

USER GUIDE

PCS HIGH-LOW TIMER™ CONTROLLER

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BASIC OPERATIONS

Controller's Faceplate

Figure 1 shows the controller's faceplate with the power on/off switch, status display, and keypad.

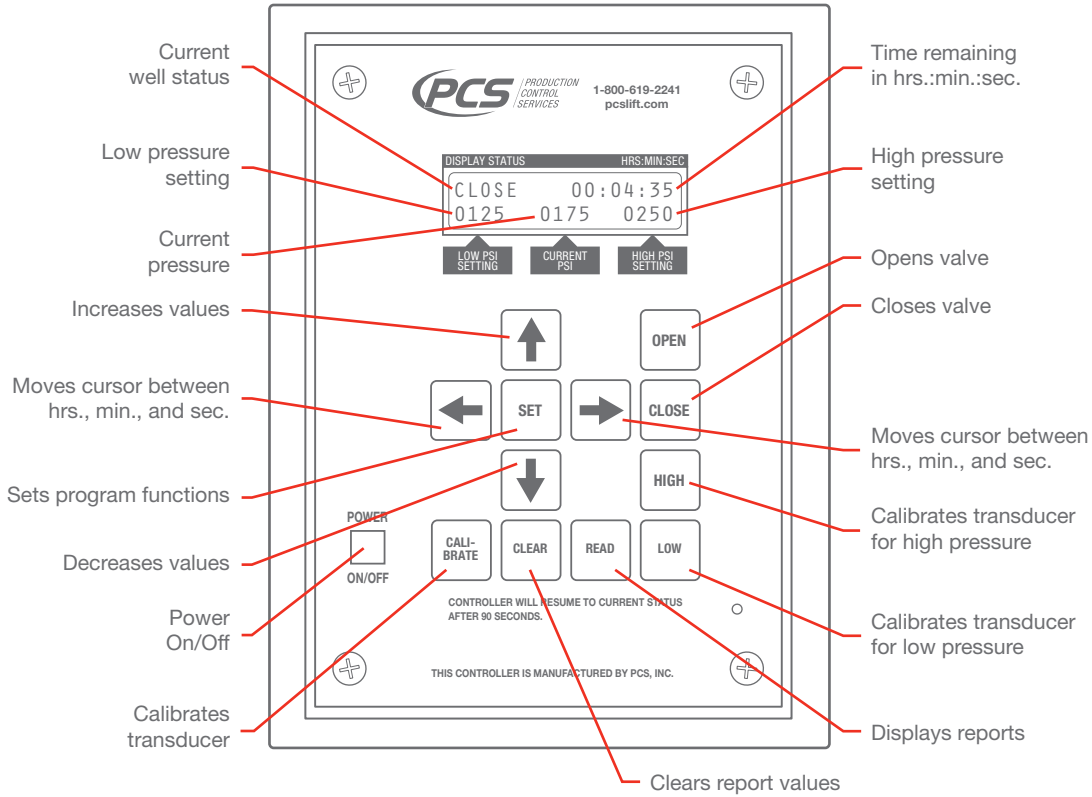


Figure 1 – Controller's Faceplate

Turning the Controller On and Off

To turn the PCS High-Low Timer Controller on or off, insert a screw driver into the slot marked POWER ON/OFF. See Figure 1.

Move the toggle switch to the left to turn the controller on. Move the toggle switch to the right to turn the controller off.

Status Display

After you turn the PCS High-Low Timer Controller on, the status display remains on. The controller never sleeps.

The first line of the status display shows the currently running program function and the time remaining.

Example:
CLOSE 00:00:00

The second line of the status display shows the low pressure setting, the current pressure, and the high pressure setting.

Example:
0125 0175 0250

PROGRAM FUNCTION AND REPORT REFERENCE

The tables in this section cross-reference the program functions and reports described in this *User Guide*.

Program Functions

To program these functions, press SET *parameter*.
To display their current values, press READ *parameter*.

Program Function	SET or READ	Display Name	Page
OPEN TIME	OPEN	OPEN	4
CLOSE TIME	CLOSE	CLOSE	4
MANDATORY SHUT-IN TIME		MAND-SI	5
DELAY TIME (SALES)	⇨	DELAY	4
Sensor Operation	↑	SENSOR	4
HIGH CLOSE PRESSURE	HIGH	HIGH PRES	5
HIGH OPEN		HIGH OPEN	
LOW CLOSE PRESSURE	LOW	LOW PRES	5
LOW OPEN		LOW OPEN	
DELAY CLOSE TIME	⇩	DEL-CLS	6

Reports

To display these reports, press READ *parameter*.

Report	READ	Page
Software Version Report	CLEAR	7
Valve and Plunger Counts History	⇨	7
Valve Total Time Report		
Battery and Solar Panel Status Report		
Plunger Travel Time History		

Clearing Report Values

Program Function	SET	Display Name	Page
Clear Valve and Plunger Counts History and Valve Total Time Report	⇨	PRESS CLEAR TO CLEAR ALL TOTALS	7

SETTING PROGRAM FUNCTIONS

- 1 Press SET and the button for the function you want to program.

Example: SET OPEN.

The status display shows the function and its current value.

Example for time function:
OPEN 00:00:00

Example for pressure function:
HIGH PRES 0250

- 2 If you are programming a time function, the cursor is at the hour value. Use the ⇨ and ⇩ buttons to move the cursor back and forth between the values for hours, minutes, and seconds.

Note: The ⇨ and ⇩ buttons are inactive while you program a pressure function.

- 3 For both time and pressure functions, press the ↑ button to increase the value or the ↓ button to decrease the value.

Press and quickly release the ↑ or ↓ button to increase or decrease the value by 1. Press either button without releasing it to make a big change in the value.

- 4 When you have programmed the value you want, press SET to store the value.

To exit the function without changing its value, press CLEAR.

HOW PLUNGER OPERATION WORKS

- 1 The controller closes the valve to shut in the well and counts down the CLOSE TIME (SET CLOSE). This gives the plunger time to fall to the bottom of the well.
- 2 When the CLOSE TIME countdown reaches zero, the controller opens the valve.
- 3 The controller counts down the OPEN TIME (SET OPEN).
 - If the plunger arrives during the OPEN TIME countdown, the controller goes to step 4.
 - If the plunger does not arrive during the OPEN TIME countdown, the controller closes the valve and counts down the MANDATORY SHUT-IN TIME (SET CLOSE). When this countdown reaches zero, the controller opens the valve and repeats step 3.

Note: If connected to a pressure switch, the controller closes the well when it receives a pressure input. Pressure input overrides the OPEN TIME countdown.

- 4 The controller counts down the DELAY TIME (SALES) (SET ⇨). When the DELAY TIME (SALES) countdown reaches zero, the controller goes back to step 1.

Note: If the controller is connected to a pressure switch, pressure input overrides the DELAY TIME (SALES) countdown.

CREATING A PLUNGER OPERATION PROGRAM

Program Setup Functions

Sensor Operation =  **SET** 

Set the sensor to ON.

If you set the sensor to OFF, the controller goes directly from OPEN TIME to CLOSE TIME. It does not go from OPEN TIME to DELAY TIME (SALES). The controller does count plunger arrivals for the Plunger Travel Time History.

Transducer Calibration

See “Calibrating the Transducer” on page 6.

Program Control Functions

CLOSE TIME =  **SET CLOSE**

CLOSE TIME is when the well is shut-in and not flowing. It is also when the plunger falls, and the well builds pressure for the next cycle.

Important! You must have a CLOSE time. Do **not** program 00:00:00 as the CLOSE time.

Note: Following CLOSE TIME, a status display for MANDATORY SHUT-IN TIME appears. See “MANDATORY SHUT-IN TIME” on page 5 for more information.

OPEN TIME =  **SET OPEN**

OPEN TIME is when the well is first opened, and gas is flowing through the motor valve. During OPEN TIME, the plunger starts to surface and the well sells its initial head gas.

DELAY TIME (SALES) =  **SET** 

DELAY TIME (SALES) sells gas through the valve after the plunger has arrived.

MANDATORY SHUT-IN TIME =  SET CLOSE Optional

If the valve is opened, but a plunger does not surface, the well likely needs more time to rebuild pressure for the next plunger attempt.

- 1 To set MANDATORY SHUT-IN TIME, press SET CLOSE.

The status display shows the CLOSE TIME.

- 2 Press CLEAR.

The status display shows the MANDATORY SHUT-IN TIME in hours, minutes, and seconds.

- 3 Set the MANDATORY SHUT-IN TIME to at least twice the time required to build enough pressure to surface the plunger. For example, if a well usually takes 2 hours to build enough pressure to surface the plunger, set MANDATORY SHUT-IN TIME to 4 hours or more.

Note: MANDATORY SHUT-IN TIME must be greater than CLOSE TIME. If the plunger does not surface, MANDATORY SHUT-IN TIME replaces CLOSE TIME. MANDATORY SHUT-IN TIME is not in addition to CLOSE TIME.

If you are not using MANDATORY SHUT-IN TIME, set it to 00:00:00.

Pressure Safeguard Features

HIGH CLOSE PRESSURE AND HIGH OPEN PRESSURE=  SET HIGH

When the pressure reaches the HIGH CLOSE PRESSURE set point, the controller prevents the valve from opening and closes the valve if it is open.

The controller prevents the valve from opening until the pressure drops to the HIGH OPEN PRESSURE set point.



Example: The HIGH CLOSE PRESSURE setting is 250 psi, and the HIGH OPEN PRESSURE setting is 200 psi. The controller closes the valve when the pressure reaches a high of 250 psi. The controller waits until the pressure drops to 200 psi to open the valve.

If you don't want the controller to monitor high pressure, set HIGH CLOSE PRESSURE and HIGH OPEN PRESSURE to 9999 psi.

To set the HIGH CLOSE PRESSURE and HIGH OPEN PRESSURE:



- 1 Press SET HIGH.

The status display shows:
HIGH PRES 0250

- 2 Press  or  to change the HIGH CLOSE PRESSURE value.

- 3 Press SET to store the value.

The status display shows:
HIGH OPEN 0200

- 4 Press  or  to change the HIGH OPEN PRESSURE value.

- 5 When you are done, press SET to store the value.

LOW CLOSE PRESSURE AND LOW OPEN PRESSURE =  SET LOW

When the pressure reaches the LOW CLOSE PRESSURE set point, the controller prevents the valve from opening and closes the valve if it is open.

The controller prevents the valve from opening until the pressure rises to the LOW OPEN PRESSURE set point.

Example: The LOW CLOSE PRESSURE is 125 psi, and the LOW OPEN PRESSURE is 135 psi. The controller closes the valve when the pressure reaches a low of 125 psi. The controller waits until the pressure reaches 135 psi to open the valve.



If you don't want the controller to monitor low pressure, set LOW CLOSE PRESSURE and LOW OPEN PRESSURE to 0 psi.

To set the LOW CLOSE PRESSURE and LOW OPEN PRESSURE:

- 1 Press SET LOW.

The status display shows:



```
LOW PRES  0125
```

- 2 Press  or  to change the LOW CLOSE PRESSURE value.

- 3 Press SET to store the value.

The status display shows:

```
LOW OPEN  0135
```

- 4 Press  or  to change the LOW OPEN PRESSURE value.

- 5 When you are done, press SET to store the value.

DELAY CLOSE TIME =  SET 

If you are using HIGH CLOSE PRESSURE, LOW CLOSE PRESSURE, or both, you can use DELAY CLOSE TIME to keep the controller from shutting in the well if there is a brief spike or drop in pressure. Brief spikes in pressure often occur when the controller opens the well after an extended shut-in period.

When the controller opens the valve, it does not close the valve in response to pressure input during the DELAY CLOSE TIME period.

Example:

- DELAY CLOSE TIME is set at 6 minutes.
- When the controller opens the well and starts to count down the OPEN TIME, there is a 3 to 5 minute spike in pressure.
- For the first 6 minutes of the OPEN TIME countdown, the controller does not shut in the well even if the HIGH CLOSE PRESSURE is reached.
- After 6 minutes, the controller shuts in the well if the high pressure condition still exists.

If you are not using the pressure safeguard features, set DELAY CLOSE TIME to 00:00:00.

CALIBRATING THE TRANSDUCER

The controller uses a transducer to monitor pressure.

Calibrate Transducer for Low

Pressure =  CALIBRATE LOW

- 1 With the transducer in place, remove pressure.

- 2 Press CALIBRATE.

The status display shows:

```
CALIBRATE XDUCER
```

- 3 Press LOW.

The status display shows:

```
TRANSDUCER ZERO?
```

```
UP=YES   DOWN=NO
```

- 4 Press .

Calibrate Transducer for High

Pressure =  CALIBRATE HIGH

- 1 Apply pressure to the transducer.

- 2 Press CALIBRATE.

The status display shows:

```
TRANSDUCER ZERO?
```

- 3 Press HIGH.

The status display shows:

```
0000
```

```
TRANS PRESSURE
```

- 4 After applying pressure, measure with an accurate pressure gauge to obtain the pressure value for the next step.

- 5 Press  or  to enter the pressure value.

- 6 Press SET.

OPERATING THE VALVE MANUALLY

Open the Valve = OPEN

- Press OPEN.

If the current pressure is out of range, the controller either:

- Closes the valve immediately, **or**
- If a DELAY CLOSE TIME is set, goes to DELAY CLOSE TIME.


Close the Valve = CLOSE

- Press CLOSE.

CLOSE overrides all programmed functions such as OPEN TIME and DELAY TIME (SALES).

CONTROLLER REPORTS

Display Reports = READ

- 1 To display 4 of the the PCS High-Low Timer Controller's 5 reports, press READ .

The status display shows the first report: Valve and Plunger Counts History.

- 2 To display each of the next 3 reports, press READ again.
- 3 After you have displayed the last report, Plunger Travel Time History, press READ to display the current well status.

Valve and Plunger Counts History

This report shows how many times the valve opened and how many times the plunger arrived while the valve was open.

Example:

```
VALVE CNT: 0013
PLUNGER: 0010
```

In this example, the valve opened 13 times, and the plunger arrived 10 times while the valve was open.

Valve Total Time Report

This report shows 2 times of up to 999 hrs., 59 min., 59 sec. accumulated since the report was last cleared:

- TOT OPN: Total time that the valve was open. OPEN TIME, DELAY TIME (SALES), and DELAY CLOSE TIME are accumulated under TOT OPN time.
- TOT CLS: Total time that the valve was closed. CLOSE TIME and MANDATORY SHUT-IN TIME are accumulated under TOT CLS time.

Example:

```
TOT OPN016:31:13
TOT CLS040:21:50
```

In this example, the total valve open time is 16 hrs., 31 min., 13 sec. The total valve close time is 40 hrs., 21 min., 50 sec.

Battery Status Report

This report shows the current voltage of the battery.

Example: BATTERY: 6.34

Plunger Travel Time History

This report provides information about the 10 most recent plunger travel times.

Use the READ button to scan through the report.

- PLT-0 shows the most recent plunger run during OPEN TIME.
- PLT-1 shows the 2nd most recent plunger run during OPEN TIME.
- PLT-9 shows the 10th most recent plunger run during OPEN TIME.
- PLT-0 NO PLUNGER shows the most recent plunger run: the plunger did not surface.

The time shows how long the plunger took to surface.

Example: PLT-0 000:08:15


In this example, the plunger surfaced after 8 minutes and 15 seconds of OPEN TIME.

Software Version Report = READ CLEAR

This report displays the chip and software version numbers.

Example: VERSION 126-04

Clear Report Values = SET

- 1 To clear the Valve and Plunger Counts History, and the Valve Total Time Report, press SET .

The display status shows:

```
PRESS CLEAR TO
CLEAR ALL TOTALS
```

- 2 Press CLEAR.

Note: To return to the current well status without clearing report values, press READ.

TROUBLESHOOTING

If you have a problem with the controller, try these troubleshooting tips. If they don't solve the problem, call your PCS sales and service representative.

Controller Display Problems

Controller won't turn on or controller's display is blank

The controller never sleeps. The display should never be blank while the controller is on.

- 1 With a screwdriver, move the power switch to off (see page 2).
- 2 Wait a few seconds and then move the power switch back to on.

If the display remains blank, go to Test 1.

Test 1: Check fuse.

- 1 With a screwdriver, move the power switch to off.
- 2 Remove the controller's faceplate.
- 3 Remove the fuse from its yellow casing.
 - If the fuse is defective, replace it with a 5 amp, 250 volt fuse. The controller's box contains 1 extra fuse. When you are done, replace the controller's faceplate and move the power switch to on.
 - If the fuse is OK, go to Test 2.

Test 2: Check batteries and wire connections.

The battery life is approximately 1 to 3 years.

The controller has a safety feature. If the battery voltage is low, the controller closes the motor valve and shuts in.

- 1 Check the battery voltage with a volt meter. Replace the battery if it is below 6 volts.
- 2 Check the battery wires for loose connections.
- 3 Replace the controller's faceplate.
- 4 With a screwdriver, move the power switch to on.
 - If the display is still blank, call your PCS sales and service representative.
- 5 If the controller's display is now working and if you replaced the battery, check the manufacture date on the battery. If the battery is less than 3 years old, check the solar panel. Go to Test 3.

Test 3: Check solar panel.

- 1 Disconnect the solar panel from the terminals. Use a volt meter to obtain the voltage and amperage. A good solar panel reading in full sun exposure is 10.7 volts and 350-430 mA.
- 2 If the solar panel is defective, change it.
- 3 Check the solar panel installation.
 - The solar panel should face south.
 - The tilt of the solar panel should be the latitude of the location plus 15 degrees. Example: if the latitude is 45 degrees, tilt the solar panel 60 degrees with respect to the horizon.
 - The element should be free from dirt, oil, and so on.
 - Check for cracks in the solar panel.
 - Check whether the solar panel is shaded during any part of the day. If it is, re-position it to receive the most sunlight each day.
- 4 Check the solar panel wire connection.
- 5 Make sure the power switch is on. The controller's display should be on.
- 6 If the solar panel tests good, but the batteries are not lasting as long as they should, call your PCS sales and service representative.

Controller's display is scrambled

Static electricity may have made the controller lose its place in the program cycle.

- 1 With a screwdriver, move the power switch to off (see page 2). Wait a few seconds and then move the power switch back to on.
- 2 If the display is still scrambled after this test, call your PCS sales and service representative.

Program Cycle Problems

Controller won't run program cycle or won't open motor valve

Test 1: Check battery and wire connections.

The battery life is approximately 1 to 3 years.

The controller has a safety feature. If the battery voltage is low, the controller closes the motor valve and shuts in.

- 1 Press READ \leftarrow READ READ and check the battery's voltage.
Replace the battery if it is below 6 volts.
- 2 With a screwdriver, move the power switch to off (see page 2).
- 3 Remove the controller's faceplate.
- 4 Check the battery wires for loose connections.
- 5 Make sure the fuse is good.
- 6 Replace the controller's faceplate.
- 7 With a screwdriver, move the power switch to on.
- 8 Press OPEN and CLOSE a few times to make sure the solenoid is shifting.
 - If the controller is now operating properly and if you replaced the battery, check the manufacture date on the battery. If the battery is less than 3 years old, check the solar panel. Go to Test 2.
 - If the controller still won't run the program cycle or open the motor valve, go to Test 3.

Test 2: Check solar panel.

- 1 Disconnect the solar panel from the terminals. Use a volt meter to obtain the voltage and amperage. A good solar panel reading in full sun exposure is 10.7 volts and 350-430 mA.
- 2 If the solar panel is defective, change it.
- 3 Check the solar panel installation.
 - The solar panel should face south.
 - The tilt of the solar panel should be the latitude of the location plus 15 degrees. Example: if the latitude is 45 degrees, tilt the solar panel 60 degrees with respect to the horizon.
 - The element should be free from dirt, oil, and so on.
 - Check for cracks in the solar panel.
 - Check whether the solar panel is shaded during any part of the day. If it is, re-position it to receive the most sunlight each day.
- 4 Check the solar panel wire connection.
- 5 Make sure the power switch is on. The controller's display should be on.
- 6 If the solar panel tests good, but the batteries are not lasting as long as they should, call your PCS sales and service representative.

Test 3: Check solenoid (shift valve).

- 1 Press OPEN.
- 2 If the solenoid won't open, clean the supply hoses and puck inside the solenoid valve.
- 3 Retest.
- 4 If they are good, replace the puck or the entire solenoid.

Test 4: Check gas supply pressure, filter, and regulator(s).

- 1 Check the gas supply pressure to the motor valve. The recommended supply pressure is 25-35 psi. If the pressure is too low or too high, it will not open the motor valve.
- 2 Check the filter and regulator(s) for debris and ice.
- 3 If the controller is still not working properly, call your PCS sales and service representative.

After CLOSE TIME has counted down to zero, controller goes directly to DELAY TIME (SALES)

- Press READ \leftarrow READ READ READ to check the Plunger Travel Time History. If the display shows a few seconds of plunger travel time, such as PLT-00:00:03, the controller went through the opening and closing part of the program even though the plunger did not arrive.

Test 1: Check the sensor wire connections.

- 1 If a wire was spliced in because of the distance between the controller and the sensor, check the connection where the wire was spliced. The wire may be corroded and causing a short.
- 2 If the sensor wire connections are good, go to Test 2.

Test 2: Check controller by disconnecting the sensor.

- 1 Remove the controller's faceplate.
- 2 Disconnect the sensor's wires from the terminals on the inside of the controller's faceplate:
 - Disconnect the black wire from the GND terminal.
 - Disconnect the green wire from the AUX terminal.
- 3 Press OPEN. The controller should count down the OPEN TIME.
 - If the controller goes from OPEN TIME to DELAY TIME (SALES), the controller's circuit board is not working properly. Call your PCS sales and service representative.
 - If the controller does not go to DELAY TIME (SALES), continue with the next step.
- 4 Use a wire to short the AUX and GND terminals. The controller is OK if it goes to DELAY TIME (SALES).
- 5 Reconnect the sensor to the terminals. Make sure the wires are connected correctly.
- 6 Replace the controller's faceplate.




Test 3: Check plunger.

- 1 Check whether the plunger is stuck in the lubricator.
- 2 If the plunger is not stuck in the lubricator, go to Test 4.

Test 4: Check the sensor.

- 1 Remove the sensor from the wellhead.
- 2 Press OPEN.
 - If the controller counts down the OPEN TIME, go to step 3.
 - If the controller goes straight into DELAY TIME (SALES), there is a short. Either the wire going to the controller is bad, or the sensor must be replaced. Go to step 5.
- 3 Hold the sensor in your hand, and move a steel wrench through the sensor band.
 - If the controller goes to DELAY TIME (SALES), the problem may be a wellhead electrical current.
 - Go to step 4.
- 4 Possible causes of a wellhead electrical problem:
 - The sensor or sensor wire may be defective, or
 - The well may need the newest version of PCS' 2-coil sensor. This sensor is available in 2-wire or 3-wire connections.
- 5 Call your PCS sales and service representative.

Plunger has surfaced, but OPEN TIME does not go to DELAY TIME (SALES)

- Make sure sensor is turned on: Press READ . The controller's display should show SENSOR: ON.
 - If the display shows SENSOR: ON, go to Test 1.
 - If the display shows SENSOR: OFF, press SET  and then press . Go to Test 2, step 2.

Test 1: Check controller by disconnecting the sensor.

- 1 Remove the controller's faceplate.
- 2 Disconnect the sensor's wires from the terminals on the inside of the controller's faceplate:
 - Disconnect the black wire from the GND terminal.
 - Disconnect the green wire from the AUX terminal.
- 3 Press OPEN. The controller should count down the OPEN TIME.
 - If the controller goes from OPEN TIME to DELAY TIME (SALES), the controller's circuit board is not working properly. Call your PCS sales and service representative.
 - If the controller does not go to DELAY TIME (SALES), continue with the next step.
- 4 Use a wire to short the AUX and GND terminals. The controller is OK if it goes to DELAY TIME (SALES).
- 5 Reconnect the sensor to the terminals. Make sure the wires are connected correctly.
- 6 Replace the controller's faceplate.

Test 2: Check sensor.

- 1 Press OPEN.
- 2 Run a steel wrench along the back of the sensor.
 - If the controller goes to DELAY TIME (SALES), the sensor is OK.
 - If the controller does not go to DELAY TIME (SALES), call your PCS sales and service representative.

Test 3: Check sensor alignment.

- 1 Realign the sensor by 90 degrees.
Example: If the sensor is aligned on the north or south side, realign it on the east or west side.
- 2 If realigning the sensor does not solve the problem, call your PCS sales and service representative.

Solenoid (Shift Valve) Problems

Solenoid (shift valve) does not operate at any time or does not operate at night

If the solenoid does not operate at night, the solar panel may be powering the controller during the day.

Test 1: Check batteries and wire connections.

The battery life is approximately 1 to 3 years.

The controller has a safety feature. If the battery voltage is low, the controller closes the motor valve and shuts in.

- 1 Press READ \leftarrow READ READ and check the battery's voltage.
Replace the battery if it is below 6 volts.
- 2 Check the battery wires for loose connections.
- 3 Make sure the fuse is good.
- 4 Replace the controller's faceplate.
- 5 With a screwdriver, move the power switch to on.
- 6 Press OPEN and CLOSE a few times to make sure the solenoid is shifting.
 - If the solenoid is now operating properly and if you replaced the battery, check the manufacture date on the battery. If the battery is less than 3 years old, check the solar panel. Go to Test 2.
 - If the solenoid still does not operate, go to Test 3.

Test 2: Check solar panel.

- 1 Disconnect the solar panel from the terminals. Use a volt meter to obtain the voltage and amperage. A good solar panel reading in full sun exposure is 10.7 volts and 350-430 mA.

- 2 If the solar panel is defective, change it.
- 3 Check the solar panel installation.
 - The solar panel should face south.
 - The tilt of the solar panel should be the latitude of the location plus 15 degrees. Example: if the latitude is 45 degrees, tilt the solar panel 60 degrees with respect to the horizon.
 - The element should be free from dirt, oil, and so on.
 - Check for cracks in the solar panel.
 - Check whether the solar panel is shaded during any part of the day. If it is, re-position it to receive the most sunlight each day.
- 4 Check the solar panel wire connection.
- 5 Make sure the power switch is on. The controller's display should be on.
- 6 If the solar panel tests good, but the batteries are not lasting as long as they should, call your PCS sales and service representative.

Test 3: Check solenoid (shift valve).

- 1 Press OPEN.
- 2 If the solenoid won't open, clean the supply hoses and puck inside the solenoid valve.
- 3 Retest.
- 4 If they are good, replace the puck or the entire solenoid.

PREVENTIVE MAINTENANCE

Battery

Always replace the controller's battery when it is 3 years old.

You can get more information
about the PCS products at: pcslift.com



3771 Eureka Way
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Warranty: Production Control Services, Inc. warrants all PCS manufactured equipment to be free of defects in material and workmanship for ONE YEAR from date of purchase by original buyer only. Warranty is completely void if abuse, neglect, misuse or misapplication is the cause of the malfunction. Determination of abuse or damage to be made solely by PCS.

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