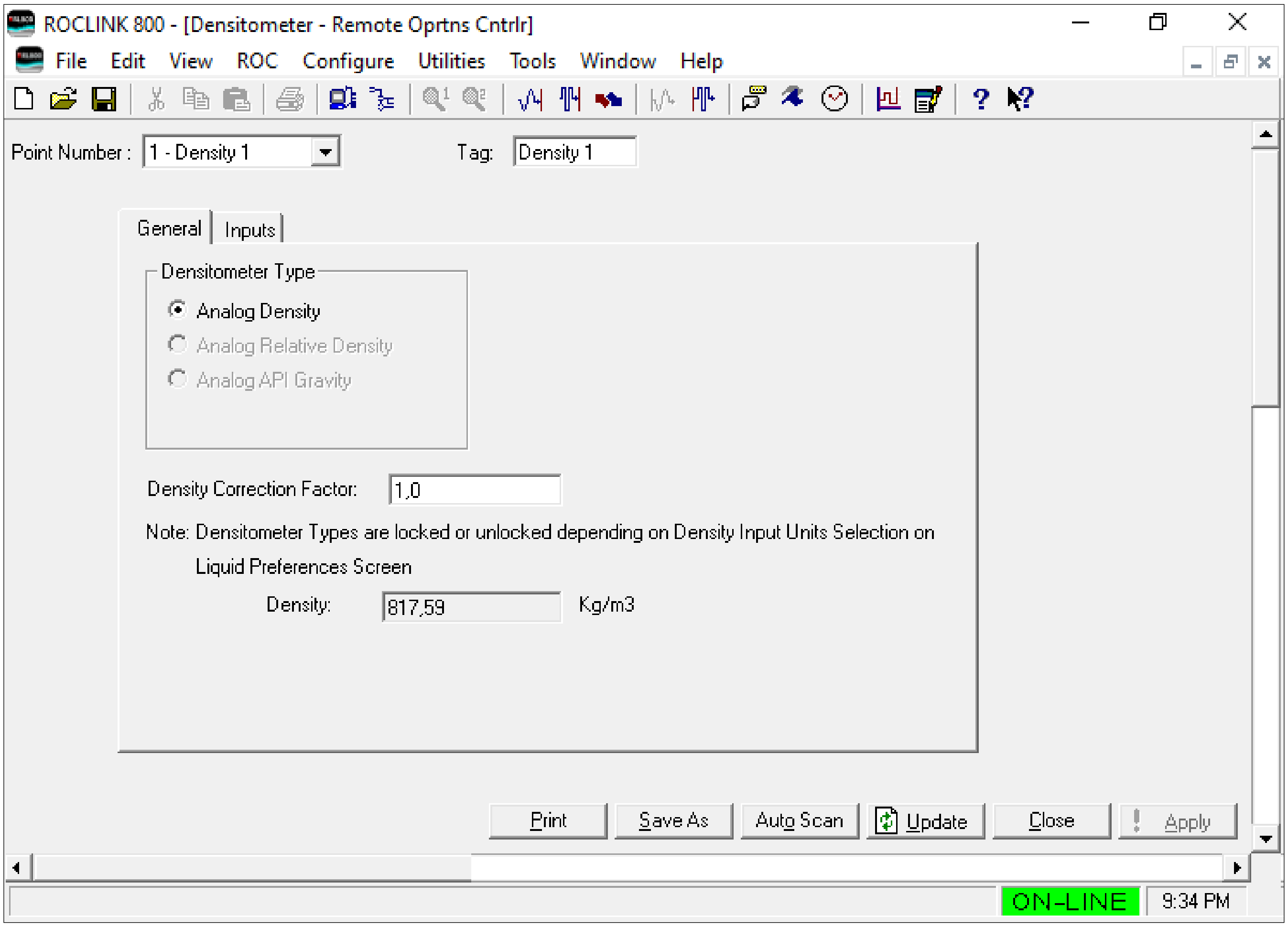


Figure D-6. Densitometer Screen

Note: The Densitometer screen has a tab format. *Sections D.1.3.1* and *D.1.3.2* discuss the requirements for each Densitometer screen tab.

D.1.3.1 Densitometer – General Tab

Use this tab (which displays when you access the Densitometer screen) to provide general information about the densitometer.

1. Select the **General** tab on the Densitometer screen. The General screen displays:

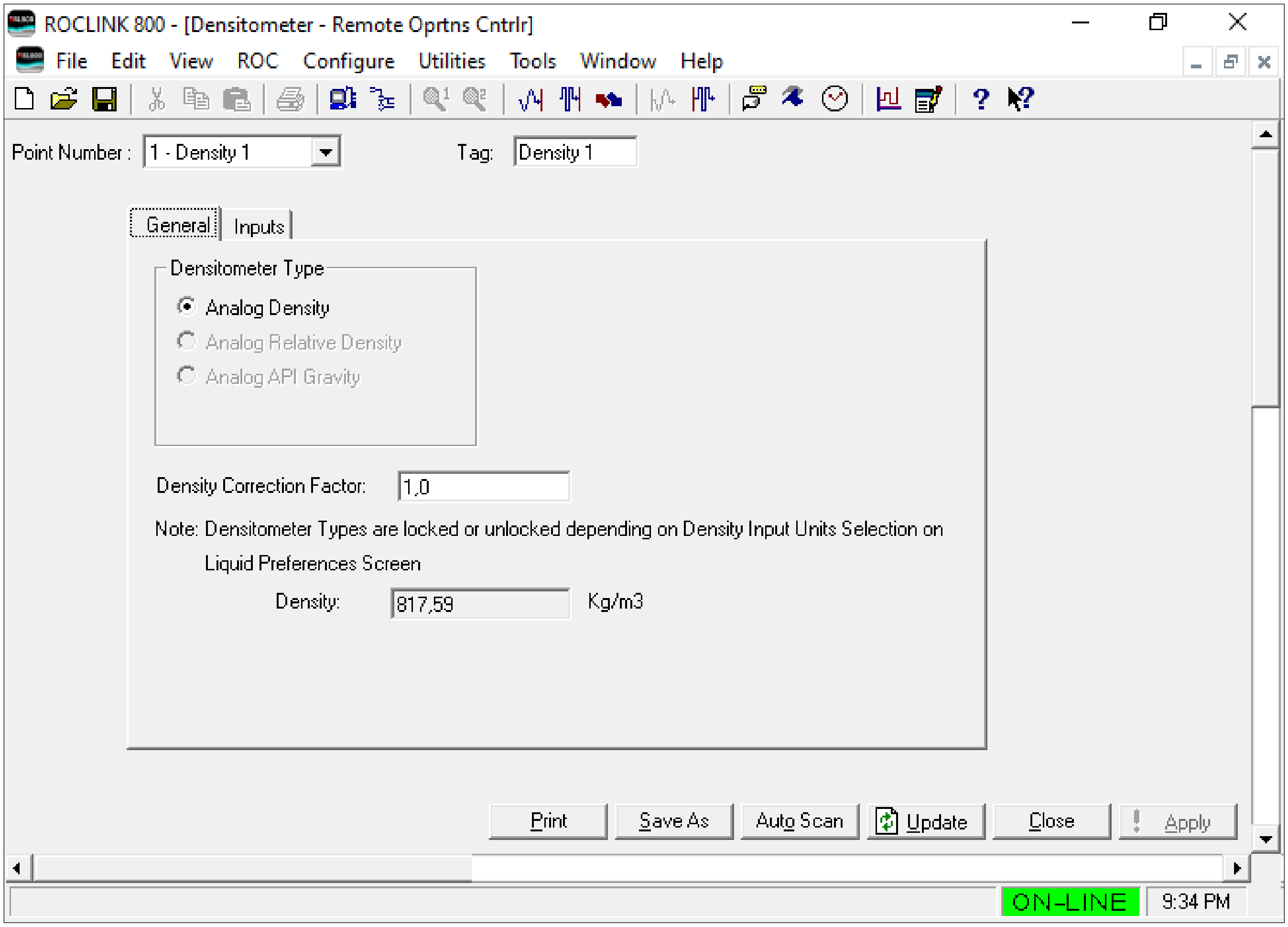


Figure D-7. Densitometer, General tab

2. Review the values in the following fields:

Field	Description
Point Number	Indicates the specific densitometer you want to define. Click ▾ to display additional densitometers.
Tag	Sets a short description (up to 10 alphanumeric characters) for the selected densitometer. **Note**: The program uses this description on subsequent program screens.
Densitometer Type	Indicates the specific kind of densitometer associated with this point number. **Note**: The Density Units you define on the Liquid Preference screen control the types of densitometers displayed for selection. If you select **Relative Density**, the program only allows you to select **Analog Relative Density**. If you select **API Gravity**, the program only allows you to select **Analog API Gravity**.

Field	Description
Density Correction Factor	Sets, if appropriate, a correction factor the program uses to adjust the densitometer input.
Density	This **read-only** field shows the density associated with the selected densitometer.

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section D.1.3.2* to view inputs for the selected densitometer.

D.1.3.2 Densitometer – Inputs Tab

Use this tab to define densitometer-specific density, temperature, and pressure inputs or view these values from the selected densitometer.

1. Select the **Inputs** tab on the Densitometer screen. The Inputs screen displays.

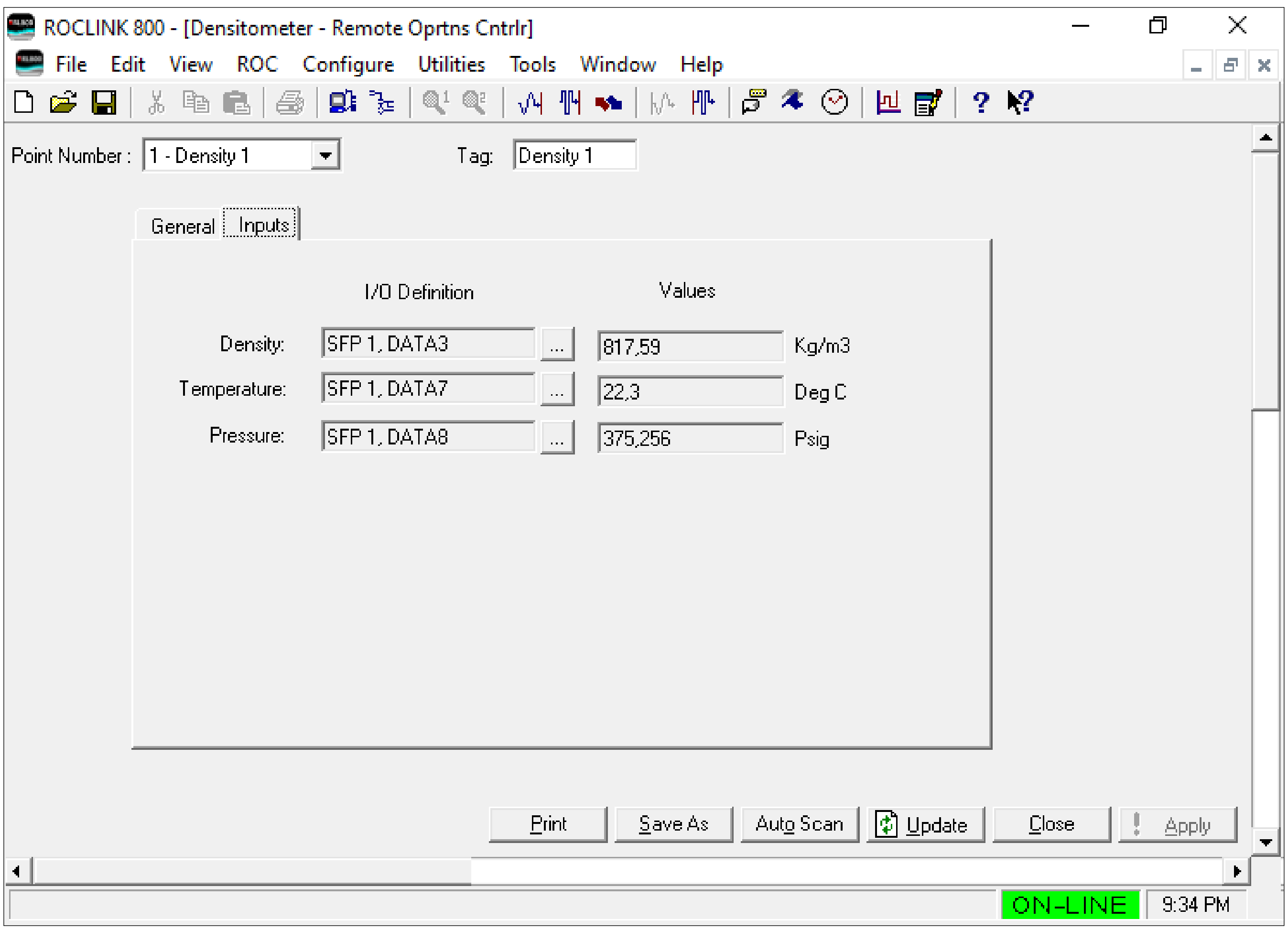


Figure D-8. Densitometer, Inputs tab

2. Review the values in the following fields:

Field	Description
Density	Assigns the point type, logical, and parameter (TLP) of the density I/O value for the selected densitometer. Click ... to display the Select TLP screen and define your TLP selection. **Note**: If you select **Undefined** for the density input, you can manually enter a value for the density. Otherwise, the program displays the value for the currently selected input.
Pressure	Assigns the point type, logical, and parameter (TLP) of the pressure I/O value for the selected densitometer. Click ... to display the Select TLP screen and define your TLP selection. **Note**: If you select **Undefined** for the pressure input, you can manually enter a value (in PSI) for the static pressure. Otherwise, the program displays the value for the currently selected input.
Temperature	Assigns the point type, logical, and parameter (TLP) for the temperature I/O value for the selected densitometer. Click ... to display the Select TLP dialog box and define your TLP selection. **Note**: If you select **Undefined** for the temperature input, you can manually enter a value for the temperature. Otherwise, the program displays the value for the currently selected input.

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section D.1.4* to define liquid turbine parameters.

D.1.4 Liquid Turbine

Use this screen and its tabs to define parameters for a liquid meter.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #1, LiquidCalcs**.
3. Double-click **Display #74, Liquid Turbine**.
4. Double-click **#1, LiqTurb 1**. The screen displays:

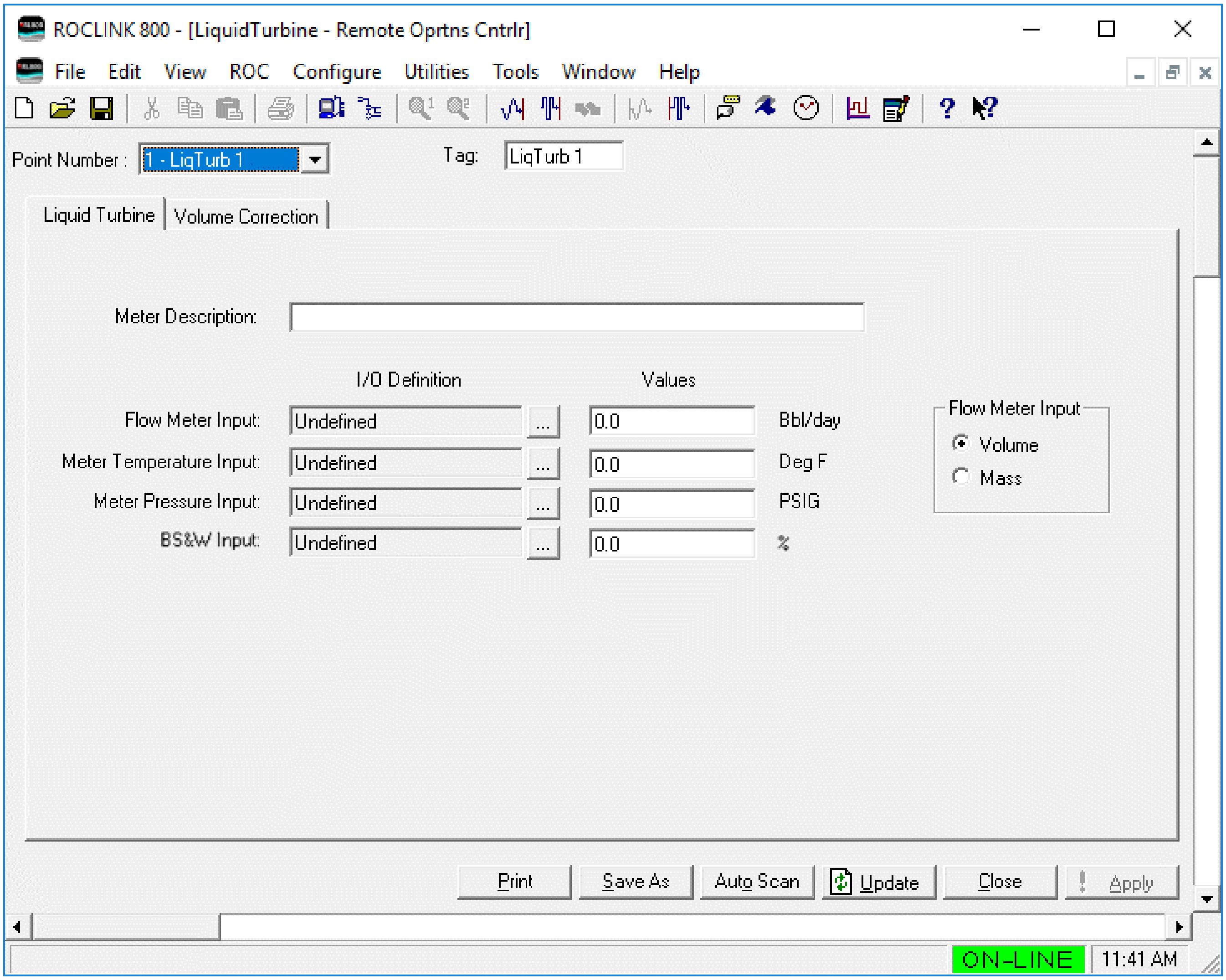


Figure D-9. Liquid Turbine

Note: The Liquid Turbine screen—like other screens in this program—has a tab format. *Sections D.1.4.1* and *D.1.4.2* discuss the requirements for each tab on the Liquid Turbine screen.

D.1.4.1 Liquid Turbine – Liquid Turbine Tab

Use this tab (which displays when you access the Liquid Turbine screen) to provide general information about the liquid meter.

1. Select the **Liquid Turbine** tab on the Liquid Turbine screen. The Liquid Turbine screen displays.

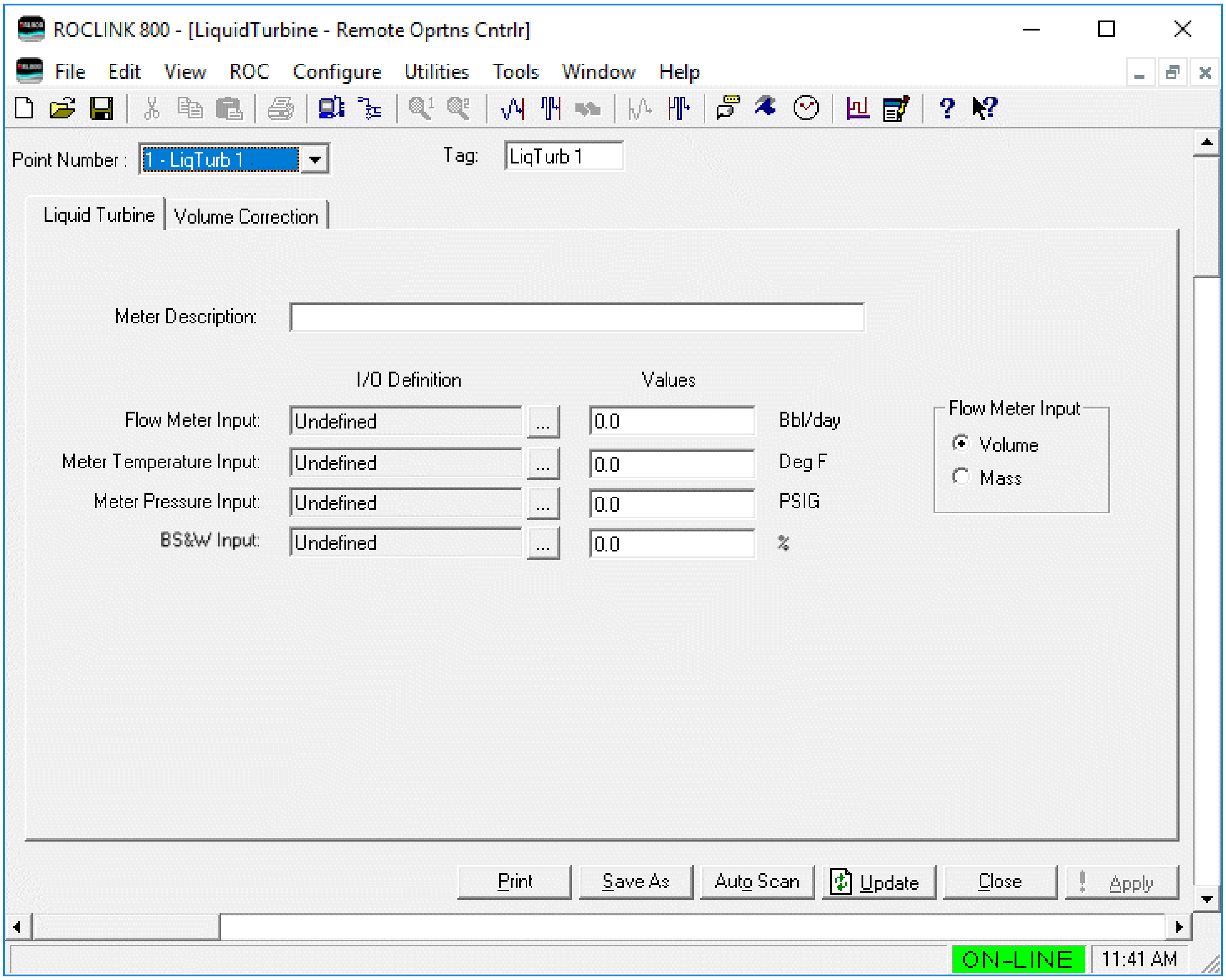


Figure D-9. Liquid Turbine, Liquid Turbine tab

2. Review the values in the following fields:

Field	**Description**
Point Number	Indicates the liquid meter you want to define. Click ▼ to display up to three additional meters.
Tag	Sets a short description (up to 10 alphanumeric characters) for the selected meter. **Note**: The program uses this description on subsequent program screens.
Meter Description	Sets a long description (up to 30 alphanumeric characters) for the selected meter.

Field	Description
Flow Meter Input	Sets the input value for the flow meter. Click ... to display a Select TLP screen you use to define the input value. You can also leave the TLP undefined and enter a specific value in the Values field.
Meter Temperature Input	Sets the input value for the flow meter temperature. Click ... to display a Select TLP screen you use to define the input value. You can also leave the TLP undefined and enter a specific value in the Values field.
Meter Pressure Input	Sets the input value for the flow meter pressure. Click ... to display a Select TLP screen you use to define the input value. You can also leave the TLP undefined and enter a specific value in the Values field.
BS&W Input	Sets the input value for the base sediment and water (BS&W) percent. Click ... to display a Select TLP screen you use to define the input value. You can also leave the TLP undefined and enter a specific value in the Values field.
Flow Meter Input	Sets whether the input is a mass or volume unit.

3. Click **Apply** to save any changes you have made to this screen.
4. Proceed to *Section D.1.4.2* to define volume correction parameters for the liquid turbine.

D.1.4.2 Liquid Turbine – Volume Correction Tab

Use this tab to define volume correction calculation specifics for the selected meter. To access this screen:

1. Select the **Volume Correction** tab on the Liquid Turbine screen. The Volume Correction screen displays.

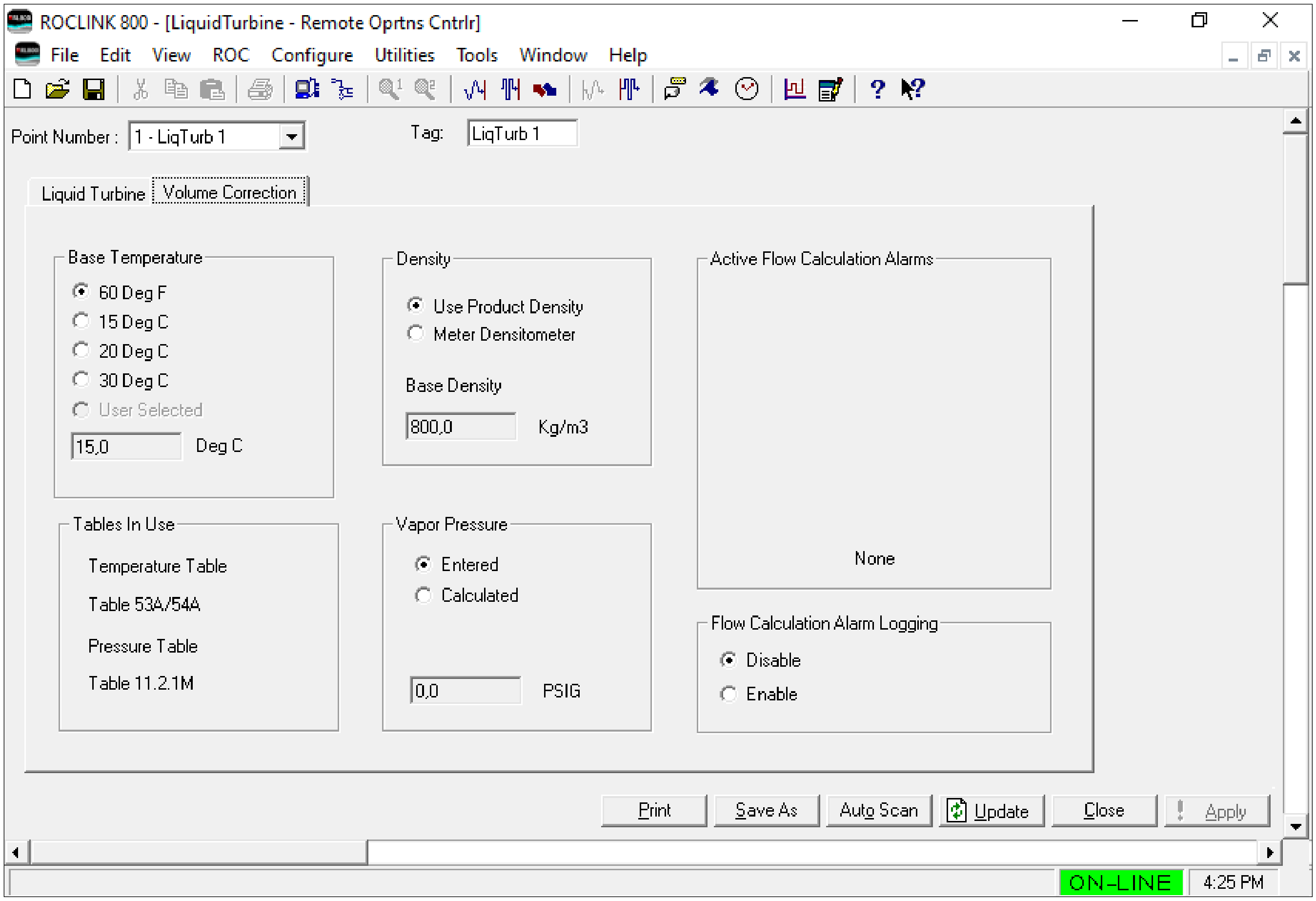


Figure D-10. Liquid Turbine, Volume Correction tab

2. Review the values in the following fields:

Field	Description
Base Temperature	Sets the base temperature, as specified by contract or organizational policy, expressed as degrees Fahrenheit or degrees Celsius. Valid values are 60 Deg F, 15 Deg C, 20 Deg C, 30 Deg C, or User Selected. **Notes:** ▪ User Selected is available **only** if you select **2004 API / ASTM / IP Tables** in the Petroleum Measurement Table Options field and a **fluid type other than Ethanol** in the Fluid Type field (Liquid Product > Product Definition Tab). ▪ If you select User Selected in the Base Temperature field (Liquid Turbine > Volume Correction Tab), the units of measurement that you select in the Temperature Units field (Deg F or Deg C) must match the units of measurement in the Base Temperature field.
Tables in Use	This **read-only** field shows the specific temperature and pressure tables the program uses when calculating density and volume

Field	Description
	correction. The standards depend on the selections you make in the Product screen and on the Base Temperature you select. Where appropriate, the constants associated with the selected standard also display. **Note**: The tables in use are auto-selected based on Liquid Preferences, Base Density, Base Temperature, Product type, and Petroleum Measurement Table options.
Density	Sets the base density value as **Use Product Density** that you select in Liquid Product or to use the **Meter Densitometer** value from the Densitometer you select. The default is **Use Product Density**. **Note:** The value displays in the Base Density field.
Vapor Pressure	This **read-only** field displays the vapor pressure (or equilibrium pressure) in use for the meter, which is used in pressure correction. This value is either calculated by the program, or user entered, depending on the option selected at the associated station. **Note**: Calculation of the vapor pressure value is **only** applicable when the fluid type is light hydrocarbon.
Active Flow Calculation Alarms	This **read-only** field shows the active flow calculation alarms. Possible alarms include Temperature Out Of Bounds, Pressure Out Of Bounds, Observed Density Out Of Bounds, Base Density Out Of Bounds, Convergence Error, Refined Product Alarms, Alpha Out Of Bounds, and CTL / CPL Out Of Bounds.
Flow Calculation Alarm Logging	Sets if flow calculation alarms are entered in the device alarm log. If Disable is selected, the conditions that cause the alarm are still evaluated and reported on this screen, but no entry is made in the alarm log. If Enable is selected, entries for the flow calculation alarms are entered in the alarm log.

3. Click **Apply** to save any changes you have made to this screen.
4. Proceed to *Section D.1.5* to configure prodview the calculation alarm ranges.

D.1.5 Calculation Alarm Range Limits

The calculation standards implemented in the Liquid Calculations user program often indicate the range for which the inputs (such as temperature, pressure, density, etc.) are valid. When the inputs to the calculation exceed the published limits, the accuracy of the results becomes questionable. In this case of out-of-range inputs, the calculation continues and a calculation alarm is raised.

A flow calculation alarm is provided at the Liquid Meter. If enabled, it provides an indication if any of the inputs to the calculation in use exceed these ranges. The ranges of the values which will raise a calculation alarm vary, depending on the calculation in use. No calculation alarms are provided for the fluid type of ethanol.

D.1.5.1 API MPMS 11.1 1980

The following ranges are as described in American Petroleum Institute, Manual of Petroleum Measurement Standards Chapter 11.1 1980. This standard covers the API commodities groups of Crude Oil, Refined Products, Special Application Products, and Lubricating Oils.

The input ranges specified in this section are valid when one of the above fluid types is selected, and the liquid product the measurement table option is set to **1980 API / ASTM / IP / ISO Tables**.

Notes:

- **Odd** numbered tables are **Observed to Base**.
- **Even** numbered tables are **Base to Alternate**.

Table 5A

Selections:

- Observed density units – API
- Base Temperature – 60 F
- Product – Crude Oil

API	Temperature in °F
0 to 40	0 to 300
40 to 50	0 to 250
50 to 100	0 to 200

Table 5B

Selections:

- Observed density units – API
- Base Temperature – 60 F
- Product – Refined Products

API	Temperature in °F
0 to 40	0 to 300
40 to 50	0 to 250
50 to 100	0 to 200

Table 5D Selections:

- Observed density units – API
- Base Temperature – 60 F
- Product – Lube Oil

API	Temperature in °F
-10.0 to 45.0	0 to 300

Table 6A Selections:

- Base density units – API
- Base Temperature – 60 F
- Product – Crude Oil

API	Temperature in °F
0 to 40	0 to 300
40 to 50	0 to 250
50 to 100	0 to 200

Table 6B Selections:

- Base density units – API
- Base Temperature – 60 F
- Product – Refined Product

API	Temperature in °F
0 to 40	0 to 300
40 to 50	0 to 250
50 to 85	0 to 200

Table 6C Selections:

- Base density units – API
- Base Temperature – 60 F
- Product – Special

Thermal coefficient expansion x 10^-6	Temperature in °F
270 to 510	0 to 300
510 to 530	0 to 250
530 to 930	0 to 200

Table 6D Selections:

- Base density units – API
- Base Temperature – 60 F
- Product – Lube Oil

Density API	Temperature in °F
-10.0 to 45.0 API	0 to 300 F

Table 23A Selections:

- Observed density units – Relative Density
- Base Temperature – 60 F
- Product – Crude Oil

Relative Density 60/60F	Temperature in °F
0.8250 to 1.0760	0 to 300
0.7795 to 0.8250	0 to 250
0.6110 to 0.7795	0 to 200

Table 23B Selections:

- Observed density units – Relative Density
- Base Temperature – 60 F
- Product – Refined Products

Relative Density 60/60F	Temperature in °F
0.8250 to 1.0760	0 to 300
0.7795 to 0.8250	0 to 250
0.6535 to 0.7795	0 to 200

Table 23D Selections:

- Observed density units – Relative Density
- Base Temperature – 60 F
- Product – Lube Oil

Density API	Temperature in °F
0.801699716713881 To 1.16460905349794 Relative	0 to 300 F

Table 24A Selections:

- Base density units – Relative Density
- Base Temperature – 60 F
- Product – Crude Oil

Relative Density 60/60F	Temperature in °F
0.8250 to 1.0760	0 to 300
0.7795 to 0.8250	0 to 250
0.6110 to 0.7795	0 to 200

Table 24B

Selections:

- Base density units – Relative Density
- Base Temperature – 60 F
- Product – Refined Product

Relative Density 60/60F	Temperature in °F
0.8250 to 1.0760	0 to 300
0.7795 to 0.8250	0 to 250
0.6535 to 0.7795	0 to 200

Table 24C

Selections:

- Base density units – Relative Density
- Base Temperature – 60 F
- Product – Special

Thermal coefficient expansion x 10^-6	Temperature in °F
270 to 510	0 to 300
510 to 530	0 to 250
530 to 930	0 to 200

Table 24D

Selections:

- Base density units – Relative Density
- Base Temperature – 60 F
- Product – Lube Oil

Density API	Temperature in °F
0.801699716713881 To 1.16460905349794 Relative	0 to 300 F

Table 53A

Selections:

- Observed density units – Kg/m3
- Base Temperature – 15C
- Product – Crude Oil

Density Kg/M3	Temperature in °C
610 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 53B Selections:

- Observed density units – Kg/m3
- Base Temperature – 15C
- Product – Refined Products

Density Kg/M3	Temperature in °C
653 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 53D Selections:

- Observed density units – Kg/M3
- Base Temperature – 15C
- Product – Lube Oil

Density API	Temperature in °C
800.0 to 1164.0 kg/m3	-20.0 to 150.0 deg C

Table 54A Selections:

- Base density units – Kg/m3
- Base Temperature – 15C
- Product – Crude Oil

Density Kg/M3	Temperature in °C
610 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 54B Selections:

- Base density units – Kg/m3
- Base Temperature – 15C
- Product – Refined Products

Density Kg/M3	Temperature in °C
653 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 54C Selections:

- Base density units – Kg/m3
- Base Temperature – 15C
- Product – Special

Thermal coefficient expansion x 10^-6	Temperature in °C
486 to 918	-18 to 150
918 to 954	-18 to 125
954 to 1674	-18 to 90

Table 54D Selections:

- Base density units – Kg/M3
- Base Temperature – 15C
- Product – Lube Oil

Density API	Temperature in °C
800.0 to 1064.0 kg/m3	20.0 to 150.0 deg C

Table 59A Selections:

- Observed density units – Kg/m3
- Base Temperature – 20C
- Product – Crude Oil

Density Kg/M3	Temperature in °C
610 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 59B Selections:

- Observed density units – Kg/m3
- Base Temperature – 20C
- Product – Refined Products

Density Kg/M3	Temperature in °C
653 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 59D Selections:

- Observed density units – Kg/m3
- Base Temperature – 20C
- Product – Lube Oil

Density in Kg/M3	Temperature in °C
800 to 824	-18 to 125
824 to 1164	-18 to 150

Table60A Selections:

- Base density units – Kg/m3
- Base Temperature – 20C
- Product – Crude Oil

Density Kg/M3	Temperature in °C
610 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 60B Selections:

- Base density units – Kg/m3
- Base Temperature – 20C
- Product – Refined Products

Density Kg/M3	Temperature in °C
653 to 778	-18 to 95
778 to 824	-18 to 125
824 to 1075	-18 to 150

Table 60D Selections:

- Base density units – Kg/m3
- Base Temperature – 20C
- Product – Lube Oil

Density Kg/M3	Temperature in °C
800 to 824	-18 to 125
824 to 1164	-18 to 150

D.1.5.2 API MPMS 11.1 2004

The following ranges are as described in American Petroleum Institute, Manual of Petroleum Measurement Standards Chapter 11.1 2004. This standard covers the API commodities groups of Crude Oil, Refined Products, Special Application Products, and Lubricating Oils.

The input ranges specified in this section are valid when one of the above fluid types is selected, and the liquid product the measurement table option is set to **2004 API / ASTM / IP Tables**.

	Crude Oil	Refined Products	Lubrication Oils
Base Density			
kg/m3 @ 60°F	610.6 to 1163.5		800.9 to 1163.5
Relative Density @ 60°F	0.61120 to 1.16464		0.80168 to 1.1646
API Gravity @ 60°F	100.0 to -10.0		45.0 to -10.0
kg/m3 @ 15°C	611.16 to 1163.79	611.16 to 1163.86	801.25 to 1163.85
kg/m3 @ 20°C	606.12 to 1161.15	606.12 to 1160.62	798.11 to 1160.71
Observed Density			
kg/m3 @ 60°F	470.5 to 1201.8	470.4 to 1209.5	714.3 to 1208.3
Relative Density @ 60°F	0.47096 to 1.20298	0.47086 to 1.21069	0.715 to 1.20949
API Gravity @ 60°F	168.948 to -13.8758	169.0118 to -14.6246	66.40111 to -14.5086
Temperature			
°C	-50.00 to 150.00		
°F	-58.0 to 302.0		
Pressure			
psig	0 to 1500		
kPa (gauge)	0 to 1.034 X 10^{4}		
bar (gauge)	0 to 103.4		
Coefficient of Thermal Compressibility (α60)			
per °F	230.0 X 10^{-6} to 930.0 X 10^{-6}		
per °C	414.0 X 10^{-6} to 1674.0 X 10^{-6}		

D.1.5.3 GPA TP-27 Alarm Ranges

The following ranges are as described in the Gas Producers Association, Technical Publication 27. This standard covers commodities that are considered to be light hydrocarbons.

The input ranges specified in this section are valid when the in-use fluid type is set to Light Hydrocabons, and the Light Hydrocabon option on the Product page is set to **GPA TP-27**.

Table 23E Selections:

- Observed density units – Relative Density
- Base Temperature – 60 F
- Product – Light Hydrocarbon

Observed Density Relative	Temperature in °F
0.21 to 0.74	-50.8 to 199.4

Table 24E Selections:

- Base density units – Relative Density
- Base Temperature – 60 F
- Product – Light Hydrocarbon

Base Density Relative	Temperature in °F
0.35 to 0.688	-50.8 to 199.4

Table 53E Selections:

- Observed density units – Kg/M3
- Base Temperature – 15C
- Product – Light Hydrocarbon

Observed Density Kg/M3	Temperature in °C
349.6556 to 687.323008	-46.0 to 93.0

Table 54E Selections:

- Base density units – Kg/M3
- Base Temperature – 15C
- Product – Light Hydrocarbon

Base Density Kg/M3	Temperature in °C
209.79336 to 739.27184	-46.0 to 93.0

Table 59E Selections:

- Observed density units – Kg/M3
- Base Temperature – 20C
- Product – Light Hydrocarbon

Observed Density Kg/M3	Temperature in °C
349.6556 to 687.323008	-46.0 to 93.0

Table 60E Selections:

- Base density units – Kg/M3
- Base Temperature – 20C
- Product – Light Hydrocarbon

Base Density Kg/M3	Temperature in °C
209.79336 to 739.27184	-46.0 to 93.0

D.1.5.4 API MPMS 1952

The following ranges are as described in American Petroleum Institute, Manual of Petroleum Measurement Standards 1952.The input ranges specified in this section are valid when 1952 Petroleum fluid types is selected, and the liquid product the measurement table option is set to 1952 API / ASTM / IP / ISO Tables.

Table 53/54 Selections:

- Observed density unit – Kg/m^3
- Base Temperature – 150 °C
- Product – Petroleum 1952

Density (Kg/m^3)	Temperature in °C
500 to 1100	-46 to 150

D.2 Transaction History

Use the first two tabs on this screen to review batch and transaction history. Use the third tab to configure history.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #2, TransactionHistory**.
3. Double-click **Display #19, TransHistorySetup**. The screen displays:

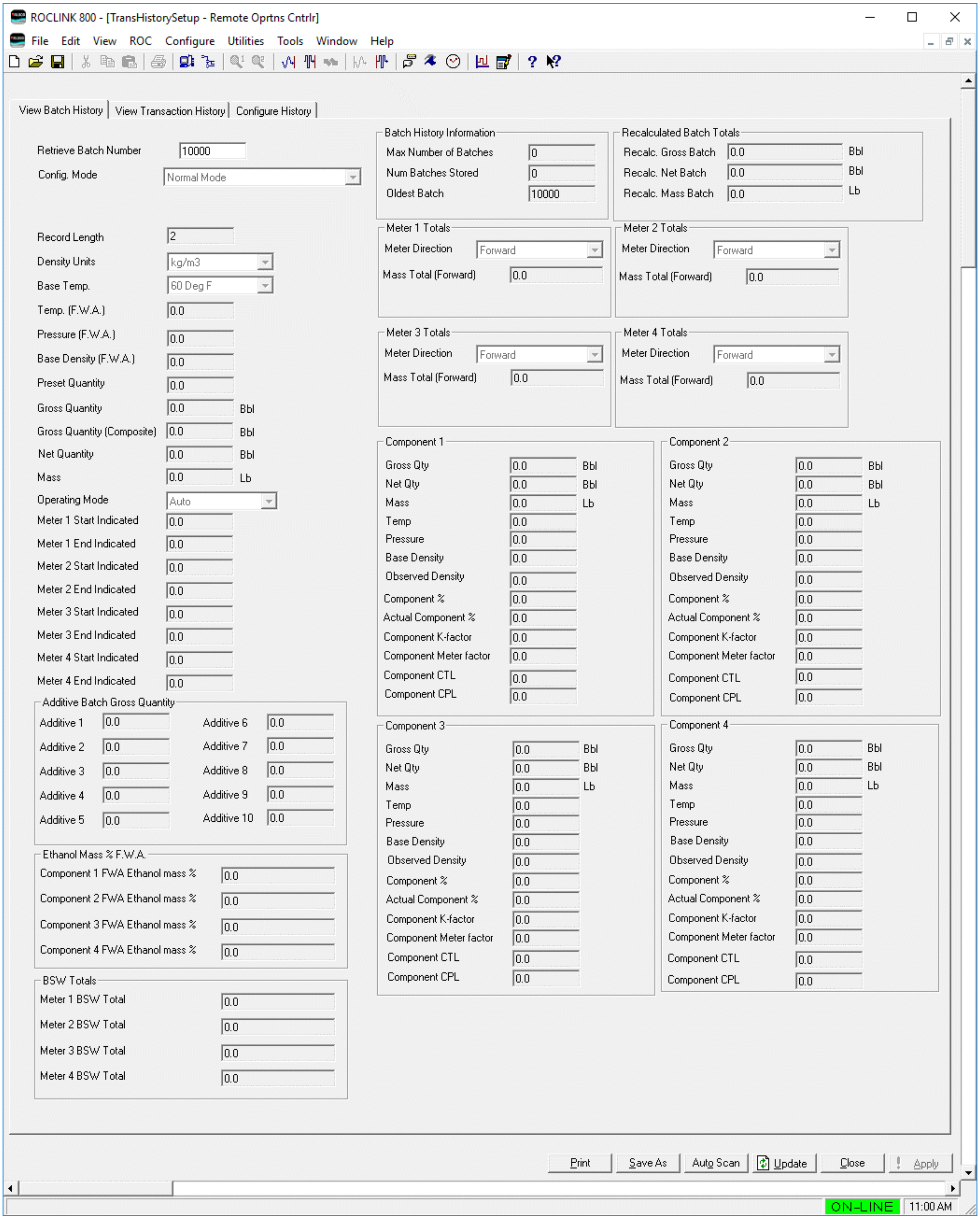


Figure D-11 Trans History Setup Screen

Note: The Trans History Setup screen has a tab format. *Sections D.2.1* through *D.2.2* discuss the specifics of each tab.

D.2.1 Trans History Setup – View Batch History

Use this tab (which displays when you access the Trans History Setup screen) to view batch-related history information.

1. Select the **View Batch History** tab on the Trans History Setup screen. The View Batch History screen displays.

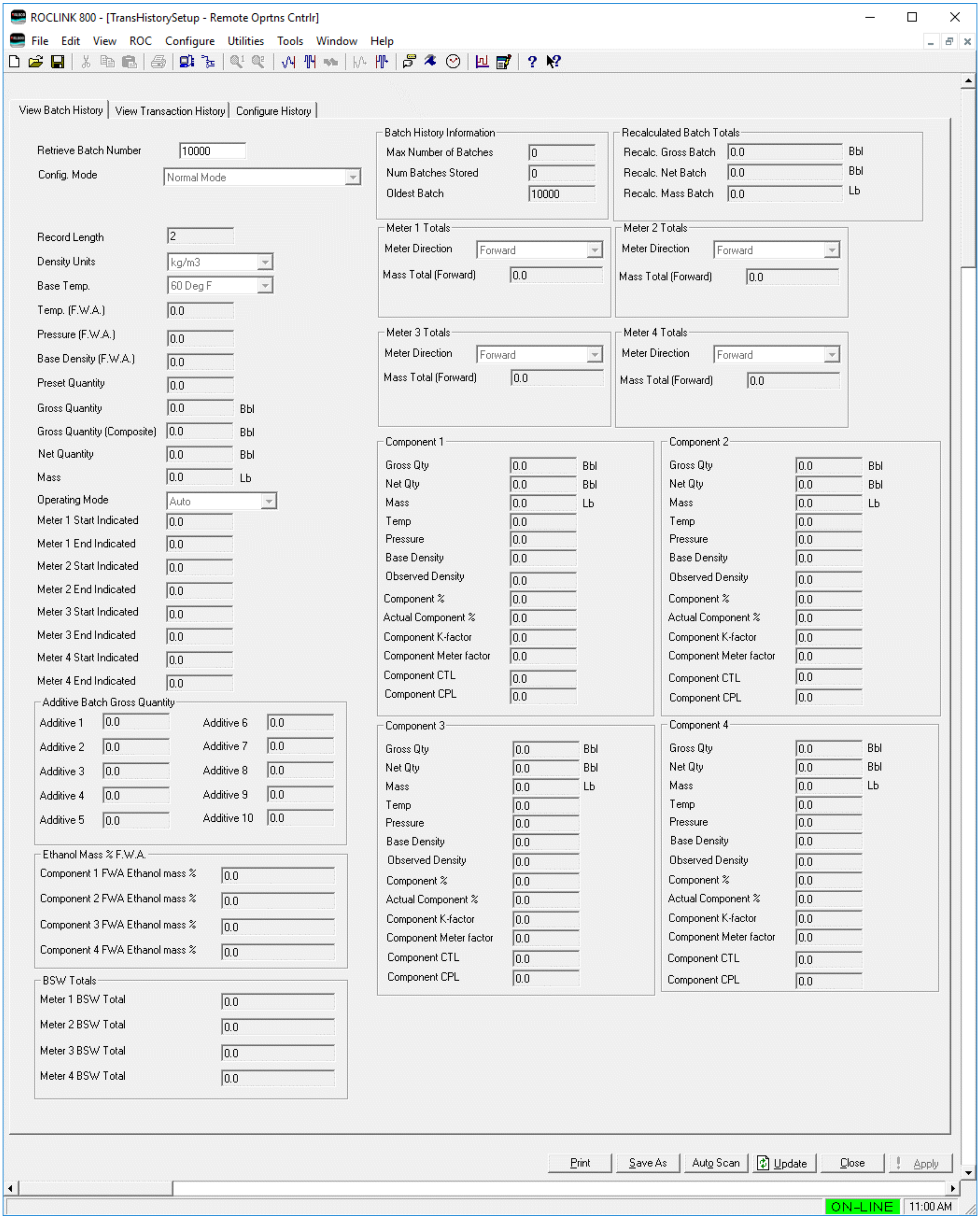


Figure D-12. Trans History Setup, View Batch History tab

2. Review the values in the following fields.

Field	Description
Retrieve Batch Number	Identifies the batch to retrieve from history. Enter a valid batch number and click **Apply**.
Config Mode	This **read-only** field shows whether the selected batch completed in **normal** mode (Weights & Measures key locked) or in **configuration** mode (Weights & Measures key open). This batch data is archived and always populated (archiving of this parameter is not configurable).
Record Length	This **read-only** field shows the length of the calculated batch, determined by adding all the configured parameters plus three default points. The system recalculates this value at every configuration change and at boot. **Note**: If a parameter is double type, it takes two history points instead of one. Length indicates the number of history points required in the batch segment.
Density Units	This **read-only** field shows the density units selected for this batch.
Base Temp	This **read-only** field shows the base temperature selected for this batch. **Note**: In Version 1.0, this field is labeled and shows the temperature Net Corrected To.
Temp. (F.W.A.)	This **read-only** field shows the flow weighted average temperature for the batch.
Pressure (F.W.A.)	This **read-only** field shows the flow weighted average pressure for the batch.
Base Density (F.W.A.)	This **read-only** field shows the flow-weight average base density for the batch.
Preset Quantity	This **read-only** field shows the preset quantity for the batch.
Gross Quantity	This **read-only** field shows the gross quantity for the batch.
Gross Quantity (Composite)	This **read-only** field shows the composite gross quantity for the batch.
Net Quantity	This **read-only** field shows the net quantity for the batch.
Mass	This **read-only** field shows the mass for the batch.
Operating Mode	This **read-only** field shows the operating mode (**Automatic** or **Manual**) for the batch.
Meter 1 Start Indicated through **Meter 4 Start Indicated**	These **read-only** fields show the batch starting indicated volume for meters 1 through 4.

Field	Description
Meter 1 End Indicated through **Meter 4 End Indicated**	These **read-only** fields show the batch ending indicated volume for meters 1 through 4.
Additive Batch Gross Quantity	
Additive 1 through **Additive 10**	These **read-only** fields show gross quantities for additive 1 through 10 for the batch.
Ethanol Mass % F.W.A.	
Component 1 F.W.A. Ethanol mass % through **Component 4 F.W.A. Ethanol mass %**	These **read-only** fields show component Ethanol mass % for the batch.
BSW Totals	
Meter 1 BSW Total through **Meter 4 BSW Total**	These **read-only** fields show the BSW Volume total populated by history user program if you select the **BSW Totals** checkbox on Transaction History > Configure History tab [TLP:65,0,24].
Batch History Information	
Max Number of Batches	This **read-only** field shows the maximum number of batches that the system can archive.
Num Batches Stored	This **read-only** field shows the total number of batches currently stored in history.
Oldest Batch	This **read-only** field shows the oldest batch number present in the history segment.
Recalculated Batch Totals	
Recalc. Gross Batch	This **read-only** field shows the Recalc Gross Batch total.
Recalc. Net Batch	This **read-only** field shows the Recalc Net Batch total.
Recalc. Mass Batch	This **read-only** field shows the Recalc Mass Batch total.
Meter 1 through **Meter 4 Totals**	
Meter Direction 1 through **4**	This **read-only** field shows the direction of the fluid flowing through the meter.
Meter Total (Forward) 1 through **4**	This **read-only** field shows the mass total that passed through the meter if you configure the meter flow direction for forward flow. This value resets at batch authorization.
Meter Total (Reverse) 1 through **4**	This **read-only** field shows the mass total that passed through the meter if you configure the meter flow direction for reverse flow. This value resets at batch authorization.
Component 1 through **Component 4**	**Note**: These fields show component-specific data for this batch.

Field	Description
Gross Qty	This **read-only** field shows the component-specific gross quantity in this batch.
Net Qty	This **read-only** field shows the component-specific net quantity in this batch.
Mass	This **read-only** field shows the component-specific mass quantity in this batch.
Temp	This **read-only** field shows the component-specific temperature in this batch.
Pressure	This **read-only** field shows the component-specific pressure in this batch.
Base Density	This **read-only** field shows the component-specific base density in this batch.
Observed Density	This **read-only** field shows the component-specific observed density in this batch.
Component %	This **read-only** field shows the required percentage of this component for this batch.
Actual Component %	This **read-only** field shows the actual delivered percentage of this component in this batch.
Component K-factor	This **read-only** field shows the flow-weighted average (FWA) K-factor of this component in this batch.
Component Meter factor	This **read-only** field shows the flow-weighted average (FWA) Meter factor of this component in this batch.
Component CTL	This **read-only** field shows the flow-weighted average (FWA) CTL factor for this component in this batch.
Component CPL	This **read-only** field shows the flow-weighted average (FWA) CPL factor for this component in this batch.

3. Proceed to *Section D.2.2* to view transaction history.

D.2.2 Trans History Setup – View Transaction History

Use this tab to review transaction history.

1. Select the **View Transaction History** tab on the Trans History Setup screen. The View Transaction History screen displays.

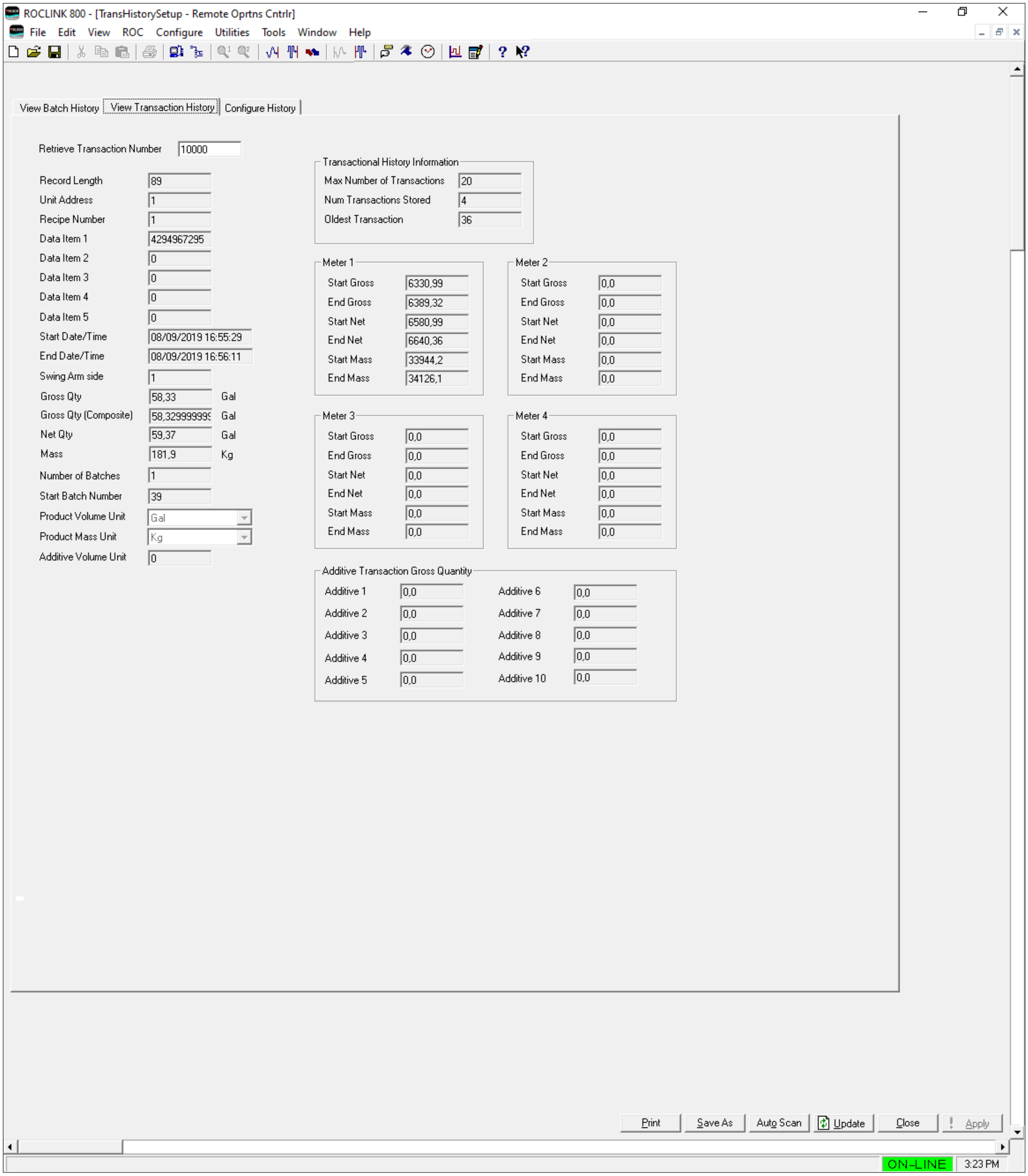


Figure D-13. Trans History Setup, View Transaction History tab

2. Review the values in the following fields.

Field	Description
Retrieve Transaction Number	Identifies the transaction to retrieve from history. Enter a valid transaction number and click **Apply**.
Record Length	This **read-only** field shows the calculated transaction length, determined by adding together all the configured transaction parameters and 3 default points. The system calculates this value at every configuration change and at boot. **Note**: If a parameter is double type, it takes 2 history points instead of 1. Length indicates the number of history points required in the transaction segment.
Unit Address	This **read-only** field shows the unit address for this transaction, if defined.
Recipe Number	This **read-only** field shows the recipe number for this transaction, if defined.
Data Item 1 through **Data Item 5**	These **read-only** fields show up to five data items for the transaction, if defined.
Start Date/Time	This **read-only** field shows the starting time and date for the transaction.
End Date/Time	This **read-only** field shows the ending time and date for the transaction.
Swing Arm Side	This **read-only** field shows the swing arm side for the transaction.
Gross Qty	This **read-only** field shows the gross quantity for the transaction.
Gross Qty (Composite)	This **read-only** field shows the composite gross quantity for the transaction.
Net Qty	This **read-only** field shows the net quantity for the transaction.
Mass	This **read-only** field shows the mass for the transaction.
Additive 1 through **Additive 6 Gross Qty**	These **read-only** fields show the gross quantities for up to six additives for the transaction.
Number of Batches	This **read-only** field shows the total number of batches for the transaction.
Start Batch Number	This **read-only** field shows the starting batch number in this transaction.
Product Volume Unit	This **read-only** field shows the product volume unit.
Product Mass Unit	This **read-only** field shows the product mass unit.

Field	Description
Transactional History Information	
Max Number of Transactions	This **read-only** field shows the maximum number of transactions that the system can archive.
Num Transactions Stored	This **read-only** field shows the total number of transactions currently stored in history.
Oldest Transaction	This **read-only** field shows the oldest transaction number present in the history segment.
Meters 1 through **4**	**Note**: These fields show meter-specific data for the transaction.
Start Gross	This **read-only** field shows the meter-specific starting gross quantity in this transaction.
End Gross	This **read-only** field shows the meter-specific ending gross quantity in this transaction.
Start Net	This **read-only** field shows the meter-specific starting net quantity in this transaction.
End Net	This **read-only** field shows the meter-specific ending net quantity in this transaction.
Start Mass	This **read-only** field shows the meter-specific starting mass for this transaction.
End Mass	This **read-only** field shows the meter-specific ending mass for this transaction.
Additive Transaction Gross Quantity	
Additive 1 through **Additive 10**	These **read-only** fields show the gross quantities for up to ten additives for the transaction

3. Proceed to *Section D.2.3* to configure batch and transaction data.

D.2.3 Trans History Setup – Configure History

Use this screen to configure stored history components for batch and transaction data.

Note: It is possible to overload system memory by selecting **all** batch and transaction options to archive. Balance archive requirements with operating requirements.

1. Select the **Configure History** tab on the Trans History Setup screen. The Configure History screen displays.

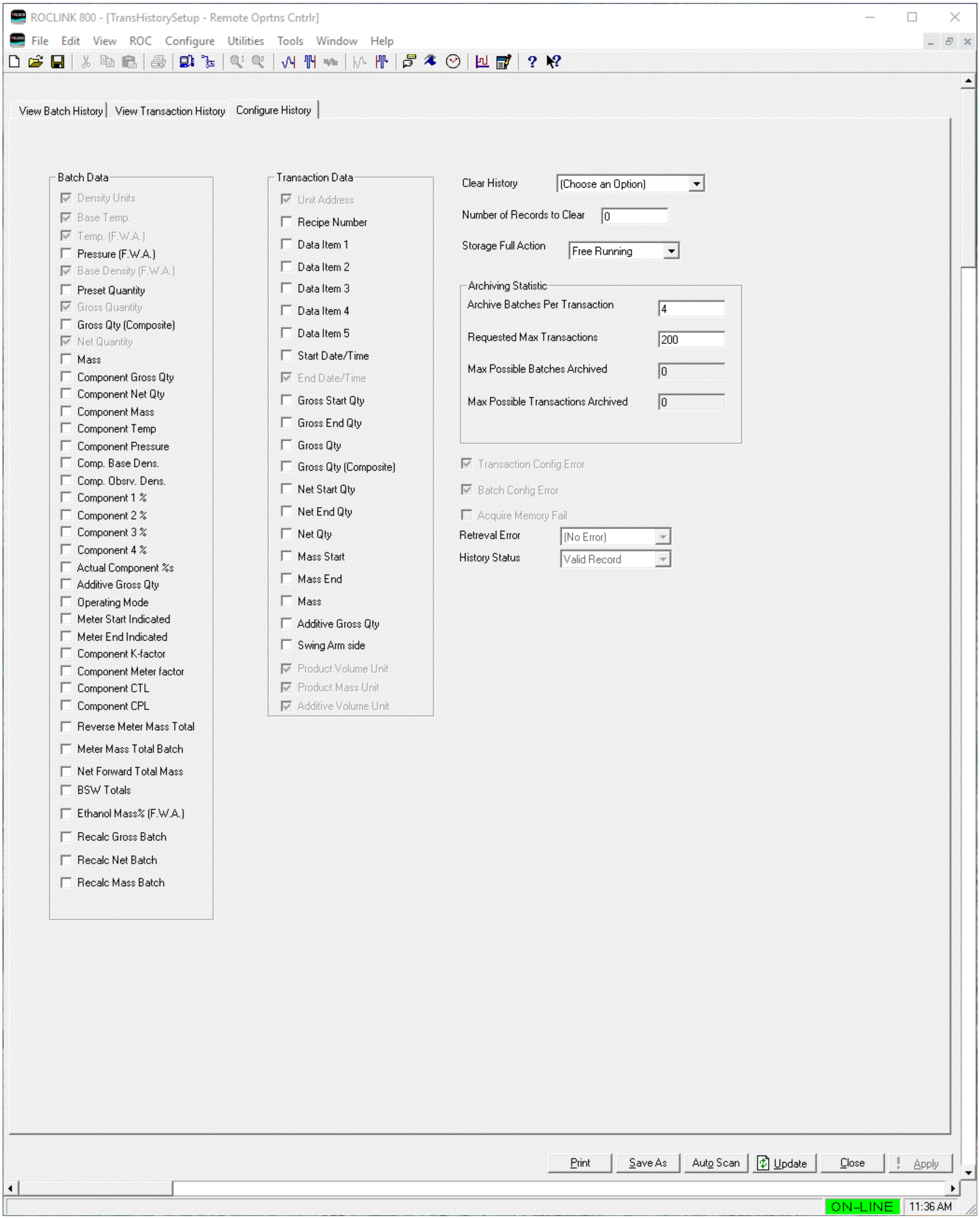


Figure D-14. Trans History Setup, Configure History tab

2. Review the values in the following fields.

Note: Complete the appropriate check box to archive Batch Data or Transaction Data options. Archiving occurs either at the end of the batch or at the end of the transaction. After the system completes archiving this data, it clears the option.

Field	Description
Batch Data	Sets the parameters to be archived for each batch.
Density Units	Sets whether the system archives the batch's density units. **Note**: By default, the system always archives this value. You cannot select it.
Base Temp	Sets whether the system archives the batch's base temperature option. **Note**: By default, the system always archives this value. You cannot select it.
Temp. (F.W.A.)	Sets whether the system archives the batch's flow weighted average temperature. **Note**: By default, the system always archives this value. You cannot select it.
Pressure (F.W.A.)	Sets whether the system archives the batch's flow weighted average pressure.
Base Density (F.W.A.)	Sets whether the system archives the batch's flow-weighted average base density. **Note**: By default, the system always archives this value. You cannot select it.
Preset Quantity	Sets whether the system archives the batch's preset quantity.
Gross Quantity	Sets whether the system archives the batch's gross quantity. **Note**: By default, the system always archives this value. You cannot select it.
Gross Quantity (Composite)	Sets whether the system archives the batch's composite gross quantity.
Net Quantity	Sets whether the system archives the batch's net quantity. **Note**: By default, the system always archives this value. You cannot select it.
Mass	Sets whether the system archives the batch's mass.
Component Gross Qty	Sets whether the system archives the batch's component gross quantity.
Component Net Qty	Sets whether the system archives the batch's component net quantity.

Field	Description
Component Mass	Sets whether the system archives the batch's component mass quantity.
Component Temp	Sets whether the system archives the batch's component temperature.
Component Pressure	Sets whether the system archives the batch's component pressure.
Comp. Base Dens.	Sets whether the system archives the batch's component base density.
Comp. Obsrv. Dens.	Sets whether the system archives the batch's component observed density.
Component 1 % through **Component 4 %**	Sets whether the system archives the batch's percentage of component 1, 2, 3, or 4.
Actual Component %	Sets whether the system archives the batch's actual component percentage.
Additive Gross Qty	Sets whether the system archives the batch's additive gross batch totalizer.
Operating Mode	Sets whether the system archives the batch's operating mode (manual or automatic, in relationship to the TAS).
Meter Start Indicated	Sets whether the system archives the meter's starting indicated value at the end of the batch.
Meter End Indicated	Sets whether the system archives the meter's ending indicated value at the end of the batch.
Component K-factor	Sets whether the system archives the meter's flow-weighted average (FWA) K-factor at the end of the batch.
Component Meter factor	Sets whether the system archives the meter's flow-weighted average (FWA) meter factor at the end of the batch.
Component CTL	Sets whether the system archives the component's CTL factor.
Component CPL	Sets whether the system archives the component's CPL factor.
Reverse Meter Mass Total	Sets whether the system archives the batch's reverse direction mass total.
Meter Mass Total Batch	Sets whether the system archives the batch's forward direction mass total.
Net Forward Total Mass	Sets whether the system archives the batch's net forward total mass. The net foward total mass is calculated according to the following equation: *Net Forward Total Mass = Meter Mass Total Batch - Reverse Meter Mass Total (Batch)* **Note:** This total is used by the vapor recovery application.

Field	Description
BSW Totals	Sets whether the system archives the batch's BSW Volume Totals [TLP:73,x,68] at the end of the batch.
Ethanol Mass % (F.W.A.)	Sets whether the system archives the batch's Ethanol Mass % (F.W.A.) [TLP:69,x,107] at the end of the batch.
Recalc Gross Batch	Sets whether the system archives the batch's Recalculated Gross Batch Total [TLP:64,0,96] at the end of the batch.
Recalc Net Batch	Sets whether the system archives the batch's Recalculated Net Batch Total [TLP:64,0,97] at the end of the batch.
Recalc Mass Batch	Sets whether the system archives the batch's Recalculated Mass Batch Total [TLP:64,0,98] at the end of the batch.
Transaction Data	Sets the parameters to be archived for each transaction.
Unit Address	Sets whether the system archives the transaction's unit address. **Note**: By default, the system always archives this value. You cannot select it.
Recipe Number	Sets whether the system archives the transaction's recipe number.
Data Item 1 through **Data Item 5**	Sets whether the system archives up to five data items for the transaction.
Start Date/Time	Sets whether the system archives the transaction's starting date and time.
End Date/Time	Sets whether the system archives the transaction's ending date and time.
Gross Start Qty	Sets whether the system archives the meter's gross quantity when the transaction starts.
Gross End Qty	Sets whether the system archives the meter's gross quantity when the transaction ends.
Gross Qty	Sets whether the system archives the transaction's gross quantity.
Gross Qty (Composite)	Sets whether the system archives the transaction's composite gross quantity.
Net Start Qty	Sets whether the system archives the meter's net quantity when the transaction starts.
Net End Qty	Sets whether the system archives the meter's net quantity when the transaction ends.
Net Qty	Sets whether the system archives the transaction's net quantity.
Mass Start	Sets whether the system archives the meter's mass quantity when the transaction starts.

Field	Description
Mass End	Sets whether the system archives the meter's mass quantity when the transaction ends.
Mass	Sets whether the system archives the transaction's mass.
Additive Gross Qty	Sets whether the system archives the transaction's additive gross quantity.
Swing Arm Side	Sets whether the system archives the transaction's swing arm side.
Clear History	Sets whether the system clears a specified number of oldest transaction records. Click ▼ to display all valid values: **(Choose an Option)** No transaction records are cleared. **Clear Number of Records** Clears a number of oldest transaction records, based on the value in the **Number of Records to Clear** field. If the **Number of Records to Clear** field contains **0**, the system deletes all records. **Release and Acquire Memory** Clears **all** transactions and updates configuration of history segments according to the history point type. **Note**: If you select this option, you **must** also complete the **Number of Records to Clear** field. If you tell the system to clear history and leave the **Number of Records to Clear** field at 0 (its default), the system clears **all** transaction records.
Number of Records to Clear	Sets the number of transaction records to clear. Valid values are **0** to **9999**; the default is **0**. **0** clears all transaction records.
Storage Full Action	Sets how the system responds to the Storage Memory Full alarm. Valid values are **Free Running** (overwrites old transactions) or **Lock Unit** (raises an alarm at preset verification/recipe verification and locks authorization until you clear space for the new transactions).
Archiving Statistic	
Archive Batches Per Transaction	Sets memory distribution for available history memory between the transaction segment and the batch segment. Valid values are **1** to **10000**; the default value is **4**.

Field	Description
Requested Max Transaction	Sets memory requirements. If enough memory is not available in history, the system internally calculates a new value based on free memory, transaction record length, batch record length, and number of archive batches per transaction. The new value is written as the max number of transactions. Valid values are **1** to **10000**; the default value is **200**.
Max Possible Batches Archived	This read-only field shows the maximum number of batches that the system can archive.
Max Possible Transactions Archived	This read-only field shows the maximum number of transactions that the system can archive.
Transaction Config Error	This **read-only** field indicates that the configuration has changed for the transaction segment and that the configuration is not synchronized with the transaction history segment. The system resets this field after you Release and Acquire Memory.
Batch Config Error	This **read-only** field indicates that the configuration has changed for the batch segment and that the configuration is not synchronized with the batch history segment. The system resets this field after you Release and Acquire Memory.
Acquire Memory Fail	This **read-only** field indicates that the DL8000 is not able to acquire enough memory to archive according to configurations.
Retrieval Error	This **read-only** field shows any errors related to data retrieval. **Invalid Transaction** displays if the request was to retrieve a transaction not available in history. **Invalid Batch** displays if the request was to retrieve a batch not available in history.

3. Click **Apply** to save any changes you made to this screen.
4. Click **Close** to display the Directory Tree.
5. Proceed to *Section D.3* to define printer parameters.

D.3 Printer

Use this screen to designate printers, define report content and appearance, and resolve printer-related processing errors.

Note: The system uses a report template, or display file, to accumulate and print reports. The default display is embedded in the Printer user program. You can download a custom display on the Display Administrator screen (**View** > **Display** > **From Device** > **Administrator**). See *Section D.3.1, Report Display Files*, for more information.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #3, Printer**.
3. Double-click **Display #6**, **Print Setup**. The screen displays:

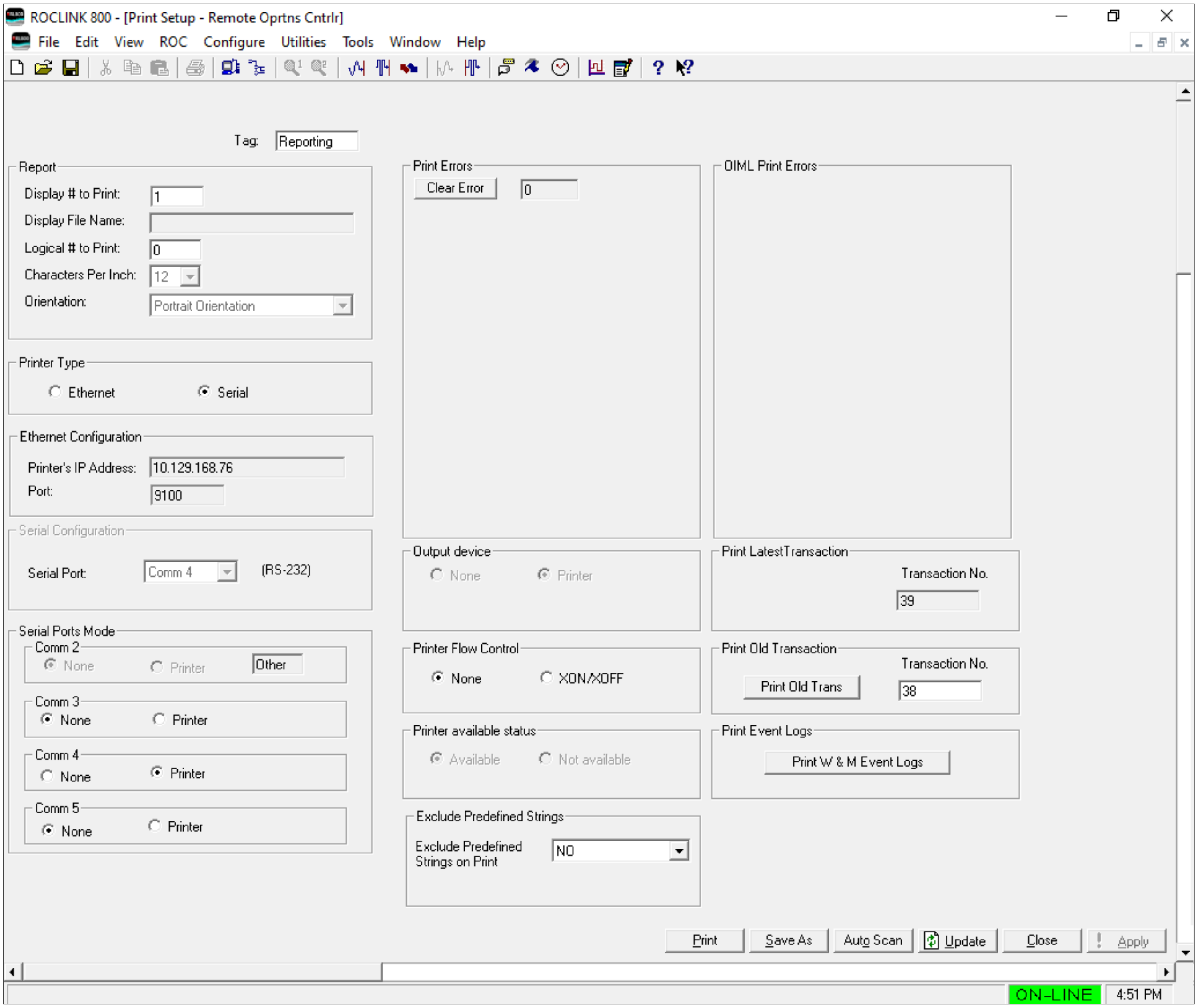


Figure D-15. Print Setup Screen

4. Review the values in the following fields.

Field	Description
Tag	Sets a name (up to 20 alphanumeric characters) for a specific print or display file. The default is **Reporting**.

Field	Description
Display # to Print	Sets the number of the display you want to print. The default is **7**. **Note**: The default display is embedded in the Printer user program. You can download a custom display on the Display Administrator screen (**View** > **Display** > **From Device** > **Administrator**). See *Section D.3.1, Report Display Files*, for more information.
Display File Name	This **read-only** field shows the name associated with the file you selected in the **Display # to Print** field.
Logical # to Print	Indicates the logical (of a TLP) to print. If your display is tied to a specific point type, then the system uses **only** this configured value instead of all logical numbers for all text boxes associated with the point types.
Characters Per Inch	Sets the number of characters that print per inch. Use this value to fit large displays onto the printable area. This is effectively an inverse font size setting. Click ▼ to display all available options. **Note**: You can edit this field **only** when you set the Printer Type as **Ethernet**.
Orientation	Sets the page orientation output of the Ethernet-based printer. Click ▼ to display available options. **Note**: You can edit this field **only** when you set the Printer Type as **Ethernet**.
Printer Type	Sets the printer communication option. Valid values are **Ethernet** or **Serial**; the default is **Ethernet**. **Note**: If you have **neither** a serial card **nor** an Ethernet connection for your DL8000, the system grays out this option.
Printer's IP Address	Sets an Internet Protocol address (such as 155.177.78.160) for the printer you want to use. The default is **0.0.0.0.** If you enter an invalid IP address, the system displays an error in the Error frame and disables printing until you correct the IP address and click **Clear Error**. **Note**: You can edit this field **only** when you set the Printer Type as **Ethernet**.
Port	Indicates the server port for the printer. The default is **9100**. **Note**: You can edit this field **only** when you set the Printer Type as **Ethernet**.

Field	Description	
Serial Port	Indicates the serial port for the printer. Click ▼ to display all available serial ports. This field is enabled **only** if you have set the Printer Type as **Serial**. **Note**: If the Batching program is active, **do not** set this option manually. The Batching program automatically sets it.	
Serial Ports Mode Comm2 through **Comm5**	Assigns the specified comm port to a printer. Valid values are **2** through **5**. The default is **2**.	
Print Errors	Displays errors related to printing or communications. These errors are:	
	Bad IP Address	IP address as entered is invalid.
	Bad Port Number	No RS-232 or RS-485 module is installed on the selected serial port. **Note**: This error occurs **only** if Printer Type is **Serial**.
	Inet Error	The IP address is not in the proper format. **Note**: This error occurs only if the Printer Type is **Ethernet**.
	Cannot acquire Socket Handle	Cannot acquire a socket. **Note**: This error occurs only if the Printer Type is **Ethernet**.
	Cannot connect	Cannot connect to printer; this error may also occur as a result of timing out. **Note**: For serial printing, this error may occur if the program is unable to acquire the assigned port (which is in use by another application).
	Sending Error	Error occurred while sending data.
	Display Not Found	The display you entered in **Display # to Print** does not exist. **Note**: See *Section D.3.1, Report Display Files*, for more information.

Field	Description	
	Cannot Allocate Memory	The system cannot allocate sufficient dynamic memory to show the display (each display requires about 10KB of memory).
	Bad Configuration	A configuration file is corrupt. You cannot reset this error even if only one corrupt configuration parameter exists. The system resets this error when all corrupt configuration parameters have been resolved.
	Bad Output Device	The specified output device is incorrect.
Clear Error	Click to clear the displayed error after you have corrected the error condition.	
Output Device	Indicates whether the system sends output to a printer.	
Printer Flow Control	When set to XON/XOFF, special non-printable, control characters are transmitted between the DL8000 and the printer to control the flow of data. The printer must also support this feature. This option only applies to serial printing. Use this feature if you connect the DL8000 to a slow printer. When a batch completes, the DL8000 sends data to the printer. Since the DL8000 is faster than the printer, the printer falls behind, and starts to be overwhelmed by the data. The printer thus sends XOFF to the DL8000. The printer user program on the DL8000 "sees" the XOFF, and temporarily stops sending data. Once the printer has "caught up", it sends XON to the DL8000. The DL8000 sees XON, and starts sending data again.	
Printer Available Status	This **read-only** field displays if a printer is available to receive data, as detected by the XON/XOFF flow control. This field only applies if the above Printer Flow Control option is set to XON/XOFF.	

Field	Description
Exclude Predefined Strings on Print	This option excludes predefined strings from being printed in reports. Valid values are No (include predefined strings) and Yes (exclude predefined strings). **Notes**: ▪ Predefined strings are defined as the default (predefined) options (strings) selected on the Configure History tab of the TransHistorySetup screen. For example, the options Gross Quantity and End Date/Time are selected by default and you are unable to deselect them. Selecting this option excludes those options (predefined strings) from being printed. ▪ This TLP can be configured through the ROCKLINK display **only** and not through the Keypad display setup.
OIML Print Errors	If Legal Record is set to Printout and an OIML print error occurs, the Primary Print Error occurs along with other errors, the Print Error Alarm with Info severity will raise, and a new transaction is not authorized. If Legal Record is set to History and an OIML print error occurs, the Secondary Print Error occurs along with other errors, and the Print Error Alarm with Info severity will raise. Secondary type errors will reset on next transaction authorization. Possible errors include Parity Bit Error, Printer Not Available, No Data Archived, Print Timeout, Primary Print Error, Secondary Print Error, Print Aborted, Cannot Open Serial Port, Dynamic Memory Allocation Fail, CRC Fail Error, and Misc. Print Error. **Note**: OIML Print Errors only occur when Legal Record is set to Printout or History and the request for latest transaction has failed.
Print Latest Transaction	Click to print the latest transaction number. **Note**: The system completes the **Transaction No**. field with either the number of the most recently completed transaction (if no transaction is in progress) or the current transaction (if a transaction is in progress).
Print Old Transaction	Click to print a completed transaction. **Note**: You complete the Transaction No. field with the number of a previously completed transaction. Also, if this parameter value is **10,000**, the latest transaction in the archive memory will print after receiving the Print command.
Print W & M Event Logs	Click to print the current Weights & Measures event log.

5. Click **Apply** to save any changes you have made to this screen.
6. Click **Close** to display the directory tree.
7. Proceed to *Section D.3.1* to customize display files.

D.3.1 Report Display Files

Remote Automation Solutions includes a special display file (DefaultPrintFormat.dsp) on the DL8000 CD-ROM. You edit this file to meet your site-specific report needs and then download the modified display file to your DL8000 for later use.

Editing Display Files

Remote Automation Solutions includes a special display file (DefaultPrintFormat.dsp) on the DL8000 CD-ROM. You can use this file to refine the content of your reports. Unlike other .dsp files (which you copy into a directory that houses the program files), you install this .dsp directly into the device using the Display Administrator utility:

1. Select **View** > **Display** > **From File** on the ROCLINK 800 menu bar. The system displays an Open File dialog.
2. Select **DefaultPrintFormat** and click **Open**. The system loads the display.
3. Click **Edit** to open the Display Editor program.
4. Add, edit, or delete screen content to meet your reporting needs.
5. When you attempt to exit the screen, the system prompts you to save the file. Click **Yes**, and save the display file using a name **other than** DefaultPrintFormat.dsp.
6. Click **Save** to close the dialog and return to the ROCLINK 800 screen.

Adding Display Files to the DL8000

Unlike other .dsp files (which you copy into a directory that houses the program files), once you complete editing this report file, you install it directly into the DL8000 using the Display Administrator utility:

1. Double-click **User Display** on the directory tree. The Administrator option displays.

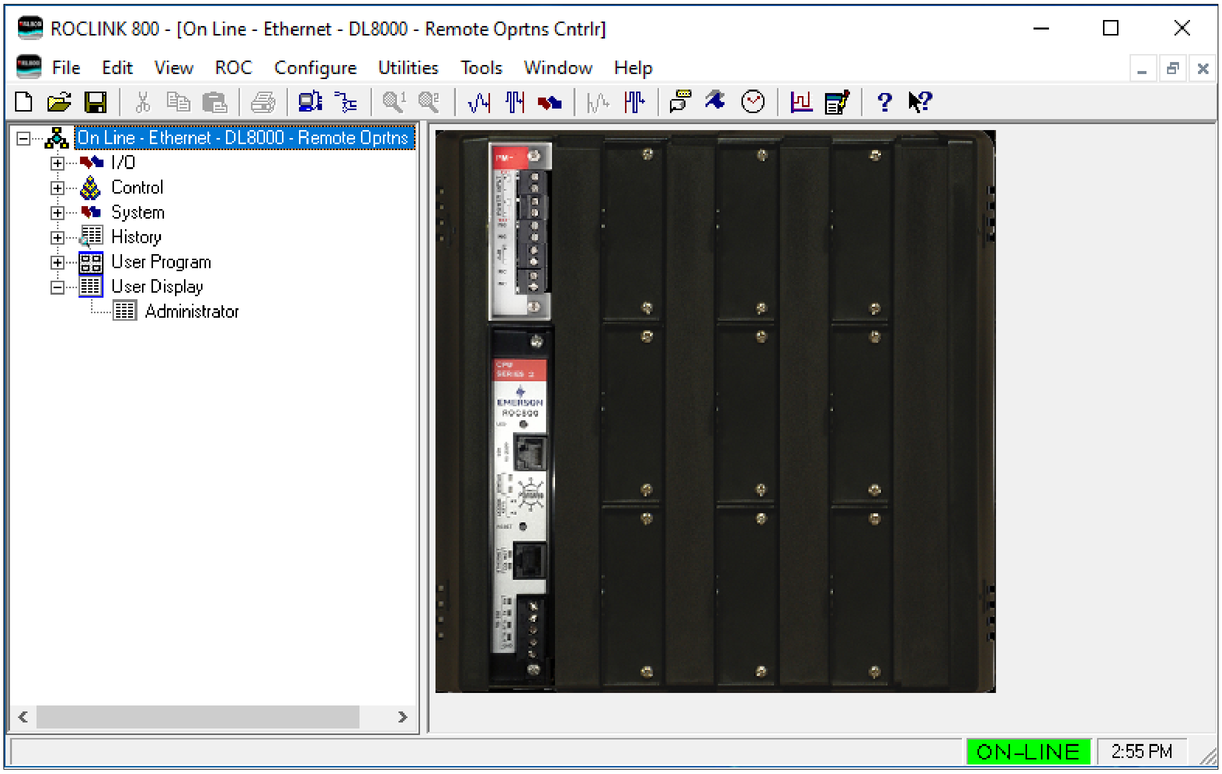


Figure D-16. Administrator option

2. Double-click **Administrator**. The Display Administrator screen displays.

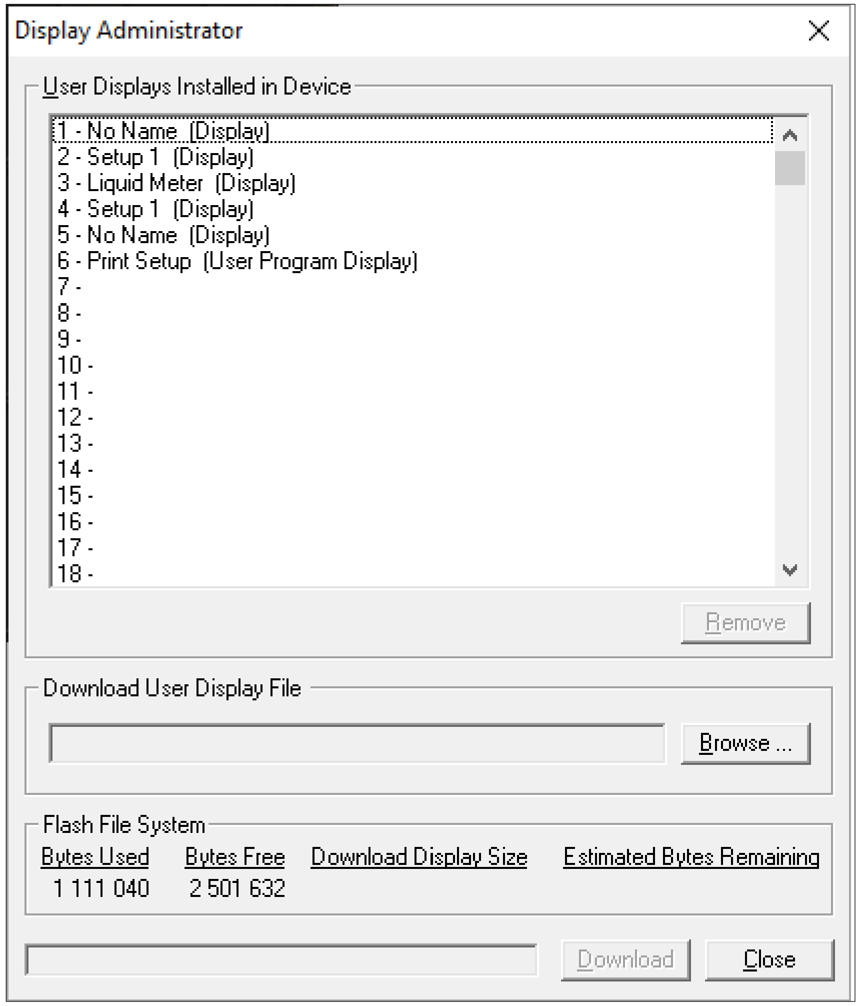


Figure D-17. Display Administrator

Note: This screen shows any user displays currently installed in the device.

3. Click **Browse**. A Select User Display File dialog displays.

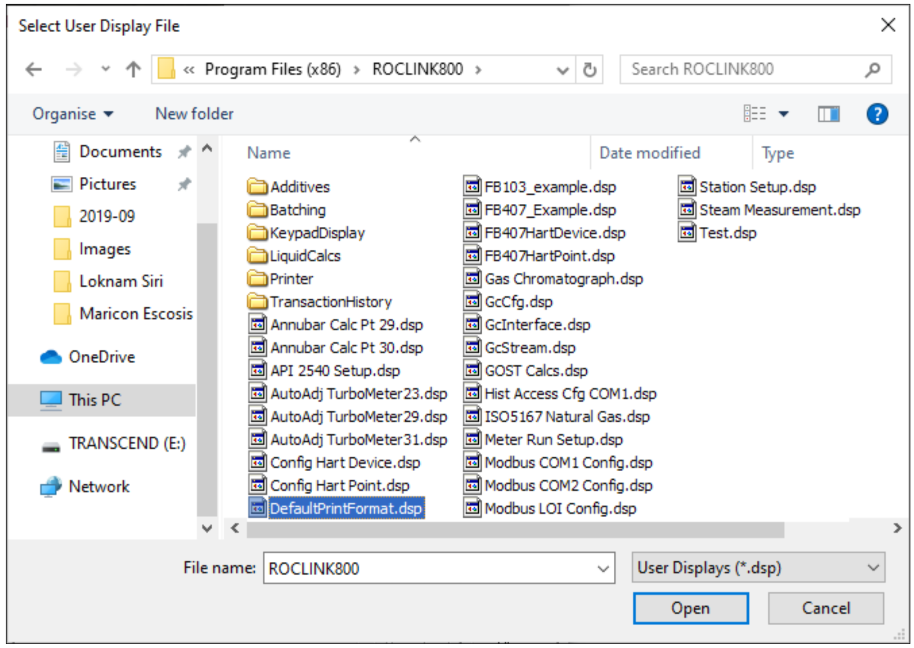


Figure D-18. Select User Display File dialog

4. Select **DefaultPrintFormat** (as shown) and click **Open**. The system displays the Display Administrator screen with the selected .dsp file in the Download User Display File field.

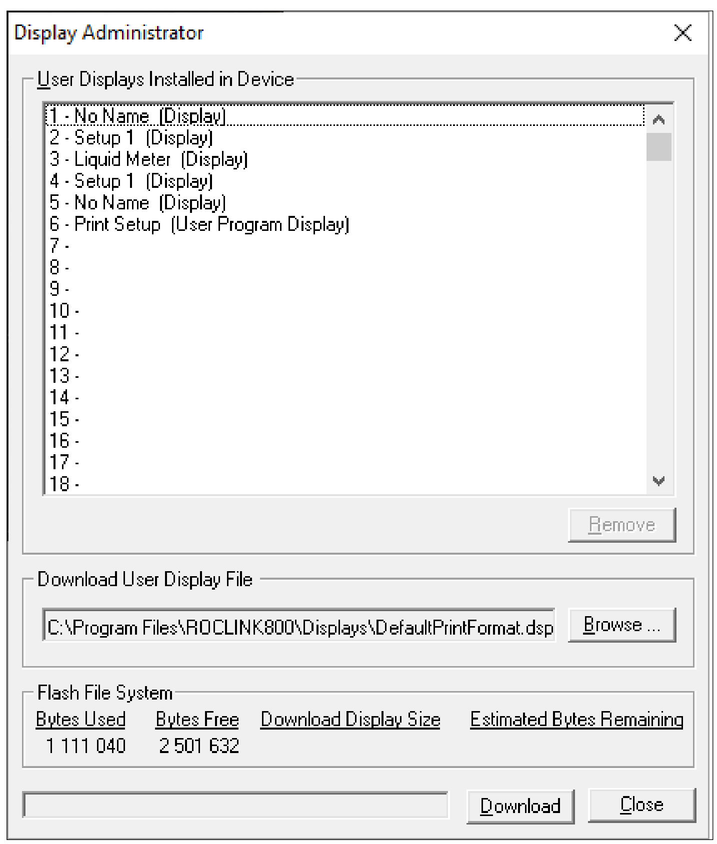
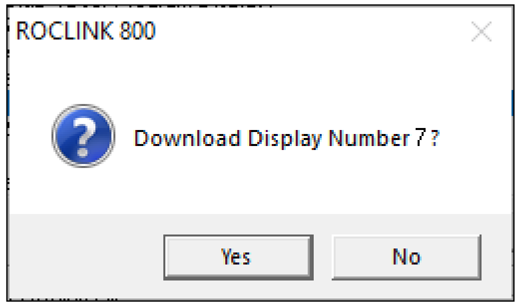


Figure D-19. Display Administrator (loaded)

5. Select an empty display slot (such as #7) and click **Download**. The system displays a confirmation message.



6. Click **Yes** to download the display. When the download completes, the system displays a message.

7. Click **OK**. The Display Administrator displays showing the newly installed display file (here, **Trans & Batch**).

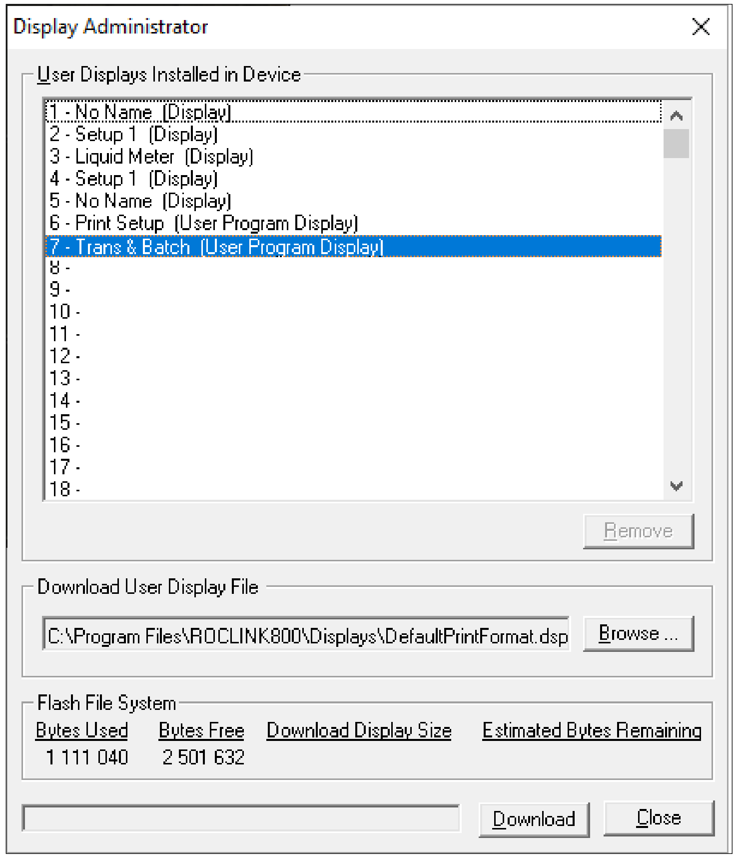
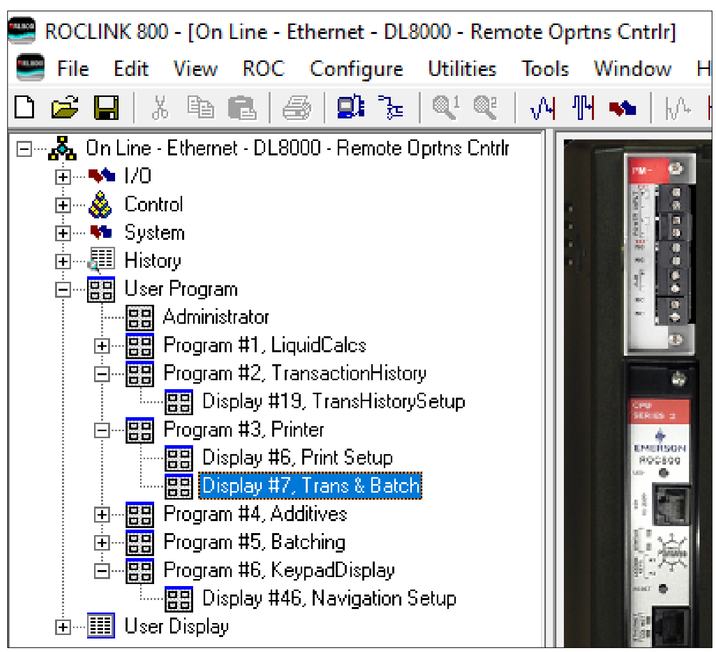


Figure D-20. Display Administrator (installed)

The system also adds this display to the directory tree:



8. Proceed to *Section D.3.2* to review **Display #7, Trans & Batch**.

D.3.2 Transaction and Batch

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #3**.
3. Double-click **Display #7**, **Trans & Batch**. The screen displays:

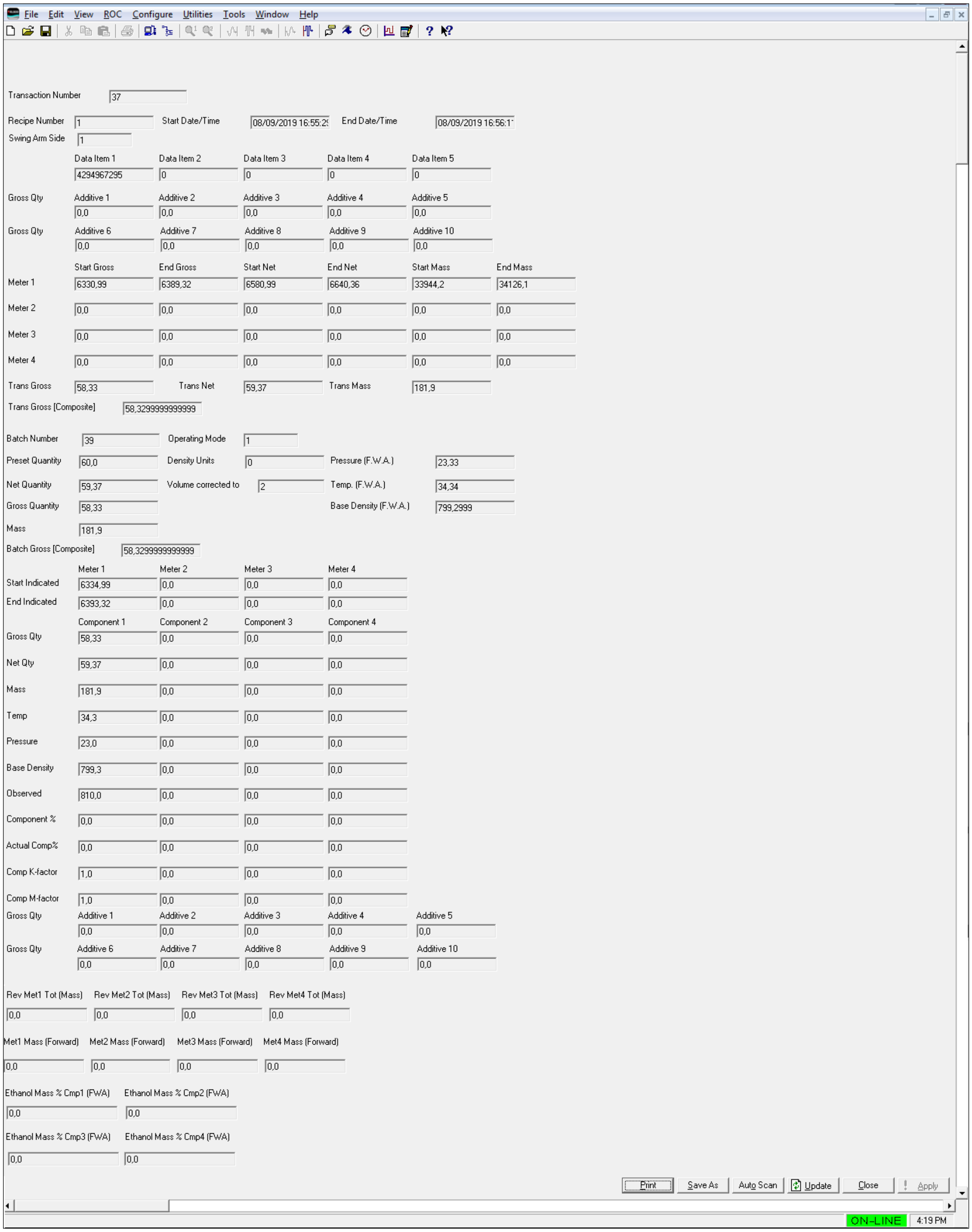


Figure D-22. Transaction and Batch Screen

4. Review the values in the following fields:

Field	Description
Transaction Number	This **read-only** field shows the transaction number.
Recipe Number	This **read-only** field shows the recipe number for this transaction.
Start Date/Time	This **read-only** field shows the starting time and date for the transaction.
End Date/Time	This **read-only** field shows the ending time and date for the transaction.
Swing Arm Side	This **read-only** field shows the swing arm side for the transaction.
Data Item 1 through **Data Item 5**	These **read-only** fields show up to five data items for the transaction, if defined.
Gross Qty Additive 1 through **Additive 11**	These **read-only** fields show the gross quantities for up to eleven additives for the transaction.
Meters 1 through **4**	**Note**: These fields show meter-specific data for the transaction.
Start Gross	This **read-only** field shows the meter-specific starting gross quantity in this transaction.
End Gross	This **read-only** field shows the meter-specific ending gross quantity in this transaction.
Start Net	This **read-only** field shows the meter-specific starting net quantity in this transaction.
End Net	This **read-only** field shows the meter-specific ending net quantity in this transaction.
Start Mass	This **read-only** field shows the meter-specific starting mass for this transaction.
End Mass	This **read-only** field shows the meter-specific ending mass for this transaction.
Trans Gross	This **read-only** field shows the gross quantity for the transaction.
Trans Net	This **read-only** field shows the net quantity for the transaction.
Trans Mass	This **read-only** field shows the mass for the transaction.
Trans Gross (Composite)	This **read-only** field shows the composite gross quantity for the transaction.
Batch Number	This **read-only** field shows the batch number.
Operating Mode	This **read-only** field shows the operating mode (**Automatic** or **Manual**) for the batch.
Preset Quantity	This **read-only** field shows the preset quantity for the batch.
Density Units	This **read-only** field shows the density units selected for this batch.
Pressure (F.W.A)	This **read-only** field shows the flow weighted average pressure for the batch.
Net Quantity	This **read-only** field shows the net quantity for the batch.

Field	Description
Volume corrected to	This **read-only** field shows the Base Temp Option data populated by History user program (configured parameter [61,0,5] is set by system to archive this data).
Temp. (F.W.A)	This **read-only** field shows the flow weighted average temperature for the batch.
Gross Quantity	This **read-only** field shows the gross quantity for the batch.
Base Density (F.W.A)	This **read-only** field shows the flow-weight average base density for the batch.
Mass	This **read-only** field shows the mass for the batch.
Batch Gross (Composite)	This **read-only** field shows the composite gross quantity for the batch.
Start Indicated Meter 1 through **Meter 4**	These **read-only** fields show the batch starting indicated volume for meters 1 through 4.
End Indicated Meter 1 through **Meter 4**	These **read-only** fields show the batch ending indicated volume for meters 1 through 4.
Gross Qty Component 1 through **Component 4**	This **read-only** field shows the component-specific gross quantity in this batch.
Net Qty Component 1 through **Component 4**	This **read-only** field shows the component-specific net quantity in this batch.
Mass Component 1 through **Component 4**	This **read-only** field shows the component-specific mass quantity in this batch.
Temp Component 1 through **Component 4**	This **read-only** field shows the component-specific temperature in this batch.
Pressure Component 1 through **Component 4**	This **read-only** field shows the component-specific pressure in this batch.
Base Density Component 1 through **Component 4**	This **read-only** field shows the component-specific base density in this batch.
Observed Component 1 through **Component 4**	This **read-only** field shows the component-specific observed density in this batch.
Component % Component 1 through **Component 4**	This **read-only** field shows the required percentage of this component for this batch.
Actual Comp% Component 1 through **Component 4**	This **read-only** field shows the required percentage of this component for this batch.
Comp K-factor	This **read-only** field shows the flow-weighted average (FWA) K-factor of this component in this batch.
Comp M-factor	This **read-only** field shows the flow-weighted average (FWA) Meter factor of this component in this batch.

Field	Description
Gross Qty Additive 1 through **Additive 11**	These **read-only** fields show gross quantities for additives 1 through 11 for the batch.
Rev Met1 Tot (Mass) through **Rev Met4 Tot (Mass)**	This **read-only** field shows the mass total that passed through the meter if you configure the meter flow direction for reverse flow.
Met1 Mass (Forward) through **Met4 Mass (Forward)**	This **read-only** field shows the mass total that passed through the meter if you configure the meter flow direction for forward flow.
Ethanol Mass % Cmp 1 (FWA) through **Ethanol Mass % Cmp 4 (FWA)**	This **read-only** field shows the This read-only field shows archived Ethanol mass % value (from Ethanol mass % [TLP:72,X,12]).

5. Click **Close** to display the Directory Tree.
6. Proceed to *Section D.4 Additives* to configure the additives.

D.4 Additives

Use this screen to define general additive parameters and I/O points and to view additive-related totals.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #4, Additives**.
3. Double-click **Display #16, Additive Setup**.
4. Double-click **#1**. The screen displays:

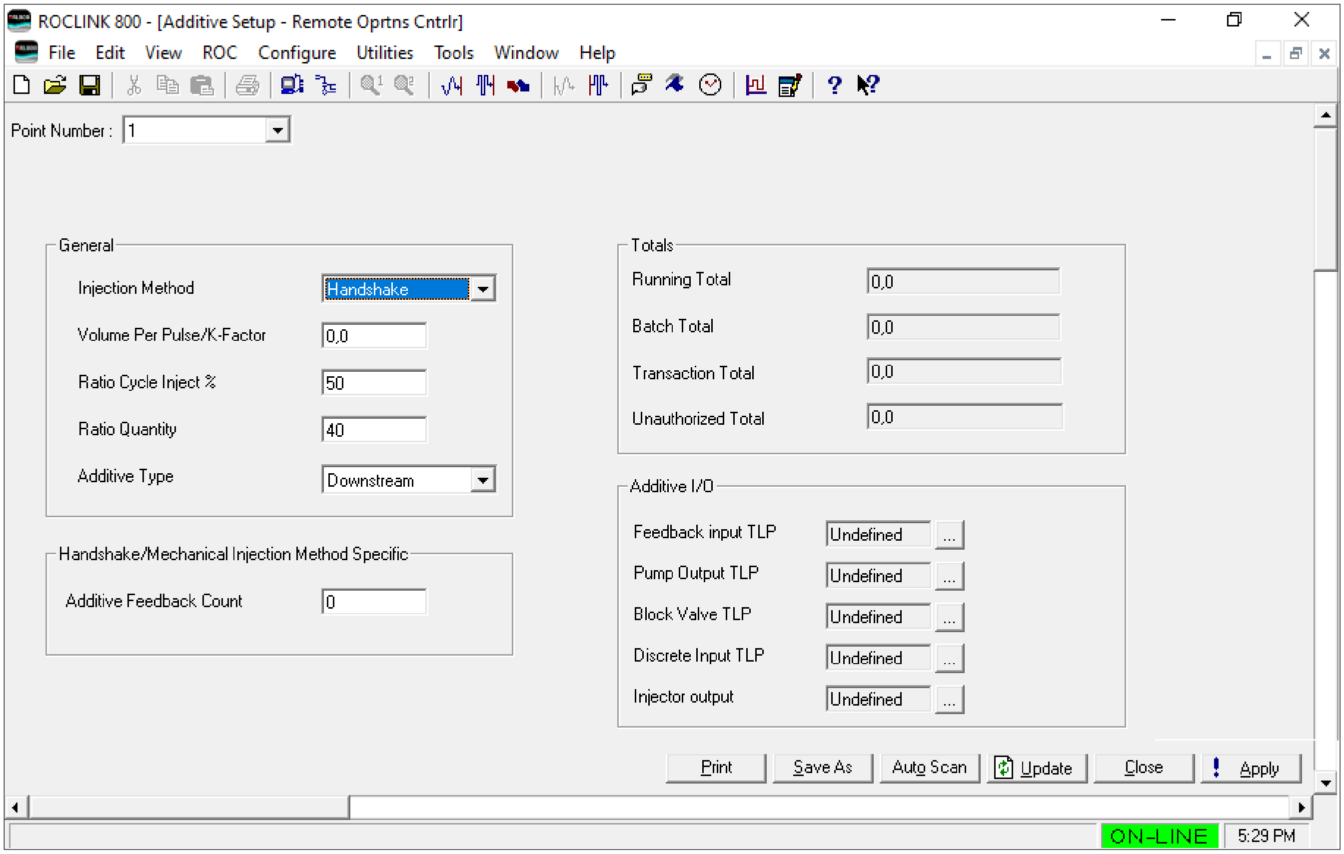


Figure D-23a. Additive Setup Screen, Injection Method: Handshake/Mechanical

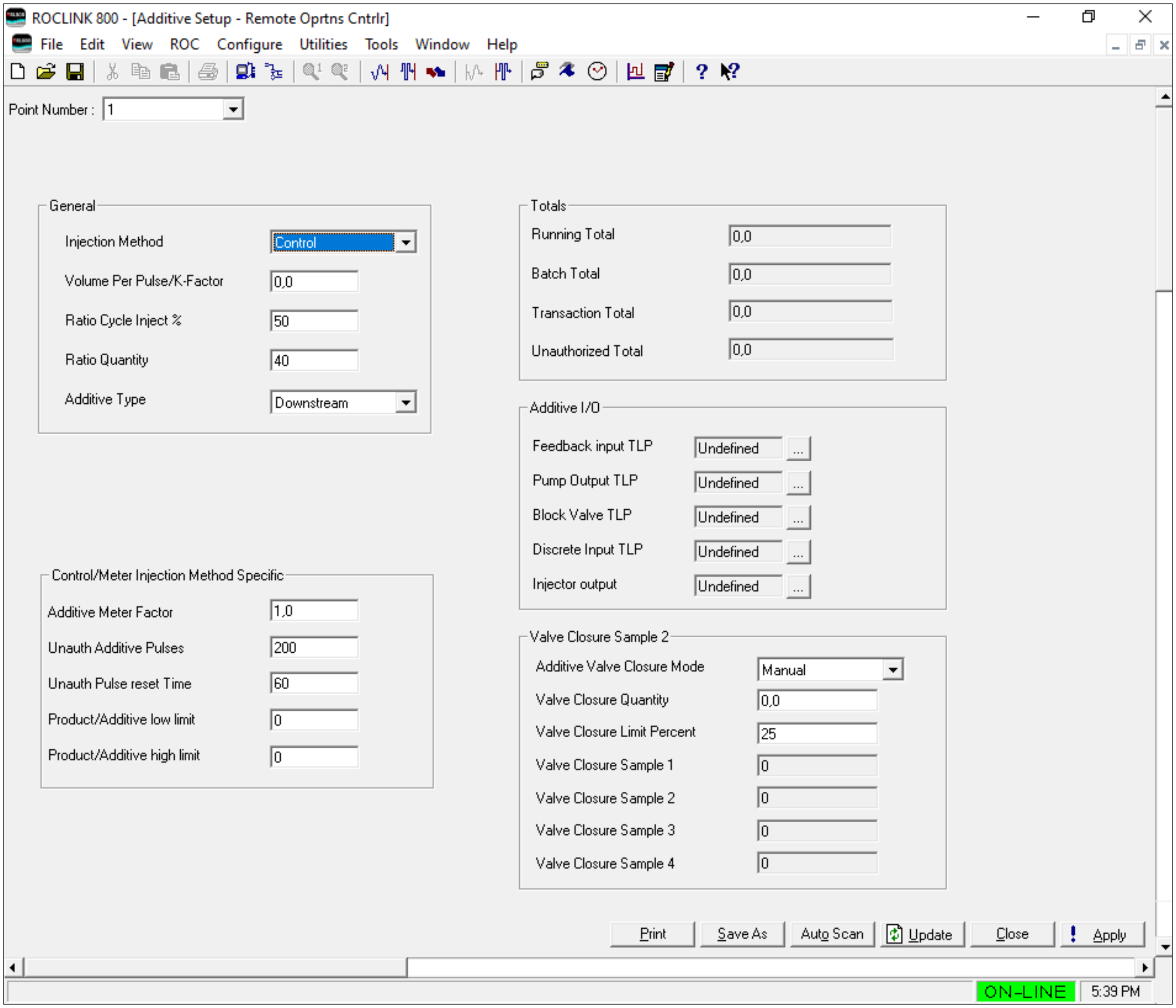


Figure D-23b. Additive Setup Screen, Injection Method: Control

5. Review the values in the following fields.

Field	Description	
Point Number	Sets the number of the additive to define. Click ▼ to display all valid values. You can define up to 6 additives.	
Injection Method	Sets the method used to inject the additive. Click ▼ to display all valid values:	
	Mechanical	Uses a simple mechanical injection. This is the **default** value.

Field	Description
	Handshake Uses a number of confirmation pulses to ensure injection occurs but does not check a fixed quantity. **Note**: This method (along with Mechanical and Meter methods) uses sensing injectors or a fixed cylinder (quantity) for each injection.
	Control Provides on/off time of additive solenoids.
Volume Per Pulse/K-factor	Sets a volume per pulse value the system uses when totalizing additives. Valid values are **0** to **9999.99**; the default value is **0.00**. If feedback **is** configured, the system adds this value into totalizers when it receives a pulse on the feedback channel. If feedback **is not** configured, the system adds this value to totals when the ratio output is energized. In the case of Control additive injection, this parameter provides the K-factor for the additive meter.
Ratio Cycle Inject %	Sets the percentage value of internal ratio cycle when injection begins with each injection cycle. Valid values are **0** to **100**; the default value is **50**.
Ratio Quantity	Sets the quantity, in units defined on the Liquid Preferences screen, that controls an additive injection cycle for a given additive. **Note**: If you select the **Recipe Selection with Multi Rate** additive selection method (specified on the General Setup tab on the Preset Setup screen), use the Additive Ratio Quantity parameter (on the Recipe Setup screen) **instead** of this parameter.

Field	Description
Additive Type	Sets whether the system injects additive before or after main product meter. Click ▼ to display all valid values: **Upstream** or **Downstream**; the default is **Downstream**. If you select **Upstream**, the additive injects **before** the main product meter and the system includes it in component totals. If you select **Downstream**, the additive injects **after** the main product meter. The system does not include the additive in component totals. Instead, the system uses Additive Delivered Quantity to calculate Composite Gross Batch Totals and Composite Gross Transaction Totals. **Note**: If you set the Preset Additive Option (on the Preset Setup screen) as **Inclusive**, you must configure all additive types as **Downstream**.
Handshake/Mechanical Injection Method Specific	**Note**: The following field displays **only** if you select **Mechanical** or **Handshake** as the Injection Method. Refer to *Figure 23a*.
Additive Feedback Count	Sets either the number of pulses for each additive ratio cycle (for **Mechanical** injection methods) or a value in seconds (for **Handshake** methods). Valid values are **0** to **9999**; the default value is **0**. **Note**: If you enter **0** in this field, you disable the Additive alarm. For handshake methods, if the ratio output is activated and the system does not receive the feedback pulses within the defined interval, the Additive alarm occurs.
Control/Meter Injection Method Specific	**Note**: These fields display **only** if you select **Meter** or **Control** as the Injection Method. Refer to *Figure 23b*.
Additive Meter Factor	Sets a meter factor for the additive meter. Valid values are **any valid float**; the default value is **1.0**.
Unauth Additive Pulses	Sets a maximum number of unauthorized pulses allowed within the time value specified in the Unauth Pulses Reset Time field. If the DL8000 receives more than the specified number of pulses during that time, it raises the Additive Fail Unauthorized alarm. Valid values are **0** to **99999**; the default value is **200**. Enter **0** to disable the alarm.
Unauthorized Pulse Reset Time	Sets, in seconds, the time period during which the system checks the additive for unauthorized pulses. Valid values are **0** to **2**; the default value is **0**.

Field	Description
Product/Additive low limit	Sets a ratio between the product delivered and the additive delivered. If the additive injected value falls below this value during the batch, the system raises the Additive Fail alarm. Valid values are **0** to **999**; the default value is **5**.
Product/Additive high limit	Sets a ratio between the product delivered and the additive delivered. If the additive injected value rises above this value during the batch, the system raises the Additive Fail alarm. Valid values are **0** to **999**; the default value is **5**.
Totals	
Running Total	This **read-only** field shows the authorized total of additives since the preset initialized.
Batch Total	This **read-only** field shows the totalized value of additives for the current batch.
Transaction Total	This **read-only** field shows the totalized value of additives for the current transaction.
Unauthorized Total	This **read-only** field shows the unauthorized total of additives since the preset initialized.
Additive I/O	
Feedback Input TLP	Sets the TLP used to store accumulated pulses for verifying additive injection. **Note**: This TLP should reference an AMP, PI, or DI point type having a U32 data type.
Pump Output TLP	Sets the TLP used to start and stop the additive pump. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Block Valve TLP	Sets the TLP used to control the additive block valve towards the injector. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Discrete Input TLP	Sets the TLP used to select additives when the additive Selection Method (specified on the Preset Setup screen) is **Discrete Input**. **Note**: This TLP should reference an ACIO or DI point type having a U8 data type.
Injector Output	Sets the TLP used to control the injector output channel. This output cycles according to the value defined in the **Ratio Cycle Inject %** field and the internal additive ratio quantity. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.

Field	Description	
Valve Closure Sample	**Note**: These fields display **only** if you select **Control** as the Injection Method. Refer to *Figure 23b*.	
Additive Valve Closure Mode	Sets valve closure mode for each additive.	
	Manual	If manual mode is selected, then preset will use additive valve closure qty. [TLP:67, x,46] during valve closure calculation of given additive.
	Auto	If auto mode is selected, then preset will calculate valve closure qty. based on self-learning.
Valve Closure Quantity	Sets the required additive valve closure qty. when Additive Valve Closure Mode [TLP:67, x,47] is selected as manual mode. It will be in same unit as additive X Qty./injection. **Note:** Additive injection will be disabled if **Additive Valve Closure Quantity** [TLP: 67, x,46] is more than or equal to Additive X Qty./Injection of given additive when additive valve closure mode selected is manual.	
Valve Closure Limit Percent	Sets the value used to filter out wrong valve closure samples. If newly calculated valve closure quantity is more than valve closure limit % of Additive x quantity/injection, then limit the new value to configured percentage.	
Valve Closure Sample 1 through **4**	This **read-only** field shows the valve closure sample 1 through 4 is stored in terms of pulses received at feedback input from the meter after the additive flow control valve is closed to when the flow becomes zero.	

6. Click **Apply** to save any changes you have made to this screen.
7. Click **Close** to display the directory tree.
8. Proceed to *Section D.5* to define batching parameters.

D.5 Batching

Use this program and its component screens to define basic preset parameters (such as flow rates, preset characteristics, alarms, and input values) and to view totals and other preset data.

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #5, Batching**.

D.5.1 Component Setup

Use this screen to define component characteristics and values for K-factors and meter factors, and to view both running and batch totals.

To access this screen:

1. Double-click **Display #8, Component Setup**.
2. Double-click **#1**. The screen displays:

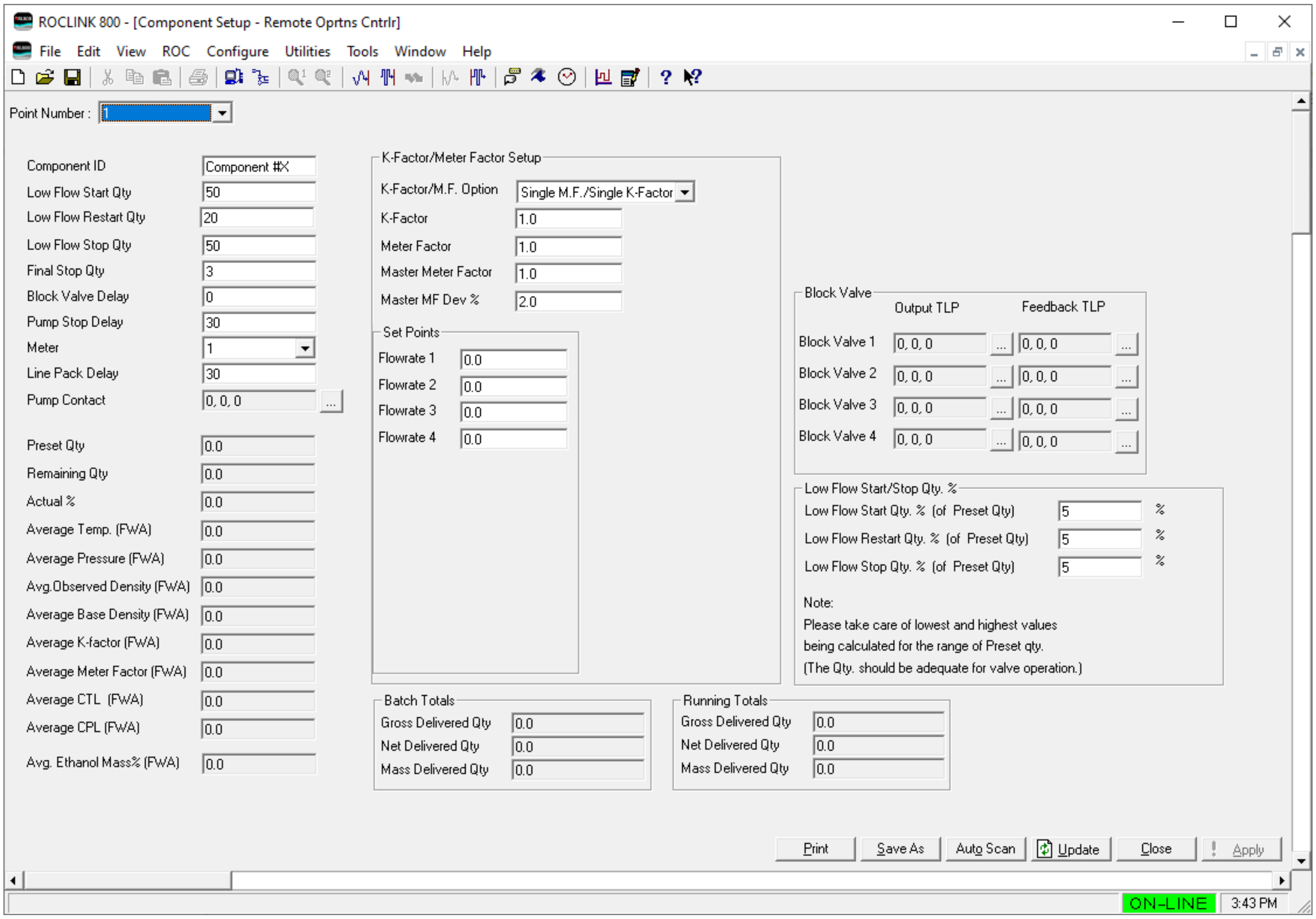


Figure D-24. Component Setup Screen

3. Review the values in the following fields.

Field	Description
Point Number	Indicates the specific component you want to define. Click ▾ to display additional products for this screen.
Component ID	Provides a short description (up to 12 alphanumeric characters) for the selected component. **Note**: The program uses this description on subsequent program screens.

Field	Description
Low Flow Start Qty	Sets, in units specified on the Liquid Preferences screen, the gross volume of liquid that must load at the low flowrate before a high flowrate command can be issued to the flow control valve. Valid values are **0** to **99999**; the **default** value is **50**. The transition from low flow start rate to high flow rate is based on the gross volume delivered. **Note**: This field displays **only** if you select **Sequential** as the Unit Type on the Preset Setup screen.
Low Flow Restart Qty	Sets, in units specified on the Liquid Preferences screen, the gross volume of liquid that must be loaded at the low flowrate following a restart before a high flowrate command can be issued to the flow control valve. Valid values are **0** to **99999**; the **default** value is **20**. The system uses this value either (a) when restarting a suspended batch for which the Low Flow Start Quantity has been delivered **or** (b) when starting a component other than the first component in a sequential blend. **Note**: This field displays **only** if you select **Sequential** as the Unit Type on the Preset Setup screen.
Low Flow Stop Qty	Sets, in units specified on the Liquid Preferences screen, the volume of liquid that must load at the low flowrate before the system issues a stop command to the flow control valve. Valid values are **0** to **99999**; the **default** value is **50**. **Note**: You set the quantity (gross, standard, or mass) using the Preset Delivery Type field on the Preset Setup screen’s General Setup tab.
Final Stop Qty	Sets, in units specified on the Liquid Preferences screen, the volume of liquid at which, if achieved, the system sends a stop command to the flow control valve. Valid values are **0** to **99999**; the **default** value is **3**. **Note**: You set the quantity (gross, standard, or mass) using the Preset Delivery Type field on the Preset Setup screen’s General Setup tab.
Block Valve Delay	Sets, in seconds, the amount of time during startup between the opening of the component block valve and the opening of the component flow control valve. Valid values are **0** to **99**; the default value is **0**.

Field	Description
Pump Stop Delay	Sets, in seconds, the amount of time after issuing the command to close the flow control valve that the system de-energizes the pump run relay output. Valid values are **0** to **999**; the **default** value is **30**.
Meter	Sets the flow meter used to measure each component. Click ▾ to display all meters. Valid values are **1** to **4**; the **default** value is **1**.
Line Pack Delay	Sets, in seconds, the amount of time between the starting of a product pump and the opening of the flow control valve. Valid values are **0** to **999**; the **default** value is **30**.
Pump Contact	Sets the TLP used to control the pump contact. Click ... to display a Select TLP screen you use to define this TLP. **Note**: This TLP should identify a valid DO or ACIO.
Preset Qty	This **read-only** field shows the volume of liquid to be delivered.
Remaining Qty	This **read-only** field shows the remaining volume of liquid to be delivered. As the component is metered during loading, the system dynamically adjusts this value.
Actual %	This **read-only** field shows the ratio of the component in the batch currently being delivered. The system resets this value when a new batch is authorized.
Average Temp. (FWA)	This **read-only** field shows the flow-weighted average (FWA) component temperature, calculated while the batch is in progress. The system resets this value to zero when a new batch is authorized
Average Pressure (FWA)	This **read-only** field shows the flow-weighted average (FWA) component pressure, calculated while the batch is in progress. The system resets this value to zero when a new batch is authorized
Avg. Observed Density (FWA)	This **read-only** field shows the flow-weighted average (FWA) observed density for the component, calculated while the batch is flowing through a meter. The system resets this value to zero when a new batch is authorized.
Average Base Density (FWA)	This **read-only** field shows the flow-weighted average (FWA) base density for the component, calculated while the batch is in progress. The system resets this value to zero when a new batch is authorized.

Field	Description
Average K-factor (FWA)	This **read-only** field shows the flow-weighted average (FWA) K-factor for the component as it flows through the meter. The system calculates this value while the batch is in progress, and resets this value to zero when a new batch is authorized.
Average Meter Factor (FWA)	This **read-only** field shows the flow-weighted average (FWA) Meter Factor for the component as it flows through the meter. The system calculates this value while the batch is in progress, and resets this value to zero when a new batch is authorized.
Average CTL (FWA)	This **read-only** field shows the flow weighted average (FWA) CTL value for the component as it flows through a meter. The system calculates this value while the batch is in progress, and resets this value to zero when a new batch is authorized.
Average CPL (FWA)	This **read-only** field shows the flow weighted average (FWA) CPL value for the component as it flows through a meter. The system calculates this value while the batch is in progress, and rests this value to zero when a new batch is authorized.
Avg. Ethanol Mass% (FWA)	Calculates the FWA value of Ethanol mass % in batching user program for all the components and then archive it. The value of Ethanol mass % will be read from parameter Ethanol Mass % [TLP: 72, X, 12].
K-Factor/Meter Factor Setup	
K-Factor/M.F. Option	Sets options the system uses when calculating K-factors or meter factors. Valid values are: **Single MF/ Single K-factor** – Uses a single meter factor and a single K-factor for the meter. Set values for each in the **K-Factor** and **Meter Factor** fields. This is the **default** value. **MF Curve/ Single K-factor** – Uses a series of meter factor curve values and a single K-factor. Complete the **K-Factor** field and provide up to 12 Meter Factor and Flowrate values in the Meter Factor Curve frame. **Note**: If you change this option, you must restart the preset so that it can check the range of the 12 factors.
K-Factor	Sets the linear meter constant (K-factor) value the system uses for this meter. Valid values are any positive non-zero value; the **default** value is **1**.

Field	Description
Meter Factor	Sets the meter factor (obtained by dividing the quantity of fluid the proving system measured by the quantity the meter indicates during proving) the system uses for this meter. Valid values are **0.8** to **1.2**; the default value is **1**. **Note**: This field is **not** available if you select the **MF Curve/Single K-factor** option.
Master Meter Factor	Sets the value for the master meter factor (MF). The program checks the overall meter factor deviation percentage against this value using the calculations: Low Limit = Master MF – [Master MF x Master MF %/100] High Limit= Master MF + [Master MF x Master MF %/100] An alarm occurs If the meter factor is not within this range.
Master MF Dev %	Sets, as a percentage, the allowable overall deviation of the meter factor. The program uses this value when calculating the high and low limits of the master meter factor.
Set Points	Defines the setpoint for up to 12 flowrates. Valid values are **0** to **999999**; the **default** value is **0**. **Note**: The number of flowrates displayed depends on the value you enter in the **Points of Linearization** field on the Preset Setup screen.
Set Point Factors	Sets the meter factor for up to 12 corresponding flowrates. Valid values are **0.8** to **1.2**; the **default** value is **1**. **Note**: This field displays only if you select the **Single MF Curve/Single K-factor** option. Also, the number of factors displayed depends on the value you enter in the **Points of Linearization** field on the Preset Setup screen.
Batch Totals	
Gross Delivered Qty	This **read-only** field shows the gross volume quantity delivered for the current component in the batch. The program resets this value when a new batch is authorized.
Net Delivered Qty	This **read-only** field shows the net standard volume quantity delivered for the current component in the batch. The program resets this value when a new batch is authorized.
Mass Delivered Qty	This **read-only** field shows the mass quantity delivered for the current component in the batch. The program resets this value when a new batch is authorized.

Field	Description
Running Totals	
Gross Delivered Qty	This **read-only** field shows a running total for the gross volume quantity delivered for the current component since the preset's initialization. This value does not reset, but rolls over when it reaches the rollover limit.
Net Delivered Qty	This **read-only** field shows a running total for the net standard volume quantity delivered for the current component since the preset's initialization. This value does not reset, but rolls over only when it reaches the rollover limit.
Mass Delivered Qty	This **read-only** field shows a running total for the mass quantity delivered for the current component since the preset's initialization. This value does not reset, but rolls over only when it reaches the rollover limit.
Inline Parameter	**Note**: The following fields display **only** if you select **Inline** as the Unit Type on the Preset Setup screen.
Current Zone	This **read-only** field shows the component's delivery profile flowrate zone. Valid values are: **0** Low flow start **1** High flow **2** Low flow stop **3** Lock **4** Final stop (that is, a normal stop). This is the **default** value.
Stop Rate	Sets the flowrate at which this component is delivered during the component's configured low-flow stop quantity at the end of an inline batch. Valid values are **0** to **99999.9;** the default value is **150**. This standardizes the final closure of the flow control valve to the same flowrate so that valve closure averaging works correctly, independently of the individual component blend percentages in the recipes. It also means that the overall flow ate at the end of a batch is the sum of the stop rates of any flowing components. This value is also used during the delivery of flush component.

Field	Description
LP High Flowrate	Sets the flowrate at which the system delivers low proportion components into the blend during the high flow zone of the blend. Valid values are **0** to **99999.9**; the default value is **200**. You also use the **Delivery Sequence** field on the Recipe Setup screen to indicate the low-proportion component. Entering **01**, for example, would indicate that the first defined component is high-proportion and the second defined component is low-proportion.
Block Valve 1 through **Block Valve 4**	If you select **Sequential (Auto)** in the Unit Type field on the Preset Setup screen's General tab, use Block Valve 1 **only** to set the block valve output of the component. If you select **Inline** in the Unit Type field and enable **Side Stream Blending** on the Preset Setup screen's General tab, use Block Valve 1 through Block Valve 4 to set the block valve output of each component. **Note:** These fields display **only** if you select either **Sequential (Auto)** as the Unit Type or enable **Side Stream Blending** on the Preset Setup screen's General Setup tab.
Output TLP (1-4)	Click ... to select the TLP to store output values, which control the delivery of this component into the common pipe. **Note**: This TLP should identify a valid DO or ACIO. TLPs 2-4 are used **only** for Side Stream Blending.
Feedback TLP (1-4)	Click ... to select the TLP to store block valve feedback values, which monitor the status of the block valve. **Note**: This TLP should identify a valid ACIO or DI. TLPs 2-4 are used **only** for Side Stream Blending.
Low Flow Start Qty. %	Sets, in percentage, the gross volume of liquid that must load at the low flowrate before a high flowrate command can be issued to the flow control valve. Valid values are **1** to **100**; the **default** value is **5**. The transition from low flow start rate to high flow rate is based on the gross volume delivered. **Note**: This field displays **only** if you select **Percentage of Preset Qty** as the Low Flow Start/Stop Qty. Option on the General tab of the Preset Setup screen.

Field	Description
Low Flow Restart Qty. %	Sets, in percentage, the gross volume of liquid that must be loaded at the low flowrate following a restart before a high flowrate command can be issued to the flow control valve. Valid values are **1** to **100**; the **default** value is **5**. The system uses this value either (a) when restarting a suspended batch for which the Low Flow Start Quantity has been delivered **or** (b) when starting a component other than the first component in a sequential blend. **Note**: This field displays **only** if you select **Percentage of Preset Qty** as the Low Flow Start/Stop Qty. Option on the General tab of the Preset Setup screen.
Low Flow Stop Qty. %	Sets, in percentage, the volume of liquid that must load at the low flowrate before the system issues a stop command to the flow control valve. Valid values are **1** to **100**; the **default** value is **5**. The value entered should allow sufficient time to stabilize the flowrate before closing the flow control valve. **Note**: This field displays **only** if you select **Percentage of Preset Qty** as the Low Flow Start/Stop Qty. Option on the General tab of the Preset Setup screen.

4. Click **Apply** to save any changes you have made to this screen.
5. Click **Close**. The Directory Tree displays.
6. Proceed to *Section D.5.2* to define driver IDs and enable security.

D.5.2 Driver Security

Use this screen to define up to 32 driver IDs and enable security for loading processes.

To access this screen:

1. Double-click **Display #9, Driver Security Setup**. The screen displays:

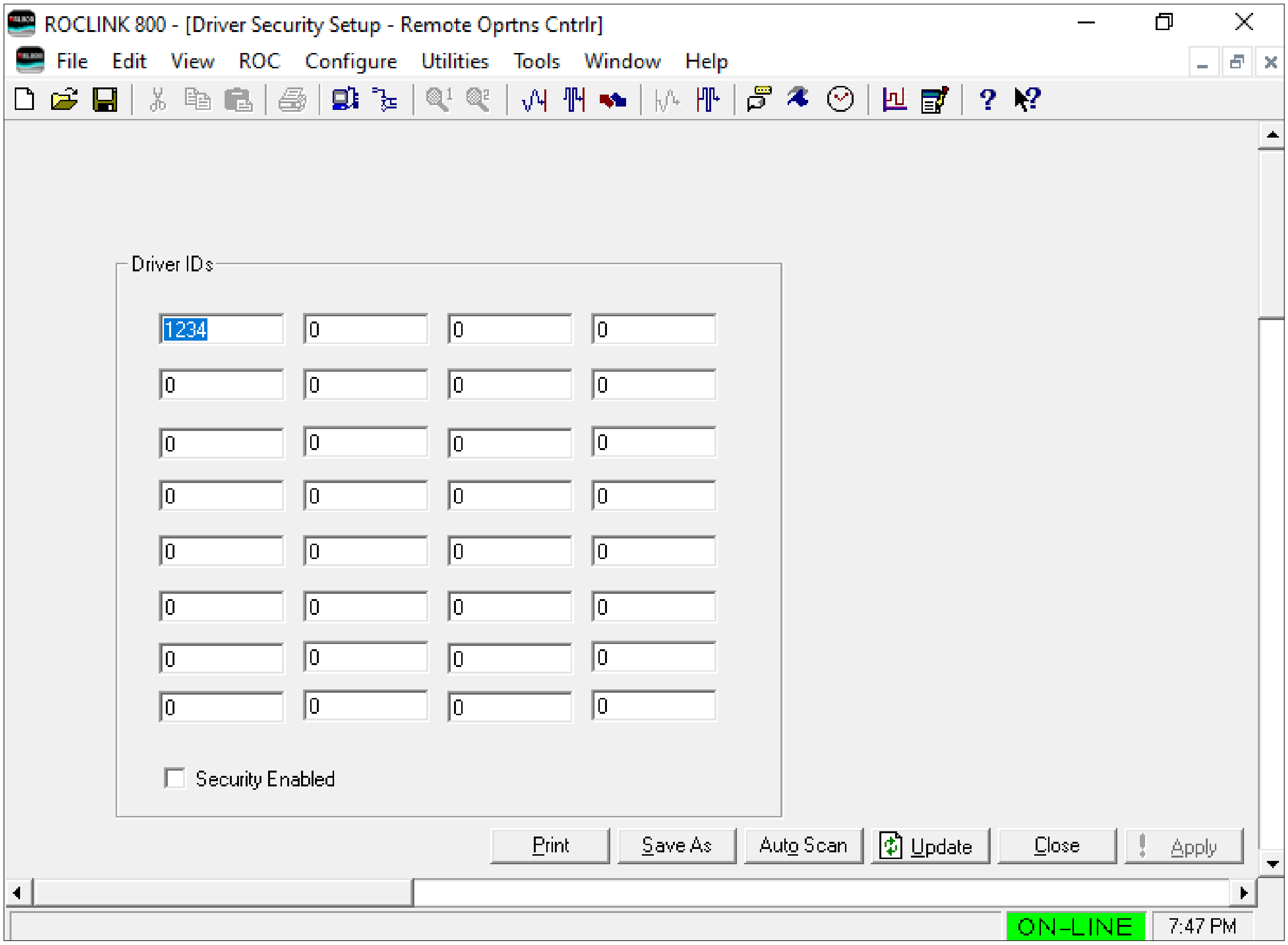


Figure D-25. Driver Security Screen

2. Review the values in the following fields:

Field	Description
Driver ID	Sets a unique 9-digit ID for a driver. Define up to 32 IDs.
Security Enabled	Enables the system, when checked, to require a driver to supply a valid ID before continuing with the loading process. The default is **disabled** (unchecked). **Note**: This feature is available in manual operating mode when you complete the **Number of Data Items** field on the General Setup tab of the Preset Setup screen with a non-zero number. This causes the system to use the Data Prompt 1 field as a prompt for the driver to enter an ID.

3. Click **Apply** to save any changes you have made to this screen.
4. Click **Close** to display the Directory Tree.

5. Proceed to *Section D.5.3* to define meter parameters.

D.5.3 Meter Setup

Use this screen to define maximum and minimum flow rates, TLP values for temperature probes, and to view totals and batch and transaction data.

To access this screen:

1. Double-click **Display #10, Meter Setup**.

2. Double-click **#1.** The screen displays:

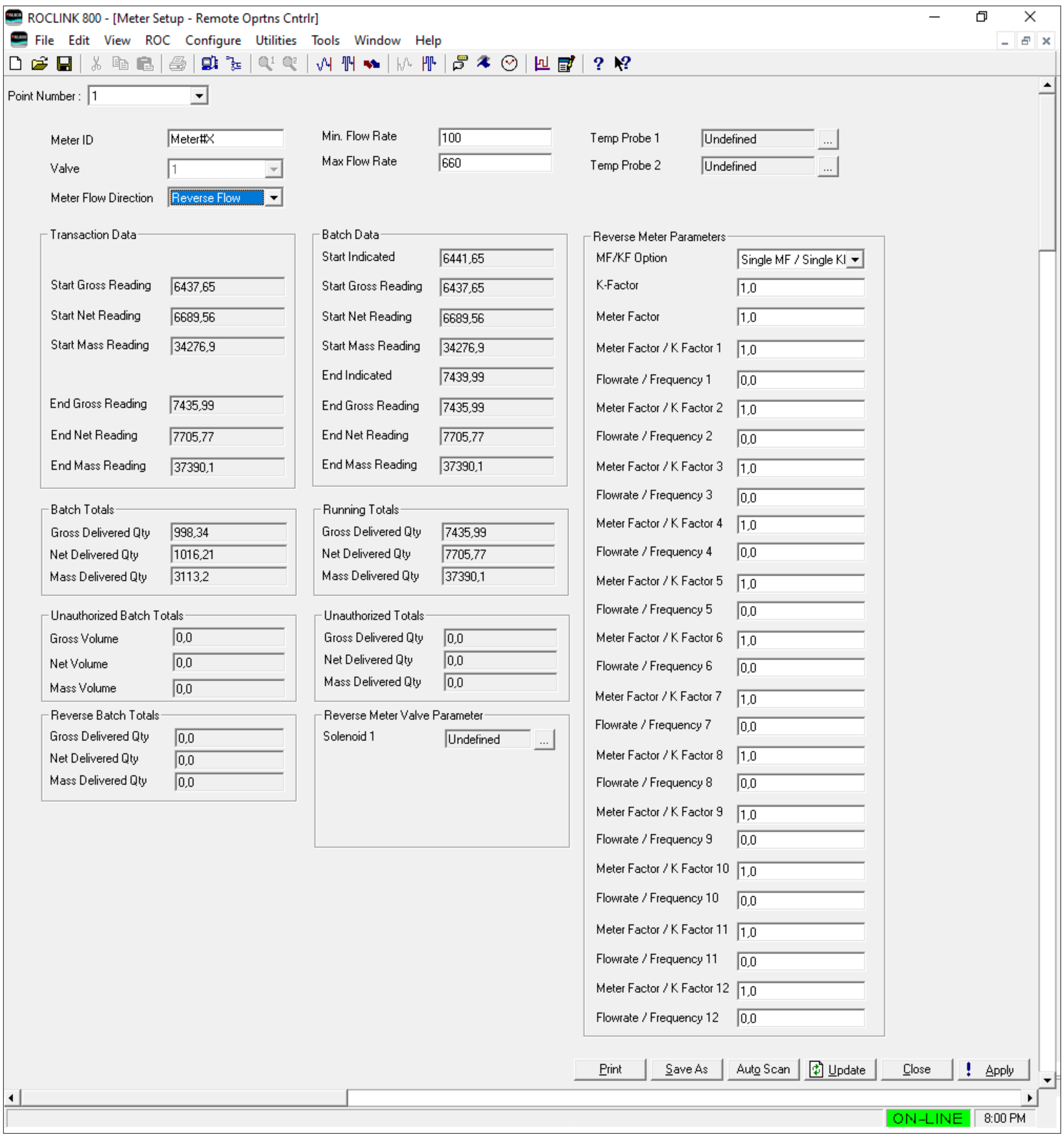


Figure D-26. Meter Setup Screen

3. Review the values in the following fields.

Field	Description
Point Number	Indicates the specific meter you want to define. Click ▾ to display all defined meters.
Meter ID	Provides a short description (up to 7 alphanumeric characters) for the selected meter.
Valve	This **read-only** field shows the flow control valve that controls this meter. **Note**: For **sequential** blending, two meters can use the same flow control valve. For **inline** blending each recipe component should have a unique valve.
Meter Flow Direction	Sets the direction of flow for a non-system meter (a meter with a number greater than the value specified in the **Number of Meters** field on the General Setup tab on the Preset Setup screen). Valid values are **Normal Flow** and **Reverse Flow**; the default value is **Normal Flow**. **Note**: For meters defined as reverse flow, the system updates only the Reverse Batch Total and Net Forward Batch Total values.
Min. Flow Rate	Sets the minimum flowrate allowed before the system triggers an alarm. Valid values are **0** to **99999**; the default value is **100**. Define the units for the flowrate in the Flow Rate Option field on the Liquid Preferences screen. Define the number of seconds the minimum flowrate is permitted in the Low Flow Time field on the Alarm Setup tab on the Preset Setup screen. **Note**: Each meter can have a different minimum flowrate.
Max. Flow Rate	Sets the maximum flowrate allowed before the system triggers an alarm. Valid values are **0** to **99999**; the default value is **660**. Define the units for the flowrate in the Flow Rate Option field on the Liquid Preferences screen. Define the number of seconds the maximum flowrate is permitted in the High Flow Time field on the Alarm Setup tab on the Preset Setup screen. **Note**: Each meter can have a different maximum flowrate.
Temp Probe 1 and **2**	Sets the TLP to store the input from one of two probes for meter temperature. Click … to display a Select TLP screen you use to define the TLP, which should a float data type. The default value is [0,0,0]. **Note**: The system uses this value to trigger a temperature drift alarm.

Field	Description
Transaction Data	
Start Gross Reading	This **read-only** field shows the gross totalizer reading at the beginning of this transaction.
Start Net Reading	This **read-only** field shows the net totalizer reading at the beginning of the transaction.
Start Mass Reading	This **read-only** field shows the mass totalizer reading at the beginning of the transaction.
End Gross Reading	This **read-only** field shows the gross totalizer reading at the end of the transaction.
End Net Reading	This **read-only** field shows the net totalizer reading at the end of the transaction.
End Mass Reading	This **read-only** field shows the mass totalizer reading at the end of the transaction.
Batch Totals	
Gross Delivered Qty	This **read-only** field shows the gross volume delivered from this meter for the current batch (meter authorized) or for the last completed batch. The system resets this value for a new authorized batch.
Net Delivered Qty	This **read-only** field shows the net standard volume delivered from this meter for the current batch (meter authorized) or for the last completed batch. The system resets this value for a new authorized batch.
Mass Delivered Qty	This **read-only** field shows the mass delivered from this meter for the current batch (meter authorized) or for the last completed batch. The system resets this value for a new authorized batch.
Unauthorized Batch Totals	**Note**: Unauthorized volumes occur only when the system-based authorization routines fail.
Gross Volume	This r**ead-only** field shows the gross totalizer reading for this batch for any liquid delivered while the meter is unauthorized.
Net Volume	This **read-only** field shows the net totalizer reading for this batch for any liquid delivered while the meter is unauthorized.
Mass Volume	This **read-only** field shows the mass totalizer reading for this batch for any liquid delivered while the meter is unauthorized.
Batch Data	
Start Indicated	This **read-only** field shows the volume meter totalizer reading at the beginning of this batch.
Start Gross Reading	This **read-only** field shows the gross totalizer reading at the beginning of this batch.

Field	Description
Start Net Reading	This **read-only** field shows the net totalizer reading at the beginning of the batch.
Start Mass Reading	This **read-only** field shows the mass totalizer reading at the beginning of the batch.
End Indicated	This **read-only** field shows the volume meter totalizer reading at the end of this batch.
End Gross Reading	This **read-only** field shows the gross totalizer reading at the end of the batch.
End Net Reading	This **read-only** field shows the net totalizer reading at the end of the batch.
End Mass Reading	This **read-only** field shows the mass totalizer reading at the end of the batch.
Running Totals	
Gross Delivered Qty	This **read-only** field shows a running gross volume (authorized) for the meter. This value never resets; it rolls over only when it reaches the rollover limit.
Net Delivered Qty	This **read-only** field shows a running net standard volume (authorized) for the meter. This value never resets; it rolls over only when it reaches the rollover limit.
Mass Delivered Qty	This **read-only** field shows a running mass total (authorized) for the meter. This value never resets; it rolls over only when it reaches the rollover limit.
Unauthorized Totals	
Gross Delivered Qty	This **read-only** field shows a running gross total for the volume of liquid delivered while the meter is unauthorized. This value never resets; it rolls over only when it reaches the rollover limit.
Net Delivered Qty	This **read-only** field shows a running net total for the volume of liquid delivered while the meter is unauthorized. This value never resets; it rolls over only when it reaches the rollover limit.
Mass Delivered Qty	This **read-only** field shows a running mass total for the volume of liquid delivered while the meter is unauthorized. This value never resets; it rolls over only when it reaches the rollover limit.
Reverse Meter Valve Parameters	**Note**: The following field displays **only** if you select **Reverse Flow** as Meter Flow Direction.
Solenoid 1	Click [...] to select the TLP that sets the output status contact for the first solenoid. The default value is **Undefined** [0,0,0].

Field	Description	
Reverse Meter Parameters	**Note**: These fields display **only** if you select **Reverse Flow** as Meter Flow Direction.	
MF/KF Option	Sets which options the system uses when calculating K-factors or meter factors. Valid values are:	
	Single MF / Single K-factor	Uses a single meter factor and a single K-factor for the reverse meter. Set values for each in the **K-Factor** and **Meter Factor** fields. This is the **default** value.
	MF Curve/ Single K-factor	Uses a series of meter factor curve values and a single K-factor. Complete the K-Factor field and provide up to 12 Meter Factor and Flowrate values in the Meter Factor Curve frame.
K-Factor	Sets the linear meter constant (K-factor) value the system uses for this reverse meter.	
Meter Factor	Sets the meter factor (obtained by dividing the quantity of fluid the proving system measured by the quantity the meter indicates during proving) the system uses for this reverse meter.	
Meter Factor / K Factor 1 through **12**	Sets either the meter factor for up to 12 flowrates or the K-factor for associated frequency	
Flowrate / Frequency 1 through **12**	Sets the flowrate for the corresponding meter factor.	

4. Click **Apply** to save any changes you have made to this screen.
5. Click **Close** to display the Directory Tree.
6. Proceed to *Section D.5.4* to define preset parameters.

D.5.4 Preset Setup

Use the tabs (General Setup, Alarm Setup, Current Data, Error Investigation and Batch Recalculations) on the Preset Setup screen to define general preset characteristics, alarms, and data formats.

To access this screen:

1. Double-click **Display #11, Preset Setup**. The screen displays:

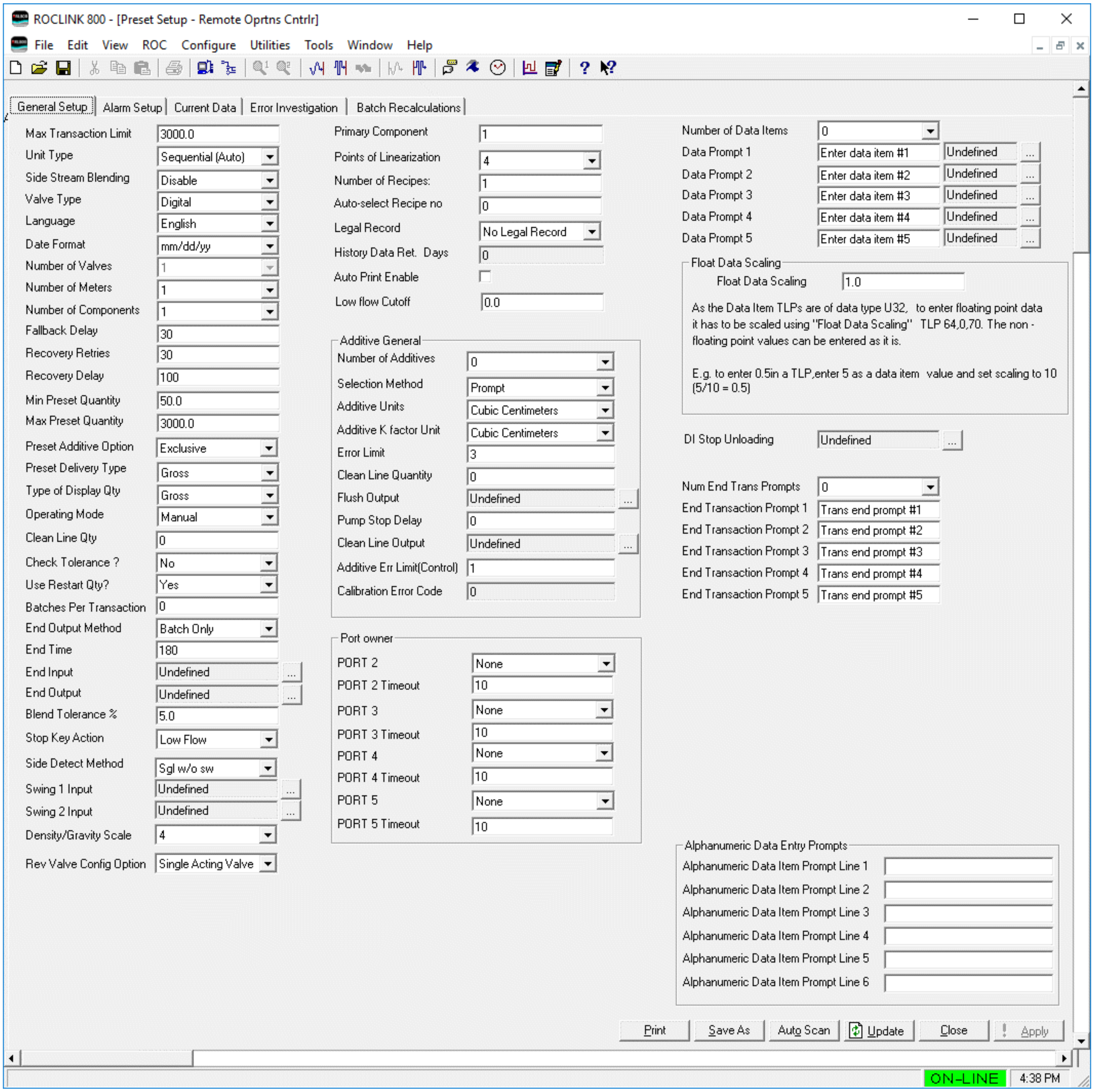


Figure D-27. Preset Setup Screen

Note: The Preset Setup screen has a tab format. *Sections D.5.4.1* through *D.5.4.3* discuss the requirements for each Preset Setup screen tab.

D.5.4.1 Preset Setup – General Setup Tab

Use this tab (which displays when you access the Preset Setup screen) to define general operational parameters for the preset controller. Use it also to define values for Unit Type (sequential or inline) and Valve Type (digital or 2-stage).

1. Select the **General Setup** tab on the Preset Setup screen. The General Setup screen displays:

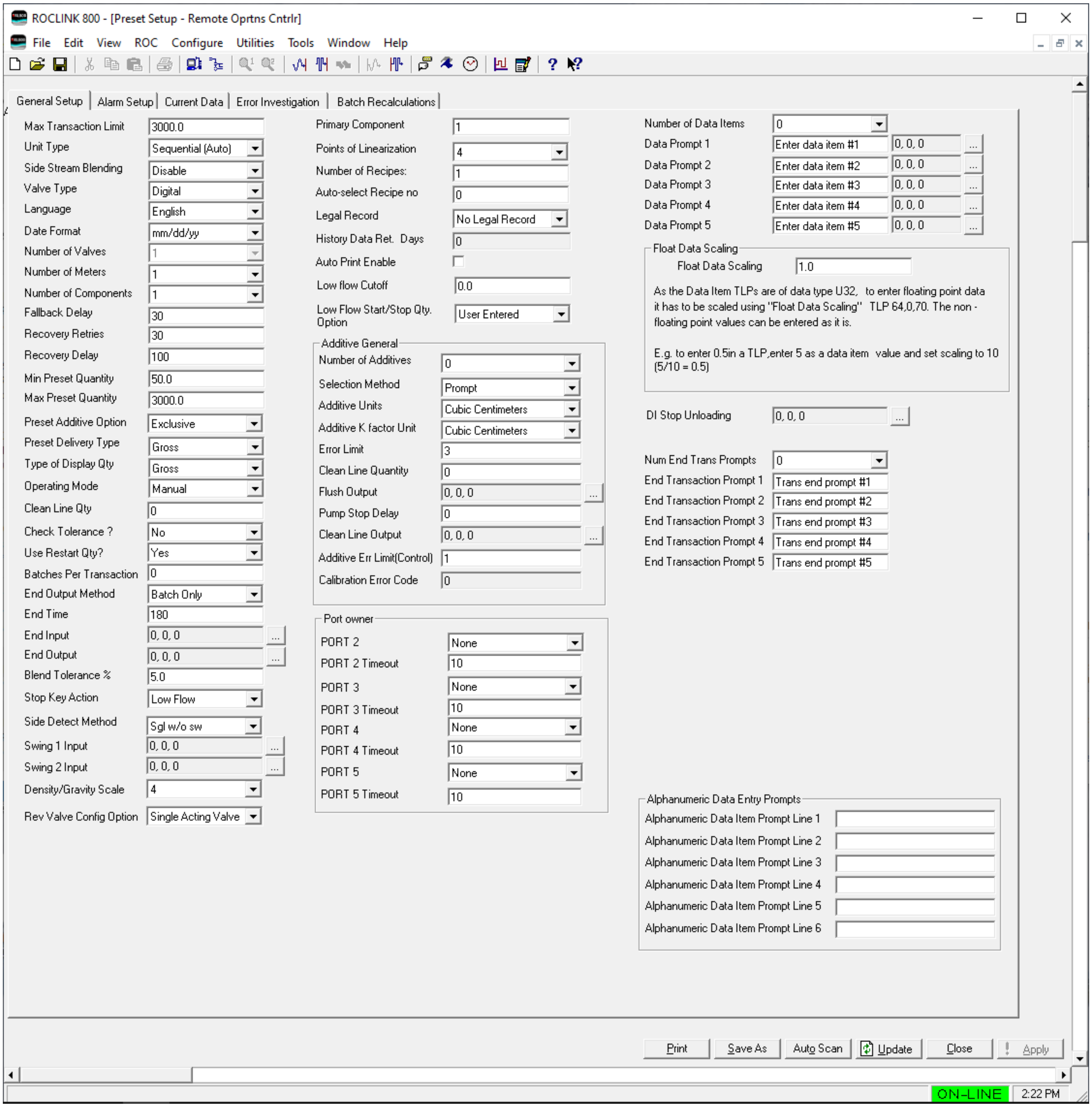


Figure D-28. Preset Setup, General Setup tab

2. Review the values in the following fields.

Field	Description
Max Transaction Limit	Sets the maximum limit on the total quantity of preset loaded in one transaction (that is, the sum of all presets of all individual batches in the transaction). Valid values are **5** to **9,999,999**; the default value is **3000**. When the preset reaches the transaction limit, it prevents authorization of a new batch in the same transaction and generates an error message.
Unit Type	Sets the method used to control batch deliveries. Valid values are **Inline** and **Sequential (Auto)**; the default is **Sequential (Auto)**. Click ▼ to display all valid values. **Inline** – Blends one or more components simultaneously. Each component flow is measured by a separate flow meter and controlled by a separate digital flow control valve. **Note**: If you enable side stream blending, the system supports inline blending with side-stream. **Sequential (Auto)** – Blends one or more components in sequence; block valves are automatically controlled. This is the **default**. **Unloading** – Unloads a single product. **Note**: Blending is **not** supported. **Note**: You **must** define a unit type for each preset.
Side Stream Blending	Enables/Disables side stream blending. Click ▼ to display all valid values. **Enable** – Side-stream blending is performed. **Disable** – Side-stream blending is **not** performed. This is the **default**. **Note:** Side-stream blending is supported **only** if you select **Inline** in the Unit Type field.
Valve Type	Sets the type of flow control valve. All flow control valves must be the same type. Valid values are **Digital** and **2-Stage**; the default is **Digital**. Click ▼ to display all valid values. **Digital** – Flow control is digitally controlled and automatically adjusted to meet a setpoint value.

Field	Description
	2-Stage — Flow control is based on line pressure. **Note**: You can use 2-stage valves **only** if you configure **Unit Type** as **Sequential**.
	Analog — Valve is controlled by a 4 to 20 mA signal.
	Note: You **must** define a valve type, and all flow control valves for the preset **must** be the same type.
Language	Sets the language displayed on the keypad. Click ▼ to display all valid values. The default is **English**.
Date Format	Sets the format used for displaying dates on the keypad. Valid values are **mm/dd/yy**, **dd/mm/yy**, and **yy/mm/dd**; **mm/dd/yy** is the default.
Number of Valves	This **read-only** field indicates the number of valves in the system. The value is the same as the Number of Meters.
Number of Meters	Sets the total number of flow meters in the system. Valid values are **1** to **4**; you **must** define at least **1** (the default value).
Number of Components	Sets the total number of liquid components in the system. Valid values are **1** to **4**; you **must** define at least **1** (the default value).
Fallback Delay	Sets, in seconds, the maximum amount of time the system tries to achieve a targeted flowrate before using a fall-back rate. Valid values are **0** to **999**; the value is **30**. **Note**: This field displays **only** if you select **Digital** as the Valve Type.
Recovery Retries	Sets the maximum number of attempts the system makes to increase flow rate to a higher flowrate (for recovery) before halting attempts and maintaining the current or fall back flow rate. **Note**: This field displays **only** if you select **Digital** as the Valve Type.
Recovery Delay	Sets, in seconds, the amount of time the system stays in a fall-back flowrate before starting stream recovery. Valid values are **0** to **999**, the default value is **100**. **Note**: This field displays **only** if you select **Digital** as the Valve Type.

Field	Description	
Min Preset Quantity	Sets the minimum quantity (gross volume, net standard volume, or mass, as defined in the **Preset Delivery Type** field) that can be delivered in a single batch. A batch cannot be started or restarted if the remaining quantity is less than this value. Valid values are a non-zero positive value up to **9,999,999**; the default value is **5**.	
Max Preset Quantity	Sets the maximum quantity (gross volume, net standard volume, or mass, as defined in the **Preset Delivery Type** field) that can be delivered in a single batch. Valid values are **5** to **9,999,999**; the default value is **3000**.	
Preset Additive Option	Sets whether the entered batch preset quantity (stored at TLP 63,0,69) includes the additive batch quantity. Valid values are:	
	Exclusive	Excludes the additive quantity from the batch preset quantity (the **default**)
	Inclusive	Includes the additive quantity in the batch preset quantity. The Composite Batch gross volume [TLP 64,0,2] is the sum of the Batch gross volume [TLP 63.0.135] and the Additive batch volume [TLP 67,x,36]. **Note**: If you use this option, the additive user program must be running, the Preset Delivery Type value (set on the General Setup tab of the Preset Setup screen) must be **Gross**, and the All Additive Type (set on the Additive Setup screen) must be **Downstream**. The system checks these values during recipe verification.
Preset Delivery Type	Sets the delivery type for all quantities (preset, loaded, or remaining) in the batch. (Ramp up to high flowrate is always based on gross quantity.) Valid values are:	
	Gross	Gross Volume (the **default**)
	Standard	Net Standard Volume
	Mass	Mass Volume

Field	Description
Type of Display Qty	Sets the quantity used for display purposes. Valid values are **Gross Volume, Net Standard Volume, Mass Volume, Composite Gross**; the default is **Gross Volume**. **Composite Gross** should be used when Preset Additive Type [TLP:64,0,26] is set to INCLUSIVE and Additive Type [TLP:67,X,8] selected as "Downstream". **Composite Batch Gross Del Qty** [TLP ID: 64,0,2] will be summation of Gross Del Qty (Batch) [TLP ID: 63,0,135] and additive batch volume [TLP ID: 67,0,36]
Operating Mode	Sets how the preset interacts with a terminal automation system (TAS). Valid values are **Auto** (TAS maintains bidirectional communications between the preset and itself to monitor and control the batch delivery operations) and **Manual** (TAS maintains bidirectional communications between the preset and itself to monitor batch delivery operations; preset does not accept TAS-issued control functions). The default is **Manual**.
Clean Line Qty	Sets the quantity of the primary component to load at the end of the batch delivery to purge the blend from the loading lines. Valid values are **0** to **9999**; the default value is **0**. **Note**: For a particular batch, if the preset quantity is less than or equal to the clean line quantity, the batch is delivered as if there were no clean line quantity configured.
Check Tolerance?	Sets whether the blend ratio needs to be checked after adjustment for flush. Valid values are **No** (do not check) and **Yes** (check blend ratio before batching and at end of batch). The default value is **No**. **Note**: If checking fails at the end of a batch, the system issues an “Unable to Maintain Blend” alarm.
Use Restart Qty?	Sets whether the system uses the Low Flow Restart Quantity (as defined on the Component Setup screen) when restarting a halted batch or when starting a new component for a sequential batch. Valid values are **Yes** (use Low Flow Restart Quantity) or **No**. The default is **Yes**. **Note**: This is used **only** for a sequential batch.
Batches Per Transaction	Sets the maximum of batches per transaction. Valid values are **0** to **10000**; the default is **0** (which indicates that a maximum of 10000 batches can be executed).
End Output Method	Sets when the system performs end output, end input, and end time processing. Valid values are:

Field	Description	
	Batch Only	Perform end processing only at the end of a batch. This is the **default**.
	Transaction Only	Perform end processing only at the end of a transaction.
	Batch and Transaction	Perform end processing at both the end of a batch and the end of a transaction.
End Time	Sets, in seconds, the maximum time the system keeps the end output energized for the end of the batch or transaction, based on the value defined in the **End Output Method** field. Valid values are **0** to **9999**; the default value is **180**. **Note**: At the expiration of this time, the system raises a "safety circuit 3" alarm.	
End Input	Sets an input status TLP the system references during the end batch/end transaction processing. The system scans this TLP after energizing the end output **Note**: This TLP should reference an ACIO or DI point type having a U8 data type.	
End Output	Sets an output status TLP the system references during the end batch/end transaction processing. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.	
Blend Tolerance %	Sets the tolerance percentage for blend ratios. Valid values are **0.000** to **99.999**; the default is **5**. The system uses this value: ▪ During inline batch delivery to check blend ratio at high flowrate. Results out of range trigger the "instantaneous blend ratio" alarm. ▪ At the end of a batch to check the deviation percentage of a component after delivery. Results out of range trigger the "unable to maintain blend" alarm. ▪ Before starting a new batch to check the blend ratio after adjusting for flush component. If the blend ratio check fails at the start of a batch, the preset verification fails and the system issues a "Blend Tolerance Fail" **Note**: This field is valid **only** if you set the **Check Tolerance?** field to **No**.	

Field	Description	
Stop Key Action	Sets the action the system takes when the batch is stopped either by pressing the Stop key on the preset or from a TAS-originated stop batch command. Valid values are **Low Flow** (wait for flow rate to become zero before starting pump stop delay timer for closing the pump) and **Immediate** (immediately stop batch without requiring a pump stop delay). The default value is **Low Flow**.	
Side Detect Method	Sets the method used to detect one of three possible positions (side 1, side 2, or parked) of the product-loading swing arm. Detection is based on inputs from swing arm position switches (swing arm 1 input at TLP 64,0,8 or swing arm 2 input at TLP 64,0,9). Click ▼ to display all valid values:	
	Sgl w/o sw	Single side without swing arm switch. Side 1 forced to be active at all times. This is the **default**.
	Sgl 1 sw (SW2)	Single side with one swing arm switch: SW2 CLOSED = side 1 SW2 OPEN = parked.
	Sgl 1 sw (SW1)	Single side with one swing arm switch: SW1 CLOSED = side 1 SW1 OPEN = parked.
	Dbl 1 sw (SW2)	Double side with one swing arm switch: SW2 CLOSED = side 1 SW2 OPEN = side 2 (SW1 must be OPEN)
	Dbl 1 sw (SW1)	Double side with one swing arm switch: SW1 CLOSED = side 1 SW1 OPEN = side 2 (SW2 must be OPEN)
	Dbl 2 sw	Double side with two swing arm switches: SW2 CLOSED and SW1 OPEN = side 1 SW2 OPEN and SW1 CLOSED = side 2 SW2 OPEN and SW1 OPEN = parked

Field	Description
Swing 1 Input	Sets the digital input for input switch 1 used to determine the current side [TLP 63,0,145) based on the side detect method [TLP 64,0,7]. **Note**: This TLP should reference an ACIO or DI point type having a U8 data type. If input is not configured, then the system considers the switch status as OPEN or 0.
Swing 2 Input	Sets the digital input for input switch 2 used to determine the current side [TLP 63,0,145) based on the side detect method [TLP 64,0,7]. **Note**: This TLP should reference an ACIO or DI point type having a U8 data type. If input is not configured, then the system considers the switch status as OPEN or 0.
Density/Gravity Scale	Sets the scaling used for density values coming in the response frame for read commands sent to the TAS. This value is also used as a scaling factor for query frames of set commands from the TAS. The scaling multiplication or division factor is 10x[Density/Gravity Scale value]. Valid values are **1** to **4**; the default value is **4**. **Note**: This is used for DanLoad 6000 protocol.
Rev Valve Config Option	Sets what type of reverse meter valve is installed. Valid values are Single Acting Valve or Double Acting Valve.
Primary Component	Sets the component number used for flushing the line. Valid values are **1** - **4**, the default value is **1**.
Points of Linearization	Sets the number of flowrate points and meter factors used for the meter factor curve. Valid values are **1** to **12**, the default value is **4**.
Number of Recipes	Sets the total number of allowable recipes. Valid values are **1** to **30**; the default is **1**. **Note**: You must define at least **1** recipe. If you define **only** 1 recipe, it allows automatic authorization of transactions in a manual operating mode.

Field	Description	
Auto-select Recipe no	Sets the recipe number used for automatic authorization of a transaction in manual operating mode. Valid values are **0** to the number of currently defined valid recipes; the default value is **0**. **Note**: If recipe verification fails, the system displays an invalid recipe screen and the operator can change this parameter to select a different recipe. You can change this parameter until the transaction is in progress (that is, after transaction authorization and prior to the start of the first batch in the transaction) in order to select a different recipe or un-authorize the transaction.	
Legal Record	This option be used to assure that batch information is retained if so required by a legal approval organization. Click ▼ to display all valid values. Valid values are:	
	No Legal Record	No legal record is required. This is the default.
	Printout	The legal record is considered to be a physical printout batch ticket and must be generated at the conclusion of each batch.
	History	The legal record is considered to be the batch information saved to the DL8000 internal memory via transactional history. When this option is selected, the History Data Ret. Days field must be set to the number of days required.
History Data Ret. Days	Sets the number of days for which information must be retained if the legal record is selected as history. The default value is **100** days.	
Auto Print Enable	Sets whether the system automatically prints a batch ticket upon archiving a transaction. Select this box to print the ticket; leave this box blank (the default) to not print the ticket.	
Low flow Cutoff	Sets the flow rate limit that, when reached, closes the block valve in the low flow stop zone. If the flow rate is below the user-configured low flow cutoff limit and the component enters in final stop zone, the respective block valve is closed. **Note**: This feature is used when the main flow control valve is not properly closing due to leaking or signal noise.	

Field	Description	
Low Flow Start/Stop Qty. Options	Sets how the system determines the component low flow start, low flow stop, and low flow restart quantities. Valid values are:	
	User Entered	The system uses a user-entered value to determine the low flow start, low flow stop, and low flow restart quantities. **Note**: If you select this option, then you **must** also enter values in the **Low Flow Start Qty**, **Low Flow Restart Qty**, and **Low Flow Stop Qty** fields on the Component Setup screen.
	Percentage Of Preset Qty. Entered	The system uses a percentage of the preset quantity to determine the low flow start, low flow stop, and low flow restart quantities. **Note**: If you select this option, then the Low Flow Start, Low Flow Restart and Low Flow Stop quantities will be calculated automatically as percentage of preset value. You enter these percentages in the **Low Flow Start Qty. %**, **Low Flow Restart Qty. %**, and **Low Flow Stop Qty. %** fields on the Component Setup screen.
Additive General		
Number of Additives	Sets the number of additives the system uses. Valid values are **1** to **6**, the default value is **0**.	
Selection Method	Sets the method used to select additives. Valid values are:	
	Prompt	Displays all configured additives for selection in the transaction. This is the **default**.
	Discrete Inputs	Requires digital input to select an additive for a specific transaction.
	Recipe Selection	Displays a selectable list of recipes for which additives have been predefined.
	Recipe selection with Multi-rate	Displays a selectable list of recipes in which additives have been predefined but allows different additive injection ratios through predefined recipes.

Field	Description
Additive Units	Sets the unit of volume for additives. Valid values are **cubic centimeters**, **cubic inches**, **gallons**, **liters, barrels, cubic feet,** or **cubic meters**. Click ▼ to display all valid values; the default value is **cubic centimeters**.
Additive K factor Unit	Sets the unit for the additive volume per pulse (TLP:67,x,2) configured. Valid values are **cubic centimeters**, **cubic inches**, **gallons**, **liters, barrels, cubic feet,** or **cubic meters**. Click ▼ to display all valid values; the default value is **cubic centimeters**.
Error Limit	Sets the maximum number of pulses by which the actual feedback can vary from the ideal count before the system issues the Additive Fail alarm. Valid values are **0** to **99**; the default value is **3**.
Clean Line Quantity	Sets the quantity of component delivered at the end of a batch or at the end of all the recipe components without additive injection. This prevents contamination of the next component or batch. Valid values are **0** to **9999**; the default value is **0**. **Note**: This value should **at least equal** the volume of the pipe and loading arm between the point where the additive is injected and the connection to the vehicle.
Flush Output	Sets the TLP which stores output contact. This TLP activates during the delivery of the clean line quantity at the end of batch delivery. Intended for use in multi-stream injection mode, this option is available regardless of the injection mode. If used, however, it activates 10 units **after** the Clean Line Output. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Pump Stop Delay	Sets, in seconds, how long the system waits after the batch ends or a Batch Halt command occurs to close the additive pump. Valid values are **0** to **99**; the default value is **0**.
Clean Line Output	Sets the TLP which stores output contact. This TLP activates during the delivery of the additive clean line quantity at the end of batch delivery. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Additive Err Limit (Control)	Defines, for the Control injection method, the number of injection cycles worth of additive (that is, ideal doses of additive) by which the actual volume of an additive can differ from the ideal volume of an additive at any point in a batch before the system checks percentages before raising an Additive Fail # alarm. Valid values are **0** to **99**; the default value is **1**.

Field	Description	
Calibration Error Code	This **display-only** field shows an error code that may have occurred during the additive calibration process. Valid values are:	
	0	No error
	1	Invalid Additive Due To Injection Method. Selected additive is not configured for control injection method
	2	Invalid Additive Due To Number of Additives Available. Selected additive is more than configured additive in the system.
	3	Additive User Program Not Available or Running.
	4	Additive Calibration Qty Per Injection not configured for Selected additive when injection method is Control.
	5	Injections For Additive Calibration is zero.
	6	K factor not configured.
	7	Meter factor not configured.
Port Owner		
PORT 2 through **PORT 5**	Sets the port owner and protocol for comm ports 2 through 5. Click ▼ to display all valid values. **Note**: Each application should be configured to a unique port. If you configure the same application to two ports, the application captures only the first configured port.	
PORT 2 Timeout through **PORT 5 Timeout**	Sets, in seconds, the time the system waits before triggering a timeout alarm for the comm port. Valid values are **0** to **300**, the default is **10**. **Note**: Enter **0** to disable the alarm.	
Number of Data Items	Sets the number of auxiliary data items the preset supports. The system uses data items when printing transaction tickets and archiving each transaction. You can define up to **5** data items; **0** is the default value. Once you define the number of data items, use the Data Prompt fields to define the text for each prompt. In **manual mode**, the system uses this value to get data items before authorizing a new transaction. In **auto operating mode**, the terminal automation system (TAS) must issue a display message command to get the auxiliary data items from the operator.	

Field	Description
Data Prompt 1—5	Sets up to 5 auxiliary text strings of up to 20 alphanumeric characters that display on the keypad following recipe selection. The system uses these strings for additional verification, if necessary. **Note**: Data Prompt 1 is a **required** field, since the system verifies the result against the database.
Float Data Scaling	Enables you to enter floating point data to the parameters mapped by TLP:64,0,65/66/67/68/69 via the Data Prompt 1 – 5 fields [TLP:63,0,187 through 196]. The Data Prompt fields only allow you to enter U32 data types. The system scales the Data Prompt value using the value you enter here as the denominator. For example: In order to enter a value of 0.5 in a Data Prompt field, enter a value of 5 in the Data Prompt field and enter a value of 10 in the Float Data Scaling field (5/10=0.5).
DI Stop Unloading	Click ... to set the TLP for a digital input to indicate the end of unloading to the preset. If this input is configured and activated, then the DL8000 will STOP unloading.
Num End Trans Prompts	Sets the number of post-transaction informational prompts the preset supports. You can define up to **5** prompts; **0** is the default.
End Transaction Prompt 1—5	Sets up to 5 auxiliary text strings of up to 20 alphanumeric characters that display on the keypad following transaction completion.
Inline Blending	**Note**: These fields display **only** if you select **Inline** as the Unit Type.
Correction After Qty	Sets the gross volume of blend that must be delivered before the system checks for the Inner Error Limit. Valid values are **0** to **9999**; the default value is **100**. **Note**: This field displays **only** if you select **Inline** as the Unit Type.

Field	Description
Inner Error Limit	Sets, as a percentage, the maximum deviation of a stream's current blend ratio from its ideal blend ratio. If the deviation exceeds this value, the system waits for the duration defined in the Blend Control Alarm Delay field before making a new blend correction. The system calculates the current blend ratio using the delivered quantity against the selected delivery type. Valid values are **0** to **20**; the default value is **2**. The system makes a new blend adjustment upon expiration of the error timer. No new adjustments occur if a previous adjustment made reduces the blend errors as desired **or** the blend adjustment window (50% of adjustment volume of the fastest stream) of the previous adjustment is not delivered. **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Blend Adj Volume	Sets a "window" of flow during which blend adjustment occurs **and** completes. Valid values are **0** to **9999**; the default value is **50**. This quantity is based on the delivery type and should be large enough to avoid repeated adjustment and allow sufficient time for streams to achieve the adjusted target flowrates and correct blend ratios. **Note**: This field displays **only** if you select **Inline** as the Unit Type. The defined quantity occurs **only** in high proportion streams.
Rate Reduction	Sets the flowrate reduction the system uses if it cannot maintain a high flowrate for fallback or recovery. Valid values are **0** to **9999**; the default value is **100**. The system calculates the reduction as (high or normal flowrate) – (rate reduction). This reduction represents the reduced rate for the entire blend flowrate. **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Blend Error Method	Sets the method for computing blend ratio adjustments and sensing blend ratio error conditions. **Percent Difference** is the only currently supported value. **Note**: This field displays **only** if you select **Inline** as the Unit Type.

Field	Description
Max Fallback	Sets the maximum number of levels a stream can use to perform a fallback operation. Valid values are **0** to **15**; the default value is **4**. The system calculates the lowest allowed fallback flowrate as (high or normal flowrate) – (max fallback X rate reduction). **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Blend Low Flow Start Qty	Sets the low flow start gross quantity at which the preset switches the blend to high flow zone (that is, it ramps up high proportion streams to high flowrate and starts delivery of low proportion streams). **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Blend Control Delay	Sets, in seconds, how long any stream's blend error or deviation can continuously exceed the Internal Error Limit before the system begins making blend adjustments. Valid values are **0** to **999**; the default value is **5**. **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Low Set Point	Sets a percentage of maximum flowrate that establishes a cut-off target flowrate. Valid values are **1** to **100**; the default value is **20**. If the stream flowrate is above this value, the system uses the defined high flow percentage error. If the flowrate is at or below this value, the system uses the low flow percentage error to define the tolerance band for flowrate. **Note**: This field displays **only** if you select **Inline** as the Unit Type.
Alphanumeric Data Entry Prompts	
Alphanumeric Data Item Prompt Line 1 through **Line 6**	Sets the first through sixth line data prompt for alphanumeric data entry. Enter a maximum of 20 characters. The system stores this value in TLP 64,0,75 to 64,0,80. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only. For details, refer to *Appendix E – Miscellaneous Procedures.*

3. Click **Apply** to save any changes you have made to this screen.
4. Proceed to *Section D.5.4.2* to define preset alarms.

D.5.4.2 Preset Setup – Alarm Setup Tab

Use this tab to define alarms and alarm actions in the preset.

1. Select the **Alarm Setup** tab on the Preset Setup screen. The Alarm Setup screen displays.

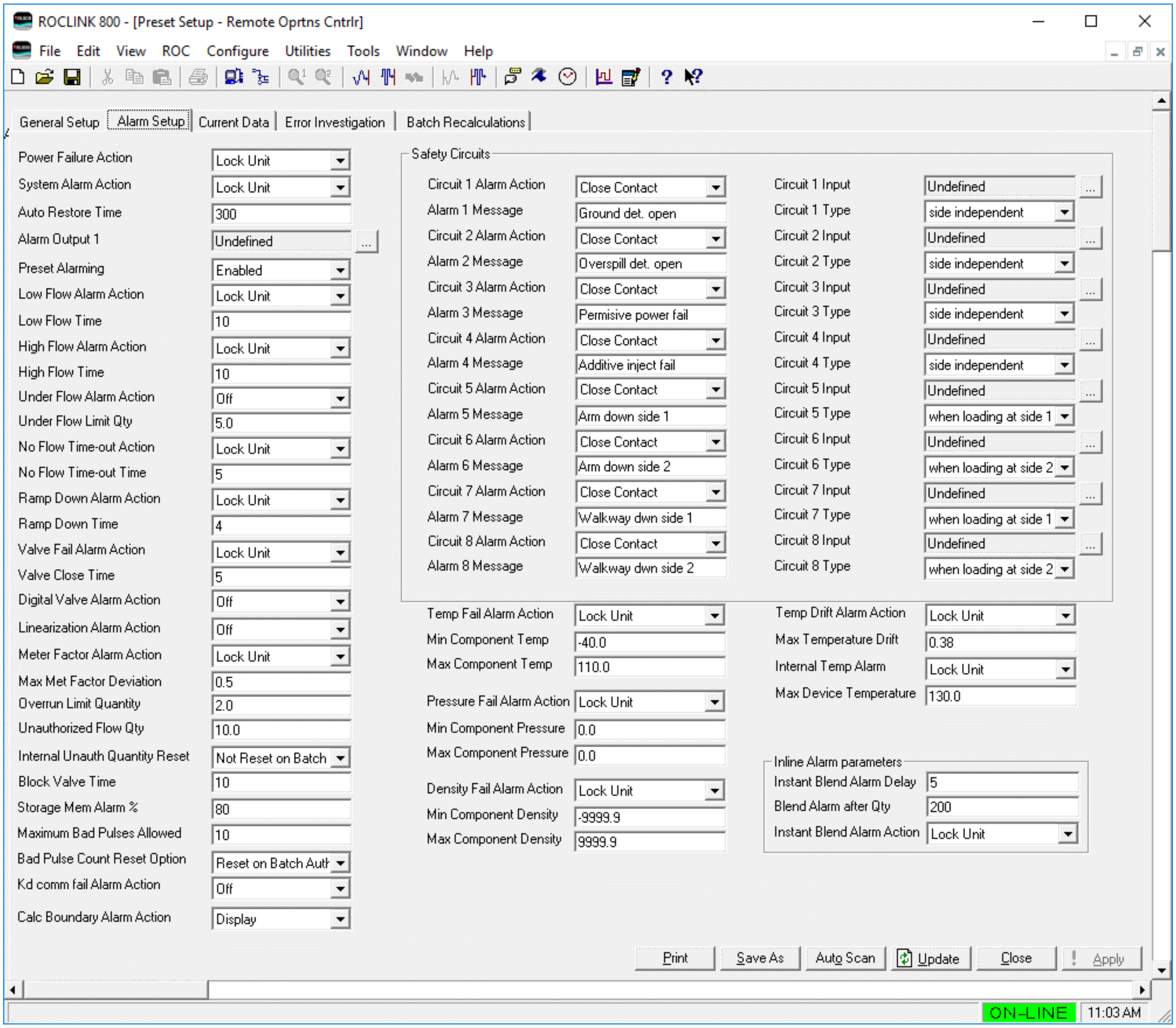


Figure D-29. Preset Setup, Alarm Setup tab

2. Review the values in the following fields.

Field	Description	
Power Failure Action	Sets the response to a power failure. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
System Alarm Action	Sets the response to a system alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Auto Restore Time	Sets, in seconds, how long the system waits before automatically resetting the Parameter Restored alarm. Valid values are **1** to **65,535**; the default value is **300**.	
Alarm Output 1	Sets the TLP which is activated when any alarm achieves a “close contact” or “lock unit” severity. Click … to display a Select TLP screen you use to define the TLP. **Note**: The TLP should be an ACIO or DO point type with an UINT8 data type.	
Preset Alarming	Sets whether the preset writes raised and cleared alarms to the alarm log. Valid values are **Disabled** or **Enabled**; the default is **Enabled**.	

Field	Description	
Low Flow Alarm Action	Sets the response to a low flowrate alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Low Flow Time	Sets, in seconds, the maximum time the stream's current flowrate (if non-zero) can be at or below the minimum flowrate (defined in the **Min Flow Rate** field on the Meter Setup screen) before the low flow alarm occurs. Valid values are **5** to **999**; the default is **10**.	
High Flow Alarm Action	Sets the response to a high flowrate alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
High Flow Time	Sets, in seconds, the maximum time the stream's current flowrate can be at or above the maximum flowrate (defined in the **Max Flow Rate** field on the Meter Setup screen) before the high flow alarm occurs. Valid values are **5** to **999**; the default is **10**.	
Under Flow Alarm Action	Sets the response to a under flow. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely. This is the **default** for this alarm.
	Display	Displays alarm.

Field	Description	
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset.
Under Flow Limit Qty	Sets the quantity of liquid by which the loaded quantity can be less than the preset quantity before the Valve Closed Early Meter # alarm occurs. Valid values are **0.0** to **99.9**; the default is **5.0**.	
No Flow Time-out Action	Sets the response to a no-flow alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
No Flow Time-out Time	Sets, in seconds, the maximum time a flow control valve can be open without a detected flow pulse input before a Timed-out – No Flow Detected Meter # alarm occurs. Valid values are **1** to **99**; the default is **5**.	
Ramp Down Alarm Action	Sets the response to a ramp down condition when the preset cannot reduce the flowrate to a defined lower non-zero flowrate within the time period defined in the **Ramp Down Time** field. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.

Field	Description	
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Ramp Down Time	Sets, in seconds, the maximum time the system attempts to ramp down the flowrate before a Ramp Down alarm occurs. Valid values are **0** to **999**; the default is **4**.	
Valve Fail Alarm Action	Sets the response to a valve fail alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Valve Close Time	Sets, in seconds, the maximum time the system waits for flowrate to reduce to zero after issuing a close valve command to stop a batch. If the flowrate does not reduce to zero within this time, a Valve Fail Meter # alarm occurs. Valid values are **1** to **99**; the default value is **5**. The system issues this alarm when a batch stops due to user stop or any alarm. It is not checked for normal completion of component.	
Digital Valve Alarm Action	Sets the response to a digital valve fail alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely. This is the **default** for this alarm.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset.

Field	Description	
Linearization Alarm Action	Sets the response to a linearization comp # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely. This is the **default** for this alarm.
	Display	Displays alarm; clear to proceed with next batch. **Note**: If you assign this value to the alarm, the system allows you to complete the current batch but you **must** clear this alarm before beginning a new batch.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset.
Meter Factor Alarm Action	Sets the response to a meter factor deviation comp # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm; clear to proceed with next batch. **Note**: If you assign this value to the alarm, the system allows you to complete the current batch but you **must** clear this alarm before beginning a new batch.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.

<table>
<tr><th>Field</th><th colspan="2">Description</th></tr>
<tr><td>Max Met Factor Deviation</td><td colspan="2">Sets the maximum allowable deviation between adjacent meter factors. Value values are 0.0 to 9.999; the default value is 2. The system uses this value to check the Meter Factor Deviation alarm.</td></tr>
<tr><td>Overrun Limit Quantity</td><td colspan="2">Sets the allowable quantity, in excess of the component/batch preset quantity, that can be delivered before the Unable to Close Valve Meter or Overflow Preset alarm occurs. Valid values are 0.0 to 99.9; the default value is 2.

WARNING: Setting this value to zero disables this function and poses a significant safety risk to your site. If your site does not have overrun limit hardware installed, do not set this value to zero.</td></tr>
<tr><td>Unauthorized Flow Qty</td><td colspan="2">Sets the allowable unauthorized gross volume to be recorded as unauthorized flow before the Unauthorized Flow Meter # primary alarm occurs. Valid values are 0.0 to 99.9; the default value is 10.

Note: If you set this value to include a .1 value (that is, 10.1 or 9.1), the system resets the internal unauthorized total (maintained for this alarm) to zero when it authorizes a new batch. You can also disable this alarm by setting this value to 0.</td></tr>
<tr><td rowspan="3">Internal Unauth Quantity Reset</td><td colspan="2">Sets whether the accumulated unauthorized pulses (maintained for the system) reset to 0 when a new batch is authorized. Click ▼ to display all valid values:</td></tr>
<tr><td>Not Reset on Batch auth</td><td>Do not reset the accumulated pulses at the time of batch authorization. This is the default value.</td></tr>
<tr><td>Reset on Batch auth</td><td>Reset the accumulated pulses every time a new batch is authorized.</td></tr>
<tr><td>Block Valve Time</td><td colspan="2">Sets, in seconds, the maximum amount of time required to close a block valve after issuing the close command. If the block valve does not close within this time, the Block Valve Fail comp # alarm occurs.

Note: The four Feedback TLPs defined in the Block Valves frame on the Component Setup screen provide the status of these valves.</td></tr>
</table>

Field	Description	
Storage Mem Alarm %	Sets a percentage of used archive memory at or above which the system raises the Archive Memory Pre full **Info** alarm when authorizing a new transaction or a new batch. This alarm is a pre-warning, informing you that archive storage memory presently used is equal to or more than this configured percentage of total allocated archive storage memory. Valid values are **0** to **100**; the default value is **80**. **Note**: Set this parameter to **0** to disable the Storage memory pre-full alarm.	
Maximum Bad Pulses Allowed	Sets the maximum number of allowable bad pulses at which the system raises the Pulse Security Meter# alarm. Valid values are **0** to **65535**; the default value is **10**.	
Bad Pulse Count Reset Option	Sets an option to reset the accumulated bad pulses received from the APM module for each meter. The DL8000 accumulates bad pulses to raise the Pulse Security Meter# alarm. Click ▼ to display all valid values:	
	Accumulate	Reset counter to 0 when respective Pulse Security Meter# alarm clears.
	Reset on Batch Accumulation	Reset counter to 0 on new batch authorization **or** when respective Pulse Security Meter# alarm clears. This is the **default** value.
Kd comm. Fail Alarm Action	Sets the response if the DL8000 CPU loses communication with the unit's keypad display. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
Calc Boundary Alarm Action	Sets the response to a Calc Boundary alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.

Field	Description	
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Safety Circuits		
Circuit 1 – 8 Alarm Action	Sets the response to an Open state for the discrete input assigned to this function by values defined in the TLPs for Circuit 1 through Circuit 8 Inputs. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1. This is the **default** for this alarm.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset.
Alarm 1 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 1. The default value is **Ground det. open**.	
Alarm 2 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 2. The default value is **Overspill det. open**.	
Alarm 3 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 3. The default value is **Permissive power fail**.	
Alarm 4 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 4. The default value is **Additive inject fail**.	
Alarm 5 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 5. The default value is **Arm down side 1**.	
Alarm 6 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 6. The default value is **Arm down side 2**.	
Alarm 7 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 7. The default value is **Walkway dwn side 1**.	
Alarm 8 Message	Sets the message (up to 20 alphanumeric characters) associated with alarm 8. The default value is **Walkway dwn side 2**.	

Field	Description
Circuit 1 – 8 Input	Sets a TLP to receive the digital input for safety circuits 1 through 8. Click to display a Select TLP screen you use to define the TLP. **Note**: These TLPs should reference an ACIO or DI point type having a U8 data type.
Circuit 1 – 8 Type	Sets the side assignment for safety circuits 1 through 8. The DL8000 scans safety circuits when loading is in progress. The current side is determined by the side detect method and the swing arm position inputs. Click ▼ to display all valid values: **side independent** – Enable regardless of current side. **Note**: This is the **default** for circuit 1 Type through Circuit 4 Type. **when loading at side 1** – Enabled only if loading on side 1. **Note**: This is the **default** for Circuit 5 Type and Circuit 7 Type. **when loading at side 2** – Enabled only if loading on side 2. **Note**: This is the **default** for Circuit 6 Type and Circuit 8 Type.
Temp Fail Alarm Action	Sets the response to a Temperature Fail Meter # alarm. Click ▼ to display all valid values: **Off** – Turns off alarming entirely. **Display** – Displays alarm. **Stop Batch** – Displays alarm and stops batch. **Close Contact** – Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1. **Lock Unit** – Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Min Component Temp	Sets, in units defined on the Liquid Preferences screen, the minimum allowable component temperature below which the Temperature Fail Meter # alarm occurs. Valid values are **–999.9** to **999.9**; the default value is **–40**.

Field	Description	
Max Component Temp	Sets, in units defined on the Liquid Preferences screen, the maximum allowable component temperature above which the Temperature Fail Meter # alarm occurs. Valid values are **–999.9** to **999.9**; the default value is **110**.	
Pressure Fail Alarm Action	Sets the response to a Press Fail Meter # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Min Component Pressure	Sets, in units defined on the Liquid Preferences screen, the minimum allowable component pressure below which the Pressure Fail Meter # alarm occurs. Valid values are **0.0** to **9999.99**; the default value is **0**.	
Max Component Pressure	Sets, in units defined on the Liquid Preferences screen, the maximum allowable component pressure above which the Pressure Fail Meter # alarm occurs. Valid values are **0.0** to **9999.99**; the default value is **0**.	
Density Fail Alarm Action	Sets the response to a Density Fail Meter # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Min Component Density	Sets, in units defined on the Liquid Preferences screen, the minimum allowable component density below which the Density Fail Meter # alarm occurs. Valid values are **–9999. 9** to **9999.9**; the default value is **–9999.9**.	

Field	Description	
Max Component Density	Sets, in units defined on the Liquid Preferences screen, the maximum allowable component density above which the Density Fail Meter # alarm occurs. Valid values are **–9999. 9** to **9999.99**; the default value is **9999.99**.	
Temperature Drift Alarm Action	Sets the response to a Temp Drift Meter # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.
Max Temperature Drift	Sets, as a percentage, the maximum allowable deviation between readings from two different temperature probes (**Temp Probe 1** and **Temp Probe 2** defined on the Meter Setup screen) above which the Temp Drift Meter # alarm occurs. Valid values are **0.0** to **9.999**; the default value is **0.38**.	
Internal Temp Alarm Action	Sets the response to an Internal Temp Fail alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.

Field	Description
Max Device Temperature	Sets, in units defined on the System Analog Input screen, the maximum allowable device temperature above which the Internal Temp Fail alarm occurs. Valid values are **0.0** to **300.0**; the default value is **130**. **Note**: Before completing this field, check the value currently defined on the System Analog Input screen. From the ROCLINK 800 menu bar, select **Configure** > **I/O** > **System AI Points**. When the System Analog Input screen displays, select **5 OnBoardTemp** in the Analog Input field. Verify that the EU Value Units field contains the appropriate value.
Inline Alarm parameters	**Note**: These fields display **only** if you select **Inline** as a **Unit Type** on the General Setup tab.
Instant Blend Alarm Delay	Sets, in seconds, the duration for which a stream's blend error/deviation percentage can continuously exceed the blend tolerance percentage. Valid values are **0** to **999**; the default value is **5**. The system starts the timer at this value when the deviation exceeds the value of the Blend Tolerance Percentage (defined on the General Setup tab) and stops this timer if the deviation equals or is less than the Blend Tolerance Percentage. If the timer expires the Instant Blend alarm occurs. **Note**: This field displays **only** if you select **Inline** as a **Unit Type** on the General Setup tab.
Blend Alarm after Qty	Sets, in units defined on the Liquid Preferences screen, the gross volume of liquid which must flow following a batch start or restart **before** the system checks the blend ratio and begins adjusting the blend and can trigger the Instant Blend alarm. This value must be **greater** than the value you define for the Low Flow Start Qty and **less** than value you define for the Final Stop Quantity (both defined on the Component Setup screen's General Setup tab). Valid values are **0** to **9999**; the default value is **200**. **Note**: This field displays **only** if you select **Inline** as a **Unit Type** on the General Setup tab.

Field	Description	
Instant Blend Alarm Action	Sets the response to an Instant Blend Comp # alarm. Click ▼ to display all valid values:	
	Off	Turns off alarming entirely.
	Display	Displays alarm.
	Stop Batch	Displays alarm and stops batch.
	Close Contact	Displays alarm, stops batch, and activates the TLP defined as Alarm Output 1.
	Lock Unit	Displays alarm, stops batch, activates the TLP defined as Alarm Output 1, and locks the preset. This is the **default** for this alarm.

3. Click **Apply** to save any changes you made to this screen.
4. Proceed to *Section D.5.4.3* to review current preset data.

D.5.4.3 Preset Setup – Current Data Tab

Use this tab to review the preset's current data. If you do not have a terminal automation system (TAS), you can use this screen to review data.

Note: You cannot change any data displayed on this screen.

1. Select the **Current Data** tab on the Preset Setup screen. The Current Data screen displays.

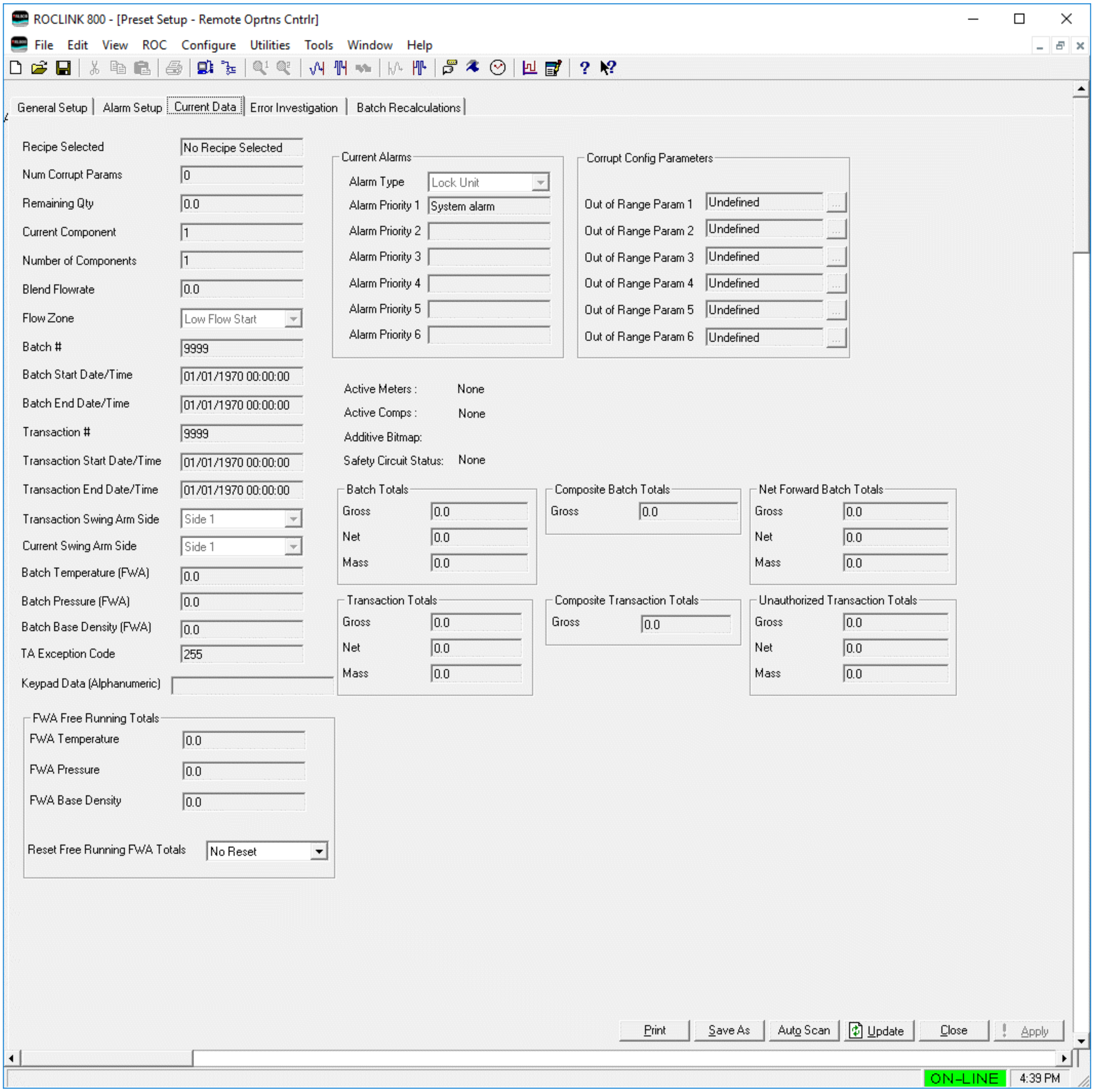


Figure D-30. Preset Setup, Current Data tab

2. Review the values in the following fields.

Field	Description
Recipe Selected	This **read-only** field shows the currently selected recipe.
Num Corrupt Params	This **read-only** field shows the current count of corrupted configuration parameters.
Remaining Qty	This **read-only** field shows the quantity remaining to be delivered for the current batch.

Field	Description
Current Component	This **read-only** field shows the component currently being delivered. **Note**: This field is meaningful only if you select **Sequential (Auto)** as a Unit Type on the General Setup tab.
Number of Components	This **read-only** field shows the total number of components in the currently selected recipe.
Blend Flowrate	This **read-only** field shows either: ▪ The current flowrate of the component being loaded when the batch is in progress if you selected **Sequential (Auto)** as a Unit Type on the General Setup tab **OR** ▪ The current flowrate of the blend of components being loaded when the batch is in progress if you selected **Inline** as a Unit Type on the General Setup tab.
Flow Zone	This **read-only** field shows either: ▪ The current flow zone of the component being loaded when the batch is in progress if you selected **Sequential (Auto)** as a Unit Type on the General Setup tab **OR** ▪ The current flowrate of the blend of components being loaded when the batch is in progress if you selected **Inline** as a Unit Type on the General Setup tab.
Batch #	This **read-only** field shows the system-assigned identification number for **either** the current batch in progress **or** the last completed batch.
Batch Start Date/Time	This **read-only** field shows the time and date the current batch began.
Batch End Date/Time	This **read-only** field shows the time and date the previous batch ended.
Transaction #	This **read-only** field shows the system-assigned identification number for **either** the current transaction in progress **or** the last completed transaction.
Transaction Start Date/Time	This **read-only** field shows the time and date the current transaction began.
Transaction End Date/Time	This **read-only** field shows the time and date the previous transaction ended.

Field	Description
Transaction Swing Arm Side	This **read-only** field shows the swing arm side either for the transaction in progress or the last transaction ended. In the **Auto** operating mode, you can change this parameter until the transaction is authorized. The TAS should set this value prior to authorization. In **Manual** operating mode, this parameter is set internally based on the current side [TLP 63.0.145] when the first batch in the transaction starts. Click ▼ to display all valid values: **Parked state** – Loading cannot take place in this state. **Side 1** – Loading is allowed only on swing arm side 1. **Side 2** – Loading is allowed only on swing arm side 2.
Current Swing Arm Side	This **read-only** field indicates the current side of the product-loading swing arm based on side detect method [TLP: 64,0,7] and the status of two Swing Arm Input switches [TLP: 64,0,8 and 64,0,9]. Click ▼ to display all valid values: **Parked state** – Loading cannot take place in this state. **Side 1** – Swing arm is on side 1. **Side 2** – Swing arm is on side 2.
Batch Temperature (FWA)	This **read-only** field shows the flow-weighted average temperature for **either** the current batch in progress **or** the last completed batch.
Batch Pressure (FWA)	This **read-only** field shows the flow-weighted average pressure for **either** the current batch in progress **or** the last completed batch.
Batch Base Density (FWA)	This **read-only** field shows the flow-weighted average base density for **either** the current batch in progress **or** the last completed batch.
TA Exception Code	This **read-only** field shows the exception raised during the current or last TAS command.
Keypad Data (Alphanumeric)	Shows the alphanumeric data you enter using the keypad display. **Note**: This field shows "::::::::::::::::::::" after you activate the Alphanumeric mode and issuing a display command but have not entered the alphanumeric value using the keypad display.
FWA Free Running Totals	
FWA Temperature	This **read-only** field shows the FWA Temperature totals.

Field	Description
FWA Pressure	This **read-only** field shows the FWA Pressure totals.
FWA Base Density	This **read-only** field shows the FWA Density totals.
Reset Free Running FWA Totals	Click ▼ and select **Reset Totals** to reset the values shown in the FWA Free Running Totals fields.
Current Alarms	These **read-only** fields show any alarms associated with the current batch.
Alarm Type	This **read-only** field shows the type of highest priority alarm currently active.
Alarm Priority 1 through **6**	These **read-only** fields show up to the last six prioritized active alarms.
Corrupt Config Parameters	
Out of Range Param 1 through **6**	These **read-only** fields show the TLP values for up to six out-of-range or corrupt parameters in the configuration setup.
Active Meters	These **read-only** fields show the status of up to four active meters.
Active Comps	These **read-only** fields show the authorized state for up to four components.
Additive Bitmap	These **read-only** fields show which additives have been selected for this transaction.
Safety Circuit Status	These **read-only** fields show the status of safety circuits currently in an unsafe state.
Batch Totals	These **read-only** fields show the gross, net, and mass totals for **either** the current batch in progress **or** the last completed batch.
Transaction Totals	These **read-only** fields show the gross, net, and mass totals for **either** the current transaction in progress **or** the last completed transaction.
Composite Batch Totals	This **read-only** field shows the gross composite total for **either** the current batch in progress **or** the last completed batch. **Note**: This total includes main components and additives delivered in the batch. It is the summation of Gross Batch Del Qty [TLP 63,0,135] and the additive batch volume [TLP 67,x,37] of the downstream additives [TLP 67,x,8].

Field	Description
Composite Transaction Totals	This **read-only** field shows the gross composite total for **either** the current transaction in progress **or** the last completed transaction. **Note**: This total includes main components and additives delivered in the transaction. It is the summation of Gross Transaction Del Qty [TLP 63,0,135] and the additive transaction volume [TLP 67,x,37] of the downstream additives [TLP 67,x,8].
Net Forward Batch Totals	These **read-only** fields show the gross, net, and mass net forward totals for **either** the current batch in progress **or** the last completed batch. The system uses this value in LPG loading, where the reverse flow is also present, and includes the reverse flow through dedicated meters in the net forward batch totals. Totals represent the difference of Gross Batch Del Qty [TLP 63,0,135] and Reverse Meter Total of non-system meters with a flow direction [TLP 75,x,53] configured as **Reverse Flow**. **Note**: These totals update **only** if at least one meter is configured for reverse flow [TLP 75,x,53]. Totals reset when the new batch is authorized.
Unauthorized Transaction Totals	These **read-only** fields show the gross, net, and mass totals for any unauthorized quantities since the end of the last transaction.

3. Click **Close** to display the Directory Tree.
4. Proceed to *Section D.5.4.4* to review specific errors which cause Data Error Alarm.

D.5.4.4 Preset Setup – Error Investigation Tab

Use this tab to elaborate the specific errors which cause Data Error Alarm. This tab also shows other user program configuration statuses.

1. Select the **Error Investigation** tab on the Preset Setup screen. The Error Investigation screen displays.

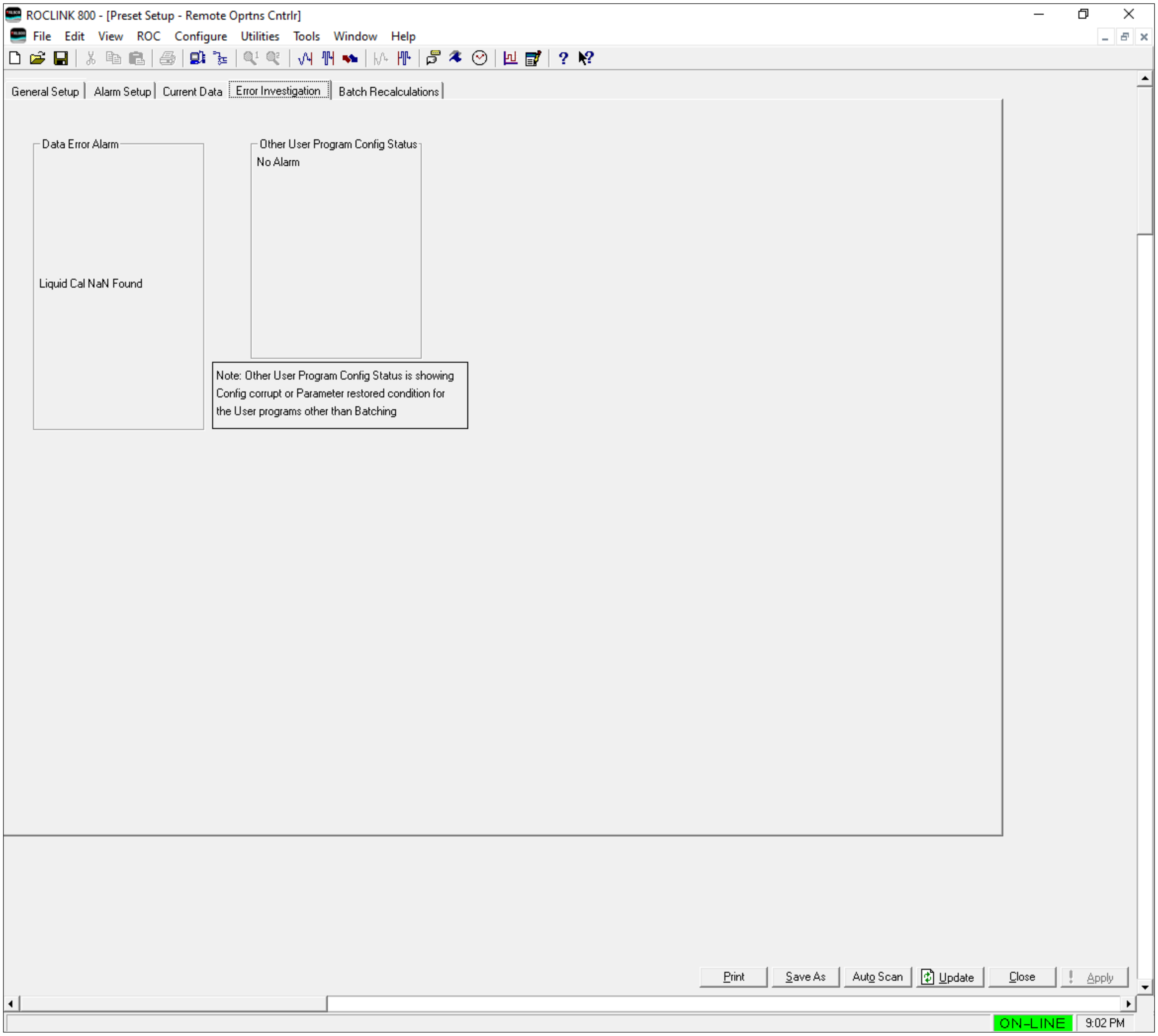


Figure D-31. Preset Setup, Error Investigation tab

2. Review the values in the following fields.

Field	Description
Data Error Alarm	This field shows the different alarm conditions which cause **Data Error Alarms**.
Other User Programs Config Status	This field shows the different alarm conditions which cause **Other User Program Configuration Corrupted Alarms**.

3. Click **Close** to display the Directory Tree.
4. Proceed to *Section D.5.5* to review Batch Recalculations.

D.5.4.5 Preset Setup – Batch Recalculations Tab

Use this tab to configure the type of recalculation for a batch.

1. Select the **Batch Recalculations** tab on the Preset Setup screen. The Batch Recalculations screen displays.

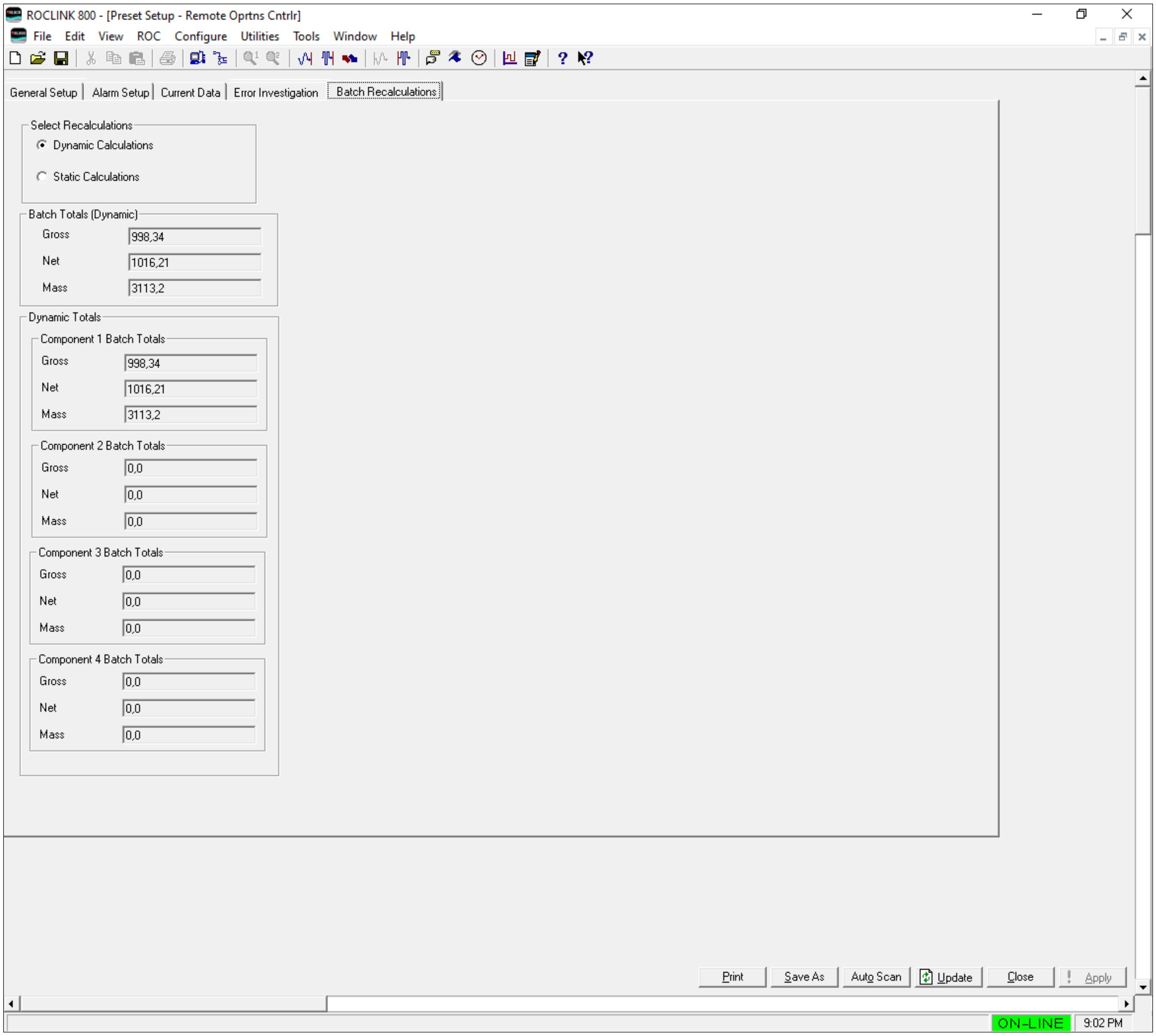


Figure D-32a. Preset Setup, Batch Recalculations tab, Dynamic Calculations

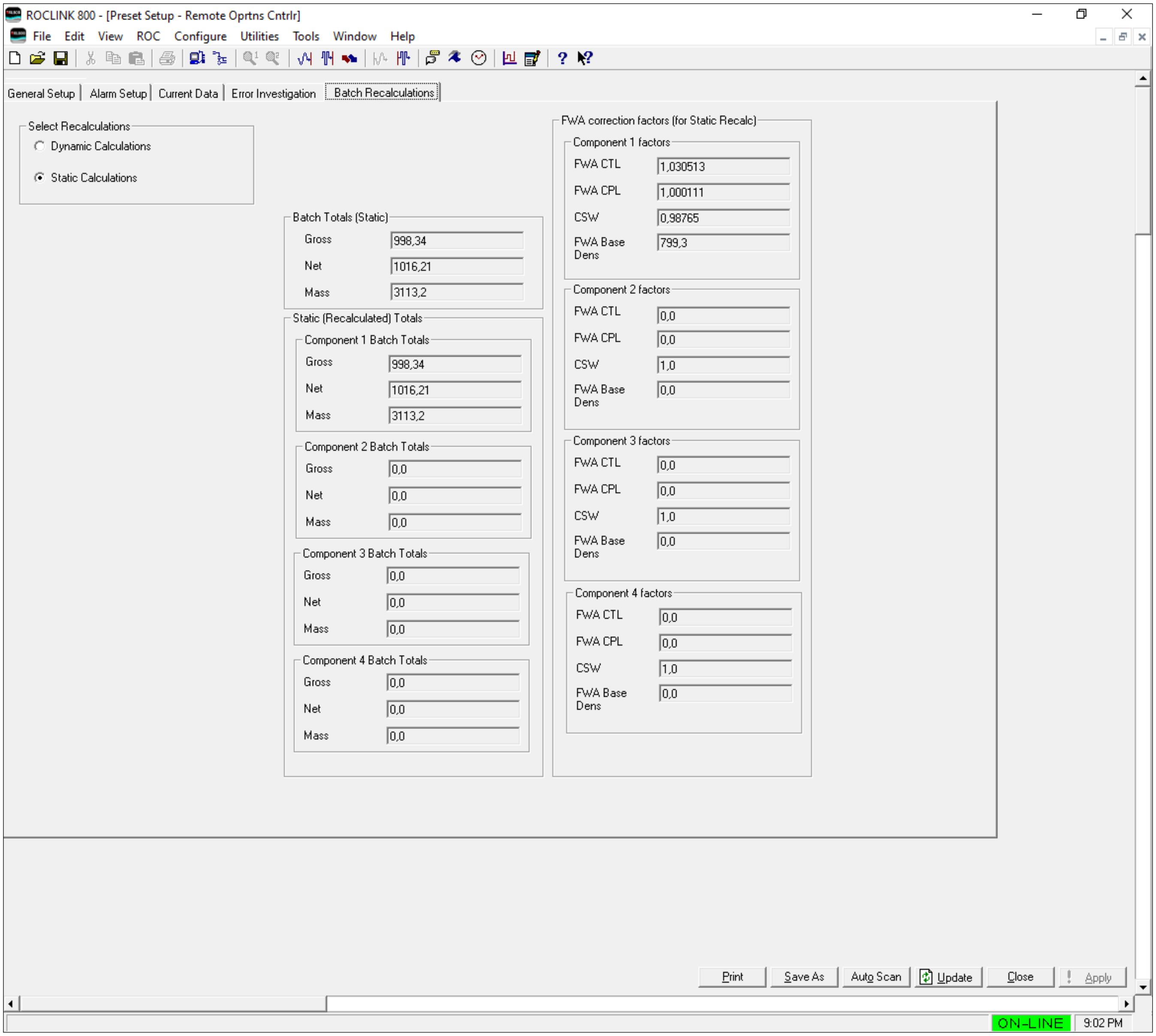


Figure D-32b. Preset Setup, Batch Recalculations tab, Static Calculations

2. Review the values in the following fields.

Field	Description
Select Recalculations	Use this tab to configure the type of recalculation of a specific batch. Choose the option: ▪ Dynamic Calculations – This option, if selected the system uses existing totals only. As these totals gets updated in every calculation cycle, they have been mentioned as dynamic totals. ▪ Static Calculations – This option, if selected the system uses static calculations. This means that batch totals will get calculated at the end of batch using FWA volume correction factors. **Gross Standard Volume (GSV) static:** *Component X Recalculated GSV [TLP:69, X, 118] = Component X recalculated Gross Volume [TLP:69, X, 117] x Avg Component CTL(FWA) [TLP: 69, X, 101] x Avg Component CPL(FWA) [TLP: 69, X, 102]* For the net standard value calculations parameter CSW [TLP:73, X, 94] shall be used. **Net Standard Volume (NSV) static:** *Component X Recalculated Net Standard Volume [TLP:69, X, 121] = Component X Recalculated GSV [TLP:69, X, 118] x CSW factor [TLP:73, X, 94]*
Batch Totals (Dynamic)	These **read-only** fields show the gross, net, and mass batch totals. **Note**: These fields display **only** if you select **Dynamic Calculations** as the recalculations option. Refer to *Figure D-32a*.
Dynamic Totals	These **read-only** fields show the **Component 1 Batch 1 Totals** through **Component 4 Batch Totals** (gross, net, and mass). **Note**: These fields display **only** if you select **Dynamic Calculations** as the recalculations option. Refer to *Figure D-32a*.
Batch Totals (Static)	These **read-only** fields show the gross, net, and mass batch totals. **Note**: These fields display **only** if you select **Static Calculations** as the recalculations option. Refer to *Figure D-32b*.
Static (Recalculated) Totals	These **read-only** fields show the **Component 1 Batch 1 Totals** through **Component 4 Batch Totals** (gross, net, and mass). **Note**: These fields display **only** if you select **Static Calculations** as the recalculations option. Refer to *Figure D-32b*.

Field	Description
FWA correction factors (for Static Recalc)	These **read-only** fields show the Flow Weighted Average (FWA) correction factors (FWA CTL, FWA CPL, CSW and FWA Base Dens) for **Component 1 Factors** through **Component 4 Factors**. **Note**: These fields display **only** if you select **Static Calculations** as the recalculations option. Refer to *Figure D-32b*.

3. Click **Close** to display the Directory Tree.
4. Proceed to *Section D.5.5* to define recipes.

D.5.5 Recipe Setup

Use this screen to define recipes.

To access this screen:

1. Double-click **Display #12, Recipe Setup**.
2. Double-click **#1.** The screen displays:

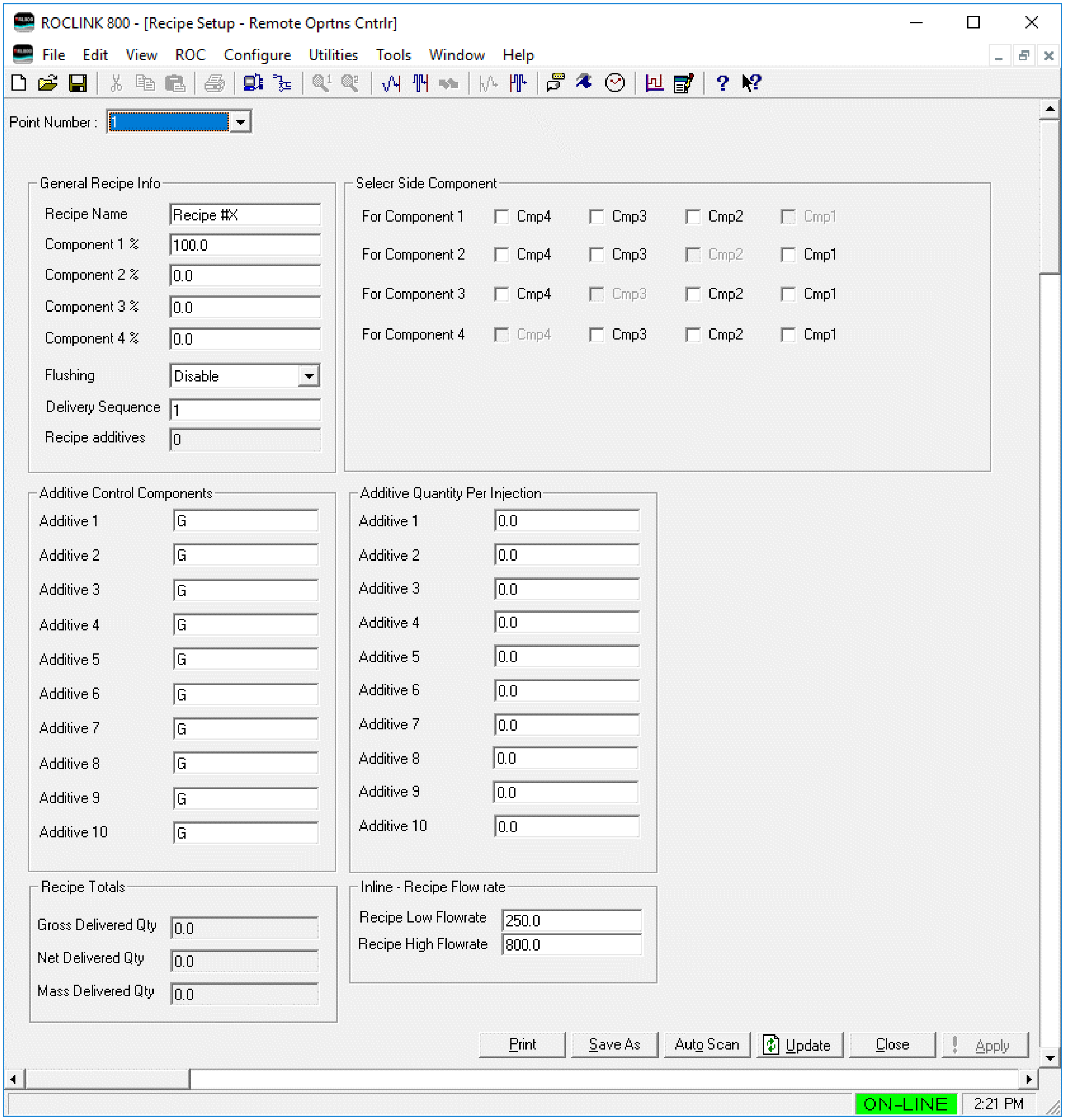


Figure D-33. Recipe Setup Screen

3. Review the values in the following fields.

Field	Description
Point Number	Sets the number of the recipe to define. Click ▼ to display all valid values. You can define up to 30 recipes.
General Recipe Info	
Recipe Name	Sets a name, of up to 20 alphanumeric characters, associated with the selected recipe.
Component 1 % through **Component 4 %**	Sets the percentage of the component to be delivered in the batch. Valid values are **0** to **100**. The default value for component 1 is **100**; the default for components 2-4 is **0**. **Note**: **0** indicates the component is not being used.
Flushing	Sets whether flushing occurs in the recipe. Valid values are **Disable** (do not flush) or **Enable** (flush); the default value is **Disable**.
Delivery Sequence	Sets **either** the order in which each component is added to the blend (for **sequential** blending) **or** indicates the proportion of the component (for **inline** blending). The definition is based on the value in the **Unit Type** field on the Preset Setup screen's General Setup tab: **Sequential** – Indicates the sequence in which all components are added to the blend. **312** indicates that component 3 is added first, followed by component 1, then component **2**. **Inline** – Indicates whether the component is a high proportion (0) or low proportion (1). **010** indicates that the first and third components are high-proportion and the second component is low-proportion (delivered only during high flow). The default value is **1**.
Recipe Additives	Sets the status of each additive in the recipe, where **1** enables the additive and **0** disables the additive. For example, **100110** indicates that additives 1, 4, and 5 are enabled for this recipe and additives 2, 3, and 6 are disabled for this recipe. The default value is 0 (no additive is enabled).

Field	Description
Select Side Component 1 through **Component 4**	Sets the components injected upstream to the wild component 1 through 4 as the side stream component for the selected recipe. The default is unchecked (no side components for the recipe). Each bit starting from LSB is used for one side component. Bit 0 is used for component 1. If the bit is set to 1, then the side component needs to be injected. If the bit is set to 0, then the side component is not injected. **Note**: These fields display **only** if you **Enable** Side Stream Blending on the General Setup tab on the Preset Setup screen.
Additive Control Components 1 through **10**	Sets the components for each of ten additives, whose flow total should be considered to control the Ratio output. Each character represents one component, starting from the left side for component 1. Valid values are: **G** Use gross quantity of component. **S** Use net quantity of component. **M** Use mass quantity of component. **X** Don't use quantity of component.
Recipe Totals	These **read-only** fields show the gross, net, and mass delivered quantities of liquid for this recipe.
Additive Quantity Per Injection Additive 1 through **Additive 10**	Sets the required per-injection quantity, in additive units defined on the General Setup tab on the Preset Setup screen, for each of six additives. (The value entered in the Additive Ratio Quantity fields controls the number of injections.) Valid values are **0** to **9999999999.9999**; the default for each field is **0**. If you enter a value less than 0.0000001, the system considers it as **0**. For additives using the **control injection** method, the system uses these fields to calculate ideal pulses per injection. Configure these values so that the ideal pulses per injection is not less that one. For additives using the **metered injection** method, the system uses these fields to scan for additive high and low alarms. Set this value to **0** to prevent these alarms. Finally, the system uses these fields to calculate the additive volume in the preset quantity entered if you set the Preset Additive Option (on the General Setup tab) to **Inclusive** and the Injection Method (on the Additive Setup screen) to **Control**.
Inline – Recipe Flowrate	**Note**: These fields display **only** if you select **Inline** as the Unit Type on the General Setup tab on the Preset Setup screen.

Field	Description
Recipe Low Flowrate	Sets the low flowrate start setpoint for the batch recipe loading profile. Valid values are **0** to **99999.9**; the default value is **250**. This target flowrate is always a delivery type based flowrate.
Recipe High Flowrate	Sets the high flowrate setpoint for the batch recipe loading profile. Valid values are 0 to 99999.9; the default value is 800. This target flowrate is always a delivery type based flowrate.
Additive Ratio Quantity **Additive 1** through **Additive 10**	Sets the quantity, as units defined on the Liquid Preferences screen, for each of ten additives. Valid values are **0** to **9999**; default for each field is **40**. The indicated quantity of base products controls one injection cycle for a given additive. The system uses these fields **only** for recipes with multi-rate selection methods. **Note**: These fields display **only** if you select **Recipe Selection with Multi Rate** as an additive selection method on the General Setup tab on the Preset Setup screen.

4. Click **Apply** to save any changes you have made to this screen.
5. Click **Close** to display the Directory Tree.
6. Proceed to *Section D.5.6* to define valve parameters.

D.5.6 Valve Setup

Use this screen to define valve parameters.

Note: This screen's fields change based on the value you define (**Digital** or **2-Stage**) in the Valve Type field on the Preset Setup screen's General Setup tab.

To access this screen:

1. Double-click **Display #13, Valve Setup**.
2. Double-click **#1.** The screen displays:

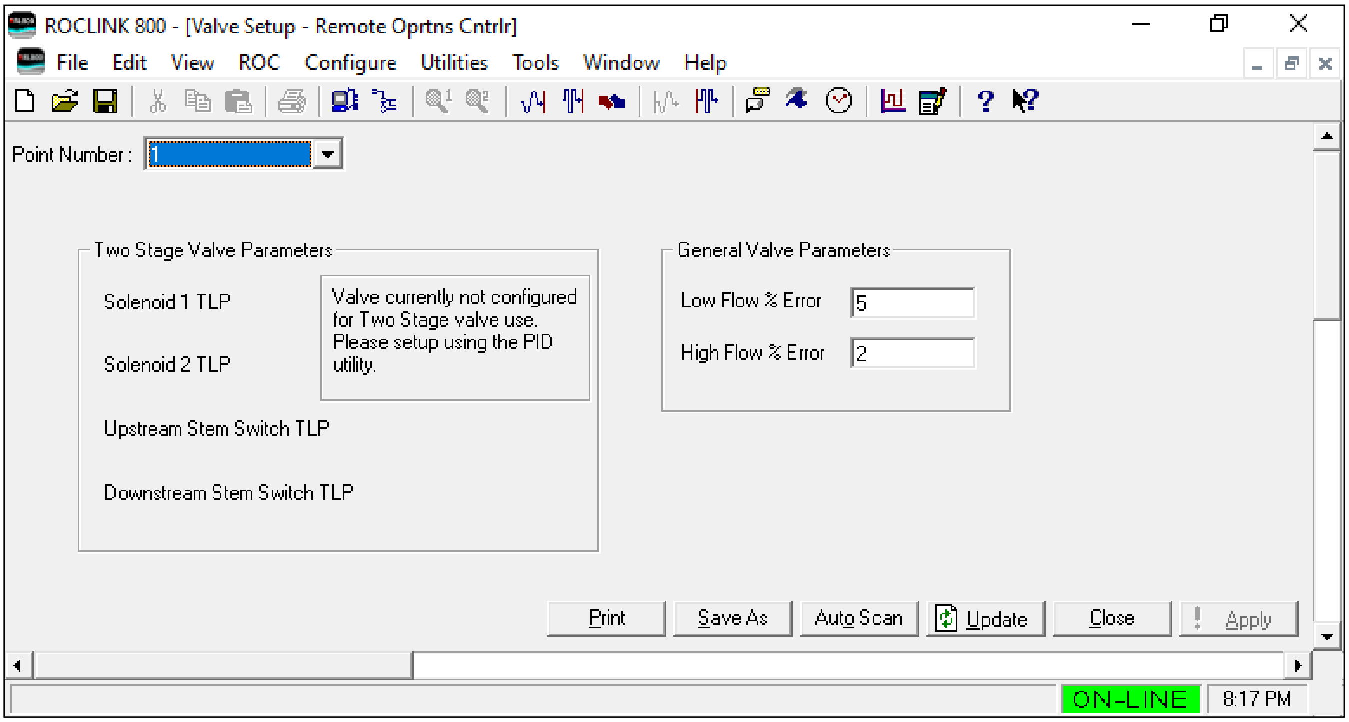


Figure D-34. Valve Setup Screen

3. Review the values in the following fields.

Field	Description
Point Number	Sets the number of the valve to define. Click ▼ to display all valid values. You can define up to four valves.
Solenoid 1 TLP	Sets the output status contact TLP for the first (upstream) solenoid. Click … to display a Select TLP dialog box you use to define the TLP. This TLP should reference an ACIO or DO point type having a U8 data type. **Note**: If you have selected a digital value type (on the Preset Setup screen's General Setup tab), a message displays indicating that you must use a PID loop to configure this value.
Solenoid 2 TLP	Sets the output status contact TLP for the second (downstream) solenoid. Click … to display a Select TLP dialog box you use to define the TLP. This TLP should reference an ACIO or DO point type having a U8 data type. **Note**: If you have selected a digital value type (on the Preset Setup screen's General Setup tab), a message displays indicating that you must use a PID loop to configure this value.

Field	Description
Upstream Stem Switch TLP	Sets the output status contact TLP for the first (upstream) stem switch. Click ... to display a Select TLP dialog box you use to define the TLP. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Downstream Stem Switch TLP	Sets the output status contact TLP for the second (downstream) stem switch. Click ... to display a Select TLP dialog box you use to define the TLP. **Note**: This TLP should reference an ACIO or DO point type having a U8 data type.
Low Flow % Error	Sets the allowable percentage of difference between the actual low flowrate and the programmed low flowrate that can occur before the system sends a flowrate adjustment command to the flow control valve. Valid values are **2** to **10**; the default value is **2**. **Note**: Higher values may affect measurement accuracy, since the flowrate may to vary over a wider range without being controlled. This deadband is in effect only when a low flowrate is established. It is not in effect when the flowrate is changing to a low flowrate during startup or shutdown.
High Flow % Error	Sets the allowable percentage of difference between the actual high flowrate and the programmed high flowrate (setpoint) that can occur before the system sends a flowrate adjustment command to the flow control valve. Valid values are **2** to **10**; the default value is **5**. **Note**: Higher values may affect measurement accuracy, since the flowrate may to vary over a wider range without being controlled. This deadband is in effect only when you have established a high flowrate setpoint.

4. Click **Apply** to save any changes you have made to this screen.
5. Click **Close** to display the Directory Tree.
6. Proceed to *Section D.6* to configure the keypad display.

D.6 Keypad Display

Use the tabs (Display Properties, PINs, and Dynamic Data) on the Navigation Display screen to define parameters that control the preset keypad.

To access this screen:

1. From the Directory Tree, double-click **User Program.**
2. Click **Program #6, KeypadDisplay**.
3. Double-click **Display #46, Navigation Setup**. The screen displays:

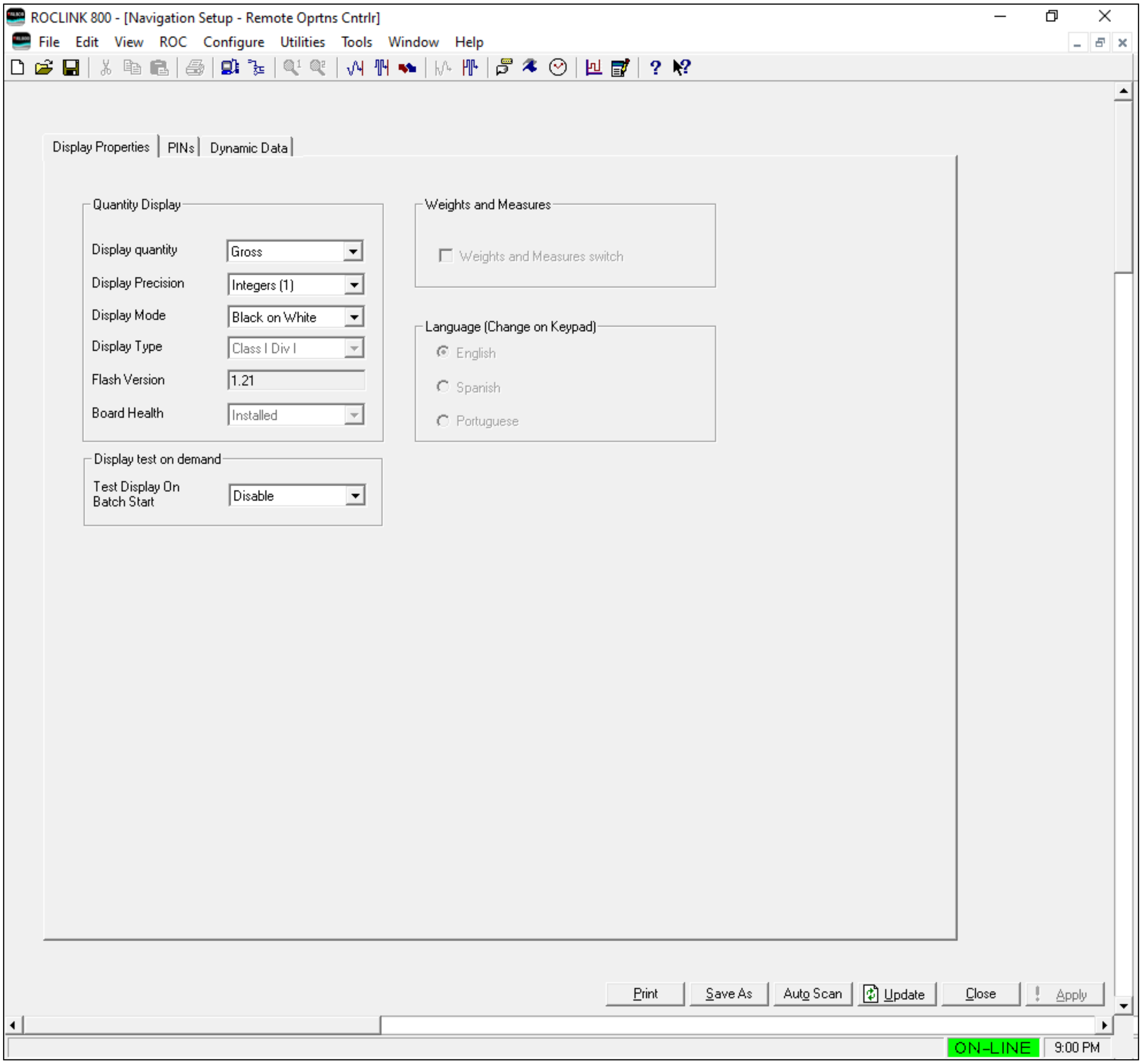


Figure D-35. Navigation Display Screen

Note: The Navigation Display screen has a tab format. *Sections D.6.1* through *D.6.3* discuss the requirements for each Navigation Display screen tab.

D.6.1 Navigation Display – Display Properties Tab

Use this tab (which displays when you access the Navigation Display screen) to define general display properties for the preset keypad.

1. Select the **Display Properties** tab on the Navigation Setup screen. The Display Properties screen displays.

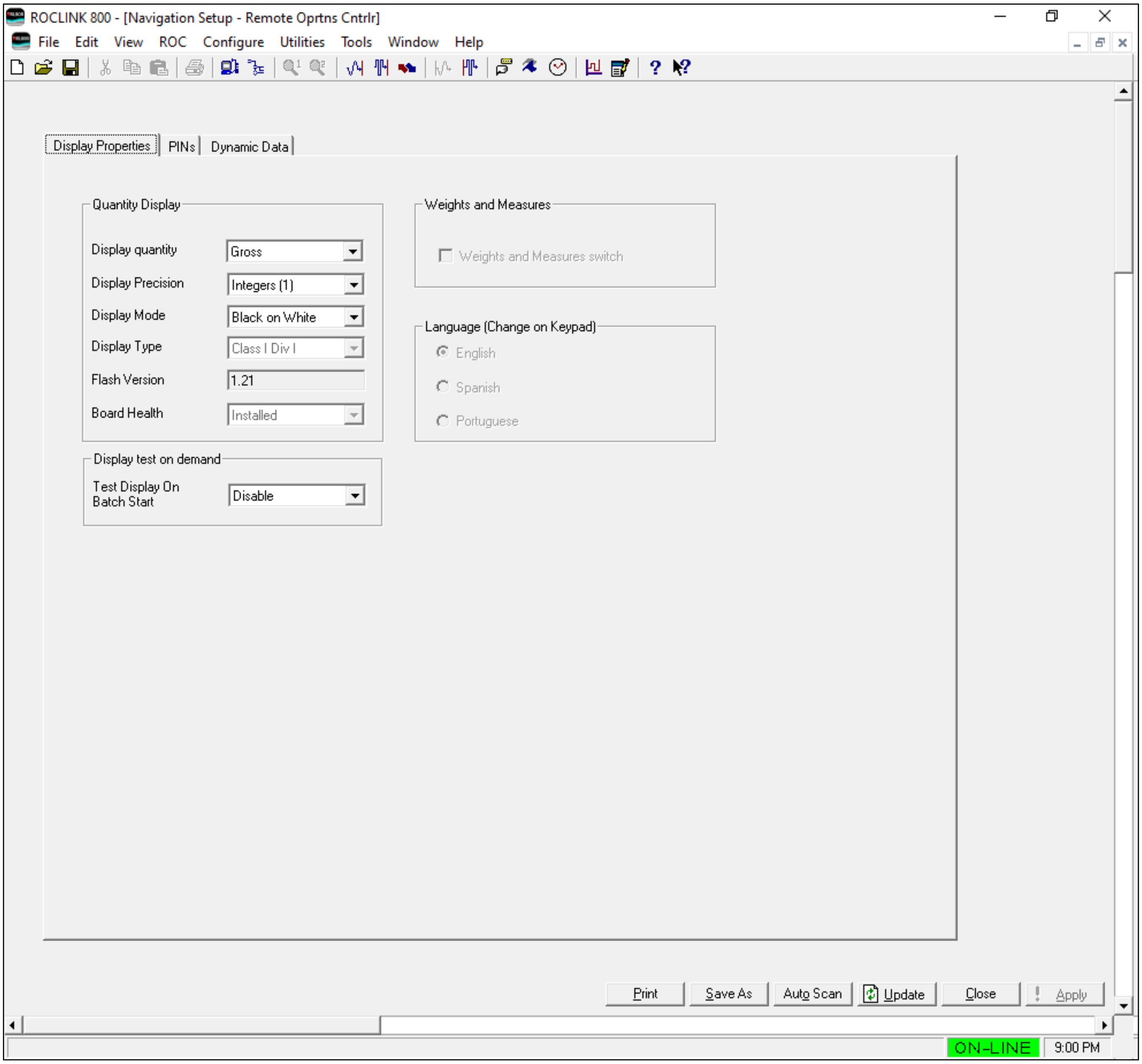


Figure D-36. Navigation Display, Display Properties tab

2. Review the values in the following fields.

Field	Description
Display Quantity	Sets the quantity displays on the keypad. Valid values are **Gross** (the **default**) **Standard**, or **Mass**. Click ▼ to display all valid values:

Field	Description
Display Precision	Sets the level of unit precision displayed on the loading screen. Valid values are **Integers (1)** (the default); **Tenths (0.1)**, or **Hundreths (0.01)**. Click ▼ to display all valid values.
Display Mode	Sets whether the loading screen displays black letters on a white background (**Black on White**) or white letters on a black background (**White on Black**). The default value is **Black on White**.
Last Key Press	Shows the last key pressed on the display. **Note**: You must be in **Auto Scan** mode for this field to show the display's actions.
Display Type	Sets the Class and Division rating for the display type. The system currently supports only **Class 1 Div 1**.
Flash Version	This **read-only** field shows the version of firmware stored in the display memory.
Board Health	This **read-only** field shows the status of the LCD board. Valid values are **Not Installed**, **Installed**, and **LCD Error**.
Weights and Measures	Indicates whether the Weights and Measures switch is active on the display. **Note**: You must be in **Auto Scan** mode for this field to show the display's actions.
Language	Sets the language shown on the display. **English** is the default value.

3. Click **Apply** to save any changes you made to this screen.
4. Proceed to *Section D.6.2* to define personal identification numbers (PINs).

D.6.2 Navigation Display – PINs Tab

Use this screen to define up to 100 personal identification numbers (PINs) operators use to gain access to the system to resolve alarms.

1. Select the **PINs** tab on the Navigation Setup screen. The PINs screen displays.

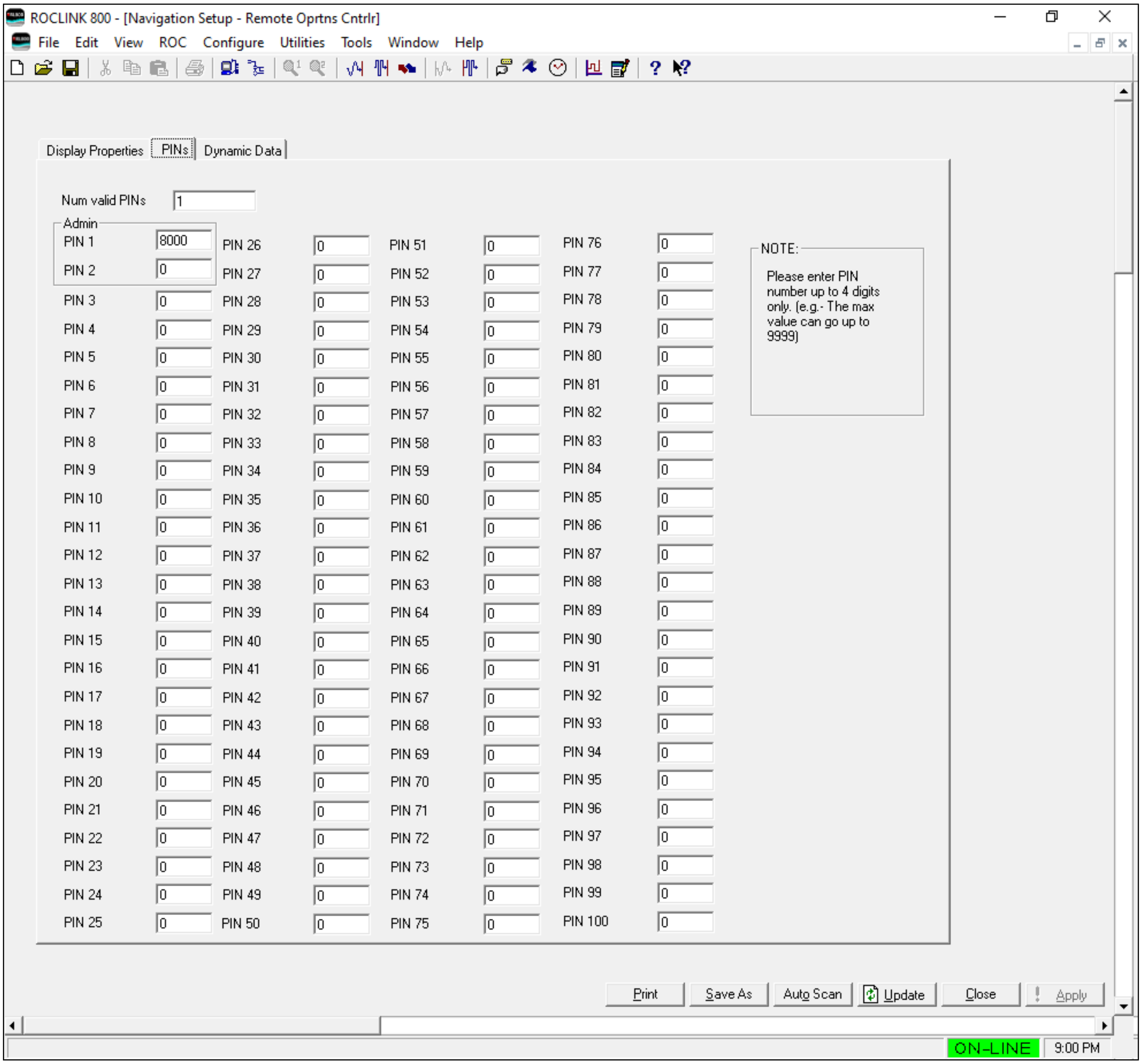


Figure D-37. Navigation Display, PINs tab

2. Review the values in the following fields.

Field	Description
Num valid PINs	Sets the total number of valid PINs. Valid values are **0** to **100**; the default is **1**.

Field	Description
PIN1 through **PIN100**	Sets a specific 4-digit password for each PIN. **Note**: The first two PINs (PIN 1 and PIN 2) are always intended for administrative tasks (calibration, configuration, or changing the mode). If you set the value in the **Num valid PINs** field to more than **2**, the indicated number of driver-designated PINs (in excess of **2**) can perform these administrative functions **in addition to** standard driver functions (clear alarms, change backlight, change contrast, and change language).

3. Click **Apply** to save any changes you made to this screen.
4. Proceed to *Section D.6.3* to define dynamic data parameters.

D.6.3 Navigation Display – Dynamic Data Tab

Use this screen to define up to 17 additional dynamic parameters (such as flowrate, quantity loaded, quantity remaining, or meter factors) that appear on the right side of the display during the loading sequence. You associate each custom tag with a specific TLP.

The first five parameters (defined on Loading Screen 1) display on the standard loading screen. To access parameters defined on Loading Screen 2 or Loading Screen 3, an operator presses ➔ or 🡠.

Note: Recipe is the only predefined tag.

1. Select the **Dynamic Data** tab on the Navigation Setup screen. The Dynamic Data screen displays.

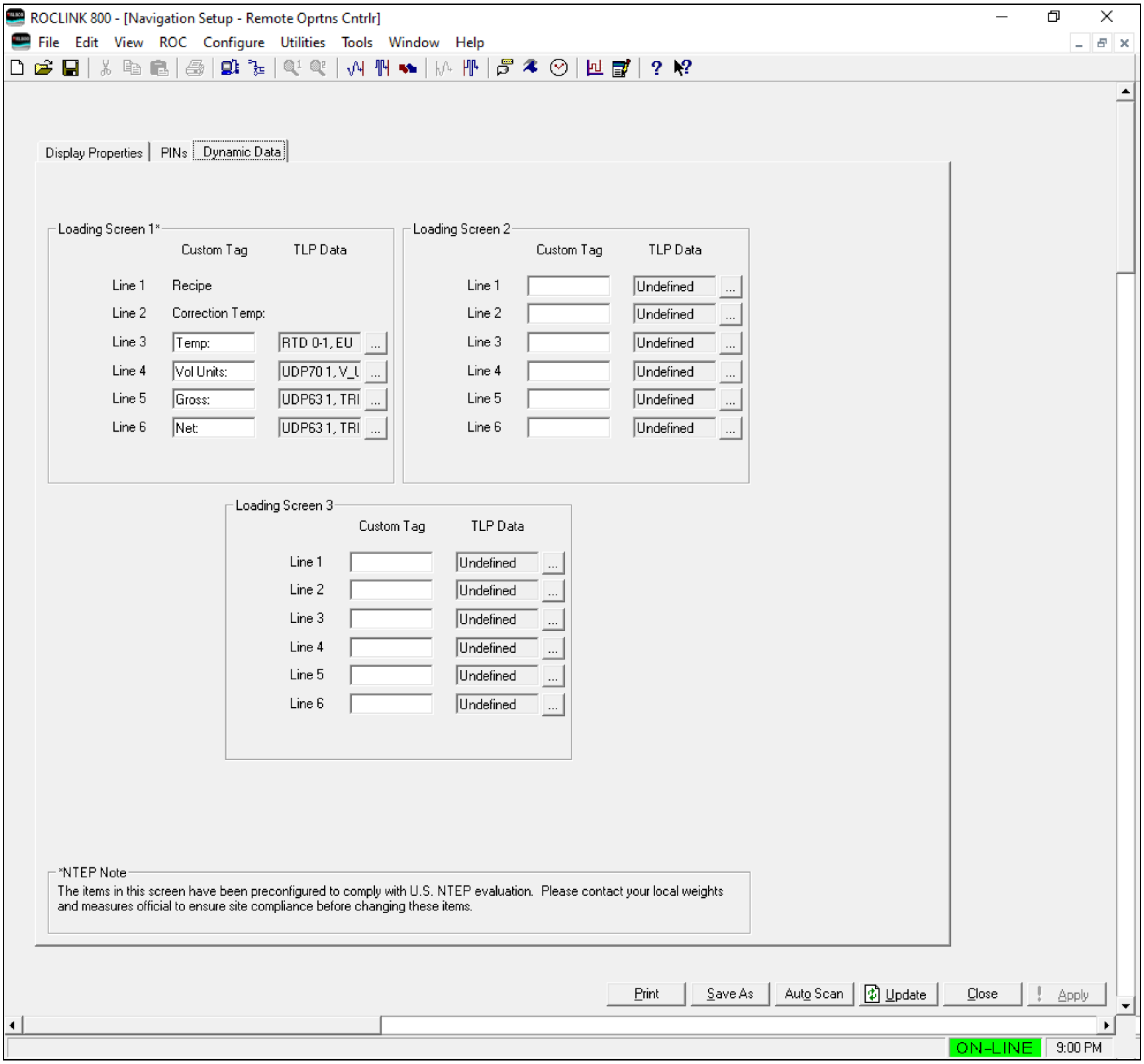


Figure D-38. Navigation Display, Dynamic Data tab

2. Review the values in the following fields.

Field	Description
Custom Tag	Sets a label of up to 10 alphanumeric characters for the displayed value. **Note**: **Recipe** is the only predefined label.
TLP Data	Sets the TLP associated with the custom tag. Click ... to display a Select TLP screen you use to define the TLP.

3. Click **Apply** to save any changes you made to this screen.

4. Click **Close** to display the Directory Tree.

5. Proceed to *Section D.6.4* to configure the DL8000 communication port used by the keypad display.

D.6.4 Comm Port Ownership

Use the Comm Port screen to assign ownership of the Comm2 communications port to the DL8000.

1. Select **ROC** > **Comm Ports**. The Comm Port screen displays.

2. Click ▼ in the Comm Ports field to access and select **COMM2**.

3. In the Baud Rate frame, select **57.6 K**.

4. In the Port Owner frame, select **LCD**.

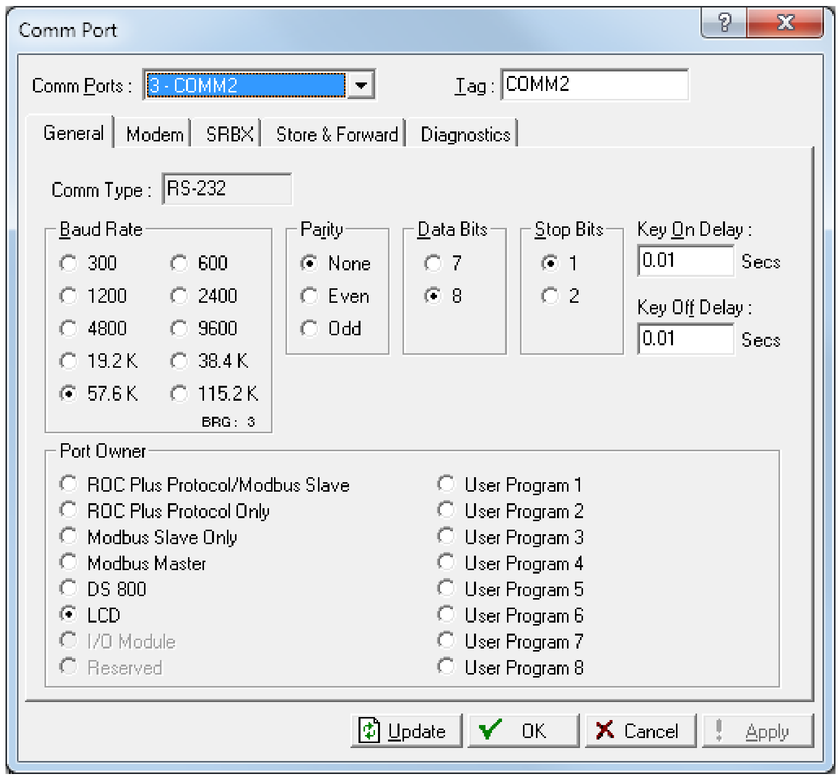


Figure D-39. Comm Port Screen

5. Click **Apply** to save the changes you made to this screen.

Note: The Keypad display uses Port 2 (RS232 port on CPU card) for communication with DL8000. Communication failure occurs if you change the baud rate or port owner for Port 2. If this occurs, reconfigure the port parameters by using ROCLINK 800.

---

6. Proceed to *Section D.7* to save your configuration.

D.7 Saving the Configuration

Whenever you modify or change a configuration, it is a good practice to save the final configuration to memory. To save the configuration:

1. Select **ROC** > **Flags** from the ROCLINK menu bar. The Flags screen displays:

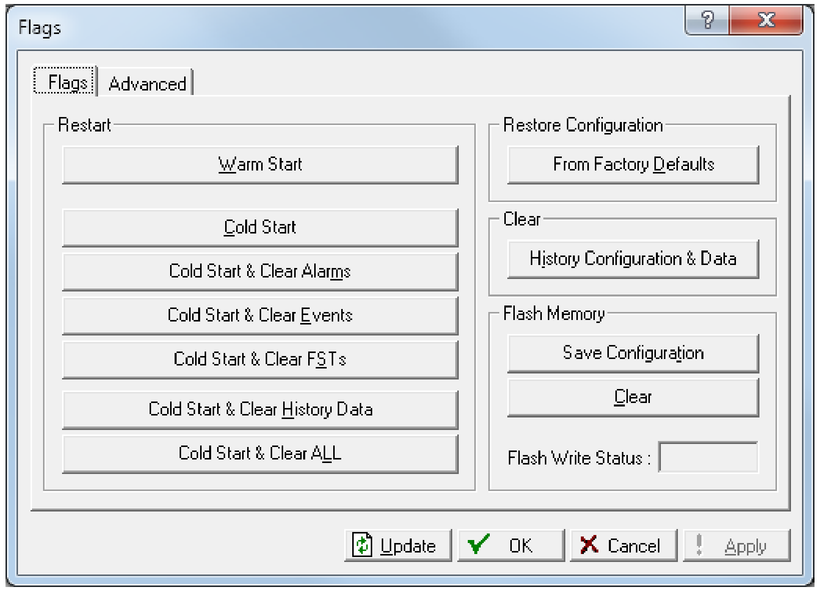


Figure D-40. Flags Screen

7. Click **Save Configuration**. A verification message displays:

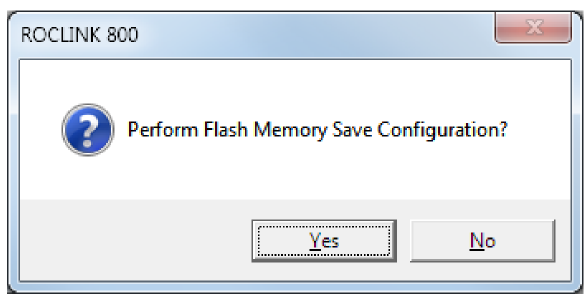


Figure D-41. Perform Screen

8. Click **Yes** to begin the save process. The Status field on the Flags screen displays *In Progress*. When the process ends, the Status field on the Flags screen displays *Completed*.

9. Click **Update** on the Flags screen. This completes the process of saving your new configuration.

Note: For archival purposes, you should also save this configuration to your PC’s hard drive or a removable media (such as a diskette or flash drive) using the **File > Save Configuration** option on the ROCLINK 800 menu bar.

Appendix E – Miscellaneous Procedures

In This Chapter

E.1 Configuring Alphanumeric and Multiple Line Display

Prompts that display on the keypad ("data items") of the standard DL8000 accept only numeric data. This program enables the keypad to accept alphanumeric characters. Both the Preset and the generic Modbus protocols support this feature. Existing prompts with data type UINT32 continue to work as usual.

Note: The Transaction History program does not archive alphanumeric values.

The data item of the standard DL8000 programs accepts numeric data entry only. The Alphanumeric program allows the user to enter alphanumeric characters to the data item.

E.1.1 Preset Setup Screen

The Preset Setup screen has five tabs. Only the General Setup and Current Data tabs that you can access the Alphanumeric Data.

To access this screen:

1. From the Directory Tree, select **User Program** > **Program #5, Batching**.
2. Double-click **Display #11, Preset Setup**. The Preset Setup – screen displays, showing the General Setup tab:

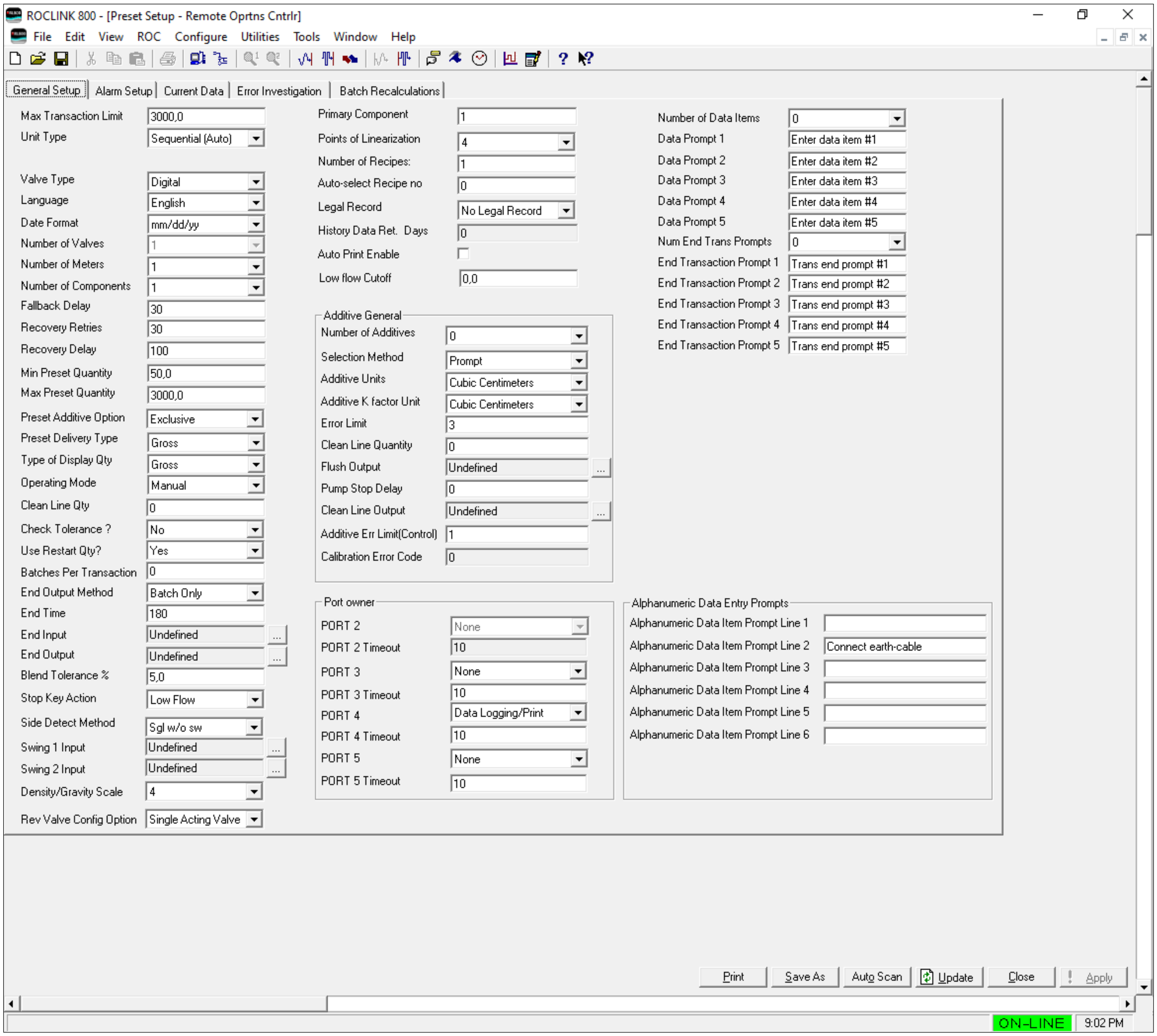


Figure E-1. Preset Setup Screen

Refer to *Section E.1.2* through *Section E.1.3* to configure the General Setup and the Current Data tabs.

E.1.2 Preset Setup – General Setup Tab

Use this screen (which displays when you first access the Preset Setup screen) to configure the Alphanumeric data item prompt lines.

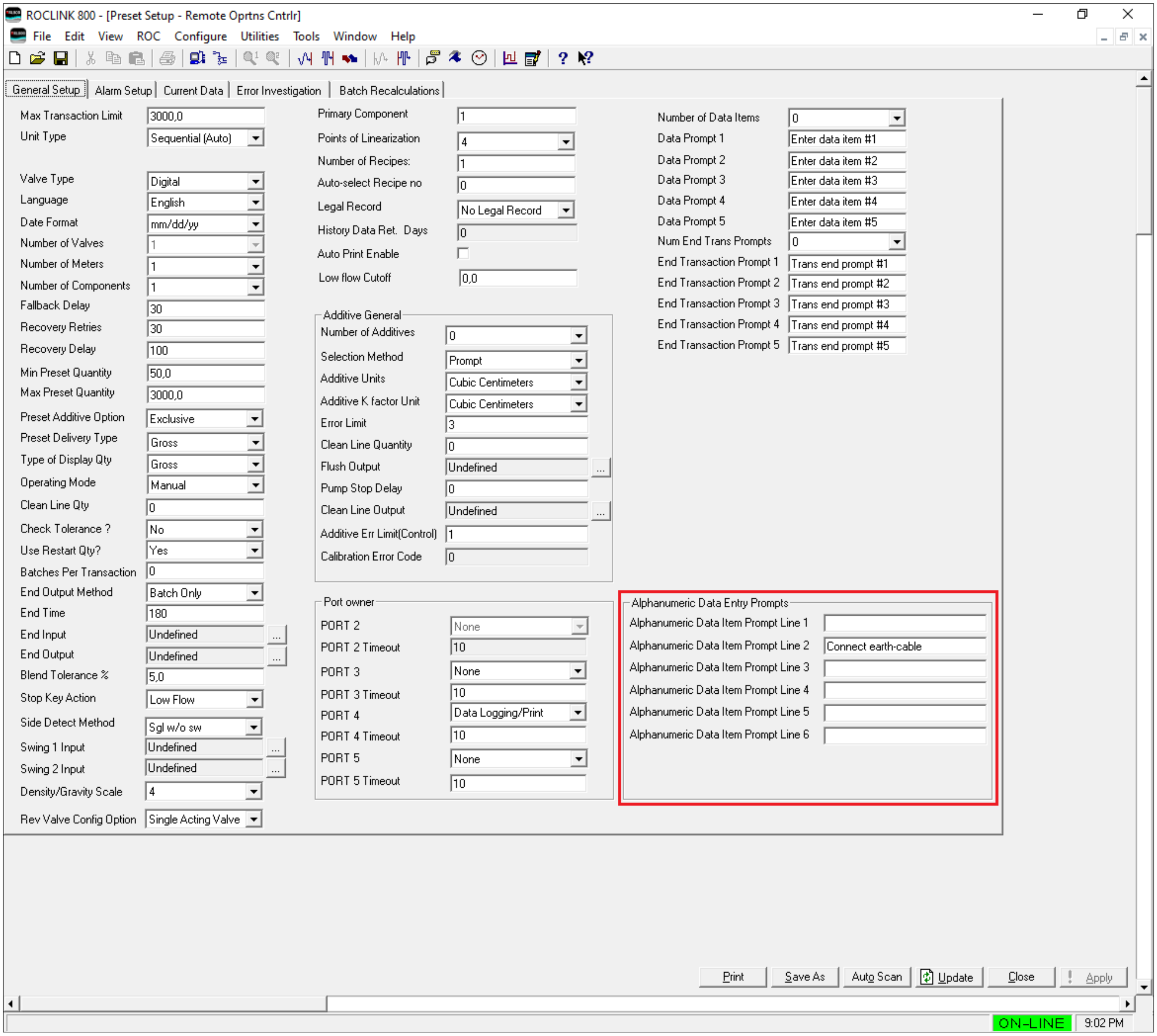


Figure E-2. Preset Setup Screen – General Setup tab

1. Review the values in the following fields:

Field	Description
Alphanumeric Data Item Prompt Line 1	Sets the first line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,75. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.

Field	Description
Alphanumeric Data Item Prompt Line 2	Sets the second line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,76. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.
Alphanumeric Data Item Prompt Line 3	Sets the third line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,77. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.
Alphanumeric Data Item Prompt Line 4	Sets the fourth line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,78. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.
Alphanumeric Data Item Prompt Line 5	Sets the fifth line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,79. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.

Field	Description
Alphanumeric Data Item Prompt Line 6	Sets the sixth line of data prompt for alphanumeric data entry. Enter a maximum of 19 characters. The system stores this value in TLP 64,0,80. **Note**: The data prompt lines can be configured via the DL8000 keypad display Setup/Configuration > System > Prompt menu. Due to display limitation length of data prompt line, you can set this field for up to 19 characters only.

2. Click **Apply** to save any changes you have made to this screen.
3. Proceed to *Section E.1.3* to configure the Preset Setup – Current Data Tab.

E.1.3 Preset Setup – Current Data Tab Screen

Use this screen to view the Keypad Data Alphanumeric value.

To access this screen:

1. Select the **Current Data** tab on the Preset Setup Screen. Current Data screen displays:

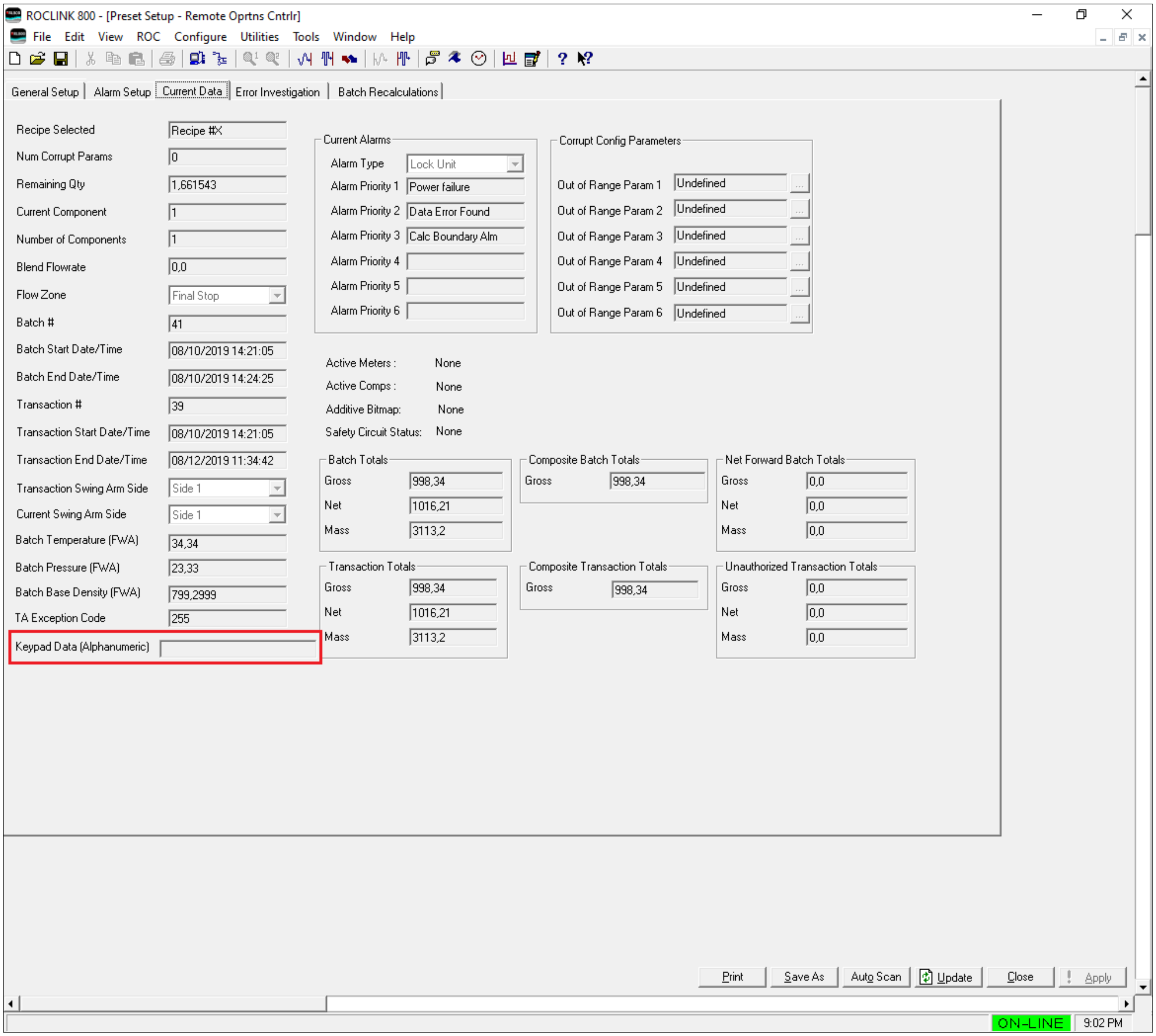


Figure E-3. Preset Setup Screen – Current Data tab

2. Review the values in the following field:

Field	Description
Keypad Data-Alphanumeric	Shows the alphanumeric data you enter using the keypad display. **Note**: This field shows “::::::::::::::::::::” after you activate the Alphanumeric mode and issuing a display command but have not entered the alphanumeric value using the keypad display.

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section E.1.4* to activate Alphanumeric mode.

E.1.4 Activating the Alphanumeric Mode

To enable the Alphanumeric mode of the DL8000 Preset, you must set the operation mode to **Auto**. You can access the operation mode field by going to **Display #11, Preset setup > General Setup** tab. You can also use TAS to set the preset operation mode (TLP 63, 0, 36) to **Auto** by setting the TLP value to 0.

You also need the setup the following parameters:

Auxiliary Display Index (TLP 63,0,178) The Alphanumeric data entry is enabled by setting the auxiliary data index parameter value to 11. This is to avoid conflict with the Existing Data Item and End Prompts which use the value of 1 to 10. You can set the value for auxiliary data index using TAS or FST Register.

Note: If the auxiliary data index is entered with wrong value (e.g. values above 11) and display message command 0X1C is issued then "Invalid Number of data items" (0X48) will be returned by the DL8000.

Prompt Width (TLP 63,0,176) By default, the prompt width for alphanumeric data entry is set to 0. The data entry field is not displayed at this value. You can set the prompt width to a maximum of 16 characters to display the data entry field and enter your preferred alphanumeric characters. You can set the value for prompt width using TAS or FST Register.

Note: If prompt width is set to a value greater than 16 and the auxiliary data index is set to 11 (alphanumeric enabled), then the parameter is automatically restored to 16 by the user program.

If the auxiliary data index is set to 0, the Alphanumeric mode is disabled (this allows numeric data entry only) and prompt width is set to a value greater than 8, then the parameter is automatically restored to 8 by the user program.

TA Command (TLP 63,0,166) In order for the DL8000 to prompt a field asking you to enter the alphanumeric data, you must issue a display command (0X1C) using the TA command. You must set the TA command value to 28 using TAS.

Input Control Security Mode (TLP 63, 0, 253) Input control security mode sets the data hiding feature of the alphanumeric data entry. You set the Input Control Security mode value to 1 using TAS to enable this feature. This displays asterisks (*) instead of the actual alphanumeric characters.

Note: The keypad unit has key repressed timer of 1.25 seconds. Within this time period, any character on a particular key can be entered on the same cursor position. After the timer expires, the cursor will automatically move to the next position.

Proceed to *Section D7 – Saving the Configuration* to save the configuration.

E.1.5 Using the Program

After you enable the Aphanumeric mode to the DL8000 and issue a display message command, the DL8000 keypad display shows the following screen:

06/28/13 07:50:18 Data Prompt Line1 Data Prompt Line2 Data Prompt Line3 Data Prompt Line4 Data Prompt Line5 Data Prompt Line6 (ENTER to Continue)	[ ]

Figure E-4. Keypad Display

1. Type in a response to the data prompt and press **ENTER**.

06/28/13 07:50:18 Data Prompt Line1 Data Prompt Line2 Data Prompt Line3 Data Prompt Line4 Data Prompt Line5 Data Prompt Line6 (ENTER to Continue)	[***A]

Figure E-5. Keypad Display

Notes:

- The keypad displays asterisks (*) instead of the actual characters only if you have enabled the input control security mode. See *Section E.1.4* for setting up the input control security mode.
- The acceptable number of characters depends on the prompt width you have defined. See *Section E.1.4* for setting up the prompt width.

2. *Figure E-6* shows the keypad display after pressing **ENTER**. The entered value now displays in the **Keypad Data Alphanumeric** field of **Display #11**, **Preset setup > Currect Data** tab of ROCLINK 800.

06/28/13 07:50:18	
Data Prompt Line1	
Data Prompt Line2	
Data Prompt Line3	
Data Prompt Line4	[*******]
Data Prompt Line5	
Data Prompt Line6	
Data Entered	Please wait

Figure E-6. Keypad Display

Note: The "Please wait" message indicates that the DL8000 is waiting for TA commands to be issued. For more information about the TA commands, see *DL8000 Preset Controller Instruction Manual* (part D301244X012).

E.2 Configuring API 1952 Table 53 and 54 Calculations

Table 53 provides Observed to Base calculations. This means using the Observed Density (Raw Density [TLP:74,X,3]) and Observed Temperature (Density Temperature Value [TLP:74,X,6]) calculates Base Density [TLP:71,X,17].

Note: This calculation table does not need Pressure input.

Table 54 provides Base to Meter calculations. This means using the Base Density [TLP:71,X,17] and Meter Temperature [TLP:73,X,25] calculates CTL value [TLP:73,X,37].

The CPL value [TLP:73,X,38] = 1.00.

Proceed to *Section E.2.1 Configuration* to configure the program.

E.2.1 Configuration

This section provides information on how to configure the API 1952 Table 52 and 53 calculations feature.

Refer to *Figure D-1. DL8000 User Program Displays* and start the Liquid Calcs program. You can configure the following display screens:

- Display #70, Liquid Preferences
- Display #71, Product
- Display #72, Densitometer
- Display #74, Liquid Turbine

E.2.1.1 Liquid Preferences

Use this screen to define global measurement units for process inputs, process outputs, process variables, and mass units.

To access this screen:

1. From the Directory Tree, double-click **User Program**.
2. Click **Program #1**, **Liquid Calcs**.
3. Click **Display #70, Liquid Preferences**. The screen displays:

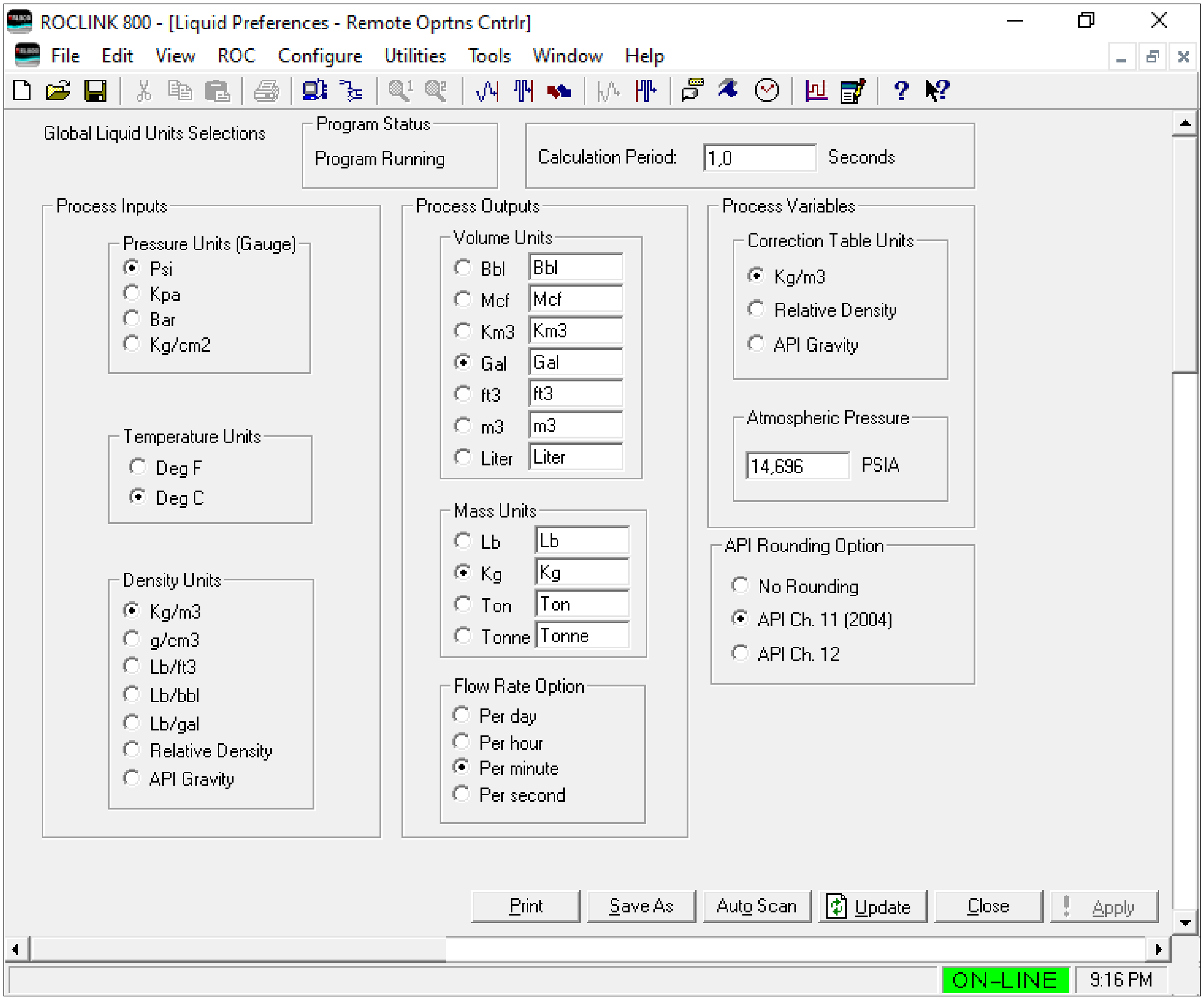


Figure E-7. Liquid Preferences Screen

4. Click **Apply** to save the changes.
5. Click **OK** to close the screen. Proceed to *Section E.2.1.2* to configure the Product screen.

E.2.1.2 Product

Use this screen and its tabs to define a liquid product and its associated fluid properties.

To access this screen:

1. From the Directory Tree, double-click **User Program**.
2. Click **Program #1, Liquid Calcs**.
3. Click **Display #71, Product**.

4. Click the Product Definition Tab.

a. Select Point Number: **1 – Product 1**.

b. Select Fluid Type: **Petroleum 1952**.

c. Select Measurement Table Options: **1952 API / ASTM / ISO Tables**.

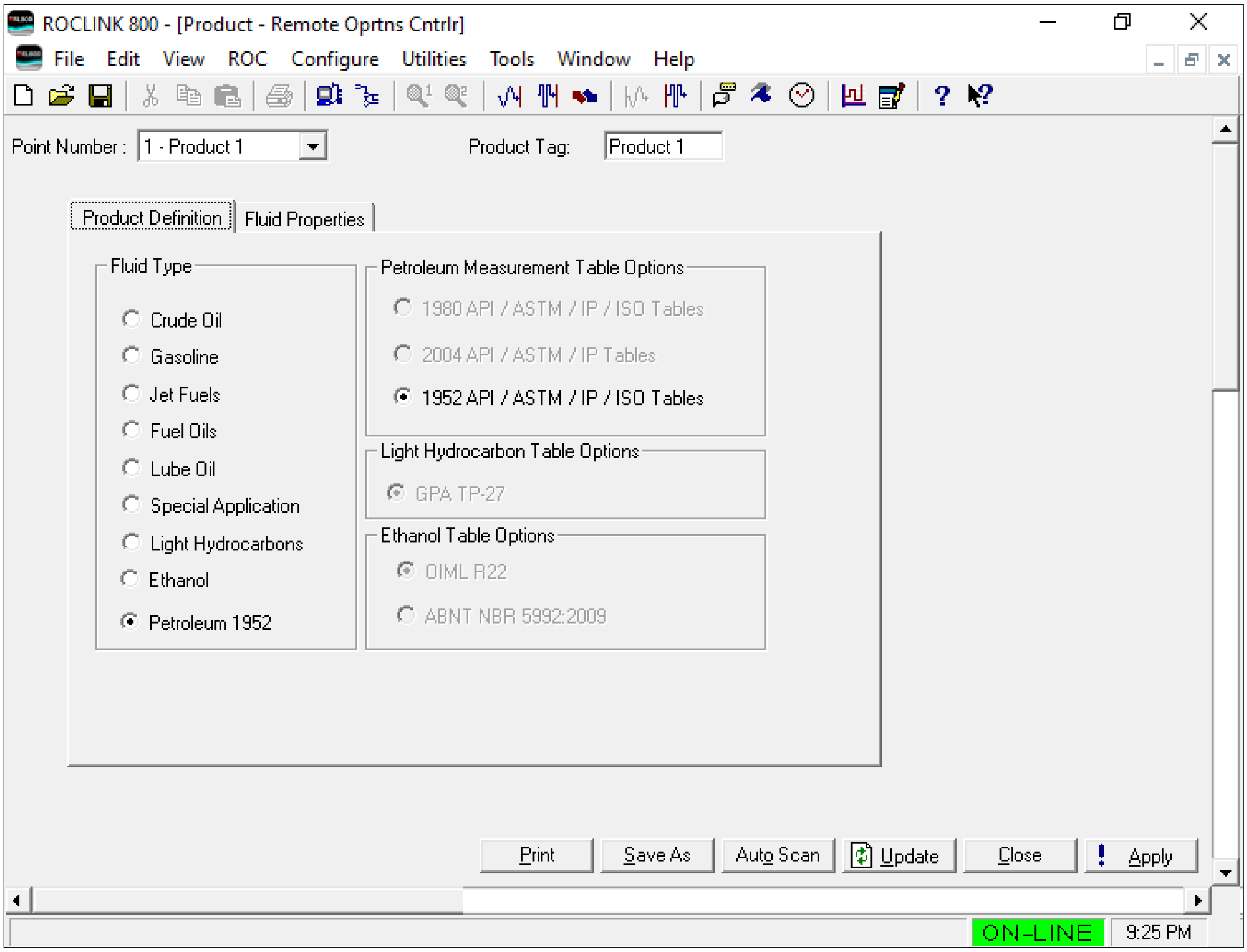


Figure E-8. Product Definition tab

5. Click **Apply** to save the changes.

6. Click the Fluid Properties Tab.

a. Select Point Number: **1 – Product 1**.

b. Select Compressibility Options: **Auto Select Compressibility Table**.

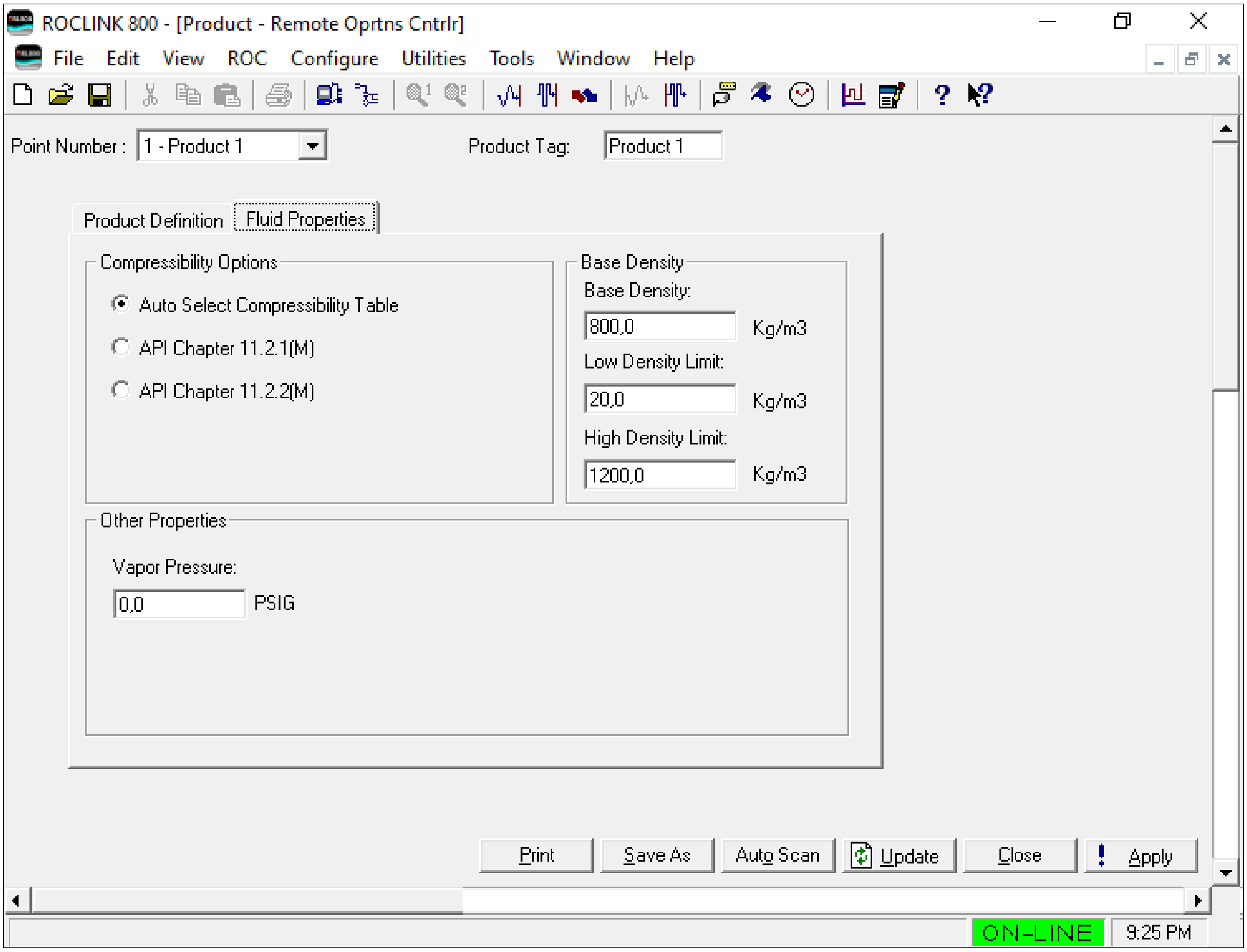


Figure E-9. Fluid Properties tab

7. Click **Apply** to save the changes.

E.2.2 Configuring the Densitometer

1. Click **Display #72, Densitometer**.
2. Click the General Tab.
   a. Select Point Number: **1 – Density 1**.
   b. Select Densitometer Type: **Analog Density**.

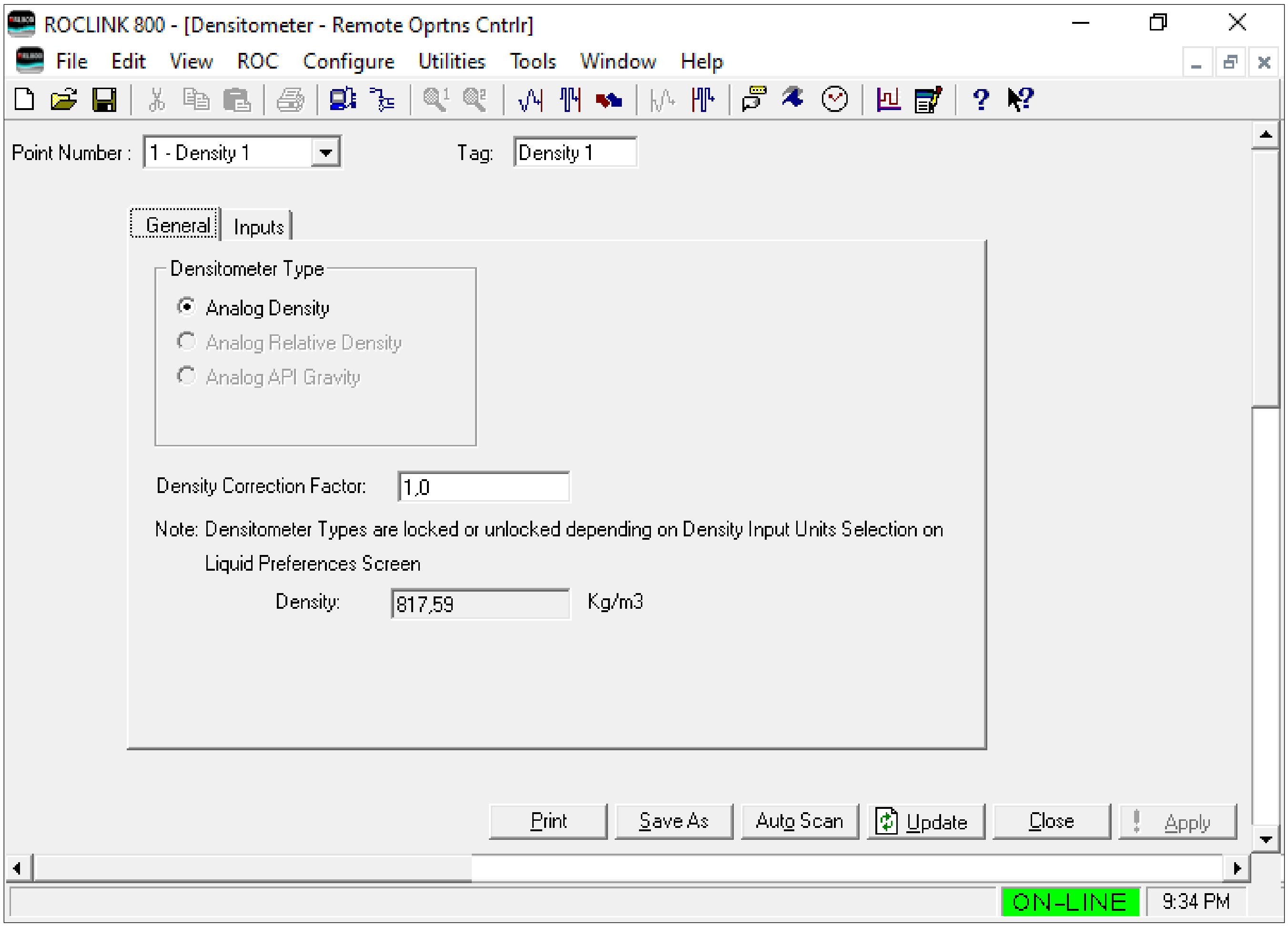


Figure E-10. Densitometer, General tab

3. Click the Inputs Tab.

a. The Configure Density is **790 Kg/m^3** and the Temperature is **0** (Example shown with soft point configure as input).

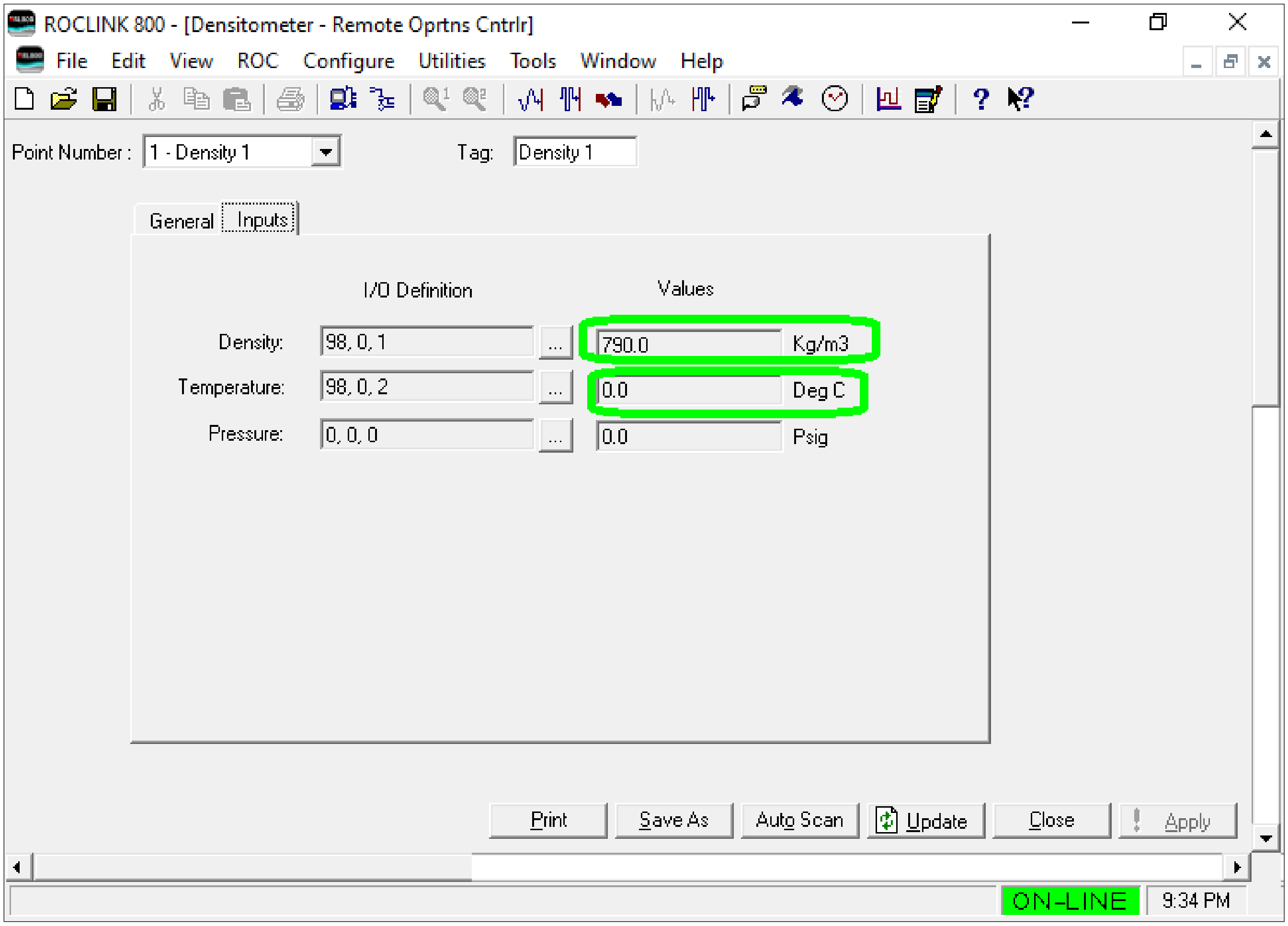


Figure E-11. Densitometer, Inputs tab

4. Click **Apply** to save the changes.

E.2.3 Configuring the LiquidTurbine

1. Click **Display #74, LiquidTurbine**.
2. Click the Liquid Turbine Tab.
   a. Select Point Number: **1 – LiqTurb 1**.
   b. Select Flow Meter Input: **Volume**.
   c. The Meter Temperature Input is **0.0 Deg C**.

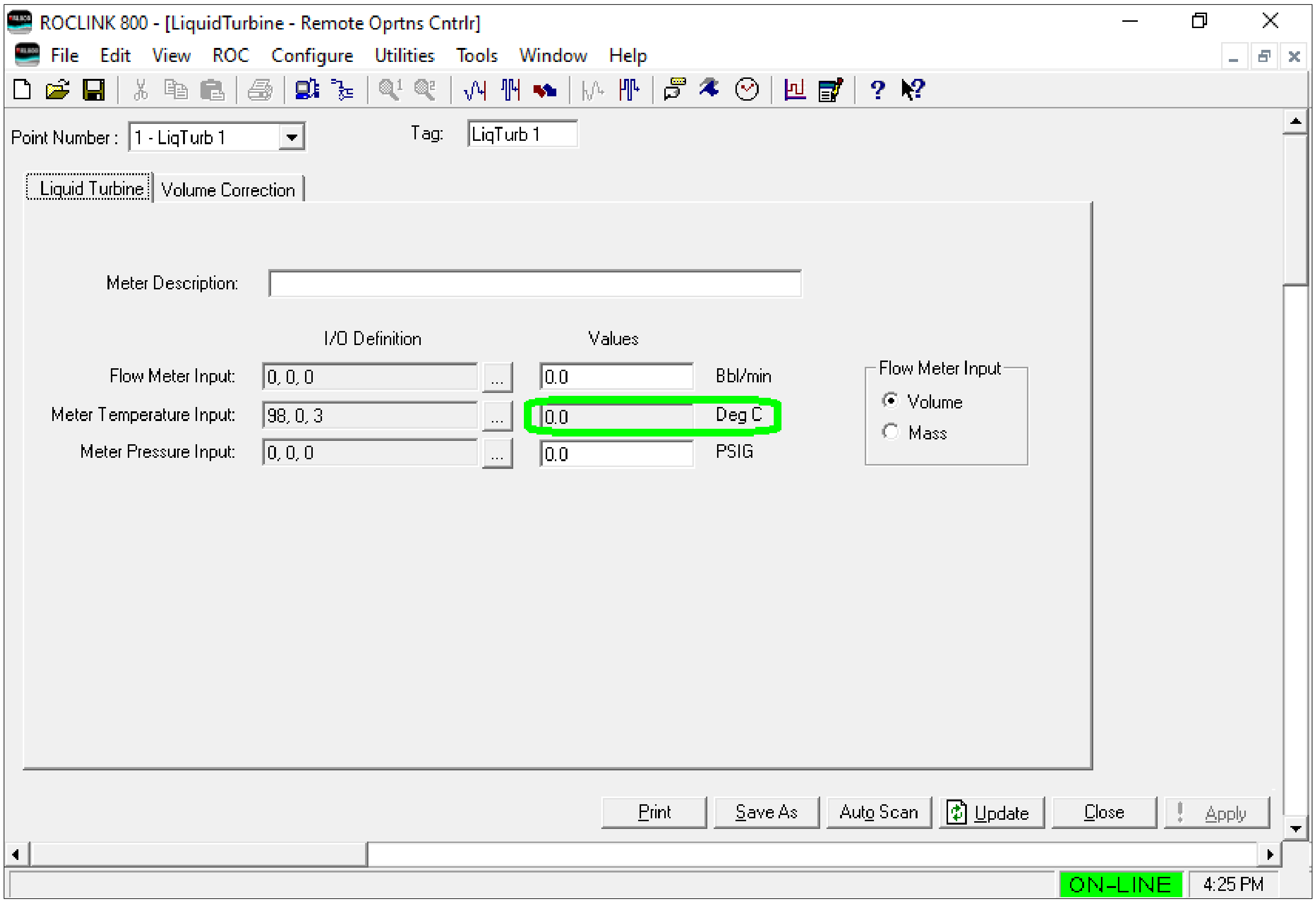


Figure E-12. LiquidTurbine, Liquid Turbine tab

3. Click the Volume Correction Tab.

a. The Base Temperature is **15 Deg C**.

b. Select Density: **Meter Densitometer**.

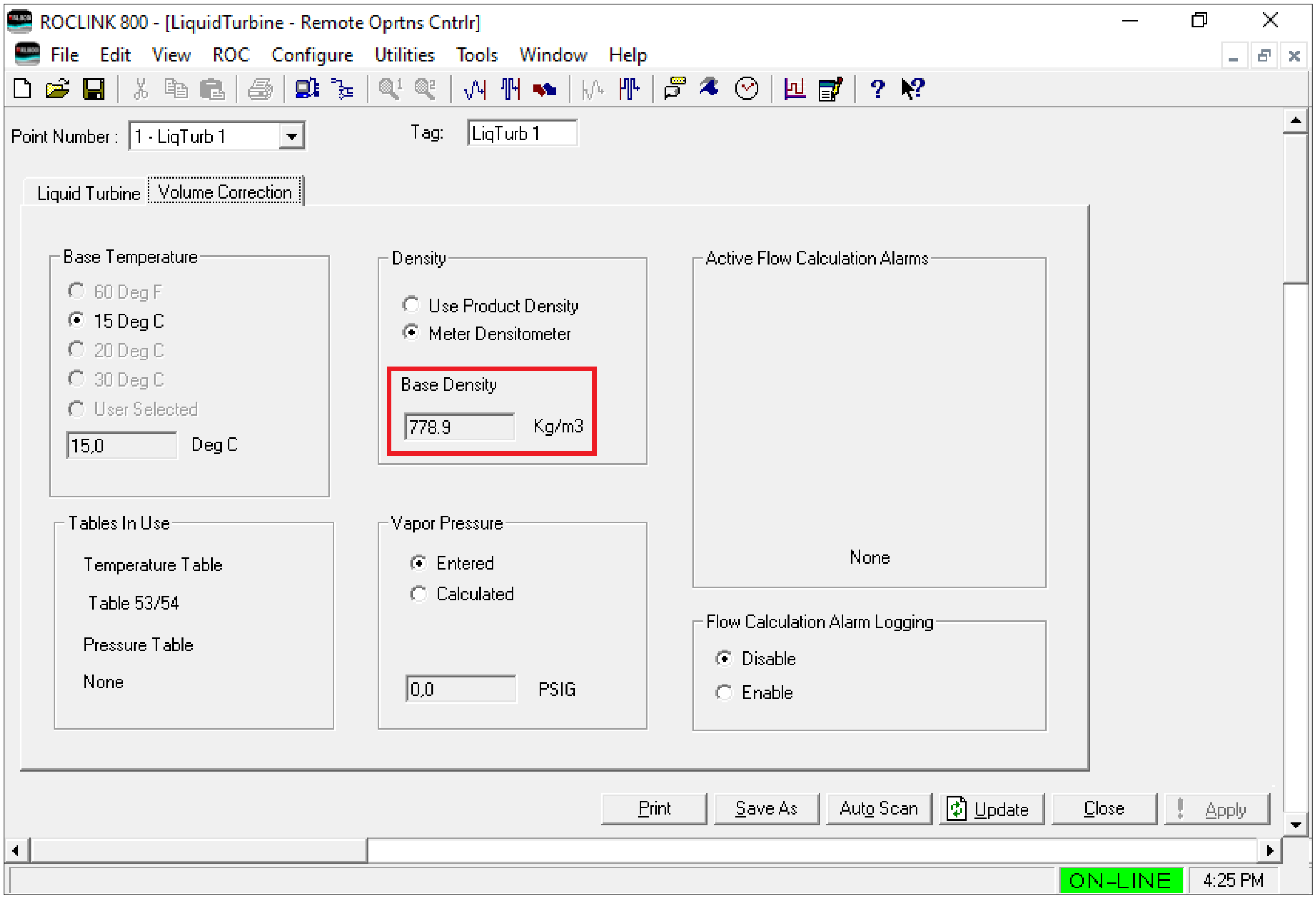


Figure E-13. LiquidTurbine, Volume Correction tab

c. The Base Density output is calcluated as **778.9 kg/m^3**.

E.3 API Chapter 12 rounding (Totals and Volume Correction Factors)

In the DL8000, the user can select an option to round the totals and volume correction factors. The option is API CH12, where the selected totals and volume corrections factors can be rounded. The print output also gets formatted as per API CH12 if the option is selected.

The following API CH12 tables were referred:

Table E-1. Volume Discrimination Levels

	USC Units		SI Units	
	(Bbl)	**(gal)**	**(m^3)**	**(L)**
Op Meter Reading (MR_o)	XX.XX	XX.XX	XX.XXX	XX.0
C1 Meter Reading (MR_c)	XX.XX	XX.XX	XX.XXX	XX.0
Indicated Volume (IV)	XX.XX	XX.XX	XX.XXX	XX.0
Gross Std Volume (GSV)	XX.XX	XX.XX	XX.XXX	XX.0
Net Std Volume (NSV)	XX.XX	XX.XX	XX.XXX	XX.0
S&W Volume (SWV)	XX.XX	XX.XX	XX.XXX	XX.0

Table E-2. Correction Factor Discrimination Levels

%S&W	XX.XXX
CSW	X.XXXXX
CTL	X.XXXX
CPL	X.XXXX
MF	X.XXXX
CCF	X.XXXX

E.3.1 No Rounding

1. Select the No Rounding option in the API Rounding Option. The API Rounding Option can be found in the Liquid Preferences screen.

To access this screen:

a. From the Directory Tree, double-click **User Program**.

b. Click **Program #1**, **Liquid Calcs**.

c. Click **Display #70, Liquid Preferences**. The screen displays:

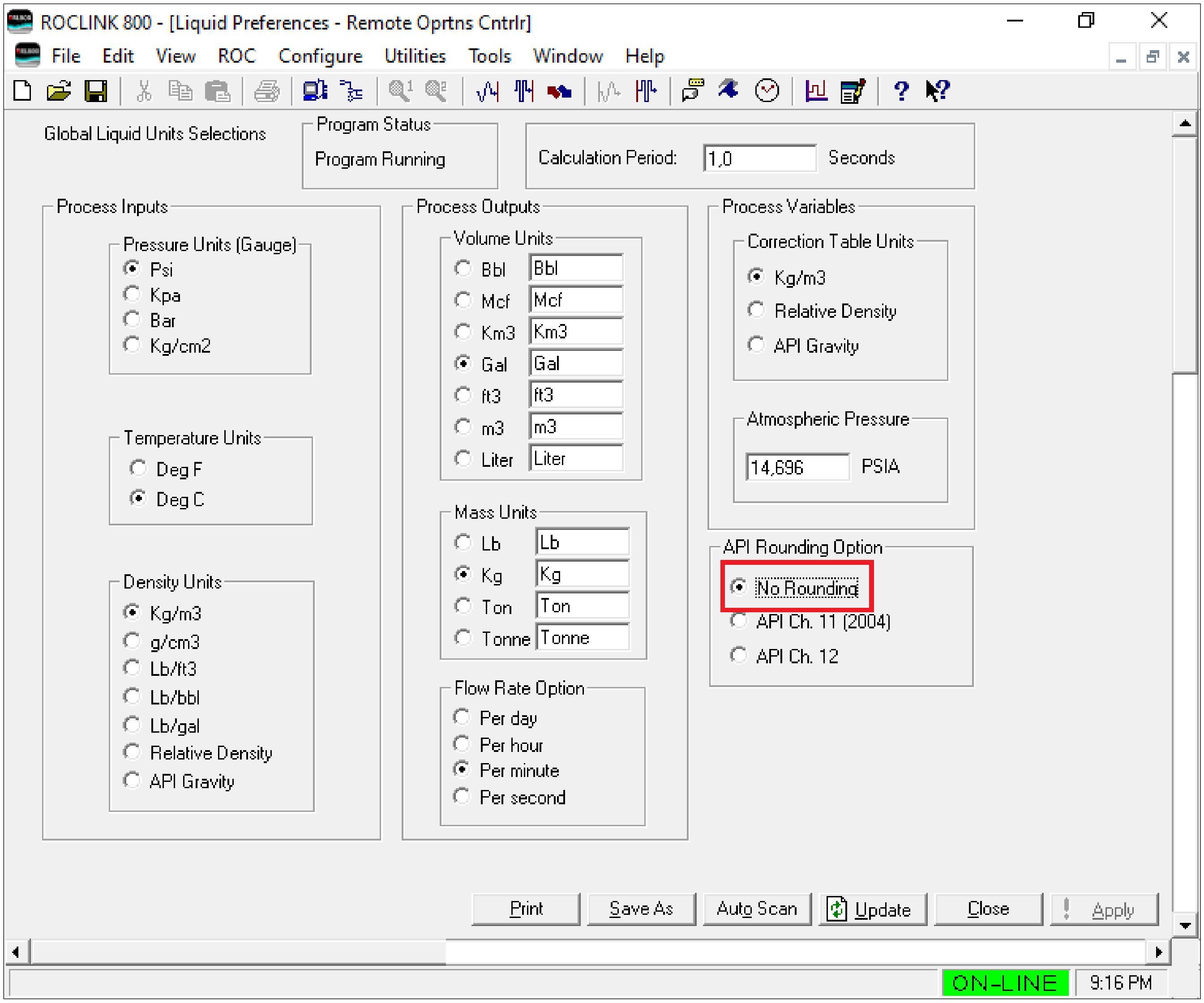


Figure E-14. Liquid Preferences Screen, No Rounding

d. Select API Rounding Option: **No Rounding**.

e. Click **Apply** to save the changes.

2. Set the required liquid calc parameters (density/temperature/pressure) to get volume correction factors with more than 4 decimal places.

Set the product as follows:

a. From the Directory Tree, double-click **User Program**.

b. Click **Program #1**, **Liquid Calcs**.

c. Click **Display #71, Product**.

d. Double-click **#1, Product 1**. The screen displays:

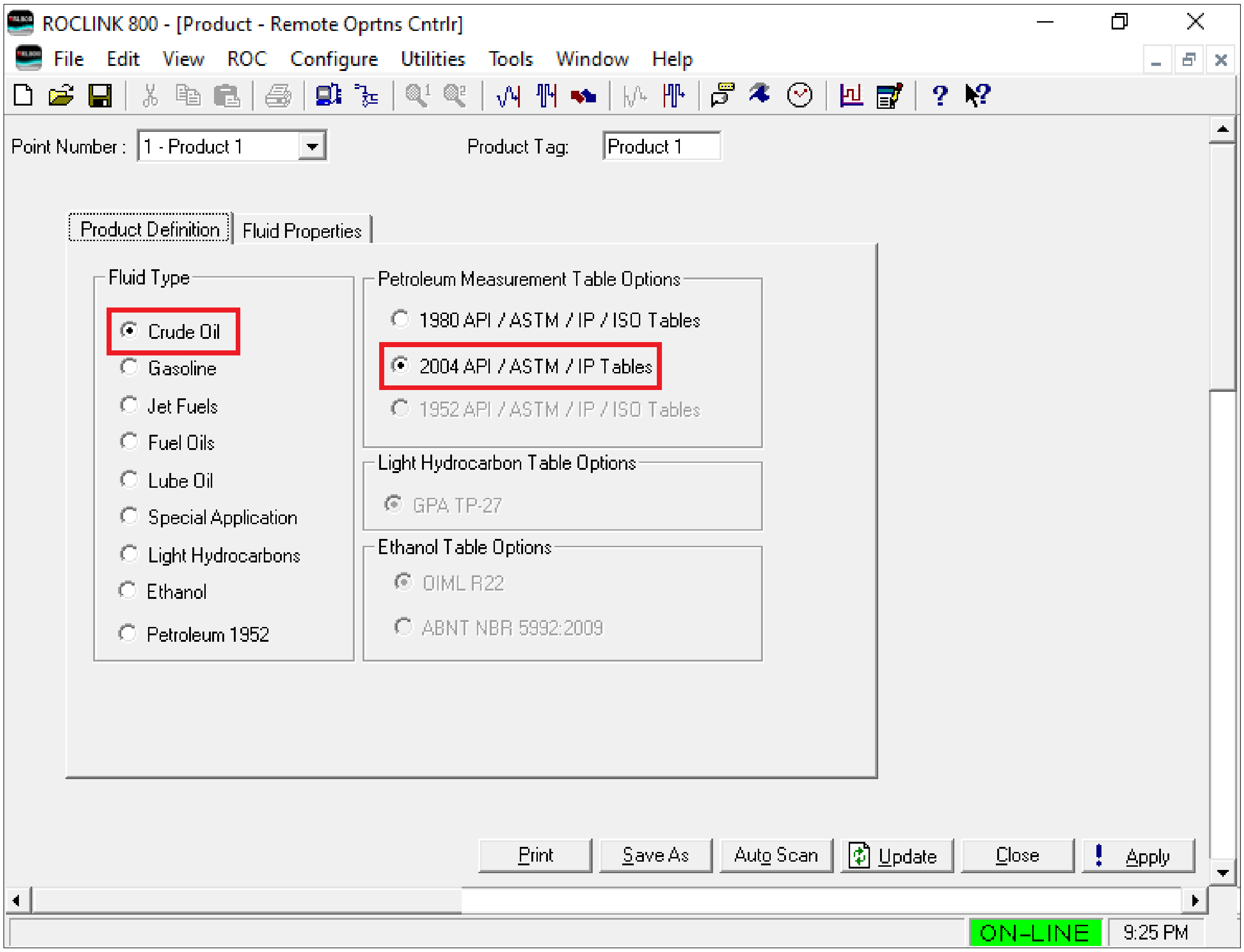


Figure E-15. Product Definition tab

e. Click the Product Definition Tab.

f. Select Fluid Type: **Crude Oil**.

g. Select Measurement Table Options: **2004 API / ASTM / IP Tables**.

h. Click **Apply** to save the changes.

Set the density as follows:

i. Click the Fluid Properties Tab. The screen displays:

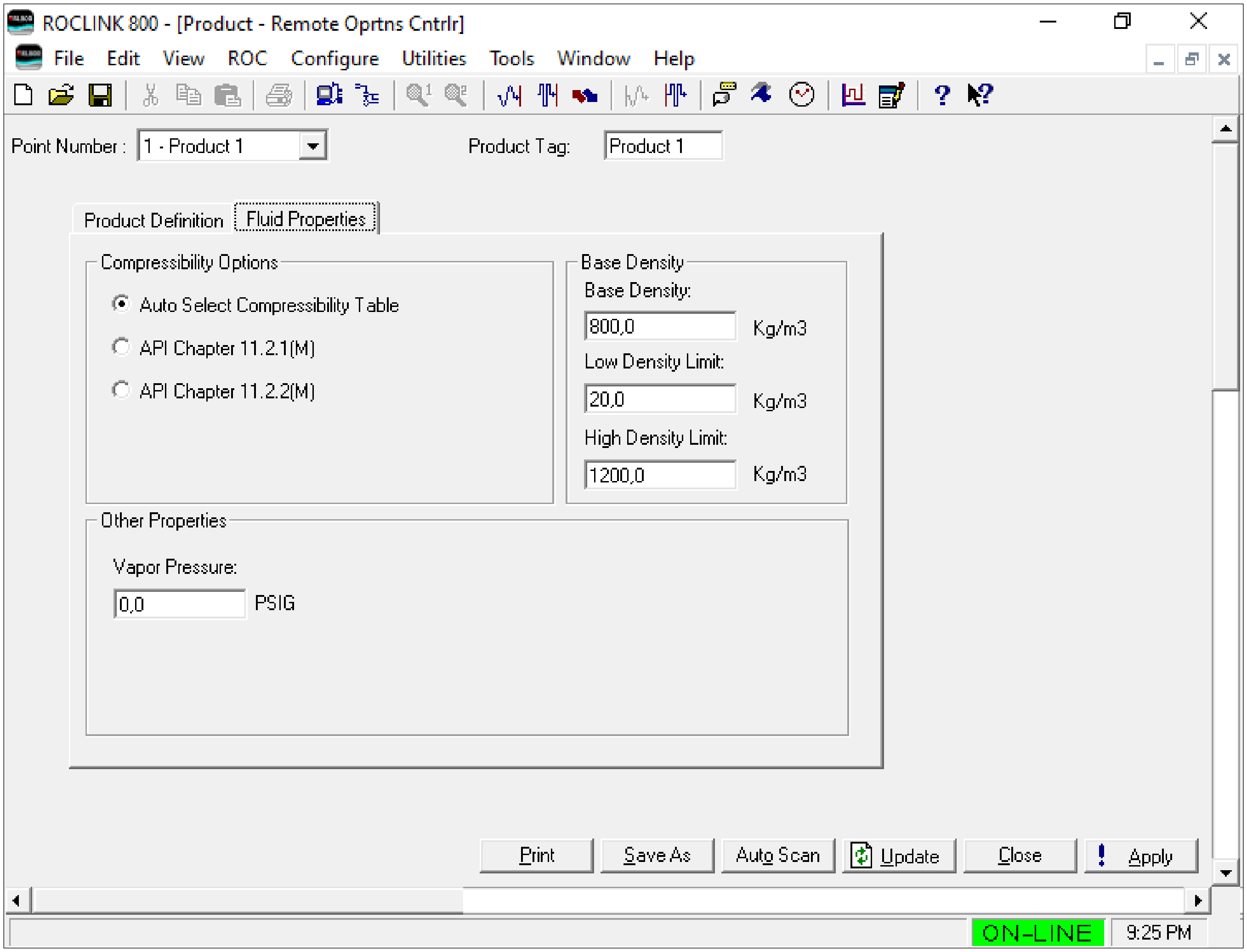


Figure E-16. Fluid Properties tab

j. Select Compressibility Options: **Auto Select Compressibility Table**.

k. Manually type the Base Density: **800 Kg/m^3**.

l. Click **Apply** to save the changes.

Assign the appropriate obeserved Density Input, observed Temperature and Presseure as follows:

m. Click **Display #72, Densitometer**.

n. Click the Inputs Tab. The screen displays:

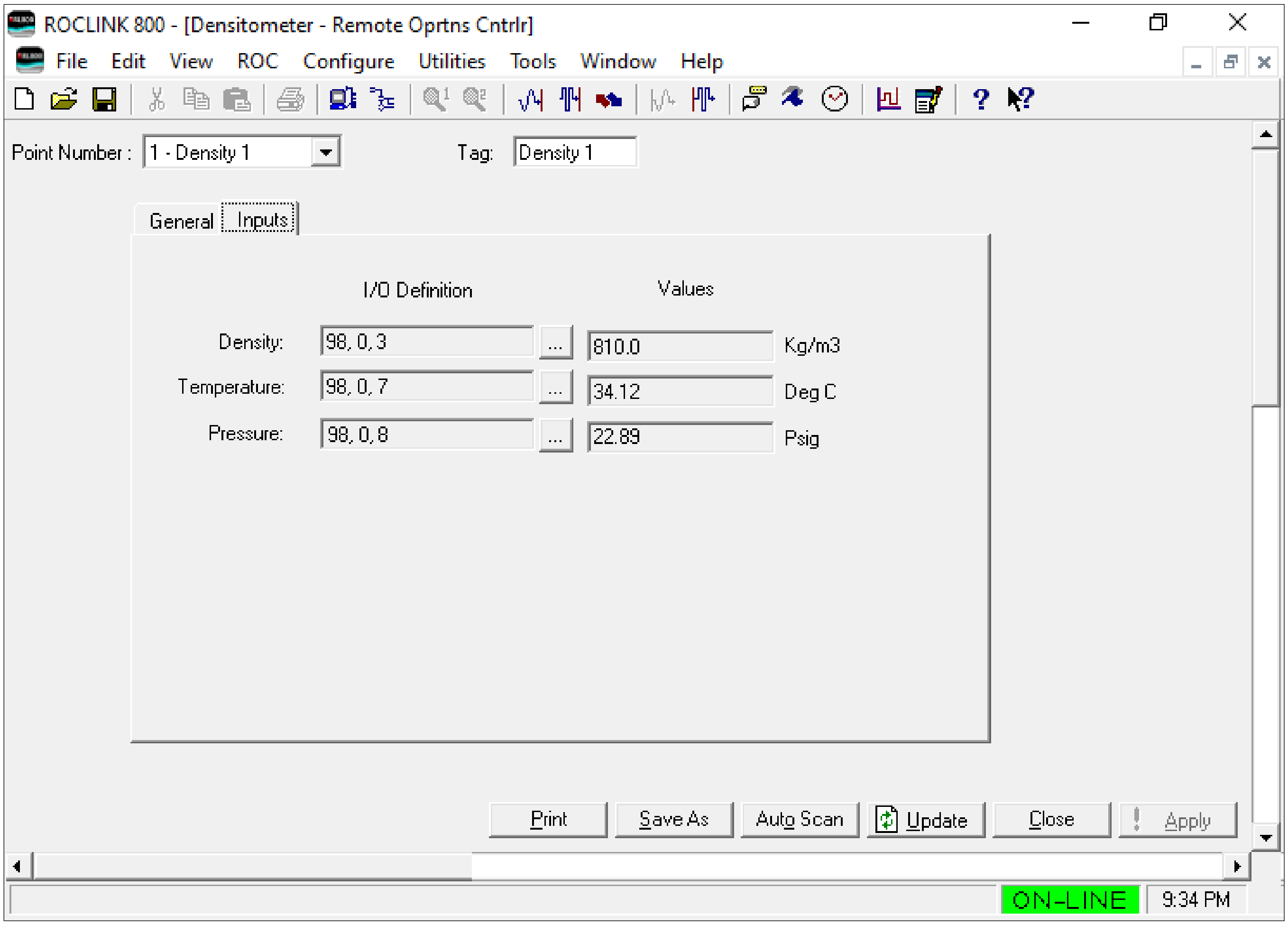


Figure E-17. Inputs tab

o. Select Point Number: **1 – Density 1**.

p. Click **Apply** to save the changes.

Set the Base Temperature as follows:

q. Click **Display #74, LiquidTurbine**.

r. Click the Volume Correction Tab. The screen displays:

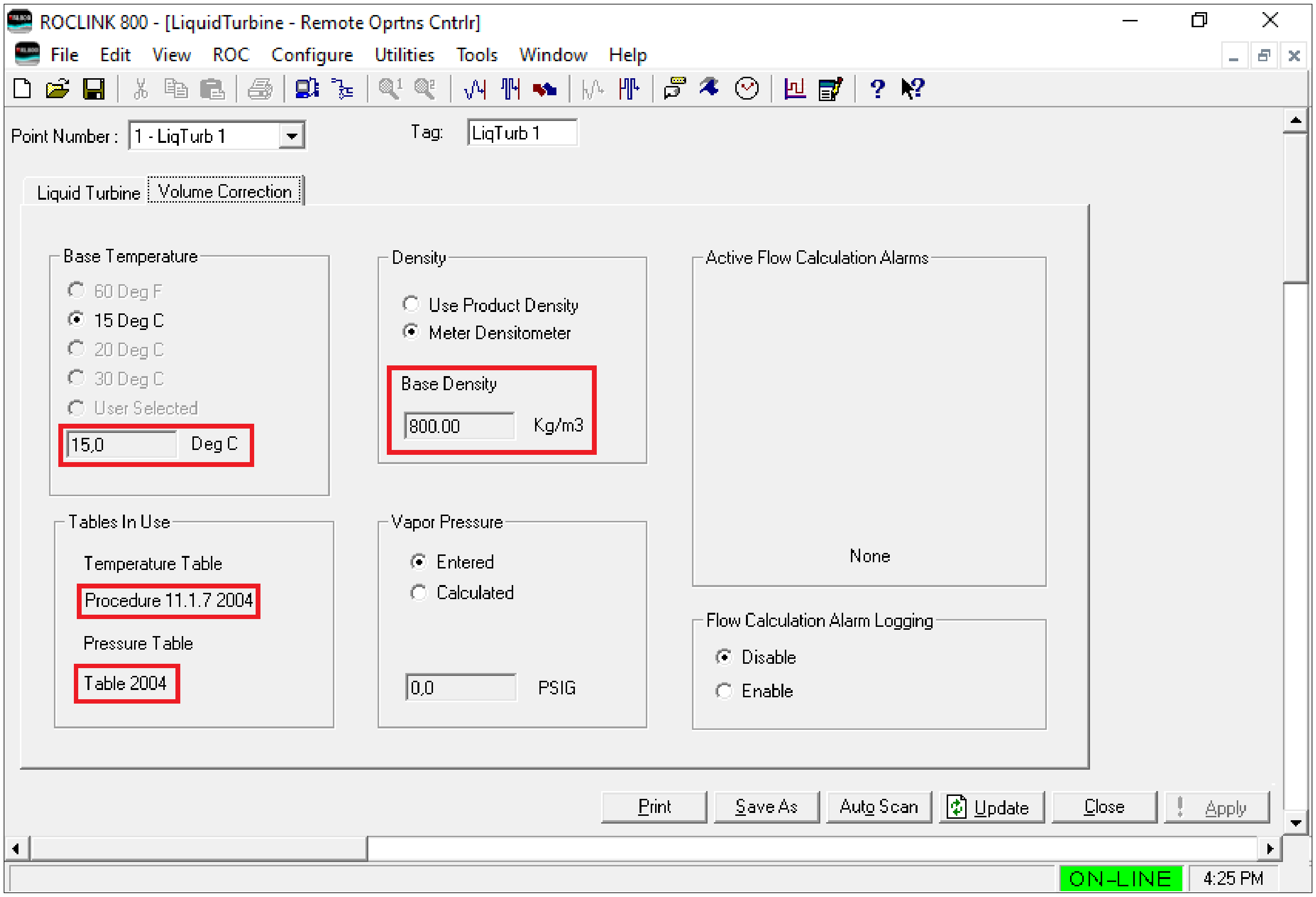


Figure E-18. Volume Correction tab

s. Select Point Number: **1 – LiqTurb 1**.

t. Click **Apply** to save the changes.

Set the meter (Liquid Turbine) temperature and pressure as follows:

u. Click **Display #74, LiquidTurbine**.

v. Click the Liquid Turbine Tab. The screen displays:

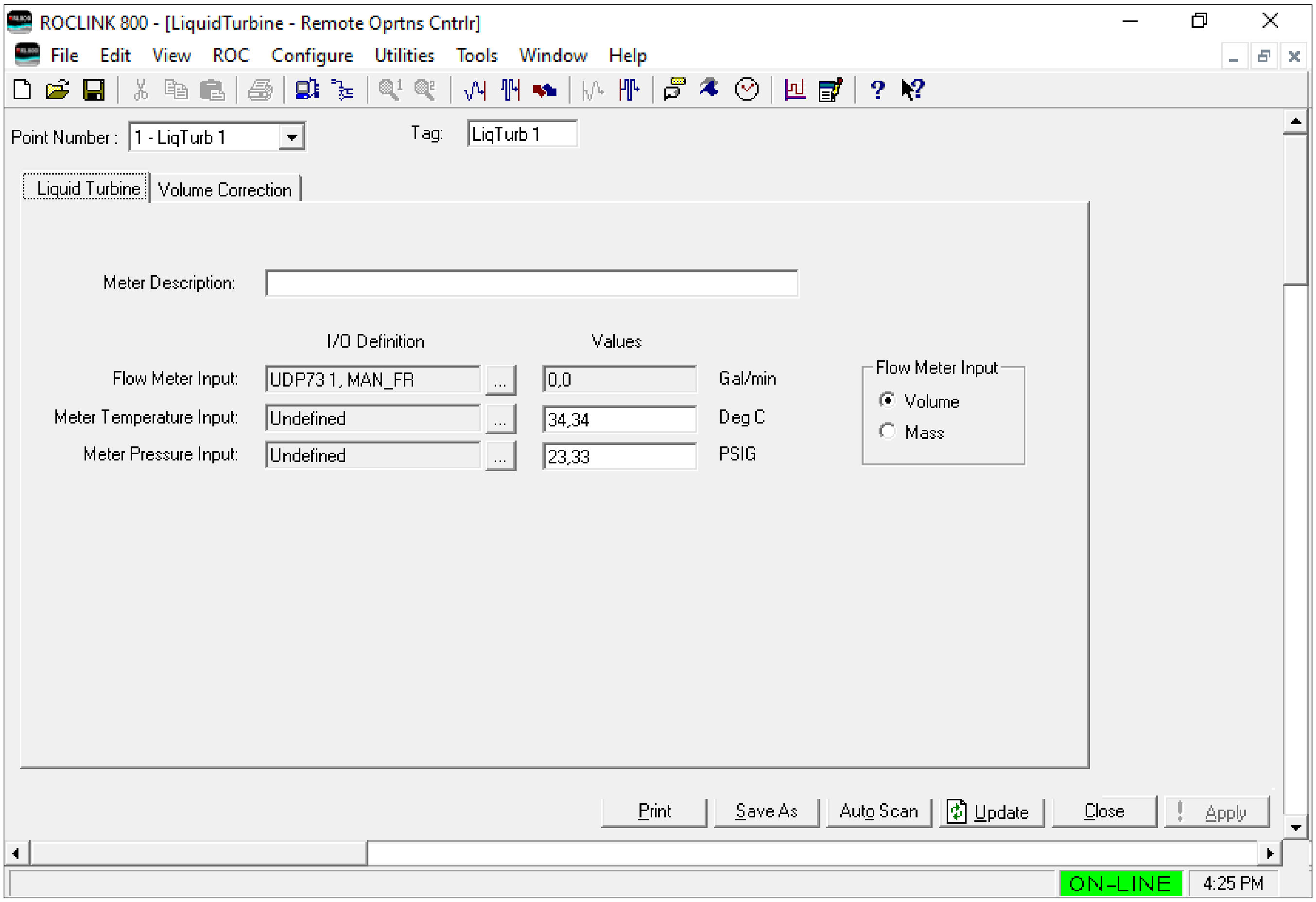


Figure E-19. Liquid Turbine tab

w. Select the Flow Meter Input: **Volume**

x. Manually type the Meter Temperature Input: **34.34**

y. Manually type the Pressure Input: **23.33**

z. Click **Apply** to save the changes.

3. Create a custom display to observed Liquid Calc volume correction factors. Refer to *Appendix B – The Display Editor* for details.

a. Configure the custom user display with the TLPs shown below:

Table E-3. TLPs

Parameter Description	TLP to be configured on user display
CTL	73,X,37
CPL	73,X,38
CCF	73,X,39
CSW	73,X,94

CTPL	73,X,106

Note: The above TLPs are not part of the standard ROCLINK displays. You need to create custom display to see them.

b. Refer to *Figure 21*. You notice that the volume correction factors displays more than 4 decimal digits (except for CSW, always rounded to 5 decimal places).

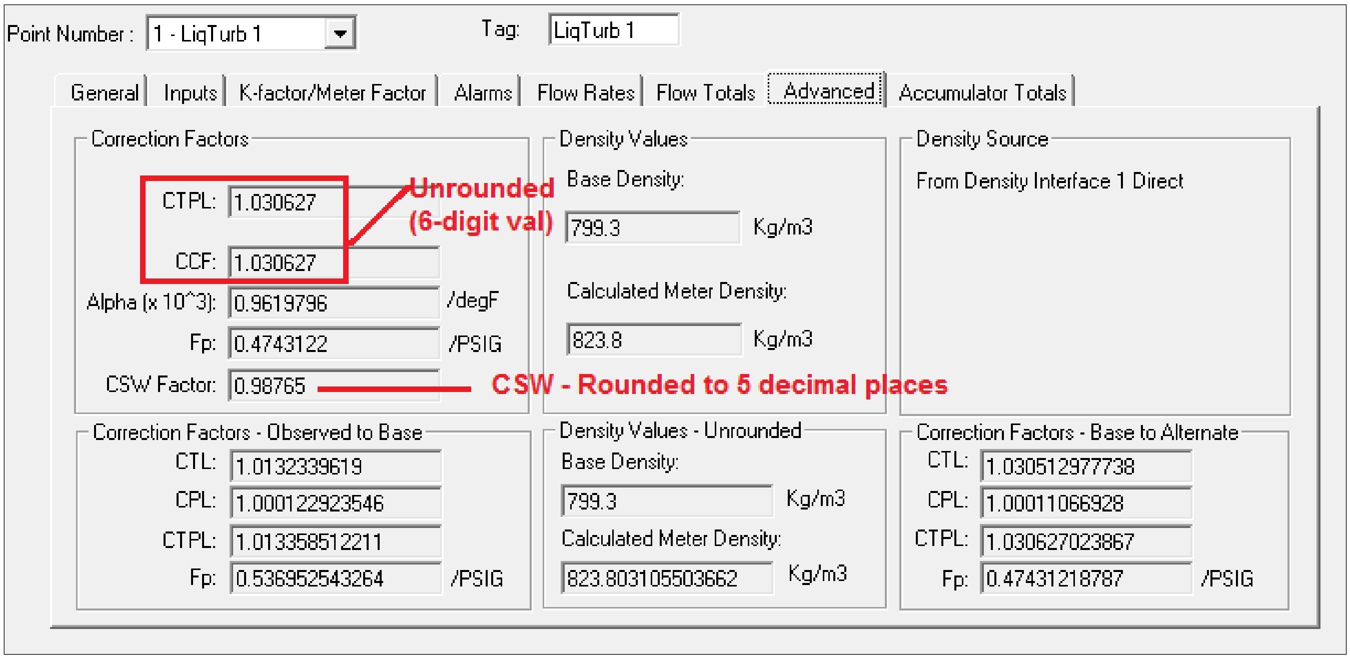


Figure E-20. Volume Correction Factors, Unrounded

4. Run a batch with the above configuration as follows:

a. From the Directory Tree, double-click **User Program**.

b. Double-click **Display #8, Component Setup**.

c. Double-click **#1**. The screen displays:

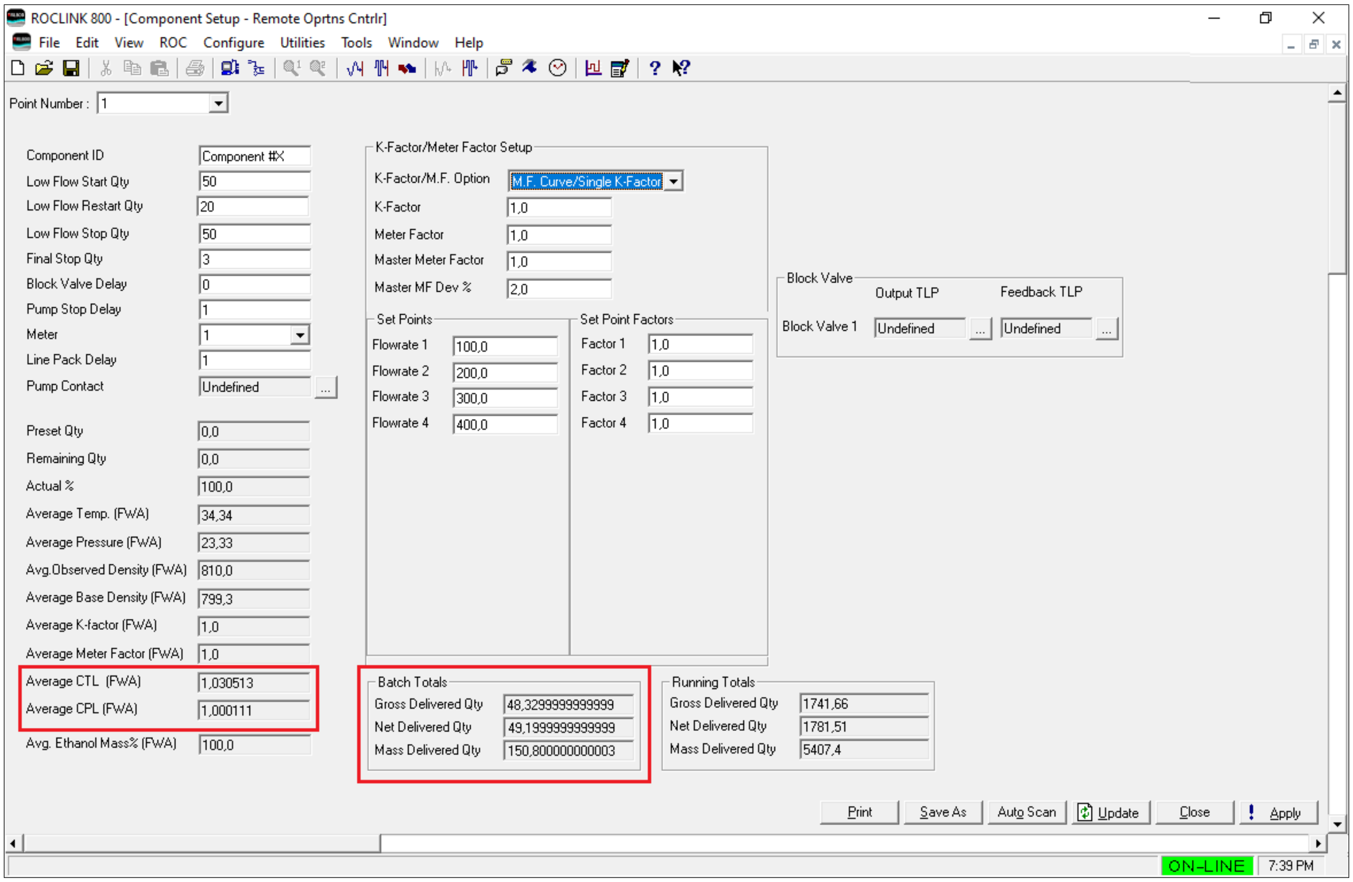


Figure E-21. Component Setup Screen, Unrounded Totals

The **read-only** fields: Average CTL (FWA), Average CPL (FWA) and Batch Totals (Gross Delivered Qty, Net Delivered Qty and Mass Delivered Qty) their values are unrounded.

d. Click **Apply** to save the changes.

Check the Batch Totals and Transaction Totals as follows:

e. From the Directory Tree, double-click **User Program**.

f. Double-click **Display #11, Preset Setup**.

g. Click the **Current Data** tab. The screen displays:

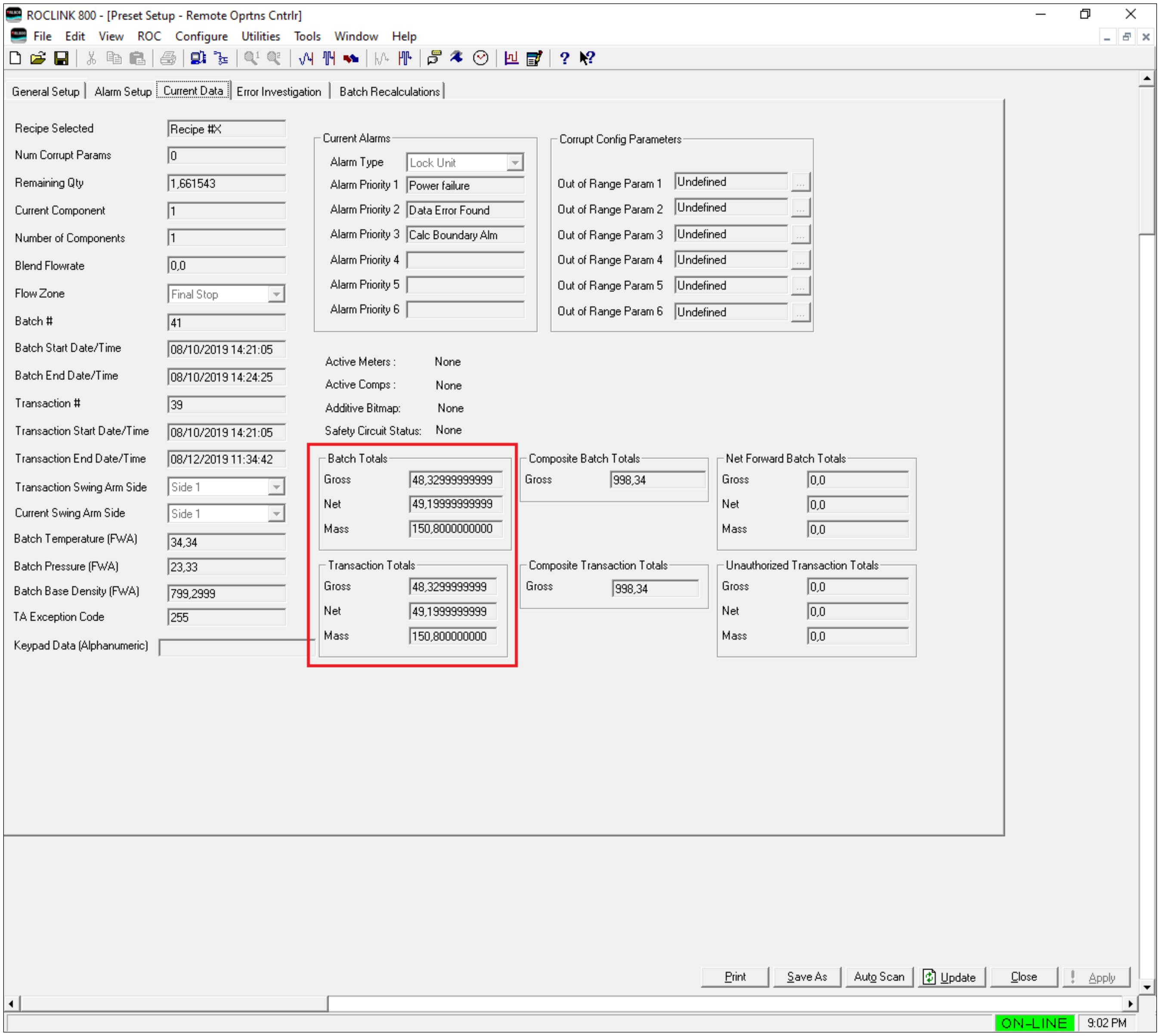


Figure E-22. Preset Setup Screen, Current Data tab, Unrounded Totals

The **read-only** fields: Batch Totals (Gross, Net and Mass) and Transaction Totals (Gross, Net and Mass) their values are unrounded.

h. Click **Apply** to save the changes.

Check the Static Totals as follows:

i. Click the **Batch Recalculations** tab. The screen displays:

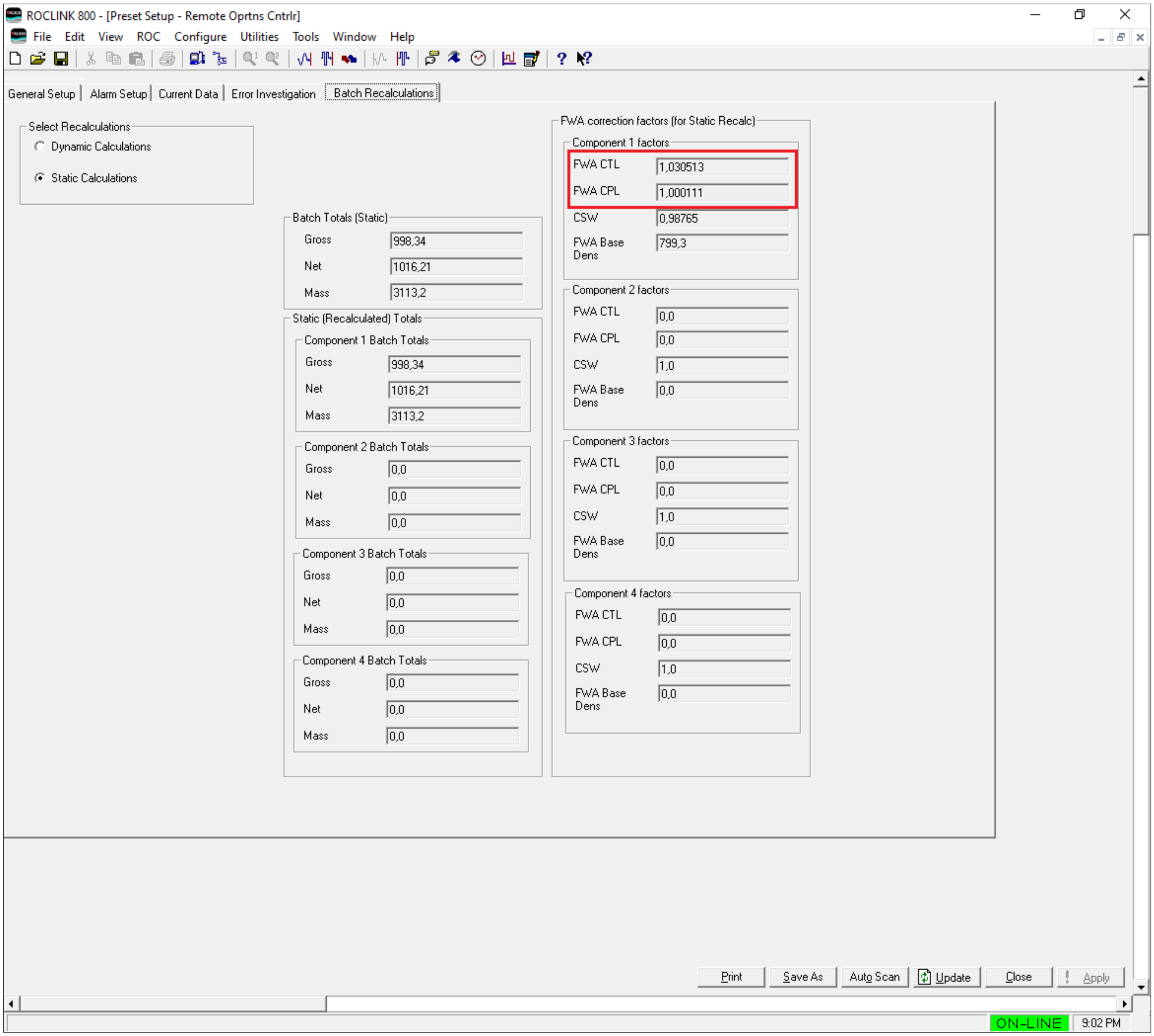


Figure E-23. Preset Setup Screen, Batch Recalculations tab, Unrounded Totals

The **read-only** fields: FWA CTL and FWA CPL their values are unrounded.

j. Click **Apply** to save the changes.

5. You can try printing a completed batch to show the unrounded totals and volume correction factors.

To print the unrounded totals and volume correction factors, do the following:

a. From the Directory Tree, double-click **User Program**.

b. Click **Program #6, KeypadDisplay**.

c. Double-click **Display #46, Navigation Setup**.

d. Click **Display Properties** tab. The screen displays:

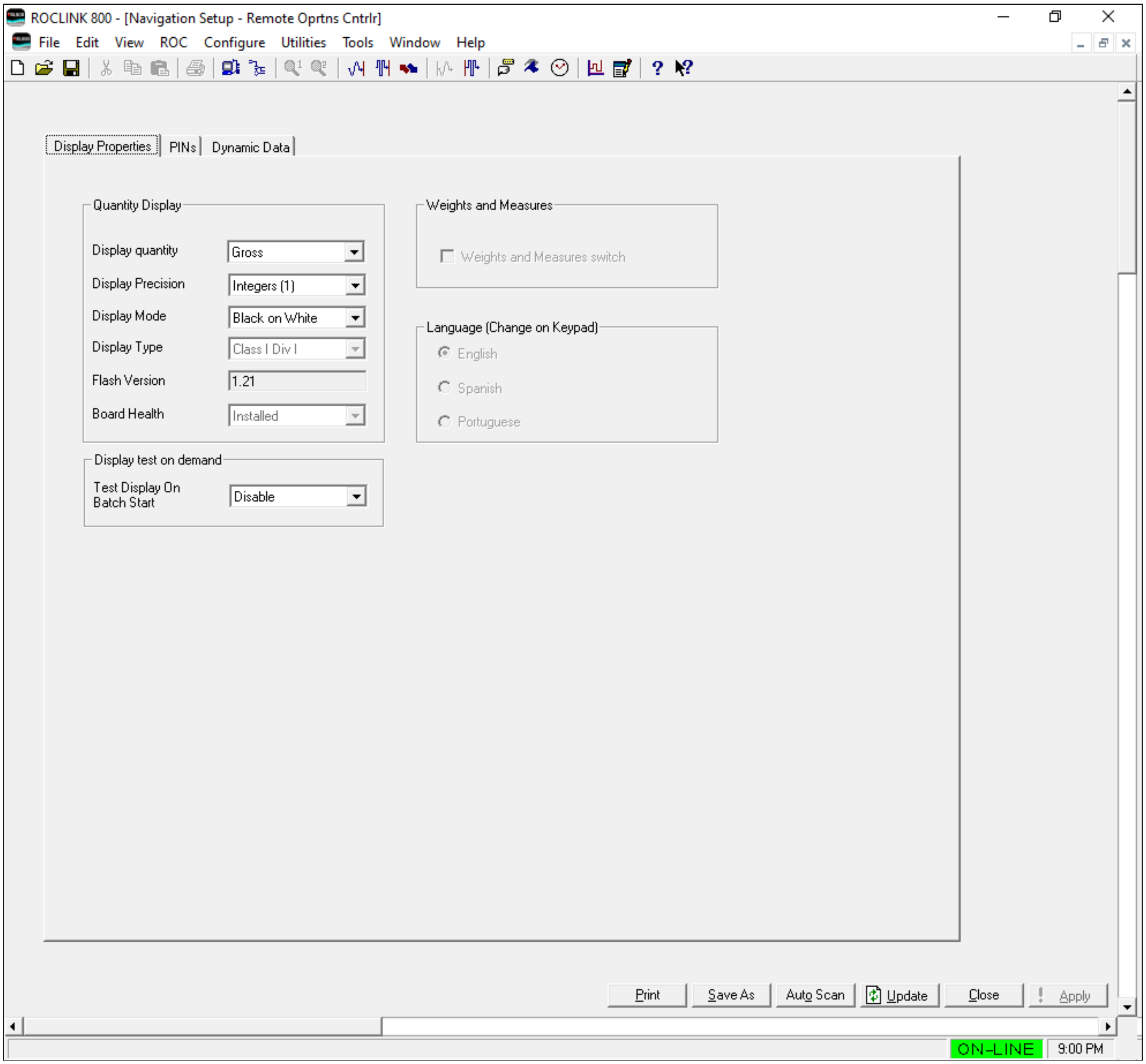


Figure E-24. Navigation Display Screen

e. Go to Quantity Display category, set the following parameters:

Display quantity: **Gross**
Display Precision: **Intergers (1)**
Display Mode: **Black on White**

f. Click **Apply** to save the changes.

g. Refer to *Section 4.6 – Printing a Configuration* to printout the above parameters. See the print below:

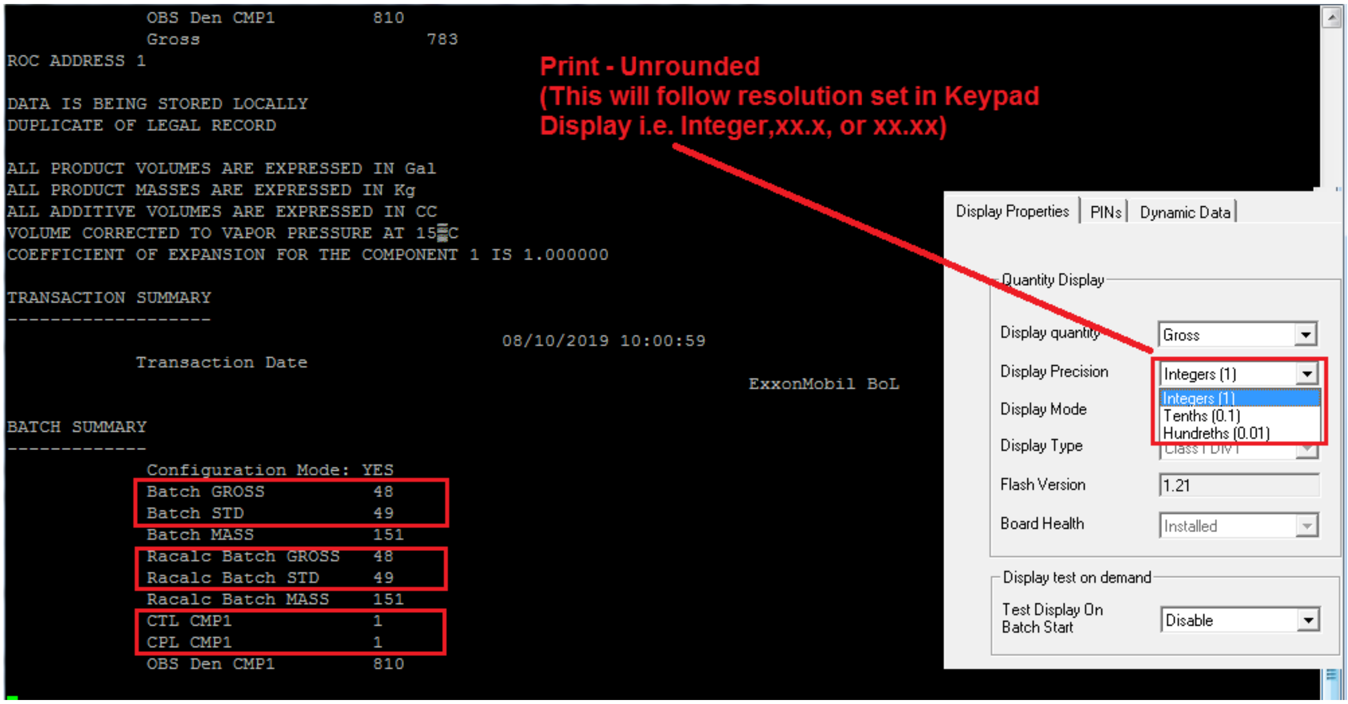


Figure E-25. Unrounded Totals, Printed

6. The unrounded data is archive and you can view the Transaction History .

To access the Transaction History, do the following:

a. From the Directory Tree, double-click **User Program.**

b. Click **Program #2, TransactionHistory**.

c. Double-click **Display #19, TransHistorySetup**.

d. Click the **View Batch History** tab. The screen displays:

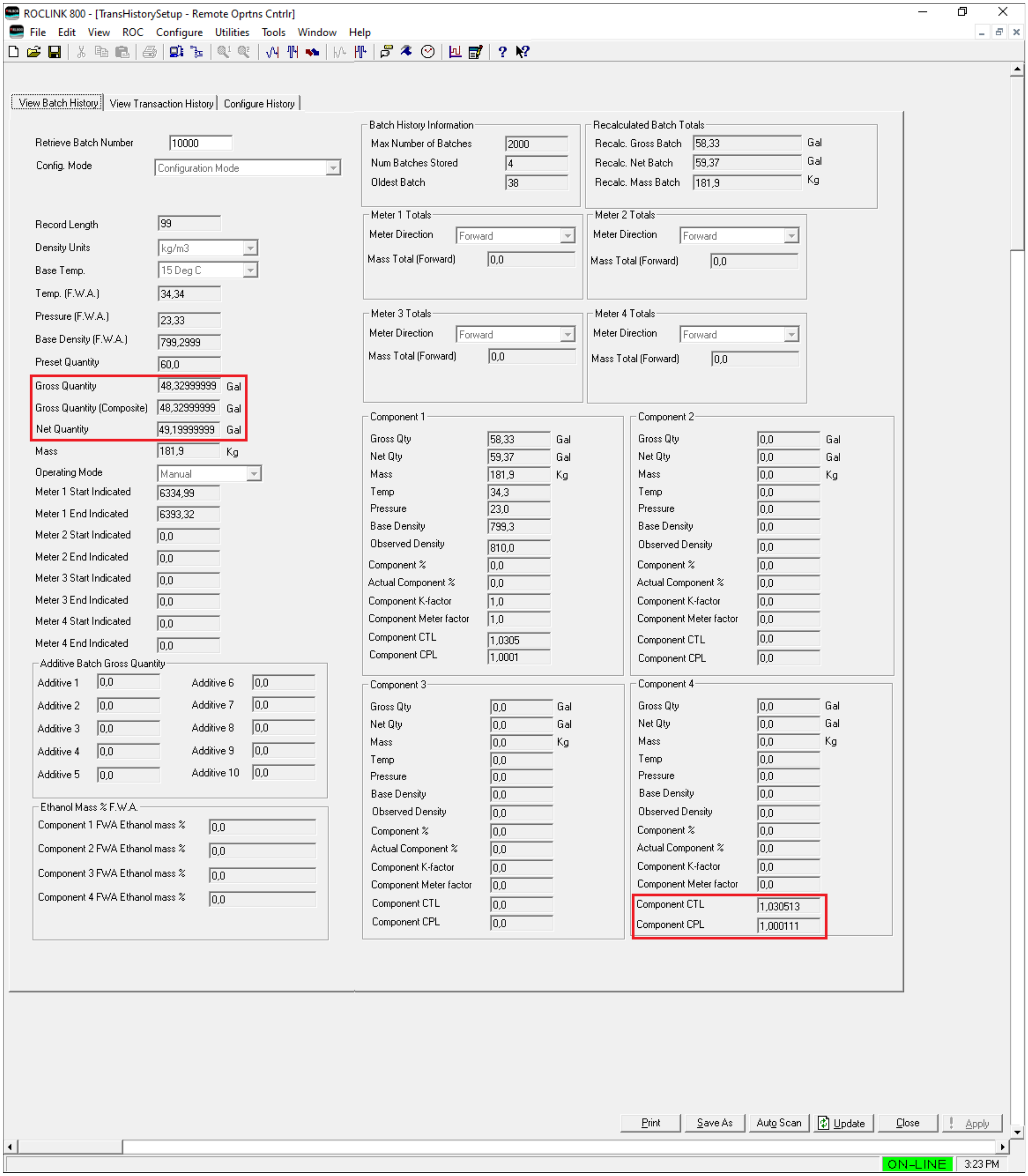


Figure E-26. View Batch History Screen, Unrounded Data

The totals of Gross Quantity, Gross Quantity (Composite), Net Quantity, Component CTL and Component CPL are unrounded.

E.3.2 With Rounding

Set the API CH12 rounding option as follows:

1. Select the API Ch.12 option in the API Rounding Option. The API Rounding Option can be found in the Liquid Preferences screen.

   To access this screen:

   a. From the Directory Tree, double-click **User Program**.

   b. Click **Program #1**, **Liquid Calcs**.

   c. Click **Display #70, Liquid Preferences**. The screen displays:

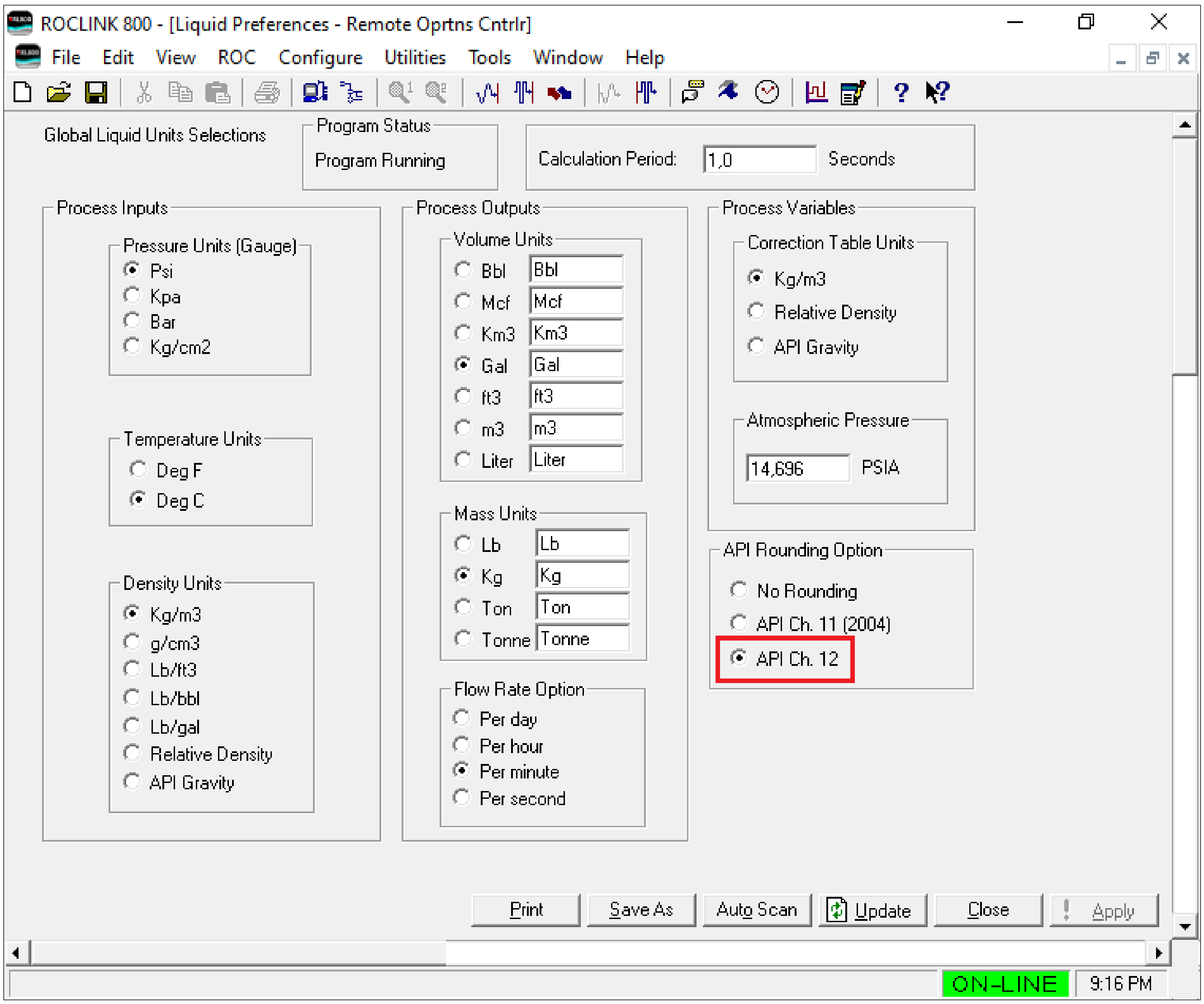


Figure E-27. Liquid Preferences Screen, API Ch.12

   d. Select API Rounding Option: **API Ch. 12**.

   e. Click **Apply** to save the changes.

2. Check again the Volume Correction Factors totals. See *Figure E-29*.

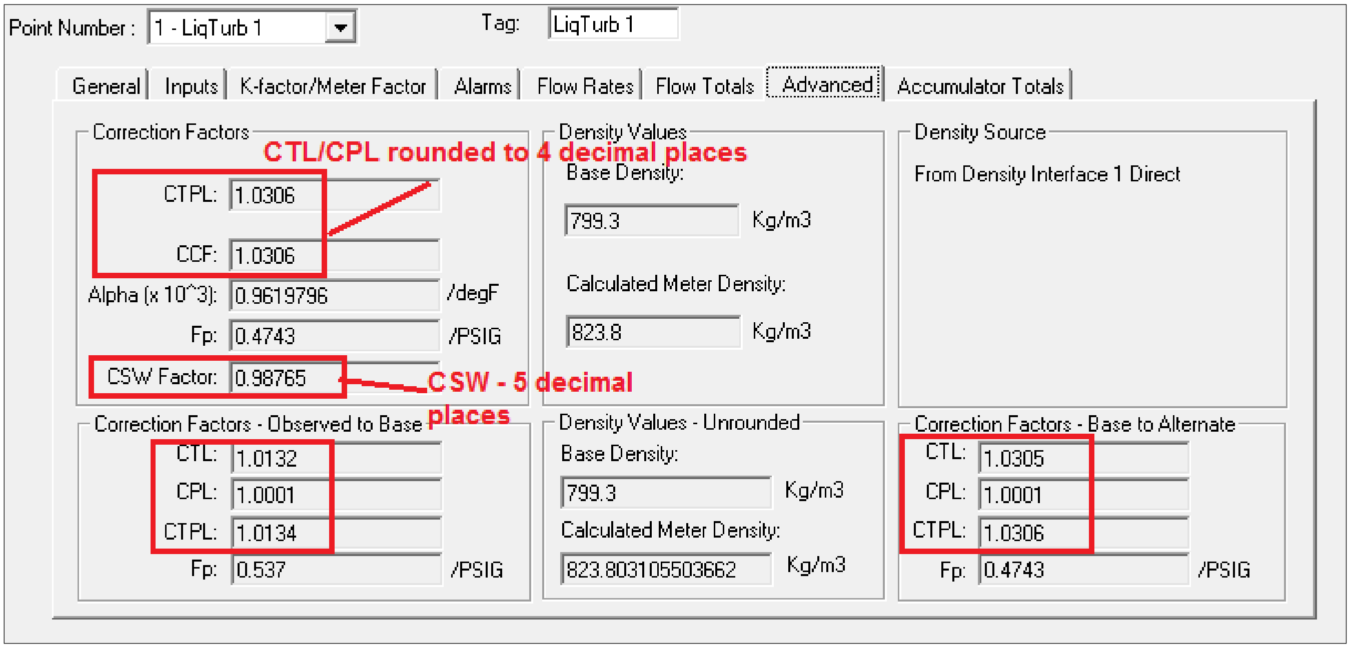


Figure E-28. Volume Correction Factors, Rounded

3. Rerun the batch with the same Preset values as follows:

a. From the Directory Tree, double-click **User Program**.

b. Double-click **Display #8, Component Setup**.

c. Double-click **#1**. The screen displays:

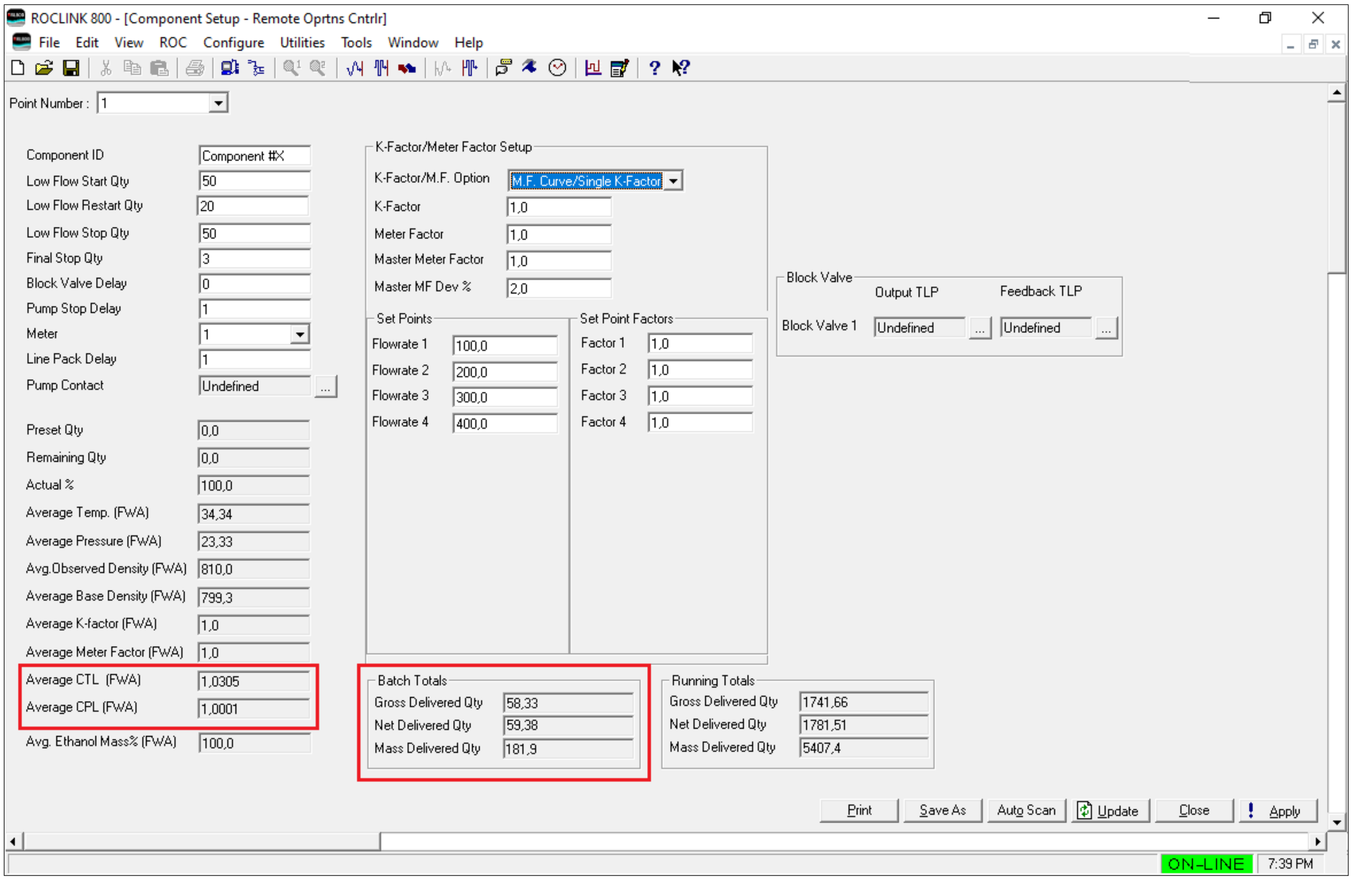


Figure E-29. Component Setup Screen, Rounded Totals

The **read-only** fields: Average CTL (FWA), Average CPL (FWA) and Batch Totals (Gross Delivered Qty, Net Delivered Qty and Mass Delivered Qty) their values are rounded.

4. Check the Static Totals. Click the **Batch Recalculations** tab. The screen displays:

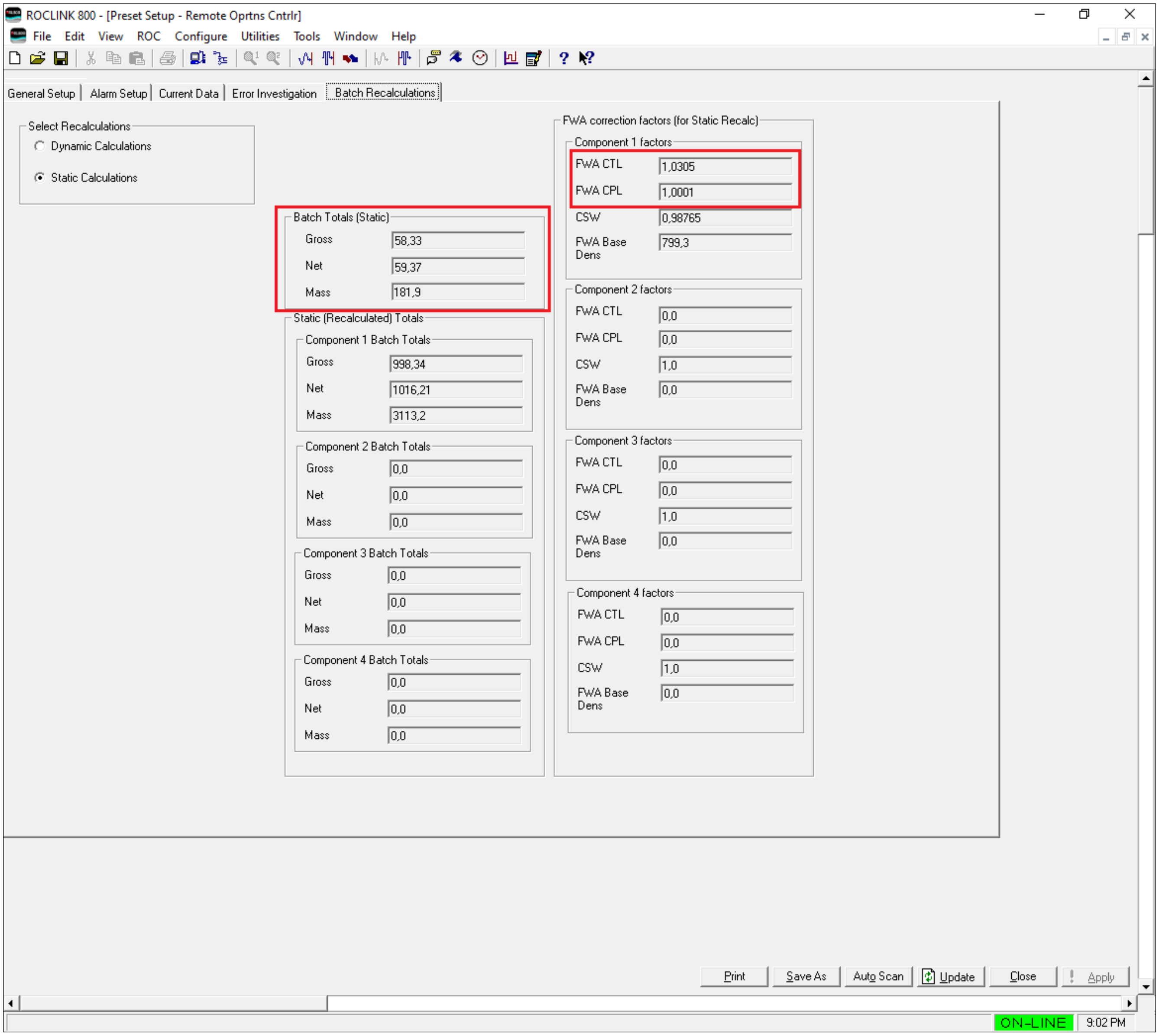


Figure E-30. Preset Setup Screen, Batch Recalculations tab, Rounded Totals

The **read-only** fields: Batch Totals (Gross, Net and Mass) FWA CTL and FWA CPL their values are urounded.

5. Reprint the batch to show the rounded totals and volume correction factors as follows:

a. From the Directory Tree, double-click **User Program**.

b. Click **Program #6, KeypadDisplay**.

c. Double-click **Display #46, Navigation Setup**.

d. Click **Display Properties** tab. The screen displays:

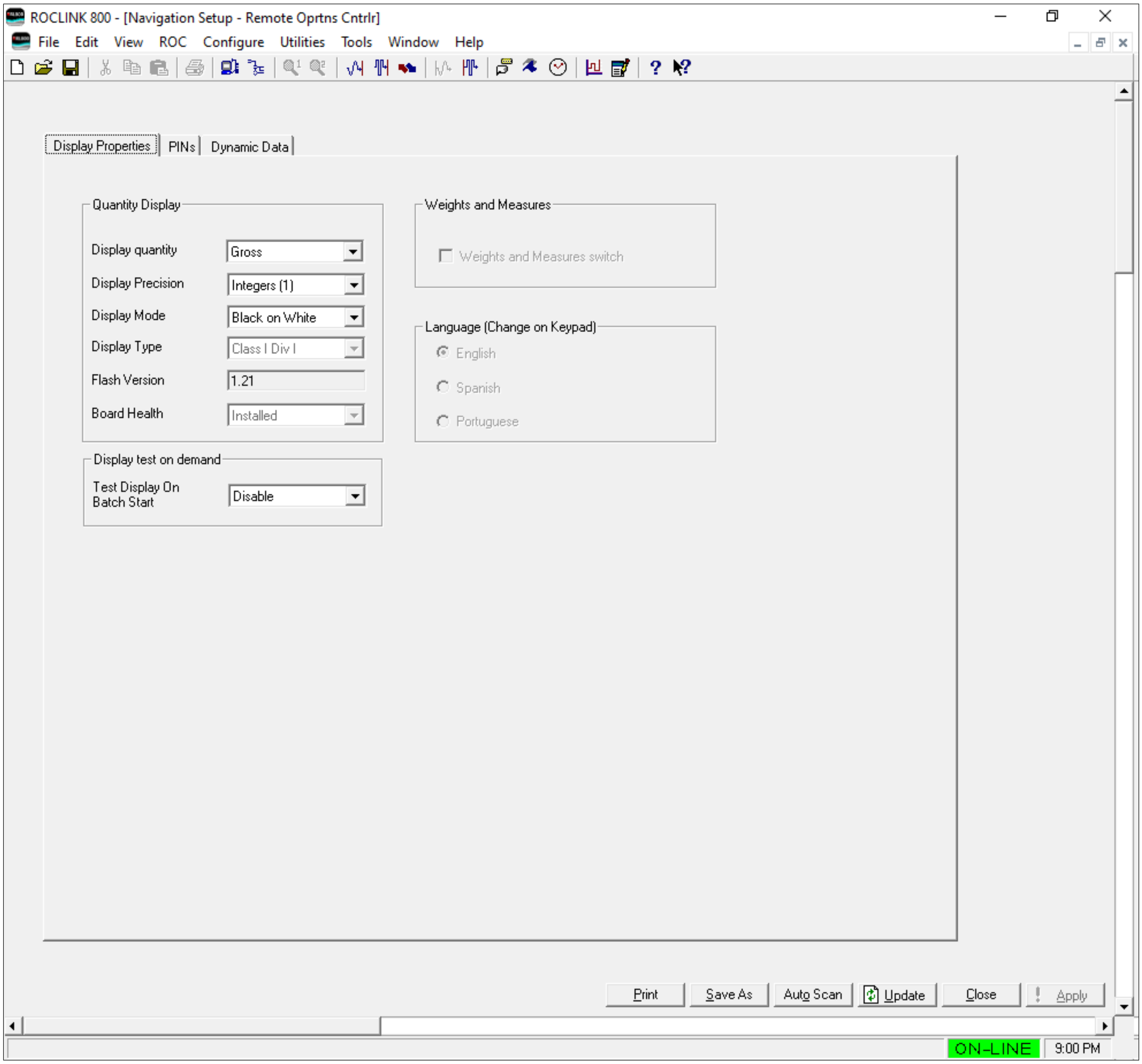


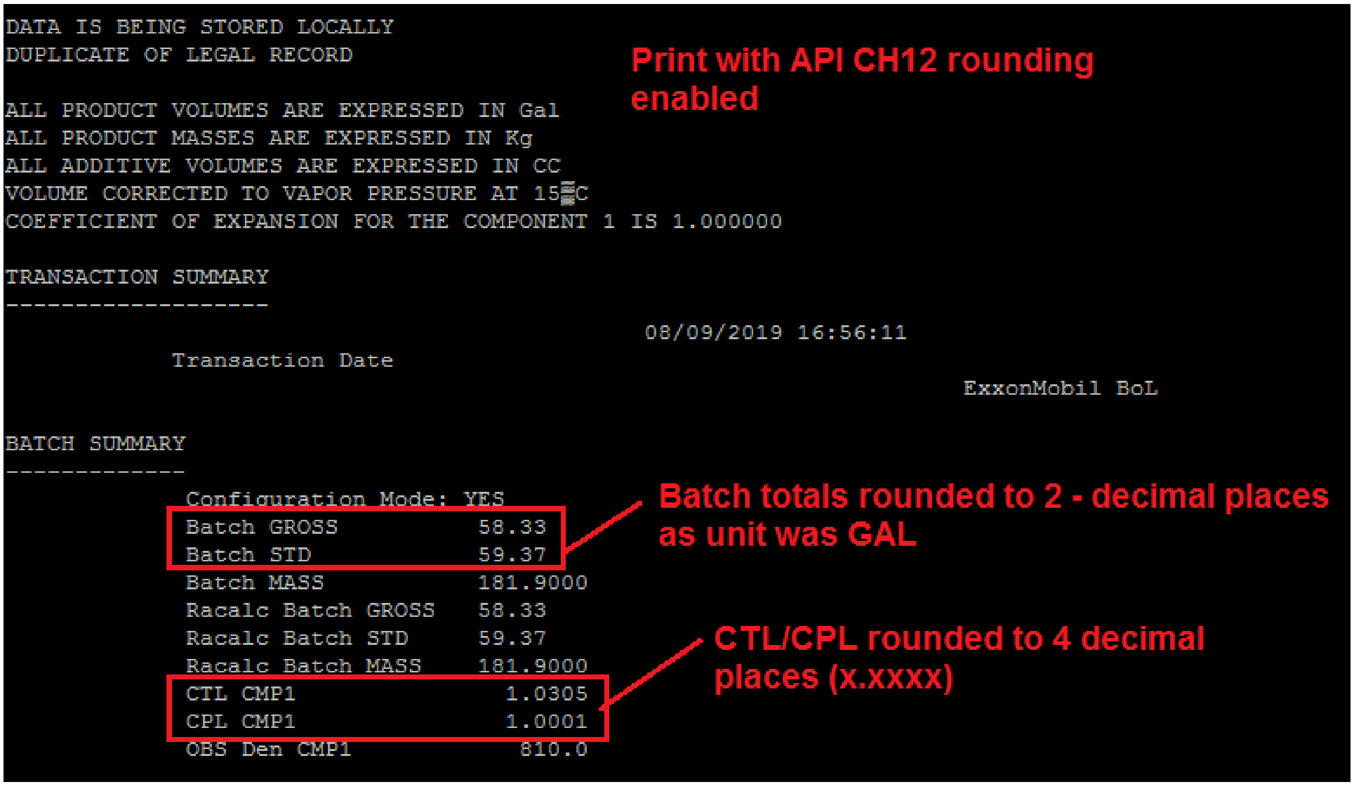
Figure E-31. Navigation Display Screen

e. Go to Quantity Display category, set the following parameters:

Display quantity: **Gross**
Display Precision: **Intergers (1)**
Display Mode: **Black on White**

f. Click **Apply** to save the changes.

g. Refer to *Section 4.6 – Printing a Configuration* to printout the above parameters. See the print below:



```
DATA IS BEING STORED LOCALLY
DUPLICATE OF LEGAL RECORD

ALL PRODUCT VOLUMES ARE EXPRESSED IN Gal
ALL PRODUCT MASSES ARE EXPRESSED IN Kg
ALL ADDITIVE VOLUMES ARE EXPRESSED IN CC
VOLUME CORRECTED TO VAPOR PRESSURE AT 15▒C
COEFFICIENT OF EXPANSION FOR THE COMPONENT 1 IS 1.000000

TRANSACTION SUMMARY
-------------------
                                              08/09/2019 16:56:11
            Transaction Date
                                                                     ExxonMobil BoL

BATCH SUMMARY
-------------
             Configuration Mode: YES
             Batch GROSS            58.33
             Batch STD              59.37
             Batch MASS             181.9000
             Racalc Batch GROSS     58.33
             Racalc Batch STD       59.37
             Racalc Batch MASS      181.9000
             CTL CMP1                 1.0305
             CPL CMP1                 1.0001
             OBS Den CMP1             810.0
```


Figure E-32. Rounded Totals, Printed

6. The rounded data is archive and you can view the Transaction History .

To access the Transaction History, do the following:

a. From the Directory Tree, double-click **User Program.**

b. Click **Program #2, TransactionHistory**.

c. Double-click **Display #19, TransHistorySetup**.

d. Click the **View Batch History** tab. The screen displays:

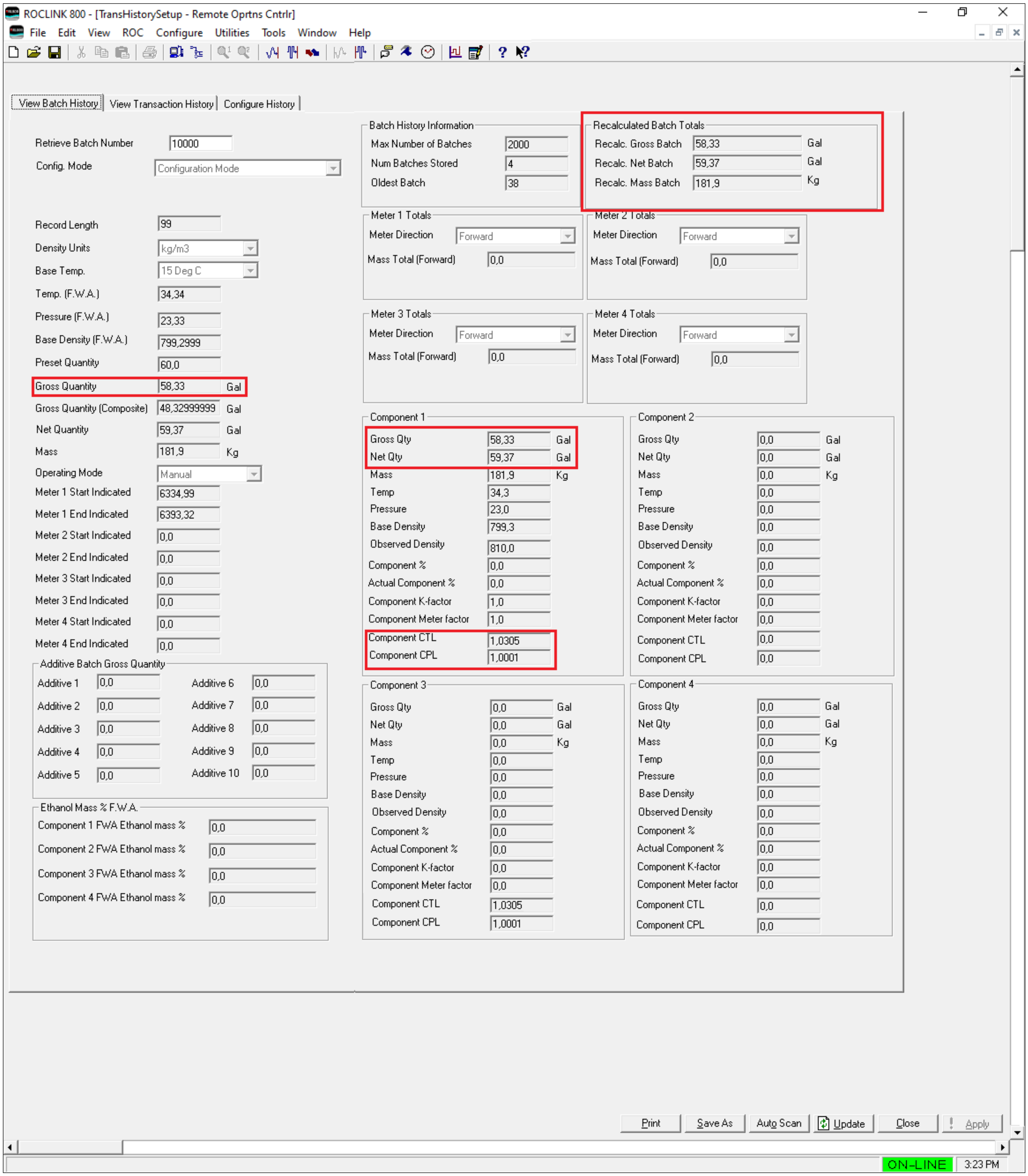


Figure E-33. View Batch History Screen, Rounded Data

The totals of Gross Quantity, Component 1 (Gross Qty, Net Qty, Component CTL and Component CPL) and Recalculated Batch Totals (Recalc. Gross Batch, Recalc. Net Batch and Recalc. Mass Batch) are rounded.

E.4 Unloading

To configure a unit for unloading, you need to first select the Unit Type as **Unloading** (option **3** for the TLP 63,0,12). You can accomplish this either from the Preset Setup screen (display #11) or from the Setup/Configuration menu on the DL8000 keypad display.

Once you select **Unloading** as the unit type, the Batching program:

- Sets the Max Preset value [TLP:63,0,28] and the Max Transaction limit [TLP:63,0,4] to the maximum limit of 9999999 units.
- Sets the value for the Number of Additives [TLP:63,0,100] to 0 (since additive injection does **not** occur during unloading).
- Sets the alarm severity of the Low Flow, Pressure Failure, and No Flow alarms to 2 (Display – Stop Batch).

Note: You can change these alarm severities according to your organization's needs.

To start an unloading transaction you must first select a recipe. Recipe verification fails if **any** of the following conditions are present:

- Number of components present in the recipe [TLP:63,0.37] is more than 1, **OR**
- Number of additives [TLP:63,0,100] is more than 0, **OR**
- If Max Preset Qty [TLP:63,0,28] does not equal 9999999, **OR**
- If Max Transaction Limit Qty [TLP:63,0,4] does not equal 9999999.

If any of these conditions is present, the program changes the batching status to **4** (Invalid Recipe) and the "Invalid Recipe" display appears on the preset screen:

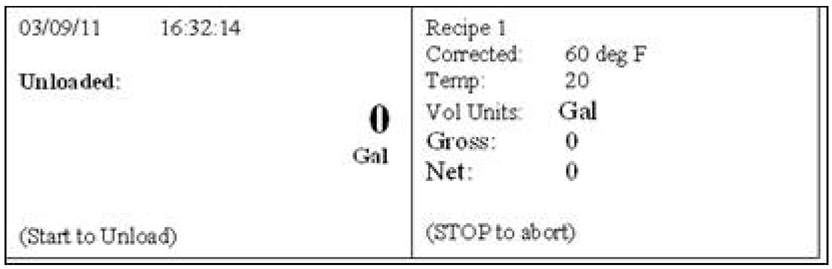
14/02/12 13:58:59 Invalid Recipe (Info message)	(Press CLEAR)

The program sets the following error codes [TLP:63,0,95]:

Error Code	Message displayed on Keypad	Description
22	UNLDG-InvdMasPreset	Invalid Max preset value for unloading (Max Preset Qty [TLP:63,0,28]) does not equal 9999999)
23	UNLDG-InvdMaxTrLim	Invalid max transaction limit qty for unloading (Max Transaction Limit Qty [TLP:63, 0, 4] does not equal 9999999)

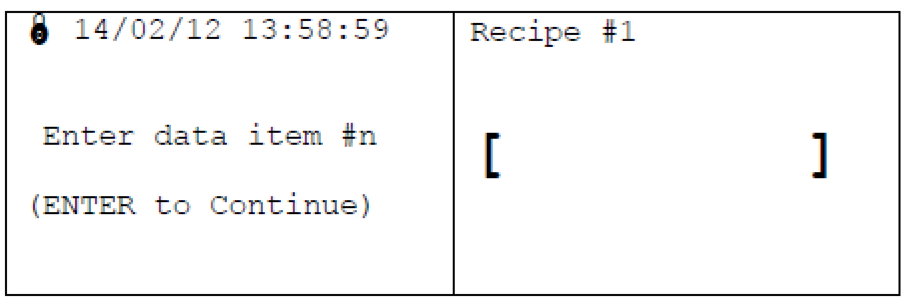
Error Code	Message displayed on Keypad	Description
24	UNLDG-InvdNoOfAdtv	Invalid number of additives for unloading (number of additives [TLP:63,0,100]) is more than 1)
25	UNLDG-Invd Recipe	Invalid recipe for unloading (number of components present in the recipe [TLP:63,0,37] is more than 1)

If the selected recipe **is** valid, the program automatically enters a Preset Quantity value [TLP:63,0,0] equal to the Max Preset quantity value [TLP:63,0,28] (that is, **9999999**). The program displays an Unloading screen:



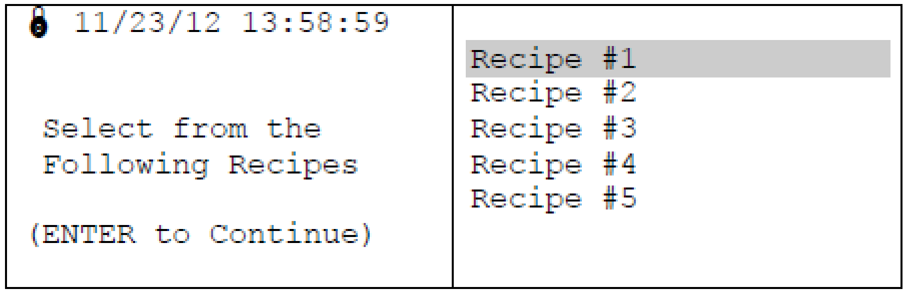
Press **Enter** to start the delivery (there is no Preset entry screen). For unloading, the program does not display a progress bar.

If you have correctly configured the data items (so that TLP:63,0,186 is non-zero), then after a valid recipe selection the preset displays a data item prompt:



Once you enter a data item, the program automatically enters a Preset Quantity value [TLP:63,0,0] equal to the Max Preset quantity value [TLP:63,0,28] (that is, **9999999**) and the preset displays the Unloading screen.

If you press **Stop** at the Unloading screen, the display returns to the Recipe selection screen:



Unloading stops under the following conditions:

- Unloaded quantity has reached the preset value (that is, the Max Preset value of 9999999 units), **OR**
- The operator has pressed **Stop** to end the batch, **OR**
- The truck being unloaded empties, which is noted in one of the following ways:
  - Activation of the Low Pressure alarm
  - Activation of the Low Flow alarm
  - Activation of the No Flow alarm
  - Activation of the digital input configured to stop unloading [TLP:64,0,64]

Once you select **Unloading** as the Unit Type, the Batching program sets the following alarms to severity 2 (*Display - stop batch*):

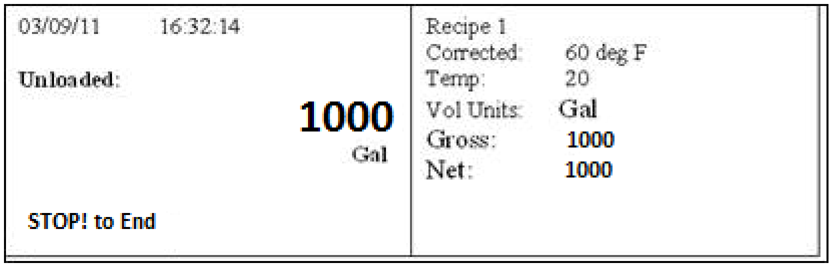
- Low flow alarm –Low Flow Alarm Action [TLP:63,0,17]
- Low Pressure alarm –Pressure Fail Alarm Action [TLP:63,0,182]
- No flow alarm - No Flow Alarm Action [TLP:63,0,44]

Note: You can change these severities according to your organization's needs.

You can configure DI to command the end of unloading using either the Preset Setup screen or the Setup/Configuration menu on the keypad display.

E.4.1 Manual Mode

With a Unit Type of **Unloading**, the preset does not display an Entry screen to the operator. When the batch completes (that is, Batching status [TLP:63,0,9] is **13**), the preset displays the message *STOP! To End*. This message appears in place of the message *Enter New Preset* (which appears for any unit type value other than Unloading).



Press **STOP** to end the transaction.

E.4.2 Auto Mode

If the mode is AUTO and the operator tries to authorize new batch at batching status 13, the program raises the exception 5Fh MAX Transaction Total. This is because the Unloading Unit Type automatically enters the Max Preset Qty (999999).

This is because – for unloading – the program automatically enters the Max Preset Qty (9999999) which is equal to the Max Transaction Limit (9999999).

As the new preset entry causes the Transaction Qty to exceed this value, the preset verification fails. The operator must then end the transaction and start a new batch under a new transaction.

At the end of a transaction, the system archives the respective batch and transaction data, prints (if auto-print has been enabled), and resets the preset to the Select Recipe state (1).

The program totalizes and archives the unloaded quantity using the same totalizers and TLPs which have been defined for loading applications (Component, Batch, and Transaction totalizers). No new totalizers are added for unloading application except for FWA non resettable totals.

The system adds the BSW volume total [TLP:73,X,68] to the History user program as a Batch archive data.

E.4.3 User Data Entry to a Specific TLP

The program adds the parameters “**Data item #n TLP**” of **TLP data type** [TLP:64,0,65/66/67/68/69] for each data item entry. This reads data from the parameter Data item 1 to Data item 5 [TLP:63,0,188/190/192/194/196] and saves it to the TLP mapped by parameter “Data item #n TLP” [TLP:64,0,65/66/67/68/69].

The program pairs the new parameter as:

Data Item 1 [TLP:63,0,188] - > Data Item 1 TLP [TLP:64,0,65]

Data Item 2 [TLP:63,0,190] - > Data Item 1 TLP [TLP:64,0,66]

Data Item 3 [TLP:63,0,192] - > Data Item 1 TLP [TLP:64,0,67]

Data Item 4 [TLP:63,0,194] - > Data Item 1 TLP [TLP:64,0,68]

Data Item 5 [TLP:63,0,196] - > Data Item 1 TLP [TLP:64,0,69]

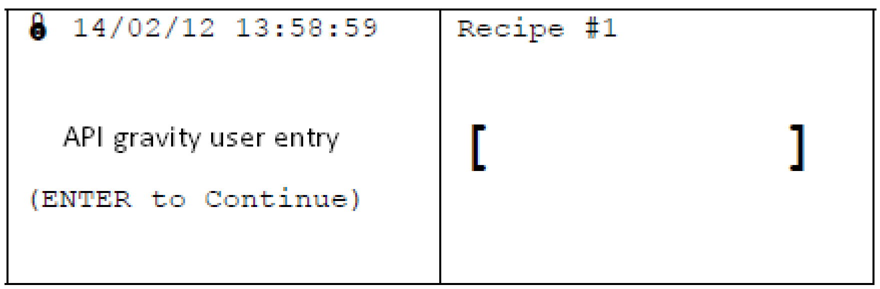
For example, the TLP mapped in the parameter **Data Item 1 TLP** [TLP:64,0,65] reads data from **Data Item 1** [TLP:63,0,188]

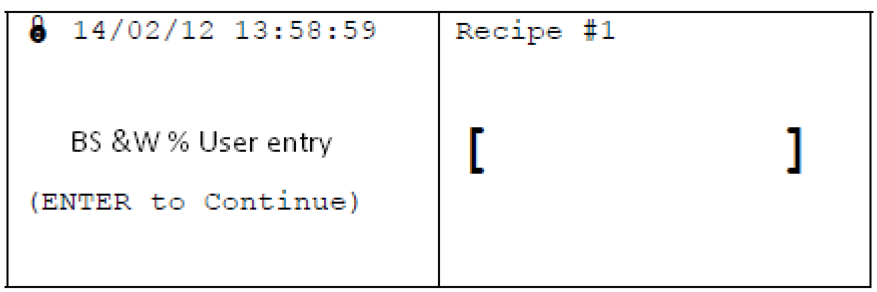
You can set the parameter "**Data item #n TLP**" [TLP:64,0,65/66/67/68/69] to TLP:0,0,0. The data item then acts like a regular data item entry, since it has no associated TLP.

Note: You can **only** configure "data item #n TLP" [TLP:64,0,65/66/67/68/69] through the ROCLINK Preset Setup screen.

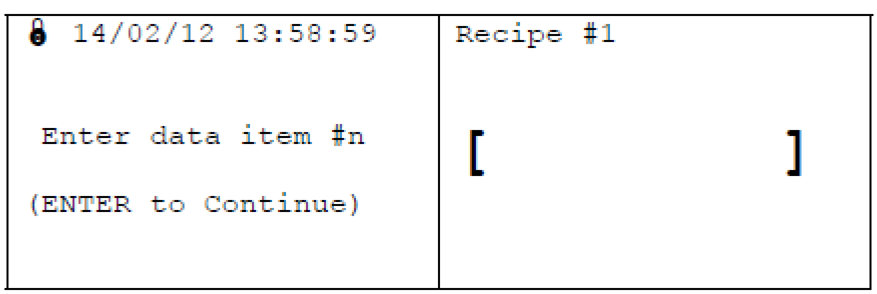
For example:

1. Map parameter "Data item #n TLP" [TLP:64,0,65/66/67/68/69] to any valid DL8000 TLP. (For example, you can map API gravity [TLP:74,X,3 – Raw density input value] and BSW % entry [TLP:73,X26])
2. Set the Data Item Prompt1 to 5 [TLP:63,0,187/189/191/193/195] as you require. For example, in case of accepting user entries for API and BSW, you can the data item prompts to "*API gravity user entry*" and "*BS &W % User entry*" and the preset prompts the operator to enter these values after selecting a recipe.





The program treats the remaining 3 data items (with no TLP configured) as regular data item prompts:



Note: The BSW parameter is Weights & Measure-protected. If an operator should enter a value, you must open the Weights & Measure using a data item (so that the BWS entry occurs **after** the selection of a recipe).

The data item TLPs are U32 data types. If the TLP assigned for data item ("Data item #n TLP" [TLP:64, 0,65/66/67/68/69]) is a float or double data type, then you must scale the value to enter it. Use the Float Data Scaling parameter [TLP:64,0,70] to enter the float data.

You can set this to a required value (such as 10) and then enter the required value. In the case of 10.5, enter **105** at the data item prompt and set scaling to **10**. This scales the entered value as 10.5 to the respective float or double data type TLP.

Other data types (U8, U16, or U32) do not require scaling.

Note: The program **does not** support **negative** entries through the data item prompts.

The program range-checks "Data item #n TLP" [TLP:64,0,65/66/67/68/69] for:

- The assigned TLP can be anything from PT 60 (Printer point Type) to PT76 (Valve point type) **OR**
- It can be a soft point **OR**
- No TLP assignment [TLP:0,0,0] **OR**
- FWA Non resettable Totals

E.4.4 FWA Non-resettable Totalizers

The program adds the following FWA non resettable totalizers:

- Average FWA Temperature Continuous [TLP:64,0,71]
- Average FWA Pressure Continuous [TLP:64,0,72]
- Average FWA Base Density Continuous [TLP:64,0,73]

All these TLPs have double as their data type. These totalizers are following the rollover limit as specified by Liquid Calculations program.

The program resets the totalizers when you:

- Modify of the rollover limit [TLP:70,0,12]
- Set the **Reset FWA Continuous Totals** parameter [TLP:64,0,74] to **1**. Configure this TLP using either the Preset Setup screen or the Setup and Configuration menu on the keypad.

Note: You can reset the non-resettable FWA totals **only** when no transaction is in progress.

E.4.5 When Unit is in AUTO Mode

The program verifies the recipe when the transaction is authorized (the TA system sends command 06h). Recipe verification fails in **any** of these circumstances:

- If the number of components present in the recipe [TLP:63,0,37] is more than 1
- If the number of additives [TLP:63,0,100] is more than 1
- If the Max Preset Qty [TLP:63,0,28] does not equal 9999999
- If the Max Transaction Limit Qty [TLP:63,0,4] does not equal 9999999

In this case, the program sets the exception code [TLP:63,0,168] to **56h,** *Recipe Verification fail,* and sets the error code [TLP:63,0,95] as follows:

- **Error Code 22**:
  Invalid Max Preset Value for unloading (Max Preset Qty [TLP:63,0,28] does not equal 9999999)
- **Error Code 23**:
  Invalid Max Transaction Limit Qty for unloading (Max Transaction Limit Qty [TLP:63,0,4] does not equal 9999999)
- **Error Code 24**:
  Invalid number of additives for unloading (number of additives [TLP:63,0,100] is greater than 1)
- **Error Code 25**:
  Invalid recipe for unloading (number of components present in the recipe [TLP:63,0,37] is greater than 1)

Issuing the Prompt Preset Volume command (08h)

This command acts as normal preset entry command. The system prompts the operator to enter a preset quantity:

14/02/12 13:58:59 Enter Preset Quantity (ENTER to Continue)	Recipe #1 [ ] Bbl

Once the operator enters a preset quantity, the program updates the preset with the entered value. After this command, the program expects the Authorize Batch command. For the **Unloading** Unit Type, the Authorize Batch command overwrites the operator-entered preset with the Max

Preset Qty (9999999) and the program presents the operator with the Unloading screen.

Note: For unloading, the Prompt Preset Volume command (08h) is not necessary. After the program authorizes the transaction, you can issue the Authorize Batch command (0Ah).

When the program issues the Authorize Batch command (0Ah), the program displays the Unloading screen (as with manual unloading).

The legacy DL6000 protocol allows you to define the preset quantity for the batch. The Unloading program ignores any user-defined preset quantity and overwrites it with the Max Preset Qty of 9999999.

Auto Mode of Operation

All the commands applicable to the base DL8000 product work for the Unloading program.

Changes in the Command Sequence and Exception Codes for Unloading

Commands

If the driver selects a valid recipe and the transaction is authorized, then you can directly authorize the batch by issuing the Authorize Batch command (0Ah). For unloading, there is no need to issue a Preset Entry command (08h) since the program automatically enters the preset.

The legacy DL6000 protocol has a command that allows you to enter a desired preset quantity at batch authorization. For unloading, the program overrides any user-entered preset quantity.

Exception Code

If the operating mode is AUTO and you try to authorize a new batch at batching status 13 (that is, when one batch on that transaction has completed), the program issues exception **5Fh** (**Max Transaction Total**).

This is because the Unloading program automatically enters the Max Preset Qty (9999999) which is equal to the Max Transaction Limit (9999999). If the entered preset quantity exceeds the Max Transaction Qty Limit, the preset verification fails, and the program issues exception **5Fh** (decimal 95)

At this point, the operator must end the transaction and start a fresh batch under a new transaction.

In AUTO mode, the program verifies the recipe when the transaction is authorized (when the TA system issues command 06h). Recipe verification fails under any of the following conditions:

- If the number of components present in the recipe [TLP:63,0,37] is more than 1 **OR**
- If the number of additives [TLP:63,0,100] is not 0 **OR**

- If the Max Preset Qty [TLP:63,0,28] does not equal 9999999 **OR**
- If the Max Transaction Limit Qty [TLP:63,0,4] does not equal 9999999

The program sets the exception code [TLP:63,0,168] to 56h (*Recipe Verification fail*) and sets the error code [TLP:63,0,95] to one of the following:

- **Error Code 22**:
  Invalid Max Preset Value for unloading (Max Preset Qty [TLP:63,0,28] does not equal 9999999)
- **Error Code 23**:
  Invalid Max Transaction Limit Qty for unloading (Max Transaction Limit Qty [TLP:63,0,4] does not equal 9999999)
- **Error Code 24**:
  Invalid number of additives for unloading (number of additives [TLP:63,0,100] is greater than 1)
- **Error Code 25**:
  Invalid recipe for unloading (number of components present in the recipe [TLP:63,0,37] is greater than 1)

E.5 Configuring Vapor Recovery

The vapor recovery feature measures the amount of returned or recovered vapor during the loading of light hydrocarbons and calculates the net delivered mass (forward mass minus reverse mass) for billing purposes. This feature is available for mass delivery **only** and the delivered quantity is equal to the preset mass quantity.

Example: 2000 kg is the preset to be loaded. The DL8000 monitors/controls the forward mass (liquid phase) minus the reverse mass (gas phase), to assure that 2000 kg remained at the target vessel.

You can **only** configure one meter for reverse flow, and that meter **must** be a non-system meter (e.g. if the number of meters in the system configured as 1, then meter 2 through meter 4 are non-system meters). If you select more than one non-system meter, then the user program keeps only one non-system meter and sets the Meter Flow direction to Normal Flow for the remaining meters.

You must configure the following parameters for the reverse meter:

- **Unit Type** must be set to **Sequential**.
- **Delivery Type** must be set to **Mass**.

The system adds a verification check to avoid configuration errors when using a reverse meter. Possible reverse meter configuration error codes are:

Table E-2. Reverse Meter Configuration Error Codes

Error Code	Description
20	Reverse meter configured and delivery type not MASS.
21	Reverse meter configured and unit type not SEQUENTIAL (Auto/Manual).

Notes:

- A DL8000 configured for vapor recovery can **only** be used for this purpose. You **cannot** configure the remaining meters to perform "normal" non-vapor recovery batches.
- The preset quantity **must** be configured for mass, and you **must** configure a mass output (pulses per mass) for both field meters (liquid phase-forward meter and gas phase-reverse meter).
- The reverse meter is considered non-system meter. The DL8000 does not scan for any flow, temperature, pressure, or density alarms on non-system meters.

To configure vapor recovery:

1. Configure the DL8000 to measure Light Hydrocarbons:

   a. From the Directory Tree, double-click **User Program**.

   b. Double-click **Program #1, LiquidCalcs**.

   c. Double-click **Display #71, Product**.

   d. Double-click **#1, Product 1**. The Product screen displays showing the Product Definition tab:

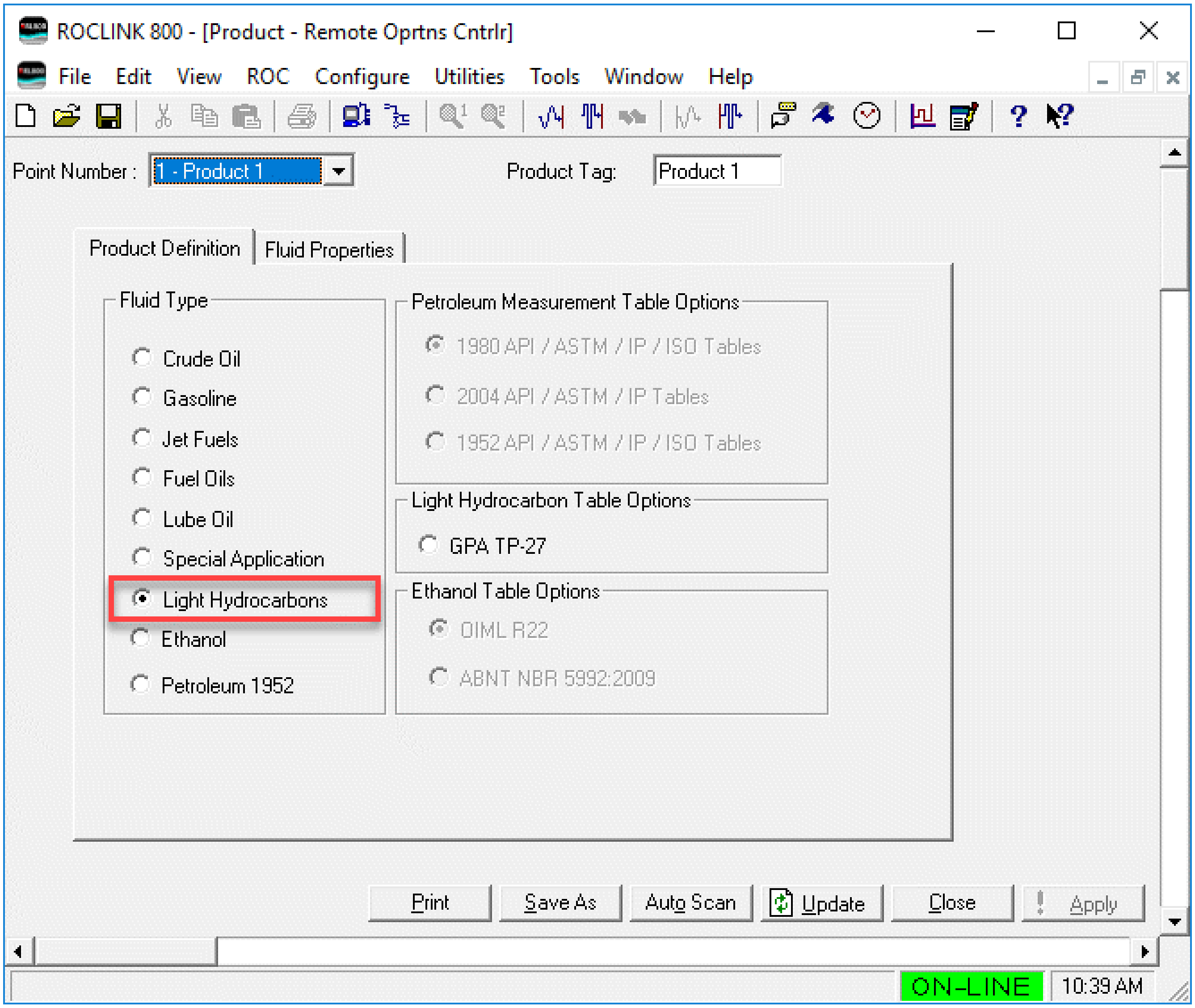


Figure E-34. Product

e. Select **Light** Hydrocarbons in the Fluid Type field.

f. Click **Apply** to save the changes.

g. Click **Close** to exit the screen.

2. Configure the liquid phase-forward meter and the gas phase-reverse meter to **both** measure mass:

a. From the Directory Tree, double-click **User Program**.

b. Double-click **Program #1, LiquidCalcs**.

c. Double-click **Display #74, Liquid Turbine**.

d. Double-click **#1, LiqTurb 1**. The Liquid Turbine screen displays:

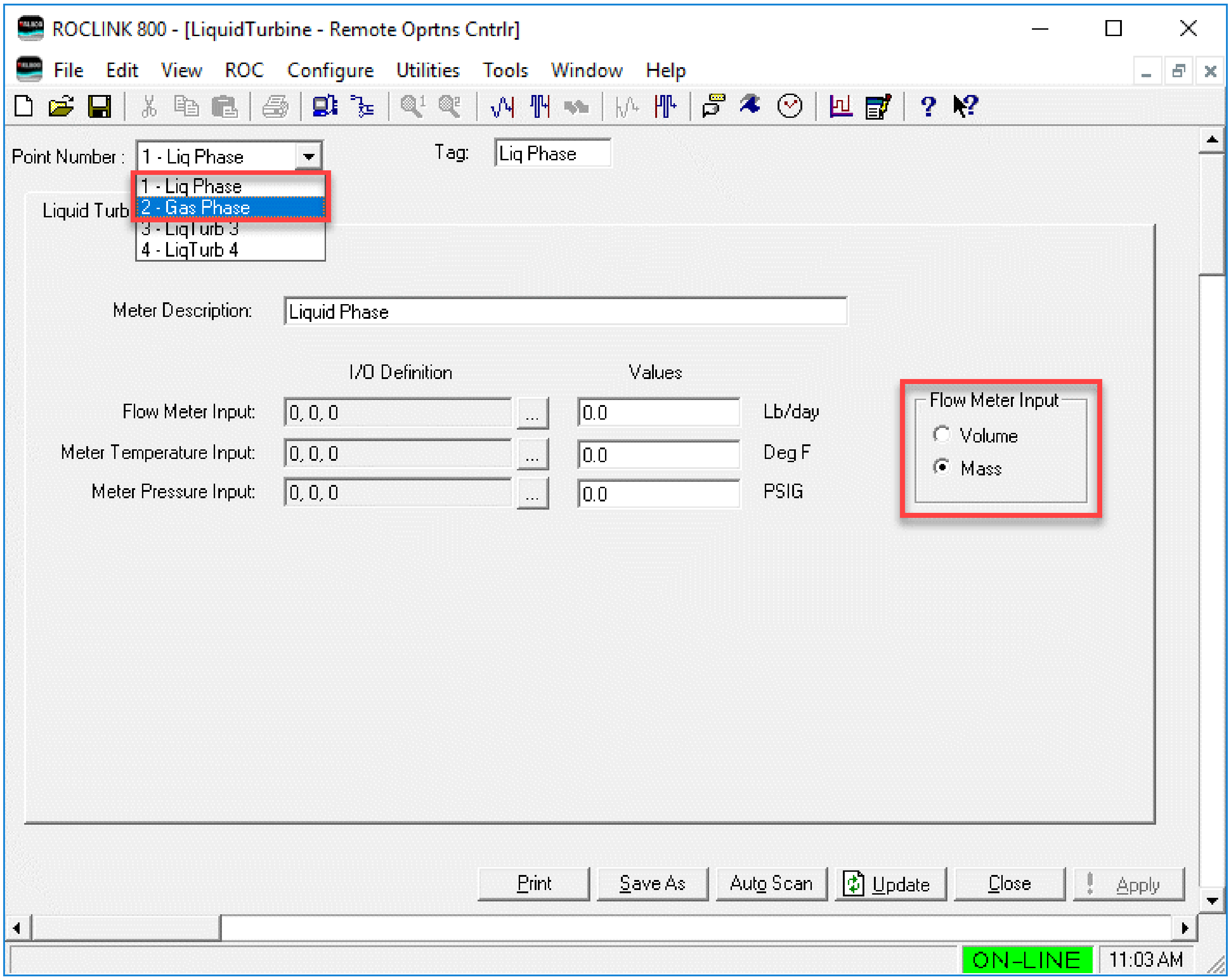


Figure E-35. Liquid Turbine

e. Configure the **I/O Definition** fields based on your liquid phase-forward meter.

f. Select **Mass** in the Flow Meter Input field.

g. Click **Apply** to save the changes.

h. Repeat these steps for the gas phase-reverse meter.

i. Click **Close** to exit the screen.

3. Configure the the flow direction of the liquid (forward) meter and gas (reverse) meter:

   a. From the Directory Tree, double-click **User Program**.

   b. Double-click **Program #5, Batching**.

   c. Double-click **Display #10, Meter Setup**.

   d. Double-click **#1**. The Meter Setup screen displays:

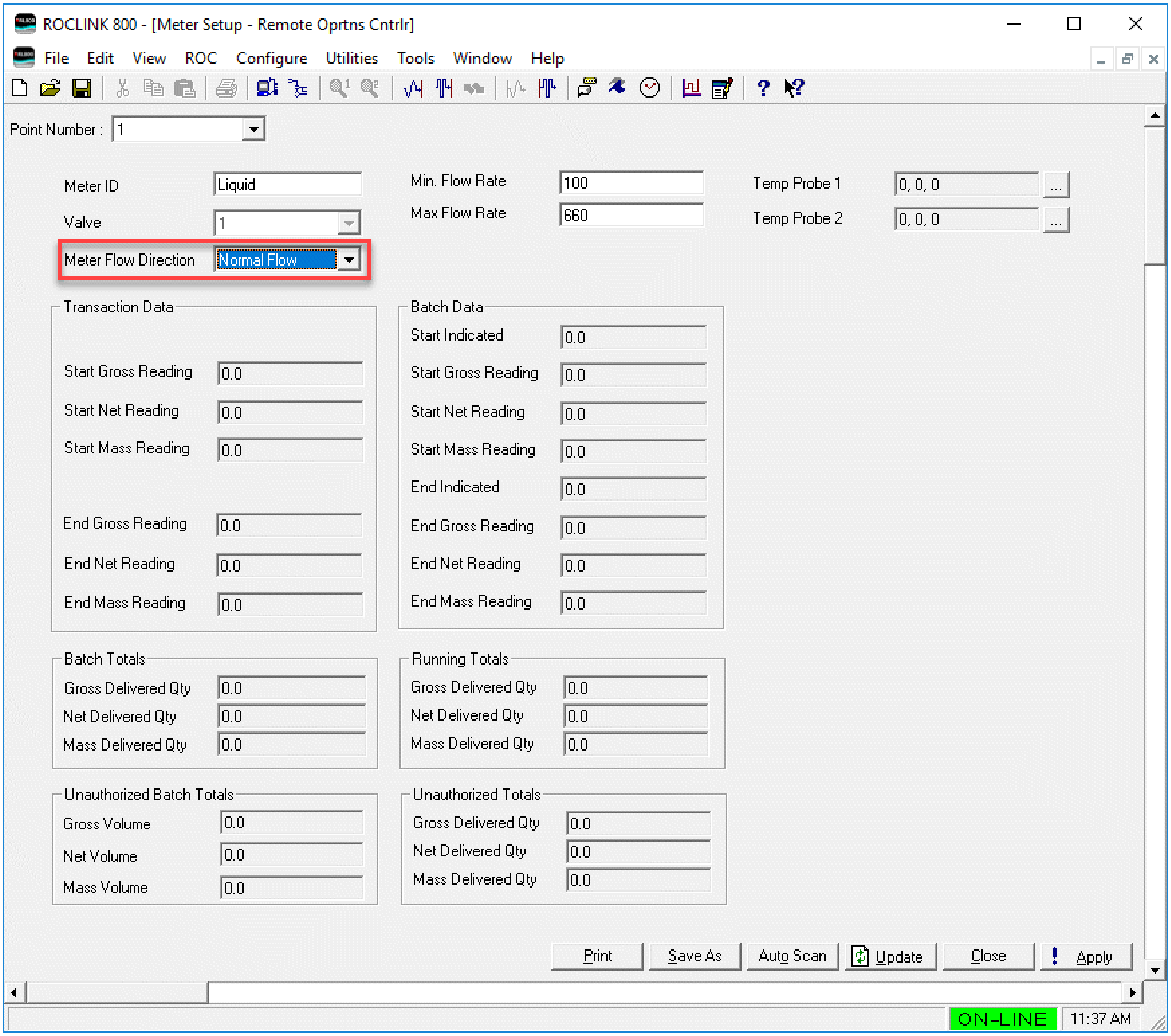


Figure E-36. Meter Setup – Liquid, Normal Flow

e. In the **Point Number** field, select the Meter Setup instance associated with the liquid phase-forward meter.

f. Select **Normal Flow** in the Meter Flow Direction field.

g. Click **Apply** to save the changes.

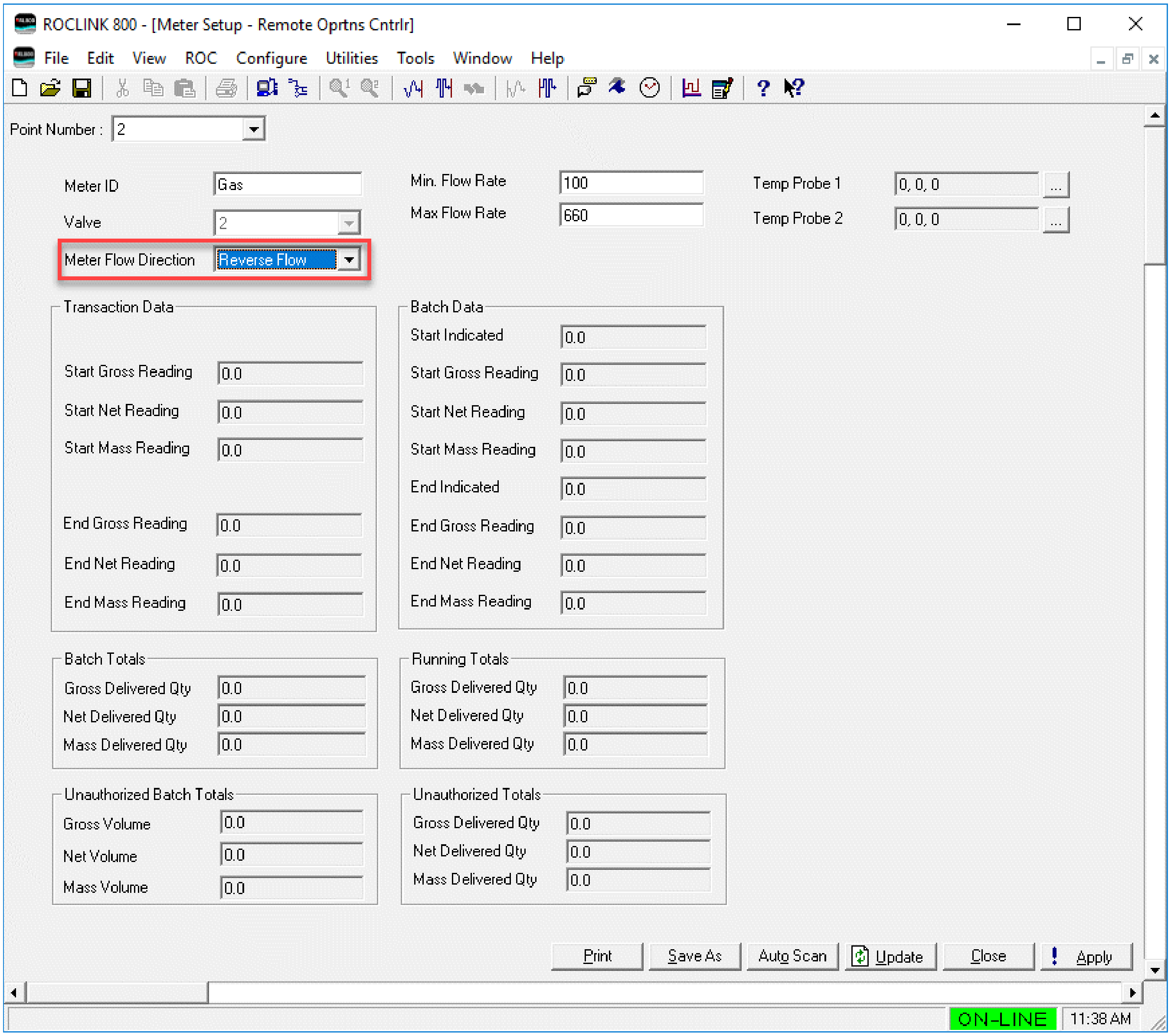


Figure E-37. Meter Setup – Gas, Reverse Flow

h. In the **Point Number** field, select the Meter Setup instance associated with the gas phase-reverse meter.

i. Select **Reverse Flow** in the Meter Flow Direction field.

j. Click **Apply** to save the changes.

k. Click **Close** to exit the screen.

4. Configure the Preset Setup – General Setup tab:

a. From the Directory Tree, double-click **User Program**.

b. Double-click **Program #5, Batching**.

c. Double-click **Display #11, Preset Setup**. The Preset Setup screen displays showing the General Setup tab:

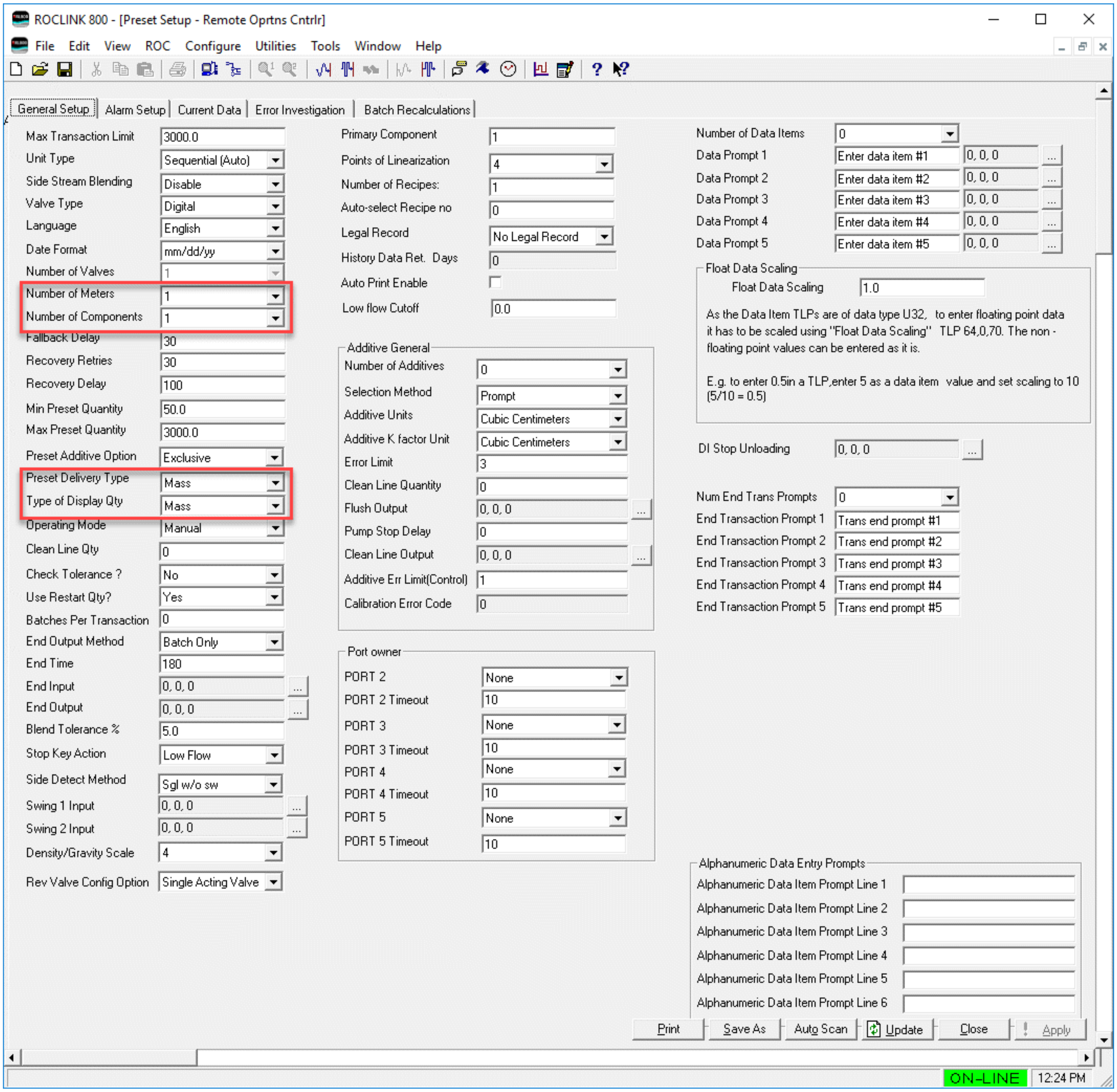


Figure E-38. Preset Setup – General Setup tab

d. Set the **Number of Meters** field to **1**.

e. Set the **Number of Components** field to **1**.

f. Set The **Preset Delivery Type** field to **Mass**.

g. Set The **Type of Display Qty** field to **Mass**.

h. Click **Apply** to save the changes.

i. Click **Close** to exit the screen.

5. Configure the Transaction History Setup – Configure History tab to archive net forward and reverse meter totals:

   a. From the Directory Tree, double-click **User Program**.

   b. Double-click **Program #2, TransactionHistory**.

   c. Double-click **Display #19, TransactionHistorySetup**. The Preset Setup screen displays showing the General Setup tab.

   d. Select the **Configure History** tab:

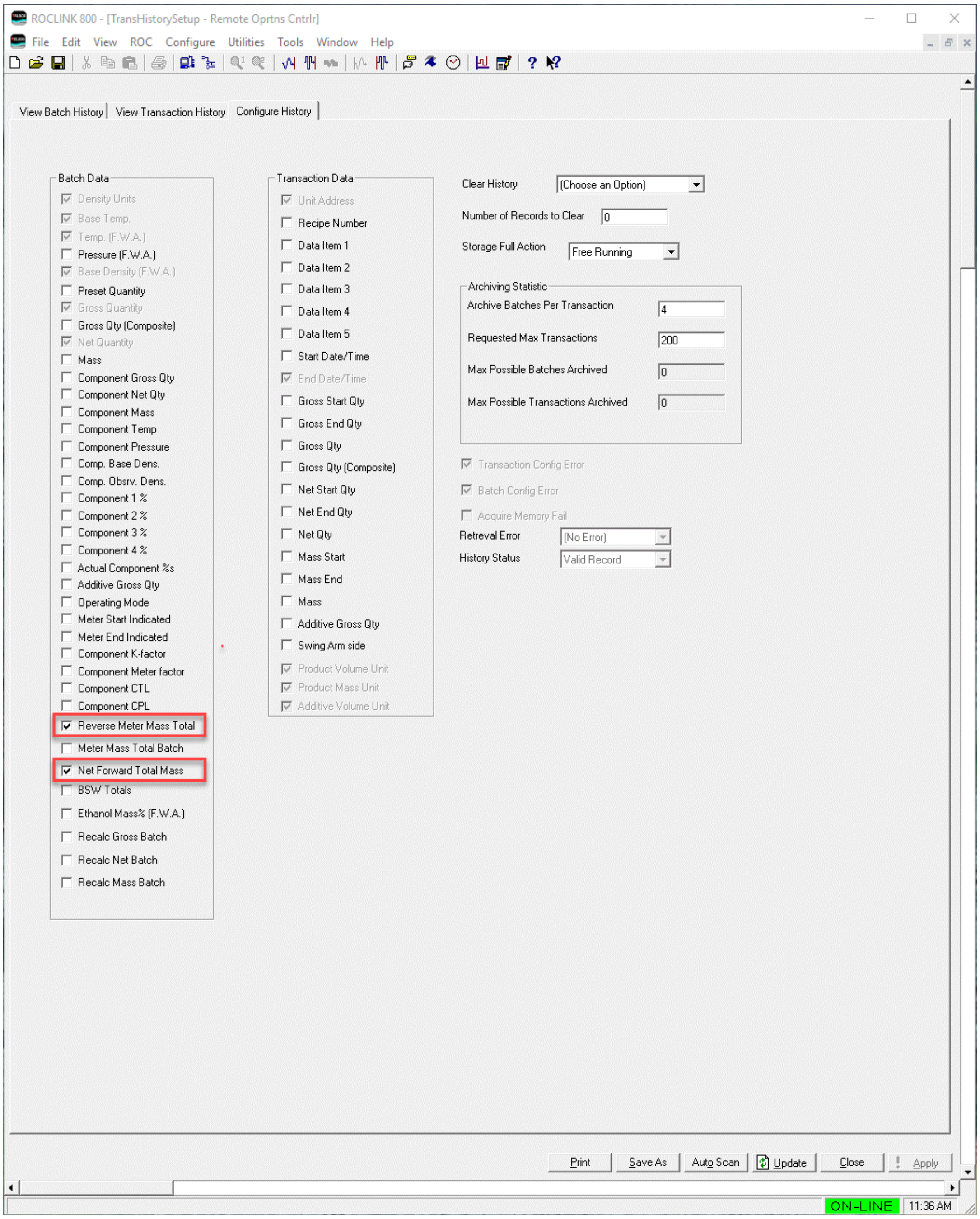


Figure E-39. Transaction History Setup – Configure History tab

e. Place a checkmark next to **Reverse Meter Mass Total**.

f. Place a checkmark next to **Net Forward Total Mass**.

g. Click **Apply** to save the changes.

6. You can now view mass totals on the **Transaction History Setup – View Batch History** tab [*Net Forward Mass = Mass Total (Forward) – Mass Total (Reverse)*]:

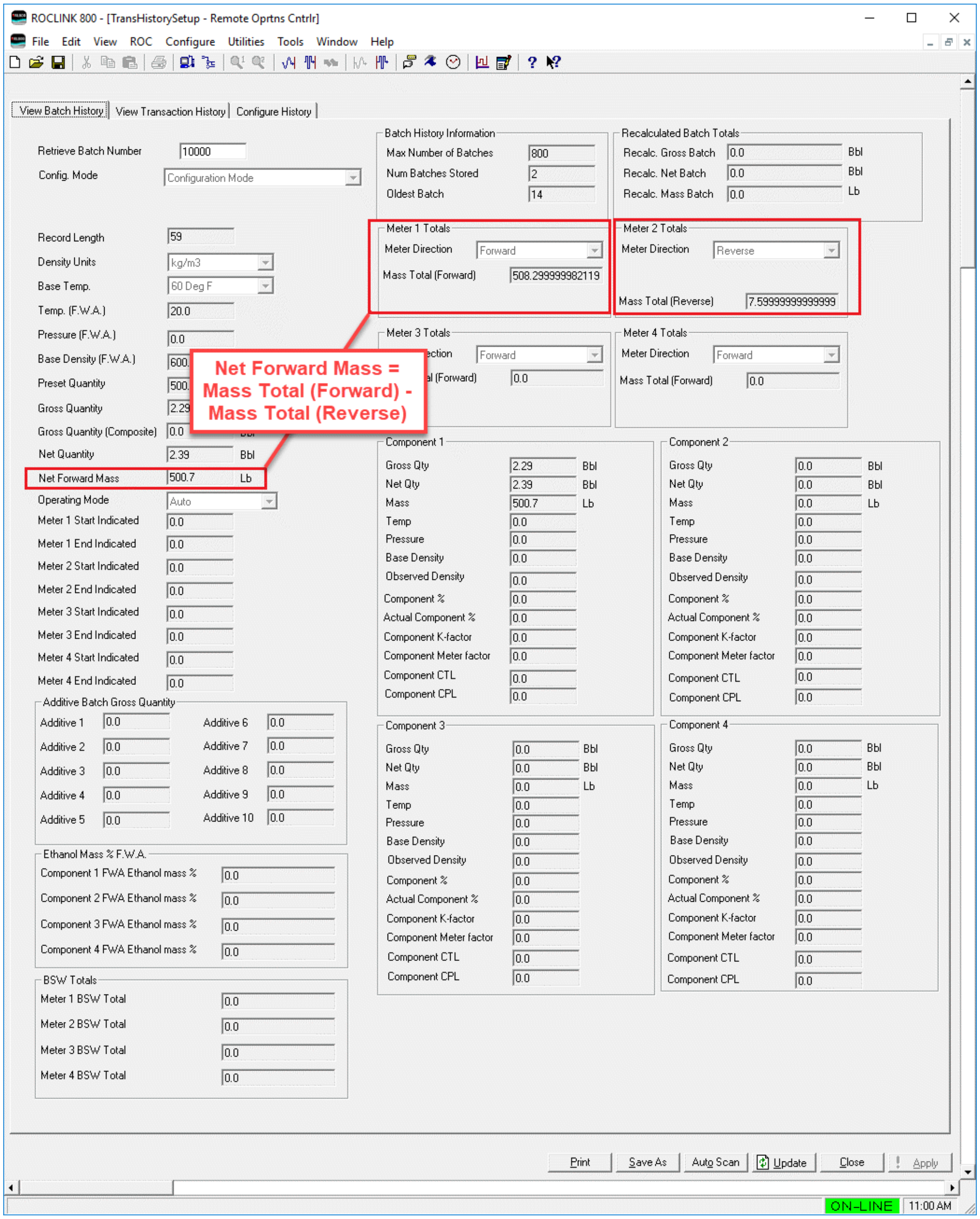


Figure E-40. Transaction History Setup – View Batch History tab

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