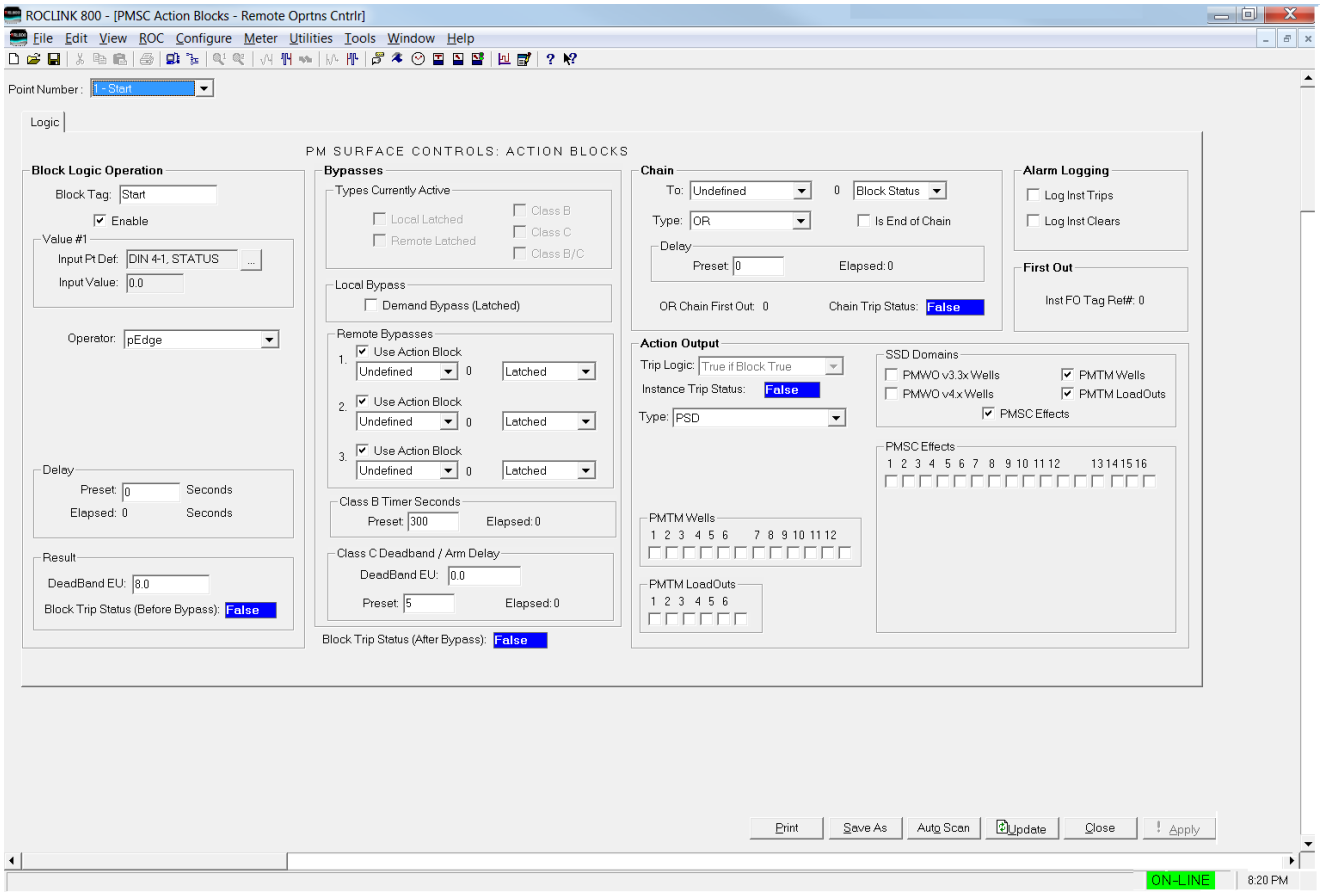
Part D301759X012
January 2017

Surface Control Manager User Manual (for ROC800-Series and FloBoss™ 107 Controllers)



Remote Automation Solutions

EMERSON™

Revision Tracking Sheet

January 2017

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

Page	Revision
All Pages	January-2017
All Pages	August-2016
Initial release	September-2014

Contents

Chapter 1 – Introduction

⚠ Caution **When implementing control using this product, observe best industry practices as suggested by applicable and appropriate environmental, health, and safety organizations. While this product can be used as A safety component in a system, it is NOT intended or designed to be the ONLY safety mechanism in that system.**

This chapter describes the structure of this manual and presents an overview and installation instructions of the Surface Control Manager program for the ROC800-Series Remote Operations Controller and the FloBoss™ 107 Flow Computer.

Note: The Surface Control Manager program (v407_00_XXXblk.tar) comes with PMCB Calculation Blocks (Display #218) for ROC800. For FloBoss 107, it is a separate program. For installation procedures, refer to *Section 2.2.2 – PMCB Calculation Blocks Program* for details.

1.1 Scope and Organization

This document serves as the user manual for the Surface Control Manager program, which is intended for use in a ROC800-Series (ROC800) and FloBoss 107 (FB107). This manual describes how to download, install, and configure the Surface Control Manager program (referred to as the "Surface Control program" or "the program" throughout the rest of this manual). You access and configure this program using ROCLINK™ 800 Configuration Software (version 2.30 or greater) loaded on a personal computer (PC) running Microsoft® Windows® 2000 (with Service Pack 2), Windows XP (with Service Pack 3), Windows Vista™ (32-bit), or Windows 7 (32-bit and 64-bit).

The sections in this manual provide information in a sequence appropriate for first-time users. Once you become familiar with the procedures and the software, the manual becomes a reference tool.

This manual has the following major sections:

- *Chapter 1 – Introduction*
- *Chapter 2 – Installation*
- *Chapter 3 – Configuration*
- *Chapter 4 – Reference*
- *Appendix A – PMCB Calculation Blocks – Supported Functions*

This manual assumes that you are familiar with the ROC800 or FB107 and its configuration. For more information, refer to the following manuals:

- *FloBoss™ 107 Flow Manager Instruction Manual* (Part D301232X012)

- *ROC800-Series Remote Operations Controller Instruction Manual* (Part D301217X012)
- *ROCLINK™ 800 Configuration Software User Manual (for FloBoss™ 107)* (Part D301249X012)
- *ROCLINK™ 800 Configuration Software User Manual (for ROC800-Series)* (Part D301250X012)
- *ROCLINK™ 800 Configuration Software User Manual (for ROC800L)* (Part D301246X012)

1.2 Product Overview

The two main functional areas on a well pad are the well itself ("downhole") and the equipment on the surrounding ground ("surface management"). "Surface control" refers to the ability to manage both the control logic of that equipment as well as any maintenance bypass requirements for that equipment and surface shut-in of wells. The Surface Control Management application enables you to configure the ROC800 or the FB107 to perform logical control and maintenance bypass using "action blocks." Action blocks are configurable program components that drive effects (such as valves opening or closing). The FB107 program supports 48 action blocks; the ROC800 programs support 48, 96, 144 or 192 action blocks. Additionally, a quartet of utilities accompanies each action block. These utilities provide the sequential effects for an action block, monitor run times (to calculate run and down times for air compressors, engines, and other equipment), accumulate values (for today, yesterday, this month, previous month, and for a running period), and provide configurable outputs (analog outputs, pulse outputs, etc.).

The Surface Control Program has an added feature – PMCB Calculation Blocks. This program enables you to specify complex mathematical or logical (Boolean) equations for entry in a free-form style. These equations typically would either not be suited (too complex) for entry in Action Blocks or Cause & Effect, or possibly you prefer to save Action Blocks by processing all math and some logic problems in the PMCB Calculation Blocks program.

1.3 Program Requirements

The Surface Control Manager program is compatible with version 3.52 (or greater) of the ROC800 firmware, version 1.31 (or greater) of the ROC800L firmware, version 1.61 (or greater) of the FB107 firmware, and with version 2.30 (or greater) of the ROCLINK 800 software.

Program specifics include:

Note: Load only **one** version of the program, depending on your action blocks and utilities requirements:

- The **PMSC_v407_00_48blk.tar** program file supports 48 action blocks, 4 calc blocks and 16 utilities and installs in a ROC800 which requires only 1 license.
- The **PMSC_v407_00_96blk.tar** program file supports 96 action blocks, 8 calc block and 32 utilities and installs in a ROC800 which requires 2 licenses.
- The **PMSC_v407_00_144blk.tar** programs file supports 144 action blocks, 12 calc blocks and 48 utilities and installs in a ROC800 which requires 3 licenses.
- The **PMSC_v407_00_192blk.tar** programs file supports 192 action blocks, 16 calc blocks and 64 utilities and installs in a ROC800 which requires 4 licenses.
- The **PMSC_v407_XX_5.bin** supports 48 action blocks and 16 utilities and installs in an FB107 which requires only 1 license.

File Name	Target Unit/ Version	User Defined Point (UDP)	Flash Used (in bytes)	DRAM Used (in bytes)	ROCKLINK 800 Version	Display Number
PMSC_v407_00_48blk.tar	ROC800 3.52 ROC800L 1.31	68, 71, 218	130,345	172,032	2.30	68, 71, 218
PMSC_v407_00_96blk.tar	ROC800 3.52 ROC800L 1.31	68, 71, 218	130,345	172,032	2.30	68, 71, 218
PMSC_v407_00_144blk.tar	ROC800 3.52 ROC800L 1.31	68, 71, 218	130,345	172,032	2.30	68, 71, 218
PMSC_v407_00_192blk.tar	ROC800 3.52 ROC800L 1.31	68, 71, 218	130,345	172,032	2.30	68, 71, 218
PMSC_v407_XX_5.bin	FB107 1.61	28, 31	62,808	16,384	2.30	28, 31
PMCB_v400_01_3.bin	FB107 1.61	27	32,651	16,384	2.30	27
PMCB_v400_01_6.bin	FB107 1.61	39	32,651	16,384	2.30	39

For information on viewing the memory allocation of user programs, refer to the following manuals;

- *ROCLINK™ 800 Configuration Software User Manual (for FloBoss™ 107)* (Part D301249X012)
- *ROCLINK™ 800 Configuration Software User Manual (for ROC800-Series)* (Part D301250X012)
- *ROCLINK™ 800 Configuration Software User Manual (for ROC800L)* (Part D301246X012)

1.3.1 License Key

License keys, when matched with valid license codes, grant access to applications such as the Surface Control Manager program.

For **ROC800**, the term "license key" refers to the physical piece of hardware that can contain up to seven different licenses (refer to *Figure 1*). Each ROC800 can have none, one, or two license keys installed. If you remove a license key after enabling an application, the firmware disables the task from running. This prevents unauthorized execution of protected applications in a ROC800.

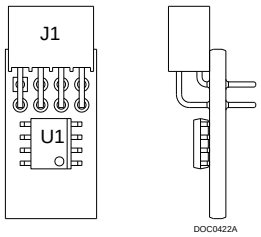


Figure 1-1. License Key

Note: The Surface Control Manager program for **ROC800** requires up to 3 **PMSC** license keys depending on your program requirement. Refer to the **Note** on *Section 1.3* for more information regarding the program and its corresponding license key requirements.

For **FB107**, Remote Automation Solutions delivers software licenses on secure USB drives. You must install the **PMSC** license key to use the Surface Control Manager program.

Chapter 2 – Installation

This section provides instructions for installing the Surface Control Manager program into the ROC800 or FB107. Read *Section 1.3* of this manual for program requirements.

2.1 Installing the License Key

Section 2.1.1 provides license key installation instructions for ROC800 and *Section 2.1.2* provides license key installation instructions for FB107.

2.1.1 Installing the License Key for the ROC800

If you order the Surface Control Manager program for a new FB107 or ROC800, your FB107 or ROC800 is delivered with the license key installed. Go to *Section 2.2*.

If you order the program for an existing ROC800, you must install the license key yourself.

Caution

Failure to exercise proper electrostatic discharge precautions, such as wearing a grounded wrist strap may reset the processor or damage electronic components, resulting in interrupted operations.

When working on units located in a hazardous area (where explosive gases may be present), make sure the area is in a non-hazardous state before performing these procedures. Performing these procedures in a hazardous area could result in personal injury or property damage.

To install a license key:

1. Remove power from the ROC800.
2. Remove the wire channel cover.
3. Unscrew the screws from the Central Processing Unit (CPU) faceplate.
4. Remove the CPU faceplate.
5. Place the license key in the appropriate terminal slot (**P4** or **P6**) in the CPU.

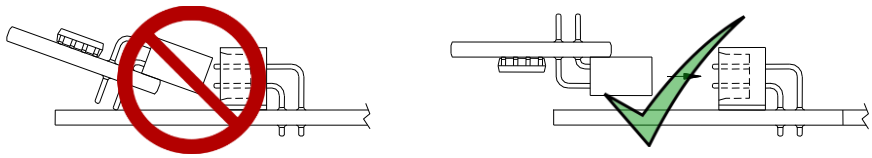


Figure 2-1. License Key Installation

6. Press the license key into the terminal unit until it is firmly seated (refer to *Figure 2*).
7. Replace the CPU faceplate.

8. Replace the screws on the CPU faceplate.
9. Replace the wire channel cover.
10. Restore power to the ROC800.
11. Proceed to *Section 2.1.3* to verify your license keys.

2.1.2 Installing the License Key for the FB107

A license is required to use the Surface Control Manager program. To install a license on the FB107:

1. Insert the USB license key in a USB port on your PC.
2. Select **Utilities** > **License Key Administrator** > **Transfer Between DEVICE and KEY** from the ROCLINK 800 menu bar. The Transfer Licenses Between a Device and a Key screen displays:

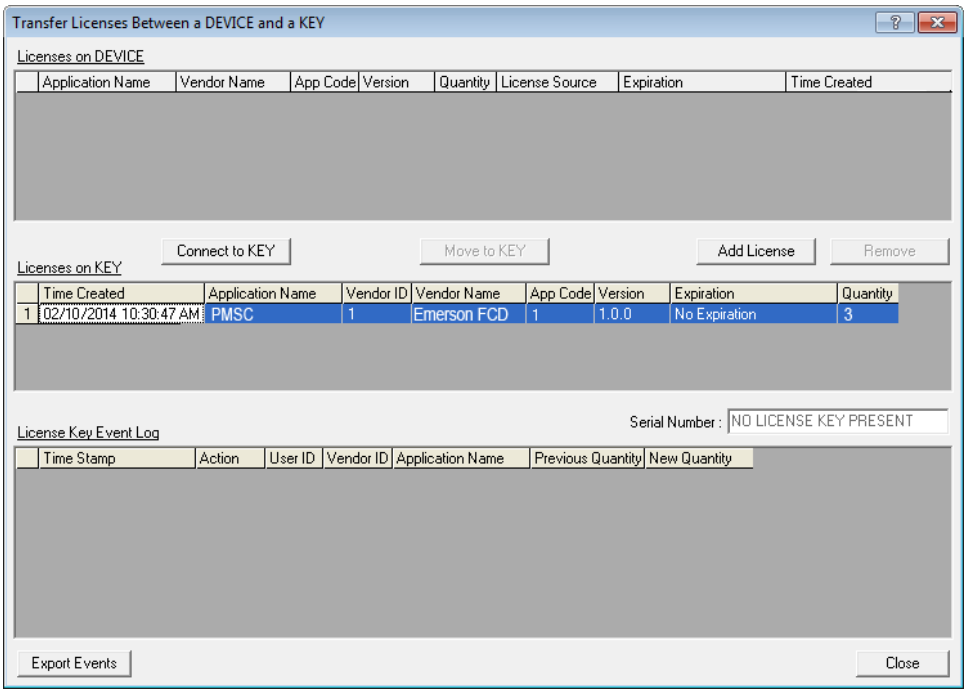


Figure 2-2. Transfer Licenses Between a Device and a Key

Note: This screen has three sections. The upper portion (Licenses on Device) shows any software licenses installed on the FB107. The middle portion (Licenses on Key) shows software licenses on the license key. The lower portion of the screen (License Key Event Log) provides a rolling log of the last eight events related to this license key.

3. Select the key-based license you want to transfer to the FB107 (**PMSC**, as shown in *Figure 2-2*).
4. Click **Move to Device**. ROCLINK moves the license from the key to the FB107 and updates the screen.

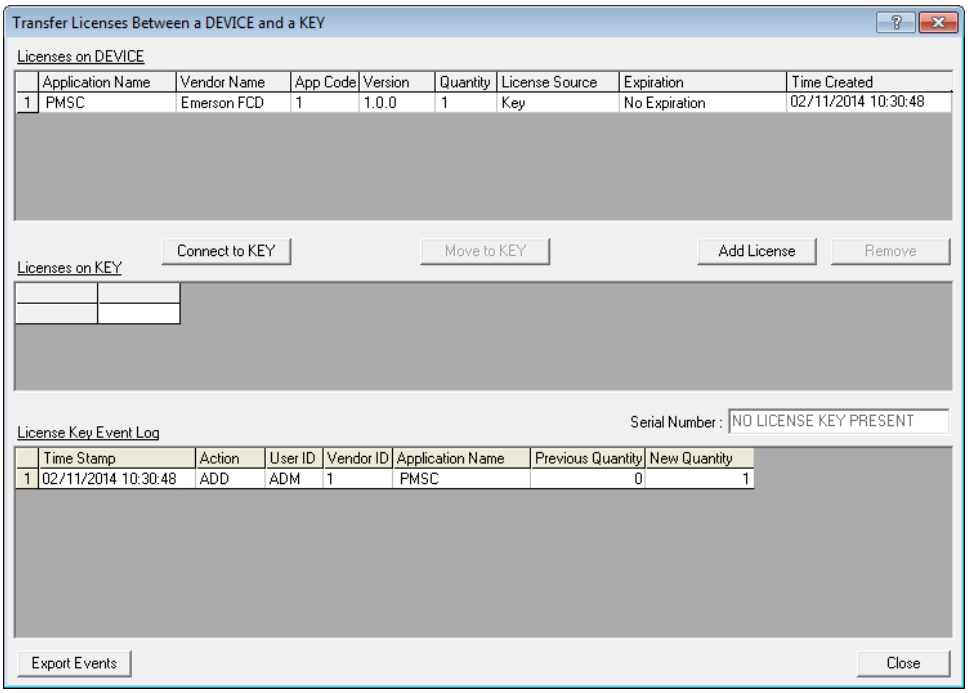


Figure 2-3. License Installed

Note: An FB107 can hold up to six different licenses, although you can install only one instance of each license on the FB107. When you click **Move to Device**, ROCLINK 800 moves only one instance of the license onto the FB107 and automatically decreases the license quantity on the USB key by one.

5. Verify the license name displays in the Licenses on Device section of the screen. Proceed to *Section 2.2* to download the user program.

2.1.3 Verifying the License Key Installation (for ROC800)

After you install the license key, you can verify whether the ROC800 recognizes the key. From the ROCLINK 800 screen, From the ROCLINK 800 screen, select **Utilities** > **License Key Administrator**. The License Key Administrator screen displays:

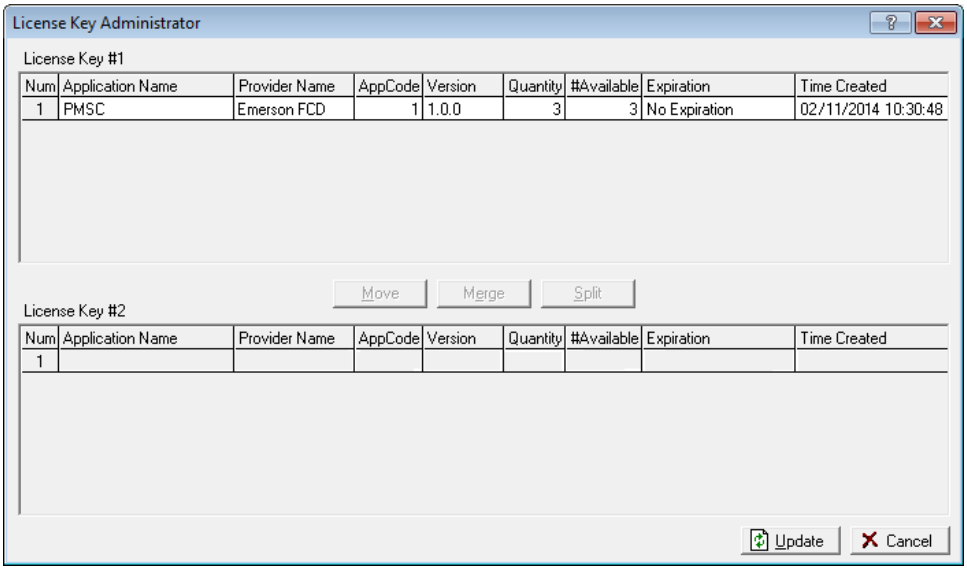


Figure 2-4. Transfer Licenses Between a Device and a Key

2.2 Downloading the Program

Section 2.2.1 provides downloading instructions of the Surface Control Program for ROC800 or FB107 and *Section 2.2.2* downloading instructions of the PMCB Calculation Blocks for FB107.

2.2.1 Surface Control Program

This section provides instructions for installing the program into the Flash memory on the ROC800 or FB107.

To download the program using ROCLINK 800 software:

1. Connect the ROC800 or the FB107 to your computer using the LOI port.
2. Start and logon to ROCLINK 800.
3. Select **Utilities** > **User Program Administrator** from the ROCLINK menu bar. The User Program Administrator screen displays (see *Figure 2-5*):

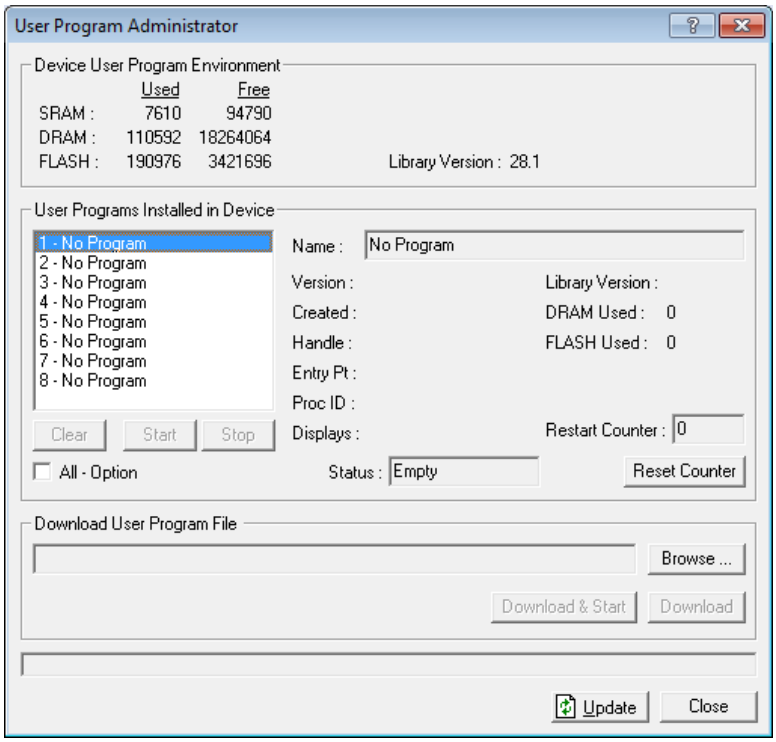


Figure 2-5. User Program Administrator

4. Click **Browse** in the Download User Program File frame. The Select User Program File screen displays (see *Figure 2-6*).

   Note: If you install the program in the ROC800, choose any available user program slot. If you use FB107, the program installs automatically in user program slot 5.

5. Select the path and user program file to download from the CD-ROM. (Program files are typically located in the Program Files folder on the CD-ROM). As *Figure 2-6* shows, the screen lists all valid user program files with the **.tar** (for ROC800) or **.bin** (for FB107) extension:

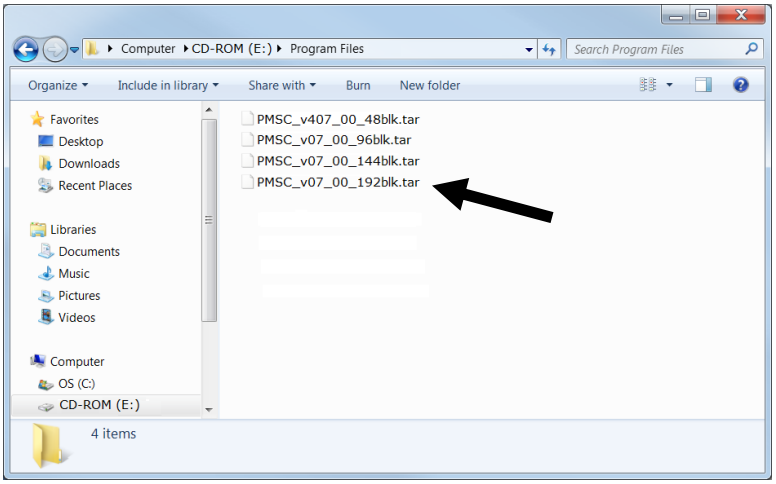


Figure 2-6. Select User Program File

6. Click **Open** to select the program file. The User Program Administrator screen displays:

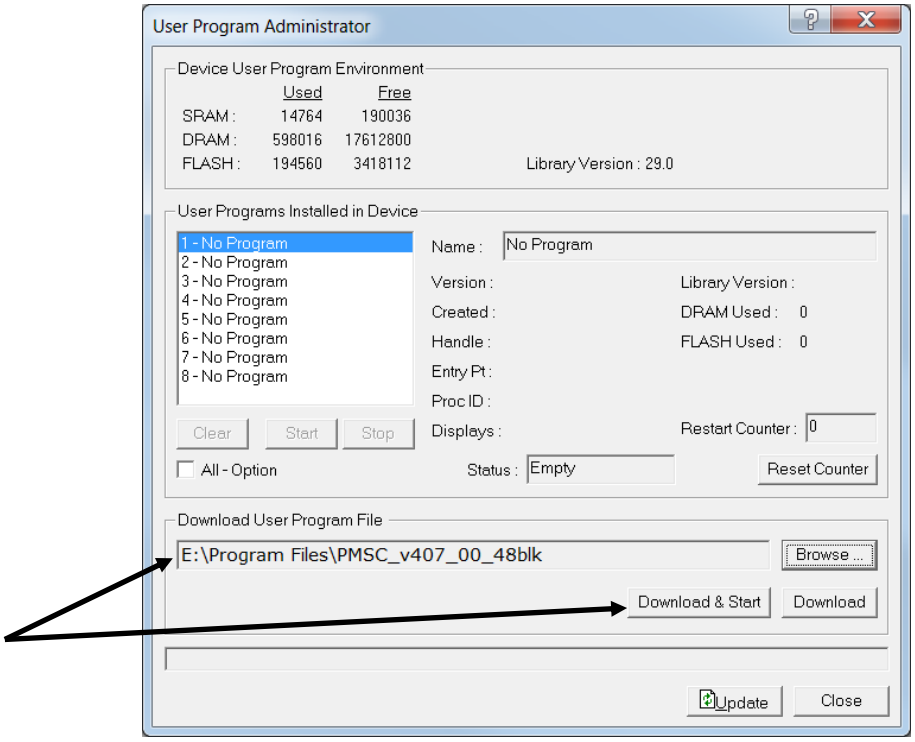


Figure 2-7. User Program Administrator

7. Click **Download & Start** to begin loading the selected programs. The following message displays:

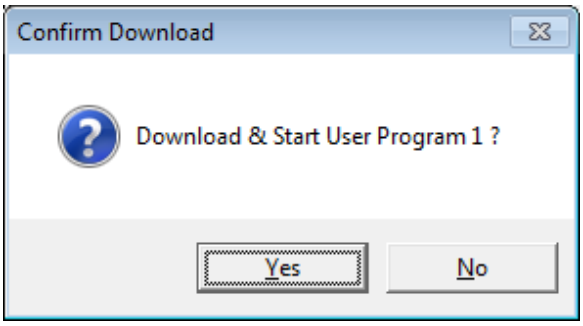


Figure 2-8. Confirm Download

8. Click **Yes** to begin the download. When the download completes the following message displays:

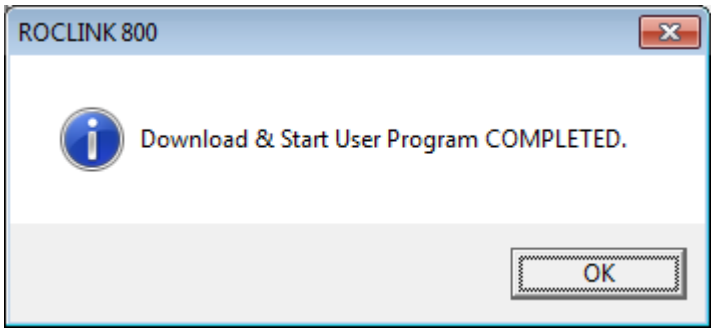


Figure 2-9. ROCLINK 800 Download Confirmation

9. Click **OK**. The User Program Administrator screen displays (see *Figure 2-10*). Note that:
   - The User Programs Installed in Device frame identifies the installed program(s).
   - The Status field indicates that the program is running.

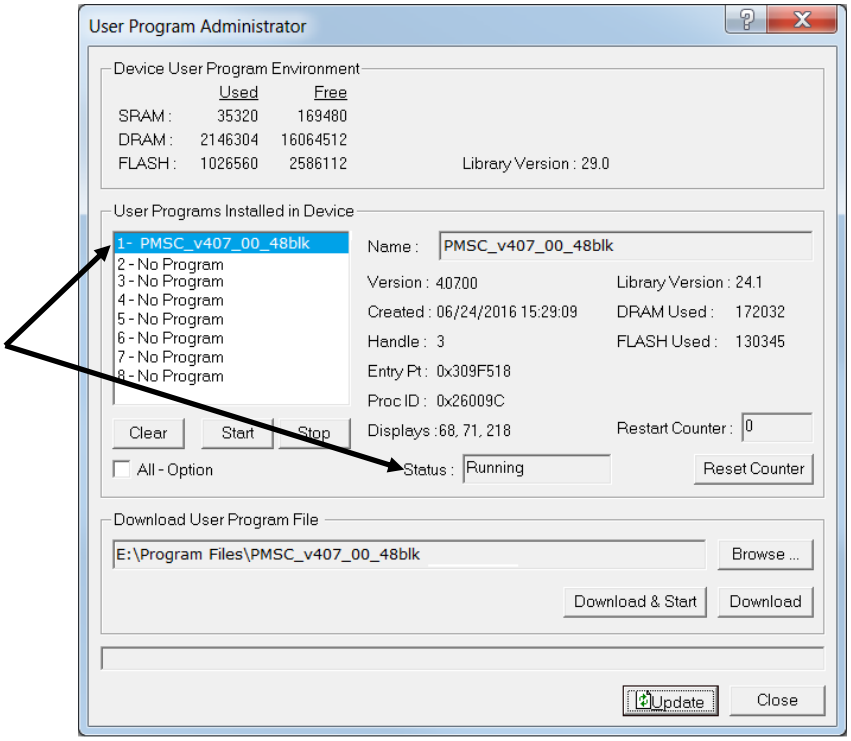


Figure 2-10. User Program Administrator

10. Click **Close**. The ROCLINK 800 screen displays and the download is complete. Proceed to *Chapter 3, Configuration*.

2.2.2 PMCB Calculation Blocks Program

This section provides instructions for installing the PMCB Calculation Blocks program into the Flash memory on the FB107.

Notes:

- The PM Calculation Blocks program installs separately into the FB107.
- There are two versions of the PMCB Calculation Blocks program are included. Installation and operation are identical between programs, but they use different point type locations, different display numbers, and are loaded into different program slots on the FB107. PMCB_v400_01_3.bin loads into user program location 3 and User Defined Point (UDP) 27. PMCB_v400_01_6.bin loads into user program location 6 and User Defined Point (UDP) 39. Install the program version that avoids point type conflicts with currently installed programs.
- This document shows the installation of PMCB_v400_01_3.bin. The installation process and functionality is the same for all version of the Calculation Blocks program.

To download the program using ROCLINK 800 software:

1. Connect the FB107 to your computer using the LOI port.

2. Start and logon to ROCLINK 800.
3. Select **Utilities** > **User Program Administrator** from the ROCLINK menu bar. The User Program Administrator screen displays (see *Figure 2-11*):

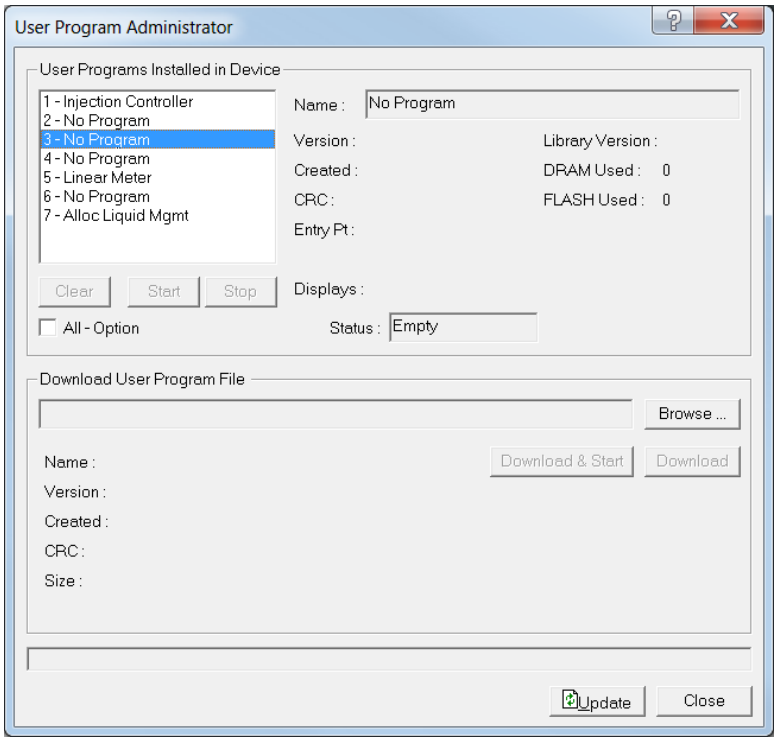


Figure 2-11. User Program Administrator

4. Click **Browse** in the Download User Program File frame. The Select User Program File screen displays (see *Figure 2-12*).
5. Select the path and user program file to download from the CD-ROM. (Program files are typically located in the Program Files folder on the CD-ROM). As *Figure 2-12* shows, the screen lists all valid user program files with the .BIN extension:

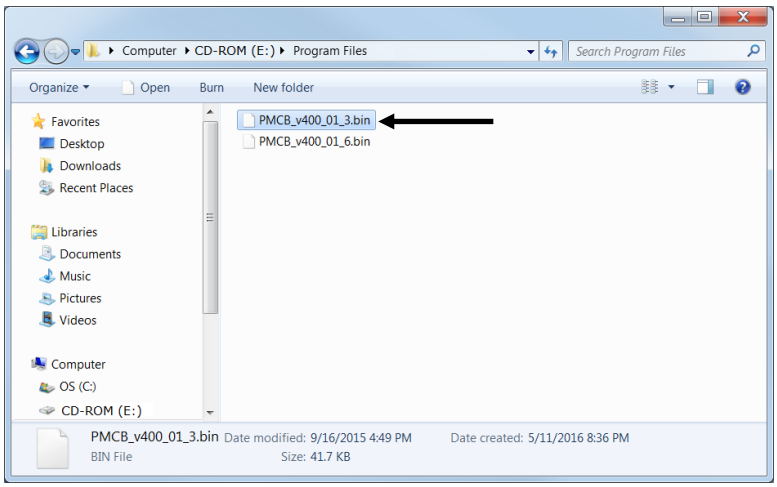


Figure 2-12. Select User Program File

6. Click **Open** to select the program file. The User Program Administrator screen displays. As shown in *Figure 2-13*, note that the Download User Program File frame identifies the selected program and that the **Download & Start** button is active:

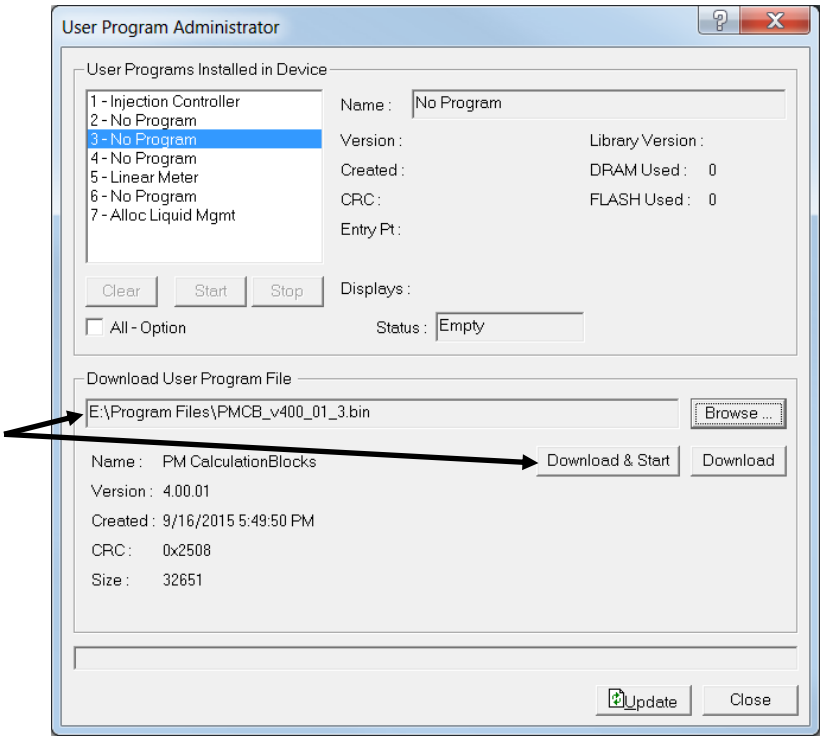


Figure 2-13. User Program Administrator

7. Click **Download & Start** to begin loading the selected programs. The following message displays:

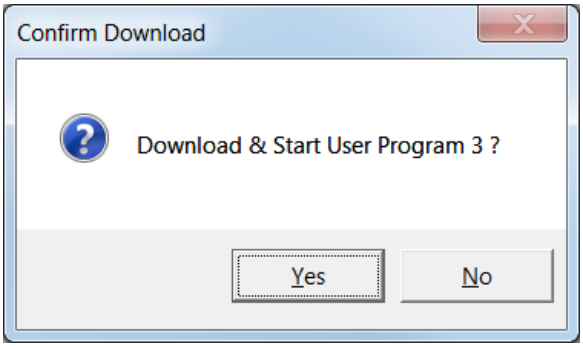


Figure 2-14. Confirm Download

Note: For the FB107, ROCLINK800 assigns program positions based on memory allocations. For this reason, the PMCB_v400_01_3.bin program automatically installs as program 3. For PMCB_v400_01_6.bin program automatically installs as program 6.

8. Click **Yes** to begin the download. During the download, the program performs a warm start, creates an event in the event log, and when the download completes displays the following message:

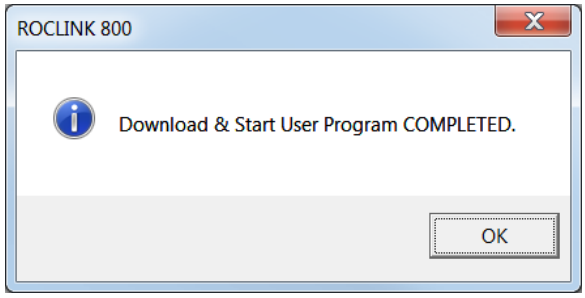


Figure 2-15. ROCLINK 800 Download Confirmation

9. Click **OK**. The User Program Administrator screen displays (see *Figure 2-16*). Note that:
   - The User Programs Installed in Device frame identifies the loaded program.
   - The Status field indicates that the program is running.

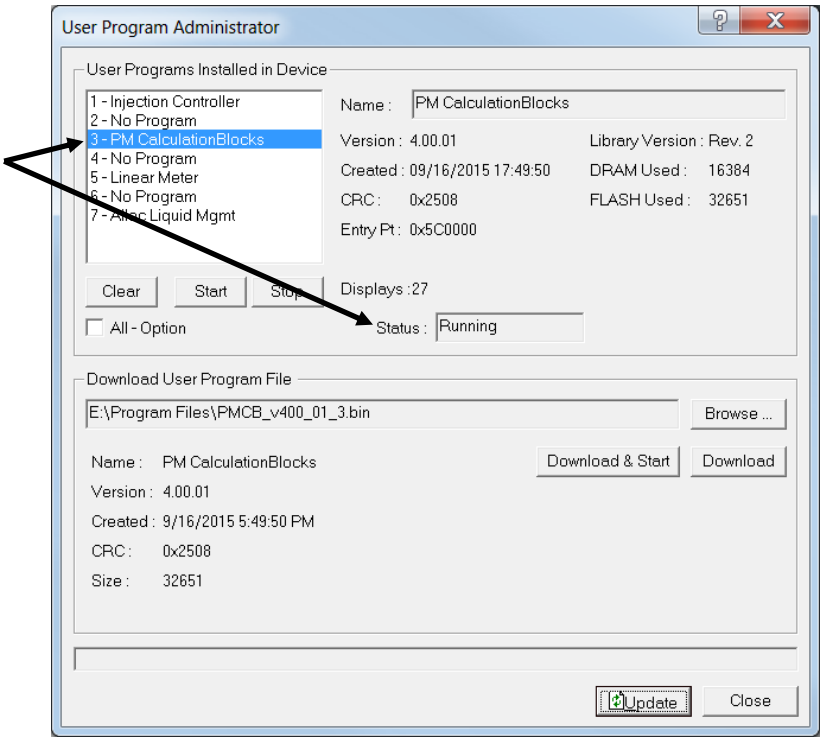


Figure 2-16. User Program Administrator

10. Click **Close** and proceed to *Section 3.3 – PMCB Calculation Blocks* to configure the program.

2.3 MPU Loading Threshold (ROC800)

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.

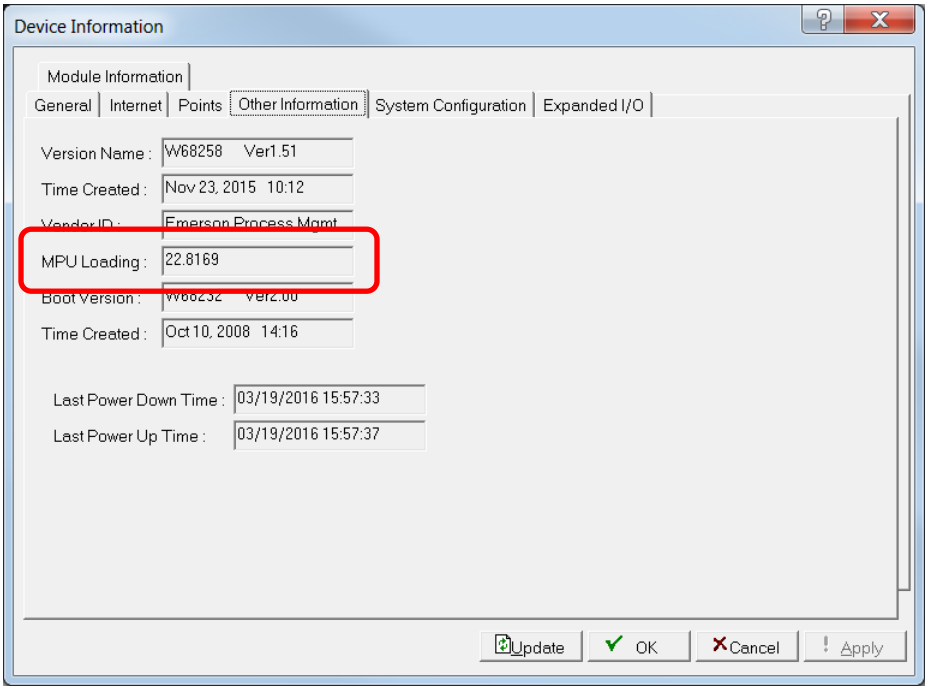


Figure 2-17. MPU Loading

Chapter 3 – Configuration

After you have loaded the Surface Control Manager program on the FB107 or the ROC800, you configure the program using three program-specific screens:

- PMSC Action Blocks
- PMSC Utilities
- PMCB Calculation Blocks

To configure the program (after logging onto ROCLINK 800 and successfully installing the program), proceed through the program screens as shown in the following sections.

You can access all the program-specific screens from the main ROCLINK 800 screen:

Note: The configuration screens of the Surface Control Manager program for both the ROC800 and the FB107 platforms are identical.

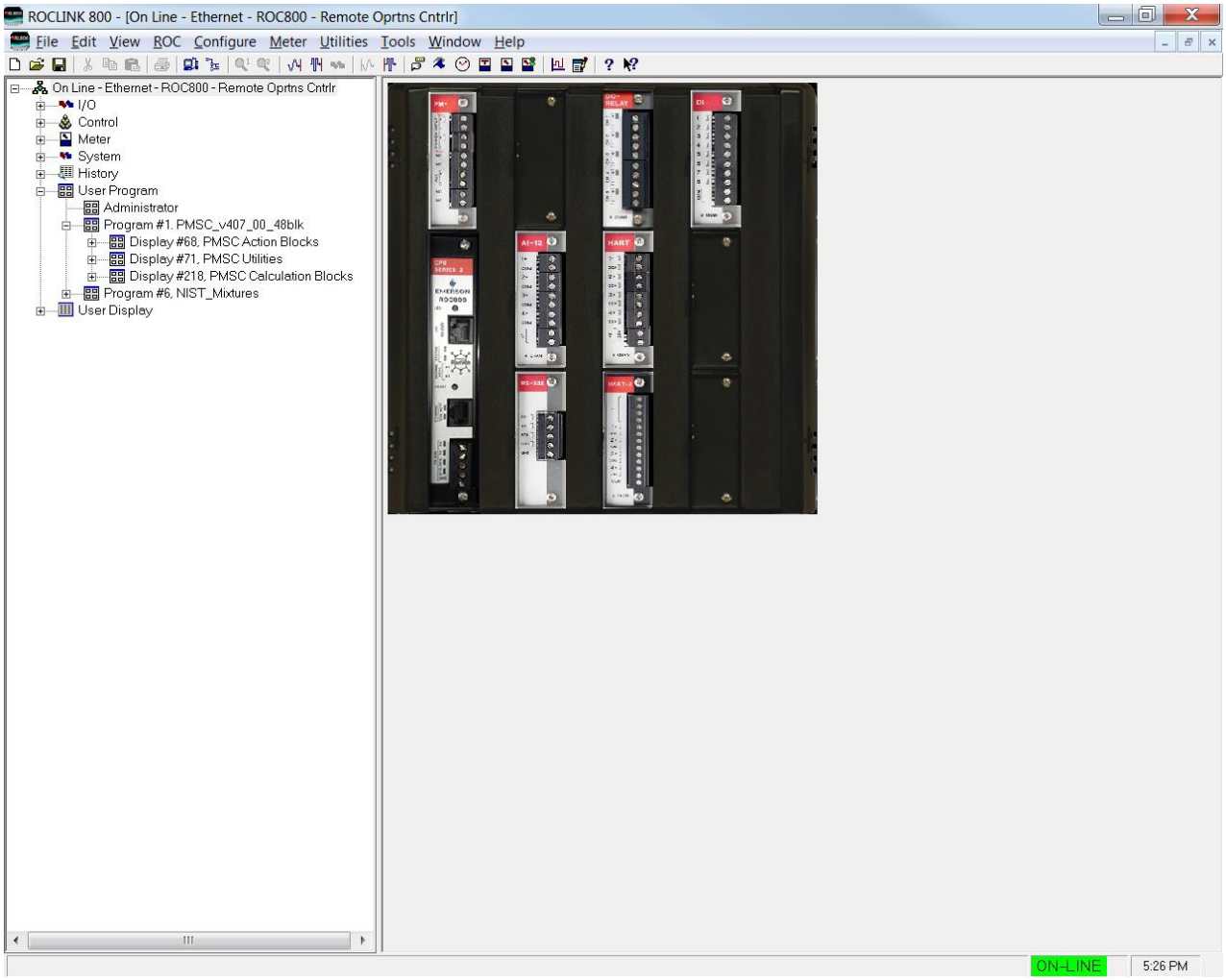


Figure 3-1. ROCLINK 800

3.1 PMSC Action Blocks Screen

The screen has five main sections:

- Block Logic Operation– Use this section to define the logic for each action block.
- Bypasses– Use this section to configure temporary overrides for the result of the raw action block logic.
- Chain– Use this section to logically link one action block to another.
- Action Output– Use this section to define any actions to be performed when the action block is "true". These actions can include writing to a defined parameter, moving a value, or shutting down another aspect of an associated user program, such as Tank Manager or Well Optimization.
- Alarm Logging– Use this section to generate alarms in the device alarm log, based on the status changes of the action block.

To access this screen:

1. From the Directory Tree, select **User Program > Program #1, PMSC_v407_00_48blk**.
2. Double-click **Display #68, PMSC Action Blocks**.

   Note: This section shows how to access the access the Action Blocks screen for the ROC800. To access the Action Blocks for FB107, double-click Display #28, PMSC Action Blocks.

3. Double-click **#1, Block 1**. The PMSC Action Blocks screen displays:

   Note: Depending on the device (ROC800 or FB107) and the version of the program installed, you may have up to 144 of these screens, one for each action block.

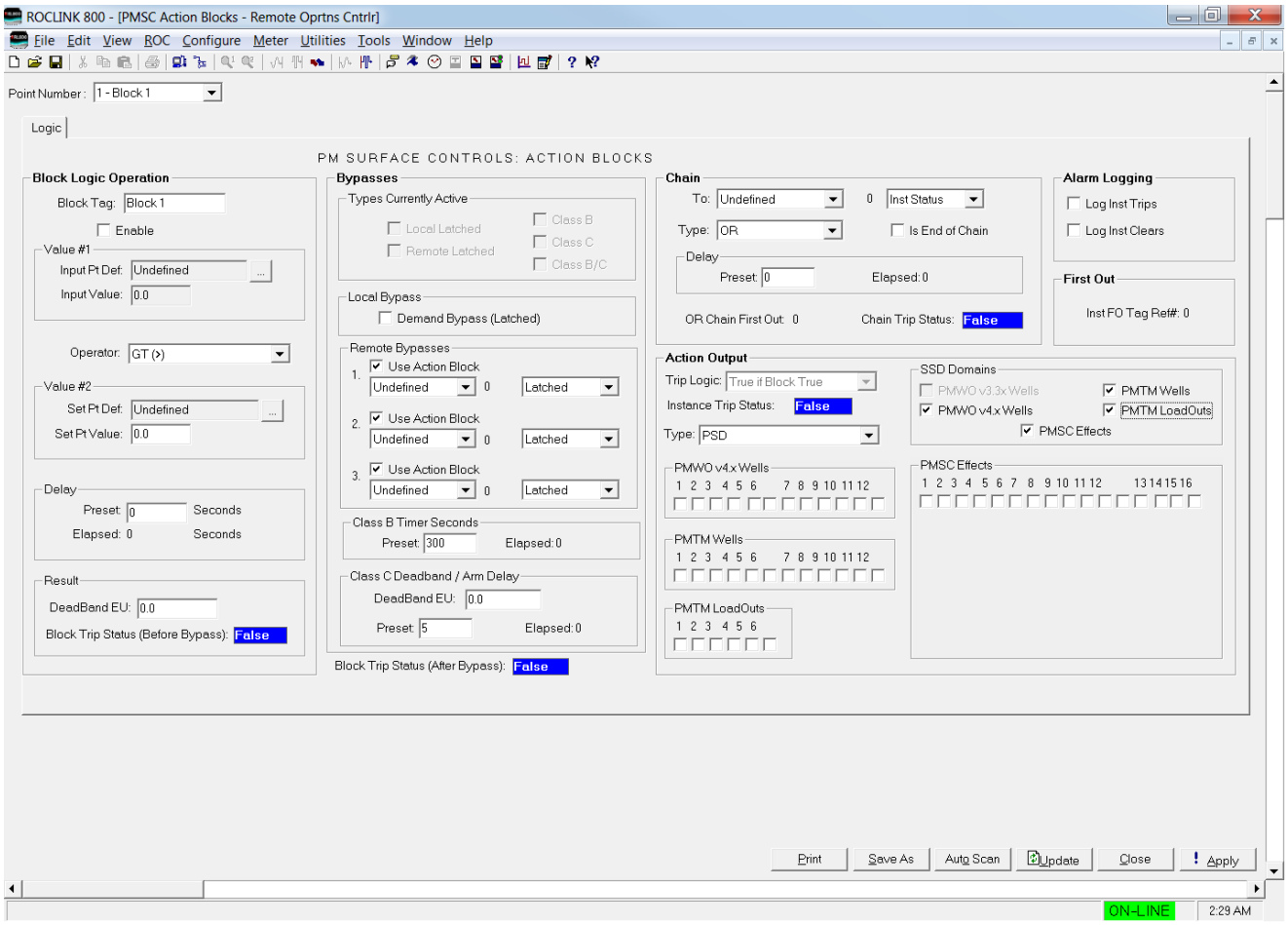


Figure 3-2. PMSC Action Blocks Screen

4. Review the values in the following fields:

Field	Description
Block Logic Operation	
Block Tag	Sets the action block tag name.
Enable	Enables the action block when checked.
Input Pt Def	Sets the TLP source of the input value.
Input Value	Displays the input's live value.
Operator	Selects a mathematical or logical operator from the dropdown list. Click to select a valid operator: **GT (>)** – If the **Input Value** is greater than the **Set Pt Value** for the **Delay Preset** time, the block is set true. **GE (>=)** – If the **Input Value** is greater than or equal to the **Set Pt Value** for the **Delay Preset** time, the Block is set true. **LT (<)** – If the **Input Value** is less than the **Set Pt Value** for the **Delay Preset** time, the block is set true. **LE (<=)** – If the **Input Value** is less than or equal to the **Set Pt Value** for the **Delay Preset** time, the block is set true.

Field	Description
	EQ (==) – If the **Input Value** is equal to the **Set Pt Value** for the D**elay Preset** time, the block is set true. **NE (!=)** – If the **Input Value** is not equal to the **Set Pt Value** for the **Delay Preset** time, the block is set true. **Watchdog** – Monitors the **Input Value**, if it does not change for the **Delay Preset** time, the block is set true.
	Trip on Change – If the **Input Value** is different than the **Set Pt Value**, the block is set true.
	pEdge – Monitors the **Input Value** for a transition from 0 to 1, block is set true for one scan.
	nEdge - Monitors the **Input value** for a transition from 1 to 0, block is set true for one scan.
	Bitwise AND (&) – Compares each bit in the **Input Value** to the **Set Pt Value**. If both bits are true (1), the block is set true.
	Bitwise OR – Compares each bit in the **Input Value** to the **Set Pt Value**. If either bit matches, the block is set true.
	Add (+) – Adds **Input Value** to **Set Pt Value** and displays the results in the **Math Result** field.
	Subtract (-) – Subtracts the **Set Pt Value** from the **Input Value** and displays the results in the **Math Result** field.
	Multiply (*) – Multiplies the **Input Value** by **Set Pt Value** and displays the results in the **Math Result** field.
	Divide (/) – Divides the **Input Value** by the **Set Pt Value** and displays the results in the **Math Result** field.
	Modulus (%) – Or remainder of the **Input Value** divided by the **Set Pt Value**. Example: 17 modulus 3 = 2, or 17/3 = 5 with a remainder of 2 displayed in the **Math Result** field.
	Soft Input Reset Timer – Monitors the **Input Value** for a transition from 0 to 1. Once this transition occurs the block is set true and a time delay starts for the amount of seconds specified in the Delay Preset field. When the timer expires the block is set to false and the **Input Value** is forced back to a zero.
Set Pt Def	Selects the TLP source of the **Set Pt Value**.
Set Pt Value	Shows the value of the point defined in the **Set Pt Def** field. If you leave this field undefined, you can manually enter this value.

Field	Description
Preset	Sets the delay in seconds. This delay is either for an on delay for logic functions or for soft input rest timer. (See function description above.)
Elapsed	Shows the time delay that has elapsed, starts counting up from zero to the **Preset** time and status changes when the **Preset** time is reached.
Deadband / Math Result	Sets the deadband for clearing the comparator logic or displays the Math Result for math functions.
Block Trip Status (Before Bypass)	Displays the logic block trip indicator based only on the block logic operation, before any bypasses are applied.
Bypasses	
Types Currently Active	Shows the bypasses that are currently active.
Demand Bypass (Latched)	Activates the manual latched bypass when selected. This value could be set or removed from an FST or from an action block.
Remote Bypasses	Allows you to browse other action blocks to be used to define bypass functionality. When the remote action block is true, the bypass for this block is true. **Note:** If the Use Action Block is un-checked, click ... to select a TLP in the system. Valid bypass types are: **Latched** – Bypassed while the Remote Bypass block is true. **Class B** – Bypassed for the amount of time in the Class B Timer field once the Remote Bypass block is true. **Class C** - Bypassed until the block clears once the Remote Bypass block is true. **Class B w/C override** - Bypassed for the amount of time in the Class B Timer field or unless the Block clears before the timer expires once the Remote Bypass block is true.
Class B Timer Seconds – Preset	Sets the timer for Class B bypass.
Class B Timer Seconds – Elapsed	Shows the elapsed time for Class B bypass.
Class C Deadband / Arm Delay – Deadband EU	Sets the deadband for Class C bypass.
Class C Deadband / Arm Delay – Preset	Sets the timer for Class C bypass.

Field	Description
Class C Deadband / Arm Delay – Elapsed	Shows the elapsed time for Class C bypass.
Block Trip Status (After Bypass)	Shows the combined status of the logic block and the bypass block. For example, if the logic block is true and the bypass is not in effect, then the status is true. If the logic block is true and the bypass is in effect, then the status is false.
Chain	
To	Allows you to browse a previous action block to compare results with based on the chain type.
Type	Sets the logic of chain. Click to select an available logic type:
	AND – If the chained block and current block are true, the **Chain Trip Status** is true.
	OR – If the chained block or current blocks are true, the **Chain Trip Status** is true.
	NAND – If the chained block and current block are false, the **Chain Trip Status** is true.
	XOR Either – If one of the chained block and current block is true and the other false, the **Chain Trip Status** is true.
	XOR Local – If the chained block is set to false and current block is set to true, the **Chain Trip Status** is true.
	XOR Remote – If current block is set to false and chained block is set to true, the **Chain Trip Status** is true.
	Seal-In – If the current block is set to true and the previous block or the current chain status are set to true, the Chain Status is true until the current block status after bypass is false
	PWM Lo-Duty – If the current block is set to true and the previous block is false, the Chain Status is true for one second then toggles false for the remaining seconds in the Chain Delay Preset time. The cycle repeats while the condition remains the same, the Preset time must be more than two seconds
	PWM-Hi-Duty – If the current block is set to true and the previous block is false, the Chain Status is false for one second then toggles true for the remaining seconds in the Chain Delay Preset time. The cycle repeats while the condition remains the same, the Preset time must be more than two seconds
Is End of Chain	Indicates when this block is the end of a chain of previous blocks.
Delay	Sets the delay **Preset** timer and shows the **Elapsed** time.

Field	Description
OR Chain First Out	Shows the number of the action block that is tripped in a chain of or blocks.
Chain Trip Status	Shows the number of the action block that is tripped in a chain of OR blocks. **Note**: This field displays **only** when the Chain Type is OR.
Action Output	
Block/Chain Trip	Selects the status that trips the output. Valid values are: **True if Block True** – Output is driven true if the Block Trip Status (After Bypass) is true on this action block. **True if Chain True** – Output is driven true if the Chain Status is true on this action block. **True if Either True** – Output is driven true if the Block Trip Status (After Bypass) or the Chain Status is true on this action block. **True if Both True** – Output is driven true if the Block Trip Status (After Bypass) and the Chain Status is true on this action block.
Instance Trip Status	Shows the status of the Output Action.
Type	Selects the type of Output desired from this action block. Valid values are: **PSD** (Permanent Shutdown) – When selected a submenu of available Applications (Domains) displays allowing you to select the instance from the other applications you wish to permanently shutdown. A manual reset is required after the shutdown occurs. **TSD** (Temporary Shutdown) – When selected a submenu of available Applications (Domains) displays allowing you to select the instance from the other applications you wish to temporarily shutdown. An automatic reset occurs after the shutdown clears. **DO (Binary Action)** – Allows you to select a Binary Field to which the signal is sent. Discrete signals can be sent in the following format: Force 1True & 0False Force 0True & 1False Poke 1True Poke 0True Poke 1True & 0False Poke 0True & 1False Force 1True & Poke 0False Force 0True & Poke 1False Force 1True Force 0True

Field	Description
	Move Value – Two Functions: **1.** When using Math Operators, the Result is moved to the defined Output TLP. **2.** When using Comparator Operators, the Input Value is moved to the Output TLP when the block is true. **VAL (to Result Reg)** – Pushes the value in the Output TLP into the internal Result Register of PMSC. **SAV (from Result Reg)** – Pulls the internal Result Register value from PMSC and pushes it into the Output TLP. **No Action** – No output action will take place when the block is set true.
SSD Domains	Provides the ability to shutdown aspects of other associated programs (such as Tank Manager or Well Optimization), based on the result of the action block. Once a domain has been selected, the instances of that domain for which the block action should apply must also be selected. PMTM Wells – Sets either a (Permanent Shutdown) PSD or a (Temporary Shutdown) TSD to the associated Well defined in PM Tank Manager, Allocated Well Values/Trip Point. PMTM Loadouts – Sets either a PSD or TSD to the associated Haul HMI/Station Permissive. A PSD stops a haul in progress and a TSD pauses a haul in progress. PMv 3.3x Wells – Sets either a PSD or TSD to the associated Production Manager version 3 wells. PMWO Wells – Sets either a PSD or TSD to the associated well in PMWO 4.x. PMSC Effects – Sets a PSD or TSD to the associated effect in PMSC Utilities. **Note:** The SSD Domains are only visible when the Action Output Type has been set to PSD or TSD.
Alarm Logging	
Alarm Logging	Activates logging in the ROC Alarm Log if the action block sets (if the Log Inst Trips option is selected) or clears (if the Log Inst Clears option is selected).
First Out	Shows the First Out tag of the action block that was first tripped in a chain for which the current block is a part.

5. Click **Apply** to save your changes.

6. Click **Close** to return to the ROCLINK 800 screen. Proceed to *Section 3.2* to configure the PMSC Utilities Screen.

3.2 PMSC Utilities Screens

The PMSC Utilities screen allows you to configure the following tabs:

- PMSC Effects
- Time Count
- Accumulators/Outputs
- Alarm Blocks
- Action Block Domain Statuses

To access this screen:

1. From the Directory Tree, select **User Program > Program #1, PMSC_v407_00_48blk**.
2. Double-click Display #71, PMSC Utilities.

   Note: This section shows how to access the access the Utilities screen for the ROC800. To access the Action Blocks for FB107, double-click Display #31, PMSC Utilities.

3. Double-click **#1, Inst 1**. The PMSC Utilities screen displays:

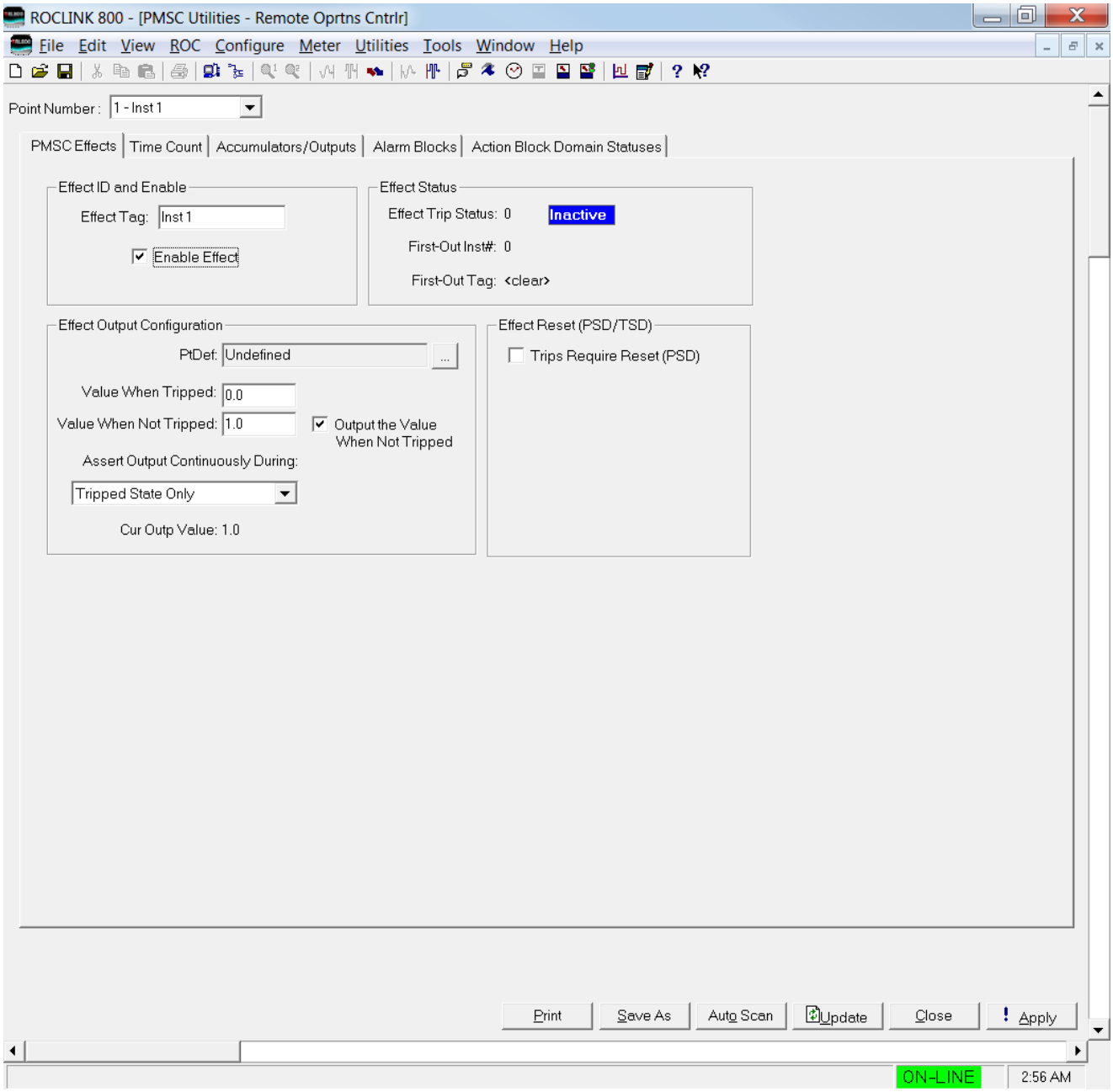


Figure 3-3. PMSC Utilities Screen

4. Follow *Section 3.2.1* through *Section 3.2.4* to configure the PMSC Effects, Time Count, Accumulations/Outputs, and the Action Block Domain Statuses tabs.

3.2.1 PMSC Utilities Screen – PMSC Effects Tab

Use this screen (which displays when you first access the PMSC Utilities screen) to configure various aspects of an effect triggered by an action block. Each effect represents a particular action that is taken when the action blocks that are linked to it are tripped or cleared. The action that is taken is the writing of a value out to a user defined parameter. Different values to be written are defined for when the effect is tripped vs. when the effect is not tripped. This allows for creating of custom actions, such as driving a discrete valve or a panel annunciation.

In addition to configuring effects, this tab allows you to configure outputs separately. You can:

- Control the output by multiple action blocks.
- Write values to analog type controls (analog outputs, PID setpoints, and so on).

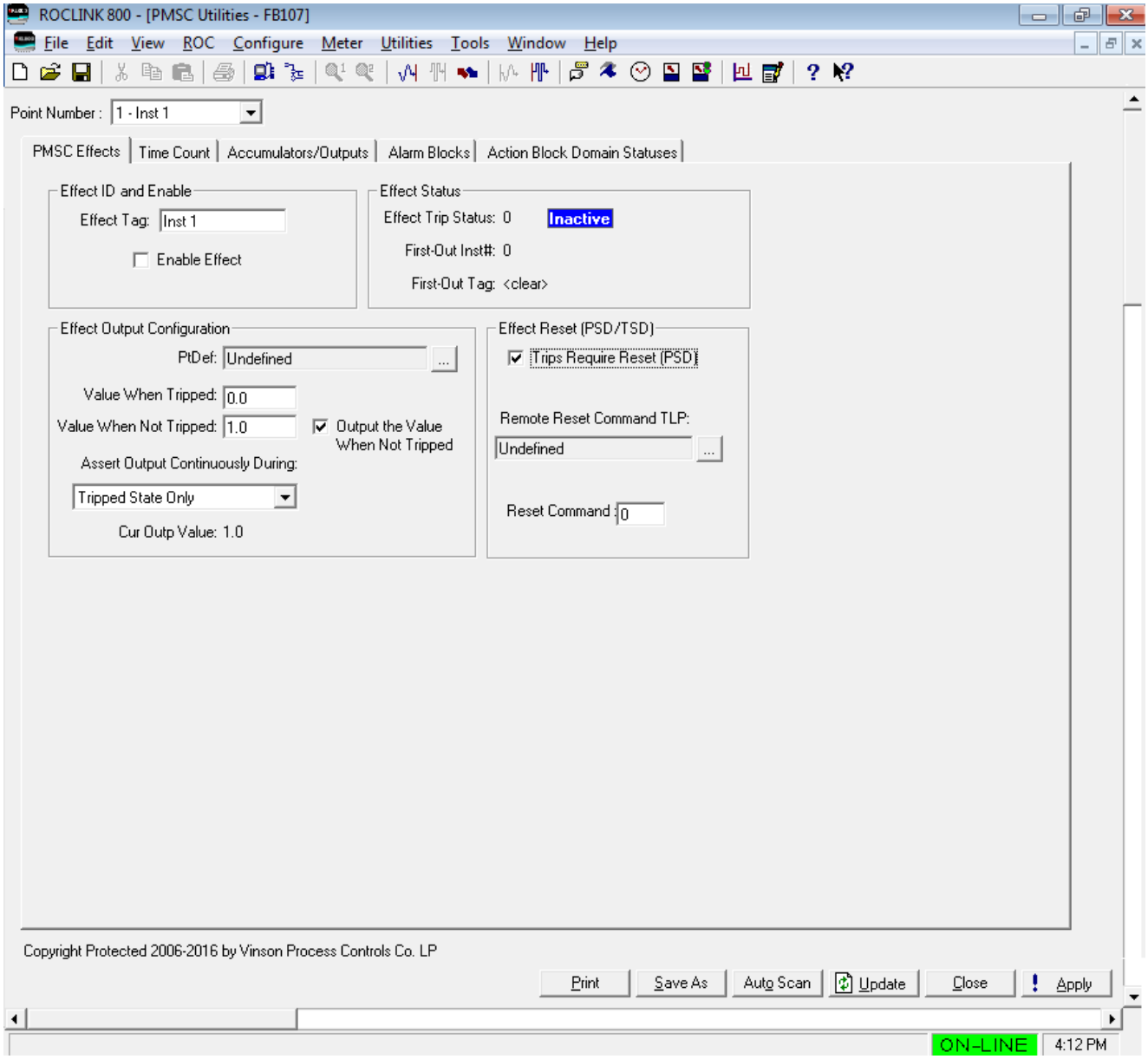


Figure 3-4. PMSC Utilities Screen – PMSC Effects tab

1. Review and complete the values in the following fields:

Field	Description
Effect Tag	Identifies the specific effect being defined.
Enable	Enables the effect.
PtDef	Sets the output to be driven.
Value When Tripped	Sets the value to be driven to the **PtDef** when the effect is Tripped (true).
Value When Not Tripped	Sets the value to be driven to the **PtDef** when the effect is Not Tripped (false).

Field	Description
Output the Value When Not Tripped	Allows the output to be either driven or not driven when the effect is false. You typically use this option when the effect needs to be manually reset. Select this option to enable the effect to drive the signal each way. If you do not select this option, the signal is driven only when the effect is true.
Assert Output Continuously During	Selects how to assert effect output to the parameter defined by the **PtDef** field. When the "Neither State" option is selected, then the output parameter is written to ***one time*** on state change, and not written to again (until the next state change). When the other options are selected ("Tripped State Only", "UnTripped State Only", and "Both States"), the configured value is written to the output parameter continuously. Click to select valid options. Neither State Tripped State Only UnTripped State Only Both States
Cur Outp Value	Shows the current output value.
Effect Trip Status	Indicates the status of the effect trip. Valid values are 1 (tripped, red box with yellow letters; active) and 0 (not tripped, blue box with white letters; inactive).
First-Out Int#	Shows the numerical values of the action block that first tripped this effect.
First-Out Tag	Shows the tag of the action block that tripped this effect.
Trips Require Reset	The user program automatically **checks** this box upon a **PSD** type trip that is connected to the effect. The user program automatically **unchecks** this box upon a **TSD** type trip that is connected to the effect. A user can override the automatic selection after the trip has occurred (check or uncheck it). When the box is checked, even though action block that caused the trip is in the cleared (normal) state, the effect will stay tripped until a reset action is performed. When the box is unchecked the effect is cleared as soon as any tripped action blocks (connected to the effect) are cleared.

Field	Description
Remote Reset Command TLP	Click to select a TLP in the ROC800 or FB107 used to reset this effect. For example, a TLP you might select is a discrete input or soft point value. When the effect is ready to be reset, any positive value written to the TLP performs the reset. The same remote TLP may be used to reset several different effects. The user program automatically resets the value of the remote TLP back to zero after processing. **Note:** This field shows **only** if you check or select the **Trips Require Reset** option.
Reset Command	Identifies a local reset field which can be mapped to HMIs, etc. Any positive value entered will cause a reset action. The value in this field is reset to zero after processing. This field is entirely independent from the "**Remote Reset Command TLP**" field. The two fields logically act as an "OR" in resetting the effect.

2. Click **Apply** to save any changes you have made to this screen.
3. Proceed to *Section 3.2.2* to configure the Utilities Screen – Time Count tab.

3.2.2 PMSC Utilities Screen – Time Count Tab

Use this screen to configure the time counter of the Surface Control manager program. Use this utility to set "timers" for equipment on a well site to remind you to perform preventive maintenance (such as for a compressor after a certain number of hours).

To access this screen:

1. **Select the** Time Count **tab on the PMSC Utilities screen. The Time Count screen displays:**

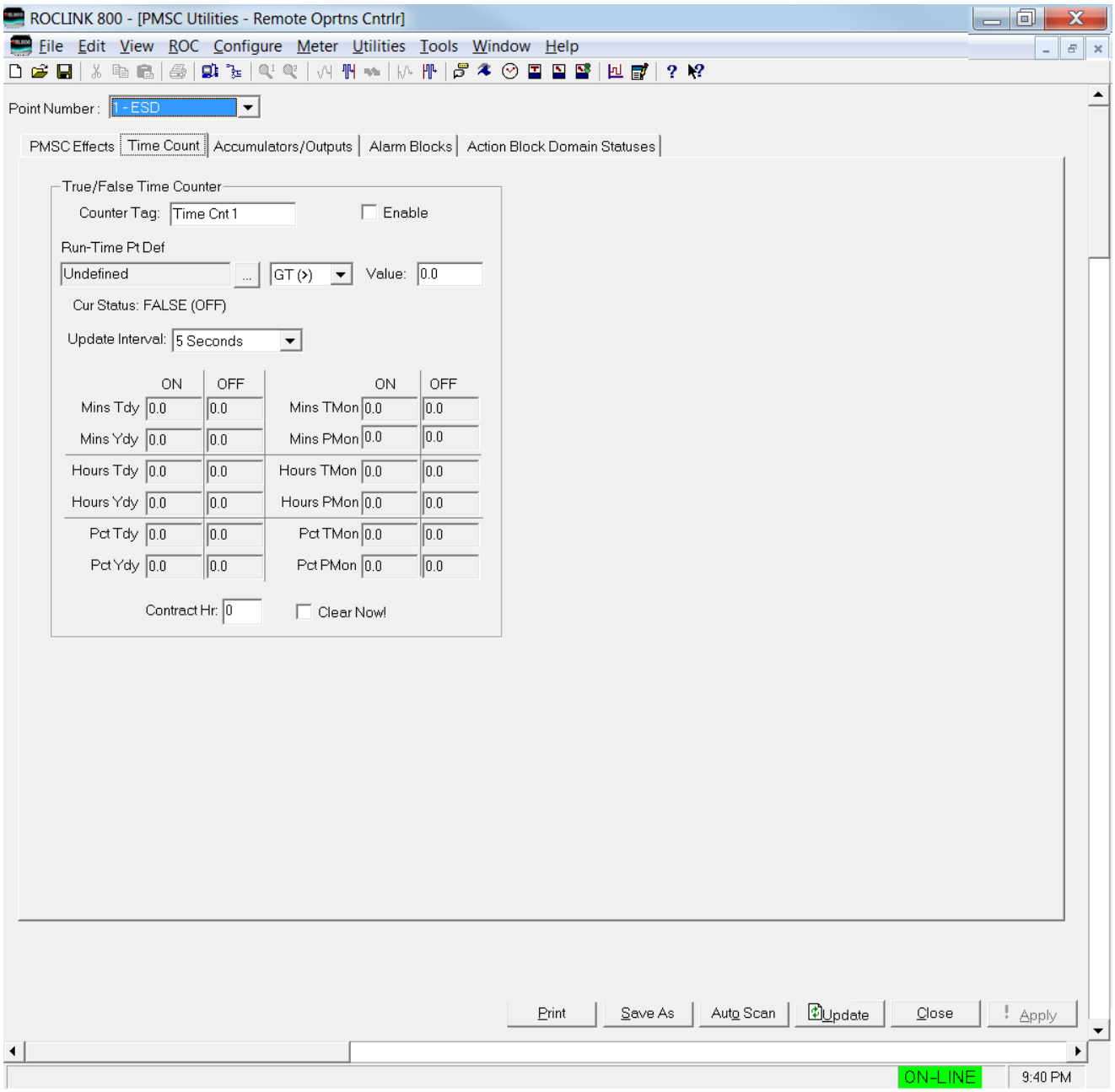


Figure 3-5. PMSC Utilities Screen – Time Count tab

2. Review the values in the following fields:

Field	Description
Counter Tag	Identifies the specific counter being defined.
Enable	Select to enable the time counter.
Run-Time Pt Def	Sets the point to be monitored to define if the On Counter or the Off Counter Advances. This value is compared using the following logical functions: **GT (>)** **GE (>=)** **LT (<)** **LE (<=)** **EQ (==)** **NE (!=)**.
Value	Defines the value to be compared to the Run-Time Pt Def.
Cur Status	Indicates if comparison statement written above is True (ON) or False (OFF).
Update Interval	Defines how often the accumulating counters update their associated values in the ROC. The calculation always runs every second, but to save MPU load the updating accumulators are only written out to the ROC points based on this parameter.
Mins Tdy	This **display-only** field shows Accumulated On minutes and Off minutes Today.
Mins Ydy	This **display-only** field shows Accumulated On minutes and Off minutes Yesterday.
Hours Tdy	This **display-only** field shows Accumulated On hours and Off hours Today.
Hours Ydy	This **display-only** field shows Accumulated On hours and Off hours Yesterday.
Pct Tdy	This **display-only** field shows Percent of time On and Off Today.
Pct Ydy	This **display-only** field shows Percent of time On and Off Yesterday.
Mins TMon	This **display-only** field shows Accumulated On minutes and Off minutes This Month.
Mins PMon	This **display-only** field shows Accumulated On minutes and Off minutes Previous Month.
Hours TMon	This **display-only** field shows Accumulated On hours and Off hours This Month.
Hours PMon	This **display-only** field shows Accumulated On hours and Off hours Previous Month.
Pct TMon	This **display-only** field shows Percent of time On and Off This Month.
Pct PMon	This **display-only** field shows Percent of time On and Off Previous Month.
Contact Hr	Sets the hour, in military hour format, at which the accumulators roll up the Days On and Off Times.

Field	Description
Clear Now!	Select this option to clear all accumulators and reset them to zero. The system automatically clears this field checkbox is auto cleared and the accumulation for On and Off time begin anew.

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section 3.2.3* to configure the PMSC Utilities Screen – Accumulators/Output tab.

3.2.3 PMSC Utilities Screen – Accumulators/Outputs Tab

The functionality on this screen changes, depending on the mode you select. There are 4 possible modes:

- **Accumulate a Rate** – This function provides daily, monthly, and running total accumulation for a flowrate you specify. The flowrate comes from a metering device providing a rate in the form of an analog or HART input, a pulse input EU value rate, or a flow calculation you implement. The flowrate integrates once per second, and that incremental amount of accumulation adds to the daily, monthly, and running totals.
- **Accumulate a Running Total** – This functionally also provides daily, monthly, and running totals. The totals, however comes from a smart meter or other device that provides an incremental accumulator value (commonly provided to the ROC800 or FB107 from a Modbus connection). The program determines the increment per second based on this accumulator input. The incremental values are added to the daily, month, and running totals. If applicable, the rollover of this incremental accumulator input value is automatically determined.
- **Output a 4-20mA Signal** – This option provide a method to link a process variable from the internal database of the device to an Analog Output (AO) point, therefore providing a 4-20 mA signal. The signal can be of any form, but is commonly used for flowrate values, valve positions, or other process variables you send to another device or system.
- **Output a Pulse at an Interval** – Allows you to generate a reoccurring pulse signal to another devices or system. Typically, this is used to send a pulse (via a ROC800 or FB107 discrete output) that represents an accumulated amount of flow. For example, If you have a daily flowrate in MCF, you can generate a pulse for every unit of MCF that is measured by the ROC800 or FB107.

To access this screen:

1. Select the **Accumulators/Outputs** tab on the PMSC Utilities screen. The Accumulation/Outputs screen displays:

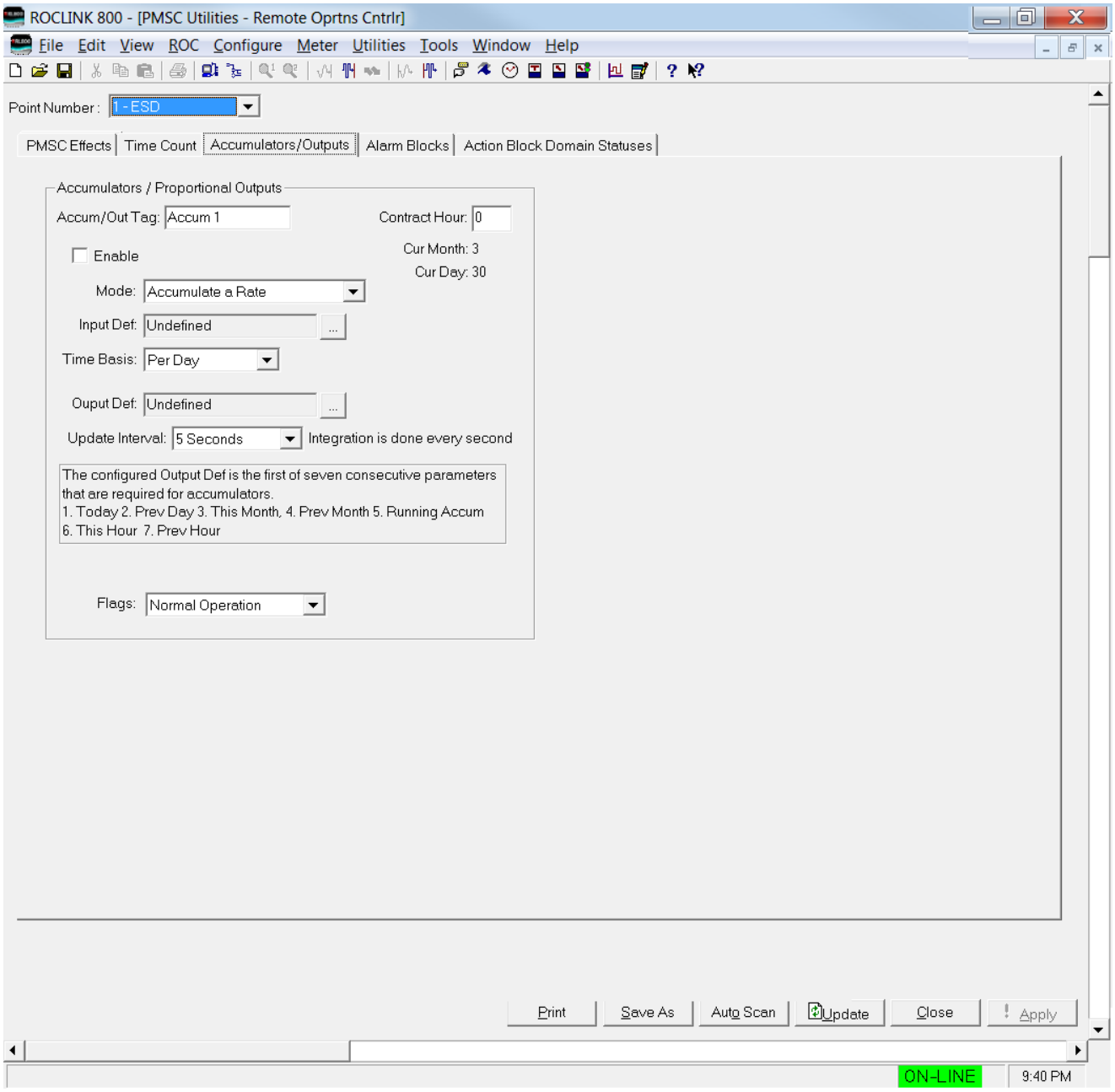


Figure 3-6. PMSC Utilities Screen – Accumulators/Outputs tab

2. Review the values in the following fields:

Field	Description
Accum/Out Tag	Identifies the specific accum/output being defined.
Enable	Enables this instance of the Accumulator/Output.

Field	Description
Mode	Selects the type of accumulator or output for this instance. Click to select a valid option: **Accumulate a Rate** – Accumulates the flow rate defined in the Input Def field. **Accumulate a Running Total** – Accumulates the accumulated value defined in the Input Def field. This should be an accumulator that does not reset each day at contract hour. Roll-over is handled internally every scan period. **Output a 4-20ma Signal** – Sends the value specified in the Input Def field to the AO defined in the Output Def and forces the 4-20 mA signal to update. **Generate a Pulse at an Interval** – Sends a Pulse Command to the DO defined in the Output Def parameter when the flow rate defined in the Input Def parameter accumulates a value greater than the value specified in the DO Out Pulse Interval.
Input Def	Defines the input used in the mode selected.
Time Basis	Defines the frequency of the flow rate in the Input Definition. Available time periods are Second, Minute, Hour and Day. For all modes besides the 4-20 mA output mode.
Output Def	Sets the output to be used. In the 4-20 mA Output and Pulse Output mode this should point to an AO or a DO. In the Flow Accumulation mode it should point to a softpoint value. The selected softpoint value defines the first of seven consecutive values to store the following accumulators: 1 = Today 2 = Yesterday 3 = This Month 4 = Previous Month 5 = Running Accum 6 = This Hour 7 = Previous Hour
Update Interval	Defines how often the accumulators update their associated values in the ROC. The calculation always runs every second, but to save MPU load the program only writes updated accumulator values to the ROC points based on this parameter.
Contact Hour	Sets the hour, in military times, at which the accumulators roll up the Days Accumulated Flows.
Cur Month	Shows the chronological number of the current month. Valid values are 1-12.
Cur Day	Shows the chronological number of the current day. Valid values are 1-31.

Field	Description
Flags	Provides functions for managing and clearing the accumulator values being stored in an associated SoftPoint. Click ▼ to select the option: Normal Operations – Operates as configured Force End Of Day – Forces all Accumulators to roll up at that instant and restart their daily at zero Force end of Month – Forces all Accumulators to roll up at that instance, including Monthly Flush Running Accum – Clears the daily Accumulator but does not roll up Cold Start Accumulator Set – Clears all Accumulators

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section 3.2.4* to configure the PMSC Utilities Screen – Alarm Blocks tab.

3.2.4 PMSC Utilities Screen – Alarm Blocks Tab

Use this screen to configure the alarm point of the Surface Control manager program. Use this utility to set three alarm point mechanisms per instance.

To access this screen:

1. Select the **Alarm Blocks** tab on the PMSC Utilities screen. The Alarm Blocks screen displays:

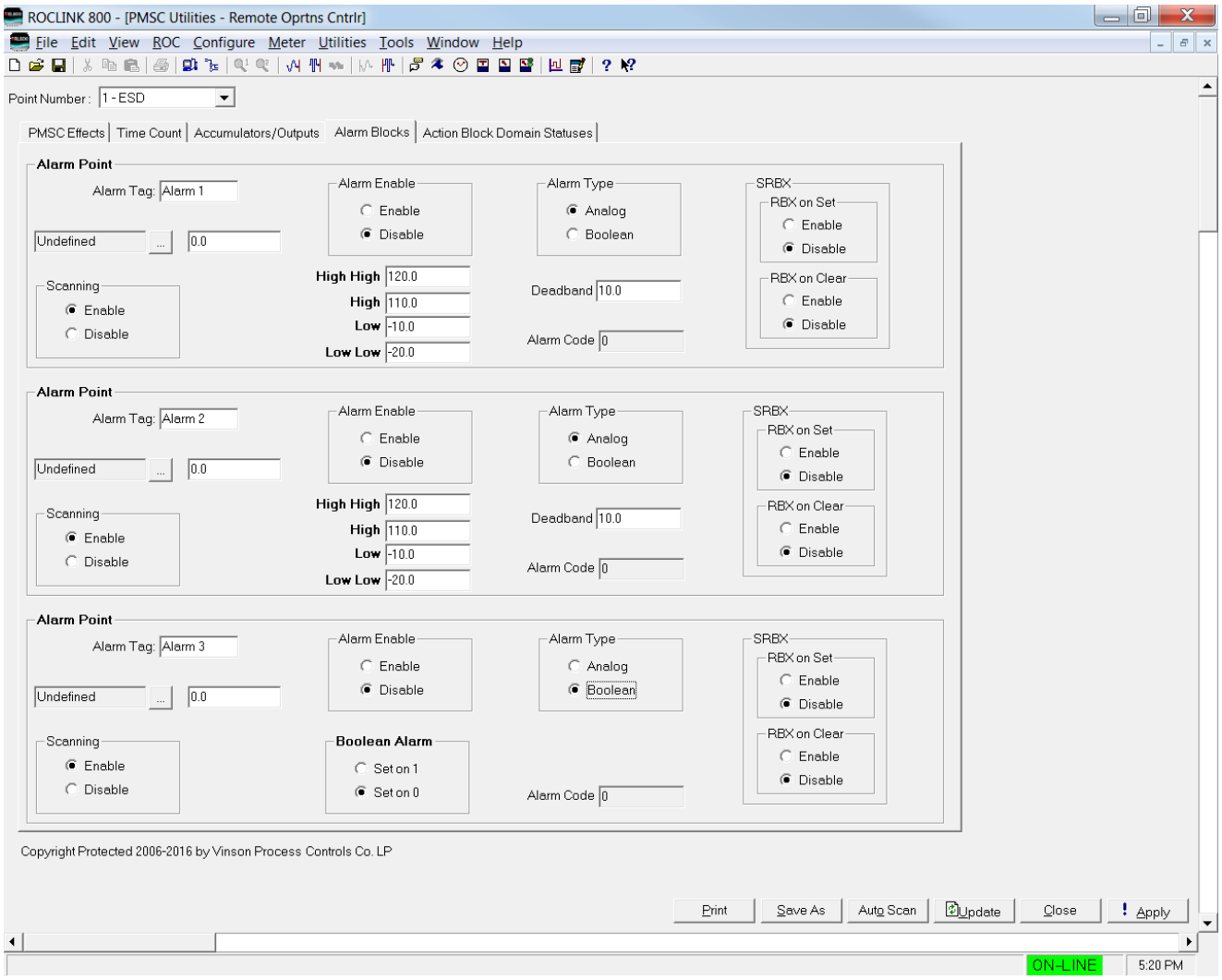


Figure 3-7. PMSC Utilities Screen – Alarm Blocks tab

2. Review the values in the following fields:

Field	Description
Alarm Tag	Sets a 10-character (for the ROC800) or an 8-character (for the FB107) alarm identification.
Alarm Point Definition	Click ... to designate the TLP for the alarm to be monitored. This field shows a valid entry (not Undefined) the value of the specified point will be displayed in the field on the right (Alarm Point Current Value) whether alarming is enabled or not.
Alarm Point Current Value	Displays the value of the point specified to the left (Alarm Point Definition). If the Alarm Point Definition is Undefined or Scanning is set to "Disable" the current value or any user-entered value here will remain unchanged.

Field	Description
Alarm Enable	Selects to **Enable** the Alarm Point Current Value is monitored for alarm conditions and the alarm code can be a positive number (an alarm condition exists). Selects to **Disable** the alarm code will always be zero.
Alarm Type	Selects to **Analog**, the Alarm Point Current Value is compared to each of the four possible alarm type setpoints (Low, Low Low, High, High High) for setting alarms along with the **Deadband** value for clearing alarms. Selects to **Boolean**, the Alarm Point Current Value is compared Boolean Alarm. A Boolean Alarm is generated when the current value equals the **Boolean Alarm** "Set on" value. **Note:** Zero and One are the only legal values for the Boolean Alarm Type. If the Alarm Point Current value can possibly be any other value the Alarm Type should be set to **Analog** as no Boolean alarm will be generated for values no exactly equal to the Boolean Alarm "Set on" value.
SRBX	
RBX on Set	Selects to **Enable** an RBX attribute is set for the alarm when any "Alarm Set" is logged. This causes any Comm Port with SRBX Mode Enabled to process the alarm setting. Selects **Disable**….
RBX on Clear	Selects to **Enable** an RBX attribute is set for the alarm when any "Alarm Clear" is logged. This causes any Comm Port with SRBX Mode Enabled to process the alarm setting. Selects **Disable**….
Scanning	Selects to **Enable** the Alarm Point Current Value is the value of the point defined in the Alarm Point Definition field. Selects to **Disable** the program and will not change the Alarm Point Current Value.
High High	Sets the High High alarm value. The Alarm Point Current Value is greater than or equal to the High High value. The alarm remains in effect until the Alarm Point Current Value goes less than High High Value minus the Deadband value. **Note:** This field displays only if you select **Analog** in the Alarm Type.
High	Sets the High alarm value. The Alarm Point Current Value is greater than or equal to the High value. The alarm remains in effect until the Alarm Point Current Value goes less than High Value minus the Deadband value. **Note:** This field displays only if you select **Analog** in the Alarm Type.

Field	Description
Low	Sets the Low alarm value. The Alarm Point Current Value is less than or equal to the Low value. The alarm remains in effect until the Alarm Point Current Value goes greater than Low Value plus the Deadband value. **Note:** This field displays only if you select **Analog** in the Alarm Type.
Low Low	Sets the Low Low alarm value. The Alarm Point Current Value is less than or equal to the Low Low value. The alarm remains in effect until the Alarm Point Current Value goes greater than Low Low Value plus the Deadband value. **Note:** This field displays only if you select **Analog** in the Alarm Type.
Boolean Alarm	Sets the boolean value that will determine when an alarm is triggered. For example, if the input alarm point definition is a discrete value where normal operation is a value of "0", the option for "Set on 1" should be selected. **Note:** This field displays only if you select **Boolean** in the Alarm Type.
Deadband	Sets the Deadband value. **Note:** This field displays only if you select **Analog** in the Alarm Type.
Alarm Code	This **display-only** field shows the alarm values: 1 = Low Alarm 2 = Low Low Alarm 4 = High Alarm 8 = High High Alarm 32 = Boolean Alarm 128 = Manual Alarm

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section 3.2.5* to configure the PMSC Utilities Screen – Action Block Domain Statuses tab.

3.2.5 PMSC Utilities Screen – Action Block Domain Statuses Tab

The Action Block Domain Statuses reports the health of other associated user programs (if installed), such as Tank Manager or Well Optimization. To access this screen:

To access this screen:

1. Select the **Action Block Domain Statuses** tab on the PMSC Utilities screen. The Action Block Domain Statuses screen displays:

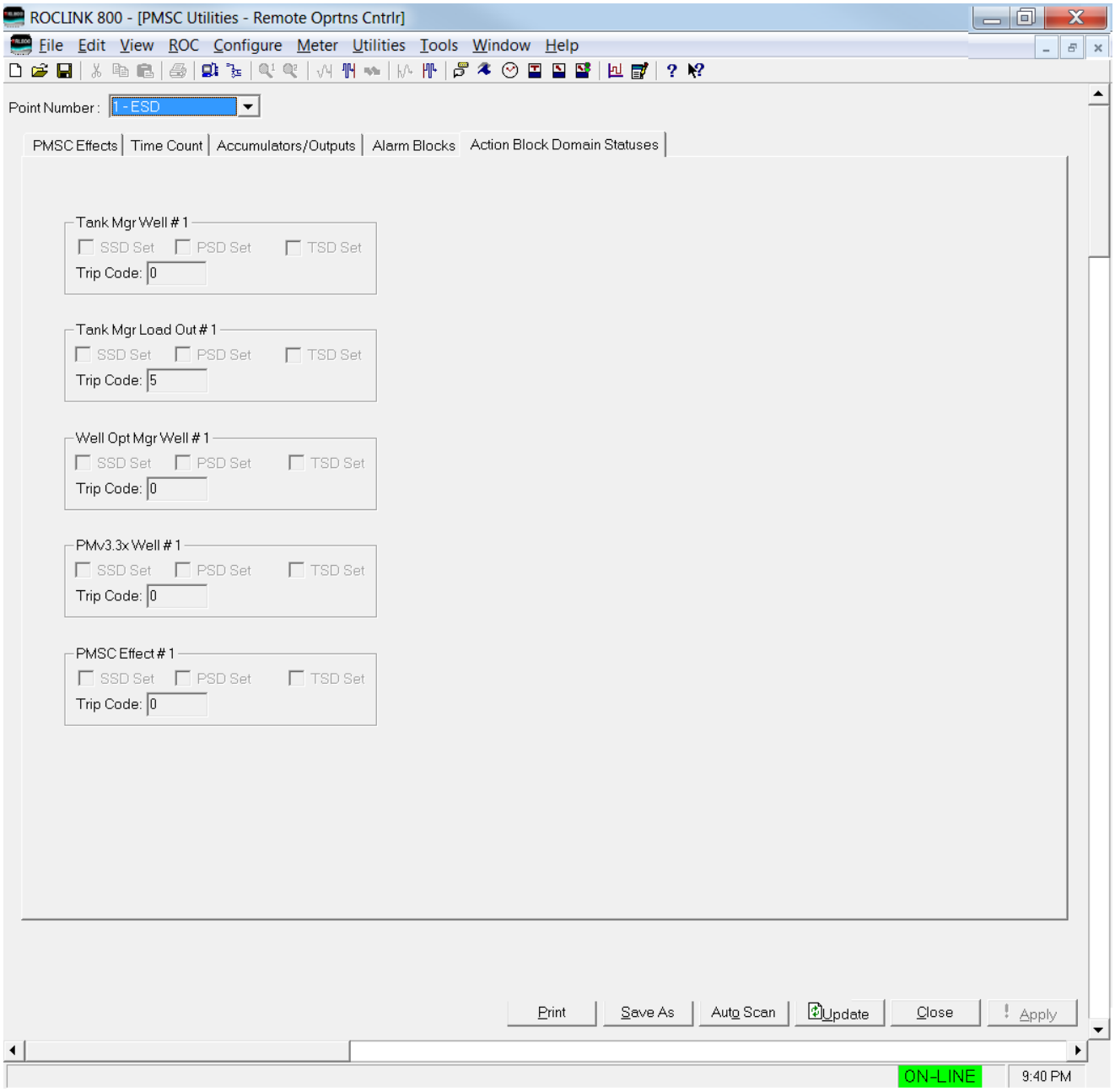


Figure 3-8. PMSC Utilities Screen – Action Block Domain Statuses tab

2. Review the values in the following fields:

Field	Description
Point Number	Selects the logical instance you want to configure.

Field	Description
Tank Mgr Well # 1	Shows the status of any Tank Manager Allocation Wells. The number beside the field name refers to the point number of the Tank Manager allocation well instance you are viewing. This is not necessarily related to the PMSC Effect or utilities on this display (of the same logical instance). If you change the **Point Number**, this field can provide the status of up to 4, 8, or 12 wells, depending on the version of the Tank Manager program you install. **Note:** The Tank Manager program supports up to 12 allocation wells, thus the numbers greater than 12 have no configuration effect.
SSD Set	This section is checked if the System Shut Down (SSD) is set for this well.
PSD Set	This section is checked if the Permanent Shutdown (PSD) is set to this well.
TSD Set	This section is checked if the Temporary Shutdown (TSD) is set to this well.
Trip Code	Sets the numerical code of First Out action block that tripped this instance.
Tank Mgr Load Out # 1	Shows the status of any Tank Manager Truck Load Out Terminals. The number beside the field name refers to the point number of the Tank Manager Load Out Terminal instance you are viewing. This is not necessarily related to the PMSC Effect or utilities on this display (of the same logical instance). If you change the **Point Number**, this field can provide the status of up to 6 loading terminals in the ROC800 and 2 loading terminals in the FB107. **Note:** The Tank Manager program supports up to 2 (for FB107) or 6 (for ROC800) loading terminals, thus the numbers greater than 2 (for FB107) or 6 (for ROC800) have no configuration effect.
SSD Set	This section is checked if the System Shut Down (SSD) is set to this Load Terminal.
PSD Set	This section is checked if the Permanent Shutdown (PSD) is set to this Load Terminal.
TSD Set	This section is checked if the Temporary Shutdown (TSD) is set to this Load Terminal.
Trip Code	Sets the numerical code of First Out Action Block that tripped this instance.

Field	Description
Well Opt Mgr Well # 1	Shows the status of any Well Optimization Manager Wells. The number beside the field name refers to the point number of the well instance you are viewing. This is not necessarily related to the PMSC Effect or utilities on this display (of the same logical instance). As you change the **Point Number**, this field can provide the status of up to 4, 8, or 12 wells, depending on the version of the Well Optimization Manager program you install. **Note:** The Well Optimization Manager program supports up to 12 optimization wells, thus the numbers greater than 12 have no configuration effect.
SSD Set	This section is checked if the System Shut Down (SSD) is set to this well.
PSD Set	This section is checked if the Permanent Shutdown (PSD) is set to this well.
TSD Set	This section is checked if and (Temporary Shutdown) TSD is set to this well.
Trip Code	Sets the numerical code of First Out Action Block that tripped this instance.
PM v3.3x Well # 1	Shows the status of any Production Manager version 3 Wells. The number beside the field name refers to the point number of the well instance you are viewing. This is not necessarily related to the PMSC Effect or utilities on this display (of the same logical instance). If you change the **Point Number** at the top of this display, this field can provide the status of up to 4 wells provided by Production Manager version 3. **Notes:** ▪ The Well Optimization Manager program supports up to 4 optimization wells, thus the numbers greater than 4 have no configuration effect. ▪ These domain statuses are provided for backwards compatibility with previous versions of Production Manager. If Production Manager version 3.3x is in use, then these domain statuses are applicable. If Well Optimization Manager is in use (or no Well Optimization program), then these domain statuses are NOT applicable. This is not valid if you install both the PM v3.3x and the Well Optimization Manager programs in the same unit.
SSD Set	This section is checked if the System Shut Down (SSD) is set to this well.
PSD Set	This section is checked if the Permanent Shutdown (PSD) is set to this well.

Field	Description
TSD Set	This section is checked if and Temporary Shutdown (TSD) is set to this well.
Trip Code	Sets the numerical code of First Out Action Block that tripped this instance.
PMSC Effect # 1	Shows the domain status of PMSC Effects. The number beside the field name refers to the point number of the instance or utilities you view. This can be up 12, 24, or 36 depending on your user program version. See program specifics note in *Section 1.3*.
SSD Set	This section is checked if the System Shut Down (SSD) is set to this Effect.
PSD Set	This section is checked if the Permanent Shutdown (PSD) is set to this Effect.
TSD Set	This section is checked if the Temporary Shutdown (TSD) is set to this Effect.
Trip Code	Sets the numerical code of First Out action block that tripped this instance.

3. Click **Apply** to save any changes you have made to this screen.

4. Proceed to *Section 3.3* to configure the PMCB Calculation Blocks.

3.3 PMCB Calculation Blocks

The PMCB Calculation Blocks display allows the configuration of up to four inputs/input arrays and up to three calculations per instance. A 10-character tag field is provided for each input and calculation.

To access this screen:

1. From the Directory Tree, select **User Program** > **Program #1, PMSC_v407_00_48blk**.

2. Double-click Display #218, PMCB Calculation Blocks.

Note: This section shows how to access the access the PMCB Calculation Blocks screen for the ROC800. To access the PMCB Calculation Blocks for FB107, double-click Display #27, PMCB Calculation Blocks or Display #39, PMCB Calculation Blocks.

3. Double-click **#1, Calculation Block 1**. Select the **Calc Blocs** tab and the screen displays:

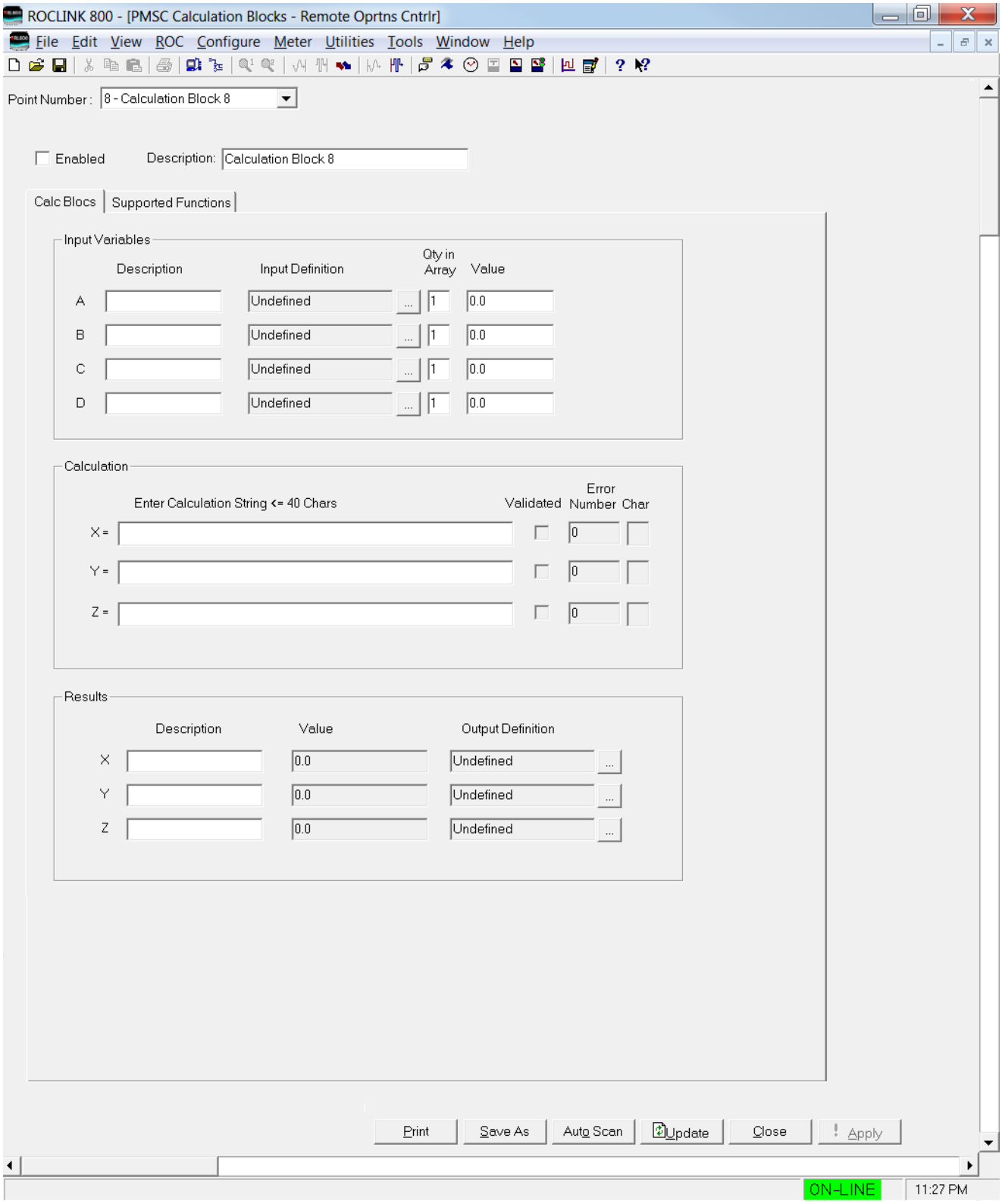


Figure 3-9. PMCB Calculation Blocks- Calc Blocks tab

4. Review and complete the values in the following fields:

Field	Description
Enabled	Executes calculations, when selected. Any defined inputs will be updated (displayed) whether the "Enabled" checkbox is checked or not. Default: **Unchecked**
Description	Sets a 20-character calculation instance identification.
Input Variables	
Description	Sets the input (defined at Input Definition).
Input Definition	Defines the inputs to be used in the calculation. The input selected is either a single data point or the starting parameter of an array of data points. Default: **Undefined**
Qty in Array	Sets the quantity of data points for the defined input. Arrays are automatically indexed by parameter (softpoints and FST registers) or by instance (all others). If you enter a number that exceeds the maximum quantity permitted, the program will change the entry to the maximum quantity. Default: **1** Array quantity limits are: **1. Logical (Instance) Indexing:** ▪ I/O Card Point Types: Currently limited to the quantity of channels on the physical IO card. ▪ Non-I/O Card Point Types: Limited to the total number of instances and not to exceed 40 bytes (example 10 floats maximum). **2. Parameter Indexing:** Soft Point parameters and FST Registers (all other arrays use logical indexing): All contiguous parameters must be the same data type as the defined parameter and not exceed 40 bytes. Effectively: **50 doubles, 10 floats, 10 shorts or 10 bytes**
Value	Sets the value of the defined data point. If the array quantity is greater than one, this field automatically hides itself.
Calculation	
Calculation String	You enter a 40-character free-form text mathematical equation or logical expression. If you enter an invalid expression, a carat will appear under the left most invalid character.
Validated	Validates each calculation string upon change. If the string is valid the program checks this box and if "Enabled" is checked, the calculation is performed.

Field	Description
Error Number	Displays the character position of the first error (left to right) if the calculation string is invalid. If the calculation string is valid, the value is set to zero.
Char	Displays the invalid character reference in the "Error Number" filed. When the calculation string is valid, this field is blank.
Results	
Results Description	You enter a 10-character text to describe the results (calculation).
Results Value	Displays the numerical result of the calculation. If the calculation contains a Boolean Fan Out (BFO()), Integer Fan Out (IFO()) or For Loop (FOR()) function, the result value displayed may be the first of an array of values (indexed by parameter only).
Results Output Definition	Defines the output point of the result value. If the calculation contains a Boolean Fan Out (BFO()), Integer Fan Out (IFO()) or For Loop (FOR()) function, the defined point may be the first of an array of points (indexed by parameter only).

5. Select the **Supported Functions** tab and the screen displays:

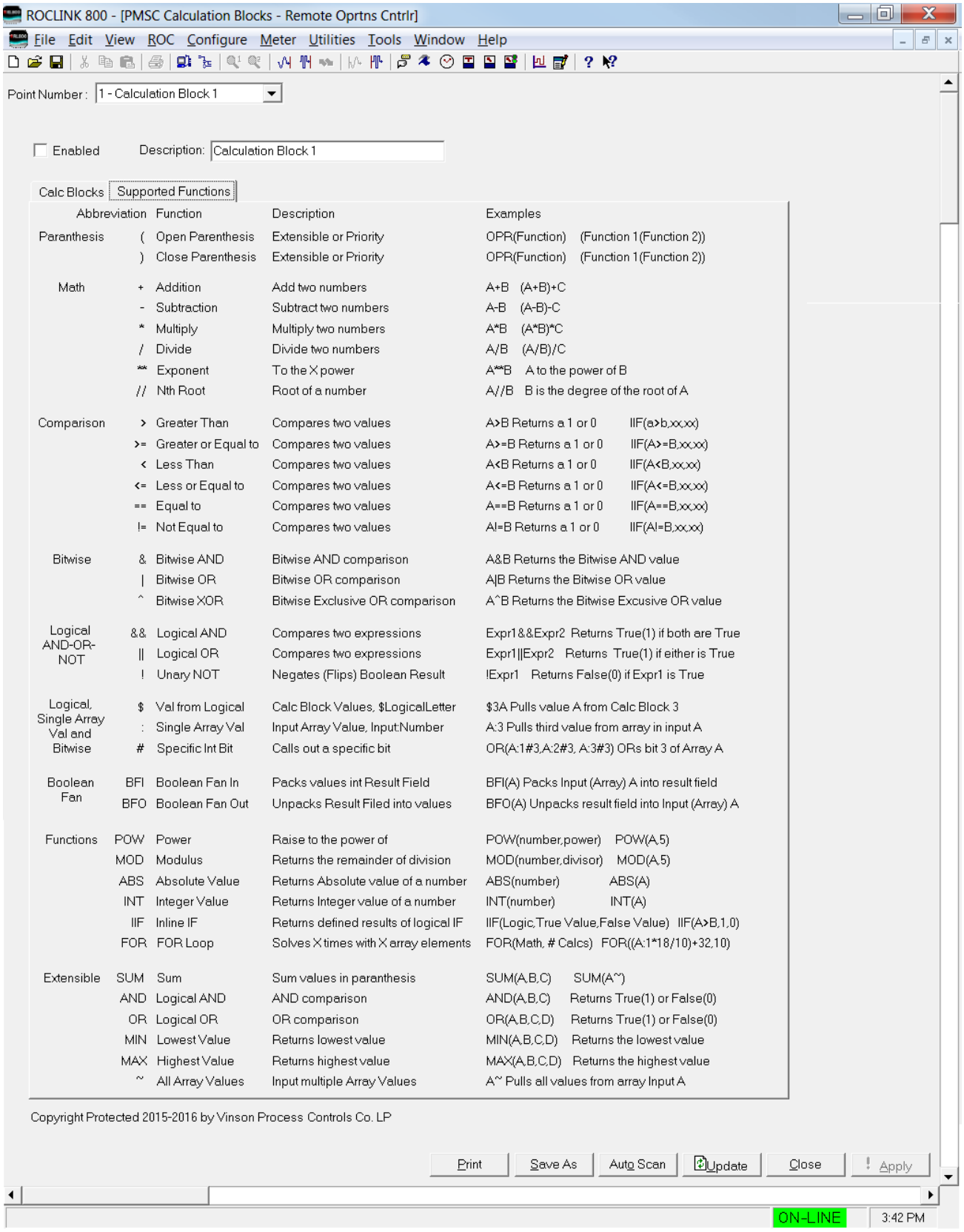


Figure 3-10. PMCB Calculation Blocks- Supported Functions tab

For more details, refer to *Appendix A – PMCB Calculation Blocks – Supported Functions.*

3.4 Saving the Configuration

Whenever you modify or change the configuration, it is a good practice to save the final configuration to memory. To save the configuration:

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

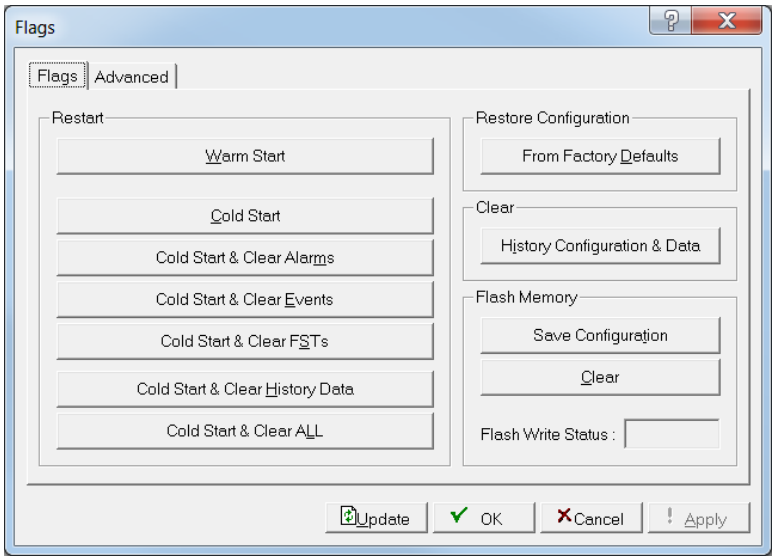


Figure 3-11. Flags

2. Click **Save Configuration**. A verification message displays:

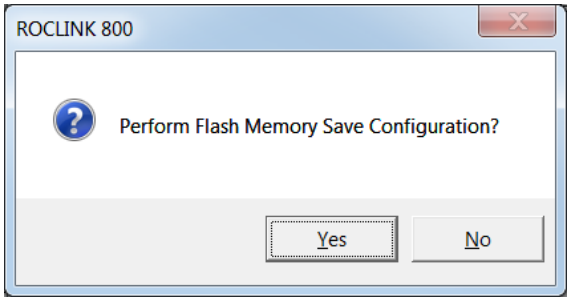


Figure 3-12. Save Verification

3. Click **Yes** to begin the save process. The Flash Write Status field on the Flags screen displays In Progress. When the Save Configuration completes, the Flash Write Status field on the Flags screen displays *Completed*.
4. Click **Update** on the Flags screen. This completes the process of saving your new configuration.

Note: For archive purposes, you should also save this configuration to your PC's hard drive or a removable media (such as a flash drive) using the **File** > **Save Configuration** option on the ROCLINK 800 menu bar.

3.5 Sample Configurations

This section presents several sample configurations. While these examples may not precisely conform to your site, they may provide useful guidelines on how to implement similar controls at your site.

3.5.1 Controlling a Pump based on Tank Level

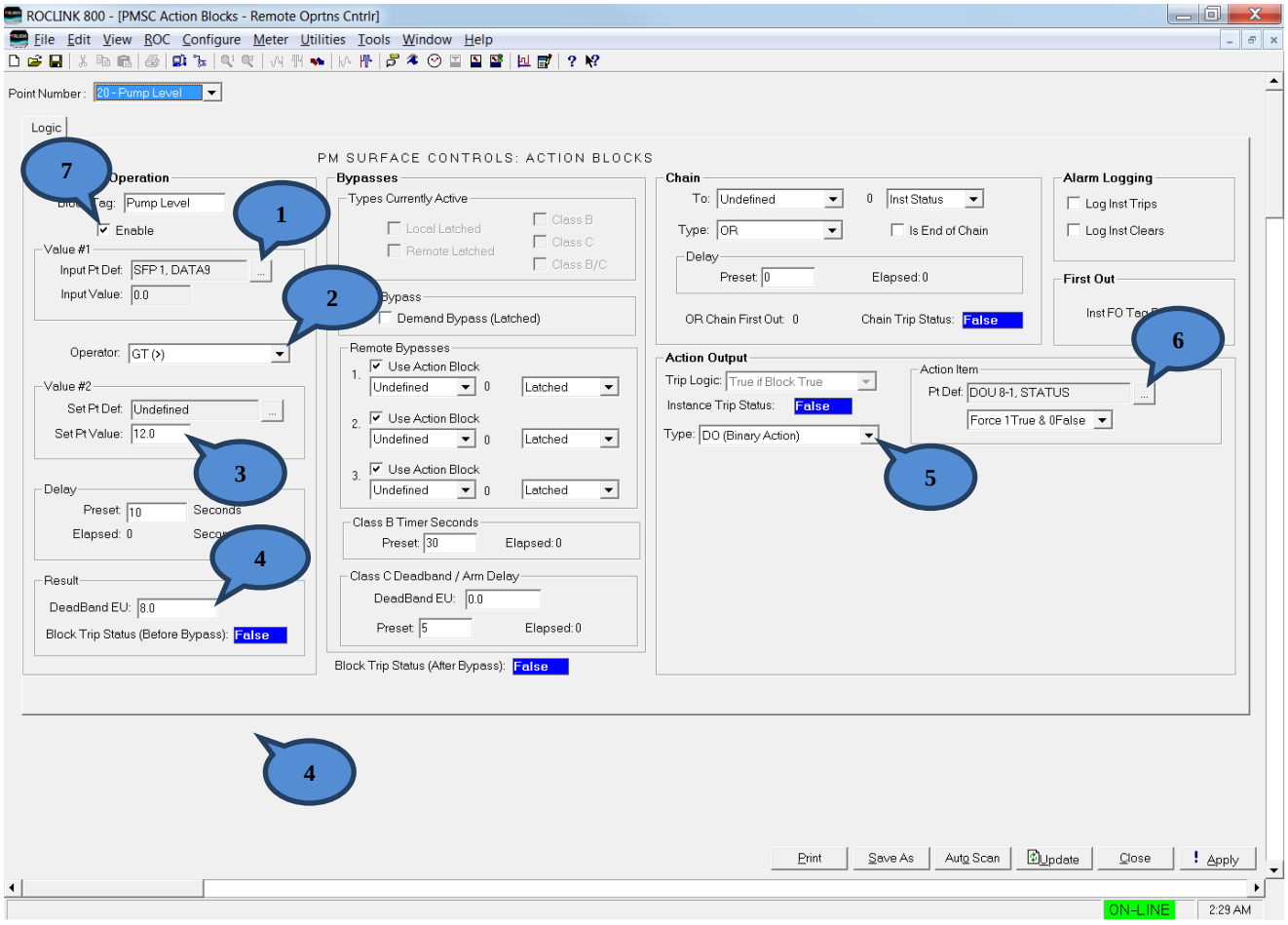


Figure 3-13. PMSC Action Blocks - Controlling a Pump based on Tank Level

1. Browse for the Tank Level Input using the **Input Pt Def** TLP selection.
2. Select the operator. In this case, the pump needs to start when the level is greater than [GT (>)] the **Set Pt Value**.
3. Specify the **Set Pt Value** at which the pump is to start.
4. Specify the **Deadband**. The difference between the **Set Pt Value** and the deadband is the level at which the pump stops. In this case, the pump starts at 12 feet rising and stops at 4 feel falling (12 -8 = 4).
5. Define the **Action Output Type**. In this case, the program writes to a DO directly.

6. Browse for the DO to be driven using the **Action Item Pt Def**.
7. Enable the action block and **Apply**.

   Optional considerations:

   - A delay time could be added to eliminate spikes on the trip point.
   - An effect could be driven rather than writing directly to an output.

3.5.2 Connecting Two Blocks with an AND Statement

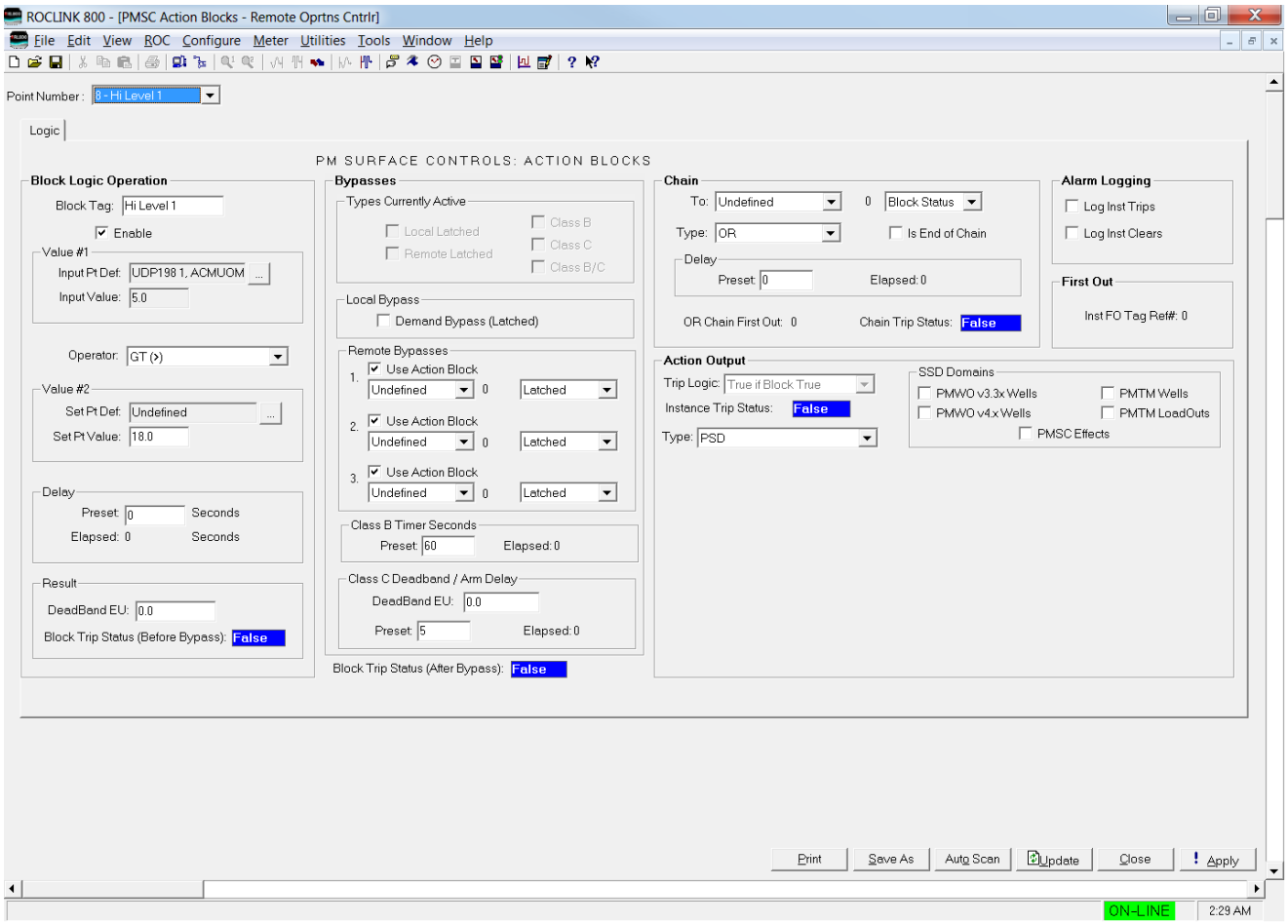


Figure 3-14. PMSC Action Blocks – Connecting two Blocks with an AND statement

In this case, two Hi Levels on separate tanks must both trip in order to shut down a well. Configure Hi Level 1 as shown in *Figure 3-14*.

Figure 3-15 shows the configuration of Hi Level 2.

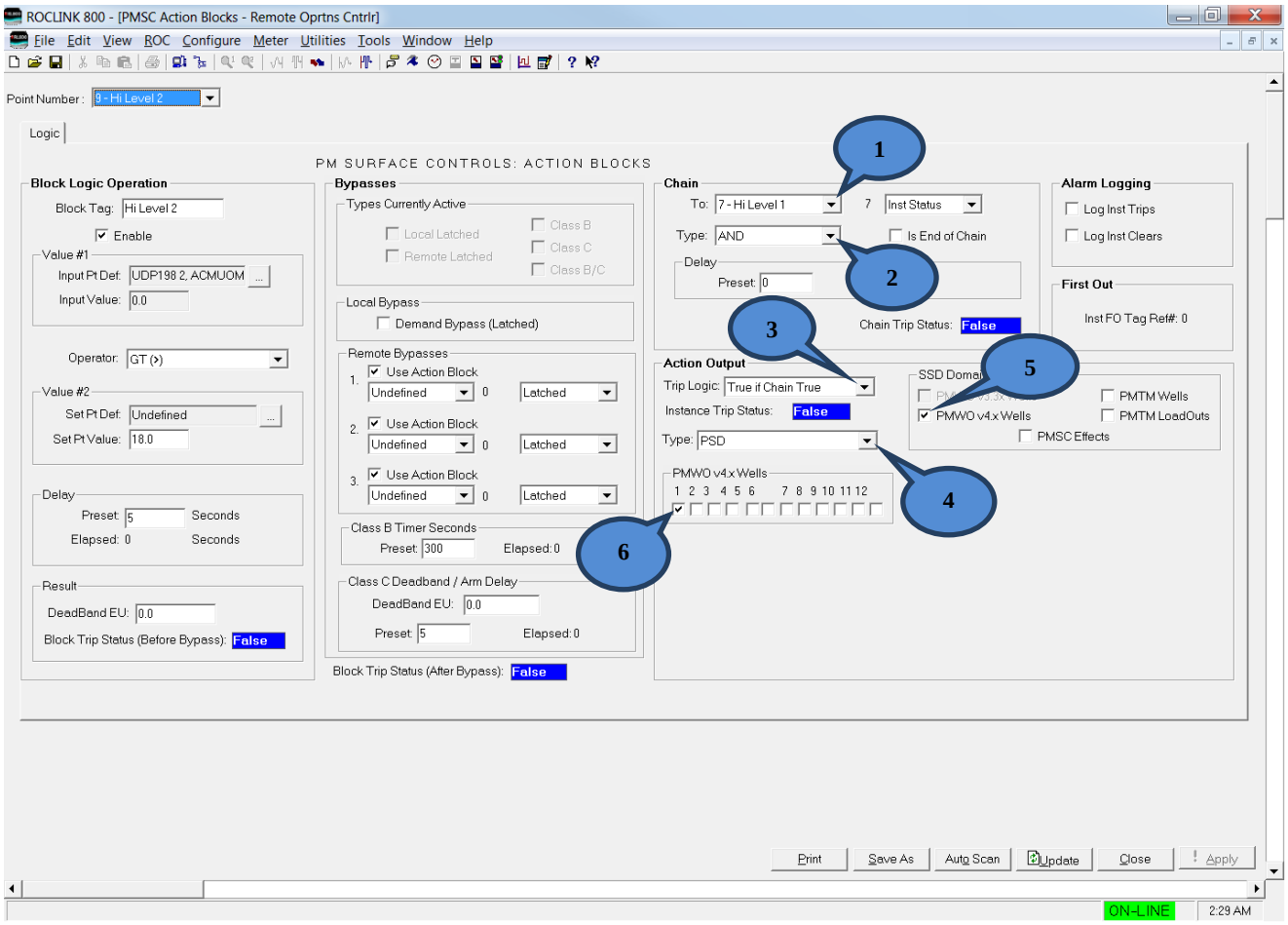


Figure 3-15. PMSC Action Blocks – Configuring High Level 2

1. Connect Hi Level 2 to Hi Level 1 by browsing for the previous block.

   Note: Chained blocks always reference a **previous** block and never the **following** block.

2. Select **AND** as the Chain Type.
3. Since this block controls the output, set the Block/Chain Trip to **True if Chain True**.
4. Select **PSD** as Action Output Type (since, in this case, the action is to permanently shut down a well)
5. Select the version of the Surface Control Manager program you pre-install.
6. Select the Well instance.
7. Click **Apply** to save your changes.

3.5.3 Connecting Two Block with an OR Statement

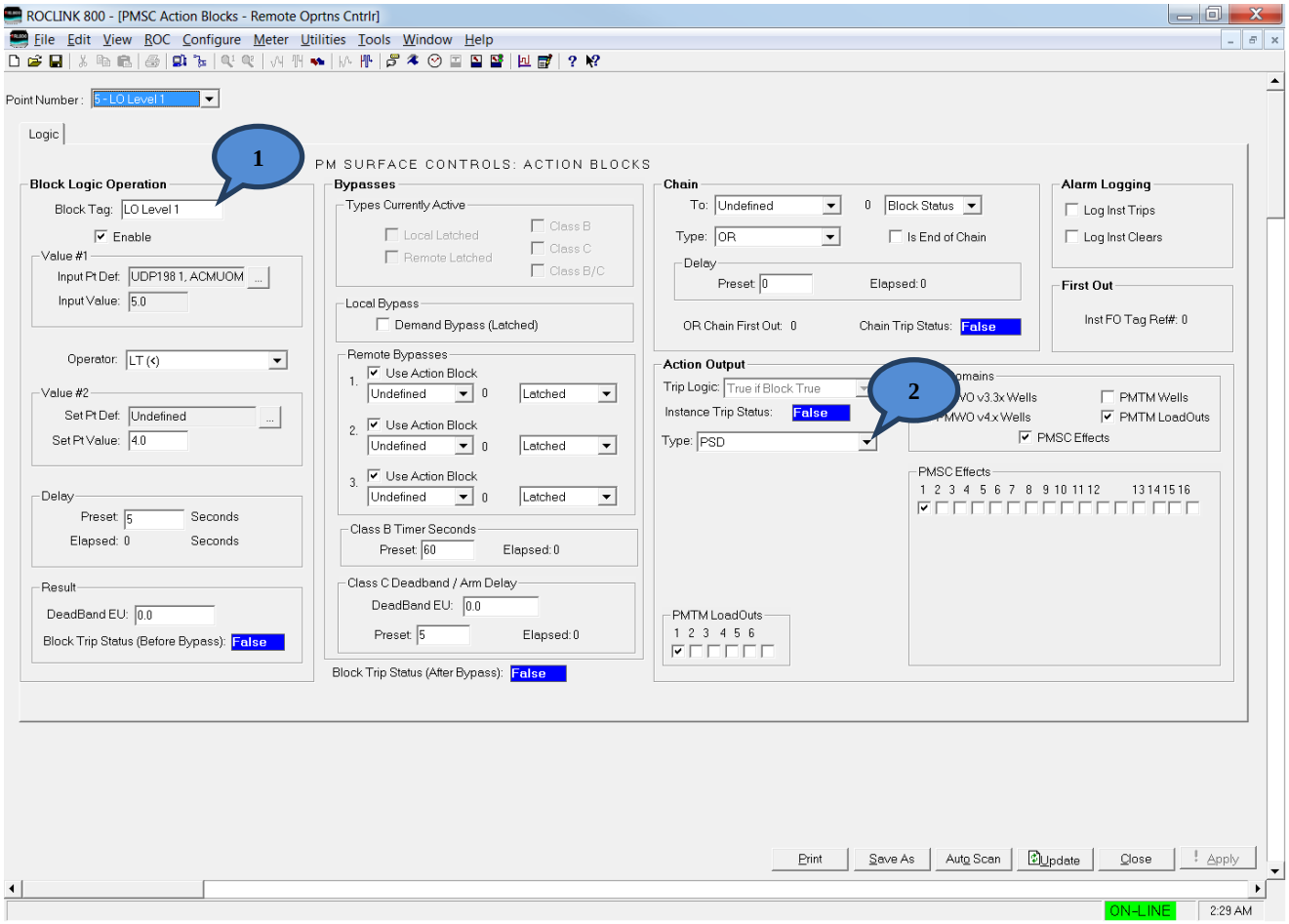


Figure 3-16. PMSC Action Blocks – Configuring Lo Level 1

In this case, either of two Lo Levels on separate tanks can shut down a Loadout Terminal and trip an ESD. Configure Lo Level 1 as shown in *Figure 3-16*.

1. Configure an action block to monitor a level transmitter and trip when the level reaches less than 4 units, after an elapsed time of 5 seconds.
2. Configure the **Action Output** Type to **PSD** – to permanently shut down the LoadOut Terminal #1 and trip Effect #1.
3. Configure Lo Level 2 as shown in *Figure 3-17*.

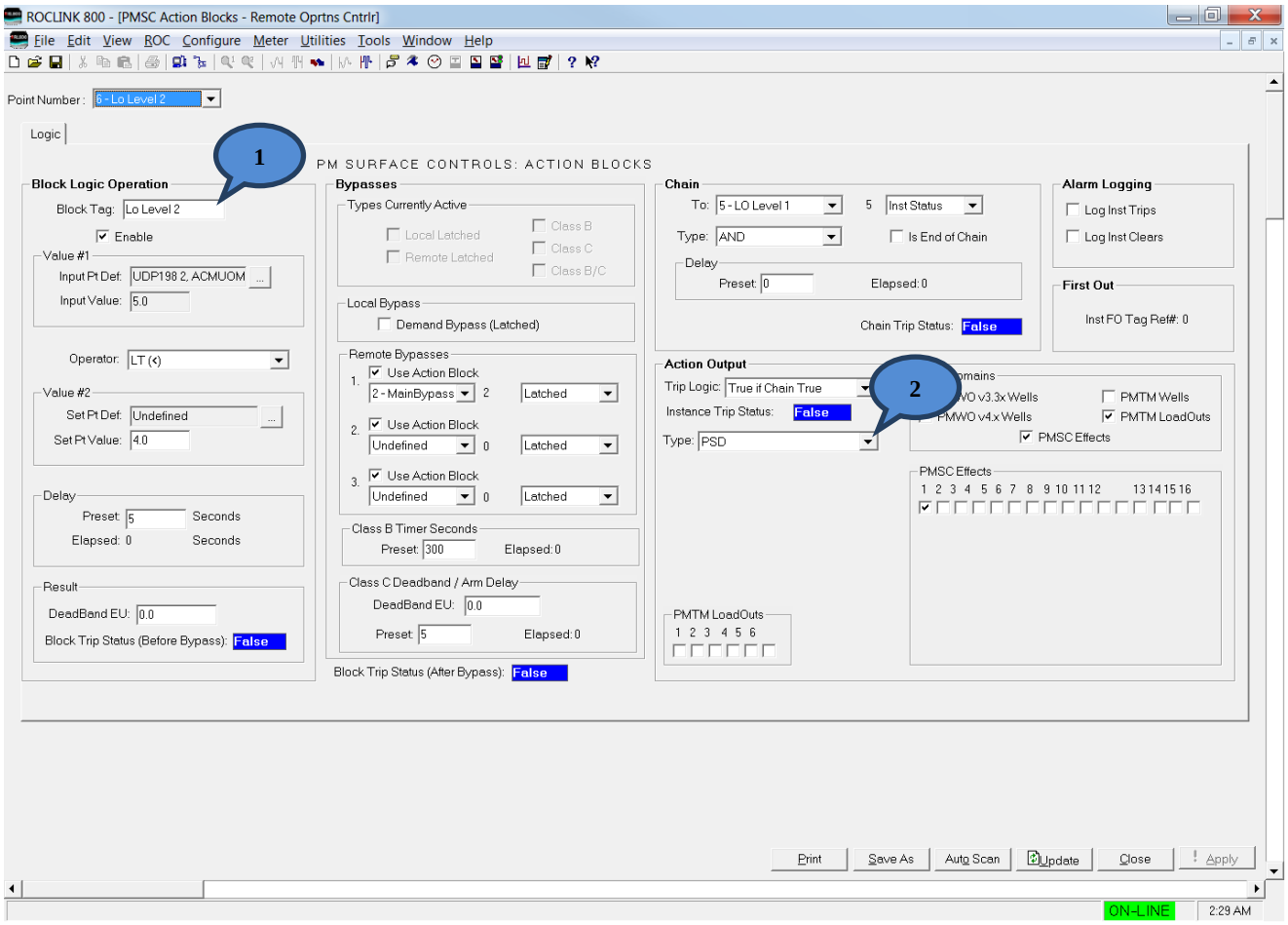


Figure 3-17. PMSC Action Blocks – Configuring Lo Level 2

1. Configure an action block to monitor a level transmitter and trip when the level reaches less than 4 units, after an elapsed time of 5 seconds.
2. Configure the Action Output Type to **PSD** – to permanently shut down the LoadOut Terminal #1 and trip Effect #1.
3. Consequently, either an action block, Lo Level 1, or Lo Level 2 trips the Loadout Terminal and the ESD effect.

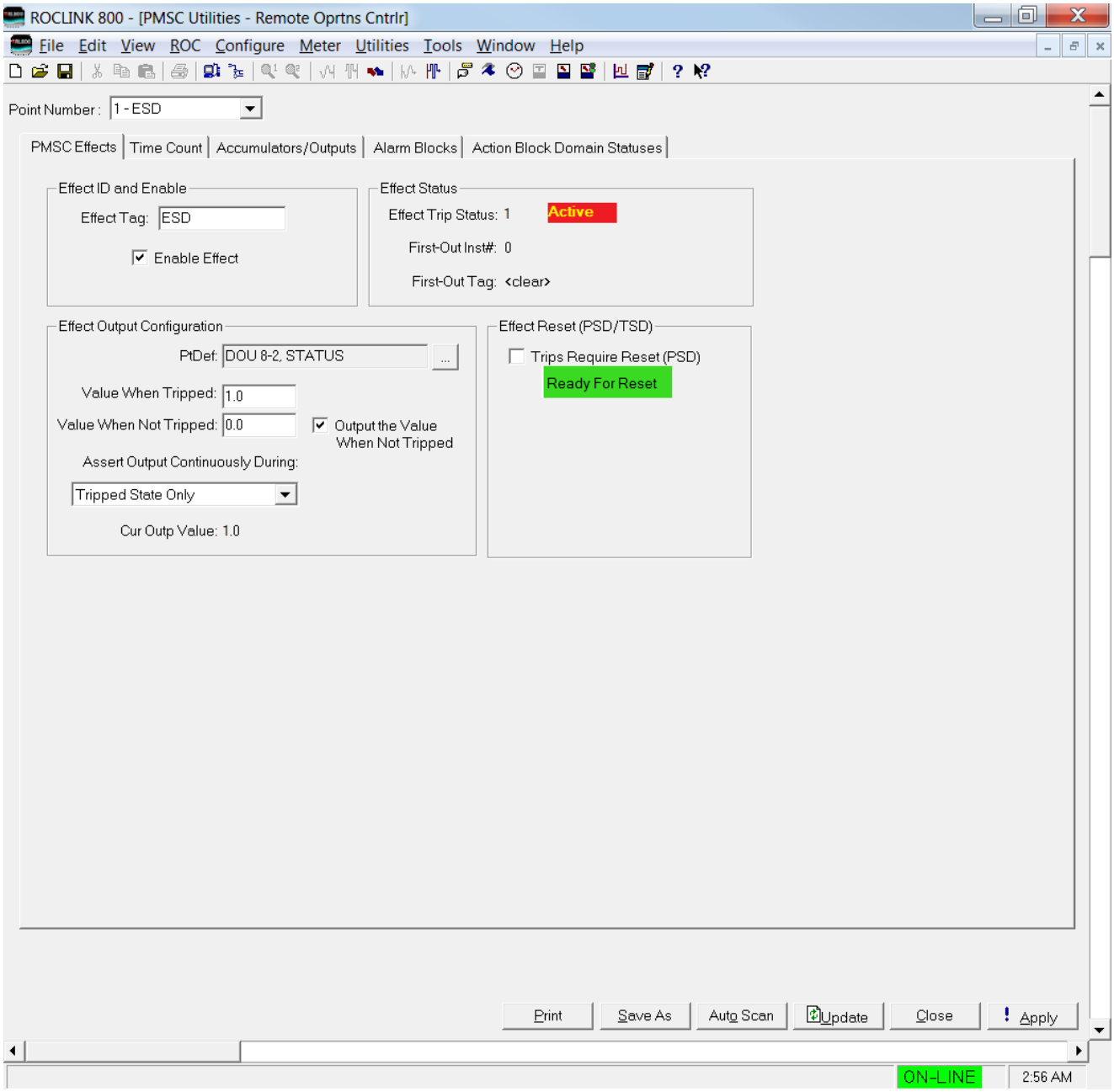


Figure 3-18. PMSC Utilities – Configuring ESD

See *Section 3.2.1* in this manual for further information on configuring an effect.

3.5.4 Setting Up a Class B Bypass

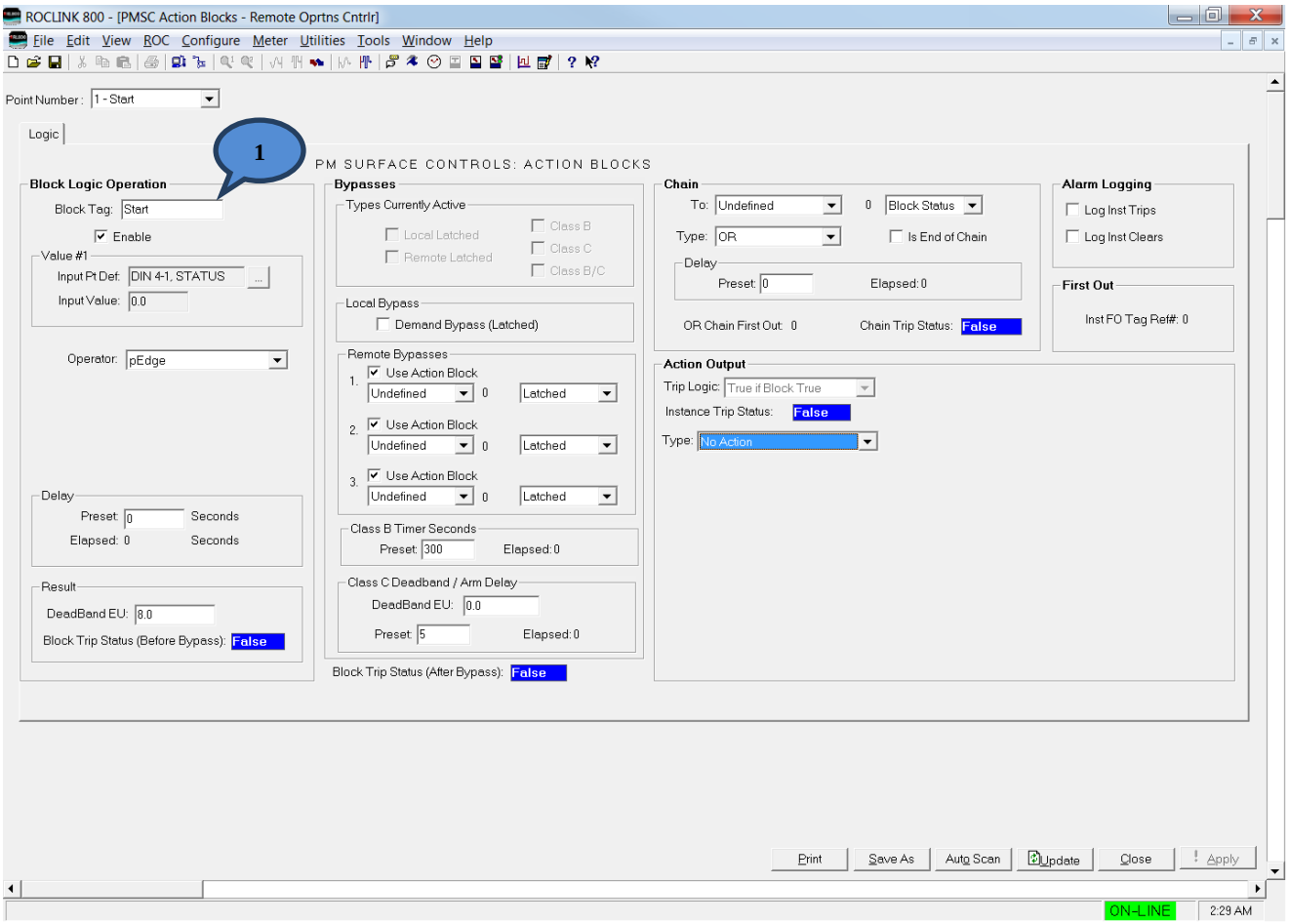


Figure 3-19. PMSC Action Blocks – Setting up a Class B Bypass

1. Configure an action block to monitor a start signal.
   a. In this case monitor a DI for a Positive Edge Transition (**pEdge**).
   b. This block goes true for one scan.

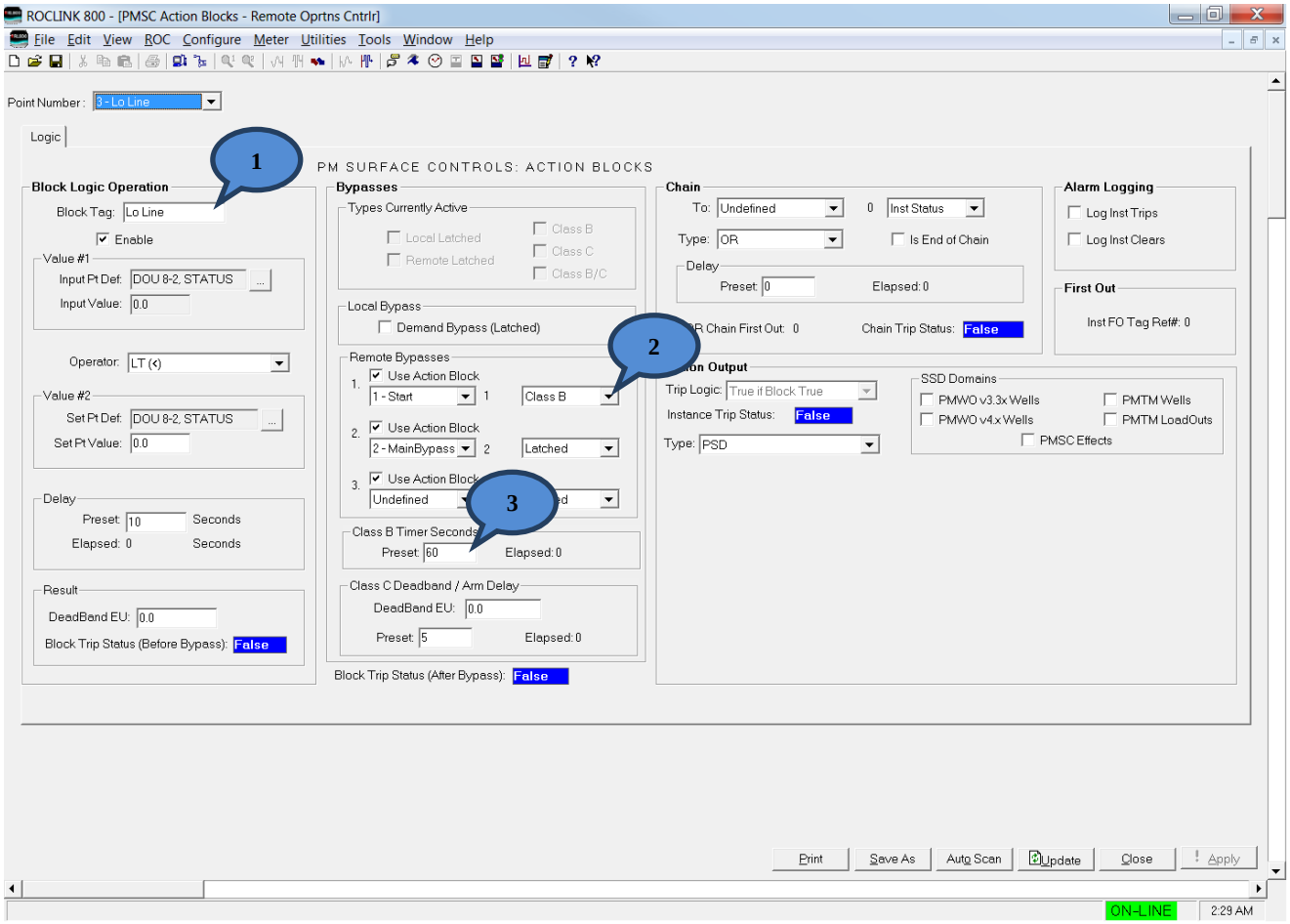


Figure 3-20. PMSC Action Blocks – Configuring Lo Line

To configure an action block that needs to be bypassed for a period of time:

1. Browse for the action block that monitors the Start Action.
2. Select Class B as the **Remote Bypass** type.
3. Enter the amount of time to bypass this block in the **Class B Timer Seconds Preset** once the Start Action is true.

3.5.5 Creating a Timed Maintenance Bypass

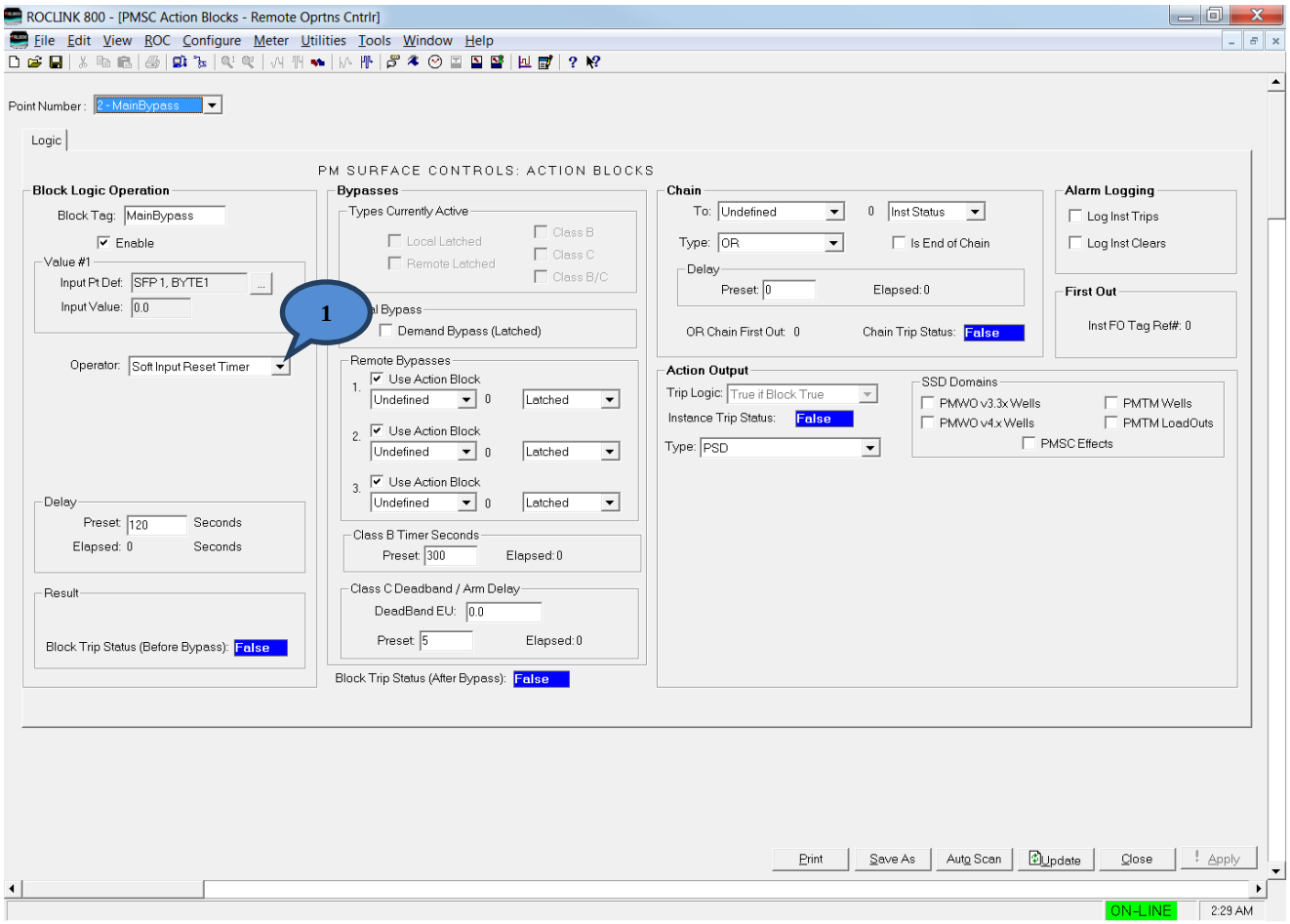


Figure 3-21. PMSC Action Blocks – Creating a Timed Maintenance Bypass

Configure an action block to monitor a softpoint value that is not connected to real IO (such as softpoint byte field).

1. Use the Operator Soft Input Reset Timer.
2. Set the amount of time this block is true in the **Delay Preset** field once the **Input Value** is true.
3. When the **Delay Preset** time expires, the block goes false.

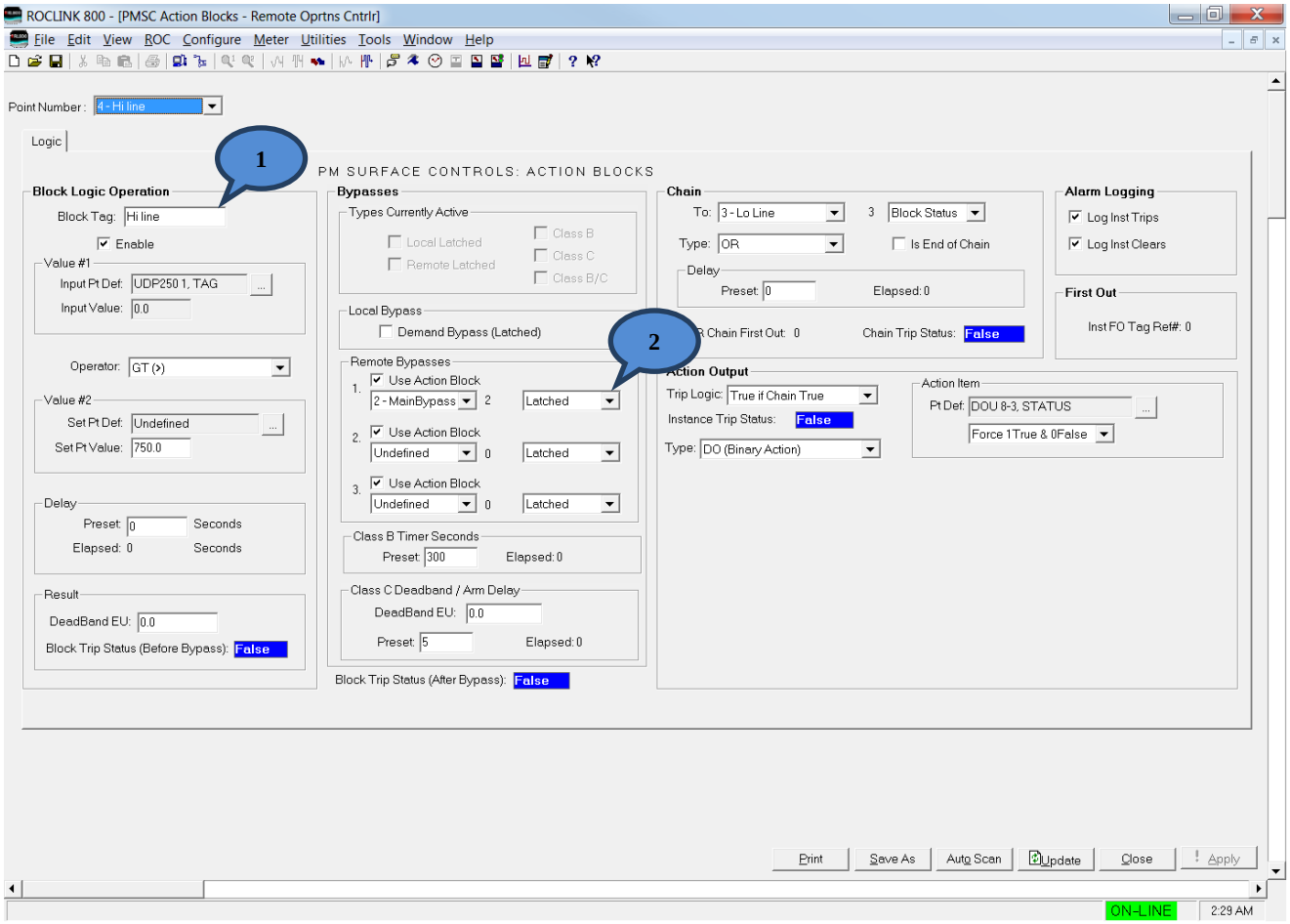


Figure 3-22. PMSC Action Blocks – Configuring Hi Line

To configure an action block needing a timed maintenance bypass:

1. Select the action block that monitors the Maintenance Bypass function.
2. Select **Latched** for the Remote Bypass.
3. The block is bypassed as long as the MaintBypass action block remains true.

Chapter 4 – Reference

This section provides information of point types and parameters used by the Surface Control Manager and Calculation Blocks program.

For Action Blocks

- Point Type 68 (ROC800)
- Point Type 28 (FB107)

For Utilities

- Point Type 71 (ROC800)
- Point Type 31 (FB107)

For Calculation Blocks

- Point Type 218 (ROC800)
- Point Type 27 (Slot #3) or Alternate #39 (Slot #6) (FB107)

4.1 Point Type 68/28: Action Blocks

Point type 68 (for ROC800) or point type 28 (for FB107) contains the parameters for configuring the action blocks. For the ROC800, the program maintains 48, 96, 144 or 192 instances of this point type (based on the size of the installed program); for the FB107, the program maintains 48 instances of the point type.

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
0	Block Tag	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	Block #" (# = logical number)	4.03.05	Sets the tag name for action block.
1	Enable	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables action block. **0** = Disabled **1** = Enabled
2	Input Pt Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Sets the TLP source of the input value.
3	Input Value	R/O	System	FLOAT	4	Any floating point number	0.0	4.03.05	Displays the input value from the TLP.
4	Statement Operator	R/W	User	TLP	1	0 - 17	0,0,0	4.03.05	Selects a logical or mathematical operator. **0** = GT (>) **1** = GE (>=) **2** = LT (<) **3** = LE (<=) **4** = EQ (==) **5** = NE (!=) **6** = Watchdog **7** = Trip On Change **8** = pEdge **9** = nEdge **10** = Bitwise AND (&) **11** = Bitwise OR **12** = Add (+) **13** = Subtract (-) **14** = Multiply (*) **15** = Divide (/) **16** = Modulus (%) **17** = Soft Input Reset Timer
5	Setpoint Def	R/W	User	FLOAT	3	Any Valid IEEE numeric TLP	0.0	4.03.05	Selects the TLP source of the Setpoint value.

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
6	Setpoint Value	R/W	User	UINT16	4	Any floating number	0	4.03.05	Displays live Set Pt Value from TLP or user entered manual value.
7	Delay Sec Preset	R/O	System	UINT16	2	0 - 65535	0	4.03.05	Sets the delay in seconds that is either for an on delay for logic functions or for soft input rest timer.
8	Delay Sec Elapsed	R/W	User	FLOAT	2	0 - 65535	0.0	4.03.05	Shows the delay elapse time.
9	Action Db Result	R/O	System	UINT8	4	Any floating number	0	4.03.05	Sets the Deadband for logic operators or math result for mathematical operators.
10	Refined Block Status	R/W	User	TLP	1	0 - 1	0,0,0	4.03.05	Shows the block trip status after bypass. **0** = False **1** = True
11	Block Action Type	R/W	User	UINT8	1	0-6	0	4.03.05	Sets the Action Output type. 0 = PSD (Permanent Shutdown) 1 = TSD (Temporary Shutdown) 2 = DO (Binary Action) 3 = Move Value 4 = VAL (to Result Register) 5 = SAV (from Result Register) 6 = No Action
12	Block Action Item Pt Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Sets the action Item Pt Def TLP selection, only visible with DO, Move Value, VAL, and SAV.
13	Block DO Behavior	R/W	User	UINT8	1	0 - 9	0	4.03.05	Selects the Action Output DO (Binary Action) behavior. **0** = Force 1True & 0False **1** = Force 0True & 1False **2** = Poke 1True **3** = Poke 0True **4** = Poke 1True & 0False **5** = Poke 0True & 1False **6** = Force 1True & Poke 0F **7** = Force 0True & Poke 1F **8** = Force 1True **9** = Force 0True

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
14	Raw Block Status	R/O	System	UINT8	1	0 - 1	0	4.03.05	Blocks trip status before bypass. 0 = False 1 = True
15	Bypasses Active	R/O	System	UINT8	1	0 - 31	0	4.03.05	Shows the bypasses that are currently active. **0** = None **Bit 0** = Local Latched **Bit 1** = Remote Latched **Bit 2** = Class B **Bit 3** = Class C **Bit 4** = Class B/C
16	Chain Status	R/O	System	UINT8	1	0-1	0	4.03.05	Chain trip status. **0** = False **1** = True
17	Trip Status	R/O	System	UINT8	1	0-1	0	4.03.05	Shows the instance trip status. **0** = False **1** = True
18	Chain With Inst	R/W	User	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Sets a chain to a block instance.
19	Chain With What Aspect	R/W	User	UINT8	1	0-2	2	4.03.05	Sets a status to chain to from block instance. **0** = Block Status **1** = Chain Status (After Bypass) **2** = Inst Status
20	Chain Type	R/W	User	UINT8	1	0-8	1	4.03.05	Selects the Chain Type to compare with chained block instance and associated status. **0** = AND **1** = OR **2** = NAND **3** = XOR_EITHER **4** = XOR_LOCAL **5** = XOR_REMOTE **6** = SEAL-IN **7** = PWM LO-DUTY **8** = PWM HI-DUTY
21	Chain First Out	R/O	System	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Shows OR chain first out number, only visible with Chain Type OR.

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
22	SSD Destination Domains	R/W	User	UINT8	1	0-31	0	4.03.05	Sets the SSD domains for Action Output Type PSD or TSD. **Bit 0** = PMTM Wells **Bit 1** = PMTM Loadouts **Bit 2** = PMWO Wells **Bit 3** = PMv3.3x Wells **Bit 4** = PMSC Effects
23	Is End of Chain	R/W	User	UINT8	1	0 - 1	0	4.03.05	Indicates the last block in a chain. **0** = False **1** = True
24	Chain Delay Sec Preset	R/W	User	UINT16	2	0 - 65535	0	4.03.05	Sets the delay in seconds as an on delay for the chain trip status.
25	Chain Delay Sec Elapsed	R/O	System	UINT16	2	0 - 65535	0	4.03.05	Shows the chain delay elapsed time in seconds.
26	Apply Action Upon	R/W	User	UINT8	1	0 - 3	0	4.03.05	Sets the Action Output Block/Chain Trip logic. **0** = True if Block True **1** = True if Chain True **2** = True if Either True **3** = True if Both True
27	1st Remote Bypass Inst	R/W	User	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Remote Bypass 1 block instance selection.
28	2nd Remote Bypass Inst	R/W	User	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Remote Bypass 2 block instance selection.
29	3rd Remote Bypass Inst	R/W	User	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Remote Bypass 3 block instance selection.
30	1st Remote Bypass Type	R/W	User	UINT8	1	0 - 3	0	4.03.05	Remote Bypass 1 bypass type. **0** = Latched **1** = Class B **2** = Class C **3** = Class B/C
31	2nd Remote Bypass Type	R/W	User	UINT8	1	0 - 3	0	4.03.05	Remote Bypass 2 bypass type. **0** = Latched **1** = Class B **2** = Class C **3** = Class B/C

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
32	3rd Remote Bypass Type	R/W	User	UINT8	1	0 - 3	0	4.03.05	Remote Bypass 3 bypass type. **0** = Latched **1** = Class B **2** = Class C **3** = Class B/C
33	Local Latched Bypass	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables or disables the Local Bypass – Demand Bypass (Latched), manual bypass. 0 = Disabled 1 = Enabled
34	Class C Byp Deadband EU	R/W	User	FL	1	Any floating point number	0.0	4.03.05	Sets the Deadband value for Class C bypass.
35	Class B Timer Preset Sec	R/W	User	UINT16	2	0 - 65535	300	4.03.05	Sets the Class B Preset timer in seconds.
36	Class C Arm Delay Sec	R/W	User	UINT16	2	0 - 65535	5	4.03.05	Sets the Class C Arm Delay Preset timer in seconds.
37	Class B Elap Sec	R/O	System	UINT16	2	0 - 65535	0	4.03.05	Shows the Class B timer elapsed time in seconds.
38	Class C DB Arm Delay Elap	R/O	System	UINT16	2	0 - 65535	0	4.03.05	Shows the Class C timer elapsed time in seconds.
39	Is a Browseable Bypass	R/W	User	UINT8	1	0-1	0	4.03.05	Determines if block selected as a bypass is a valid selection, this parameter is not visible.
40	Log Instance Trips	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables or disables Alarm Logging, log instance trips. **0** = No log **1** = Log Trips
41	Log Instance Clears	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables or disables Alarm Logging, log instance clears. **0** = No log **1** = Log Clears
42	Inst FO Tag Ref	R/O	System	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Sets the tag number of FO tripped instance.

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
43	SSD TM Well List 1-8	R/W	User	UINT8	1	0 - 255	0	4.03.05	Sets the SSD Domains link to PMTM Wells 1-8. **Bit 0** = Well 1 **Bit 1** = Well 2 **Bit 2** = Well 3 **Bit 3** = Well 4 **Bit 4** = Well 5 **Bit 5** = Well 6 **Bit 6** = Well 7 **Bit 7** = Well 8
44	SSD TM Well List 9-12	R/W	User	UINT8	1	0 - 15	0	4.03.05	Sets the SSD Domains link to PMTM Wells 9-12. **Bit 0** = Well 9 **Bit 1** = Well 10 **Bit 2** = Well 11 **Bit 3** = Well 12
45	SSD LoadOut List	R/W	User	UINT8	1	0 - 63	0	4.03.05	Sets the SSD Domains link to PMTM LoadOuts 1-6. **Bit 0** = LoadOut 1 **Bit 1** = LoadOut 2 **Bit 2** = LoadOut 3 **Bit 3** = LoadOut 4 **Bit 4** = LoadOut 5 **Bit 5** = LoadOut 6
46	SSD WO Well List 1-8	R/W	User	UINT8	1	0 - 255	0	4.03.05	Sets the SSD Domains link to PMWO Wells 1-8. **Bit 0** = Well 1 **Bit 1** = Well 2 **Bit 2** = Well 3 **Bit 3** = Well 4 **Bit 4** = Well 5 **Bit 5** = Well 6 **Bit 6** = Well 7 **Bit 7** = Well 8
47	SSD WO Well List 9-12	R/W	User	UINT8	1	0 - 15	0	4.03.05	Sets the SSD Domains link to PMWO Wells 9-12. **Bit 0** = Well 9 **Bit 1** = Well 10 **Bit 2** = Well 11 **Bit 3** = Well 12

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
48	SSD PM v3.30 Well List 1-6	R/W	User	UINT8	1	0 - 63	0	4.03.05	Sets the SSD Domains link to PMv3.3x Wells 1-8. **Bit 0** = Well 1 **Bit 1** = Well 2 **Bit 2** = Well 3 **Bit 3** = Well 4 **Bit 4** = Well 5 **Bit 5** = Well 6
49	SSD PMSC Effects 1-8	R/W	User	UINT8	1	0 - 255	0	4.03.05	SSD Domains link to PMSC Effects 1-8. **Bit 0** = Effect 1 **Bit 1** = Effect 2 **Bit 2** = Effect 3 **Bit 3** = Effect 4 **Bit 4** = Effect 5 **Bit 5** = Effect 6 **Bit 6** = Effect 7 **Bit 7** = Effect 8
50	SSD PMSC Effects 9-16	R/W	User	UINT8	1	0 - 255	0	4.03.05	Sets the SSD Domains link to PMSC Effects 9-16. **Bit 0** = Effect 9 **Bit 1** = Effect 10 **Bit 2** = Effect 11 **Bit 3** = Effect 12 **Bit 4** = Effect 13 **Bit 5** = Effect 14 **Bit 6** = Effect 15 **Bit 7** = Effect 16
51	SSD PMSC Effects 17-24	R/W	User	UINT8	1	0 - 255	0	4.03.05	Sets the SSD Domains link to PMSC Effects 17-24. **Bit 0** = Effect 17 **Bit 1** = Effect 18 **Bit 2** = Effect 19 **Bit 3** = Effect 20 **Bit 4** = Effect 21 **Bit 5** = Effect 22 **Bit 6** = Effect 23 **Bit 7** = Effect 24

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
52	SSD PMSC Effects 25-32	R/W	User	UINT8	1	0 - 255	0	4.03.05	Sets the SSD Domains link to PMSC Effects 25-32. **Bit 0** = Effect 25 **Bit 1** = Effect 26 **Bit 2** = Effect 27 **Bit 3** = Effect 28 **Bit 4** = Effect 29 **Bit 5** = Effect 30 **Bit 6** = Effect 31 **Bit 7** = Effect 32
53	SSD PMSC Effects 33-36	R/W	User	UINT8	1	0 - 15	0	4.03.05	Sets the SSD Domains link to PMSC Effects 33-36. **Bit 0** = Effect 33 **Bit 1** = Effect 34 **Bit 2** = Effect 35 **Bit 3** = Effect 36
54	Remote Bypass Status	R/O	System	UINT8	1	0	0	4.03.05	Shows the Trip status of remote bypasses. **Bit 0** = Remote Bypass 1 Status **Bit 1** = Remote Bypass 2 Status **Bit 2** = Remote Bypass 3 Status
55	Prev Scan Trip Status	R/W	User	UINT8	1	0-1	0	4.03.05	The block status after bypass of the previous, this parameter is not displayed.
56	Bypass Location Type 1	R/W	User	UINT8	1	0-1	0	4.06.00	Determines if remote bypass 1 is activated by another action block, or by a user selected TLP. **0** = User Selected TLP **1** = Remote Action Block
57	Bypass Location Type 2	R/W	User	UINT8	1	0-1	0	4.06.00	Determines if remote bypass 2 is activated by another action block, or by a user selected TLP. **0** = User Selected TLP **1** = Remote Action Block

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
58	Bypass Location Type 3	R/W	User	UINT8	1	0-1	0	4.06.00	Determines if remote bypass 3 is activated by another action block, or by a user selected TLP. **0** = User Selected TLP **1** = Remote Action Block
59	Remote Bypass TLP Def 1	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for remote bypass 1, if the type is set to use a TLP definition.
60	Remote Bypass TLP Def 2	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for remote bypass 2, if the type is set to use a TLP definition.
61	Remote Bypass TLP Def 3	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for remote bypass 3, if the type is set to use a TLP definition.
62	SSD PMSC Effects 41-48	R/W	User	UINT8	1	0 - 255	0	4.06.00	Sets the SSD Domains link to PMSC Effects 41-48. **Bit 0** = Effect 41 **Bit 1** = Effect 42 **Bit 2** = Effect 43 **Bit 3** = Effect 44 **Bit 4** = Effect 45 **Bit 5** = Effect 46 **Bit 6** = Effect 47 **Bit 7** = Effect 48
63	SSD PMSC Effects 49-56	R/W	User	UINT8	1	0 - 255	0	4.06.00	Sets the SSD Domains link to PMSC Effects 49-56. **Bit 0** = Effect 49 **Bit 1** = Effect 50 **Bit 2** = Effect 51 **Bit 3** = Effect 52 **Bit 4** = Effect 53 **Bit 5** = Effect 54 **Bit 6** = Effect 55 **Bit 7** = Effect 56

Point Type 68 (ROC800) or Point 28 (FB107): Action Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
64	SSD PMSC Effects 57-64	R/W	User	UINT8	1	0 - 255	0	4.06.00	Sets the SSD Domains link to PMSC Effects 57-64. **Bit 0** = Effect 57 **Bit 1** = Effect 58 **Bit 2** = Effect 59 **Bit 3** = Effect 60 **Bit 4** = Effect 61 **Bit 5** = Effect 62 **Bit 6** = Effect 63 **Bit 7** = Effect 64

4.2 Point Type 71/31: Utilities

Point type 71 (for ROC800) or point type 31 (for FB107) contains the parameters for configuring the utilities. For the ROC800, the program maintains 12, 24, or 36 instances of this point type (depending on the size of the installed program); for the FB107, the program maintains 16 instances of this point type.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
0	Instance Tag	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	Inst #	4.03.05	Sets the tag name for utilities.
1	Run Time Enable	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables time count. 0 = Disabled 1 = Enabled
2	Run Time Pt Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Sets the Run-Time Pt Def TLP selection.
3	RT Operator	R/W	User	UINT8	1	0 - 5	0	4.03.05	Sets the logical operator for run-time comparison. **0** = GT (>) **1** = GE (>=) **2** = LT (<) **3** = LE (<=) **4** = EQ (==) **5** = NE (!=)
4	RT Setpoint	R/W	User	FL	4	Any floating point number	0.0	4.03.05	Sets the setpoint value.
5	RT Clear Now	R/W	User	UINT8	1	0 - 1	0	4.03.05	Clears all run-time accumulators. **0** = Normal **1** = Clear Accums
6	RT Status	R/O	System	UINT8	1	0 - 1	0	4.03.05	Shows the status of live run-time. **0** = False **1** = True
7	RT ON Mins Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON minutes today.
8	RT ON Mins Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON minutes yesterday.
9	RT ON Mins TMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON minutes this month.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
10	RT ON Mins PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON minutes previous month.
11	RT ON Hours Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON hours today.
12	RT ON Hours Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON hours yesterday.
13	RT ON Hours TMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON hours this month.
14	RT ON Hours PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON hours previous month.
15	RT ON Pct Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON percent today.
16	RT ON Pct Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON percent yesterday.
17	RT ON Pct Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON percent month.
18	RT ON Pct PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time ON percent previous month.
19	RT OFF Mins Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF minutes today.
20	RT OFF Mins Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF minutes yesterday.
21	RT OFF Mins TMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF minutes this month.
22	RT OFF Mins PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF minutes previous month.
23	RT OFF Hours Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF hours today.
24	RT OFF Hours Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF hours yesterday.
25	RT OFF Hours TMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF hours this month.
26	RT OFF Hours PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF hours previous month.
27	RT OFF Pct Tdy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF percent today.
28	RT OFF Pct Ydy	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF percent yesterday.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
29	RT OFF Pct TMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF percent month.
30	RT OFF Pct PMonth	R/O	System	FL	4	Any positive floating point number	0.0	4.03.05	Shows the Run-time OFF percent previous month.
31	Contract Hour	R/W	User	UINT8	1	0 - 23	0	4.03.05	Sets the number of hours when transition occurs between days.
32	Cur Day in Use	R/O	System	UINT8	1	1 - 31	Day	4.03.05	Shows the Current day of the month.
33	Cur Month in Use	R/O	System	UINT8	1	1 - 12	Month	4.03.05	Shows the Current month.
34	Accum / Prop Out Mode	R/W	User	UINT8	1	0 - 3	0	4.03.05	Selects the Accum/Prop Output Mode. **0** = Accumulate a Rate **1** = Accumulate a Running Total **2** = Output a 4-20ma Signal **3** = Generate a Pulse at an Interval
35	AC/PO Enable	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables accumulator / proportional output. **0** = Disabled **1** = Enabled
36	AC/PO Input Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Sets the TLP source for Input Value.
37	AC/PO Output Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Sets the TLP source for Output Value.
38	AC/PO Time Basis	R/W	User	UINT8	1	0 - 3	3	4.03.05	Sets the Time basis for Accum/Prop Output. **0** = Per Day **1** = Per Hour **2** = Per Minute **3** = Per Second
39	Prop Out Pulse Interval	R/W	User	FL	4	Any floating point number	1000.0	4.03.05	Sets the DO Output Pulse Interval to send out a pulse, only visible when Mode is set to Generate a Pulse at an Interval.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
40	Prop Out Interval Accum	R/W	User	FL	4	Any positive floating point number	0.0	4.03.05	Sets the Current Interval Accumulation. This is only visible when Mode is set to Generate a Pulse at an Interval.
41	PMSC Effect Enable	R/W	User	UINT8	1	0 - 1	0,0,0	4.03.05	Enables Effect. **0** = Disabled **1** = Enabled
42	PMSC Effect Def	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0	4.03.05	Selects the Effect Output Pt Def TLP selection.
43	Effect Trip Status	R/W	User	UINT8	1	0 - 1	1.0	4.03.05	Enables the Effect Trip Status. **0** = Inactive **1** = Active
44	Effect Cur Output Value	R/W	User	FL	4	Any floating point number	0.0	4.03.05	Effect Output Current Value
45	Value When Tripped	R/W	User	FL	4	Any floating point number	1.0	4.03.05	Value when Effect is active.
46	Value When Not Tripped	R/W	User	FL	4	Any floating point number	1	4.03.05	Value when Effect is inactive.
47	Apply When Not Tripped	R/W	User	UINT8	1	0 - 1	1	4.03.05	Output the Value When Not Tripped. **0** = Disabled **1** = Enabled
48	Assert Output Continuously	R/W	User	UINT8	1	0 - 3		4.03.05	Asserts Output Continuously During selected state. **0** = Neither State **1** = Tripped State Only **2** = UnTripped State Only **3** = Both States
49	Effect Requires Preset	R/W	User	UINT8	1	0 - 1	0	4.03.05	Enables Reset for tripped Effect. **0** = Disabled **1** = Enabled
50	1st Out PMSC Block	R/W	User	UINT8	1	0-# Logicals (48, 96, 144)	0	4.03.05	Sets the Instance number of first tripped action block.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
51	Ready For Reset	R/W	User	UINT8	1	0 - 1	0	4.03.05	Shows the status that effect is ready to be reset for a PSD action block trip that has cleared, only visible when Trips Require Reset is checked and eEffect is ready to be reset.
52	Remote Reset TLP	R/W	User	TLP	3	Any Valid IEEE numeric TLP	0,0,0	4.03.05	Activates the Remote Reset Command TLP selection.
53	Reset Status	R/W	User	UINT8	1	0-255	0	4.03.05	The reset command that holds the value that must be entered to reset a trip in a PSD condition.
54	Prev Effect State	R/W	User	UINT8	1	0-2	0	4.03.05	Shows the previous state of the effect. **0** = Inactive **1** = Active, not ready for reset **2** = Active, ready for reset
55	Write Update Period	R/W	User	UINT8	1	0 - 60	0	4.03.05	Sets the Update Interval for Time Count. **1** = 1 Second **2** = 2 Seconds **3** = 3 Seconds **4** = 4 Seconds **5** = 5 Seconds **6** = 6 Seconds **10** = 10 Seconds **12** = 12 Seconds **15** = 15 Seconds **20** = 20 Seconds **30** = 30 Seconds **60** = 60 Seconds
56	AC/PO Flags	R/W	User	UINT8	1	0 - 4	0	4.03.05	Selects the flag for Accum/Prop Outputs. This is only visible when mode is set to Accumulate a Rate or Accumulate a Running Total. **0** = Normal Operation. **1** = Force End of Day **2** = Force End of Month **3** = Flush Running Accum **4** = Cold Start Accumulator Set

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
57	Effect First Out Tag	R/O	System	AC10	10	0x20 → 0x7E for each ASCII character	<clear>	4.03.05	Shows the tag of first tripped action block.
58	Perm Shutdown Set	R/W	User	UINT8	1	0 - 31	0	4.03.05	Sets the status of PSD trips. **Bit 0** = Tank Mgr Well #1 **Bit 1** = Tank Mgr LoadOut #1 **Bit 2** = Well Opt Mgr Well #1 **Bit 3** = PMv3.3 Well #1 **Bit 4** = PMSC Effect #1
59	Temp Shutdown Set	R/W	User	UINT8	1	0 - 31	0	4.03.05	Sets the status of TSD trips. **Bit 0** = Tank Mgr Well #1 **Bit 1** = Tank Mgr LoadOut #1 **Bit 2** = Well Opt Mgr Well #1 **Bit 3** = PMv3.3 Well #1 **Bit 4** = PMSC Effect #1
60	Any SSD Set	R/W	User	UINT8	1	0 - 31	0	4.03.05	Sets the status of any SSD tripped. **Bit 0** = Tank Mgr Well #1 **Bit 1** = Tank Mgr LoadOut #1 **Bit 2** = Well Opt Mgr Well #1 **Bit 3** = PMv3.3 Well #1 **Bit 4** = PMSC Effect #1
61	Trip Code TM Well	R/W	User	UINT8	1	0 - 254	0	4.03.05	Sets the Trip Code for PMTM Well reset.
62	Trip Code TM LoadOut	R/W	User	UINT8	1	0 - 254	0	4.03.05	Sets the Trip Code for PMTM LoadOut reset.
63	Trip Code WO Well	R/W	User	UINT8	1	0 - 254	0	4.03.05	Sets the Trip Code for PMWO Well reset.
64	Trip Code PMv3 Well	R/W	User	UINT8	1	0 - 254	0	4.03.05	Sets the Trip Code for PMv3.3 Well reset.
65	Trip Code PMSC Effects	R/W	User	UINT8	1	0 - 254	0	4.03.05	Sets the Trip Code for PMSC Effect reset.
66	Max Logicals	R/W	User	UINT8	1	48,96,144	48	4.03.05	Sets the maximum number of logical, depending on PMSC version.
67	User Prog Watchdog Timer	R/W	User	UINT16	2	0-65535	0	4.03.05	Used to verify that program is still running, time counter that increments once per second.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
68	Alarm Pt Tag 1	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	"Alarm 1"	4.06.00	Sets the tag for the Alarm Point 1.
69	Alarm Pt Indef TLP 1	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for the variable to be monitored for the alarm block instance.
71	Alarm Pt Input Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	0	4.06.00	The current value of the input parameter for the alarm block.
72	Alarm Pt Mode Val 1	R/W	User	UINT8	1	0 - 255	0	4.06.00	Defines the actions for the alarm block. **Bit 0** = Boolean Alarm – Set on 0 / Set on 1 **Bit 1** = Alarm Type – Analog / Boolean **Bit 2** = Not Used **Bit 3** = Not Used **Bit 4** = Alarm Enable – Disable / Enable **Bit 5** = SRBX on Clear **Bit 6** = SRBX on Set **Bit 7** = Scanning – Disable / Enable
73	Alarm Pt Code Val 1	R/W	User	UINT8	1	0 - 255	0	4.06.00	Provides an indication of all active alarms. **Bit 0** = Low Alarm **Bit 1** = Low Low Alarm **Bit 2** = High Alarm **Bit 3** = High High Alarm **Bit 4** = Not Used **Bit 5** = Boolean **Bit 6** = Not Used **Bit 7** = Scanning Disabled
74	Alarm Pt Low Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-10.0	4.06.00	Value for a Low Alarm in engineering units.
75	Alarm Pt Low Low Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-20.0	4.06.00	Value for a Low Low Alarm in engineering units.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
76	Alarm Pt High Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	110.0	4.06.00	Value for a High Alarm in engineering units.
77	Alarm Pt High High Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	120.0	4.06.00	Value for a High High Alarm in engineering units.
78	Alarm Pt Deadband Val 1	R/W	User	FL	4	Any Valid IEEE Floating Point Number	10.0	4.06.00	Provides a range (+/-) that the live input value may move between without causing another alarm.
79	Alarm Pt Tag 2	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	"Alarm 2"	4.06.00	Sets the tag for the Alarm Point 2.
80	Alarm Pt Indef TLP 2	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for the variable to be monitored for the alarm block instance.
81	Alarm Pt Input Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	0	4.06.00	The current value of the input parameter for the alarm block.
82	Alarm Pt Mode Val 2	R/W	User	UINT8	1	0 - 255	0	4.06.00	Defines the actions for the alarm block. **Bit 0** = Boolean Alarm – Set on 0 / Set on 1 **Bit 1** = Alarm Type – Analog / Boolean **Bit 2** = Not Used **Bit 3** = Not Used **Bit 4** = Alarm Enable – Disable / Enable **Bit 5** = SRBX on Clear **Bit 6** = SRBX on Set **Bit 7** = Scanning – Disable / Enable

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
83	Alarm Pt Code Val 2	R/W	User	UINT8	1	0 - 255	0	4.06.00	Provides an indication of all active alarms. **Bit 0** = Low Alarm **Bit 1** = Low Low Alarm **Bit 2** = High Alarm **Bit 3** = High High Alarm **Bit 4** = Not Used **Bit 5** = Boolean **Bit 6** = Not Used **Bit 7** = Scanning Disabled
84	Alarm Pt Low Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-10.0	4.06.00	Value for a Low Alarm in engineering units.
85	Alarm Pt Low Low Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-20.0	4.06.00	Value for a Low Low Alarm in engineering units.
86	Alarm Pt High Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	110.0	4.06.00	Value for a High Alarm in engineering units.
87	Alarm Pt High High Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	120.0	4.06.00	Value for a High High Alarm in engineering units.
88	Alarm Pt Deadband Val 2	R/W	User	FL	4	Any Valid IEEE Floating Point Number	10.0	4.06.00	Provides a range (+/-) that the live input value may move between without causing another alarm.
89	Alarm Pt Tag 3	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	“Alarm 3”	4.06.00	Sets the tag for the Alarm Point 3.
90	Alarm Pt Indef TLP 3	R/W	User	TLP	3	Any Valid Numeric TLP	0,0,0	4.06.00	Sets the TLP source for the variable to be monitored for the alarm block instance.
91	Alarm Pt Input Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	0	4.06.00	The current value of the input parameter for the alarm block.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
92	Alarm Pt Mode Val 3	R/W	User	UINT8	1	0 - 255	0	4.06.00	Defines the actions for the alarm block. **Bit 0** = Boolean Alarm – Set on 0 / Set on 1 **Bit 1** = Alarm Type – Analog / Boolean **Bit 2** = Not Used **Bit 3** = Not Used **Bit 4** = Alarm Enable – Disable / Enable **Bit 5** = SRBX on Clear **Bit 6** = SRBX on Set **Bit 7** = Scanning – Disable / Enable
93	Alarm Pt Code Val 3	R/W	User	UINT8	1	0 - 255	0	4.06.00	Provides an indication of all active alarms. **Bit 0** = Low Alarm **Bit 1** = Low Low Alarm **Bit 2** = High Alarm **Bit 3** = High High Alarm **Bit 4** = Not Used **Bit 5** = Boolean **Bit 6** = Not Used **Bit 7** = Scanning Disabled
94	Alarm Pt Low Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-10.0	4.06.00	Value for a Low Alarm in engineering units.
95	Alarm Pt Low Low Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	-20.0	4.06.00	Value for a Low Low Alarm in engineering units.
96	Alarm Pt High Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	110.0	4.06.00	Value for a High Alarm in engineering units.
97	Alarm Pt High High Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	120.0	4.06.00	Value for a High High Alarm in engineering units.
98	Alarm Pt Deadband Val 3	R/W	User	FL	4	Any Valid IEEE Floating Point Number	10.0	4.06.00	Provides a range (+/-) that the live input value may move between without causing another alarm.

Point Type 71 (ROC800) or Point Type 31 (FB107): Utilities

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
99	Time Counter Tag	R/W	User	AC10	10	0x20 → 0x7E for each ASCII character	"Time Cnt 1"	4.06.00	Sets the tag for the time counter instance.
100	Max Accum Inter-Scan	R/W	User	FL	4	Any Valid IEEE Floating Point Number	100.0	4.06.00	Maximum accepted inter-scan accumulation difference in engineering units.

4.3 Point Type 218: Calculation Blocks (for ROC800)

Point type 218 contains the parameters for the configuration of the PM Calculation Blocks of the program. The program maintains 4, 8, 12 or 16 instances of this point type (based on the size of the installed program).

Point Type 218 (for ROC800): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
0	Calculation Block X	R/W	User	String20	20	Printable ASCII Characters	Calc Block X	4.07.00	Tag for the Calculation block
1	Calculation Enable	R/W	User	UINT8		0→1	0	4.07.00	Solve Calculations for X, Y, and Z **0** = NO **1** = YES
2	Input Description A	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Input A
3	Input Description B	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Input B
4	Input Description C	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Input C
5	Input Description D	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Input D
6	Input TLP A	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Starting Location of Input A
7	Input TLP B	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Starting Location of Input B
8	Input TLP C	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Starting Location of Input C
9	Input TLP D	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Starting Location of Input D
10	Input Value A	R/W	Both	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Input A (when array size = 1)
11	Input Value B	R/W	Both	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Input B (when array size = 1)
12	Input Value C	R/W	Both	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Input C (when array size = 1)
13	Input Value D	R/W	Both	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Input D (when array size = 1)

Point Type 218 (for ROC800): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
14	Calculation String X	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.07.00	Free-Form calculation including variables, operators and functions
15	Calculation String Y	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.07.00	Free-Form calculation including variables, operators and functions
16	Calculation String Z	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.07.00	Free-Form calculation including variables, operators and functions
17	Calculation Valid X	R/W	System	UINT8	1	0→1	0	4.07.00	Is Calculation string X valid? **0** = NO **1** = YES
18	Calculation Valid Y	R/W	System	UINT8	1	0→1	0	4.07.00	Is Calculation string Y valid? **0** = NO **1** = YES
19	Calculation Valid Z	R/W	System	UINT8	1	0→1	0	4.07.00	Is Calculation string Z valid? **0** = NO **1** = YES
20	Calc Error Char NumX	R/W	System	UINT8	1	0→40	0	4.07.00	X Error Located at Char Number
21	Calc Error Char NumY	R/W	System	UINT8	1	0→40	0	4.07.00	Y Error Located at Char Number
22	Calc Error Char NumZ	R/W	System	UINT8	1	0→40	0	4.07.00	Z Error Located at Char Number
23	Result Description X	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Result X
24	Result Description Y	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Result Y
25	Result Description Z	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.07.00	Description of Result Z
26	Result Value X	R/O	System	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Result X

Point Type 218 (for ROC800): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
27	Result Value Y	R/O	System	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Result Y
28	Result Value Z	R/O	System	Double	8	Any Double-Float Value	0.0	4.07.00	Value of Result Z
29	TLP Forwarding X	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Forwarding Location for Result X
30	TLP Forwarding Y	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Forwarding Location for Result Y
31	TLP Forwarding Z	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.07.00	Forwarding Location for Result Z
32	Input Array Qty A	R/W	User	UINT8	1	1→10	1	4.07.00	Quantity of Values in Input A
33	Input Array Qty B	R/W	User	UINT8	1	1→10	1	4.07.00	Quantity of Values in Input B
34	Input Array Qty C	R/W	User	UINT8	1	1→10	1	4.07.00	Quantity of Values in Input C
35	Input Array Qty D	R/W	User	UINT8	1	1→10	1	4.07.00	Quantity of Values in Input D
36	Max Logicals	R/O	System	UINT8	1	4, 8, 12, 16	4, 8, 12, 16	4.07.00	Number of Calculation Instances
37	UProg Watchdog Timer	R/O	System	UINT16	2	0→65535	0	4.07.00	Continually Changing Values

4.4 Point Type 27/39: Calculation Blocks (for FB107)

Point type 27 (Slot #3)/Alternate #39 (Slot #6) contains the parameters for the configuration of the PM Calculation Blocks of the program. The program supports 4 logicals of point type 27 or 39.

Point Type 27/39 (for FB107): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
0	Calculation Tag	R/W	User	String20	20	Printable ASCII Characters	Calc Block X	4.00.01	Tag for the Calculation block
1	Calculation Enable	R/W	User	UINT8		0→1	0	4.00.01	Solve Calculations for X, Y, and Z **0** = NO **1** = YES
2	Input Description A	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Input A
3	Input Description B	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Input B
4	Input Description C	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Input C
5	Input Description D	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Input D
6	Input TLP A	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Starting Location of Input A
7	Input TLP B	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Starting Location of Input B
8	Input TLP C	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Starting Location of Input C
9	Input TLP D	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Starting Location of Input D
10	Input Value A	R/W	Both	Float	4	Any Floating number	0.0	4.00.01	Value of Input A (when array size = 1)
11	Input Value B	R/W	Both	Float	4	Any Floating number	0.0	4.00.01	Value of Input B (when array size = 1)
12	Input Value C	R/W	Both	Float	4	Any Floating number	0.0	4.00.01	Value of Input C (when array size = 1)
13	Input Value D	R/W	Both	Float	4	Any Floating number	0.0	4.00.01	Value of Input D (when array size = 1)

Point Type 27/39 (for FB107): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
14	Calculation String X	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.00.01	Free-Form calculation including variables, operators and functions
15	Calculation String Y	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.00.01	Free-Form calculation including variables, operators and functions
16	Calculation String Z	R/W	User	String40	40	All Numbers, A-D, X-Z, letters in function names, parenthesis, math operators	<blank>	4.00.01	Free-Form calculation including variables, operators and functions
17	Calculation Valid X	R/W	System	UINT8	1	0→1	0	4.00.01	Is Calculation string X valid? **0** = NO **1** = YES
18	Calculation Valid Y	R/W	System	UINT8	1	0→1	0	4.00.01	Is Calculation string Y valid? **0** = NO **1** = YES
19	Calculation Valid Z	R/W	System	UINT8	1	0→1	0	4.00.01	Is Calculation string Z valid? **0** = NO **1** = YES
20	Calc Error Char NumX	R/W	System	UINT8	1	0→40	0	4.00.01	X Error Located at Char Number
21	Calc Error Char NumY	R/W	System	UINT8	1	0→40	0	4.00.01	Y Error Located at Char Number
22	Calc Error Char NumZ	R/W	System	UINT8	1	0→40	0	4.00.01	Z Error Located at Char Number
23	Result Description X	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Result X
24	Result Description Y	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Result Y
25	Result Description Z	R/W	User	String10	10	Printable ASCII Characters	<blank>	4.00.01	Description of Result Z
26	Result Value X	R/O	System	Float	4	Any Floating number	0.0	4.00.01	Value of Result X
27	Result Value Y	R/O	System	Float	4	Any Floating number	0.0	4.00.01	Value of Result Y

Point Type 27/39 (for FB107): Calculation Blocks

Param #	Name	Access	System or User Update	Data Type	Length	Range	Default	Version	Description of Functionality and Meaning of Values
28	Result Value Z	R/O	System	Float	4	Any Floating number	0.0	4.00.01	Value of Result Z
29	TLP Forwarding X	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Forwarding Location for Result X
30	TLP Forwarding Y	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Forwarding Location for Result Y
31	TLP Forwarding Z	R/W	User	TLP	3	Any TLP of a Numeric Field	Undefined	4.00.01	Forwarding Location for Result Z
32	Input Array Qty A	R/W	User	UINT8	1	1→10	1	4.00.01	Quantity of Values in Input A
33	Input Array Qty B	R/W	User	UINT8	1	1→10	1	4.00.01	Quantity of Values in Input B
34	Input Array Qty C	R/W	User	UINT8	1	1→10	1	4.00.01	Quantity of Values in Input C
35	Input Array Qty D	R/W	User	UINT8	1	1→10	1	4.00.01	Quantity of Values in Input D
36	Max Logicals	R/O	System	UINT8	1	4, 8, 12, 16	4	4.00.01	Number of Calculation Instances
37	UProg Watchdog Timer	R/O	System	UINT16	2	0→65535	0	4.00.01	Continually Changing Values

Appendix A – PMCB Calculation Blocks – Supported Functions

This appendix describes the following PMCB Calculation Blocks Configuration Utilities:

- Calculations: Rules and Guidelines
- Operators
- Functions

A.1 Calculations: Rules and Guidelines

A.1.1 Execution Order

- All inputs are updated: A through D, instance by instance.
- Each calculation is solved: X through Z, instance by instance.
- Outputs are forwarded as each calculation is solved.

A.1.2 Order of Operators

- There must be an equal number of opening and closing parentheses.
- Each calculation string is broken down into operators, each with a pair of operands (an operation).
- Operations are grouped by level (quantity) of enclosed parentheses.
- The groups are solved in order from most nested to least (no parentheses).
- Each operation within a parentheses group is solved in order by priority of precedence (highest to lowest). Refer to *Table A-1. Priorities of Precedence.*
- Within a group, operations of the same priority of precedence are solved from left to right.

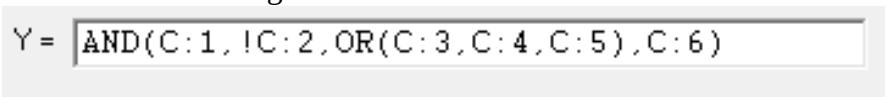
Table A-1. Priorities of Precedence

Rank	Description
13 High	Functions () (ABS, INT, IIF, POW, MOD, AND, OR, MIN, MAX, SUM, BFI, BFO, IFI, IFO, FOR)
12	Unary NOT (!), Unary Minus (-)
11	Exponential Operators (**, //)
10	Multiplication (*); Division (/)
9	Addition (+); Subtraction (-)
8	Not Implemented
7	Analog Comparisons (<, <=, >, >=)
6	Discrete Comparisons (=, !=)
5	Bitwise AND (&)
4	Bitwise Exclusive OR (^)

Rank	Description
3	Bitwise Inclusive OR (|)
2	Logical AND (&&)
1 Low	Logical OR (||)

A.1.3 Parentheses

- Enclose Function Arguments



The OR functions has three arguments (enclosed by parentheses) and the AND function has four arguments (one of them is the OR function result). The OR function is solved first as it is nested within the AND function.

- Determine Order If Operations

There are six mathematical operations to solve the equation above:

- (a**2) is solved first (regardless of priority of precedence) as it is within the inner-most (most nested, highest group level) set of parentheses. The last (sixth) operation solved is the division (r/1000) as it is the only operation outside of any parentheses (lowest parentheses group level).

- There are four operations within the single parentheses. Of these, the multiplication (3 (r)) is solved first (2nd overall) based on priority of precedence (priority = 10) and left-most position. Then the other multiplication (7b) is solved (3rd overall) as it is the same priority.

- Then the two addition operations are solved left-most (4th overall) than next to the right (r+12) (5th overall).

A.1.4 Operands

Operands may consist of the following:

- Constants

  Any numerical value such as 3, 7.5 or 123.457

- Variables
  - Input Letters (A, B, C or D) or (a, b, c, d) as case does not matter.
  - Result Letters (X, Y or Z) or (x, y, Z)

- External References

  Definition: A variable (listed above) that is proceeded by a '$' and an instance number (1-based).
  $3C refers to the C input variable from instance 3.
  $5Y refers to the Y result from instance 5.
  $4B:2 refers to the 2nd element of array input variable B from instance 4.

- Array References

  Definition: A variable letter that is followed by a ':' and an array element number.
  The input variable array must have at least the number of elements (quantity in array) as specified in the array reference.
  A:3 refers to the third element of input array variable A.
  $5B:2 refers to the second element of array input variable B from instance 5.

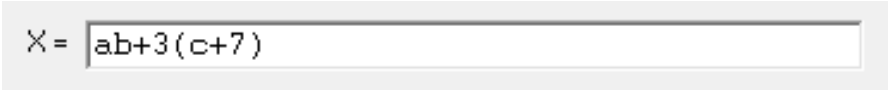
- Bitwise References

  Definition: A variable or reference followed by a '#' and bit number (1-based).
  The bitwise value is taken as a single digital bit to be a value of either 1 (True) or 0 (False).
  Bitwise references are typically used with coded items such as alarm or status codes.
  B#6 refers to the sixth bit of input variable B.
  C:3#4 refers to the fourth bit of the third element of input array C.
  $6B:2#5 refers to the fifth bit of the second element of input array B from instance 6.

A.2 Operators

A.2.1 Mathematical Operators

- Addition (+)
- Subtraction (-)
- Multiplication (*), (Two Operands in sequence)



Even though there are no multiplication operators (*) in this equation, there are two multiplication operations to be solved.

When two operands are in sequence (there is no operator between them) such as in (ab) a multiplication operation is implied.

An operand followed immediately by an opening parenthesis, such as (3(r)) implies a multiplication operation (an operand always follows an opening parenthesis).

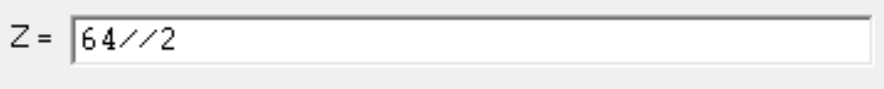
- Division (/)

  In all cases of a divide-by-zero the result will be zero.

- Raised to the Power Of (Exponents) (**)

  This operator must be between the base and an exponent.

  The other method is use a POW () function with an exponent value less than one.



  In this example the square root of sixty four equals eight. Z = 8.

  In the above examples these operations are performed before any multiplication or division operations within the same parentheses group per the priority precedence (priority 11before priority 10).

A.2.2 Comparison Operators

- Result: All comparison operation give either a 1 (True) or 0 (False) value.

  In this equation above, X = 7 when ‘a’ is greater than or equal to 300 (7*1) and X = 0 when ‘a’ is less than 300 (7*0). The one or zero result of the first operation is multiplied by 7 in the second operation.

- A comparison is required as the first argument of an IIF() function.

  Operators

  - Greater Than (>)
  - Greater Than or Equal To (>=)
  - Less Than (<)
  - Less than or Equal To (<=)
  - Equal to (=)
  - Not Equal To (!=)

  The greater than and less than (analog) operations are solved before the equal to and not equal to (digital) operations per priority or precedence (priority 7 before priority 6).

A.2.3 Bitwise Operators

- Examines numbers by Binary representation

  Example of 8-bit binary values:
  00000000 = 1 or 2^0
  00000010 = 2 or 2^1
  00000100 = 4 or 2^2
  00001000 = 8 or 2^3
  00010000 = 16 or 2^4
  00100000 = 32 or 2^5
  01000000 = 64 or 2^6
  10000000 = 128 or 2^7

  01010101 = 85 or (64 + 16 + 4 + 1)

- Bitwise AND (&)

  The corresponding (equal value) bits of both operands are multiplied together, so that if both bits in the compared position are 1 the bit in the resulting binary representation is also 1.

  Example:
  01010101 (decimal 85)
  & 00110011 (decimal 51)
  = 00010001 (decimal 17)

- Bitwise OR (|)

  The corresponding (equal value) bits of both operands are added together and if the result is greater than zero, so that if either of the bits in the compared position are 1 the bit in the resulting binary representation is also 1.

  Example:
  01010101 (decimal 85)
  | 00110011 (decimal 51)
  = 01110111 (decimal 119)

- Bitwise Exclusive OR (*)

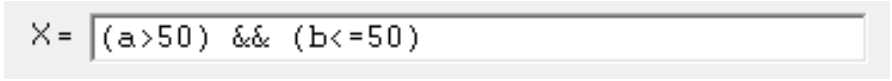
  The corresponding (equal value) bits of both operands are added together and if the result equals one, so that one and only one of the two bits in the compared position are 1 the bit in the resulting binary representation is also 1.

  Example:
  01010101 (decimal 85)
  ^ 00110011 (decimal 51)
  = 01100110 (decimal 102)

A.2.4 Logical Operators

- Work only with Boolean (True/False) expressions.
- Logical AND (&&)

  The left and right operands are multiplied together, so that if both are true (greater than zero) the result is also true (1).

  If ‘a’ is greater than 50 AND ‘b’ is less than or equal to 50, X will equal 1 (True). Otherwise X = 0 (False).

- Logical OR (||)

  The left and right operands are added together, so that if either are true (greater than zero) the result is also true (1).

  If ‘a’ is greater than 50 OR ‘b’ is less than or equal to 50, X will equal 1 (True). If both are false, then X = 0 (False).

- Logical NOT (!)

  Works as a prefix to a single Boolean expression. It flips the true/false state of the Boolean expression so that a true expression becomes false and a false expression becomes true.

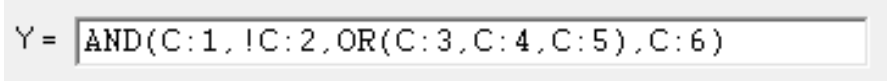
  

  X=1 (True) when ‘b’ is greater than 50 as the ‘!’ flips the value of the binary expression.

A.3 Functions

A.3.1 AND(): Logical AND

- Format: AND (expr1, expr2, ….)
- Two or more arguments are required (extensible)
- The number of arguments is limited to the 40-character string size.
- The Boolean value of all the arguments are multiplied together, so that if they are all true (1) the function result is true (1).
- The return value is either true (1) or false (1).

  Y =1 when “C:1” is true AND “C:2” is false (the NOT) AND the OR () function is true AND “C:6” is true. Otherwise Y = 0.

A.3.2 OR(): Logical OR

- Format: AND (expr1, expr2, ….)
- Two or more arguments are required (extensible)
- The number of arguments is limited to the 40-character string size.
- The Boolean value of all the arguments are added together, so that if any of them all true (1) the function result is true (1).
- The return value is either true (1) or false (1).

```
Y = AND(C:1,!C:2,OR(C:3,C:4,C:5),C:6)
```

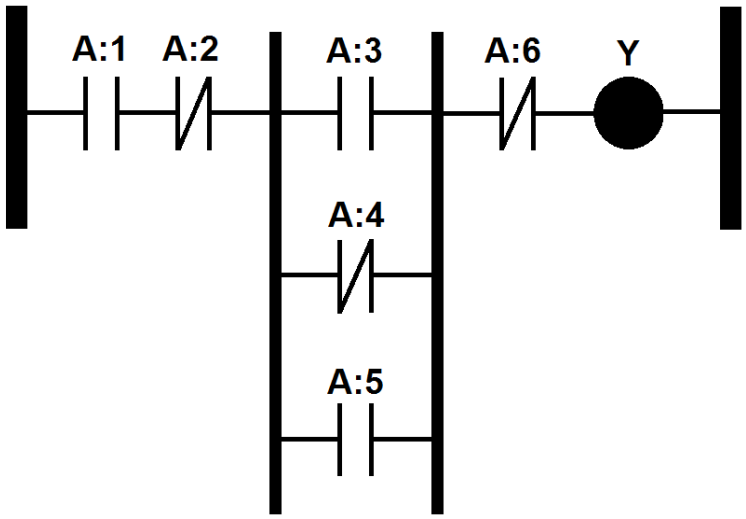
The OR() function = 1 when "C:3" is true OR "C:4" is true OR "C:5" is true. Otherwise Y = 0.

A.3.3 Boolean Calculations using AND(), OR() and NOT(!) Operators

- **Example Calculation Y = AND (A:1, !A:2, OR (A:3, !A:4, A:5), !A:6)**
- This an example of the type of discrete (Boolean) logic calculations are possible.

```
Y = AND(A:1,!A:2,OR(A:3,!A:4,A:5),!A:6)
```

This example show how just input array 'A' and result 'Y' can replace the following rung of ladder logic:



A.3.4 ABS(): Absolute Value

- Format: ABS(expr)
- Takes a single argument, however it may be a compound expression.

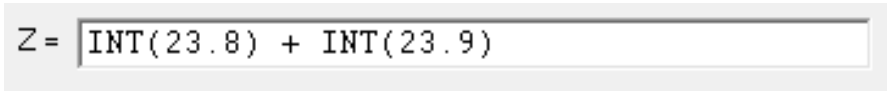
- If (expr < 0) the function returns (expr * (-1)). Otherwise it returns (expr).

Y cannot equal a negative value regardless of ‘a’ or ‘b’ being negative. Absolute value actually is an expression value’s distance from zero.

A.3.5 INT(): Integer Value

- Format: INT(expr)
- Takes a single argument, however it may be a compound expression.
- Removes the fractional part of the expression and returns the whole number value (the value to the left of the decimal point).
- The integer value is never rounded up before dropping the fractional value.

Y = 47.0. The fractional part of the sum is dropped.



Z = 46.0. The fractional part 0.8 and 0.9 are both dropped off before the addition operation.

A.3.6 MOD(): Modulus

- Format: MOD(dividend, divisor)
- Requires exactly two arguments (dividend and divisor)
- The divisor (second argument) must not be zero or else the function will simply return a zero value.
- Returns the remainder value (the integer part is dropped) of the (dividend / divisor) Euclidean division operation.

Z = 7 as the wjole number value of the quotient (3 from 3.7) is multiplied by the divisor (3*10 = 30). The result 37 – 30 = 7 is the remainder value.
Note that this remainder (Euclidean) is different from the mantissa (0.7).

A.3.7 POW(): Raise To The Power Of

- Format: POW(base, exponent)
- Requires exactly two arguments (base and exponent)
- Negative exponents are treated as the inverse of the calculation with the absolute value of the exponent: when the exponent = 2: pow(b, -2) converts to: 1.0 / POW(b, 2).
- Roots: An exponent value of 0.5 can be used to obtain a square root. POW(100, 0.5) = 10.

A.3.8 SUM(): Summation

- Format: SUM(value1, value2, value3, …)
- The number of argument is limited to the 40-character string size.
- All arguments are added together and the sum is returned.

  Example of possible arguments formats: SUM(ABS(a), 2b, c~, d:1).

Note: The tilde (~) specifies all the values are in an input array. If there are four elements in the 'C' input array, then this example effectively uses seven input arguments rather than four.

A.3.9 MIN(): Minimum Value

- Format: MIN(value1, value2, value3, …)
- The number of arguments is limited to the 40-character string size.
- The lowest (minimum) argument value of all the arguments is returned.

  Example of possible arguments formats: MIN(ABS(a), 2b, c~, d:1).

Note: The tilde (~) specifies all the values are in an input array. If there are four elements in the 'C' input array, then this example effectively uses seven input arguments rather than four.

A.3.10 MAX(): Maximum Value

- Format: MAX(value1, value2, value3, …)
- The number of arguments is limited to the 40-character string size.
- The lowest (maximum) argument value of all the arguments is returned.

  Example of possible arguments formats: MAX(ABS(a), 2b, c~, d:1).

Note: The tilde (~) specifies all the values are in an input array. If there are four elements in the 'C' input array, then this example effectively uses seven input arguments rather than four.

A.3.11 IIF(): Inline IF

- Format: IIF(comparison (Boolean) expression, value when Arg1 is true, value when Arg1 is false)
- Must contain three arguments.

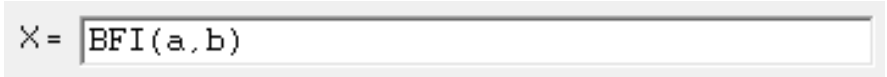
  Example: IIF(a > b, ac, bc); when 'a' is greater than 'b' the function value is 'a' times 'c'. Otherwise it is 'b' times 'c'

- As with other functions a function can be embedded within another.

  Example: IFF(a > b, IFF(b >c, c, d), b); this calculation value may equal either 'b', 'c' or 'd'.

A.3.12 BFI(): Boolean FAN-IN

- Format: BFI(array1 [Array2, Array3, …])
- Arguments are assumed to be input arrays, so no tilde (~) is used.
- One or more arguments are accepted (see below) but only the first 32 bytes will be processed.

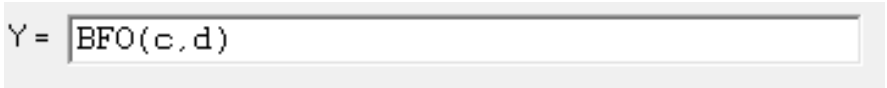


'a' and 'b' are both 10-byte softpoint byte arrays. Twenty bytes will be packed into the result (X).

Example: BFI(a, b). Both arguments reference an array of a softpoint Byte 1 through Byte 10. The lowest significant bit comes from Byte 1 of the 'a' softpoint. The highest significant bit comes from Byte 10 of the 'b' softpoint.

A.3.13 BFO(): Boolean FAN-OUT

- Format: BFO(array1 [Array2, Array3, …])
- Arguments are assumed to be input arrays, so no tilde (~) is used.
- One or more arguments are accepted (see below) but only the first 32 bytes will be processed.

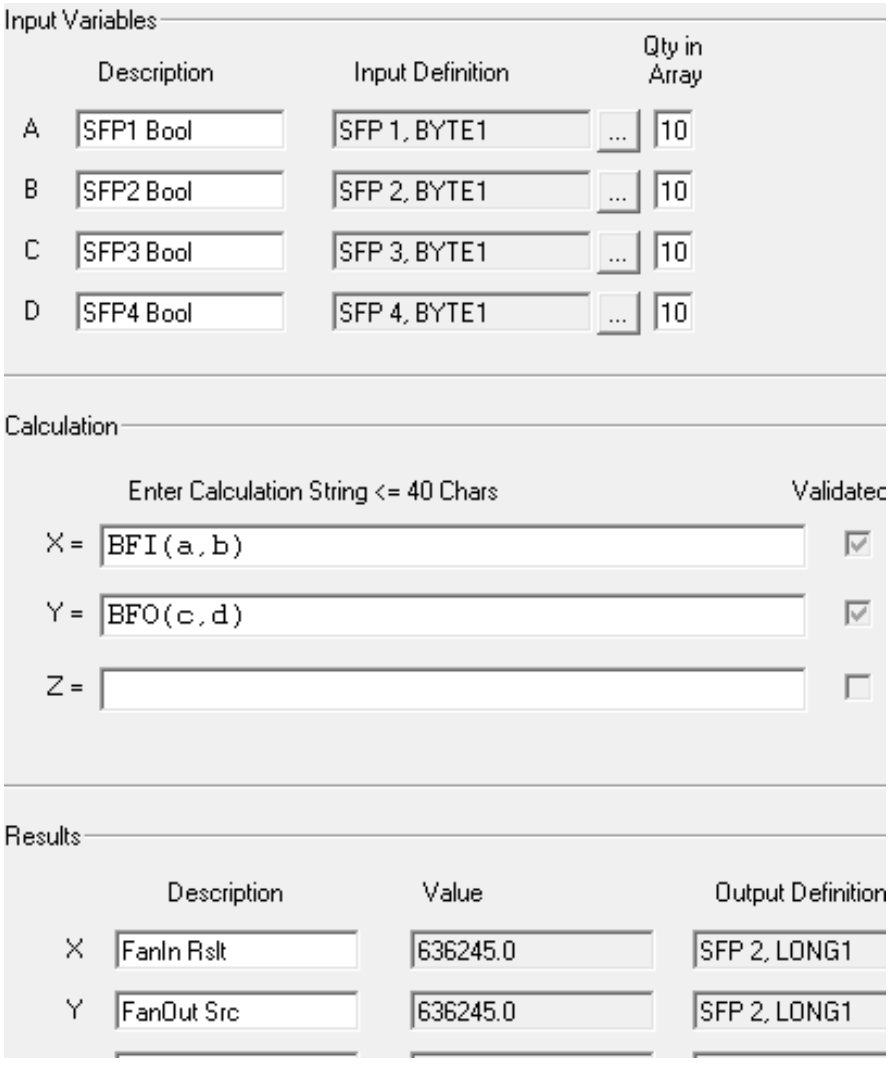


'c' and 'd' are both 10-byte softpoint byte arrays. Twenty bytes will be packed into the result (X).

- The BFO() function works in reverse of BFI() and backwards from every other function. The source to be unpacked is located in the results field. This field (X, Y, or Z) must have a valid Output Definiition and it must be set to an integer field Such as a soft point ByteX, ShortX or LongX.
- The arguments (Input variables) specify the arrays where the unpacked data is placed.

  Example: BFO(c, d). Both arguments reference an array of a softpoint Byte 1 through Byte 10. The lowest significant bit comes from Byte 1 of the 'c' softpoint. The highest significant bit comes from Byte 10 of the 'd' softpoint.

- In this example, the softpoint Byte fields (1-10) in softpoints #1 and #2 are effectively copied into the Byte fields of spoftpoints #3 and #4.



A.3.14 FOR(): FOR Loop

- Format: FOR(Math, # Calculations)
- Requires exactly two arguments (Math and # Calculations).
- Repeats a math equation multiple times, to be used with array variables.
- Example: FOR((A:1*18/10)+32, 10). This performs a simple temperature unit conversion 10 times. It assumes the variable A has been defined as an array, with 10 consecutive elements.
- The function is to be used in conjunction with Output Definition functionality, which allows the multiple results to be written out to separate parameters.
- The FOR function must be at the very start of the calculation string, and all calculation contents must be contained inside it. Inputs that are not followed by the ":" element specifiers are not incremented. They use the same value for each iteration.

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