# Operating the Pump

Power Sources

AA Batteries

To power the CADD®-Solis VIP pump, it is recommended that four AA, 1.5 volt non-rechargeable alkaline batteries are used or the CADD®-Solis pump rechargeable battery pack.

Note: Mixing new and used batteries is not recommended because it may affect low battery alarm times. Always use four new batteries when replacing depleted batteries.

The pump retains all programmed values when the batteries are removed, but the batteries must be in place during delivery. If the batteries are removed while the pump is delivering, and an AC adapter is connected, delivery stops. If an AC adapter is not connected and the batteries are removed, delivery stops and the pump loses power.

AC Adapter

The AC adapter can be used as an alternate source of power for the pump and/or to recharge the rechargeable battery pack. The pump requires AA batteries or the rechargeable battery pack to be installed as a backup while using the AC adapter.
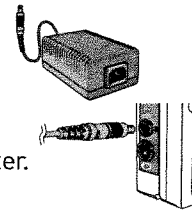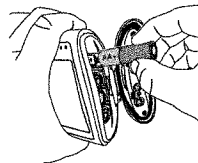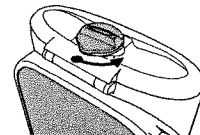
Rechargeable Battery Pack

The rechargeable battery pack is an alternative to using four AA batteries. The rechargeable battery pack can be recharged with the AC adapter, either inside or outside of the pump.
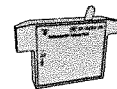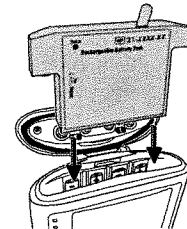
Installing Batteries or a Battery Pack

1. Make sure the pump is stopped and powered off. Using your fingers, the pump key, or a coin, turn the knob on the battery door counterclockwise to open the battery door.

2. Hold the pump at an angle and place four AA batteries in the pump, from the bottom up. Match the + and − markings on the new batteries with the markings on the pump.
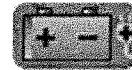
OR

Or

If using a rechargeable battery pack, insert it into the pump as shown.

3. Close the battery door and using your fingers, the pump key, or a coin, turn the knob on the battery door clockwise to lock it.

Note: If you put the batteries in backwards, the pump will not power up. Check the batteries, making sure to match the + and – markings.

AA batteries   *AA batteries with AC adapter*   *Rechargeable battery pack*   *Rechargeable battery with AC adapter*

Replacing the Battery Door

If the battery door is removed or needs replacing, simply snap the door onto the bar that is located on the pump.
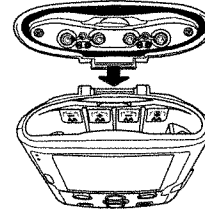
Power Up

Press and hold the power switch to turn the pump on. The pump starts the power up sequence during which it performs various self-tests and tests for alarm conditions.

> If any issues are found while the pump is performing the self tests, alarms will sound

> If you believe there is a problem, remove the pump from service and contact Smiths Medical Customer Service

CAUTION: If the power up results in an error message indicating that the protocol library was lost, do not proceed with using the pump. Follow your facility's procedures for downloading protocol libraries.

Power Down

Press the power switch to turn the pump off. You must acknowledge the "Power down?" prompt by selecting **Yes**. The pump then powers down.

Cassettes

The cassette is part of the CADD™ medication cassette reservoir or CADD® administration set that attaches to the bottom of the pump.

Notes:

> *A CADD® administation or extension set with free-flow protection must be used*

> *A CADD® high volume administration set is required for rates above 250 mL/hr*
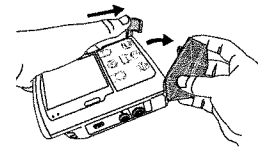
Removing a Cassette

1. Make sure the pump is stopped before removing the cassette

2. Close the tubing clamp

3. If locked, insert the pump key and turn the cassette/keypad lock counter-clockwise into the unlocked position. "Cassette Unlocked" briefly appears in the status bar.

   Note: Only PCA infusions require the cassette to be locked in order to run the pump.
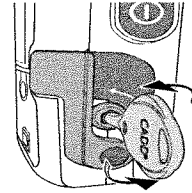
4. Push down on the cassette latch until cassette detaches

Attaching a Cassette

Obtain a new, filled CADD™ medication cassette reservoir or CADD® administration set attached to a flexible IV bag.

Before attaching a new cassette, make sure the pump is powered on. Once the cassette is attached, the pump automatically displays screens that allow you to verify the cassette type, prime the fluid path, reset the reservoir volume, review pump settings, and/or start the pump.

1. Clamp the tubing

2. Make sure the cassette latch is unlocked then open the latch
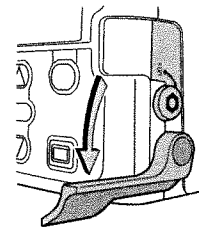
3. Insert the cassette hooks into the hinge pins on the bottom of the pump, then swing the cassette to the latch position
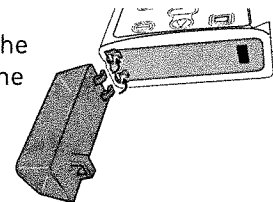
4. Place the pump upright on a firm, flat surface, and then press down on the latch side of the pump so the cassette fits tightly against the pump
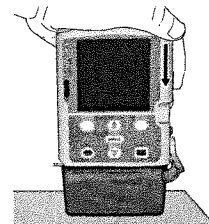
5. Lift the cassette latch handle into the closed position. If you experience resistance when lifting the cassette latch handle, do not force the latch. If the pump doesn't latch easily, unlatch the cassette and repeat the process. A message briefly appears in the status bar so you can verify the type of cassette you have attached.

6. Verify the cassette is attached correctly. Looking from left to right, the top of the cassette should line up evenly with the bottom of the pump and be securely attached. If an uneven gap exists, unlatch the cassette and repeat the process.

7. If you wish to lock the cassette, insert the pump key into the cassette/keypad lock and turn clockwise into the locked position. "Cassette Locked" appears briefly in the status bar.

   Note: For PCA infusions, the cassette must be locked in order to start the pump.
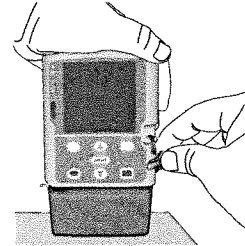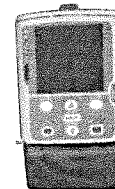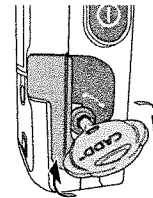
Prime Tubing

When priming the fluid path, the tubing downstream of the pump is filled with fluid, removing any air bubbles. Prime the tubing before connecting it to the patient's infusion set or indwelling catheter.

Fluid delivered by priming is subtracted from the reservoir volume, but is not added to the amount given because this fluid is not delivered to the patient. Priming is not allowed with the reservoir volume is 0 mL.

Notes:

> *The air detector is disabled while the pump is priming*

> *If the fluid path contains an air eliminating filter, it is acceptable for air bubbles to be present on the vent side of the filter.*

Prime Tubing After Changing a Cassette

Note: If you are not changing the cassette but wish to prime the fluid path, use the PrimeTubing, No Cassette Change task.

1. When a cassette is attached after the pump is powered on, a "Prime Tubing?" screen always appears

Prime tubing?

If tubing has been pre-primed choose 'No'. Contact health care provider if unsure.

No   Yes

2. Select **Yes**

Prime tubing?

No   Yes

3. Unlock the keypad, if required

4. If you have not already done so, disconnect the tubing from the patient, open the clamps and select **Prime**

Disconnect tubing from patient, open clamps. Then press 'Prime'.

Exit   Prime

5. Stop priming at any time by selecting **Stop Priming**. Priming automatically stops after 10 mL (or 20 mL if a high volume set is attached) are primed. Continue priming as needed.

Amount Primed
2.5   mL

Press 'Stop Priming' when complete

Stop Priming

Prime Tubing, No Cassette Change

1. Stop the pump if it is running

2. In the Tasks menu press ▲ or ▼ until Prime Tubing is highlighted, and then press **Select**

3. Unlock the keypad, if required

4. If you have not already done so, disconnect the tubing from the patient, open the clamps, and select **Prime**

5. Stop priming at any time by selecting **Stop Priming**. Priming automatically stops after 10 mL (or 20 mL if a high volume set is attached) are primed. Continue priming as needed.

Start the Pump

Infusion begins when the pump starts. When the pump is running, "Running" appears on the status bar, the graphic on the home screen is green, and the green indicator light flashes. If the pump will not start, a message appears on the display.

Note: Before starting the pump, be sure the tubing is primed and the pump is connected to the patient according to your facility's standards of practice.

1. Press Stop/Start.

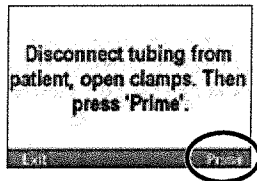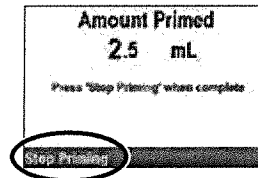   *Note: If the delivery settings have not been reviewed and the values have not been accepted, you must do so before the pump will run. (See instructions to review pump settings on page 12.) If a step or taper infusion was previously stopped and delivery was not completed (the infusion was not fully delivered), a screen appears with the message, "Infusion was interrupted before completion. Finish interrupted infusion or start from beginning with new bag." Select New Bag to reset the reservoir volume and reset the infusion. Or, select Finish to resume the infusion from the point it was at when it was last running.*

2. When "Start Pump?" appears, select **Yes**

3. The pump begins running. The red "Stopped" message in the status bar changes to a green "Running" message, and "Infusion is starting now..." appears briefly on the screen.

    If a delayed start was programmed, the display turns green and a message that the infusion is delayed appears briefly on the screen. Then the "Delayed Start" screen appears along with the time remaining until the infusion starts. The pump infuses at the programmed KVO rate.

Stop the Pump

Stopping the pump stops delivery. After the pump is stopped, "Stopped" appears in red on the status bar, the graphic on the home screen is red, the amber indicator light flashes, and the green indicator light is off.

1. Press **Stop/Start**. In a PCA protocol, if a PCA dose is in progress, "Stop PCA dose?"appears. Select **Yes** to stop the dose. In a PCA protocol, if a clinician bolus is in progress, "Stop clinician bolus?" appears. Select **Yes** to stop the bolus. A confirmation screen appears stating, "Clinician bolus stopped." Select **OK** to continue. In a taper protocol, "Taper down instead?" appears. Select **No** to stop the infusion.

2. When "Stop Pump?" appears, select **Yes**

3. The pump stops running. The green "Running" message in the status bar changes to a red "Stopped" message, and "Pump is stopping..." appears briefly on the screen.

Reset Reservoir Volume

The reservoir volume setting indicates the amount of fluid contained in the reservoir. Once this number is set, the pump keeps track of how much fluid has been delivered and adjusts the reservoir volume setting accordingly.

Note: If you are running a step or taper therapy, resetting the reservoir volume also resets the infusion. When you restart the pump, delivery starts at the beginning of the infusion duration.

To reset the reservoir volume after attaching a new cassette:

1. The pump displays a question asking if you wish to reset the volume to the default amount. If this screen does not appear, the reservoir volume may already be reset.

2. If you are running a step or taper therapy, you also see, "Infusion will be reset". Select **Yes** to reset the volume and infusion. Select **No** to keep the reservoir volume at the current setting.

To reset the reservoir volume without changing the cassette:

1. Stop the pump if it is running

2. In the Tasks menu, press ▲ or ▼ until Reset Reservoir Volume is highlighted, and then press **Select**

3. The pump displays a screen asking you to confirm that you want to reset the reservoir volume. Select **Yes**.

Tasks and Advanced Tasks

Tasks Menu Overview

The Tasks menu leads to most of the pump's operating functions. Some items in the Tasks menu will require a security code to view/edit the item.

Task Menu Function	Description on Page
Reset Reservoir Volume	28
Taper Down Now (Taper therapy)	22
Set Delayed Start (all therapies except Intermittent)	10
Set Next Dose Start Time (intermittent therapy)	10
Prime Tubing	26
View Delivery Settings	11
Display and Sound Settings	29
View Reports	32
View Advanced Tasks	33

References and Troubleshooting

Alarms and Messages

The pump can sound multiple alarms. For many of the alarms, you have the option to "acknowledge" or "silence."

> Acknowledge—the alarm clears from the screen

> Silence—the alarm stays on the screen, but is silenced for 2 minutes before it sounds again

The alarm continues until it is acknowledged or resolved. The alarms may have different sounds depending on the sound theme selected. There are three different sound themes for the alarms and beeps that the pump makes: standard, intense, and distinctive.

Types of Alarms

> **System Fault Alarm**

  If this screen appears, an unrecoverable error may have occurred, such as a hardware or software fault. The amber indicator light is continuously illuminated during these conditions and is accompanied by an audible two-tone alarm. If a system fault occurs, the fault should be reported to Smiths Medical Customer Service at 1-800-258-5361.

  To clear this alarm, remove power from the pump by opening the battery door, and if necessary, removing the AC power. Close the battery door and turn the pump back on. If the error code does not repeat, Customer Service may suggest continued use of the pump. If the error is persistent, the pump must be returned for service.

  Note: Document the error numbers displayed on the system fault screen to help Customer Service identify the problem.

> **High Priority Alarm**

  A high priority alarm always pauses or stops the pump if it is running. The alarm is accompanied by a red screen, and it persists until acknowledged by the press of a key on the pump or until the condition that triggered the alarm goes away (for example, high pressure going down). The alarm can be silenced with a key press and will sound again after two minutes if the alarm condition still exists.

> **Medium Priority Alarm**

A medium priority alarm does not stop the pump if it is running. The alarm is accompanied by an amber screen, and it persists until acknowledged by the press of a key on the pump or until the condition that triggered the alarm goes away. The alarm can be silenced with a key press and will sound again after two minutes if the alarm condition still exists.

> **Low Priority Alarm**

A low priority alarm does not stop the pump if it is running. The alarm is accompanied by a blue screen, and it persists for five seconds unless it is acknowledged by the press of a key or the condition that triggered the alarm goes away before the five seconds have passed. (Some low priority alarms persist for longer than five seconds.)

> **Informational Message**

An informational priority message does not stop the pump if it is running. This message appears in the status bar, and does not display a new alarm screen. It persists for five seconds and may be silent, requiring no acknowledgement. Some informational examples are "Cassette Locked," and "Cassette Unlocked".

Alarm Help Screens

Additional information may be displayed when certain alarms occur. The help screens describe what you can do to try to solve the current problem that is causing the alarm.

1. When an alarm occurs, select **Silence** to quiet the alarm

2. If help screens are available for the alarm, "Help" appears above the right soft key. To view the help screens, select **Help**.

3. Follow the applicable instructions provided on the help screen. To page through all available help screens, press **Next** repeatedly. Press **Acknowledge** at any time to exit Help.

4. "Retry Help" appears when no additional help steps are available. To page through the help screens again, press **Retry Help**. The Alarm screen reappears as in Step 2 above. Repeat Steps 2 and 3. When the alarm clears, the help screens will no longer be displayed.

Troubleshooting

Issue	Possible Solution
A continuous two-tone alarm is sounding, and the amber light is lit or flashing.	Delivery has stopped. Read the message on the display and refer to the list of messages in the table below. If the display is blank or contains random characters, the 4 AA batteries or the rechargeable battery pack may be depleted. Install 4 new AA batteries or a rechargeable battery pack.
The pump is sounding 2 beeps every 2 seconds, and the amber light is flashing.	Look at the message on the display and refer to the list of messages in the table below.
Three beeps sound every 5 minutes.	This is a reminder that the pump is stopped.
After installing 4 new AA batteries and powering up the pump, no screen appears and no beep sounds.	The batteries may be installed incorrectly. Review the procedure for installing batteries. Be sure to match the polarity (+ and –) markings inside the battery door with the markings on the batteries. If there is still no power, the batteries may be completely depleted.

Alarms and Messages, Alphabetical List

A more detailed list of alarms and messages is included in the Operator's Manual.

Alarm / Message	Alarm Priority	Description / Corrective Action
(Screen is blank and alarm is sounding)	High	The pump was delivering and the batteries were removed or the battery door was opened. The pump lost power and is no longer delivering. Clear the alarm by turning the pump back on, or the alarm will stop after the power has been off for a minimum of 2 minutes.
A setting was edited, but not saved, and the edit was lost.	Medium	A parameter was being manually edited, but it was not saved and the pump reverted to the home screen. Select **Acknowledge** to clear the alarm and if appropriate, edit the parameter and save.
Air in-line detected. Press **Acknowledge** then prime tubing.	High	The air detector has detected air in the fluid path. The fluid path may contain air bubbles. The pump was delivering and is now stopped and will not run. Select **Acknowledge** to clear the alarm. If the fluid path contains air bubbles, close the clamps and disconnect the fluid path from the patient. Follow the instructions in the Operator's Manual for removing air by priming. Restart the pump.
Battery depleted. Pump stopped.	High	The pump was delivering but is now stopped and the battery power is too low to operate the pump. If the AC adapter is attached, select **Acknowledge** to clear the alarm. Remove the batteries. Install 4 new AA batteries or a rechargeable battery pack. To start delivery, good batteries must always be installed even when an external source of power is connected. If appropriate, restart the pump.
Battery low. Replace battery.	Low	The rechargeable battery pack or the 4 AA batteries are low but the pump is still operable. Select **Acknowledge** to clear the alarm, or the alarm will automatically clear after 5 seconds. Recharge or change the rechargeable battery pack or replace the 4 AA batteries soon.

Alarm / Message	Alarm Priority	Description / Corrective Action
Battery removed. Pump will not run.	Medium	The pump is stopped and the rechargeable battery pack or the 4 AA batteries were removed, but the pump is still powered by the AC adapter. Select **Acknowledge** to clear the alarm. Install a fully charged rechargeable battery pack or 4 new AA batteries. To start delivery, good batteries must always be installed, even when an external source of power is connected.
Cannot start pump with a depleted battery.	Medium	The battery power is too low to operate the pump. To start delivery, good batteries must always be installed even when an external source of power is connected. Select **Acknowledge** to clear the alarm. Install 4 new AA batteries or a fully charged rechargeable battery pack. If appropriate, start the pump.
Cannot start pump with a reservoir volume of zero.	Medium	The reservoir volume in the pump is set to zero. Select **Acknowledge** to clear the alarm. Edit or reset the reservoir volume to the correct value. If appropriate, start the pump. See page <?> for more information about resetting the reservoir volume.
Cannot start pump without a latched cassette.	Medium	The pump will not start without a cassette attached. Select **Acknowledge** to clear the alarm. Make sure a cassette is properly attached, then start the pump. **NOTE:** This alarm has associated help screens.
Cassette not attached properly. Reattach cassette.	High	The cassette is not properly attached. Close the tubing, remove the cassette, then reattach. If the alarm persists, replace the cassette. **NOTE:** You must remove the cassette to continue.
Cassette was partially unlatched. Fully remove and reattach the cassette.	Medium	The cassette was not completely removed from the pump before it was reattached and the pump's sensors are not able to detect the cassette type. Remove the cassette and reattach it, then verify the cassette type in the pump display. If the alarm persists, replace the cassette. **NOTE:** You must remove the cassette to continue.
Check for empty tubing or reservoir. Pump stopped.	High	The tubing beneath the pump may not contain fluid, or the fluid container may be empty. The pump is stopped and will not run. Select **Acknowledge** to clear the alarm. Check to see if the fluid container is empty. If fluid is present in the reservoir, clamp the tubing, remove the cassette, and check for air in the tubing. If the alarm persists, remove the pump from service and contact Customer Service to return the pump for service.
Dose is now overdue. Pump is stopped.	Medium	The pump is stopped and a dose is overdue for its scheduled delivery. Select **Acknowledge** to clear the alarm, and then start the pump.

Alarm / Message	Alarm Priority	Description / Corrective Action
Downstream occlusion. Clear occlusion between pump and patient.	High	The pump has detected high pressure, which may be resulting from a downstream blockage, a kink in the fluid path, or a closed tubing clamp. Delivery is paused and will resume if the occlusion is removed. Remove the obstruction to resume operation. Or select **Stop Pump** to stop the pump and silence the alarm for 2 minutes, then remove the obstruction and restart the pump. **NOTE:** To reduce the potential for a bolus delivery after an occlusion, perform the following: 1. Select **Stop Pump** to stop the pump. 2. Close the distal clamp. If the distal clamp is the cause of obstruction, keep it closed and continue with step 4. 3. Remove the obstruction. 4. Detach the CADD™ medication cassette reservoir or CADD® administration set from the pump. 5. Open the Flow Stop feature, if present. 6. Wait 10 seconds. 7. Close the Flow Stop feature, if present. 8. Reattach the CADD™ medication cassette reservoir or CADD® administration set to the pump. 9. Open the distal clamp. 10. Review the pump program. 11. Restart the pump. **NOTE:** This alarm has associated help screens.
High flow admin set required. Remove cassette.	High	The delivery-specific parameters are programmed to values that cause the maximum rate of delivery to exceed 250 mL/hr. NOTE: You must remove the standard volume cassette to continue.
High volume admin set not allowed. Remove cassette.	High	The CADD® high volume administration set cannot be used. The pump is stopped and will not run. **NOTE:** Remove the administration set to continue.
Infusion is now overdue. Pump is stopped.	Medium	The pump is stopped and the infusion is overdue for its scheduled delivery. Select **Acknowledge** to clear the alarm, and then start the pump.
Lock cassette to start pump.	Medium	PCA mode only. The cassette must be locked onto the pump before beginning delivery. Lock the cassette to clear the alarm and the pump will automatically start. **NOTE:** This alarm has associated help screens.
Pump does not have a protocol library.	Medium	The pump had a protocol library the last time it was powered on, but now it does not. This may happen if the pump was manually reverted to the factory default, recently had a software update, or if an attempt to install a protocol library failed. Select **Acknowledge** to clear the alarm and contact the CADD®-Solis system administrator to download a new protocol library.
Pump settings and patient data lost.	Medium	The pump reverted to the factory default. The pump was either manually reverted to this default, recently had a software update, or has not been in use for some time. Select **Acknowledge** to clear the alarm and contact the CADD®-Solis system administrator to reprogram the pump.