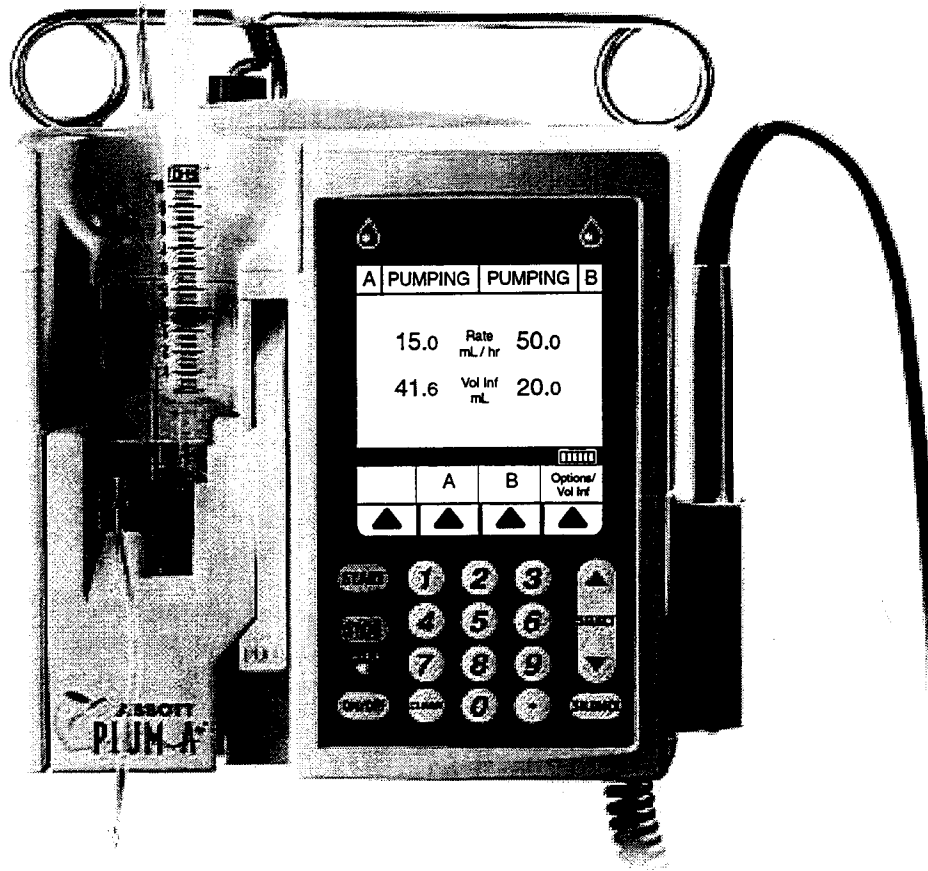


System Operating Manual



For use with List 11971-04



Abbott Laboratories
North Chicago, IL 60064
USA

430-95226-001 (Rev. 5/01)

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1.1 Product Overview

The Plum A+™ Volumetric Infusion System is designed to meet the fluid delivery requirements of today's evolving healthcare environments. The Plum A+ is a cassette based, two lines in and one line out, multi-function infusion pump. The pump can be used for standard, piggyback, or concurrent delivery. Therapy modes include:

- **Standard Infusions**
- **Multistep Programming**
- **Loading Dose**
- **Dose Calculation**

The Plum A+ is designed to deliver parenteral and enteral or epidural infusions over a broad range of infusion rates from multiple fluid container types.

The system includes a pumping module (hereafter called the pump) and an assortment of disposable IV sets (hereafter called a set), optional accessories, and this operator's manual.

The optional Barcode Reader allows drug name identification by scanning a provided list of drug names located on the Flash Tips & Barcode Directory.

A computer data port is also provided to interface with a host computer.

The Plum A+ is designed to be used in most areas of patient care, including, but not limited to:

<i>General Floor</i>	<i>Labor /Delivery/Post Partum</i>	<i>Burn Unit</i>
<i>Medical/Surgical</i>	<i>OR/Anesthesia</i>	<i>Hemodialysis</i>
<i>ICU/CCU</i>	<i>Post Op/Recovery</i>	<i>Oncology</i>
<i>Pediatrics</i>	<i>Cardiac Cath Lab</i>	<i>Mobile Intensive Care</i>
<i>Neonatology</i>	<i>Emergency</i>	<i>Nutritional</i>

Introduction

1.2 Conventions

This section describes the conventions used throughout this manual, as follows:

Convention	Application	Example
<i>Italic</i>	Reference to a section, figure, or table Function or mode specific instructions	(See Figure 3-1, Priming Cassette) <i>Primary Only:</i> Attach an empty container.
[ALL CAPS]	Keys or touchswitches on the device are described all caps in brackets	[START]
▲ [<i>Italic</i>]	Softkey Options	▲ [<i>Choose</i>]
Initial Caps lowercase	Screen displays and device labels (as appropriate)	Therapy Dose Calculation
Bold	Emphasis	...sets are supplied Sterile and are for....

WARNINGS, CAUTIONS, AND NOTES

Alert messages used throughout this manual are described below. Pay particular attention to these messages.

WARNING

A WARNING MESSAGE CONTAINS SPECIAL SAFETY EMPHASIS AND MUST BE OBSERVED AT ALL TIMES. FAILURE TO OBSERVE A WARNING MESSAGE IS POTENTIALLY LIFE THREATENING.

CAUTION: A CAUTION USUALLY APPEARS IN FRONT OF A PROCEDURE OR STATEMENT. IT CONTAINS INFORMATION THAT COULD PREVENT IRREVERSIBLE PRODUCT DAMAGE OR HARDWARE FAILURE. FAILURE TO OBSERVE A CAUTION COULD RESULT IN SERIOUS PATIENT OR USER INJURY.

Note: A Note highlights information that helps explain a concept or procedure.



This symbol directs the user to consult accompanying documents.

Note: Figures are rendered as graphic representations to approximate the actual product. Therefore, figures may not exactly reflect the product.

1.3 Definitions (General and Clinical)

TERM	MEANING
Alarms	Any condition of the pump that requires operator attention. These conditions will cause both audible and visible alarm indicators. Confirmation of the condition is usually required.
Backprime	Removal of air or fluid from the proximal line and cassette air trap. No fluid is delivered distal to the cassette during backpriming.
Bolus	A single uninterrupted discrete volume of fluid delivered in a discrete period of time.
Cassette Installed	A recognized cassette type installed with the door closed.
Concurrent Delivery	Simultaneous delivery of two fluids at independent flow rates.
Delivery Together	Delivery option which allows lines A and B to deliver concurrently.
Delivery Rate	The Delivery rate set by the operator.
Duration	The time period used to deliver a VTBI at a delivery rate set by the operator.
Error	A condition resulting when an operator attempts a non-acceptable input, such as an invalid key press.
Flow Rate	The resulting rate of fluid flow.
KVO (Keep Vein Open)	Delivery of fluid at a slow rate in order to prevent occluding the patient catheter.
Line A	Cassette Inlet line on the top center of the cassette when looking at the cassette from the front of the Device.
Line B	Cassette Inlet line on the top right of the cassette when looking at the cassette from the front of the Device.
Malfunction	Failure of the device to pass internal integrity or performance tests.
Piggyback	The mode where line B delivers first, followed by line A.
Pressure/Post Infusion Rate	Selected using ▲ [Options/Vol Inf], this mode is used to set KVO Rate and Distal Pressure Limit. It is also used to view Distal Pressure in real-time.
Units	A pre-determined delivery quantity adopted as a standard of measure.
VTBI	Volume To Be Infused – The amount of fluid remaining to be delivered to the patient.
Warning	An indication to advise the operator: <ul style="list-style-type: none"> a) Of a possibly hazardous condition such as a Low-Battery warning. b) That an attempt has been made to use a function in the wrong sequence, with the wrong values, or at the wrong time such as an Invalid Key Warning. c) That a function has been initiated in the proper manner such as a Valid Key Warning.



2.1 Features

The Plum A+ is a dual-line volumetric infusion system designed to meet the growing demand for hospital-wide, as well as alternate site and home healthcare, standardization. With its primary line, secondary line, and piggyback fluid delivery capability, the Plum A+ is suited for a wide range of medical/surgical and critical care applications. Full compatibility with LifeCare Plum Series administration sets and accessories and the LifeShield® needleless protection systems makes the Plum A+ a convenient and cost-effective infusion system.

THERAPIES

- Dose Calculation
- Loading Dose
- Multistep Programming

LINE PROGRAMMING OPTIONS

- Therapy Selection
- Nurse Call Back
- Delayed Start Setting
- Drug Label Library
- Concurrent delivery
- Titration
- Micro 0.1-99.9 mL/hr (in 0.1 mL increments) flow rate range for both lines
- Macro 100-999 mL/hr (in 1 mL increments) flow rate range for both lines
- Automated Secondary drug delivery (Piggyback)

PLUMSET CAPABILITIES

- Anti Free-Flow Protection
- Direct Connection for syringe delivery

AIR MANAGEMENT

- Air Trap
- Air Removal/Backpriming
- Air Detection-Proximal
- Air Detection-Distal

Device Description

2

BATTERY

- Battery Gauge
- Six Hour Battery Recharge Time
- Long battery life (6 hours) for emergency backup and temporary portable operation

BIOMEDICAL

- Serial Communication
- Upgradability (Field)
- Variable Rate Cap
- Alarm History
- Plug-in Bar Code Reader for drug identification (Optional)
- Nurse Call Relay Connector

OPTIONS

- Volumes Infused (A, B, Total Volume)
- KVO at dose end (1.0 ml/hr or less depending on delivery rate) or Continue Rate (CR) to continue at the current rate
- Variable Distal Pressure Settings

OTHER FEATURES

- Nonpulsatile volumetric accuracy
- Microprocessor control
- Large liquid crystal display (LCD) screen
- Panel back illumination on mains power
- Lockout switch
- Standard fullfill, partfill, syringe and vial use
- Parenteral and nonparenteral (enteral) fluid delivery
- Blood and blood products delivery
- Wide range of Standard and Specialty administration sets

2.2 User Qualification

The Plum A+ is intended for use at the direction or under the supervision of licensed physicians or certified healthcare professionals who are trained in the use of the pump and the administration of parenteral, enteral, and epidural fluids and drugs and whole blood or red blood cell components. The training should emphasize preventing related IV complications, including appropriate precautions to prevent accidental infusion of air. The epidural route can be used to provide anesthesia or analgesia.

WARNING

ADMINISTER ONLY ANESTHETICS/ANALGESICS APPROVED FOR EPIDURAL ADMINISTRATION (AS INDICATED OR ALLOWED BY THE DRUGS' FDA APPROVED LABELING). EPIDURAL ADMINISTRATION OF DRUGS OTHER THAN THOSE INDICATED FOR EPIDURAL USE COULD RESULT IN SERIOUS INJURY TO THE PATIENT.

2.3 System Self-Tests

The pump performs a suite of System Self-Tests when power is applied to confirm readiness for use.

Failure during the Self-Tests is reported as a Malfunction Condition.

This section explains the Plum A+ setup and administration set use.

3.1 Setup

WARNING

ARRANGE TUBING, CORDS, AND CABLES TO MINIMIZE THE RISK OF PATIENT STRANGULATION OR ENTANGLEMENT.

UNPACKING

CAUTION: PRODUCT DAMAGE MAY OCCUR UNLESS PROPER CARE IS EXERCISED DURING UNPACKING AND INSTALLATION. DO NOT USE THE PLUM A+ IF IT APPEARS DAMAGED IN ANY WAY. THE BATTERY MAY NOT BE CHARGED UPON RECEIPT.

Inspect the Plum A+ packaging for possible shipping damage. If damage is found, contact the delivery company immediately.

Use care when unpacking the Plum A+. Retain the packing slip and save all packing material in case the Plum A+ is damaged or fails the pump self-test and has to be returned to Abbott Laboratories.

Inspect the Plum A+ thoroughly for damage.

CAUTION: IF THE PLUM A+ APPEARS TO BE DAMAGED, CONTACT ABBOTT LABORATORIES.

To set up the Plum A+, connect the mains cord to a properly earthed mains receptacle, unless temporary battery operation is desired.

Note: Use mains power whenever possible. Store the Plum A+ connected to mains to confirm a fully charged battery for emergencies.

Note: If the quality of earth grounding source is in doubt, use battery power.

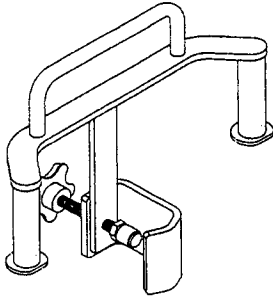
CAUTION: THE PLUM A+ SYSTEM IS DESIGNED TO OPERATE NORMALLY IN THE PRESENCE OF MOST ENCOUNTERED ELECTROMAGNETIC INTERFERENCE (EMI) CONDITIONS. IN THE EVENT OF EXTREME LEVELS OF INTERFERENCE, SUCH AS ENCOUNTERED NEXT TO AN ELECTROSURGICAL GENERATOR, CELLULAR TELEPHONES, OR 2-WAY RADIOS, IT IS POSSIBLE THAT THE NORMAL OPERATION OF A SENSOR OR MICROCOMPUTER MIGHT BE DISRUPTED. OPERATION OF THE PUMP UNDER THESE CONDITIONS SHOULD BE AVOIDED.

Instructions for Use

TANDEM CARRIER INSTRUCTIONS

The Plum A+ may be safely and conveniently mounted on an IV stand or on a tandem carrier mounted on an IV stand.

3



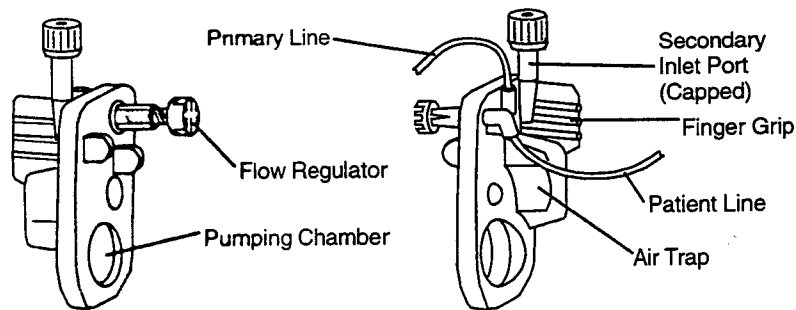
Always mount the tandem carrier (List# 12270-01) to the pole before attaching the pump(s) to the tandem carrier.

Make sure tandem carrier clamp is attached firmly to pole.

Make sure pumps are firmly attached to tandem carrier.

3.2 Administration Sets

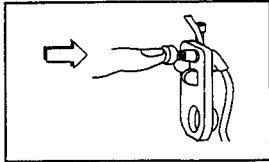
The Plum A+ is compatible with the wide range of LifeCare Plum series administration sets. Become familiar with the set components before preparing the administration set.



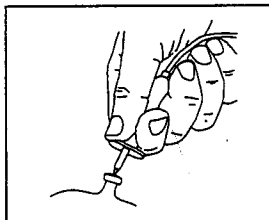
PREPARING THE ADMINISTRATION SET

Note: For detailed instructions, see administration set packaging.

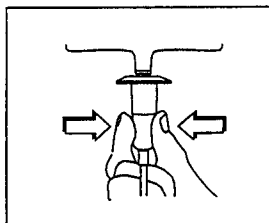
Use the aseptic technique to prepare the administration set for priming, then proceed as follows:



Make sure flow regulator is closed.



Insert piercing pin into container outlet with a twisting motion.



Fill drip chamber to about 1/2 full or to score mark. Do not completely fill.

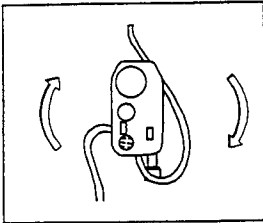
Note: To avoid getting Distal Air Alarms, confirm that the fluid bag is positioned higher than the pump. This should be set up prior to priming the cassette.

Instructions for Use

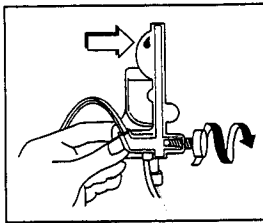
PRIMING THE ADMINISTRATION SET

To prime the administration set, proceed as follows:

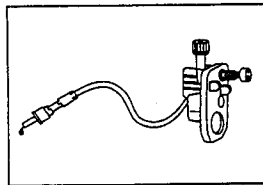
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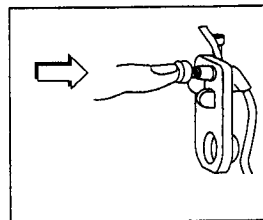
Invert the cassette.



Turn the flow regulator counter-clockwise until a drop of fluid is seen in the pumping chamber.



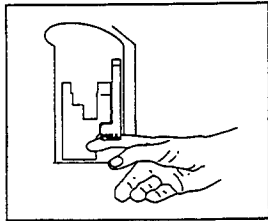
Turn the cassette upright, then prime the remainder of the administration set.



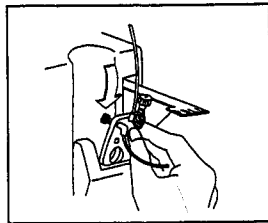
Push in the flow regulator to close. Confirm there is no flow.

LOADING THE CASSETTE

To load the primed cassette into the Plum A+, proceed as follows:



Open the cassette door by lifting up the handle.



Insert cassette into door guides. Close the cassette door. Confirm there is no flow and no kinks appear in tubing.

Note: If flow is observed, close the tubing clamps and replace the administration set.

Note: The administration set should be changed per CDC guidelines or healthcare provider policy. Discard after use.

Instructions for Use

PREPARING THE SECONDARY LINE

CAUTION: CONSULT THE DRUG LABELING TO CONFIRM DRUG COMPATIBILITY, CONCENTRATION, DELIVERY RATES, AND VOLUMES ARE ALL SUITABLE FOR CONCURRENT DELIVERY OR PIGGYBACK DELIVERY (SECONDARY FOLLOWED AUTOMATICALLY BY PRIMARY) MODES.

3

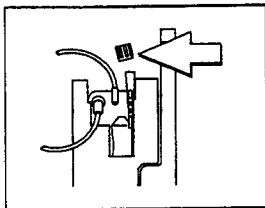
The Plum A+ features concurrent or piggyback delivery modes when therapy requires administering more than one fluid.

In addition to standard containers, the Plum A+ can use syringes or vials on the secondary port. The secondary line can be prepared without removing or repriming the cassette.

Before preparing the secondary line, observe the following guidelines:

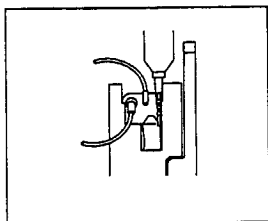
- Review the backpriming function
- Attach the secondary container using an 18- or 19- gauge, 31 mm (or shorter) needle, if the cassette secondary inlet port has a piercing reseal
- Attach syringe adapter (List 11986-48) to syringes smaller than 10 cc. (Syringes 10 cc or larger can be attached directly to the secondary port of the cassette.)
- Syringes smaller than 3 cc should not be used.
- Attach a vial adapter (List 11884-48) to the vial cap when using vials on the secondary line
- When using a syringe adapter, retract the plunger to draw approximately 1 mL of fluid into the syringe to clear air from the adapter filter.

To prepare the secondary line, use aseptic technique and proceed as follows:

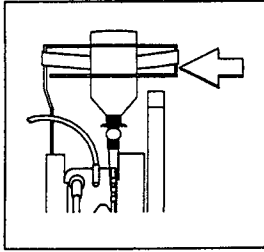


With cassette door closed: Loosen and remove white cap, then discard. Add secondary tubing or syringe.

Open all proximal clamps before pressing [START].



Set up pump per operating instructions. (See Sections 4 and 5 of this manual.)



Vial or Syringe: Secure the container to the cassette door using the *optional* container support arm (List 12095-04-01).

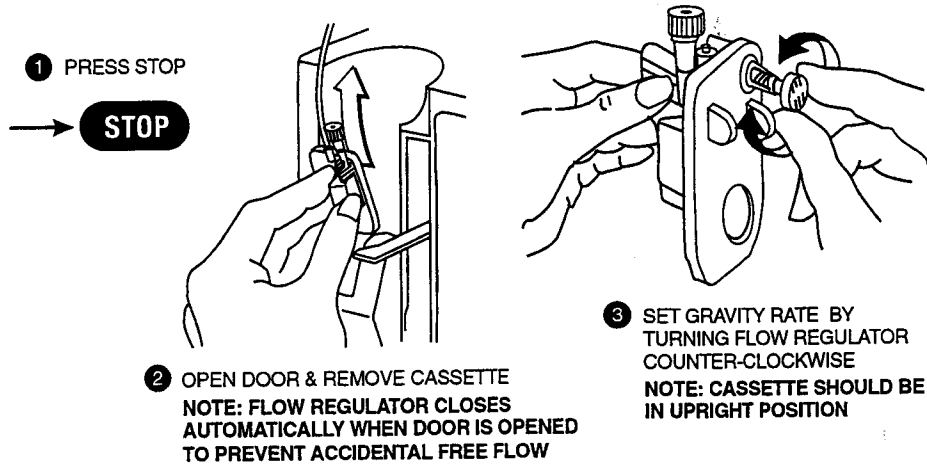
Vial: Attach the vial adapter to the secondary port. Backprime the air from the vial adapter into the vial, if necessary.

3.3 DISCONTINUING ELECTRONIC FLOW CONTROL & SETTING GRAVITY FLOW

CAUTION: BEFORE OPENING DOOR, CLOSE CLAMP ON PRIMARY OR SECONDARY SET OR REMOVE SECONDARY CONTAINER FROM SECONDARY PORT TO PREVENT MIXING OF PRIMARY AND SECONDARY FLUIDS.

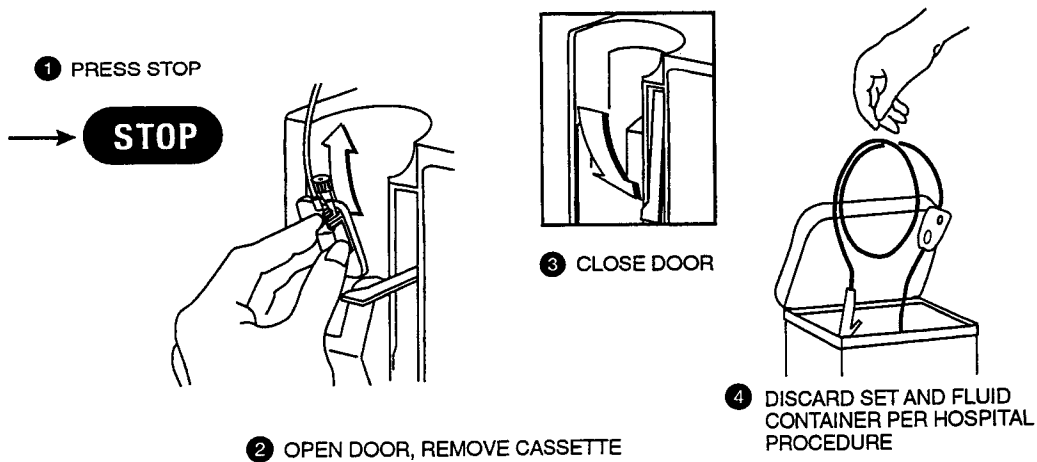
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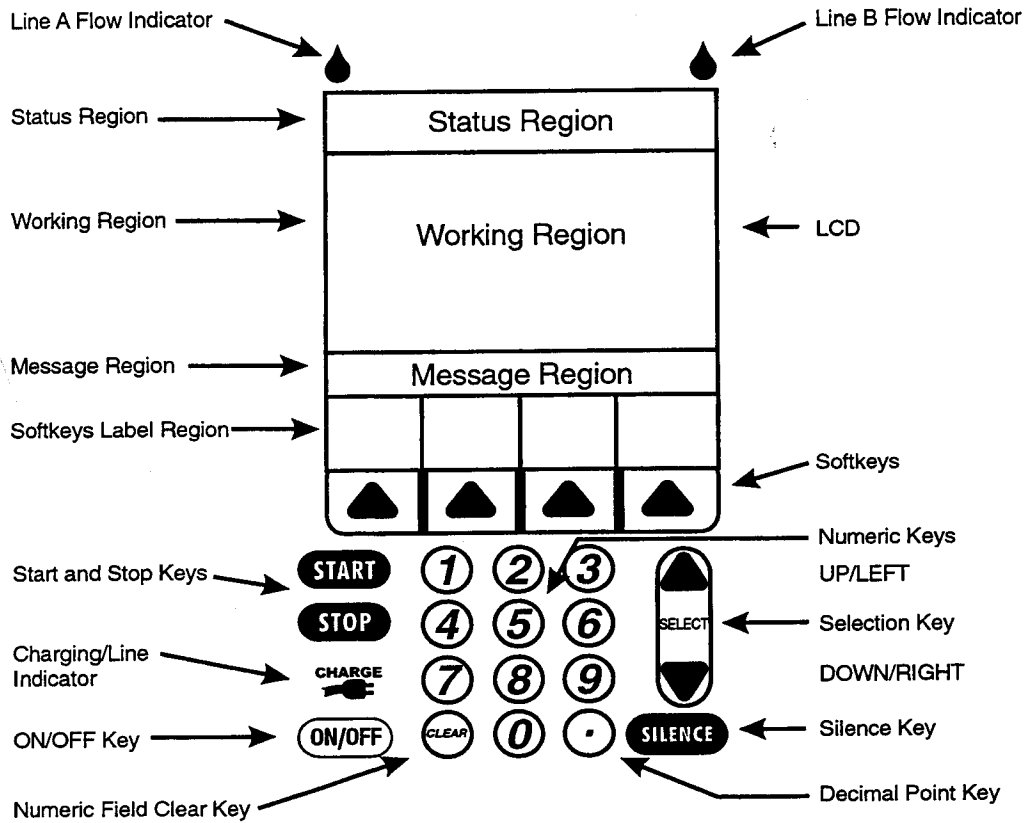
If electronic flow needs to be stopped, the precision flow regulator on the cassette can be used to manually set and maintain fluid flow in a gravity mode (see the following graphics).



NOTE: IF DOOR OPEN ALARM OCCURS, TURN PUMP OFF

3.4 DISCONTINUING FLUID ADMINISTRATION





Basic Layout of Front Panel Display and Keypad

4.1 GETTING STARTED

This section details the Plum A+ instrument setup procedures.

SYSTEM SELF-TESTS

CAUTION: DO NOT PLACE THE PLUM A+ IN SERVICE IF IT FAILS THE SYSTEM SELF-TESTS.

Connect the mains cord to mains power, then confirm that the Charging/Line indicator illuminates (above the [ON/OFF] key on the front panel).

Basic Operation

A systematic self-testing of the processing, delivery, and safety systems is performed whenever the Plum A+ is turned on, to verify readiness for operation.

Note: If the quality of earth grounding source is in doubt, use battery power.

Press the [ON/OFF] key to turn the power on. Check screen display and listen for a beep to indicate the audio is working. Wait for the self-tests to complete. If successful, put a fully primed macro cassette into the cassette door and close the door. See *Loading Cassette* in *Section 3* for details of correct procedure.

When the Charging/Line indicator is off and the battery symbol on the display is flashing, this indicates that the Plum A+ is operating on low battery power and should be recharged.

CAUTION: DO NOT OPERATE THE PLUM A+ ON PATIENTS WITH THE BATTERY REMOVED. USE OF A PROPERLY MAINTAINED AND CHARGED BATTERY HELPS CONFIRM PROPER OPERATION.

4

To confirm battery is fully charged, connect the Plum A+ to AC power for a minimum of six hours while in the OFF mode.





If an alarm occurs during the power on self-test, identify the alarm message, then take corrective action (see *Section 6, Alarms and Troubleshooting*).

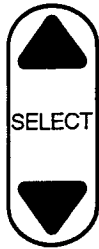
Start pump. If the self-test alarm recurs, remove the Plum A+ from service and contact the local Abbott Laboratories representative.

DATA RETENTION

Delivery program settings and programming option selections are retained in non-volatile memory. If the Plum A+ has been turned off for longer than four hours, all delivery settings are cleared and programming option selections are restored to their default selections for next use.

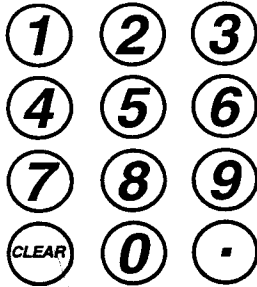
4.2 Operating Keys

	<p>The [ON/OFF] key is used to control the power of the Plum A+.</p> <p>Note: All deliveries must be stopped in order to turn the power off.</p> <p>Note: To confirm proper shutdown of pump, do not unplug until “double beep” is heard (approximately 5 seconds). If “double beep” is not heard, the pump will turn itself back on thinking the AC power was lost and revert to battery back-up power.</p>
	<p>The [START] key is used to begin infusion and as final confirmation of programming.</p>
	<p>The [STOP] key is used to stop the current delivery on one line; used in conjunction with soft keys to stop delivery on both lines.</p>
	<p>The [SILENCE] key is used to silence an audible alarm during actions to correct its cause.</p>



The [SELECT] key is used to move the highlighting cursor between the programming fields.

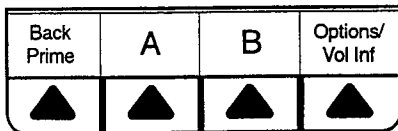
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The numeric keys are used to enter values for any highlighted field requiring numeric data.



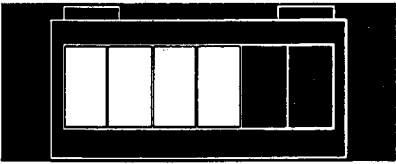
The [CLEAR] key will cause a highlighted numeric field to be cleared in preparation for data entry.

The [DECIMAL POINT] key is used to manually enter numbers other than whole numbers (i.e., 1.2 mL).

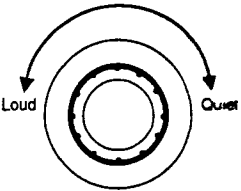
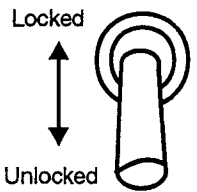


Softkeys are located at the bottom of the main display and serve a variety of functions. What each key does is indicated by the text in the display above the actual softkey.

4.3 Indicators

<p>CHARGE</p> 	<p>The Charge/Line Indicator is illuminated to indicate the battery is currently charging.</p> <p>Note: If the device is plugged into AC power, with a battery installed, and the Charge Indicator is not illuminated, contact technical support.</p>
	<p>The fluid drop symbol, when flashing, indicates an active infusion on Line A and/or Line B.</p>
	<p>Battery Capacity Symbol (located on right side of message region on display) indicates relative charge with number of white boxes from left to right.</p> <p>This example indicates the battery is about two-thirds full.</p>

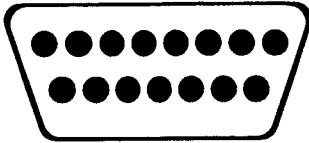
4.4 Rear Case Controls

	<p>The audio level rotary knob, located on the back, adjusts the alarm audio level.</p>
	<p>The toggle switch, located below the audio level control, activates the lockout function when the lever is placed in the "up" position, disabling all front panel keys except [STOP].</p> <p>Note: Pressing of a key while lockout is active results in the display of the lockout enabled message. This action is recommended to confirm each lockout activation.</p> <p>Note: If the lockout switch is put in the "Locked" position while the pump is off, the [ON/OFF] key allows the unit to turn on.</p>

Basic Operation

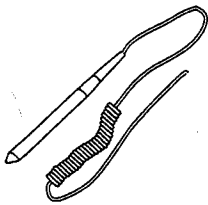


The connector located below the lockout switch is the Nurse Call Relay Connector, for providing remote notification of a nurse call event.



The RS-232 DataPort is used to interface with a host computer.

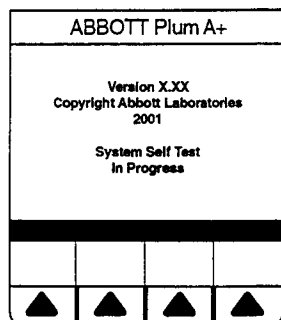
Note: Do not operate while infusing.



Barcode Wand (optional) is used to scan desired drug names from provided list. It plugs into the Barcode Wand Port, located in the back of the pump.

4

4.5 Power On



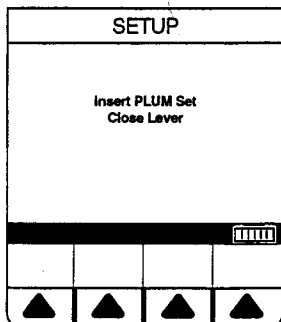
1. Press [ON/OFF] to turn on the Plum A+ and you will see the System Self-Tests screen.

CAUTION: THE PUMP MUST BE INITIALLY STARTED ON AC POWER, OTHERWISE THE DATAPORT MAY NOT OPERATE PROPERLY.

After self-testing successfully completes, the display will proceed to the next screen.

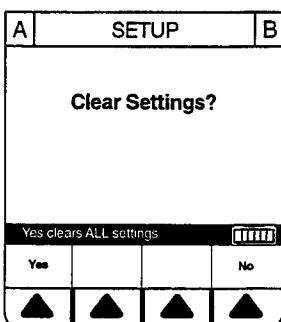
Note: If battery is missing or defective, a "Battery not installed" message with a "Continue without battery" prompt will appear (AC power only).

CAUTION: DO NOT OPERATE THE PLUM A+ ON PATIENTS WITH THE BATTERY REMOVED. USE OF A PROPERLY MAINTAINED AND CHARGED BATTERY HELPS CONFIRM PROPER OPERATION.



2. To set up the Plum A+, insert selected Plum Set and close cassette holder door lever.

Note: If cassette is already inserted, this screen is skipped.



Example of Clear Settings Screen

3. The on-screen message "Clear Settings?" may appear. Press ▲ [Yes] to clear all settings.

Clear ALL settings when changing patients or multiple programming parameters.

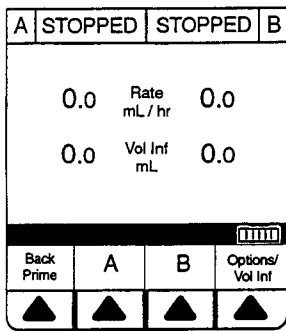
Use ▲ [Clear Program] when changing ONLY Line A or B.

Note: This clears all delivery parameters, such as Rate and VTBI on both lines, as well as setting items, such as the KVO and Nurse Callback options, to their default values.

Note: If no settings currently exist or all settings are zero, this screen will be bypassed.

4.6 Simple Delivery

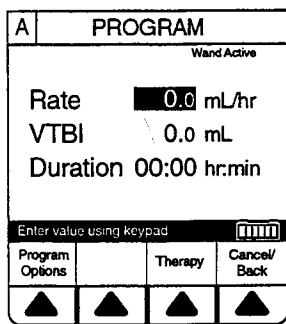
4



Example of Main Delivery Screen (with cleared settings).

Note: For clarity, whole number font sizes will appear larger than partial number font sizes (numbers on the right-side of the decimal).

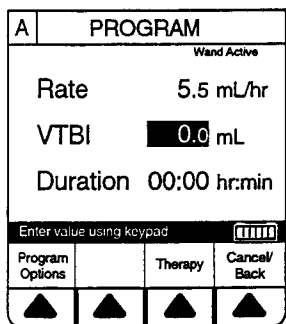
1. To Program a delivery rate, press ▲ [A].



2. To enter delivery rate, use numeric keypad.

3. Use [SELECT] key to move down to the VTBI field.

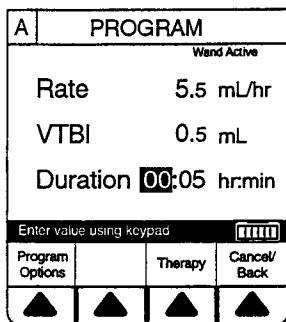
Note: Upon entry to this screen, and to all lower screens from here on, the Barcode Reader (BCR) is enabled as indicated by “Wand Active” when attached to the Plum A+. To use the BCR, swipe tip of BCR wand across entire barcode, from dot to dot, on the Abbott supplied drug list card. The drug name also can be selected using ▲ [Program Options].



4. To enter VTBI amount, use keypad.

Note: While the VTBI is being entered, the duration is automatically computed. If the computed value is greater than 99:59, dashes (-) appear in place of hours.

5. Use [SELECT] key to move down to the DURATION field.



6. Use keypad to change the hours part of duration if desired.

Note: When all parameters are displayed, changing any one parameter will result in other parameters automatically being computed. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation,

7. Use [SELECT] to change from hours to minutes.

Note: The maximum hours allowed is 99 and the maximum minutes is 59.

8. Use keypad to change minutes.

A	PUMPING	STOPPED	B
5.5	Rate mL/hr	0.0	
0.1	Vol Inf mL	0.0	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

9. Press [START] to begin infusion.

Example of Main Delivery Screen just after being programmed and started.

Note: The Line A Fluid Flow Indicator also will flash to indicate pumping.

4.7 Examples of Automatic Calculation

Examples of Automatic Calculation								
AT STARTUP			WHILE RUNNING (TITRATION)			AT KVO VTBI=0.0 DURATION=00:00		
1st Action	2nd Action	[AUTOCALC]	1st Action	2nd Action	[AUTOCALC]	1st Action	2nd Action	[AUTOCALC]
Enter RATE	Enter VTBI	[DURATION]	Change RATE	Keep VTBI	[DURATION]	Enter VTBI	Keep RATE	[DURATION]
Enter VTBI	Enter DURATION	[RATE]	Change RATE	Change VTBI	[DURATION]	Enter DURATION	Keep RATE	[VTBI]
Enter RATE	Enter DURATION	[VTBI]	Change VTBI	Keep RATE	[DURATION]	Change RATE	Enter VTBI	[DURATION]
			Change DURATION	Keep VTBI	[RATE]	Enter DURATION	Enter VTBI	[DURATION]
			Change VTBI	Change DURATION	[RATE]	Enter VTBI	Enter DURATION	[RATE]

4.8 Titration

4

A	PUMPING	PUMPING	B
25.0 Rate mL/hr 50.0 41.0 Vol Inf mL 20.0			
Enter value using keypad 			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

1. Select Line ▲ [A] (or ▲ [B]) at the Main Delivery Screen.

A	PROGRAM		
Rate 15.0 mL/hr VTBI 50.0 mL Duration 03:20 hr:min			
Enter value using keypad 			
Program Options		Therapy	Cancel/ Back
▲	▲	▲	▲

2. Enter the desired Rate using the keypad.

Note: When Rate is changed, the duration is automatically recomputed using the current VTBI. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

A	PUMPING	PUMPING	B
15.0 Rate mL/hr 50.0 41.6 Vol Inf mL 20.0			
Enter value using keypad 			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

3. After any change, press [START] to initiate new Rate and return to the Main Delivery Screen.

Note: Volume Infused is an incrementing value which is cleared in ▲ [Options/Vol Inf].

A	PROGRAM		
Rate 15.0 mL/hr VTBI 50.0 mL Duration 03:20 hr:min			
Enter value using keypad 			
Program Options		Therapy	Cancel/ Back
▲	▲	▲	▲

THE FOLLOWING 3 SCREENS ARE EXAMPLES OF CHANGED VALUES.






EXAMPLE OF CHANGED RATE.

4. From the Main Delivery Screen, press ▲ [A].

5. Use keypad to change the RATE value.

Note: The display time is only accurate to ± one minute. As shown in this example, the delivery shows 3 hours and 20 minutes (not 3 minutes and 20 seconds).

Note: [START] accepts the change. Delivery is changed to the new RATE and DURATION and display returns to Main Delivery Screen.






A	PROGRAM		
Rate	15.0 mL/hr		
VTBI	100 mL		
Duration	06:40 hr:min		
Enter value using keypad 			
Program Options		Therapy	Cancel/Back
			

EXAMPLE OF CHANGED VTBI VALUE.

- Use [SELECT] key to highlight the VTBI field.
- Use the keypad to change the VTBI value.

Note: When the VTBI is changed, the Duration is recomputed with respect to the current Rate. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation,

Note: [START] accepts the change. Delivery is changed to the new VTBI and DURATION and display returns to Main Delivery Screen.

A	PROGRAM		
Rate	150 mL/hr		
VTBI	100 mL		
Duration	00:40 hr:min		
Enter value using keypad 			
Program Options		Therapy	Cancel/Back
			

EXAMPLE OF CHANGED DURATION FIELD.

- Use [SELECT] to highlight the Duration field, then use the keypad to change it's value.

Note: When DURATION is changed, RATE is automatically recomputed using the current VTBI value. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation,

Note: [START] accepts the change. Delivery is changed to the new DURATION and RATE and display returns to Main Delivery Screen.

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

4.9 Simple Delivery using Drug List

4

A	STOPPED	STOPPED	B
<p>0.0 Rate mL/hr 0.0</p> <p>0.0 Vol Inf mL 0.0</p>			
<p>Enter value using keypad <input type="text"/></p>			
Back Prime	A	B	Options/Vol Inf
▲	▲	▲	▲

1. Select Line ▲ [A] (or ▲ [B]) at the Main Delivery Screen.

Note: To select a Drug Name using a Therapy (i.e., Dose Calc) you must first select which line you want (A or B), next select ▲ [Therapy], and then ▲ [Program Options]. If you select a Drug Name first, it will be cleared upon entry in Therapy mode.

A	PROGRAM		
<p>Wand Active</p> <p>Rate <input type="text" value="0.0"/> mL/hr</p> <p>VTBI <input type="text" value="0.0"/> mL</p> <p>Duration 00:00 hr:min</p>			
<p>Enter value using keypad <input type="text"/></p>			
Program Options		Therapy	Cancel/Back
▲	▲	▲	▲

The Line A Programming Screen appears.

2. Enter a RATE using the keypad.

3. Use [SELECT] to highlight the VTBI field and enter a value. The Duration will be automatically calculated.

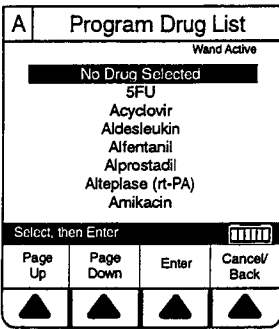
A	PROGRAM		
<p>Wand Active</p> <p>Rate <input type="text" value="5.0"/> mL/hr</p> <p>VTBI <input type="text" value="250"/> mL</p> <p>Duration 50:00 hr:min</p>			
<p>Enter value using keypad <input type="text"/></p>			
Program Options		Therapy	Cancel/Back
▲	▲	▲	▲

4. Before or after entering the simple delivery program, press ▲ [Program Options].

A	Program Options		
<p>Wand Active</p> <p>Delay Start for <input type="text" value="00:00"/> hr:min</p> <p>Callback No</p>			
<p>Enter value using keypad <input type="text"/></p>			
Drug List		Enter	Cancel/Back
▲	▲	▲	▲

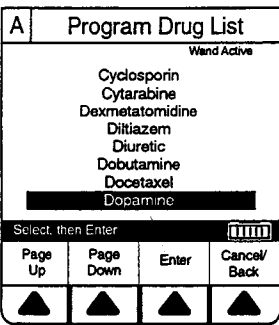
The Default screen for Program Options appears.

5. Press ▲ [Drug List].



The Drug List Screen appears, in mainly alphabetical order.

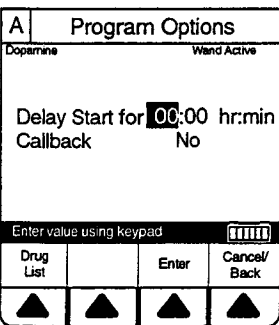
Note: Default entry is "No Drug Selected". This selection may be used later to remove an incorrect or unwanted drug name from the display.



6. Use [SELECT] to highlight desired drug name.

7. When list does not contain desired generic drug name or group name press ▲ [Page Down] (or ▲ [Page Up]) until it shows, then use [SELECT] to highlight choice.

8. Press ▲ [Enter] to indicate selection and return to the Program Options screen. Or, press ▲ [Cancel/Back] if no choice is acceptable.

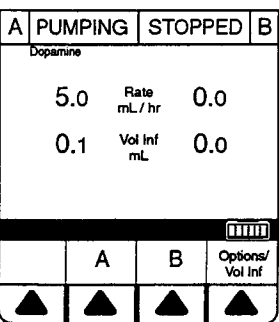


Drug name is now visible in the upper-left corner.

9. Press ▲ [Enter] or ▲ [Cancel/Back] to return to the Line Programming screen.

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

10. Press [START] to confirm the programming, begin the delivery, and return to the Main delivery screen.



Notice the drug name remains in the upper-left corner.

4.10 Simple Delivery Using Delayed Start

4

A	PROGRAM		
Wand Active			
Rate	5.0 mL/hr		
VTBI	250 mL		
Duration	50:00 hr:min		
Enter value using keypad <input type="text"/>			
Program Options		Therapy	Cancel/Back
▲	▲	▲	▲

1. Before or after entering the simple delivery program, press ▲ [Program Options].

Note: To program a Delayed Start using a Therapy (i.e., Dose Calc) you must first select which line you want (A or B), next select ▲ [Therapy], and then ▲ [Program Options]. If you program the Delayed Start first, it will be cleared upon entry into Therapy mode.

A	Program Options		
Wand Active			
Delay Start for	00:00 hr:min		
Callback	No		
Enter value using keypad <input type="text"/>			
Drug List		Enter	Cancel/Back
▲	▲	▲	▲

The Default screen for Program Options appears.

A	Program Options		
Wand Active			
Delay Start for	00:05 hr:min		
Callback	No		
Enter value using keypad <input type="text"/>			
Drug List		Enter	Cancel/Back
▲	▲	▲	▲

2. Enter values for desired hours and/or minutes.

3. Press ▲ [Enter] to confirm delayed start.

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

4. Press [START] to confirm programming.

A	DELAYED	STOPPED	B
5.0	Rate mL/hr	0.0	
0.0	Vol Inf mL	0.0	
Enter value using keypad <input type="text"/>			
	A	B	Options/Vol Inf
▲	▲	▲	▲

Line A is delayed for the time entered.

Note: Delayed line drip indicator is solid, not flashing. It will begin flashing when actually pumping.

4.11 Piggyback Delivery

A	PUMPING	STOPPED	B
5.5	Rate mL / hr	0.0	
20.0	Vol Inf mL	0.0	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

PIGGYBACK DELIVERY- Infusion will stop Line A and infuse Line B until VTBI completes. Line A will automatically restart.

1. With pumping started on Line A, to program a Piggyback delivery, press ▲ [B].

PROGRAM			B
Wand Active			
Mode	Piggyback		
Rate	0.0 mL/hr		
VTBI	0.0 mL		
Duration	00:00 hr:min		
Change using Change Mode			
Program Options	Change Mode	Therapy	Cancel/ Back
▲	▲	▲	▲

The Delivery Mode field is highlighted.

Note: If an entry was previously programmed, RATE is highlighted. If no previous entries, MODE is highlighted.

2. If field reads "Concurrent", press ▲ [Change Mode] to switch to "Piggyback".

3. Press [SELECT] to highlight the RATE field.

Note: Upon entry to this screen, and to all lower screens from here, the Barcode Reader (BCR) is enabled as indicated by "Wand Active" when attached to the Plum A+. To use the BCR, swipe tip of BCR wand across entire barcode, from dot to dot, on the Abbott supplied drug list card. The drug name also can be selected using ▲ [Program Options].

PROGRAM			B
Wand Active			
Mode	Piggyback		
Rate	0.0 mL/hr		
VTBI	0.0 mL		
Duration	00:00 hr:min		
Change using Change Mode			
Program Options	Change Mode	Therapy	Cancel/ Back
▲	▲	▲	▲

4. To enter delivery rate, use numeric keypad.

5. Use [SELECT] key to move down to the VTBI field.

Basic Operation

PROGRAM		B
Ward Active		
Mode	Piggyback	
Rate	200 mL/hr	
VTBI	100 mL	
Duration	00:30 hr:min	
Enter value using keypad		
Program Options	Therapy	Cancel/Back
▲	▲	▲

6. To enter VTBI amount, use keypad.

Note: While the VTBI is being entered, the duration is automatically computed. If the computed value is greater than 99:59, dashes (- -) appear in place of hours. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

7. Use [SELECT] key to move down to the DURATION field.

4

PROGRAM		B
Ward Active		
Mode	Piggyback	
Rate	133 mL/hr	
VTBI	100 mL	
Duration	00:45 hr:min	
Enter value using keypad		
Program Options	Therapy	Cancel/Back
▲	▲	▲

8. (Optional) Use keypad to change duration.

When all parameters are displayed, changing any one parameter will result in other parameters automatically being computed.

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

9. Press [START] to begin infusion.

Note: If Line A has a Delay Start remaining, a message will appear warning of a possible non-delivery (see section 4-18).

10. Press ▲ [Yes] to continue.

A	DELAYED	PUMPING	B
5.5	Rate mL/hr	133	
20.0	Vol Inf mL	0.1	
Enter value using keypad			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

Example of Main Delivery Screen just after being programmed and started.

4.12 Piggyback with Nurse Callback

PROGRAM		B
Wand Active		
Mode	Piggyback	
Rate	200 mL/hr	
VTBI	100 mL	
Duration	00:30 hr:min	
Enter value using keypad <input type="text"/>		
Program Options	Therapy	Cancel/Back
▲	▲	▲

1. Press ▲ [Program Options].

Note: To set a nurse callback, the pump must be stopped. This function can be selected either before or after entering the Piggyback delivery program.

Program Options		B
Wand Active		
Delay Start for 00:00 hr:min		
Callback	No	
Change using Yes/No <input type="text"/>		
Drug List	Yes/No	Enter
▲	▲	▲

The default screen for Program Options appears.

2. Use [SELECT] to highlight "Callback" field and press ▲ [Yes/No], if necessary to obtain "Yes", then press ▲ [Enter].

Note: Callback default of Yes or No is a biomedical setting and must be configured as described in the Technical Service Manual.

PROGRAM		B
Wand Active		
Mode	Piggyback	
Rate	200 mL/hr	
VTBI	100 mL	
Duration	00:30 hr:min	
Enter value using keypad <input type="text"/>		
Program Options	Therapy	Cancel/Back
▲	▲	▲

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

3. Press [START] to confirm program setting and return to Main Delivery screen.

A	PUMPING	STOPPED	B
5.5	Rate mL/hr	100	
0.3	Vol Inf mL	50.0	
Callback Line B <input type="text"/>			
	A	B	Options/Vol Inf
▲	▲	▲	▲

At end of Piggyback delivery, with Callback enabled for the line, Callback alarm is issued.

4. Press [SILENCE] to clear alarm.

4.13 Concurrent Delivery

4

A	PUMPING	STOPPED	B
5.5	Rate mL/hr	0.0	
0.1	Vol Inf mL	0.0	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CONCURRENT DELIVERY- Simultaneous delivery of two fluids at independent flow rates.

CAUTION: CONSULT DRUG LABELING TO CONFIRM DRUG COMPATIBILITY, CONCENTRATION, DELIVERY RATES, AND VOLUME ARE ALL SUITABLE FOR CONCURRENT AND PIGGYBACK DELIVERY MODES. SEE SECTION 8, FOR INFORMATION ON CONCURRENT FLOW (SEE SECTION 9 FOR DELIVERY RATE RANGES).

Note: In concurrent mode with certain alarm conditions, one line may stop while the other line may continue to deliver.

1. With pumping started on line A, to program a Concurrent delivery rate, press ▲ [B].

PROGRAM			B
Wand Active			
Mode	Piggyback		
Rate	0.0 mL/hr		
VTBI	0.0 mL		
Duration	00:00 hr:min		
Change using Change Mode			
Program Options	Change Mode	Therapy	Cancel/Back
▲	▲	▲	▲

The Delivery Mode field is highlighted.

Note: If an entry was previously programmed, RATE is highlighted. If no previous entries, MODE is highlighted.

2. If field reads "Piggyback", press ▲ [Change Mode] to switch to "Concurrent".

Note: Upon entry to this screen, and to all lower screens from here, the Barcode Reader (BCR) is enabled as indicated by "Wand Active" when attached to the Plum A+. To use the BCR, swipe tip of BCR wand across entire barcode, from dot to dot, on the Abbott supplied drug list card. The drug name also can be selected using ▲ [Program Options].

PROGRAM			B
Wand Active			
Mode	Concurrent		
Rate	0.0 mL/hr		
VTBI	0.0 mL		
Duration	00: 00 hr:min		
Change using Change Mode			
Program Options	Change Mode	Therapy	Cancel/Back
▲	▲	▲	▲

Verify change to "Concurrent" mode.

3. Use [SELECT] to highlight Rate field.

PROGRAM		B
Wand Active		
Mode	Concurrent	
Rate	0.0 mL/hr	
VTBI	0.0 mL	
Duration	00:00 hr:min	
Enter value using keypad 		
Program Options	Therapy	Cancel/Back
▲	▲	▲

4. To enter delivery rate, use numeric keypad.

Note: When Rate for Line A plus Rate for Line B is greater than valid rate ranges, a "Concurrency violation" message will explain why second line did not start. See Section 9 for valid delivery rate ranges.

Note: "Concurrency violation" may not be displayed if unit is displaying "VTBI Complete". The device will not start and an invalid keypress sound will occur when START is pressed.

5. Use [SELECT] key to move down to the VTBI field.

PROGRAM		B
Wand Active		
Mode	Concurrent	
Rate	10.0 mL/hr	
VTBI	100 mL	
Duration	10:00 hr:min	
Enter value using keypad 		
Program Options	Therapy	Cancel/Back
▲	▲	▲

6. To enter VTBI amount, use keypad.

Note: While the VTBI is being entered, the duration is automatically computed. While the computed value is greater than 99:59, dashes (- -) appear in place of hours. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

7. Use [SELECT] key to move down to the DURATION field.

8. (Optional) Enter values for desired hours and minutes.

Note: When Duration is entered, Rate is automatically computed.

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

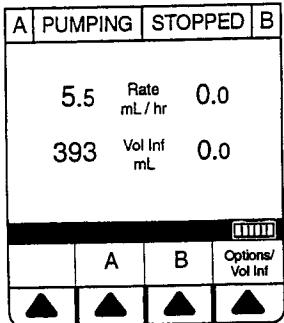
9. Press [START] to begin infusion and return to the Main Delivery screen.

A	PUMPING	PUMPING	B
5.5	Rate mL/hr	10.0	
20.4	Vol Inf mL	1.0	
Enter value using keypad 			
	A	B	Options/Vol Inf
▲	▲	▲	▲

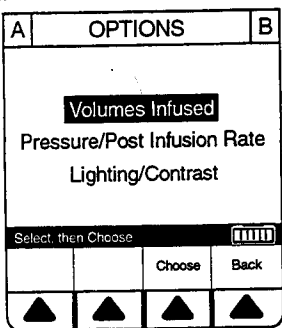
Example of a concurrent delivery.

4.14 Select Option- Volumes Infused, Pressure/Post Infusion Rate, and Lighting/Contrast

4

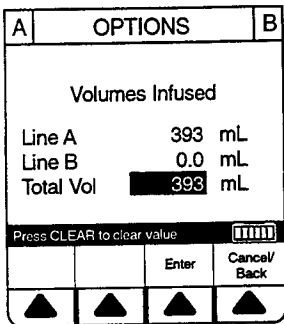


1. To select Options Screen, press ▲ [Options/Vol Inf].



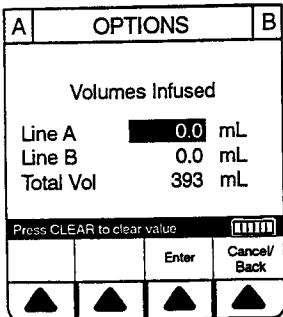
2. Use [SELECT] to highlight an option.

3. Press ▲ [Choose] to select the Volumes Infused screen.



This will bring up the Volumes Infused screen which defaults to Total Volume.

4. Use [SELECT] to scroll to Line A or B.



5. To reset Line A (or B) Volume Infused, use [SELECT] to highlight and press [CLEAR].

6. To restore the cleared quantity, press ▲ [Cancel Back].

Select Option- Volumes Infused, Pressure/Post Infusion Rate, and Lighting/Contrast

A	OPTIONS		B
Volumes Infused			
Line A	0.0	mL	
Line B	0.0	mL	
Total Vol	0.0	mL	
Press CLEAR to clear value 			
		Enter	Cancel/ Back
▲	▲	▲	▲

7. To reset all volumes, use [SELECT] to highlight Total Vol, then press [CLEAR].

8. To restore all quantities, press ▲ [Cancel/Back] softkey.

9. When clearing of quantities is completed, press ▲ [Enter] to return to the Main Delivery screen.

A	OPTIONS		B
Volumes Infused			
Pressure/Post Infusion Rate			
Lighting/Contrast			
Select, then Choose 			
		Choose	Back
▲	▲	▲	▲

10. Select ▲ [Options/Vol Inf] from the Main Delivery screen to return to the Options screen.

11. Use [SELECT] to highlight the Pressure/Post Infusion Rate option.

12. Press ▲ [Choose] to continue.

Note: Prior to changing Pressure/Post Infusion Rate, pump must be stopped.

A	OPTIONS		B
Pressure/Post Infusion Rate			
Continue Rate	KVO		
Distal Pressure Limit	6.0	psi	
Distal Pressure	0.0	psi	
Change using KVO/Rate 			
	KVO/ Rate	Enter	Cancel/ Back
▲	▲	▲	▲

13. Use [SELECT] to highlight Continue Rate or Distal Pressure Limit field.

14. Continue Rate allows a choice when VTBI is completed. Press ▲ [KVO/Rate].

- KVO- The pump will revert to a fixed KVO of 1 mL/hr or the last programmed Rate, whichever is less.
- Rate- The pump will continue at the Rate programmed.

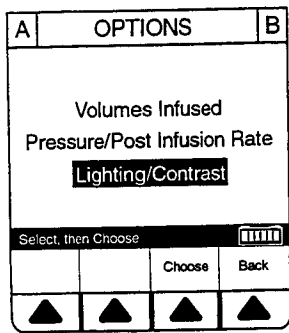
Note: Option will be for both line A and line B selections.

15. To change Distal Pressure Limit when highlighted, enter value between 1.0 and 15.0 psi.

16. Press ▲ [Enter] to keep changes and return to the Main Delivery screen, or ▲ [Cancel/Back] to restore original values Options screen.

Note: Continue Rate default of KVO or Rate is a biomedical setting and must be configured as described in the Technical Service Manual.

Basic Operation

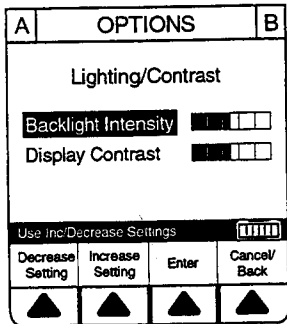


17. Select ▲ [*Options/Vol Inf*] from the Main Delivery screen to return to the Options screen.

18. Use [SELECT] key to highlight Lighting/Contrast Option.

19. Press ▲ [*Choose*] to continue.

4



20. Press [SELECT] key to highlight Backlight Intensity or Display Contrast.

21. While viewing display for desired effect, press either ▲ [*Increase Setting*] or ▲ [*Decrease Setting*] to change level.

22. Press ▲ [*Enter*] to keep change(s) and return to the Main Delivery screen, or ▲ [*Cancel/Back*] to restore previous settings and return to the Options screen.

4.15 Stop and Start with only 1 Line Pumping

A	PUMPING	STOPPED	B
100	Rate mL / hr	0.0	
8.5	Vol Inf mL	0.0	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

1. Press [STOP] at the Main Delivery Screen.

Note: If ▲ [A] (or ▲ [B]) is pressed prior to [STOP], the line is stopped, the display will show the programming screen. Press ▲ [Cancel/Back] to return to the Main Delivery screen.

A	STOPPED	STOPPED	B
100	Rate mL / hr	0.0	
8.5	Vol Inf mL	0.0	
Back Prime	A	B	Options/ Vol Inf
▲	▲	▲	▲

Example of STOPPED delivery.

2. To discontinue infusion, press [ON/OFF].

3. Clamp secondary tubing if connected.

4. Open door, remove set and close door. Or, press [START] to resume infusion.

4.16 Stop and Start with Both Lines Pumping

A	PUMPING	PUMPING	B
25.0	Rate mL / hr	50.0	
3.0	Vol Inf mL	20.4	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

1. Press [STOP] at the Main Delivery Screen.

Basic Operation

A	PUMPING	PUMPING	B
25.0	Rate mL/hr	50.0	
3.0	Vol Inf mL	20.4	
Choose line(s) to stop:			
Stop All	Stop A	Stop B	Cancel

2. Press [Stop A], [Stop B], or [Stop All].

Note: If [A] (or [B]) is pressed prior to [STOP], the display will show the programming screen. Press [Cancel/Back] to return to the Main Delivery screen.

4

A	STOPPED	STOPPED	B
25.0	Rate mL/hr	50.0	
3.0	Vol Inf mL	20.4	
Back Prime	A	B	Options/ Vol Inf

Example of stopped infusion.

Note: This is an example using [Stop All].

A	STOPPED	STOPPED	B
25.0	Rate mL/hr	50.0	
3.0	Vol Inf mL	20.4	
Choose line(s) to start:			
Start All	Start A	Start B	Cancel

CAUTION: VERIFY RATE, VTBI, AND DURATION BEFORE PRESSING [START].

3. To resume infusion, press [START].

4. Select [Start A], [Start B], or [Start All]. Or, to discontinue infusion, press [ON/OFF].

5. Clamp secondary tubing if connected.

6. Open door, remove set and close door.

4.17 Backpriming

A	STOPPED	STOPPED	B
5.5	Rate mL / hr	0.0	
8.9	Vol Inf mL	0.0	
Back Prime	A	B	Options/ Vol Inf

BACKPRIMING- Removal of air or fluid from the proximal line and cassette airtrap.

1. To initiate a backprime, press ▲ [*Back Prime*].

Note: Backpriming is available only when all delivery is stopped. Secondary container is necessary to receive the air.

A	BACKPRIMING	B	
5.5	Rate mL / hr	0.0	
8.9	Vol Inf mL	0.0	
Release Backprime to Stop			
Back Prime	A	B	Options/ Vol Inf

2. Press and hold ▲ [*Back Prime*] until fluid pumped from line A to line B has expelled the air from cassette air trap into Secondary container.

Note: Fluid flow is at maximum rate possible.

3. Upon release of ▲ [*Back Prime*], the cassette test is performed to confirm readiness for pumping. Pressing [START] will resume programmed delivery.

4.18 Clearing Program Settings

A	PUMPING	STOPPED	B
5.5	Rate mL / hr	0.0	
0.1	Vol Inf mL	0.0	
	A	B	Options/ Vol Inf

1. Press [STOP] at the Main Delivery Screen.

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [*Clear Program*] when changing ONLY Line A or B.

Basic Operation

A	PROGRAM		
Rate	5.5	mL/hr	
VTBI	22.0	mL	
Duration	03:20	hr:min	
Enter value using keypad <input type="text"/>			
Program Options	Clear Program	Therapy	Cancel/Back
▲	▲	▲	▲

2. Select Line A (or B if active) from the stopped Main Delivery Screen.

3. Select ▲ [Clear Program].

Note: If Line A or B is programmed with a Therapy (i.e., Dose Calculation), Rate, VTBI and Duration will not display values. The values to be cleared may be viewed in applicable programming screen under ▲ [Therapy].

4

A	PROGRAM		
Clear Line A Settings?			
Yes clears ALL settings <input type="text"/>			
Yes			No
▲	▲	▲	▲

4. Select ▲ [Yes].

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [Clear Program] when changing ONLY Line A or B.

A	PROGRAM		
Wand Active			
Rate	0.0	mL/hr	
VTBI	0.0	mL	
Duration	00:00	hr:min	
Enter value using keypad <input type="text"/>			
Program Options		Therapy	Cancel/Back
▲	▲	▲	▲

Example screen of "Cleared Program".

5. Press ▲ [Cancel/Back] to return to the Main Delivery screen or program new settings.

4.19 Possible Non-Delivery Programmed

PROGRAM			B
Wand Active			
Attention: Line A is stopped or delayed. Line B in piggyback mode gives no KVO or alarm at dose end.			
Continue anyway?			
<input type="text"/>			
Yes			No
▲	▲	▲	▲

Note: Whenever a valid [START] key is pressed, the device checks the delivery program(s) for non-delivery conditions (such as Line B Piggyback without Line A or delayed start) that could permit a period of non-delivery. If so, the display presents this warning screen.

1. Press ▲ [Yes] to continue with delivery. Or, press ▲ [No] to cancel.

SECTION 5

Therapies (For Advanced Users*)

* *Advanced users are those who have received additional training on programming and use of functions.*

Dose Calculation-	Allows programming Dose Rates in alternative units of measure. Dose Calculation can be used in Simple Delivery, Loading Dose, and Multistep.
Loading Dose-	Allows programming of an initial infusion rate for a specific volume, followed automatically by a maintenance rate from the same container (e.g., a fluid challenge). If Dose Calc is used, the Loading Dose and Maintenance Dose are in the same unit of measure, over the same period of time (mcg/min), from the same container.
Multistep-	Allows a sequential program to deliver up to 10 steps; fluid volumes and delivery rates may be programmed for each step. The program may be entered based on Rate and Volume or Volume and Time. If Dose Calc is used, the delivery steps are in the same unit of measure, over the same period of time, from the same container.

5.1 Dose Calc (mcg/kg/min on A)

A	STOPPED	STOPPED	B
0.0	Rate mL / hr	0.0	
0.0	Vol Inf mL	0.0	
Enter value using keypad			
Back Prime	A	B	Options/ Vol Inf
▲	▲	▲	▲

DOSE CALCULATION- Allows programming Dose Rates in alternative units of measure. Dose Calculation can be used in Simple Delivery, Loading Dose, and Multistep.

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [Clear Program] when changing ONLY Line A or B.

1. Press ▲ [A] at the Main Delivery Screen.

The Line A Programming screen appears.

A	PROGRAM		
	Ward Active		
Rate	0.0	mL/hr	
VTBI	0.0	mL	
Duration	00:00	hr:min	
Enter value using keypad			
Program Options	Therapy	Cancel/ Back	
▲	▲	▲	▲

2. Press ▲ [Therapy].

Therapies (For Advanced Users*)

A	PROGRAM		
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

The Select Therapy screen for Line A appears.

Note: Dose Calculation is the only available option if Line A is infusing.

3. Press ▲ [Choose] to continue.

A	Program Dose Calc		
mcg/kg/min	grams/hr		
mcg/kg/hr	ng/kg/min		
mcg/min	units/kg/hr		
mcg/hr	units/min		
mg/kg/hr	units/hr		
mg/min	mUn/min		
mg/hr	mEq/hr		
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

The Program Dose Calc screen appears.

Note: Screen defaults to the mcg/kg/min option or the previously selected option.

4. Use [SELECT] key to highlight the units to use in the delivery.

5. Press ▲ [Choose] to continue.

Note: Previously selected Drug Names and Delayed Start entries will be cleared if entered prior to Therapy selection. To reselect, press ▲ [Program Options] after selecting desired Therapy and Units.

A	Program Dose Calc		
Drug Conc in Container			
mcg			
mg			
grams			
Select, then Choose			
	Choose		Back
▲	▲	▲	▲

The Container Concentration Selection screen appears whenever the selected Dose Units are gram-based (e.g., grams, mg, mcg, or ng) otherwise this screen is skipped.

Note: Default choice for possible gram-based Container Concentration Unit is mg or the previously selected option.

6. Use [SELECT] key to highlight the Container Concentration units to use in the delivery.

7. Press ▲ [Choose] to continue.

A	Program Dose Calc		
Wand Active			
Conc	400 mg	250 mL	
Weight	70.0 kg		
Dose	0.000	mcg/kg/min	
VTBI	0.0	mL	
Duration	00:00	hr:min	
Rate	0.0	mL/hr	
Enter value using keypad			
Program Options			Cancel/Back
▲	▲	▲	▲

The next page of the Program Dose Calc screen appears to provide for entry of delivery program parameters.

8. Use keypad to enter desired values. Once each value is entered, use [SELECT] to highlight the next programming field.

Note: The Concentration elements and weight value must be entered before the [SELECT] key allows access to remaining fields.

5

A Program Dose Calc	
Dopamine	Ward Active
Conc	400 mg 250 mL
Weight	70.0 kg
Dose	3.00 mcg/kg/min
VTBI	0.0 mL
Duration	00:00 hr:min
Rate	7.9 mL/hr
Enter value using keypad <input type="text"/>	
Program Options	Cancel/Back
▲	▲

9. Continue to enter values using the keypad and advancing to the next field using [SELECT].

Note: As the Dose value is entered, the Rate is automatically calculated. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

A Program Dose Calc	
Dopamine	Ward Active
Conc	400 mg 250 mL
Weight	70.0 kg
Dose	3.00 mcg/kg/min
VTBI	0.0 mL
Duration	00:00 hr:min
Rate	7.9 mL/hr
Enter value using keypad <input type="text"/>	
Program Options	Cancel/Back
▲	▲

10. Use [SELECT] to scroll down to the VTBI field.

A Program Dose Calc	
Dopamine	Ward Active
Conc	400 mg 250 mL
Weight	70.0 kg
Dose	3.00 mcg/kg/min
VTBI	20.0 mL
Duration	25:18 hr:min
Rate	7.9 mL/hr
Enter value using keypad <input type="text"/>	
Program Options	Cancel/Back
▲	▲

11. Enter a value for VTBI using the keypad.

Note: As the VTBI value is entered or changes, Duration is automatically updated.

Note: The ▲ [Program Options] path to setting Delayed Start or assigning a drug name from the internal list functions exactly as described in Basic Operation for the Simple Delivery in Section 4.

A Program Dose Calc	
Dopamine	Ward Active
Conc	400 mg 250 mL
Weight	70.0 kg
Dose	3.00 mcg/kg/min
VTBI	20.0 mL
Duration	25:18 hr:min
Rate	7.9 mL/hr
Enter value using keypad <input type="text"/>	
Program Options	Cancel/Back
▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

12. After entering the desired VTBI value and any desired ▲ [Program Options], press [START] to begin infusion.

Therapies (For Advanced Users*)

A	PUMPING	STOPPED	B
Dopamine Dose Calculation			
7.9	Rate mL/hr	0.0	
0.1	Vol Inf mL	0.0	
3.00 mcg/kg/min	Dose		
	A	B	Options/ Vol Inf
▲	▲	▲	▲

The Main Delivery Screen appears, to display the information just entered.

Note: The Therapy Type is displayed as well as the Dose Rate and Dose Units.

5

5.2 Dose Calc (mg/hr on B)

A	PUMPING	STOPPED	B
5.5	Rate mL / hr	0.0	
0.1	Vol Inf mL	0.0	
			Options/ Vol Inf
▲	▲	▲	▲

DOSE CALCULATION- Allows programming Dose Rates in alternative units of measure. Dose Calculation can be used in Simple Delivery, Loading Dose, and Multistep.

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [Clear Program] when changing ONLY Line A or B.

1. Press ▲ [B] at the Main Delivery screen.

PROGRAM			B
Wand Active			
Mode	Piggyback		
Rate	0.0 mL/hr		
VTBI	0.0 mL		
Duration	00:00 hr:min		
Change using Change Mode			
Program Options	Change Mode	Therapy	Cancel/Back
▲	▲	▲	▲

The Line B Programming screen appears.

2. Press ▲ [Therapy].

PROGRAM			B
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

The Select Therapy screen for Line B appears.

The screen defaults to Dose Calculation or the previously selected option.

Note: Dose Calculation is the only available therapy while Line B is running.

3. Press ▲ [Choose] to continue.

Program Dose Calc		B
mcg/kg/min	grams/hr	
mcg/kg/hr	ng/kg/min	
mcg/min	units/kg/hr	
mcg/hr	units/min	
mg/kg/hr	units/hr	
mg/min	mUn/min	
mg/hr	mEq/hr	
Select, then Choose		
	Choose	Back
▲	▲	▲

The Program Dose Calc screen appears.

Note: The screen defaults to the mcg/kg/min option or the previously selected option.

Note: Previously selected Drug Names and Delayed Start entries will be cleared if programmed prior to Therapy selection. To reselect, press ▲ [Program Options] after selecting desired Therapy and Units.

Therapies (For Advanced Users*)

Program Dose Calc		B
mcg/kg/min	grams/hr	
mcg/kg/hr	ng/kg/min	
mcg/min	units/kg/hr	
mcg/hr	units/min	
mg/kg/hr	units/hr	
mg/min	mU/min	
mg/hr	mEq/hr	
Select, then Choose		
	Choose	Back
▲	▲	▲

4. Continue to scroll using [SELECT] key until desired field is highlighted.

5. When desired field (mg/hr in this sample) is highlighted, press ▲ [Choose].

Program Dose Calc		B
Drug Conc in Container		
mcg		
mg		
grams		
Select, then Choose		
	Choose	Back
▲	▲	▲

The Container Concentration Selection screen appears whenever the selected Dose Units are gram-based (e.g., grams, mg, mcg, or ng) otherwise this screen is skipped.

Note: Default choice for possible gram-based Container Concentration Unit is mg or the previously selected option.

6. Use [SELECT] key to highlight the Container Concentration units to use in the delivery

7. Press ▲ [Choose] to continue.

Program Dose Calc		B
Ward Active		
Conc	0.0 mg	0.0 mL
Mode	Piggyback	
Dose	0.000 mg/hr	
VTBI	0.0 mL	
Duration	00:00 hr:min	
Rate	0.0 mL/hr	
Enter value using keypad		
Program Options		Cancel/Back
▲	▲	▲

The next page of the Program Dose Calc screen appears. The screen defaults to Concentration (Conc) and a value must be entered to continue.

8. Use keypad to enter desired values. Once entered, use [SELECT] to highlight the next field.

9. To override the Piggyback Delivery Mode default, scroll down to Mode using [SELECT], then press ▲ [Change Mode].

Note: Delivery Mode Option is available on Line B, its default is Piggyback, and the Weight field is gone.

5

Program Dose Calc		B
Wand Active		
Conc	200 mg	100 mL
Mode	Concurrent	
Dose	1.00 mg/hr	
VTBI	75.0 mL	
Duration	--:00 hr:min	
Rate	0.5 mL/hr	
Enter value using keypad		
Program Options		Cancel/Back
▲	▲	▲

10. Continue entering desired values using the keypad. Use [SELECT] to advance to the next field.

Note: When entering the RATE, with a VTBI value entered, the DOSE and DURATION fields are automatically updated. To understand the Automatic Calculation feature, see Section 4.7 *Examples of Automatic Calculation*,

Note: The Duration field temporarily changes to dashes when the computed value is larger than what can be displayed.

11. Continue entering the RATE value, if desired.

Note: As Rate is entered, the Duration and Dose are automatically adjusted as individual numbers are entered.

Note: If the Duration value is changed, the Rate and Dose are automatically adjusted.

Program Dose Calc		B
Wand Active		
Conc	200 mg	100 mL
Mode	Concurrent	
Dose	1.00 mg/hr	
VTBI	75.0 mL	
Duration	--:00 hr:min	
Rate	0.5 mL/hr	
Change using Change Mode		
Program Options	Change Mode	Cancel/Back
▲	▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

12. To start the delivery, press [START].

Note: To select Delayed Start, press ▲ [Program Options].

A	PUMPING	PUMPING	B
Dose Calculation			
1.0	Rate mL/hr	0.5	
5.0	Vol Inf mL	0.2	
	Dose mg/hr	1.00	
Enter value using keypad			
	A	B	Options/Vol Inf
▲	▲	▲	▲

Upon [START], the Main Delivery Screen shows delivery status for both A and B lines.

Note: See *Delivery Rate Range* in Section 9. The ratio of concurrent rates has recommendations specified in Section 8.3.

13. Select ▲ [B].

Program Dose Calc		B
Wand Active		Morphine
Conc	200 mg	100 mL
Mode	Concurrent	
Dose	1.00 mg/hr	
VTBI	75.0 mL	
Duration	--:00 hr:min	
Rate	0.5 mL/hr	
Enter value using keypad		
Program Options		Cancel/Back
▲	▲	▲

14. To update and identify the infusing drug, enter the drug name by using either the BCR or via ▲ [Program Options] then ▲ [Drug List] with an entry for a selection.

The drug name will appear in the upper-right corner.

Note: If a drug name was previously entered and confirmed by pressing [START], it cannot be changed while line is infusing. The line must be stopped and the Dose Calc screen entered before it can be changed.

Therapies (For Advanced Users*)

A	PUMPING	PUMPING	B
Morphine Dose Calculation			
1.0	Rate mL / hr	0.5	
5.0	Vol Inf mL	0.2	
	Dose	1.00 mg/hr	
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

15. Press [START] to confirm entries and return to the Main Delivery screen.

5

5.3 Loading Dose

A	STOPPED	STOPPED	B
0.0	Rate mL/hr	0.0	
0.0	Vol Inf mL	0.0	
Back Prime	A	B	Options/ Vol Inf
▲	▲	▲	▲

LOADING DOSE- Allows programming of an initial infusion rate for a specific volume, followed automatically by a maintenance rate from the same container (e.g., a fluid challenge). If Dose Calc is used, the Loading Dose and Maintenance Dose are in the same unit of measure, over the same period of time (mcg/min), from the same container.

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [Clear Program] when changing ONLY Line A or B.

1. Select ▲ [A] (or ▲ [B]) at the Main Delivery screen.

A	PROGRAM		
Wand Active			
Rate	0.0	mL/hr	
VTBI	0.0	mL	
Duration	00:00	hr:min	
Enter value using keypad			
Program Options		Therapy	Cancel/ Back
▲	▲	▲	▲

The selected Line (A or B) Programming screen appears.

2. Press ▲ [Therapy].

A	PROGRAM		
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

The Select Therapy screen for Line A (or B) appears.

Note: This example shows line A being programmed.

A	PROGRAM		
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

3. Use [SELECT] to scroll down to Loading Dose.

4. Press ▲ [Choose] to continue.

Therapies (For Advanced Users*)

A Program Loading Dose

mL/hr	grams/hr
mcg/kg/min	ng/kg/min
mcg/kg/hr	units/kg/hr
mcg/min	units/min
mcg/hr	units/hr
mg/kg/hr	mUv/min
mg/min	mEq/hr
mg/hr	

Select, then Choose |||||

Choose Back

▲ ▲ ▲ ▲

The Program Loading Dose screen appears.

Note: The screen defaults to the mL/hr option or the previously selected option.

5. Press ▲ [Choose] to continue, or use [SELECT] to highlight another option.

6. When desired field is highlighted, press ▲ [Choose].

A Program Loading Dose

Wand Active

	Rate	VTBI	Duration
	mL/hr	mL	hr:min
1	0.0	0.0	00:00
2	0.0	0.0	00:00

Enter value using keypad |||||

Program Options Cancel/Back

▲ ▲ ▲ ▲

The next page of the Program Loading Dose screen appears.

5

A Program Loading Dose

Wand Active

	Rate	VTBI	Duration
	mL/hr	mL	hr:min
1	500	0.0	00:00
2	0.0	0.0	00:00

Enter value using keypad |||||

Program Options Cancel/Back

▲ ▲ ▲ ▲

7. Enter a rate using the keypad from 0.1 to 999 mL/hr depending on delivery mode.

A Program Loading Dose

Wand Active

	Rate	VTBI	Duration
	mL/hr	mL	hr:min
1	500	0.0	00:00
2	0.0	0.0	00:00

Enter value using keypad |||||

Program Options Cancel/Back

▲ ▲ ▲ ▲

8. After the desired value has been entered, use [SELECT] to highlight the next field.

A Program Loading Dose
Wand Active

	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	0.0	0.0	00:00

Enter value using keypad [0000]

Program Options		Cancel/Back
▲	▲	▲

9. Enter Volume To Be Infused (VTBI) from 0.1 to 9999 mL using the keypad.

Note: After a Rate and VTBI value are entered, the Duration is automatically computed. Manually changing the Duration field will automatically recompute the Rate. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

A Program Loading Dose
Wand Active

	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	0.0	0.0	00:00

Enter value using keypad [0000]

Program Options		Cancel/Back
▲	▲	▲

10. After the values for the loading dose Step-1 are entered, use [SELECT] to highlight the maintenance dose Step-2.

Note: The loading dose therapy has two steps. The first is the loading dose followed by the maintenance dose. These words will appear on the Main Screen as each step is delivered.

A Program Loading Dose
Wand Active

	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	20.0	0.0	00:00

Enter value using keypad [0000]

Program Options		Cancel/Back
▲	▲	▲

11. Enter the Rate using the keypad.

A Program Loading Dose
Wand Active

	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	20.0	0.0	00:00

Enter value using keypad [0000]

Program Options		Cancel/Back
▲	▲	▲

12. Use [SELECT] to highlight the next programming field.

Therapies (For Advanced Users*)

A Program Loading Dose			
Wand Active			
	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	20.0	400	20:00
Enter value using keypad <input type="text"/>			
Program Options			Cancel/ Back
▲	▲	▲	▲

13. Enter the desired VTBI using the keypad.

Note: After the desired Rate and VTBI values are selected, the Duration is automatically updated.

14. Press ▲ [Program Options] to enable setting a Delayed Start or to enable the Nurse Callback option.

A Program Options			
Wand Active			
Delay Start for 00:00 hr:min			
Callback No			
Enter value using keypad <input type="text"/>			
Drug List		Enter	Cancel/ Back
▲	▲	▲	▲

Note: Nurse Callback enables an alarm when a change in the delivery on a line occurs such as completing Step-1 and starting Step-2. Or on line B, a piggyback delivery is completed and line A is starting its delivery.

A Program Options			
Wand Active			
Delay Start for 00:05 hr:min			
Callback No			
Enter value using keypad <input type="text"/>			
Drug List		Enter	Cancel/ Back
▲	▲	▲	▲

15. Enter a delay time (less than or equal to 24 hours) using the keypad.

Note: Not available if a delivery is taking place on the line.

A Program Options			
Wand Active			
Delay Start for 00:05 hr:min			
Callback No			
Change using Yes/No <input type="text"/>			
Drug List	Yes/No	Enter	Cancel
▲	▲	▲	▲

16. After selecting a desired value, use [SELECT] to highlight the callback feature.

5

A Program Options			
Wand Active			
Delay Start for 00:05 hr:min			
Callback Yes			
Change using Yes/No 			
Drug List	Yes/No	Enter	Cancel
▲	▲	▲	▲

17. Select using ▲ [Yes/No].

Callback changes from NO to YES.

Note: Nurse Callback cannot be changed while a delivery is taking place on the line.

18. Press ▲ [Enter] to accept the changes.

Note: ▲ [Cancel/Back] returns the fields to their original value and displays the previous screen.

A Program Loading Dose			
Wand Active			
	Rate mL/hr	VTBI mL	Duration hr:min
1	500	55.0	00:06
2	20.0	400	20:00
Enter value using keypad 			
Program Options			Cancel/Back
▲	▲	▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

19. Press [START] to begin delivery.

A	DELAYED	STOPPED	B
Loading Dose			
	500	Rate mL / hr	0.0
	0.0	Vol Inf mL	0.0
	A	B	Options/ Vol Inf
▲	▲	▲	▲

The Main Delivery Screen appears.

Note: The words "DELAYED" and "Loading Dose" appear in the upper-left corner. These indicate the options which have been selected.

A	PUMPING	STOPPED	B
Loading Dose			
	500	Rate mL / hr	0.0
	0.5	Vol Inf mL	0.0
	A	B	Options/ Vol Inf
▲	▲	▲	▲

After the programmed delay period has expired, the Plum A+ starts "Pumping". This is indicated where "Delayed" previously was displayed.

Therapies (For Advanced Users*)

A	PUMPING	STOPPED	B
Maintenance Dose			
20.0	Rate mL/hr	0.0	
55.0	Vol Inf mL	0.0	
Callback Line A			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

After the first step has completed, the Main Delivery Screen changes to the second step.

Note: A flashing "Callback Line A" message and the audio alarm sound indicates activation of that option.

A	PUMPING	STOPPED	B
Maintenance Dose			
20.0	Rate mL/hr	0.0	
55.0	Vol Inf mL	0.0	
Callback Line A			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

20. The user should acknowledge the Callback message and stop the audio alarm by pressing [SILENCE].

A	KVO	STOPPED	B
Maintenance Dose			
1.0	Rate mL/hr	0.0	
455	Vol Inf mL	0.0	
Line A VTBI complete			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

Upon completion of delivery, the screen shows a flashing "Line A VTBI complete" message and the audible alarm sounds.

Note: The KVO rate will change to the rate of 1.0 mL/hr or less depending on delivery rate and "Pumping" mode changes to "KVO". If Continue Rate option was selected, pumping continues at original rate.

A	KVO	STOPPED	B
Maintenance Dose			
1.0	Rate mL/hr	0.0	
455	Vol Inf mL	0.0	
Line A VTBI complete			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

21. Press [SILENCE] to stop alarm sound.

Note: Warning message continues to flash and audio alarm will return after a two minute period of silence, unless delivery is stopped or VTBI of last line is changed.

5

5.4 Multistep Programming

A	STOPPED	STOPPED	B
0.0	Rate mL/hr	0.0	
0.0	Vol Inf mL	0.0	
Back Prime	A	B	Options/ Vol Inf
▲	▲	▲	▲

MULTISTEP- Allows a sequential program to deliver up to 10 steps; fluid volumes and delivery rates may be programmed for each step. The program may be entered based on Rate and Volume or Volume and Time. If Dose Calc is used, the delivery steps are in the same unit of measure, over the same period of time, from the same container.

Clear ALL settings when changing patients or multiple programming parameters.

Use ▲ [Clear Program] when changing ONLY Line A or B.

1. Select ▲ [A] at the Main Delivery screen.

A	PROGRAM		
Wand Active			
Rate	0.0	mL/hr	
VTBI	0.0	mL	
Duration	00:00	hr:min	
Enter value using keypad			
Program Options		Therapy	Cancel/ Back
▲	▲	▲	▲

The Line A Programming screen appears.

2. Press ▲ [Therapy].

A	PROGRAM		
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

The Select Therapy screen appears.

3. Use [SELECT] to scroll down to Multistep.

A	PROGRAM		
Wand Active			
Dose Calculation			
Loading Dose			
Multistep			
Select, then Choose			
		Choose	Back
▲	▲	▲	▲

4. Press ▲ [Choose] to continue.

Therapies (For Advanced Users*)

A Program Multistep

mL/hr	grams/hr
mcg/kg/min	ng/kg/min
mcg/kg/hr	units/kg/hr
mcg/min	units/min
mcg/hr	units/hr
mg/kg/hr	mUn/min
mg/min	mEq/hr
mg/hr	

Select, then Choose |||||

		Choose	Back
▲	▲	▲	▲

The Program Multistep screen appears.

Note: Screen defaults to the mL/hr option or the previously selected option.

A Program Multistep

mL/hr	grams/hr
mcg/kg/min	ng/kg/min
mcg/kg/hr	units/kg/hr
mcg/min	units/min
mcg/hr	units/hr
mg/kg/hr	mUn/min
mg/min	mEq/hr
mg/hr	

Select, then Choose |||||

		Choose	Back
▲	▲	▲	▲

5. Use [SELECT] to highlight the desired setting. This example is using mcg/hr.

6. Press ▲ [Choose] to go to the second page of the Program Multistep screen.

5

A Program Multistep

Drug Conc in Container

mcg
mg
grams

Select, then Choose |||||

	Choose		Back
▲	▲	▲	▲

The Container Concentration Selection screen appears whenever the selected Dose Units are gram-based (e.g., grams, mg, mcg, or ng) otherwise this screen is skipped.

Note: Default choice for possible gram-based Container Concentration Unit is mg or the previously selected option.

7. Press ▲ [Choose] to continue, or use [SELECT] to highlight another option.

8. When desired field is highlighted, press ▲ [Choose].

A Program Multistep

Ward Active

Conc **50.0** mg 0.0 mL

Dose	Duration	VTBI	Rate
mcg/hr	hr:min	mL	mL/hr
1 0.000	00:00	0.0	0.0
2 0.000	00:00	0.0	0.0
3 0.000	00:00	0.0	0.0
4 0.000	00:00	0.0	0.0

Enter value using keypad |||||

Program Options		More Steps	Cancel/Back
▲	▲	▲	▲

9. The default field is the concentration field (Conc). Enter value using keypad.

Note: The user must enter the concentration drug amount and diluent volume before any other entries.

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr	
1	0.000	00:00	0.0	0.0
2	0.000	00:00	0.0	0.0
3	0.000	00:00	0.0	0.0
4	0.000	00:00	0.0	0.0
Enter value using keypad				
Program Options		More Steps	Cancel/ Back	
▲	▲	▲	▲	

10. Use [SELECT] to highlight the next programming field (Diluent Amount).

11. Enter value using keypad.

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr	
1	10.0	00:00	0.0	0.1
2	0.000	00:00	0.0	0.0
3	0.000	00:00	0.0	0.0
4	0.000	00:00	0.0	0.0
Enter value using keypad				
Program Options		More Steps	Cancel/ Back	
▲	▲	▲	▲	

12. Use [SELECT] to highlight the next field.

13. Enter Dose using keypad.

Note: The Rate value is automatically computed. To understand the Automatic Calculation feature, see Section 4.7 Examples of Automatic Calculation.

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr	
1	10.0	00:00	0.9	0.1
2	0.000	00:00	0.0	0.0
3	0.000	00:00	0.0	0.0
4	0.000	00:00	0.0	0.0
Enter value using keypad				
Program Options		More Steps	Cancel/ Back	
▲	▲	▲	▲	

14. Use [SELECT] to highlight the Duration or VTBI field.

Note: The VTBI value is automatically computed when the Duration value is entered. If VTBI is entered, the Duration value is automatically computed.

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr	
1	200	09:00	18.0	2.0
2	0.000	00:00	0.0	0.0
3	0.000	00:00	0.0	0.0
4	0.000	00:00	0.0	0.0
Enter value using keypad				
Program Options		More Steps	Cancel/ Back	
▲	▲	▲	▲	

15. Use [SELECT] to highlight the Rate field.

Note: If Rate is changed, Dose and Duration (or VTBI) are automatically re-computed, depending on the programming order.

Therapies (For Advanced Users*)

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose	Duration	VTBI	Rate	
mcg/hr	hr:min	mL	mL/hr	
1	200	09:00	18.0	2.0
2	100	00:00	0.0	1.0
3	0.000	00:00	0.0	0.0
4	0.000	00:00	0.0	0.0
Enter value using keypad <input type="text"/>				
Program Options		More Steps	Cancel/Back	
▲	▲	▲	▲	

16. Use [SELECT] to scroll past the Rate. The cursor will drop down to Step-2, Dose field.

17. Enter the set of desired values for Step-2 of the program. Continue process for each additional Step.

A Program Multistep				
Wand Active				
Conc	50.0 mg	500 mL		
Dose	Duration	VTBI	Rate	
mcg/hr	hr:min	mL	mL/hr	
1	200	09:00	18.0	2.0
2	100	10:00	10.0	1.0
3	250	20:00	50.0	2.5
4	20.0	50:00	10.0	0.2
Enter value using keypad <input type="text"/>				
Program Options		More Steps	Cancel/Back	
▲	▲	▲	▲	

Note: When Step-4 is programmed, using [SELECT] to advance will highlight another item on this screen.

18. When Step-4 is programmed, press ▲ [More Steps] to program up to 10 Steps.

Note: Using [SELECT] will not advance you to the additional steps.

5

A Program Multistep				
Wand Active				
Dose	Duration	VTBI	Rate	
mcg/hr	hr:min	mL	mL/hr	
5	0.000	00:00	0.0	0.0
6	0.000	00:00	0.0	0.0
7	0.000	00:00	0.0	0.0
8	0.000	00:00	0.0	0.0
9	0.000	00:00	0.0	0.0
10	0.000	00:00	0.0	0.0
Enter value using keypad <input type="text"/>				
Program Options		Prev Steps	Cancel/Back	
▲	▲	▲	▲	

19. To set up Steps 5 through 10, enter desired values as for Steps 1 through 4.

20. To see the previous steps, press ▲ [Prev Steps].

A Program Options			
Wand Active			
Delay Start for	00:00 hr:min		
Callback	No		
Enter value using keypad <input type="text"/>			
Drug List	Enter	Cancel/Back	
▲	▲	▲	

21. To program a Delay Start Time or set up a Nurse Callback for this program, press ▲ [Program Options].

22. Enter a value using the keypad.

You can choose Drug Name, Callback, or Delay Start as previously shown.

23. Press ▲ [Enter] to accept the changes.

A	PUMPING	STOPPED	B
Step 1			
2.0	Rate mL / hr	0.0	
0.5	Vol Inf mL	0.0	
200 mcg/hr	Dose		
Enter value using keypad			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

24. Press [START] to begin the delivery. The Main Delivery Screen displays Step-1 in the upper-left corner.

Note: In units other than mL/hr, the Dose rate and units also will be displayed.

A	PUMPING	STOPPED	B
Step 3			
2.5	Rate mL / hr	0.0	
37.5	Vol Inf mL	0.0	
250 mcg/hr	Dose		
Enter value using keypad			
	A	B	Options/ Vol Inf
▲	▲	▲	▲

Example of Multistep Screen Pumping on Step-3.

25. To change a program parameter while pumping, press ▲ [A].

A	Program Multistep		
Wand Active			
Conc	50.0 mg	500 mL	
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr
d 200	00:00	0.0	2.0
d 100	00:00	0.0	1.0
* 250	20:00	50.0	2.5
4 20.0	50:00	10.0	0.2
Enter value using keypad			
Program Options	More Steps	Cancel/ Back	
▲	▲	▲	

Note: The “*” in a Step number field indicates the step is delivering or “d” indicates each completed step.

26. Enter a value using the keypad.

Note: The Concentration drug amount or Diluent volume cannot be changed while a delivery is in progress.

A	Program Multistep		
Wand Active			
Conc	50.0 mg	500 mL	
Dose mcg/hr	Duration hr:min	VTBI mL	Rate mL/hr
d 200	00:00	0.0	2.0
d 100	00:00	0.0	1.0
* 330	15:00	49.5	3.3
4 20.0	50:00	10.0	0.2
Enter value using keypad			
Program Options	More Steps	Cancel/ Back	
▲	▲	▲	

If Dose value is changed, the Duration and Rate will automatically change.

Note: Only the current delivering step and future steps can be changed.

Therapies (For Advanced Users*)

A	PUMPING	STOPPED	B
Step 3			
3.3	Rate mL/hr	0.0	
40.1	Vol Inf mL	0.0	
330 mcg/hr	Dose		
	A	B	Options/ Vol Inf
▲	▲	▲	▲

CAUTION: VERIFY DOSE, RATE, VTBI, AND DURATION BEFORE PRESSING [START].

27. Press [START] to begin infusion with the changed program and return to the Main Delivery Screen.

Note: The Values are now updated on the Main Delivery Screen.

The pump reverts to KVO when last Step completes.

The last step can be restarted by entering a new VTBI value.

5

6.1 Warning Messages

MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
<i>Stop delivery then turn off</i>	<i>Attempting to turn the pump off while a delivery is in progress.</i>	<i>Stop all lines, then turn pump off.</i>
<i>Lockout Enabled</i>	<i>Pressing any key while delivering (except STOP) when Lockout switch is enabled.</i>	<i>Place Lockout switch in disabled position (see section 4.4 Rear Case Controls), then return to enabled position.</i>
<i>Battery Service Warning</i>	<i>The battery capacity is greater than 200 mA/hr. The battery voltage is less than the depleted threshold and charge level is higher than the low charge threshold.</i>	<i>Replace battery.</i>
<i>Warning: Charger Service</i>	<i>The charging circuitry is not behaving as expected (charge voltage is not changing) and can reduce battery life.</i>	<i>Silence key is pressed.</i>
<i>Warning: Low Battery</i>	<i>Pump not plugged in to AC power.</i>	<i>Plug into AC power, only about 15 minutes of battery life remains.</i>

Note: Other error and warning messages will occur when appropriate for the current selection context. For instance, when a change to a required parameter would result in clearing some delivery settings, the warning message will appear when that field is selected. When an input error has just been made, the three quick beeps of an Invalid Key Warning will sound and an appropriate warning message will be shown to explain the problem. All such messages will be cleared or replaced by another message upon the next valid input key press.

6.2 Response to Alarms

1. Disable Lockout by confirming back switch is in the down position.
2. Press [SILENCE] key.
3. Identify/Observe Alarm condition.
4. Correct Alarm condition (see chart below).
5. Press [START] to resume infusion.

Note: Alarm messages begin with an alphanumeric code for tracking purposes only. If troubleshooting does not correct the problem, record the code number and contact technical support.

GENERAL ALARMS

6

CODE	MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
E100	Unrecognized cassette	Attempting to use unrecognized cassette	Turn off or insert recognized cassette.
E101	No Action Alarm	Pump programming incomplete.	Press [START] or continue programming.
E102	Infuser Idle 2 Minutes	Pump is ON without operator input.	Begin programming or turn pump OFF.
E103	Memory Failure	The pump did not accept the previous programmed data.	Re-enter all programmed data.
E230	Prox Air, Backprime	When the total proximal air detected exceeds the limit.	Check for clamps, or empty containers on line A or B. Correct as necessary. Backprime into line B tubing or syringe
E180, E181, E186	Distal Occlusion	Distal line kinked, IV site clotted or positional, pressure limit set too low.	Check distal tubing, check IV site, reset pressure limit. Note: See Section 8.8 for detailed instructions for avoiding a bolus following a distal occlusion.
E187	Neg Distal Occlusion	Pump too high above patient or defective set.	Lower pump or replace set.
E183, E185	Prox Occl At Startup	Proximal line obstructed, line A (or B) container disconnected or obstructed during non-delivery (startup).	Examine line A (or B) for kinks or closed clamps. Open and close door, then immediately open clamp. Continue programming. Replace set if problem persists. Note: If clamps are not opened prior to completion of cassette test, peak proximal occlusion may recur.
E233, E234	Distal Air	When air is detected at the distal sensor and exceeds the limit.	Remove and reprime cassette using standard technique.
E250	Door open while pumping	Pump door opened while operating.	Close door with cassette inserted.

CODE	MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
E251	Cassette Test Failure	Faulty cassette, proximal or distal occlusion or air in cassette detected at start up.	Check clamps, manually reprime set, close door. Backprime into line B tubing or syringe if appropriate. If alarm recurs on retest, replace set. If alarm repeats, replace pump.
E252	Depleted Battery	Too much time on battery power.	Plug into AC power.
E253	Lockout Violation	The use of the [STOP] key during delivery, or opening the door, while lockout is enabled.	Unlock lockout switch.
E254	Lockout Enabled	Pressing of any key except [STOP] during delivery while any alarm is active and lockout is enabled.	Unlock lockout switch.

LINE A ALARMS

CODE	MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
E105	Callback Line A	Alarm programmed by user. Change in delivery for Loading Dose to Maintenance Step or for any step in "Multistep" therapy provided the step is not the last step.	Press [SILENCE].
E161	Line A VTBI complete	VTBI complete on line A.	Program new VTBI.
E184, E190, E191	Prox Occl A	Proximal line obstructed, line A container disconnect or obstruction.	Examine line A for kinks or closed clamps.
E232	Prox Air A, Backprime	When proximal air detected exceeds the limit for the line.	Check for clamps, or empty container. Correct as necessary. Backprime into line B tubing or syringe

Alarms and Troubleshooting

LINE B ALARMS

CODE	MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
E104	Callback Line B	Alarm programmed by user. Change in delivery for piggyback delivery, Loading Dose to Maintenance Step, or for any step in "Multistep" therapy provided the step is not the last step.	Press [SILENCE].
E160	Line B VTBI complete	VTBI complete on line B.	Program new VTBI.
E182, E188, E189	Prox Occl B	Proximal line obstructed, line B container disconnected or obstructed.	Examine line B for kinks or closed clamps. Note: Occlusion caused by empty container, backprime into line B tubing or syringe.
E231	Prox Air B, Backprime	When proximal air detected exceeds the limit for the line.	Check for clamps, or empty container. Correct as necessary. Backprime into line B tubing or syringe.

6

MALFUNCTIONS

CODE	MESSAGE	POSSIBLE CAUSE	CORRECTIVE ACTION
E300 or higher	Malfunction	A failure has occurred in the pump's internal systems.	Record Malfunction error code. Pump must be turned OFF to clear malfunction. If alarm malfunction repeats, replace pump.

7.1 Cleaning, Maintenance, and Storage

The cleaning, maintenance, and storage of the Plum A+ are described in this section.

CLEANING AND SANITIZING

For proper maintenance of the Plum A+, observe the following cleaning and sanitizing guidelines.

Establish a routine weekly schedule for cleaning the Plum A+. To clean the Plum A+, proceed as follows:

Turn the Plum A+ off with the [ON/OFF] switch, then disconnect the Plum A+ from mains power.

The exposed surfaces of the Plum A+ may be cleaned with a lint-free cloth dampened by one of the recommended cleaning solutions in the following list or mild, nonabrasive soapy water.

CLEANING SOLUTION	MANUFACTURER	PREPARATION
<i>Super Edisonite[®]</i>	<i>S. M. Edison Co.</i>	<i>Per manufacturer's recommendation</i>
<i>Vesphene II^{® se}</i>	<i>Calgon Vestal Laboratories</i>	<i>Per manufacturer's recommendation</i>
<i>Manu-Klenz[®]</i>	<i>Calgon Vestal Laboratories</i>	<i>Per manufacturer's recommendation</i>
<i>Formula CTM</i>	<i>Diversey Corporation</i>	<i>Per manufacturer's recommendation</i>
<i>CoverageTMHBV</i>	<i>Steris Corporation, A division of Calgon Vestal Laboratories</i>	<i>Per manufacturer's recommendation</i>
<i>Sporicidin[®]</i>	<i>Sporicidin International</i>	<i>Per manufacturer's recommendation</i>
<i>Household bleach</i>	<i>Various</i>	<i>Per hospital procedures; do not exceed one part bleach in ten parts water</i>

On a routine basis, clean all of the elements behind the cassette door using cotton-tipped swabs saturated with cleaning solution. The cassette door may be unlatched from the door handle to facilitate cleaning.

To unlatch the cassette door from its handle, tilt the device back, open the cassette door, then push the door release tab to open the door fully.

Maintenance and Storage

CAUTION: TO AVOID MECHANICAL OR ELECTRONIC DAMAGE, DO NOT IMMERSE THE PLUM A+ IN ANY FLUIDS OR CLEANING SOLUTIONS.

CAUTION: CERTAIN CLEANING AND SANITIZING SOLUTIONS MAY SLOWLY DEGRADE COMPONENTS MADE FROM SOME PLASTIC MATERIALS. USING ABRASIVE CLEANERS OR CLEANING SOLUTIONS NOT RECOMMENDED BY ABBOTT LABORATORIES MAY RESULT IN PRODUCT DAMAGE. DO NOT USE COMPOUNDS CONTAINING COMBINATIONS OF ISOPROPYL ALCOHOL AND DIMETHYL BENZYL AMMONIUM CHLORIDE.

CAUTION: NEVER USE SHARP OBJECTS SUCH AS FINGERNAILS, PAPER CLIPS, OR NEEDLES TO CLEAN ANY PART OF THE PLUM A+.

CAUTION: DO NOT STERILIZE BY HEAT, STEAM, ETHYLENE OXIDE (ETO), OR RADIATION.

CAUTION: TO AVOID PUMP DAMAGE, CLEANING SOLUTIONS SHOULD ONLY BE USED AS DIRECTED. THE DISINFECTING PROPERTIES OF CLEANING SOLUTIONS VARY; CONSULT THE MANUFACTURER FOR SPECIFIC INFORMATION.

BATTERY MAINTENANCE

CAUTION: DO NOT OPERATE THE PLUM A+ ON PATIENTS WITH THE BATTERY REMOVED. USE OF A PROPERLY MAINTAINED AND CHARGED BATTERY HELPS CONFIRM PROPER OPERATION.

CAUTION: IF THE LOW-BATTERY ALARM SOUNDS, CONNECT THE PLUM A+ TO MAINS POWER IMMEDIATELY.

The Plum A+ is battery powered for emergency backup and temporary portable operation. A fully charged, new battery provides six hours of operation at 125 ml/hr or 500 ml total volume delivered, whichever occurs first.

Note: For optimum battery life, the Plum A+ should be operated on battery power for six continuous hours at least once every six months and then charged for a minimum of six hours.

The battery charges whenever the Plum A+ is connected to mains power. If the Plum A+ is switched off, recharge takes approximately six hours. Recharge takes longer if the Plum A+ is turned on.

As a general rule, the more often the battery is partially discharged and recharged, the sooner it will need to be replaced. Consult a qualified biomedical technician for battery replacement if necessary.

To maintain maximum battery charge and to prolong battery life, connect the Plum A+ to mains power whenever possible.

STORAGE

To prolong the life of the Plum A+, observe the following storage precautions:

- Store the Plum A+ away from excessive heat, cold, and humidity
- Store the Plum A+ connected to mains power
- Switch the Plum A+ off using the [ON/OFF] key

SERVICE

All servicing or adjustments to the Plum A+ should be referred to qualified technical personnel. A technical service manual may be ordered from the local Abbott Laboratories sales office.

The Plum A+ has been designed and manufactured to be safe, reliable, and easy to use. This section details precautions and possible hazards.

For safe operation of the Plum A+, observe the following precautions and hazards.

8.1 Artifacts

Nonhazardous, low-level electrical potentials are commonly observed when fluids are administered using infusion devices. These potentials are well within accepted safety standards, but may create artifacts on voltage-sensing equipment such as ECG, EMG, and EEG machines. These artifacts vary at a rate that is associated with the infusion rate. If the monitoring machine is not operating correctly or has loose or defective connections to its sensing electrodes, these artifacts may be accentuated so as to simulate actual physiological signals. To determine if the abnormality in the monitoring equipment is caused by the infusion device instead of some other source in the environment, set the infusion device so that it is temporarily not delivering fluid. Disappearance of the abnormality indicates that it was probably caused by the electronic noise generated by the infusion device. Proper setup and maintenance of the monitoring equipment should eliminate the artifact. Refer to the appropriate monitoring equipment system documentation for setup and maintenance instructions.

The Plum A+ system is designed to operate normally in the presence of most encountered electromagnetic interference (EMI) conditions. In the event of extreme levels of interference, such as encountered next to an electrosurgical generator, it is possible that the normal operation of a sensor or microcomputer might be disrupted. Even in this event, the outcome would likely be a false alarm or detected system malfunction and would not result in a hazard to patient or operator.

Use of radio frequency emitting devices such as cellular telephones and 2-way radios in close proximity of this device may affect its operation.

8.2 Healthcare Professionals and Patient Related

In vitro studies have suggested that packed red blood cells with unusually high hematocrit be diluted with blood-compatible fluids, such as 0.9% sodium chloride injection, to decrease hemolysis and increase flow rate.

Setting the primary rate greater than the secondary rate will result in a more rapid infusion of any residual secondary drug remaining in the line and the cassette.

Consult drug labeling to confirm drug compatibility, concentration, delivery rates, and volumes are all suitable for secondary, concurrent and piggyback delivery modes.

Precautions

Connecting more than one pump into one patient line may significantly affect the infusion rate of at least one of the pumps.

Arrange tubing, cords, and cables to minimize the risk of patient strangulation or entanglement.

Before opening the door, close clamp on the primary line or remove the secondary container from the secondary port to prevent mixing of primary and secondary fluids.

Although unlikely, failure of certain robust mechanical components such as the anti-free flow mechanism or valve control springs could cause fluid delivery limited to the contents of the fluid container. Single fault failure of certain electronic/motor control components would result in no more than 5 mL of unexpected fluid delivery.

A small amount of fluid is expelled from the set (less than 0.05 ml) each time the door is opened or closed with a set installed. If potent drugs are being used, take appropriate action to guard against overmedication of the patient.

Before disconnecting a syringe from the cassette, pull up the plunger slightly to avoid spilling the fluid. For rigid containers (for example, vials), close the upper slide clamp, open the cassette door, then remove and invert the cassette (ports down).

Air bubbles may form distal to the cassette as result of normal out-gassing of dissolved air in the fluid. This may occur if chilled solution is in use, if the pump is mounted significantly above the patient, or when using certain fluids known to routinely outgas. In these cases, an air eliminating filter may be used.

Repeated opening and closing of the door may defeat the proximal air-in-line alarm and may cause a distal air-in-line alarm, requiring repriming.

The screen displays the VTBI (volume to be infused) in integers when value is above 99.9. Any fraction of a milliliter delivered is not displayed, but is retained in memory.

8.3 Concurrent Flow

DELIVERY RATE

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When delivering short half-life critical drugs (*See Critical Drugs, this section*) using the Plum A+ in the Concurrent mode, the following delivery rate guidelines should be observed:

- If the critical drug (with half-life less than 6 minutes) is to be infused at less than 2.0 mL/hr, the other infusion should be no faster than 5 times the critical drug's rate. Dopamine, for example, delivered at 1.5 mL/hr should not be accompanied by an infusion programmed any faster than 7.5 mL/hr.
- If the critical drug (with half-life less than 6 minutes) is to be infused at 2.0 to 5.0 mL/hr the other infusion should be no faster than ten times the critical drug's rate. Dopamine, for example, delivered at 3.5 ml/hr should not be accompanied by an infusion programmed any faster than 35 mL/hr.
- If the critical drug (with half-life less than 6 minutes) is to be infused at 5.1 mL/hr or greater, the other infusion can be programmed at any desired rate.

Note:The total of the primary rate plus the secondary rate cannot exceed 500 mL/hr.

Note: These guidelines apply *only* when infusing *short half-life critical drugs* in *Concurrent mode*. Individual patient responses may vary requiring adjustment of delivery rates.

Delivery Rate Guidelines	
Short Half-life (less than 6 minutes) Critical Drug Infusion Rate	Maximum Rate of Accompanying Infusion
0.5 - 1.9 mL/hr	5 Times the Critical Drug Rate
2.0 - 5.0 mL/hr	10 Times the Critical Drug Rate
5.1 or Greater	Any Desired Ratio

CRITICAL DRUGS

Examples of drugs with a short half-life (approximately 6 minutes or less when given IV) include:

- | | |
|--|--|
| <ul style="list-style-type: none"> •Dobutamine •Dopamine •Epinephrine •Esmolol •Isoproterenol •Lidocaine | <ul style="list-style-type: none"> •Nitroglycerin •Nitroprusside •Norepinephrine •Oxytocin •Procainamide •Trimethaphan |
|--|--|

For these drugs, the concurrent flow guidelines should be followed when the infusion rate of the drug will be 5 mL/hr or less.

Note: This list of critical drugs is not intended to be all-inclusive of critical drugs or drugs with a short half-life.

The clinician should become familiar with the pharmacodynamics of any critical drug before administration.

This information is presented to inform clinicians of a rare situation that could be misinterpreted if they are unfamiliar with this phenomenon.

8.4 Epidural Administration

Recommended use of the epidural route is to provide anesthesia or analgesia for periods up to 96 hours.

This device can be used to administer only those anesthetics/analgesics approved for epidural administration (as indicated or allowed by the drugs' FDA approved labeling). Epidural administration of drugs other than those indicated for epidural use could result in serious injury to the patient.

For epidural administration, the use of Abbott Laboratories catheter, List No. 1193 or List No. 6947, pump sets without Y-sites, and "epidural" stickers indicating ongoing epidural administration are recommended.

Administration of drugs via the epidural route should be limited to personnel familiar with associated techniques and patient management problems. Proper epidural placement of the catheter is essential since

Precautions

catheter migration could result in intravascular or intrathecal administration. Facilities practicing epidural administration must be equipped with resuscitative equipment, oxygen, naloxone, and other resuscitative drugs. Adequate monitoring equipment (e.g., Oximetry) is recommended for continuous monitoring of the patient during epidural administration. Patients must be observed frequently for side effects in a fully-equipped and staffed environment for at least 24 hours following completion of drug administration by the epidural route. **DELAYED RESPIRATORY DEPRESSION FOLLOWING CONTINUOUS EPIDURAL ADMINISTRATION OF PRESERVATIVE-FREE MORPHINE SULFATE HAS BEEN REPORTED.**

The epidural space has 58 openings through which fluid can exit. Pressure buildup during administration is transient. However, if a large volume of fluid is administered over a short time period, the pressure will take longer to return to normal. If overdelivery occurs during administration, observe the patient closely for signs of spinal cord compression (disorientation, headache, transient neuralgias) and drug overdose.

8.5 Battery Operation

CAUTION: DO NOT OPERATE THE PLUM A+ ON PATIENTS WITH THE BATTERY REMOVED. USE OF A PROPERLY MAINTAINED AND CHARGED BATTERY HELPS CONFIRM PROPER OPERATION.

The battery may not be fully charged upon receipt. Connect the Plum A+ to AC power for at least six hours.

Use AC power whenever possible. Connect the Plum A+ to AC power during storage to ensure a fully charged battery for emergencies. If quality earth grounding source is in doubt, use battery power.

If the low-battery alarm sounds, connect the Plum A+ to AC power immediately.

8.6 Sets and Accessories

Only compatible LifeCare Plum Sets can be used with the Plum A+. See individual set instructions for additional information.

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Administration sets should be changed per CDC guidelines or healthcare provider policy. Discard after use.

LifeCare IV infusion sets with integral nonblood filters are not for use in the administration of blood, blood products, emulsions, suspensions, or any medications not totally soluble in the solution being administered. These medications may be administered through the lower Y-injection site, below the filter.

When infusing at low delivery rates (5.0 mL/hr or less) the use of thick-walled microbore Plum sets is recommended. This will reduce the amount of the fluid bolus that may be delivered when a distal line occlusion is released.

Use List 11986-48, syringe adapter when using syringes 10 cc or smaller on the secondary line. (Syringes must be larger than 3 cc.)

Use a 19-gauge or larger needle or catheter at the venipuncture site for viscous fluids if operating at rates greater than 500 ml/hr.

See *Section 10* for information on sets and accessories.

8.7 Backpriming

Backpriming is not recommended for reconstituting secondary containers containing dry powders.

To avoid pressurization when backpriming into a syringe or a vial, the user must confirm that these containers have sufficient empty space to accept the backprimed fluid.

8.8 General

Possible explosion hazard exists if used in the presence of flammable anesthetics.

Do not place Plum A+ in service if it fails the self-test.

Do not operate the Plum A+ with the case opened.

Keep the cassette door securely closed while the Plum A+ is not in use, to avoid cassette door damage.

Use the following procedure to avoid the administration of a bolus following a distal occlusion:

- **If a secondary container is in use, clamp proximal tubing before opening cassette door**
- **Open cassette door and remove the cassette**
- **Open the flow regulator briefly to dissipate the pressure and then close it**
- **Eliminate the source of occlusion**
- **Reinsert the cassette and close the cassette door**
- **Open all clamps and resume infusion**

PHYSICAL

- Dimensions:** Approximately 8" X 8" X 6", excluding pole clamp protrusion and power cord storage.
- Weight:** Approximately 9.5 lbs. with battery.
- Casing:** High-impact plastic

ELECTRICAL

- Power Requirements:** 120 V~, 50-60 Hz, 35 VA.
- Fuses:** F1, F2, 250V~, 0.5 A. (internal)
- Power Cord:** Hospital-grade AC cord. 10 ft long, with transparent plug and retainer plate.
- Battery:** One sealed, lead-acid, rechargeable 6 V battery, internal to device.
- Battery Life:** With a new fully charged battery, the infuser shall operate for a minimum of six hours at 125 mL/hr or less, or deliver 500 mL at 126 mL/hr or greater on one line.
- Recharge:** The battery charges whenever the Plum A+ is connected to AC power. The recharge time is approximately six hours with the device operating at 125 mL/hr on one line.
- Electrical Leakage:** Risk current limits meet AAMI/ANSI SCL (ungrounded) 12/78 standard.
- NURSE-CALL System:** NURSE-CALL alarm is factory set for Normally- Open (NO)
- Note: Contact the Technical Services Center to make an internal adjustment to change the device from Normally- Open (NO) to Normally Closed (NC) system.
- Circuitry Ratings:** Voltage-30 VDC Max
Current- 0.25 Amps Max
Contact Rating- 3 Watts Max

VTBI RANGE

- VTBI Range:** 0.1 to 99.9 mL (in 0.1 mL increments)
100 to 9999 mL (in 1 mL increments)

Specifications

ENVIRONMENT

Operating Temperature: 5° to 40° C
Storage Temperature: -20° to 60° C
Atmospheric Pressure: 0 - 10,000 feet (0 - 3,000m) or equivalent pressure
Relative Humidity: 10 - 90% (40° C Max)

DELIVERY RATE RANGE

Lines A and B: 0.1 - 99.9 mL/hr (in 0.1 mL increments)
100 - 999 mL/hr (in 1 mL increments)
Concurrent Delivery: 0.5 mL/hr minimum for each line
PlumSet: 500 mL/hr cumulative (A+B) maximum
KVO: 1.0 mL/hr or the last primary delivery rate, whichever is less

AIR-IN-LINE ALARM

PlumSet (Distal): Bolus 0.1 mL or larger
Cumulative 0.26 mL out of 2.5 mL
PlumSet (Proximal): Bolus at 0.5 mL, Total 1.0 mL

OCCLUSION ALARM AND LIMITS

- Distal Occlusion:** The DISTAL OCCLUSION alarm sounds after the distal set tubing or set outlet fitting becomes occluded.
- Proximal Occlusion:** The PROXIMAL OCCLUSION alarm sounds if the tubing proximal to the cassette becomes occluded.
- Distal Pressure Limit (without alarm):** 1 to 15 psig. The maximum pressure is user-selectable. Factory default setting is 6 psig.
- Maximum Infusion Pressure:** 20 psig

TIME TO DETECT DOWNSTREAM OCCLUSIONS

Rate	Occlusion Alarm Pressure Setting	Typical Time to Alarm (Macro)	Maximum Time to Alarm (Macro)
25 mL/hr	6 psig	38 seconds	47 seconds
	15 psig	98 seconds	106 seconds
1 mL/hr	6 psig	17 minutes	22 minutes
	15 psig	45 minutes	49 minutes

* Baseline backpressure is 0 psig *

BOLUS VOLUME RELEASED AFTER DOWNSTREAM OCCLUSIONS ARE CORRECTED

Rate	Occlusion Alarm Pressure Setting	Typical Bolus Volume (Macro)	Maximum Bolus Volume (Macro)
25 mL/hr	6 psig	0.23 mL	0.28 mL
	15 psig	0.55 mL	0.63 mL
1 mL/hr	6 psig	0.24 mL	0.30 mL
	15 psig	0.59 mL	0.70 mL

* Baseline backpressure is 0 psig *

Specifications

DELIVERY ACCURACY

The Plum A+ Infusion pump was designed and manufactured to maintain a volumetric delivery rate error of the total fluid delivered of less than or equal to $\pm 5\%$ over the course of 48 hours at a programmed rate of 1 to 999 mL/hr during normal operating conditions. For use of the device at rates below 1 mL/hr, the delivery rate error is less than or equal to $\pm 10\%$.

Backpressure Effect- Positive backpressure on the distal line may affect delivery accuracy by no more than 0.5% per psig (2% per psig for rates between 0.1 and 0.9 mL/hr) for backpressures up to 15 psig. A typical deviation under these conditions is 0.3%. Negative backpressure may affect delivery accuracy no more than 2% for pressures up to -2 psig (56 inches of water). A typical deviation under these conditions is 0.3%.

Filling Head Effect- Variations in filling head (such as container height) may affect delivery accuracy by no more than 2% for variations in the range -15 to +28 inches. A typical deviation under these conditions is 0.5%.

Concurrent Delivery Effect- When both lines (A & B) are delivering, the ratio of delivery for the fluid with the lowest rate may be affected by as much as 5% for ratios up to 9 to 1. For higher ratios, the absolute percentage of delivery for the lowest rate may be affected by no more than 0.5%. When air is present in the bubble trap, the absolute percentage of delivery for the lowest rate may be affected by up to 2.0%. When variations in container height are present, the absolute percentage of delivery for the lowest rate may be affected by up to 2.5% for up to 24 inches of container height differences.

TRUMPET CURVES

The Trumpet Curve Graphs following the Example show representative maximum and minimum percent flow rate deviation from the programmed rate over time. This information was developed in accordance with IEC 60601-2-24: 1998, Sub-Clause 50.102. Refer to this standard for detailed information.

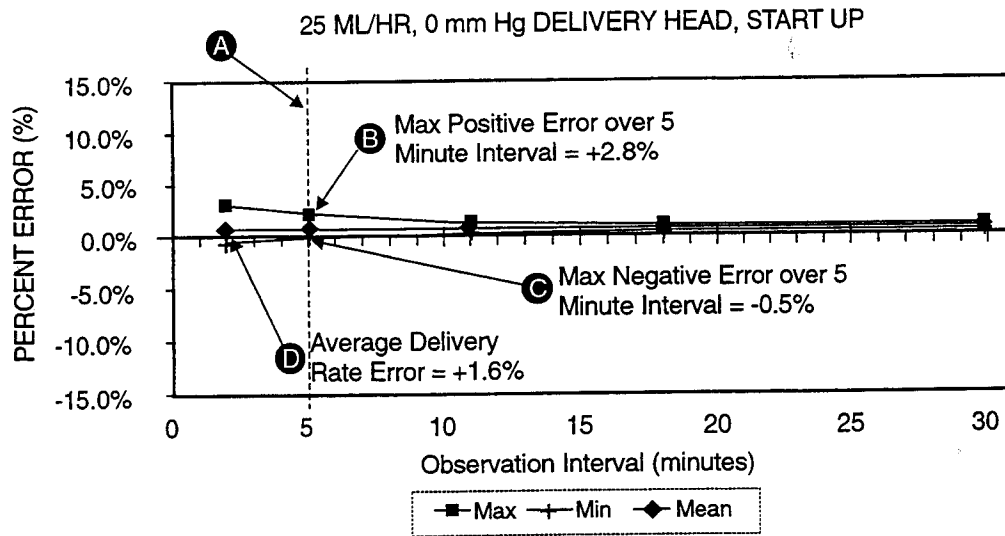
How to read a Trumpet Curve Graph (Refer to example on the following page): The graphs following the Example plot flow rates at 30 second intervals for the first 2 hours and for the 96th hour of delivery. The graph plots mean delivery rate error (Average of 3 pumps) for the 2nd hour and the 96th hour as a straight line. The graph also presents maximum and minimum average delivery rate error for this interval plotted by averaging delivery errors over intervals of 2, 5, 11, 19 and 31 minutes ("Trumpet Curve").

EXAMPLE

From the Trumpet Curve Graph sample that follows, find the 5 minute interval (A) at the horizontal axis and read the corresponding points (B) and (C) on the vertical axis. The values are approximately +2.8% and -0.5%.

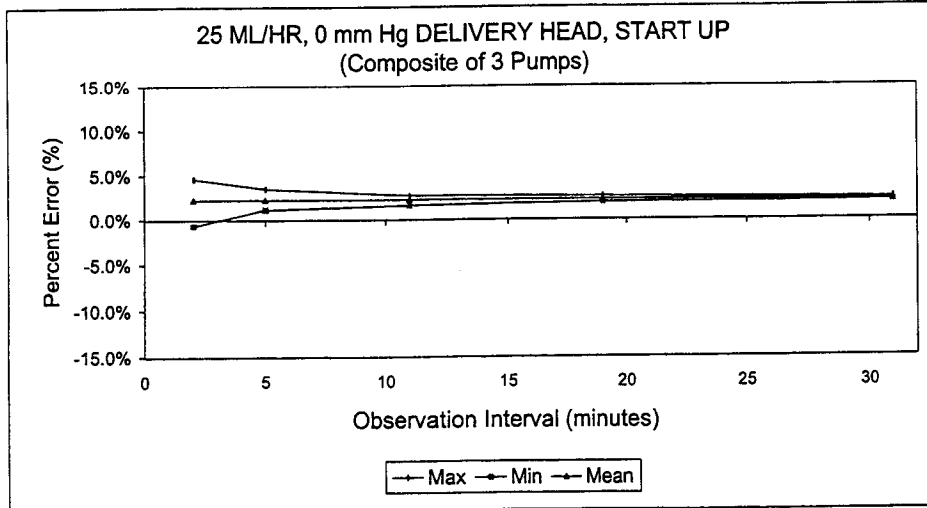
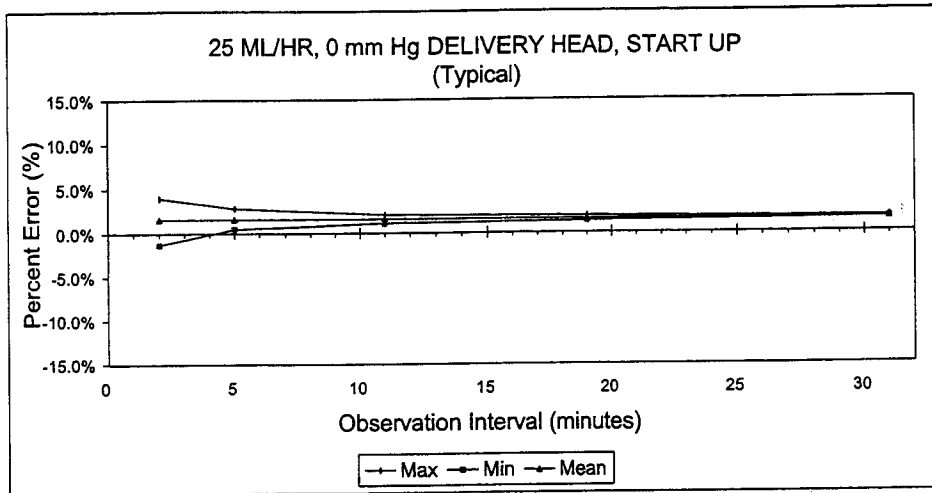
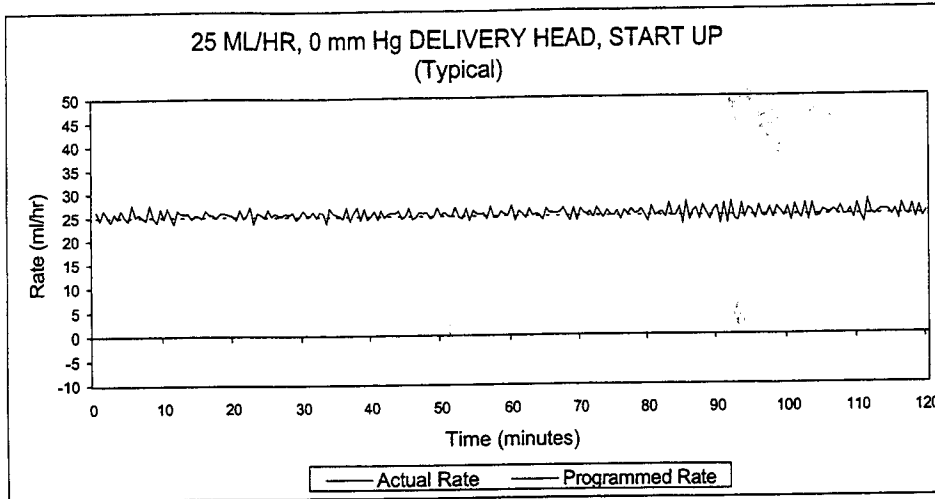
This means that at the rate of 25 mL/hr the average maximum flow rate fluctuation for any 5 minute time interval during the 2nd hour of operation was within the limits of +2.8% and -0.5% from the nominal rate. The average delivery rate error over the entire 2nd hour was +1.6% (D).

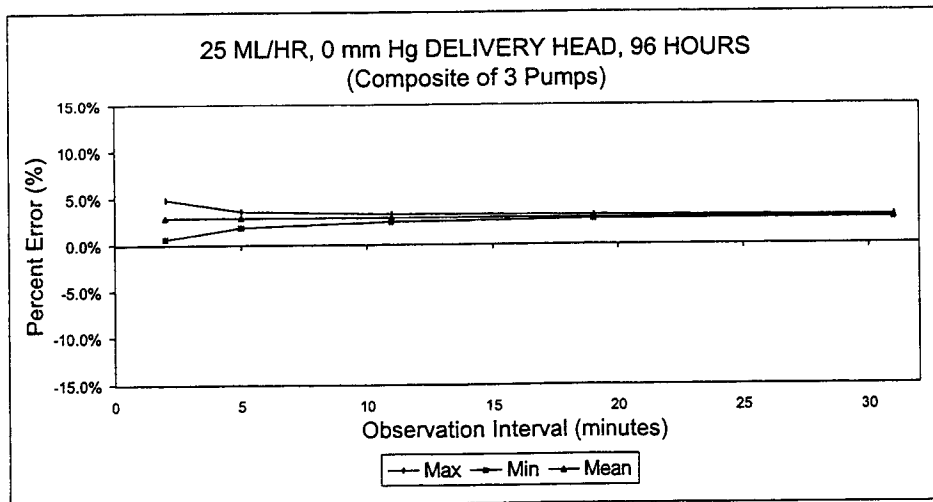
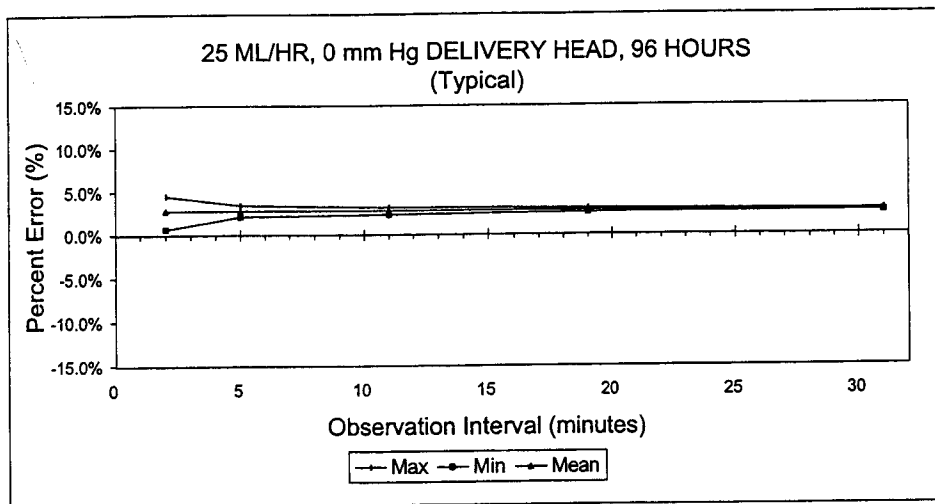
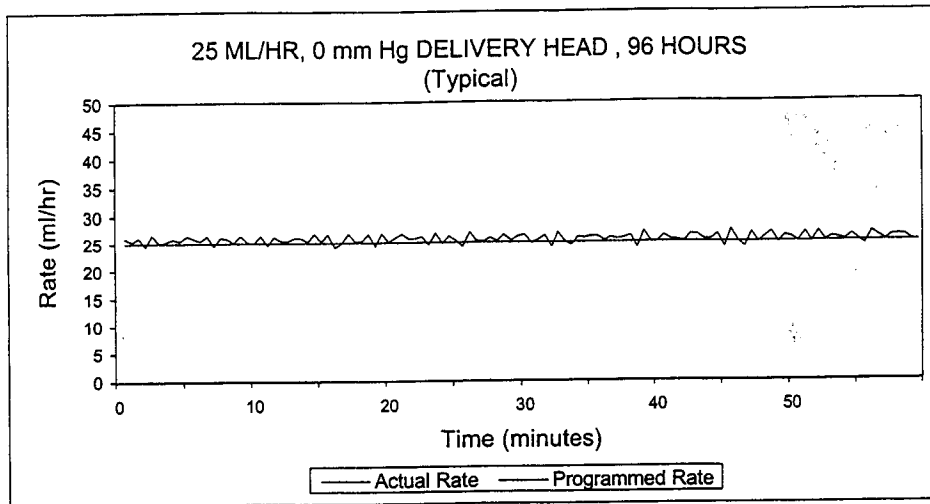
For other time intervals look at other points at the horizontal axis and determine corresponding limits as above.



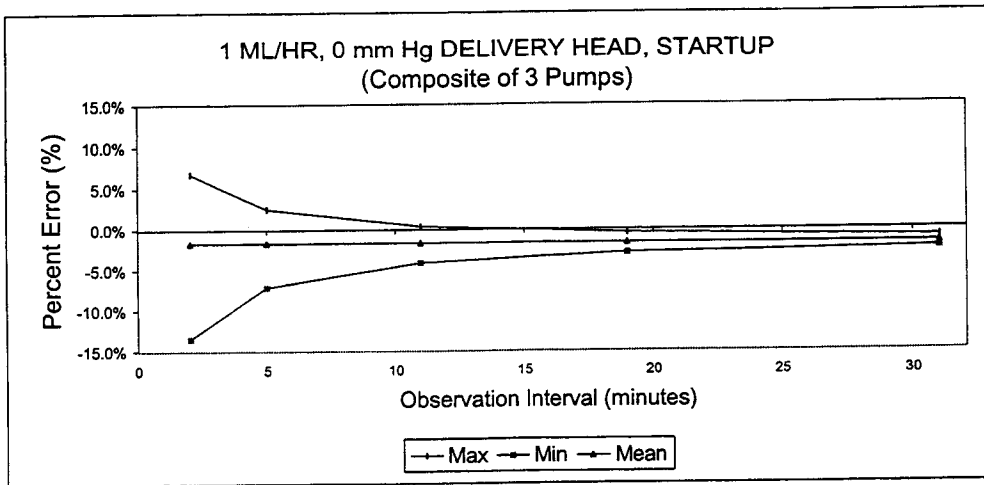
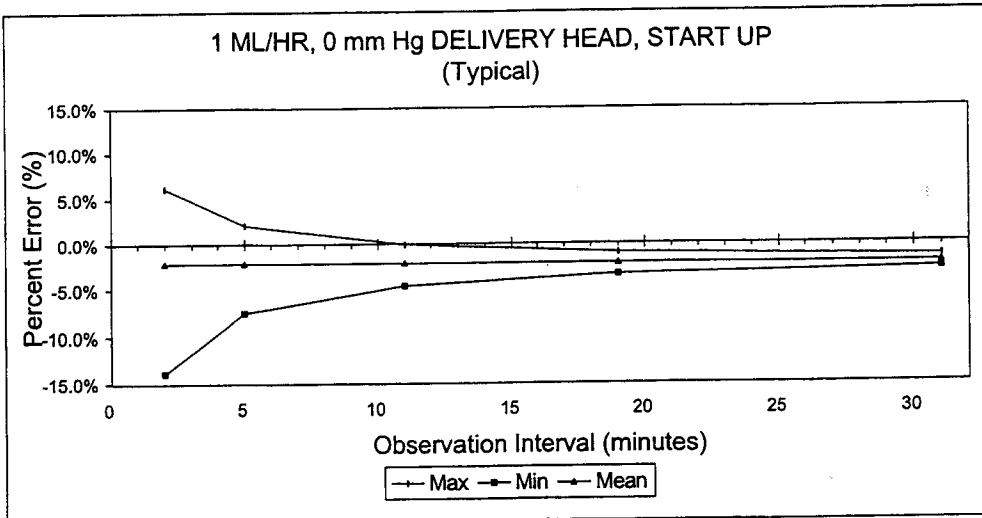
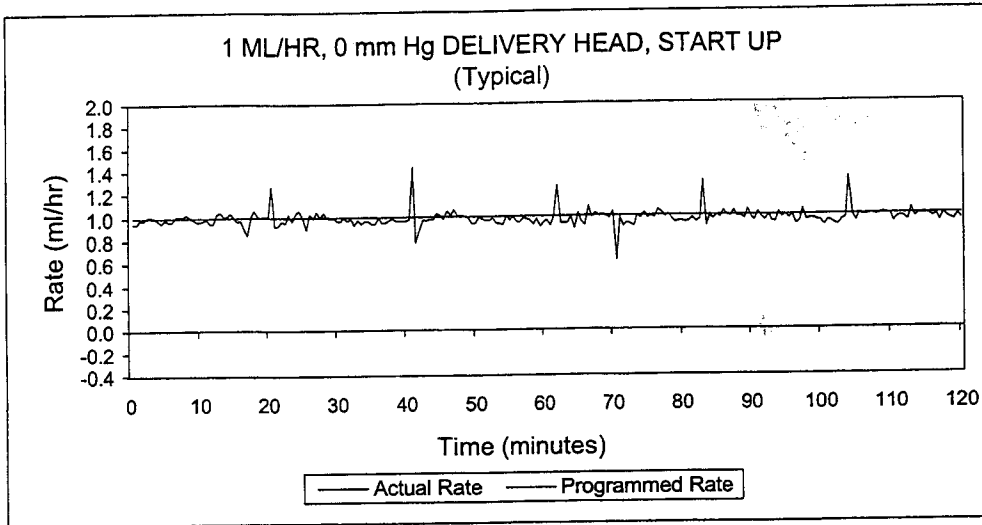
A trained professional can use the resulting graphs to select a pump with the appropriate startup and flow characteristics to suit the clinical application.

Note: As an example of how the trumpet curves can be used, consider the maximum and minimum deviations at the 5 minute average interval. The upper curve provides the maximum expected delivery rate error over a 5 minute interval, the lower curve provides the minimum expected delivery rate error over a 5 minute interval. An example would be Dopamine administered at 5 µgm/kg/min. At 5 minutes, the average drug delivery error would be within the range of +2.8% and -0.5% of the expected nominal rate.

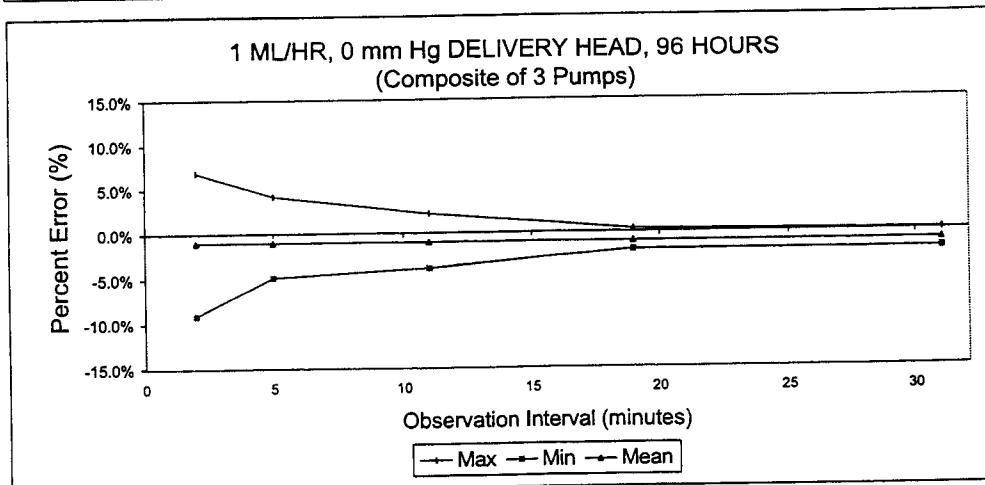
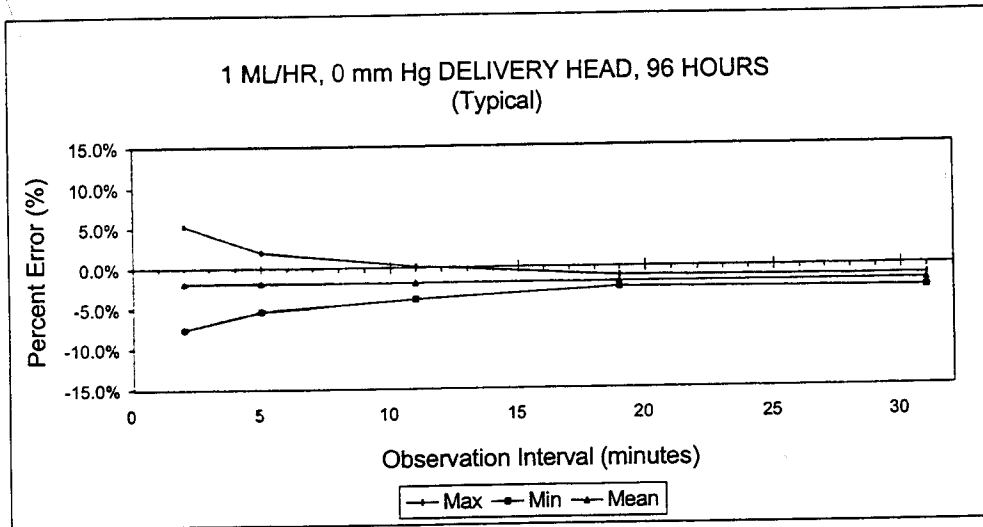
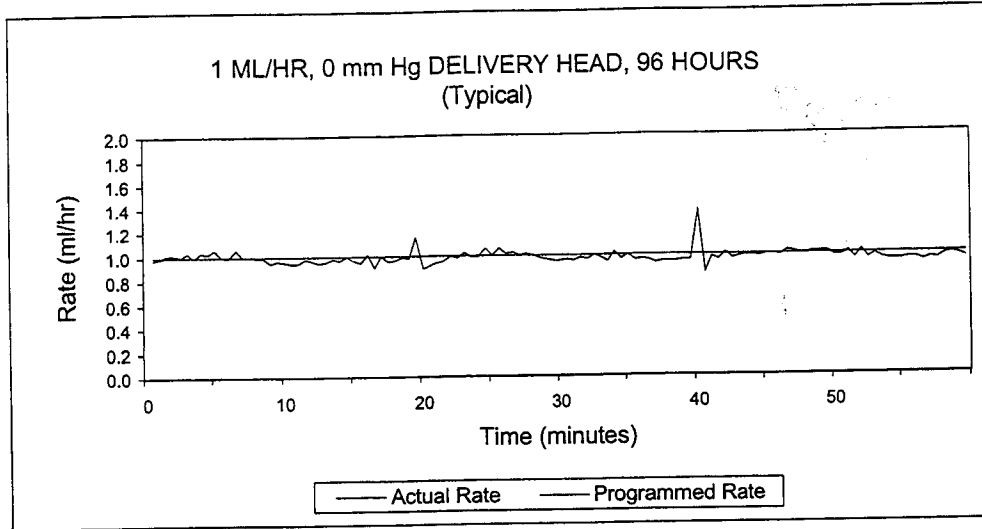




Specifications



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10.1 Administration Fluids

ADMINISTRATION FLUIDS

- All parenteral fluids
- Whole Blood
- Blood fractions

ENTERAL AND HIGH VISCOSITY FLUIDS

- Dextrose 20% to 50% concentration
- Isomil Powder
- Similac Powder
- Ensure plus HN
- TwoCal HN
- Packed red cells

CONTAINERS

- Dual Chamber Parenteral flexible container (Nutrimix)
- Large Volume Parenteral flexible plastic containers, including premixed
- Large Volume Parenteral glass containers, including premixed and nutritional
- Part Fill Parenteral flexible plastic containers, including ADD-Vantage
- Part Fill Parenteral glass containers
- Small Volume Parenterals
- Syringes, vials, includes part fills (may require special adapters)
- Top Filled Enteral bags
- Ready to hang Enteral solution containers

10.2 Accessories

- Syringe Adaptor- List# 11986-48
- Vial Adaptor- List# 11884-48
- Mini Pole- List# 12096-04-01
- Secondary Container Support- List# 12095-04-01
- Bar Code Reader (Available as a Field-Installed Infuser Option)- List# 11972-04-01
- Tandem Carrier- List# 12270-01