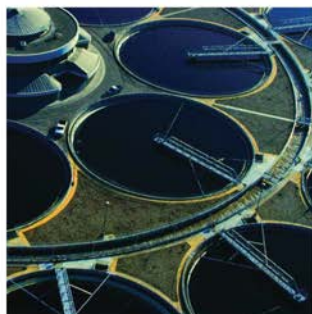


Rockwell Automation Sequencer Object

Version 4.1



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

| | | |
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This manual provides an overview of how to use the Rockwell Automation® Sequencer Object (P_Seq). The manual includes a Sequencer programming demonstration, example, and configuration instructions.

All Logic and Visualization information has been moved to the Rockwell Automation Library of Process Objects Reference Manuals, publication [PROCES-RM013](#), and publication [PROCES-RM014](#).

Software Compatibility and Content Revision

Summary of Changes

| Topic | Page |
|--|------|
| Updated State Machine Graphic | 10 |
| Updated Operator Faceplate Tab and Description | 12 |
| Updated Run-Time Faceplate Tab and Description | 13 |
| Added information to configure sequences for both 'Running' and 'Stopping' states. | 29 |

In addition:

- Updated to include Aborted state
- Updated faceplates to include Abort button
- Added information to configure

For the latest compatible software information and to download the Rockwell Automation® Library, see the Product Compatibility and Download Center at <http://www.rockwellautomation.com/rockwellautomation/support/downloads.page?>.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

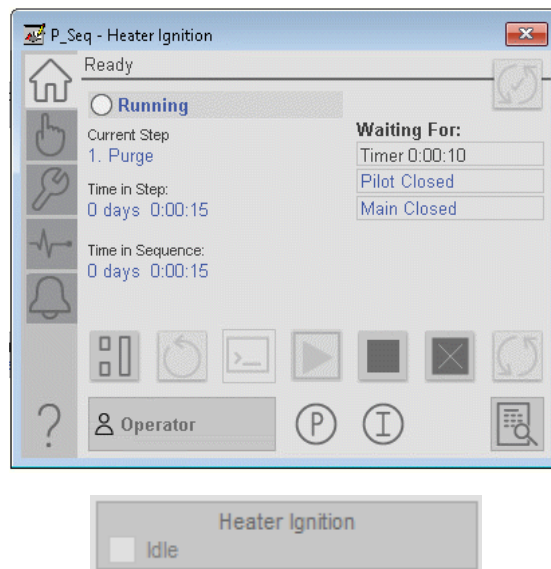
| Resource | Description |
|---|---|
| PlantPAx® distributed control system Selection Guide, publication PROCES-SG001 | Provides information to assist with equipment procurement for your PlantPAx system. |
| PlantPAx distributed control system Reference Manual, publication PROCES-RM001 | Provides characterized recommendations for implementing your PlantPAx system. |
| FactoryTalk® View Machine Edition User Manual, publication VIEWME-UM004 | Provides details on how to use this software package for creating an automation application. |
| FactoryTalk View Site Edition User Manual, publication VIEWSE-UM006 | Provides details on how to use this software package for developing and running human machine interface (HMI) applications that can involve multiple users and servers, which are distributed over a network. |
| Logix 5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010 | Provides information for the design, configuration, and programming of Add-On Instructions. |
| Rockwell Automation Library of Process Objects Reference Manuals: Publication PROCES-RM013 Publication PROCES-RM014 | Provides an overview of the code objects, display elements, and faceplates that comprise the Rockwell Automation Library of Process Objects. |

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Rockwell Automation Sequencer Object (P_Seq)

The Rockwell Automation® Sequencer Object (P_Seq) provides a flexible controller-based step sequencing solution that reduces engineering time by automating common operator procedures. The step-by-step configuration makes it easy to adjust procedures directly from the HMI displays without having to create or modify custom code in the controller. The Sequencer can be employed in simple and complex sequences without costly re-engineering and testing. You add, delete, or modify steps that are required to accomplish the objective of your sequence.

The following global object and faceplate are examples of the graphical interface tools for this Add-On Instruction.



Guidelines

The P_Seq Add-On Instruction and graphics provide bit-based sequencing with the following features:

- Up to 32 discrete (BOOL) outputs for controlling or commanding devices
- Up to 32 discrete (BOOL) inputs for monitoring device feedback
- Up to 32 floating point number (REAL) outputs for setpoints or parameter values
- A maximum of 500 steps
- Rich and intuitive human machine interface (HMI) screens for operation, monitoring, and configuration
- Short Add-On Instruction scan time for use in fast-scan control strategies
- State model consistent with higher-level procedural control, with states for Idle, Running, Complete, Held, Paused, Stopping, Stopped, and Aborted

Use this instruction in these situations:

- When you implement a procedure to operate equipment in a prescribed order (open valve, start pump, and so forth). A procedure is described in the International Society of Automation Technical Report ISA-TR106.00.01-2013 as the following:

‘A specification of a sequence of actions or activities with a defined beginning and end that is intended to accomplish a specific objective’

Although the Sequencer is intended for basic sequencing that is typical of control and equipment implementation modules (as defined in TRI06.00.01), the P_Seq instruction can be used at any level and in any application where its functionality is appropriate.

Do **not** use this instruction in these situations:

- The implementation of a batch phase, such as material addition, agitation, and transfer, where holding, restarting, or resetting logic is required. Use the PhaseManager™ capability of Logix Controller instead.
- If you need sophisticated sequential function chart (SFC) procedures, such as simultaneous threads and multi-selection branches.

Functional Description

The 32 Boolean outputs are used to assert commands to devices. The 32 Real outputs are used to set setpoints or references. Each output (Boolean or Real) can be used optionally in each step, and each output is explicitly defined even if it's not used in a step.

The 32 inputs are used to monitor Boolean signals from devices or logic to determine when a desired state, or combination of states, have been achieved, signaling the end of the step.

In operation, when a step is executed, the output values are presented at the Sequencer instruction outputs before the first check of the input conditions. In this way, the output values for each step are present for at least one scan of the Sequencer.

Step User-defined Type

To achieve the greatest flexibility regarding step information storage and number of steps in a sequence, a separate user-defined data type (UDT) is supplied to store the step information (P_SeqStep). You create an array of these UDT members to hold the step configurations of the sequence. Array length is from 2...500 steps. Step [0] of the array is not available because it's used by the Sequencer instruction for other features and bookkeeping.

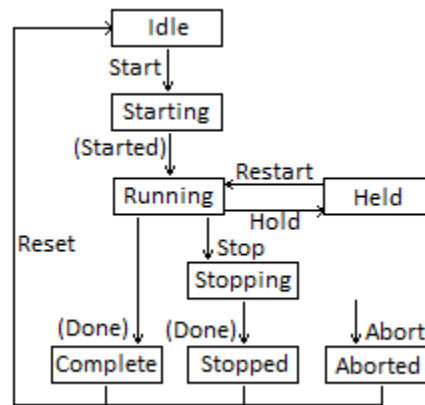
Operator Prompt

The P_Prompt instruction can be used with the Sequencer to perform manual prompt operations, such as operator messaging, entering values, or decision-making in the flow of steps.

See Rockwell Automation Library of Process Objects Reference Manuals, publication [PROCES-RM013](#), and publication [PROCES-RM014](#) for more information on the Operator Prompt.

State Machine

The P_Seq instruction executes the following state machine.



IMPORTANT No procedural steps are executed in the Idle, Starting, Held, Complete, Stopped, or Aborted states. The only action is outputs are commanded to their configured positions.

Step Timer

Each step has an optional timer which, when configured, is included in the qualification conditions of the step, along with the Boolean inputs configured. The timer configuration options provide the flexibility for the following type of scenarios:

- Timing when entering a step
- Timing after inputs are qualified

Branching and Looping

The Sequencer normally proceeds from one step to the next through the array of steps. The Sequencer can be configured for four different types of branching to accommodate looping and decisions. Branching lets the Sequencer 'jump' to another step, and not necessarily run steps in sequential order.

If branching is configured for a step, there are four options:

- Continuous - Always take a branch
- Loop count - Take a branch until the step has been executed a given number of times
- Input pattern - Take a branch if a specific input pattern exists within the Boolean inputs
- Manual prompt - Configure the manual prompt to prompt you for a branching decision

See [page 36](#) for more information.

Alarm Options

There are three optional alarms that can be configured to instruct the Sequencer to take a particular action if an alarm occurs. The Alarm Summary tab shows these alarms:


- Interlock Trip - Alerts you that an interlock condition has been triggered.
- Sequence Timeout - Alerts you that a sequence has run longer than expected.
- Step Timeout - Alerts you that a step has run longer than expected.

Engineering configuration options determine what action the Sequencer is to take if an interlock trips, if the Step Fault Timer expires, or the Sequencer Fault Timer expires.

Sequencer Demonstration

This section illustrates basic Sequencer functionality. Figures show the faceplates for each step in our example sequence. The Sequencer is the engine doing the work and the sequence is the order of actions to complete a procedure.

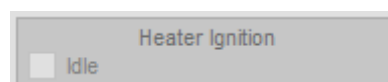
There are a multitude of lists of procedures that you can use with the Sequencer. This example uses an ordinary list to automate how to ignite a water heater.



| <u>Step</u> | <u>Name</u> | <u>Activity</u> |
|-------------|------------------|---|
| 1 | Purge | Verify pilot and main off for 1 minute |
| 2 | Open Pilot | Set pilot on |
| 3 | Ignite | Trigger ignitor |
| 4 | Check if Lit | Verify lit a. If lit, proceed to step 7 b. If still not lit after 3 retries, close valves and notify user |
| 5 | Repeat 3x | If lit, proceed to step 7 |
| 6 | Ignition Failure | Set pilot off, set main fuel off; fault notify |
| 7 | Open Main Supply | Open main supply |
| 8 | Set Temp SP | Set temperature setpoint to 120° F and shut off pilot |

1. Click the display element for the sequence.

Our example is Heater Ignition.



The Operator tab appears with buttons to operate the Sequencer.

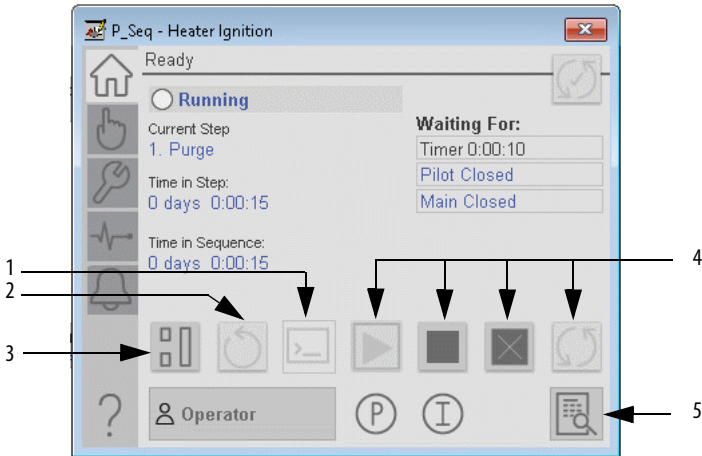


Table 1 - Operator Tab Description

| Item | Description |
|------|---|
| 1 | Respond to prompt request button |
| 2 | Resume sequence button |
| 3 | Hold sequence button |
| 4 | Sequencer operator buttons from left to right: <ul style="list-style-type: none">Start sequenceStop sequenceAbort sequenceReset sequence |
| 5 | Access to the runtime detail faceplate button |

These same buttons are also available on the runtime detail faceplate that visually arranges the progress of the steps.

2. Click the button to access the runtime detail faceplate.

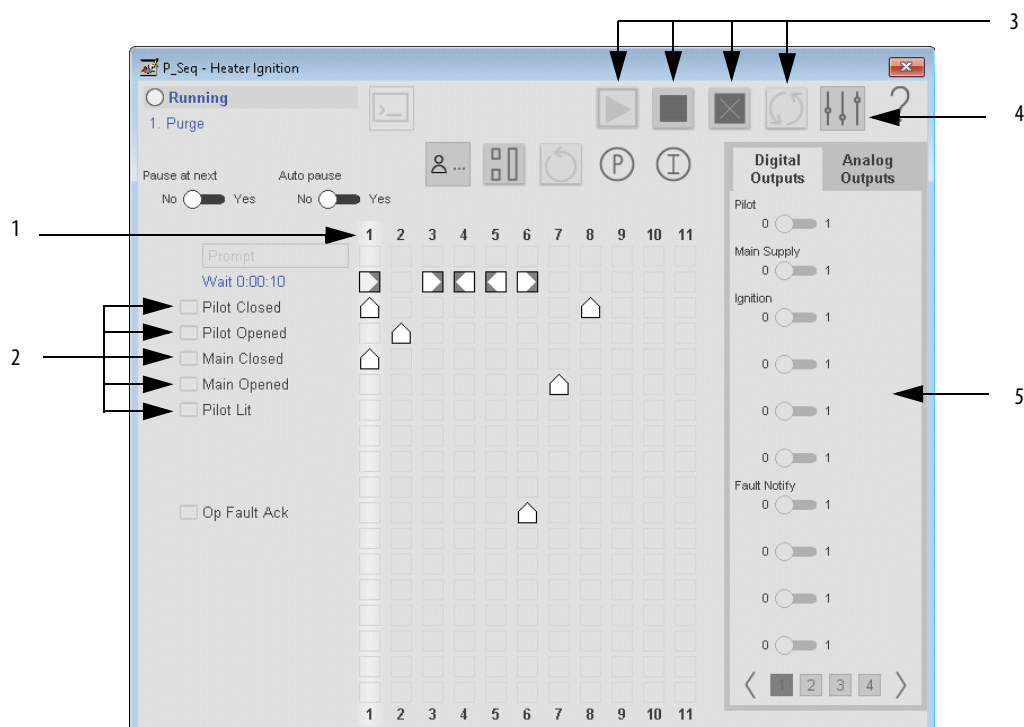


Table 2 - Runtime Faceplate Description

| Item | Description |
|------|--|
| 1 | Sequence steps |
| 2 | Inputs |
| 3 | Sequencer operator buttons from left to right: <ul style="list-style-type: none"> Start sequence Stop sequence Abort sequence Reset sequence |
| 4 | Display advanced properties |
| 5 | Outputs |

3. On the FactoryTalk® View SE Operator Detail faceplate, click the Start sequence button.

Step 1: Purge

This step verifies that the pilot and main are off for 1 minute.

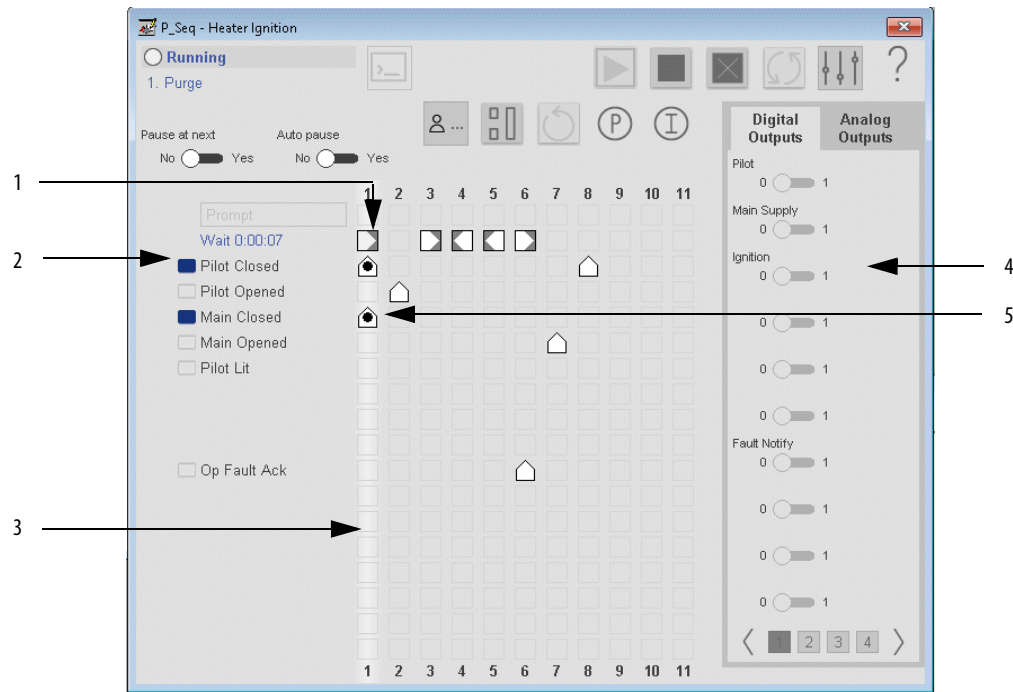


Table 3 - Step 1 Faceplate Description

| Item | Description |
|------|--|
| 1 | The shaded areas on the icon signify if the timer starts after the qualification of the step (shading on the right side) or at the beginning of the step (shading on the left side) per user configuration. |
| 2 | Button turns blue to indicate On (1 for true) when the Sequencer verifies that the pilot valve and main valve are closed. |
| 3 | Column turns white to show that the current step is in progress. Column turns brown if a running sequence is held. |
| 4 | For this step configuration, outputs are set to zero for Off. |
| 5 | The step wait timer starts after all input conditions have been qualified. When the tip of the symbol points up the input must be On to qualify; when the tip is down the input must be Off to qualify. When the input condition is qualified, a black dot appears in the middle of the icon. |

Step 2: Open Pilot

This step turns on the pilot.

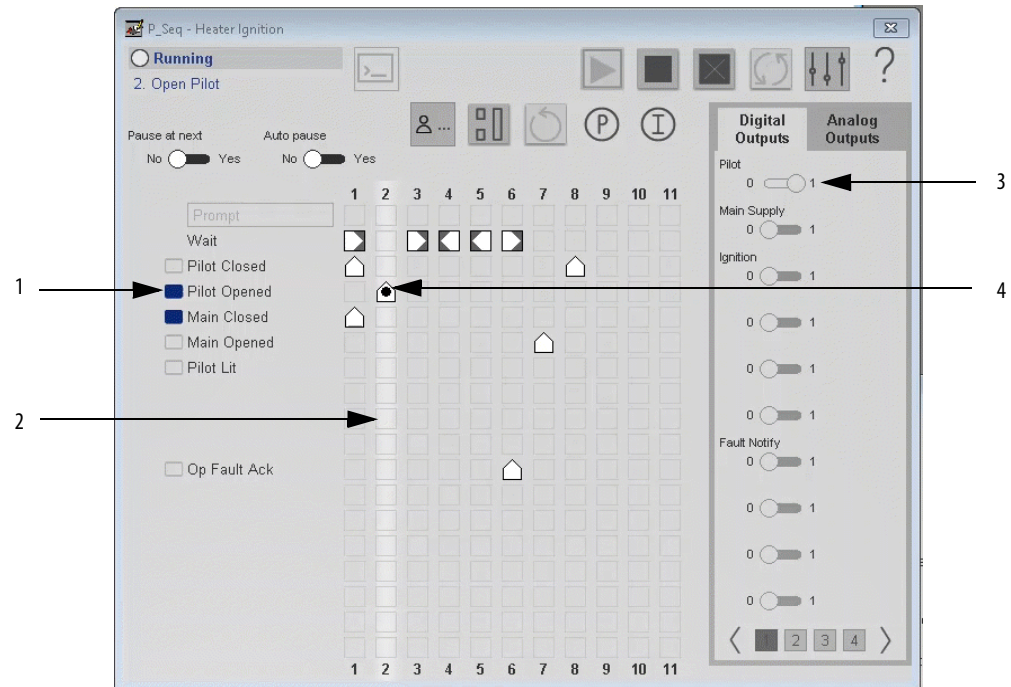


Table 4 - Step 2 Faceplate Description

| Item | Description |
|------|---|
| 1 | Pilot valve is opened (shown by a blue rectangle). |
| 2 | Column turns white to show that the current step is in progress. |
| 3 | The Pilot output (far right column) displays a '1' for true; this output is a request for the pilot valve to be open. |
| 4 | Black dot in the icon signifies this condition is qualified. |

Step 3: Ignite

This step triggers the ignitor.

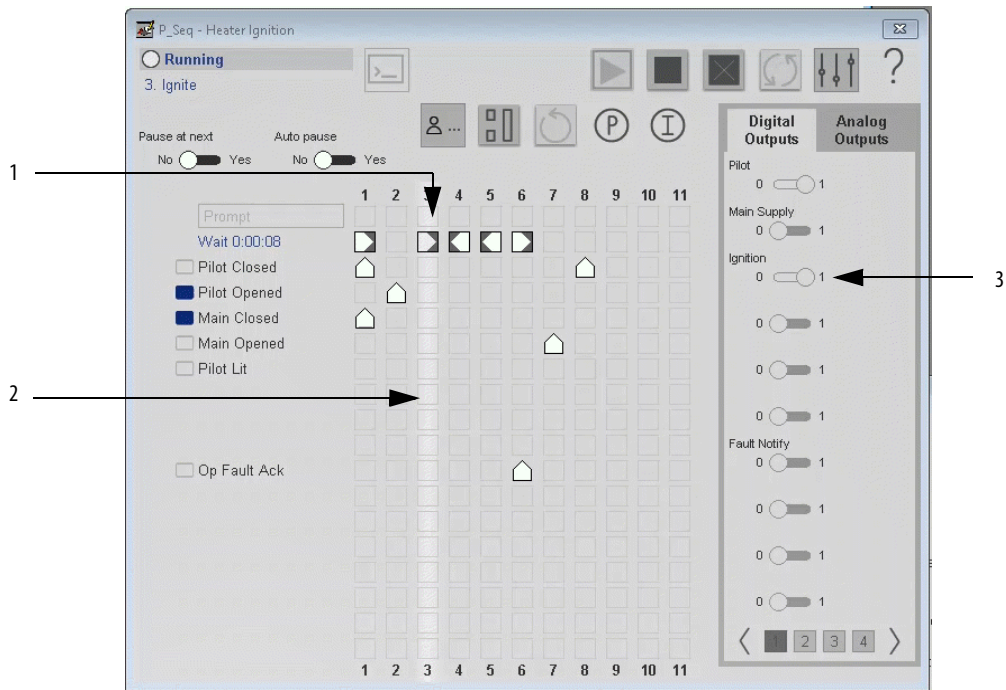


Table 5 - Step 3 Faceplate Description

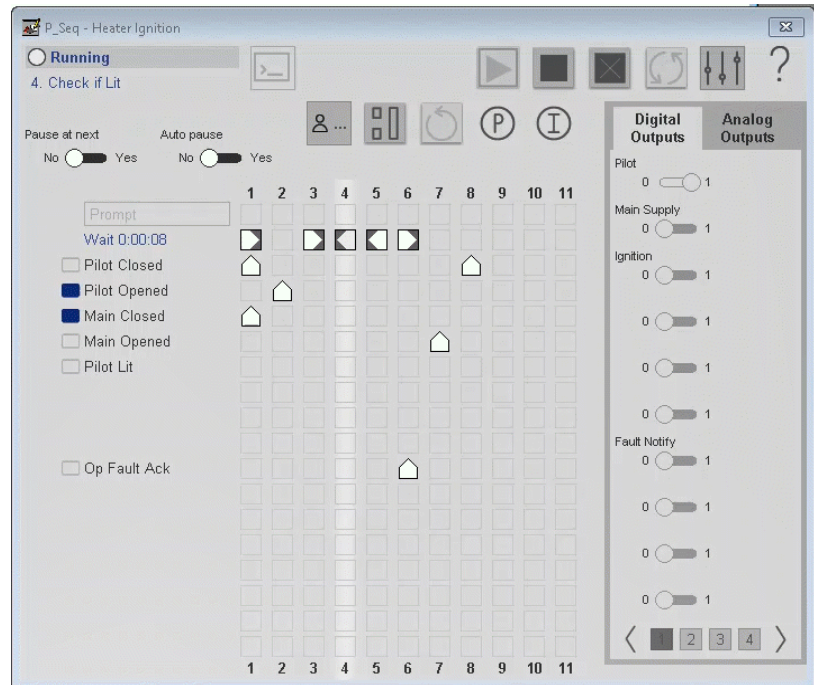
| Item | Description |
|------|---|
| 1 | Sequencer ignites the pilot and the step wait timer starts. The shaded areas on the icon signify if the timer starts after the qualification of the step (shading on the right side, as in this step) or at the beginning of the step (shading on the left side) per user configuration. |
| 2 | Column turns white to show that the current step is in progress. |
| 3 | The Ignition output displays a '1' for true; requesting ignitor on. |

Step 4: Check if Lit

This step checks if the ignitor is lit.

If the ignitor is lit, the ignitor turns off ('0' in output). The sequence branches to step 7.

If the ignitor is not lit, the ignitor turns off and the sequence branches back to step 3 to reignite the pilot. If the loop count reaches the maximum number of attempts, a fault condition can be set.

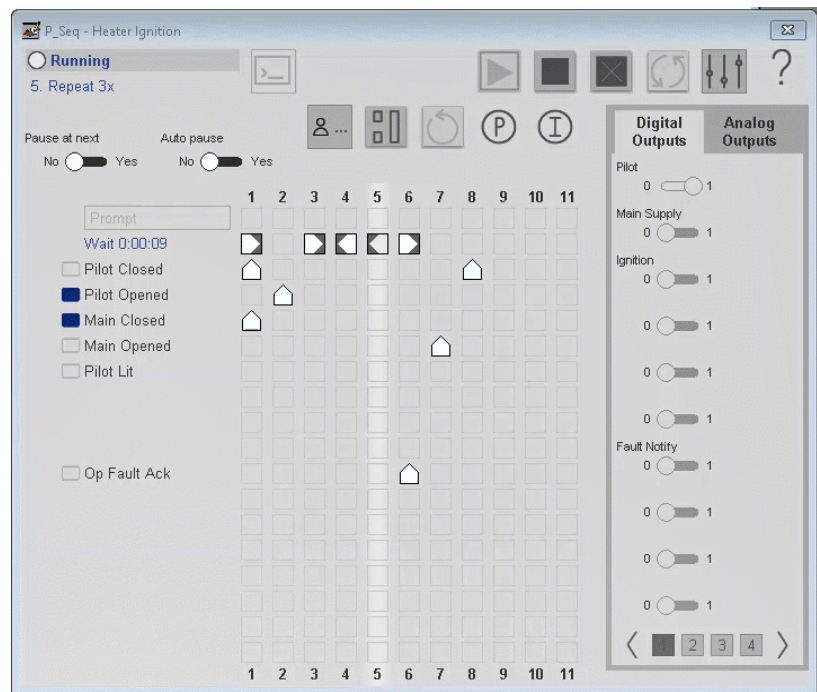


Step 5: Repeat 3x

If the pilot is lit, the sequence branches to step 7.

If the pilot is not lit, the sequence branches to step 3 to retry igniting the pilot.

After a third unsuccessful attempt to ignite the pilot, the sequence proceeds to step 6.



Step 6: Ignition Failure

The sequencer enables the output to prompt a fault if the pilot is not lit after three tries. The sequence then turns off the pilot and the main.

An operator can interact with discrete inputs/outputs or an HMI-based prompt to acknowledge the alarm. The sequencer waits per the timer setting for the fault to be acknowledged.

After a fault is acknowledged, the sequence branches to the end.

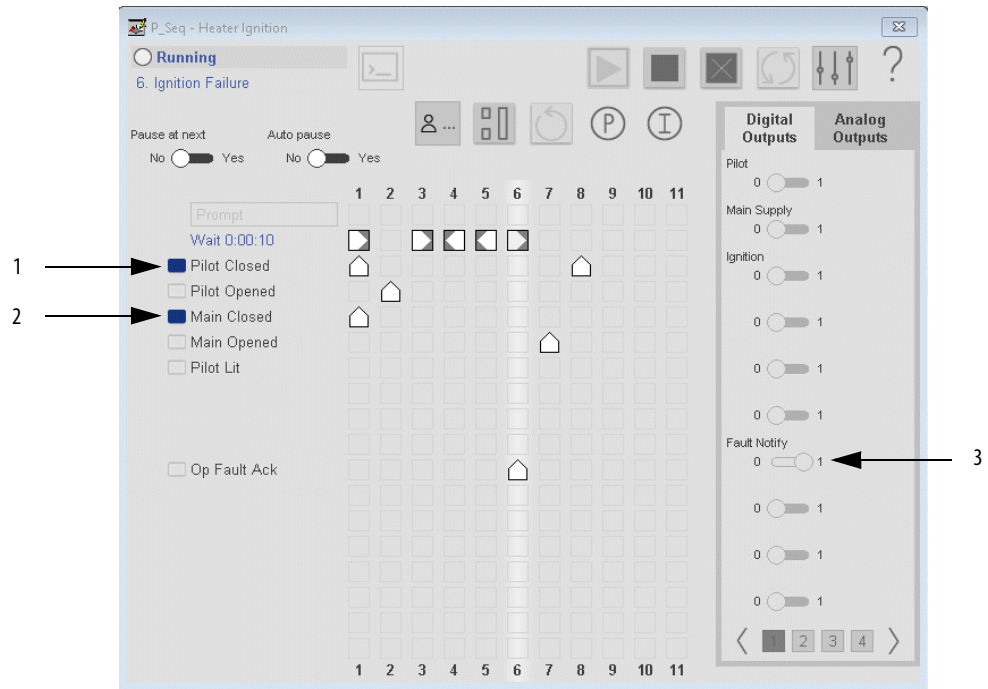
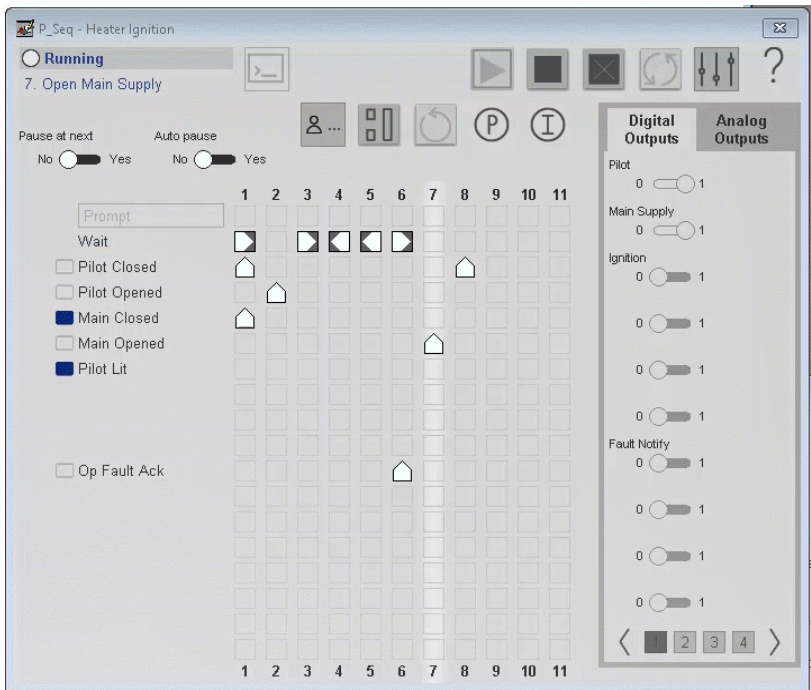


Table 6 - Step 6 Faceplate Description

| Item | Description |
|------|-------------------------------|
| 1 | Pilot is closed |
| 2 | Main is closed |
| 3 | Fault notification is enabled |

Step 7: Open Main Supply

This step opens the main supply valve.

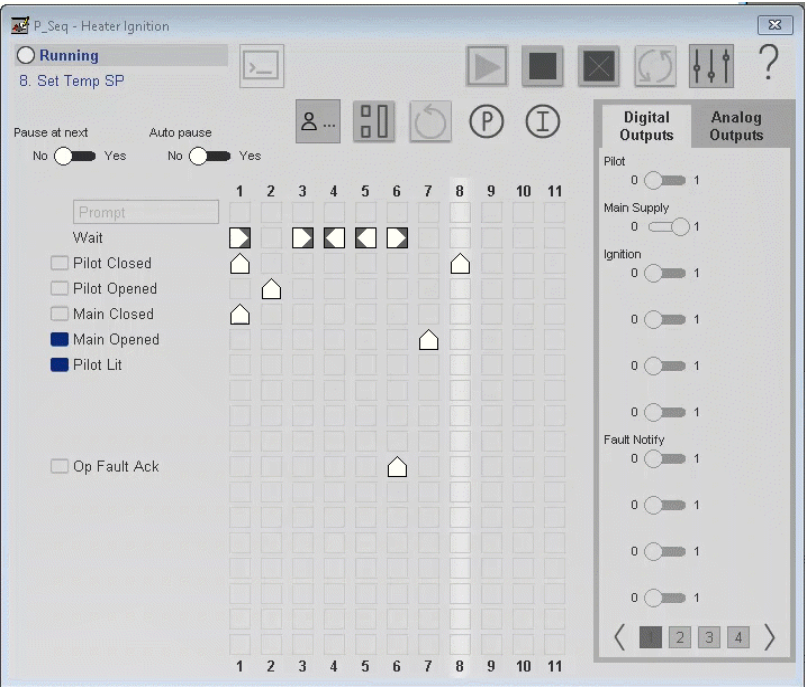


Step 8: Set Temperature Setpoint

This step sets the temperature setpoint and shuts off the pilot.

Once the heater is lit, the pilot is closed.

The temperature setpoint is set to 120 °F per the configuration.



Sequence Complete

When the sequence has completed, the status reads ‘Complete’ and the reset icon appears active.

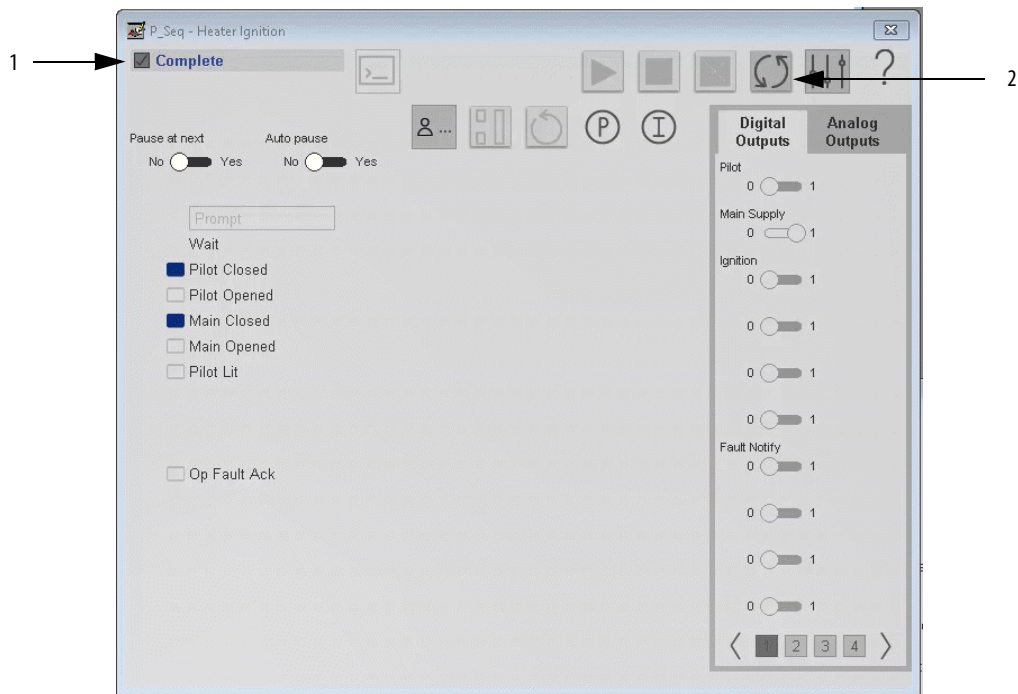


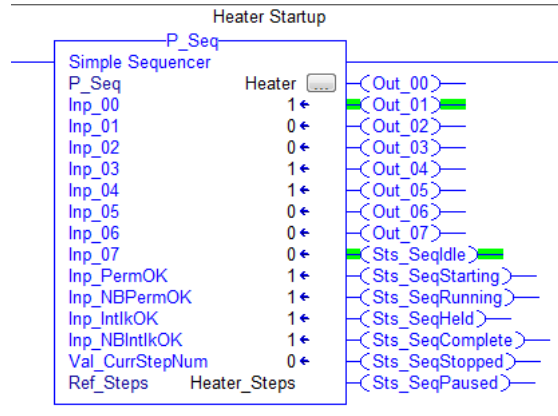
Table 7 - Complete Faceplate Description

| Item | Description |
|------|----------------------|
| 1 | Sequence Status |
| 2 | Reset icon is active |

Programming Example

This section describes how to program the individual steps of the sequence shown in the Sequencer demonstration, starting on [page 11](#).

1. Create the P_Seq instruction in your program and give the instruction a name.

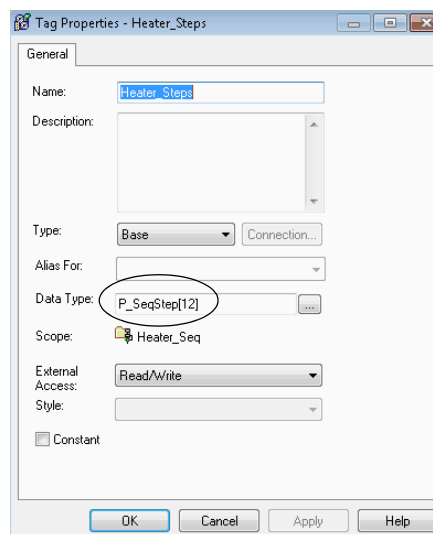


IMPORTANT The screen examples show portions of the ladder logic diagram. You can also use the P_Seq instruction in function block diagrams and structured text language.

2. Create the tags, one for the P_Seq instruction, and one for the step array.

The name of the Ref_Steps tag **must** equal the tag name of the Sequencer plus '_Steps'. Our example is 'Heater_Steps'. The faceplate looks for this tag name for step configuration details.

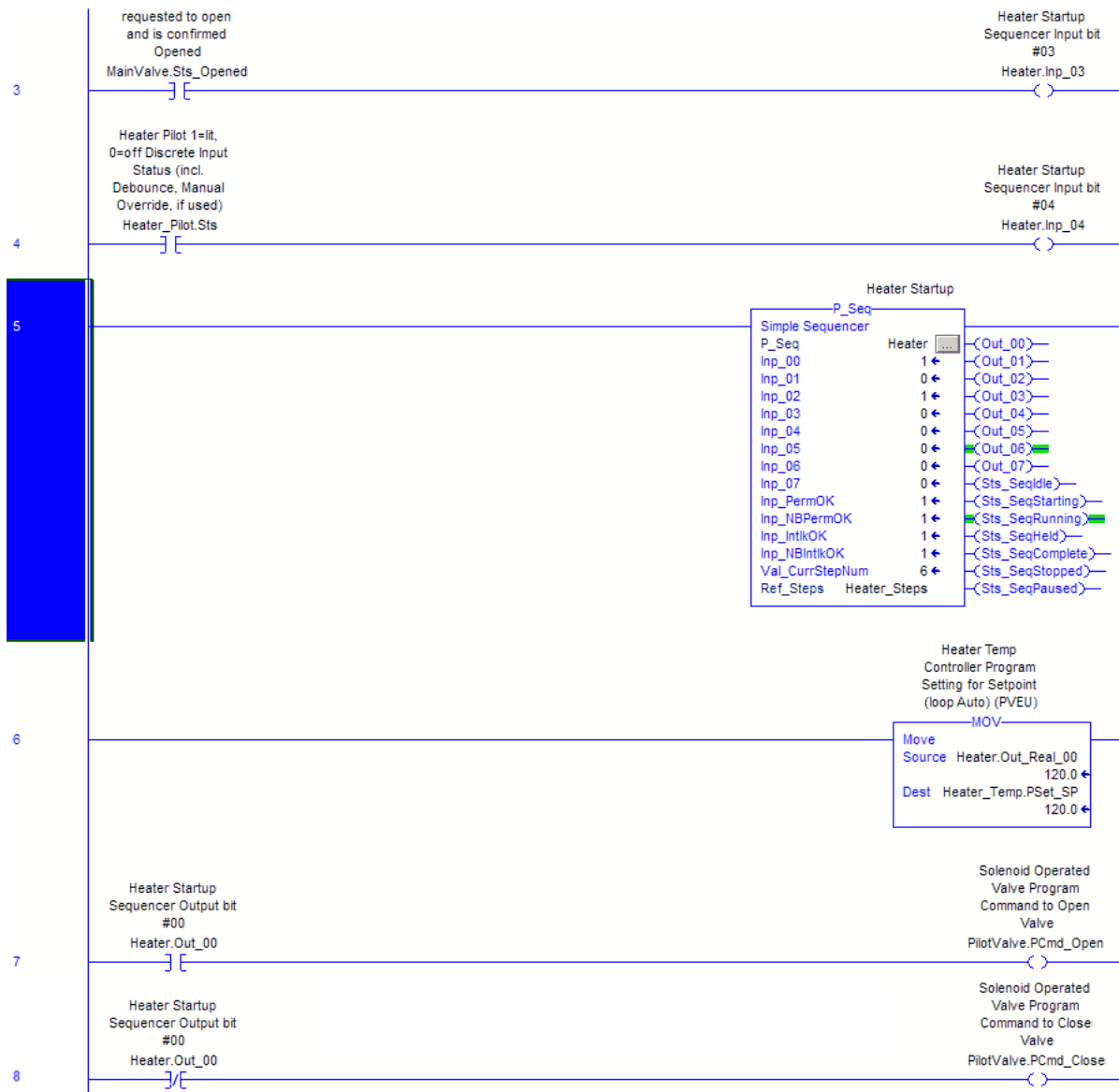
When you create the step array tag, type a number into the bracket of the array tag (P_SeqStep) to configure the number of steps to be included in the sequence.



The actual number of usable steps in a sequence is the array length minus one. For example, if you type '12', you have 11 usable steps.

3. Attach the devices associated with the sequence.

This example shows a few of the rungs linking the Sequencer to two P_ValveSO objects for the pilot and main gas valves, a P_DIn object for the flame sensor, a P_DOut object for the ignitor, and a temperature setpoint.



4. Save the file and download.

5. If you modify the file from the HMI, save the .acd file again.

There are buttons in the Engineering tab of the P_Seq instruction to access additional dialog boxes to configure the Sequencer and the sequences contained within the running and stopping states.

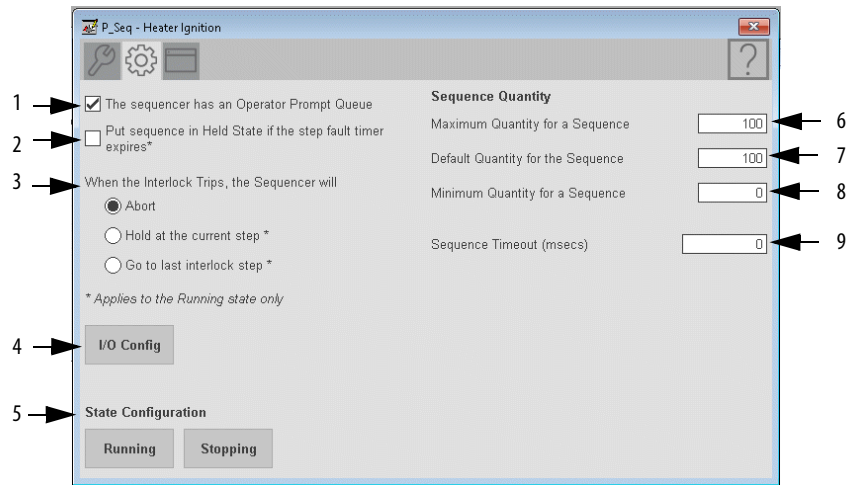


Table 8 - Engineering Tab Description

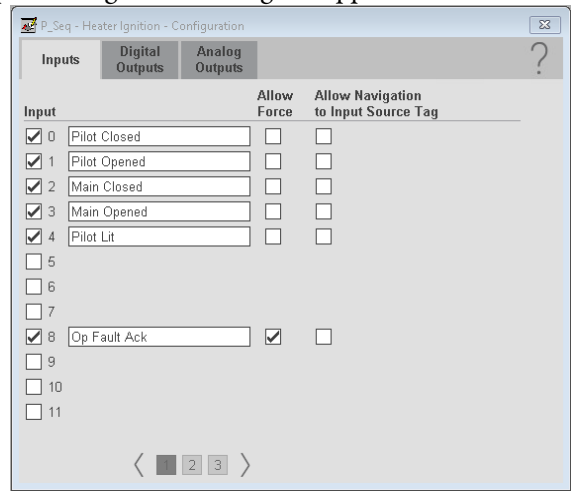
| Item | Description |
|------|--|
| 1 | Check to enable the manual prompt queue. |
| 2 | Check to put the sequence in a Held State if the step timer expires. |
| 3 | Check the box to indicate the Sequencer action when an interlock trips. |
| 4 | Click the Display Sequence Configuration Window button to access the Discrete Inputs, Discrete Outputs, and Analog Outputs configuration dialog boxes. |
| 5 | Click to open the sequencer configuration for either the Running state or the Stopping state. |
| 6 | Type a maximum value for a quantity. |
| 7 | Type a default quantity for a sequence. |
| 8 | Type a minimum value for a quantity. |
| 9 | Type a time in milliseconds that the sequence must be complete or a timeout occurs. |
| 10 | Click to configure one step. |
| 11 | Click to configure multiple steps. |

Configuring the Sequencer

You must define what the Sequencer can control and monitor by specifying the attributes of the inputs and outputs.

1. To configure how many inputs are being used by the Sequencer, click the I/O button.

The Input Configuration dialog box appears.



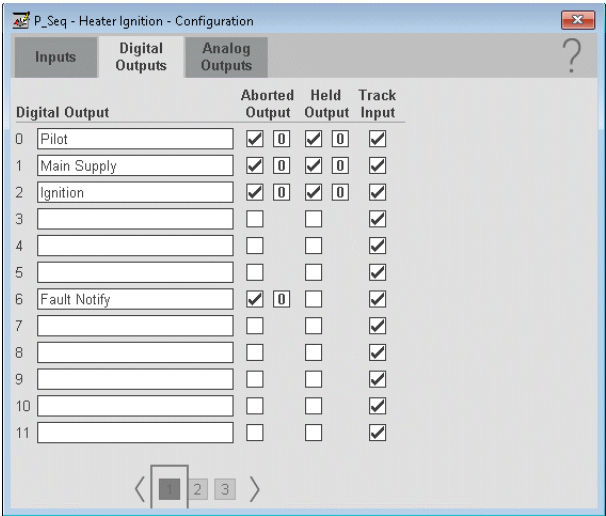
2. Complete the Discrete (BOOL) Input Configuration dialog box.

| Item | Description |
|--------------------------------------|--|
| Input | Check for each of the 32 inputs that are being configured to be used by the Sequencer. |
| Label | Type a name or description for the input in the text box. This label is used as a reference in multiple displays. |
| Allow Force | Check to enable force qualification of an input during the operation of a step. Clear the checkbox if the input cannot be forced. IMPORTANT: If the box is checked, anyone with Maintenance privileges or higher can 'force' an input to be qualified even though it is not in the required state for that step when the Sequencer is running. |
| Allow Navigation to Input Source Tag | Check to enable navigation to the faceplate of the device. This functionality requires the device to be in the same program as the P_Seq instruction and be a Rockwell Automation Library object. |

IMPORTANT Make sure to press Enter after typing in a text box to save your work.

3. To configure the outputs, click the Digital Output button.

The Digital Output Configuration dialog box appears.

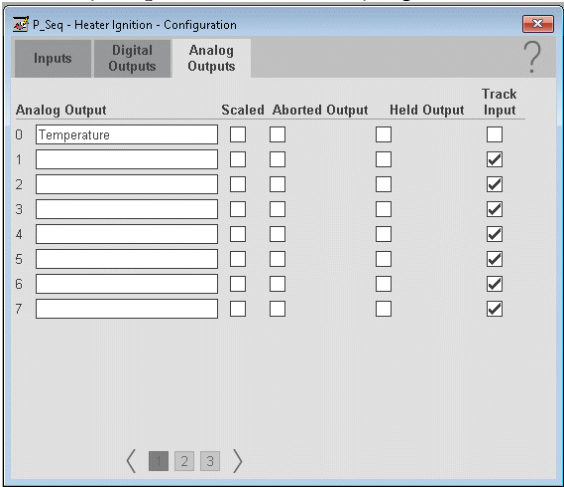


4. Complete the Digital Output Configuration dialog box. There are 3 pages and 32 outputs can be configured.

| Item | Description |
|----------------|---|
| Digital Output | Type a name or description for the output in the text box. This label is used as a reference in multiple displays. |
| Aborted Output | Check to specify whether the output is written (*checked) or left in its last state (unchecked) when the Sequencer is in the Aborted state. Click the value field to toggle the value from 0 to 1. |
| Held Output | Optional checkbox to specify whether the output is written (checked) or left in its last state (unchecked) when the sequencer is in the Held state. Click the value field to toggle the value to write between 0 and 1. |
| Track Input | Use the default check to track an output's track input value when it's not being used in a step. |

5. Click the Analog Output Configuration button.

The Analog Output Configuration dialog box appears with a number of entry fields that you specified for the array tag.



6. Complete the Analog Output Configuration dialog box.

| Item | Description |
|----------------|--|
| Analog Output | Type a name or description for the output in the text box. This label is used as a reference in multiple displays. |
| Scaled | Check to scale the output value based on the quantity entered at the start of a sequence. For example, if the REAL is 40 lb and the Quantity is 50%, the REAL output value is 20 lb. |
| Aborted Output | Optional checkbox to specify a specific value for the output when the sequencer is in the Aborted state. |
| Held Output | Optional checkbox to specify a specific value for the output when the sequencer is in the Held state. |
| Track Input | Use the default check to track an output's track input value when it's not being used in a step. |

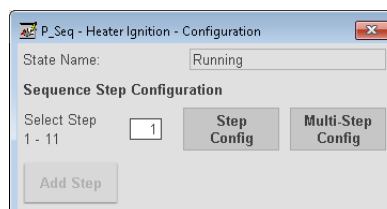
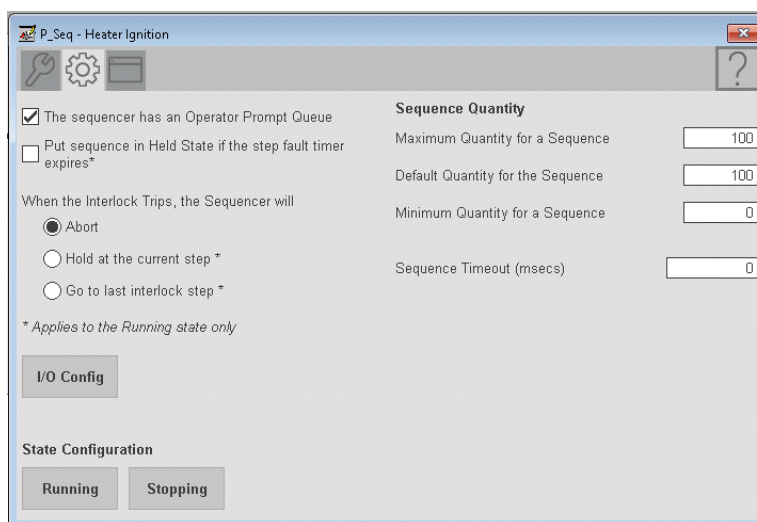
Configuring the Sequence Steps

Sequences can be configured for both the 'Running' state and the 'Stopping' state. Both states are configured using the same steps. This example uses the Running state.

This section describes how to configure what is to occur in each individual step of the sequence. Each step is configured with the inputs, outputs, and analog outputs that you created for the Sequencer to run.

You also have the option of configuring multiple sequence steps on one dialog box if there are minimal input conditions per step. See [page 37](#) for details.

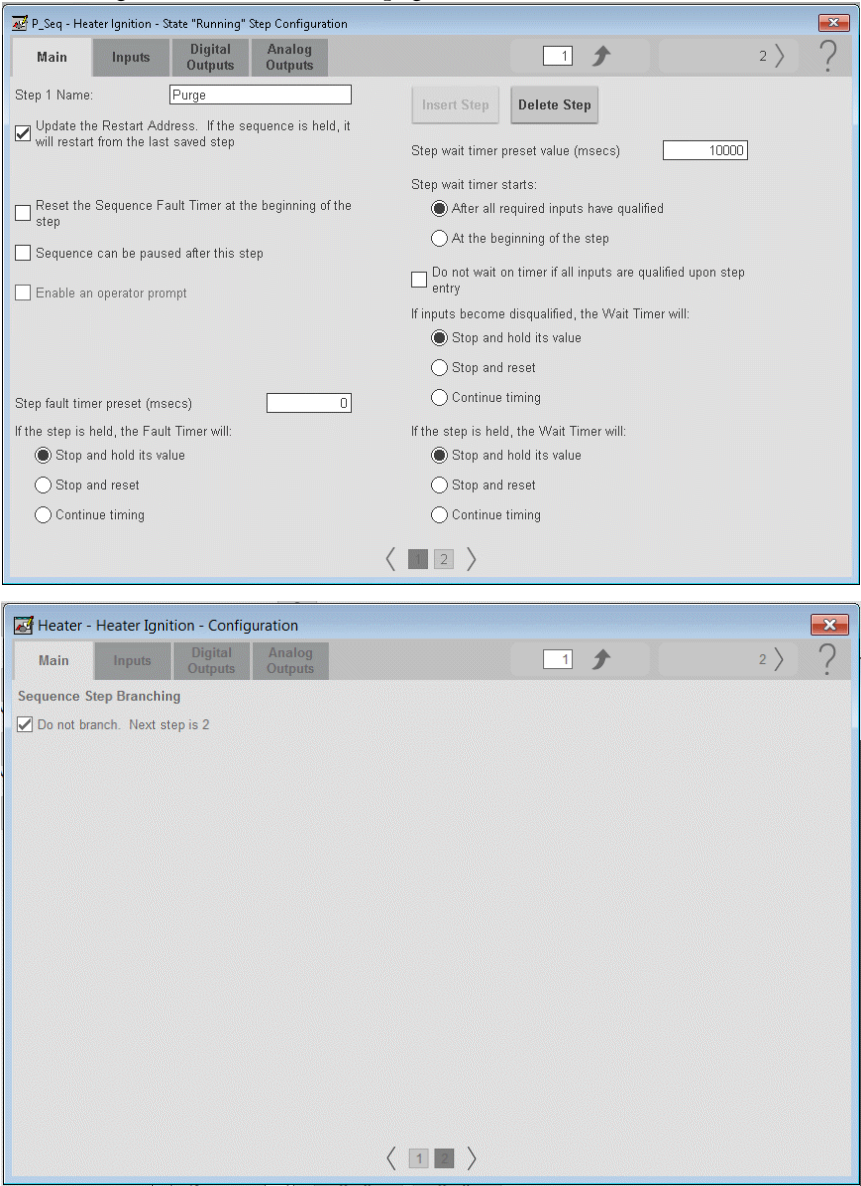
1. At the bottom of the Engineering tab, click either the Running state or Stopping state to access the sequence configuration.



2. At the bottom of the State Configuration display, click the Step Config button.

The Main-Step Configuration dialog box appears.

Step 1 formatting is shown in the following screen captures but the same dialog box is used to configure all your steps in the sequence. The main configuration consists of two pages.



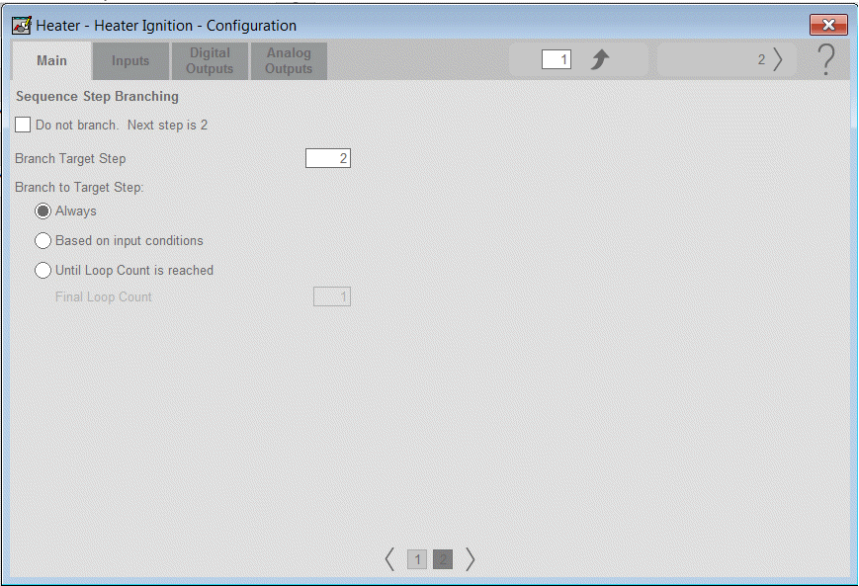
3. For each step, complete the dialog box for the actions to be taken to accomplish the step based on the respective input condition.

Table 9 - Main-Step Configuration Description

| Item | Description |
|--|---|
| Name | Type a name for the step. IMPORTANT: Make sure to press Enter or press the Page Down key after typing in a text box to save your work. |
| Update the Restart Address. If the Sequence is held, it restarts from the last saved step | Check for the sequence to restart from the last saved step the 'restart' was configured. |
| Reset the Sequence Fault Timer at the beginning of the step | Check to reset the sequence fault timer at the beginning of the step. |
| Sequence can be paused after this step | Check to enable a pause. A pause cannot occur for a step unless you check this box. |
| Enable an operator prompt | Check to enable an operator prompt for the step. A blank box appears. Click the box to configure the operator prompt for the step. Rockwell Automation Library of Process Objects Reference Manuals for more information on the Operator Prompt. Publication PROCES-RM013 Publication PROCES-RM014 |
| Sequence Step Branching | See step 4 and step 5 for details. |
| Insert Step button | Click to insert a new step before this step. IMPORTANT: See Insert and Delete Rules for Branching on page 33 . |
| Delete Step button | Click to delete this step from the sequence. IMPORTANT: See Insert and Delete Rules for Branching on page 33 . |
| Step fault timer preset (msecs) | Type a value to trigger a fault if the time to complete this step exceeds the timer setting. |
| If the step is held, the Fault Timer... <ul style="list-style-type: none"> Stops and holds its value Stops and resets Continues timing | Click the action of the step fault timer if a Held state occurs. |
| Step wait timer preset value (msecs) | Type a value to have a step wait based on the conditions of the next field. IMPORTANT: A setpoint of '0' disables the timer. |
| Step wait timer starts... <ul style="list-style-type: none"> After all required inputs have qualified At the beginning of the step | Click the action of the wait timer. IMPORTANT: If you select 'At the beginning of the step', you cannot select the next two wait timer settings for qualified and disqualified inputs. |
| Do not wait on timer if all inputs are qualified upon step entry | Check to waive the wait timer if all inputs are qualified upon step entry. IMPORTANT: This checkbox is not available if the wait timer is set to start at the beginning of the step. |
| If an input becomes disqualified, the Wait Timer... <ul style="list-style-type: none"> Stops and holds its value Stops and resets Continues timing | Click the action of the wait timer for disqualified inputs. IMPORTANT: This checkbox is not available if the wait timer is set to start at the beginning of the step. |
| If a step is held, the Wait Timer... <ul style="list-style-type: none"> Stops and holds its value Stops and resets Continues timing | Click the action of the wait timer for a step in a Held state. |

The Sequence Step Branching dialog box defaults with a check not to branch (jump forward or backward) to another step.

4. Clear the checkbox in the Do not branch box to display branch entry boxes.



5. Complete the Sequence Step Branching dialog box.

| Item | Description |
|---|--|
| Do not branch. Next step is # | Clear the checkbox to branch. Check to remove the branching boxes. |
| Branch Target Step | Type the number of the step that the Sequencer branches to based on the branch conditions. |
| Branch to Target Step... <ul style="list-style-type: none">• Always• Based on input conditions• Until Loop Count is reached | Click the action of the branch. If a loop count is selected, an entry field appears for a value. See the following IMPORTANT statement. |
| Final Loop Count | Type the number of times to execute this step before continuing with the next step instead of branching. |

IMPORTANT If 'Based on input conditions' is selected for the branch target step, a branch button appears at the top of the dialog box. Click the button to access the affected input to configure the branch state.
See [Branch on Input on page 36](#) for details.

Insert and Delete Rules for Branching

The following tables explain how the Sequencer adjusts the Branching or Branch Targets if there is branching in a sequence and you insert or delete steps.

Table 10 - Insert Steps

| Branch Target | Result |
|--|---------------------------|
| Last step number | No change |
| Lower step number than inserted step number | No change |
| Higher step number than inserted step number | Target step number plus 1 |

Table 11 - Delete Steps

| Branch Target | Unconditional ⁽¹⁾ Result | Conditional ⁽²⁾ Result |
|---|-------------------------------------|-----------------------------------|
| Last step number | No change | No change |
| Deleted Branch Target step | No change | Branch deleted |
| Lower step number than deleted step number | No change | No change |
| Higher step number than deleted step number | Target step number minus 1 | Target step number minus 1 |

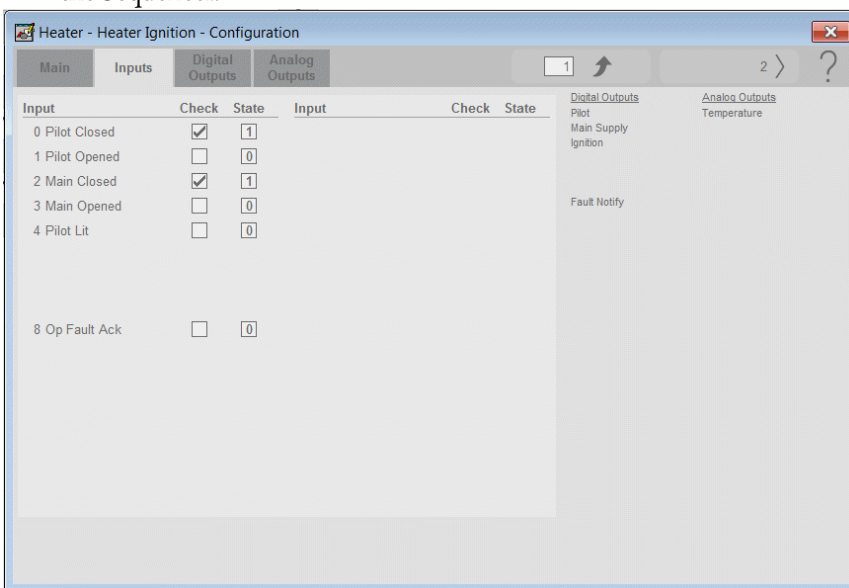
(1) Unconditional = Always (branch option).

(2) Conditional = Loop count, Input condition, or Prompt (branch options).

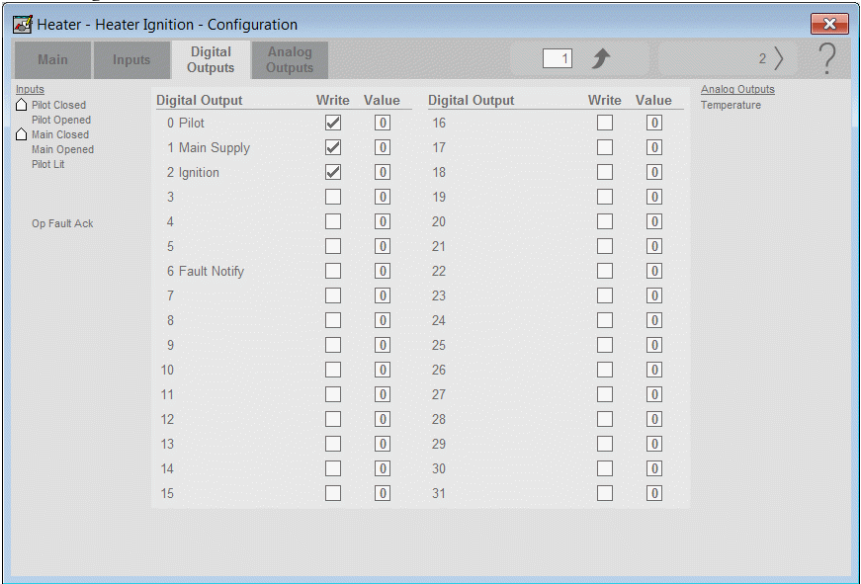
The following procedures are for associating the Sequencer inputs, outputs, and analog outputs with each step of the sequence.



- At the top of the Home-Step Configuration dialog box, click the Input button.

A dialog box appears with a list of discrete inputs that you configured for the Sequencer.



- 7. Check for each input that is tested for the step.
A value box defaults with a '0' for Off.
- 8. Click the value box to insert a '1' for On if the input must be 1 for the step to complete.
- 9. Click the Digital Output tab.
A dialog box appears with a list of outputs that you configured for the Sequencer.



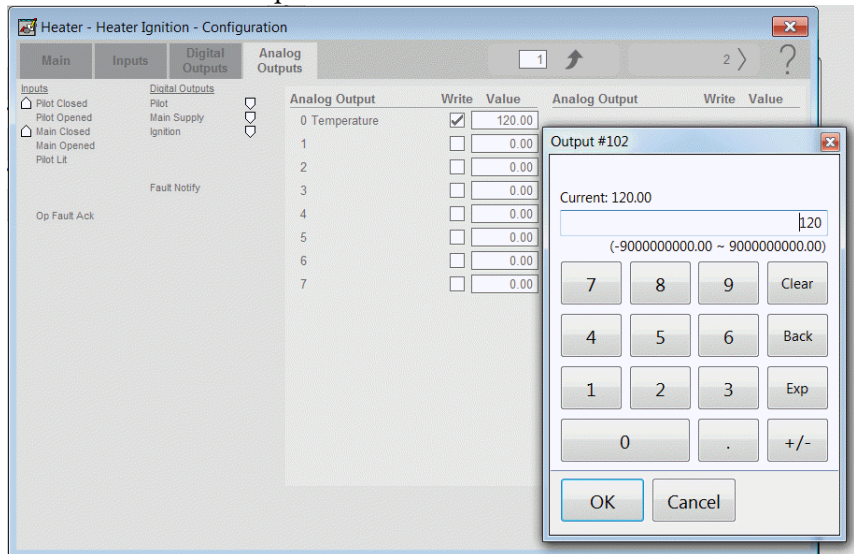
The symbol,  , in the left column of the dialog box conveniently shows the inputs that are configured to qualify when set (1). The opposite symbol,  , indicates an input that qualifies when clear (0). Inputs with no symbol are not tested.

- 10. Check for each output that is written for the step.
A value box defaults with a '0' for Off.

IMPORTANT Any digital outputs that are not configured in a step remain at their previous states.

11. Click the Analog Output button.

A dialog box appears for configuring an analog output based on the condition of the step.



12. Check for each analog output that is written for the step.
Unchecked outputs are left at the last value.
13. In the text box, type the setpoints or values per the step instruction.
A keypad appears to help you enter a value.
14. Repeat [step 3](#) through [step 13](#) for each sequential step.

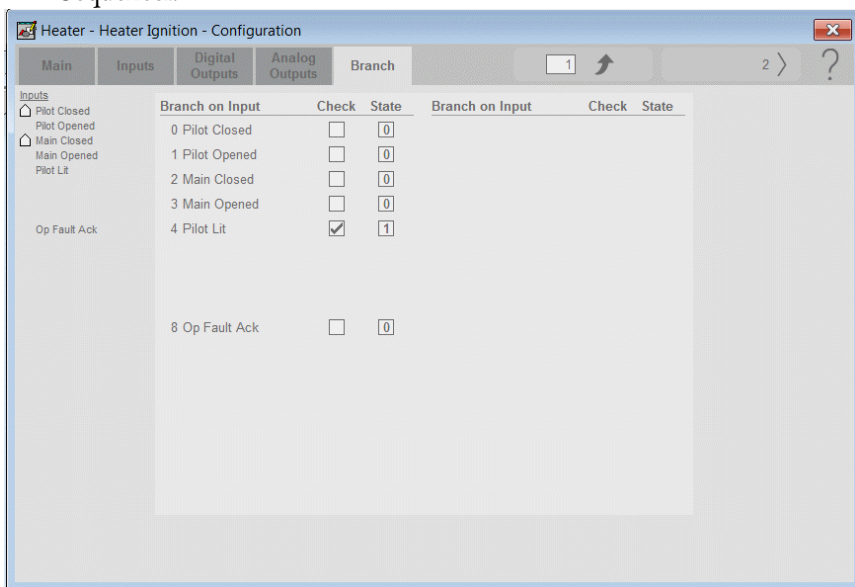
Branch on Input

You can configure an input for a condition of a branch target step in a branch dialog box. A special button appears on the Home-Step Configuration dialog box when 'based on input conditions' is selected for the branch.

1. Click the branch button.

IMPORTANT A branch condition is evaluated only after the configured inputs are qualified.

A dialog box appears with a list of inputs that you configured for the Sequencer.



2. Check for each input that applies for the step.
A value box defaults with a '0' for Off.
3. Click the value box to insert a '1' if branching occurs when the input is 1.
4. Click the page advance symbol in the upper, right corner to access another Sequence Step Configuration dialog box.

Multi-Step Configuration Dialog Box

IMPORTANT The Multi-Step Configuration dialog box is available only in FactoryTalk View SE software.

The Multi-Step Configuration dialog box provides an alternate means of configuring timing, branching, pausing, holding, interlock, and prompt options for several steps at once.

1. On the Engineering tab (see [page 25](#)), click the Multi-Step Configuration button.

The Multi-Step Configuration dialog box appears.

2. Complete the Multi-Step Configuration dialog box.

Table 12 - Multi-Step Configuration Description

| Topic | Description |
|-----------------|--|
| Step Name | Type a name for the step. IMPORTANT: Make sure to press Enter or click the Page Down key after typing in a text box to save your work. |
| Hold RS | Check for the sequence to restart from the last saved step after a Held state. |
| Intlk FB | Check to have an interlock fall back to the last saved step if this configuration is configured on the Engineering tab. |
| Reset TO | Check to reset the sequence fault timer at the beginning of the step. |
| Allow Pause | Check to let the sequence pause after this step. |
| Oper Prompt | Check to use a prompt message for an operator to take action. A Browse (...) button appears to provide access to a Manual Prompt faceplate to configure the specific prompt message. |
| Step Fault Time | Type a value (in milliseconds) for the Step Fault Time. If the time to complete this step exceeds the timer setting, a step timeout is triggered. |

Table 12 - Multi-Step Configuration Description

| Topic | Description |
|-----------------------|---|
| Step Wait Time | Type a value to have a step wait based on the conditions of the next field. |
| Step Branching Select | Choose between: - Branch Always - Branch based on input condition - Branch until loop count is reached - Branch based on message prompt - Do not branch (no) |
| Step | Type the number of the step to branch. |
| Cnt | Type a value for the number of loop counts in the branch. |

3. Click the Inputs button.

A dialog box appears with the input settings that you configured for the Sequencer.

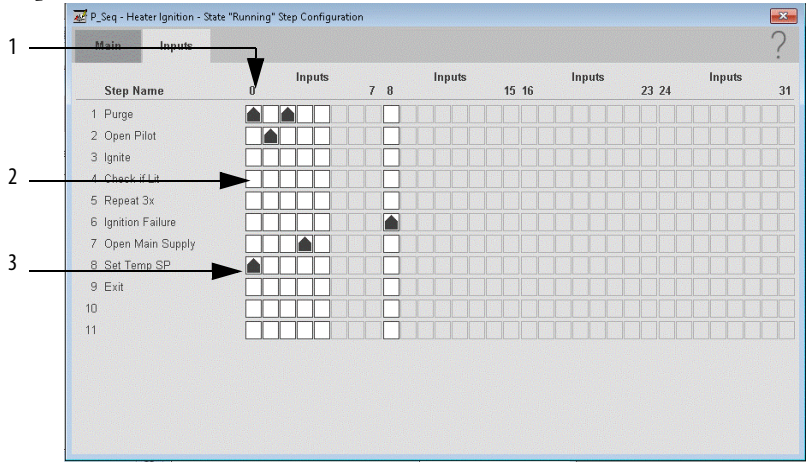


Table 13 - Sequencer Input Description

| Item | Description |
|------|---|
| 1 | Digital Inputs |
| 2 | Blank Box = Input's State Not Checked in This Step |
| 3 | Symbol Points Up = Input Must be On to Qualify Symbol Points Down = Input Must be Off to Qualify |

Required Files

The remainder of this document explains the codes and display elements that comprise the P_Seq instruction.

Controller File

The P_Seq_4.00.00_AOIL5X Add-On Instruction must be imported into the controller project to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

Visualization Files

This Add-On Instruction has associated visualization files that provide a common user interface. See Rockwell Automation Library of Process Objects: Display Elements Reference Manual, publication [PROCES-RM014](#) for more information on the visualization files. You can view or download publications at <http://www.rockwellautomation.com/literature/>.

Controller Code

The controller code for this instruction can be found in the Rockwell Automation Library of Process Objects: Logic Instructions Reference Manual, publication [PROCES-RM013](#). You can view or download publications at <http://www.rockwellautomation.com/literature/>.

Notes:

Rockwell Automation Support

Use the following resources to access support information.

| | | |
|---|---|---|
| Technical Support Center | Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates. | https://rockwellautomation.custhelp.com/ |
| Local Technical Support Phone Numbers | Locate the phone number for your country. | http://www.rockwellautomation.com/global/support/get-support-now.page |
| Direct Dial Codes | Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer. | http://www.rockwellautomation.com/global/support/direct-dial.page |
| Literature Library | Installation Instructions, Manuals, Brochures, and Technical Data. | http://www.rockwellautomation.com/global/literature-library/overview.page |
| Product Compatibility and Download Center (PCDC) | Get help determining how products interact, check features and capabilities, and find associated firmware. | http://www.rockwellautomation.com/global/support/pcdc.page |

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Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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