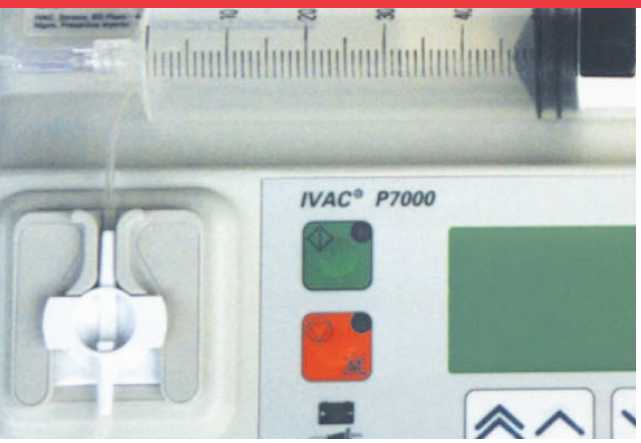
IVAC® **P7000** Syringe Pump

Directions For Use - English



CardinalHealth

CE
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Contents

Introduction

The IVAC® P7000 Syringe Pump (herein after referred to as "pump") is a fully featured high end variable pressure syringe pump suitable for critical care applications.

Intended Use:

The pump is designed to meet the infusion requirements within the operating environment specified in this Directions For Use (DFU) including general wards, critical and intensive care, neonatal, operating rooms and accident and emergency rooms.

This pump is suitable for use by appropriately trained clinicians or nurses. The syringe pump is suitable to deliver fluids and medications via intravenous and epidural routes. Supporting fluid therapy, blood transfusions and parenteral feeding.

The pump functions with a wide range of standard, single-use, disposable Luer-lock syringes. It accepts syringe sizes from 5ml to 100ml. See the 'Compatible Syringes' section for a full list of compatible syringes.

- Simple to set up and easy to operate.
- Large graphics format display including pressure trending.
- Rate Range from 0.1 to 1200ml/h.
- In- pressure monitoring from 0 to 1000 mmHg.
- Event logging records operation of pump.
- Configurable drug protocols for simplified drug dosing.

About This Manual

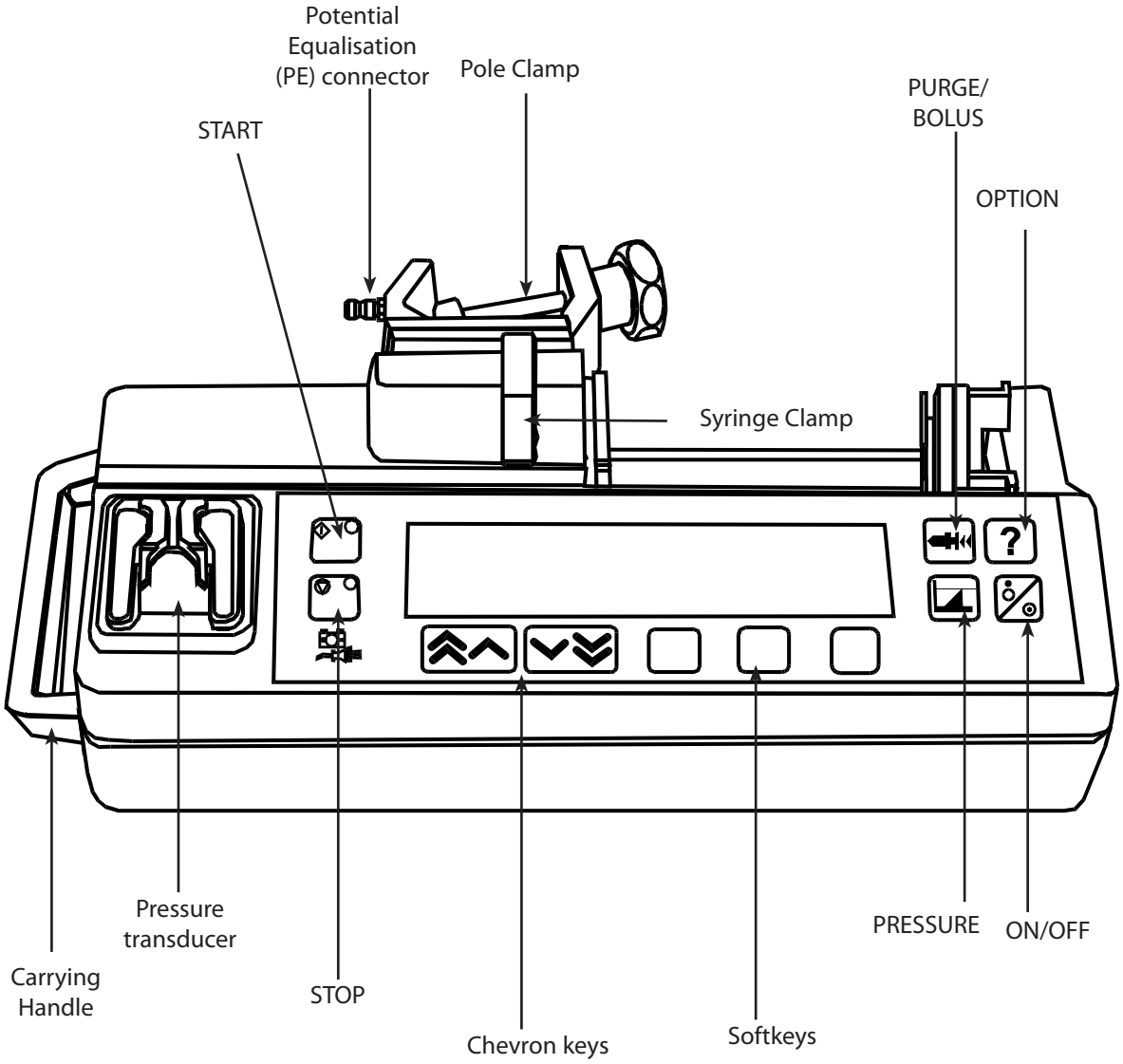
The user must be thoroughly familiar with the IVAC® P7000 Syringe Pump described in this manual prior to use.

All illustrations used in this manual show typical settings and values which may be used in setting up the functions of the pump. These settings and values are for illustrative use only. Where stated, a minimum infusion rate refers to a nominal rate of 1.0ml/h, and an intermediate infusion rate refers to a nominal rate of 5.0ml/h. The complete range of infusion rates, settings and values are shown in the Specifications section.

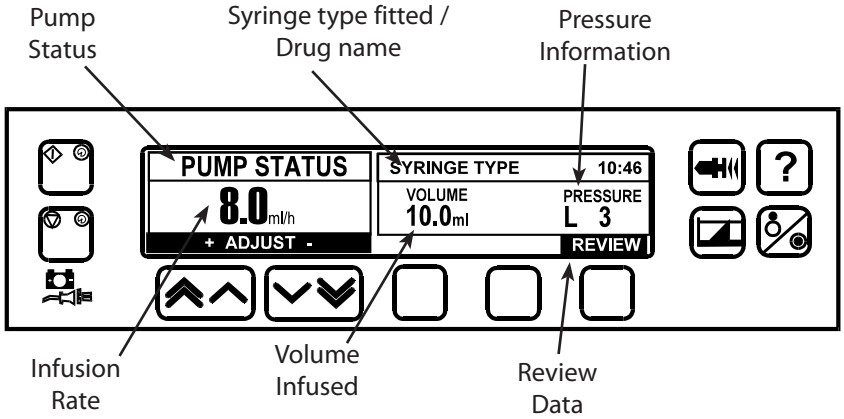
Quick Start Guide

1. Press the button to turn the pump on.
2. **NEW PATIENT?** - **NO** retains previous data. **YES** clears previous data.
3. Load syringe.
4. Confirm correct size and brand of syringe.
5. Ensure extension set is attached to syringe, but disconnected from patient. Insert pressure disc into pressure transducer.
6. INFUSION RATE - Change rate if necessary using the keys.
7. PURGE - Press the button followed by the **PURGE** softkey.
8. Connect extension set to the patient access device.
9. Press the button to start the infusion.

Features of the IVAC® P7000 Syringe Pump

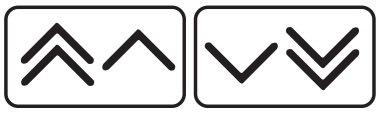
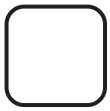


Main Display Features

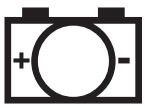


Controls & Indicators

Controls:

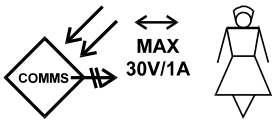
Symbol	Description
	**ON/OFF** button - Press once to switch the pump ON. Press and hold down for approximately 3 seconds to switch the pump OFF.
	**START** button - Press to start the infusion. The green LED will flash during infusion.
	**STOP** button - Press to put the infusion on hold. The amber LED will be lit while on hold. Also Press to silence alarm for 2 minutes. The alarm will resound after this time.
	**PURGE/BOLUS** button - Press to access **PURGE** or **BOLUS** softkeys. Press and hold down softkeys to operate. **PURGE** the extension set during set up. • Pump is on hold • Extension set is not connected to the patient • Volume Infused (VI) is not added **BOLUS -** fluid or drug delivered at an accelerated rate. • Pump is infusing • Extension set is connected to the patient • VI is added
	**OPTION** button - Press to access optional features (see Basic Features).
	**PRESSURE** button - Use this button to display the pumping pressure display and alarm level.
	**CHEVRON** keys - Double or single for faster/slower increase or decrease of values shown on display.
	**BLANK SOFTKEYS** - Use in conjunction with the prompts shown on the display.

Indicators:

Symbol	Description
	**BATTERY** indicator - When illuminated the pump is running on the internal battery. When flashing the battery power is low with less than 30 minutes of use remaining.
	**AC POWER** indicator - When illuminated the pump is connected to an AC power supply and the battery is being charged.

Symbol Definitions

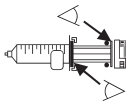
Labelling Symbols:

Symbol	Description
	Attention (Consult accompanying documents)
	Potential Equalisation (PE) Connector
	RS232/Nurse call Connector (Optional)
	Type CF applied part (Degree of protection against electrical shock)
IPX4	Protected against vertically falling drops of water
	Alternating Current
CE 0086	Device complies with the requirements of the EC Directive 93/42/EEC. Registered with the CE Mark.
	Date of Manufacture
	Manufacturer
	Not for Municipal Waste
	Important information
	Class II Equipment
	Functional Earth

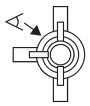
Operating Precautions

Disposable Syringes and Extension Sets

- This IVAC® P7000 Syringe Pump has been calibrated for use with single-use disposable syringes. To ensure correct and accurate operation, only use 3 piece Luer-Lock versions of the syringe make specified on the pump or described in this manual. Use of non-specified syringes or extension sets may impair the operation of the pump and the accuracy of the infusion.

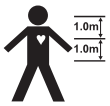


- Uncontrolled flow or syphoning may result if the syringe is located incorrectly in the pump, or if it is removed from the pump before the extension set is properly isolated from the patient. Isolation may include closing a tap in the patient line or activating a flow stop clamp.

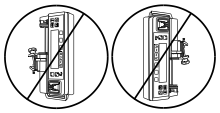


- When combining several apparatus and/or instruments with extension sets and other tubing, for example via a 3-way tap, the performance of the pump may be impacted and should be monitored closely.

Mounting the Pump



- The pump must be mounted within 1.0m above or below the patient's heart. The most accurate pressure monitoring in the extension set is achieved when the pump is positioned close to the patients heart level.



- Do not mount the pump in a vertical position with the syringe pointing upwards as this could lead to an infusion of air which may be in the syringe. To protect against the introduction of air the user should regularly monitor the progress of the infusion, syringe, extension set and patient connections and follow the priming procedure specified herein.

Operating Environment

- When using any infusion pump in conjunction with other pumps or devices requiring vascular access, extra care is advised. Adverse delivery of medication or fluids can be caused by the substantial variation in pressures created within the local vascular system by such pumps. Typical examples of those pumps are used during dialysis, bypass or cardiac assist applications.

- This pump is suitable for use in Hospital and clinical environments other than domestic establishments and those directly connected to the public single phase AC mains power supply network that supplies buildings used for domestic purposes. However, it may be used in domestic establishments under the supervision of Medical professionals with additional necessary appropriate measures. (Consult Technical Service Manual, appropriately trained technical personnel or Cardinal Health for further information).

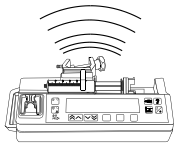
- This pump is not intended to be used in the presence of a flammable anaesthetic mixture with air or oxygen or nitrous oxide.

Operating Pressure

- This is a positive pressure pump designed to achieve very accurate fluid administration by automatically compensating for resistance encountered in the infusion system.

- The pumping pressure alarm system is not designed to provide protection against, or detection of, IV complications which can occur.

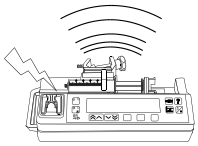
Alarm Conditions



- Several alarm conditions detected by this pump will stop the infusion and generate visual and audible alarms. Users must perform regular checks to ensure that the infusion is progressing correctly and no alarms are operating.

Electromagnetic Compatibility & Interference

- This pump is protected against the effects of external interference, including high energy radio frequency emissions, magnetic fields and electrostatic discharge (for example, as generated by electrosurgical and cauterising equipment, large motors, portable radios, cellular telephones etc.) and is designed to remain safe when unreasonable levels of interference are encountered.
- This pump is a CISPR 11 Group 1 Class A device and uses RF energy only for its internal function in the normal product offering. Therefore, its RF emissions are very low and are not likely to cause any interference with the nearby electronic equipment. However, this pump emits a certain level of electromagnetic radiation which is within the levels specified by IEC/EN60601-1-2 and IEC/EN60601-2-24. If the pump interacts with other equipment, measures should be taken to minimise the effects, for instance by repositioning or relocation.



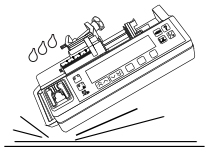
- In some circumstances the pump may be affected by an electrostatic discharge through air at levels close to or above 8kv; or by radio frequency radiation close to or above 10v/m. If the pump is affected by this external interference the pump will remain in a safe mode; the pump will duly stop the infusion and alert the user by generating a combination of visual and audible alarms. Should any encountered alarm condition persist even after user intervention, it is recommended to replace that particular pump and quarantine the pump for the attention of appropriately trained technical personnel. (Consult Technical Service Manual for further information).

Hazards

- An explosion hazard exists if the pump is used in the presence of flammable anaesthetics. Exercise care to locate the pump away from any such hazardous sources.

- Dangerous Voltage: An electrical shock hazard exists if the pump's casing is opened or removed. Refer all servicing to qualified service personnel.
- When connected to an external power source, a three-wire (Live, Neutral, Earth) supply must be used. If the integrity of the external protective conductor in the installation or its arrangement is in doubt, the pump should be operated from the battery.

- Do not open the RS232/Nurse Call protective covering when not in use. Electrostatic discharge (ESD) precautions are required when connecting RS232/Nurse Call. Touching the pins of the connectors may result in ESD protection failure. It is recommended that all actions must be taken by appropriately trained personnel.



- If this pump is dropped, subjected to excessive moisture, fluid spillage, humidity or high temperature, or otherwise suspected to have been damaged, remove it from service for inspection by a qualified service engineer. When transporting or storing the pump, use original packaging where possible, and adhere to temperature, humidity and pressure ranges stated in the Specifications section and on the outer packaging.

Latex Content

- The IVAC® P7000 Syringe Pump does not contain any Latex.

Getting Started

Initial Set-up

Before operating the pump read this Directions For Use manual carefully.

1. Check that the pump is complete, undamaged and that the voltage rating specified on the label is compatible with your AC power supply.
2. Items supplied are:
   - ***IVAC® P7000 Syringe Pump***
   - ***User Support CD (Directions For Use)***
   - ***AC Power Cable (as requested)***
   - ***Protective Packaging***
3. Connect the pump to the AC power supply for 24 hours to ensure that the internal battery is fully charged (verify that the AC Power indicator is lit).

The pump will automatically operate from its internal battery if the pump is switched on without being connected to the AC power supply. Prior to use on battery power, verify the pump continues to function on battery power once disconnected from the AC power supply.

Should the pump fail to perform correctly, replace in its original protective packaging, where possible and contact a qualified service engineer for investigation.

Pole Clamp Installation

The pole clamp is supplied fitted to the rear of the pump and will provide secure fixing to standard I.V. poles of a diameter of up to 40mm.

The pole clamp can also be fitted in a choice of 4 fixing positions allowing the pump to be mounted to vertical and horizontal poles, equipment rails and hospital furniture in a variety of convenient operating orientations.

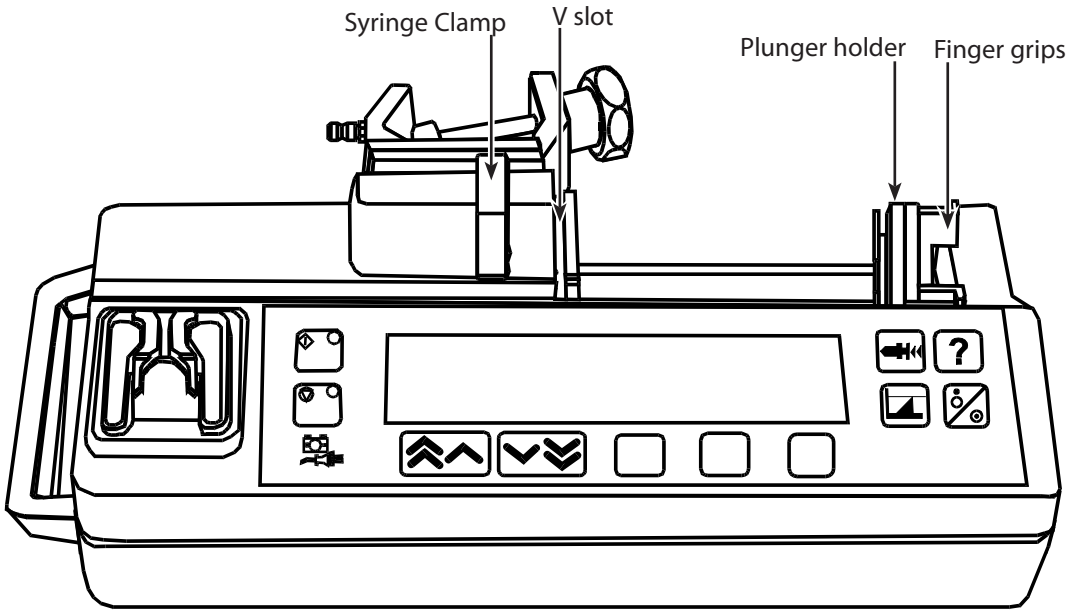
The pole clamp may be adjusted for use with horizontal fittings by using the existing fixings screws with the alternative fixing holes in the pole clamp.

The pole clamp may also be secured to the base of the pump in a choice of four positions.

The multi position pole clamp hinge will support the unit at a range of angles on an I. V. pole. To adjust the angle the unit needs to be secured to a pole; using a hand at either end of the instrument, change the screen viewing and syringe access angle of the instrument.

Do not mount the pump with the AC power inlet or the syringe pointing upwards. This could affect the electrical safety in the event of a fluid spill or lead to the infusion of air which may be in the syringe.

Loading a Syringe



Only use a syringe of the type stated on the pump or in this manual. Using an incorrect syringe could adversely affect the accuracy of the infusion and the performance of the pump.

When initially loading the syringe, allow for the volume of fluid contained in the extension set and retained in the syringe at the end of infusion as this "dead-space" will not be infused.

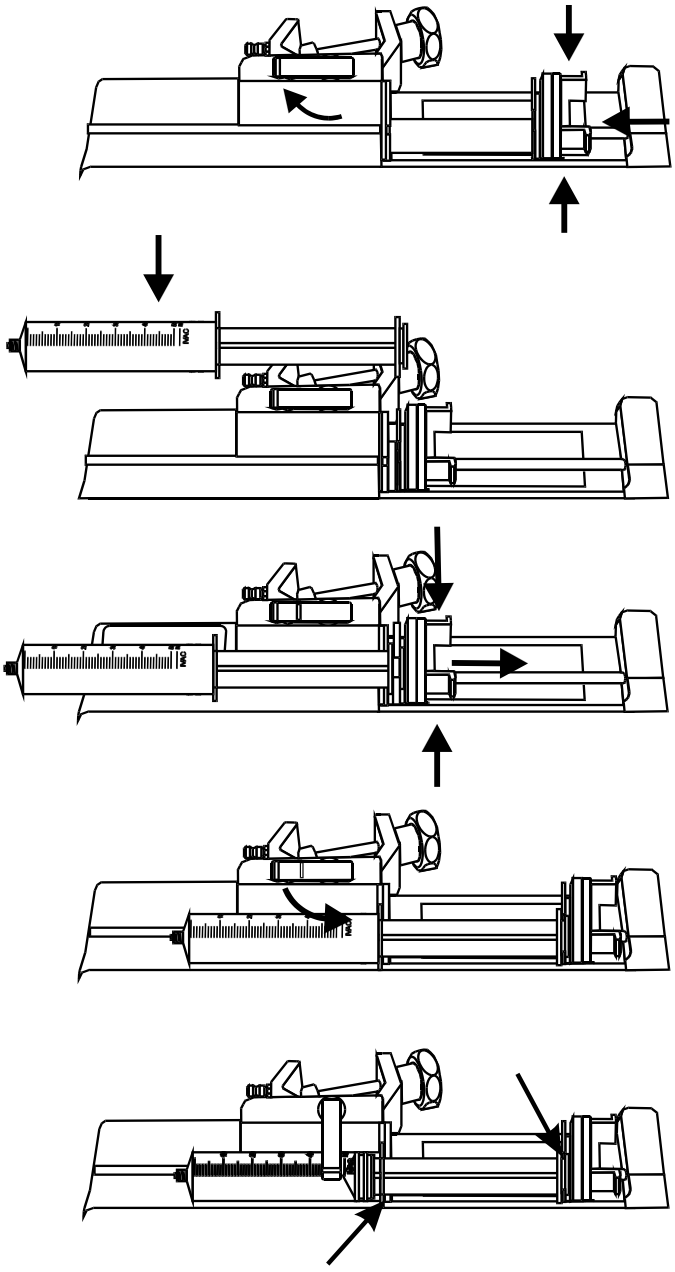
Place the pump on a stable horizontal surface or secure as described above.

Prepare, load and prime the single-use disposable syringe and extension set using standard aseptic techniques.

1. Squeeze the finger grips on the plunger holder and slide the mechanism to the left. Lift the syringe clamp and rotate clockwise.
2. Insert the syringe into the slots on the plunger holder.
3. Squeeze the finger grips on the plunger holder and slide the mechanism to the right until the syringe finger flanges locates in the V slot.

Gently advance the syringe until the finger flanges touch the front of the V slot closest to the syringe clamp. This is important to prevent delay at the start of the infusion.

4. Rotate the syringe clamp anticlockwise until it locks onto the syringe barrel to secure the syringe.
5. Check that the syringe plunger and finger flanges are correctly located in their slots.



Starting the Pump

1. Connect the pump to an AC power supply using the AC power cable.

   Press the button.

   - The pump will run a short self-test. Ensure that two beeps are activated during this test.
   - Check the display test pattern and ensure that no rows are missing.

Prior to beginning an infusion, disconnect the pump from the AC power supply, confirm the pump continues to function on battery power. Then reconnect the pump to the AC power source.

2. **NEW PATIENT? -** Answering **NO** will retain all previous rate and volume settings. **YES** will automatically clear patient information including resetting the rate and volume settings to zero.

3. LOAD SYRINGE - Load the syringe according to the procedure in this manual.

4. Insert the pressure disc into the pressure transducer.

PRESSURE TRANSDUCER - Detects if an extension set with a pressure disc is fitted. The pressure transducer will measure positive extension set pressures.

Warning - To remove or insert pressure disc from or into pressure transducer assembly, insert finger into the recess in the pressure disc and pull forward or push back with care. DO NOT PULL THE EXTENSION SET TO REMOVE OR TO INSERT THE PRESSURE DISC.

5. CONFIRM SYRINGE - Check that the syringe type and size being used matches the display. If required, the make of syringe can be changed by pressing the **TYPE** button. Press **CONFIRM** when the correct type and size are shown.

6. INFUSION RATE - Check the rate shown if old patient data has been retained and change the rate if necessary using the keys.

7. PURGE (if required) - Press the button and then press and hold the **PURGE** softkeys until fluid flows and the purging of the syringe extension set is complete. Release the softkeys. The volume used during purging will be displayed.

Purge extension set, massaging pressure disc to prevent ballooning and ensuring all air removal.

8. CONNECT TO PATIENT - Connect the extension set to the patient access device.

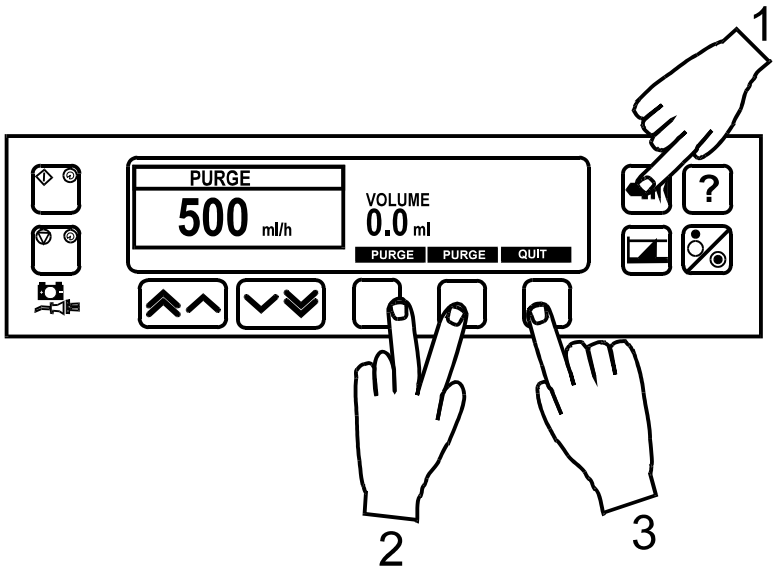
9. START - Press to commence operation. **INFUSING** will be displayed. The AMBER STOP light will be replaced by the flashing GREEN START light to indicate that the pump is in operation.

10. STOP - Press to halt the operation. **ON HOLD** will be displayed. The AMBER STOP light will replace the GREEN START light to indicate that the pump is on hold.

Purge

The button allows the delivery of a limited volume of fluid in order to purge the extension set prior to being connected to the patient access device or after changing a syringe.

1. Press the button when the pump is not infusing. Ensure that the extension set is not connected to the patient.
2. Press and hold the **PURGE** softkeys until fluid flows and the purging of the extension set is complete. The volume used during purging will be displayed, but it is not added to the volume infused.
3. When purging is complete release the **PURGE** softkeys. Press the **QUIT** softkey to exit back to the main display.



The pump will not purge if the rate lock has been enabled. During PURGE the pressure limit alarms are temporarily increased to their maximum level.

Bolus Infusion

Bolus - Administering a controlled volume of fluid or drug at an increased rate for diagnostic or therapeutic purposes. The pump should always be infusing and always attached to the patient. (Drugs given by an IV bolus could achieve immediate and high drug concentration levels.)

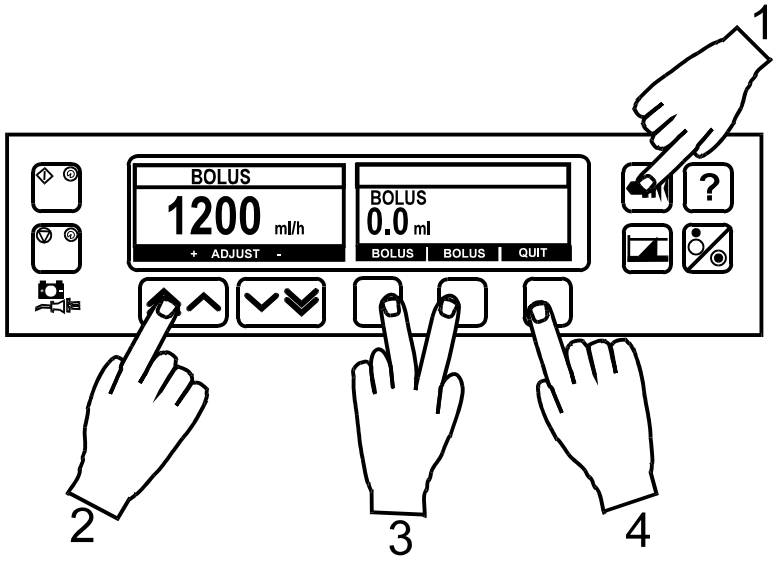
Bolus can be used at the start of an infusion or during an infusion.

If the volume of the bolus reaches the bolus volume limit the bolus will stop and the pump will automatically revert to infuse at the set rate. If the volume to be infused is reached during a bolus, the volume to be infused complete alarm will operate and the pump will revert to its previous state. Press **MUTE** to stop the alarm or **CANCEL** to acknowledge the alarm.

A Bolus cannot be administered if the "RATE LOCK" is active or if a multidose set-up is in use.

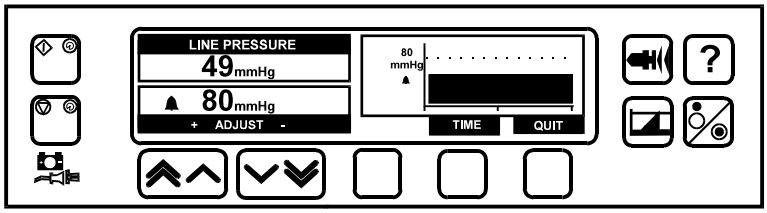
During BOLUS the pressure limit alarm is temporarily increased to the maximum level.

1. During infusion press the button once to display the bolus screen.
2. Use the keys to adjust the bolus rate if required.
3. To deliver the bolus press and hold the **BOLUS** softkeys. During the bolus, the volume being infused is displayed. When the desired bolus volume has been delivered or the bolus volume limit is reached, release the softkeys. The bolus volume is added to the total volume infused. Press the **QUIT** softkey to exit back to the main display.

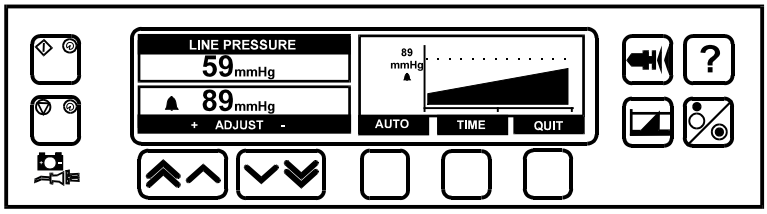


Pressure Level with pressure set fitted

1. To check and adjust the pressure level press the ◪ button. Bar graph will be displayed showing the pressure alarm level and current pressure level.



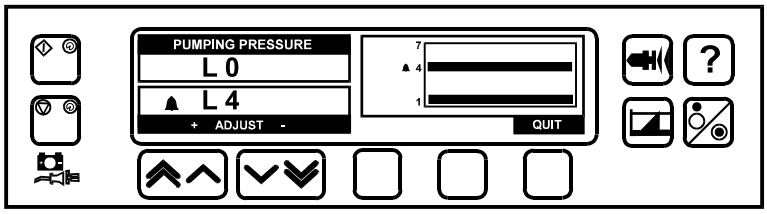
2. Press the ⩓⩔ keys to increase or decrease the pressure alarm level. The new level will be indicated on the display.
3. The **AUTO** Pressure feature may be used when a stable pressure has been achieved over a short period of infusion. If **AUTO** Pressure has been enabled the automatic pressure alarm level is calculated and set by pressing the **AUTO** softkey.
4. Press the **QUIT** softkey to exit the pressure screen.



Pressure Level without pressure set fitted (not applicable when FULLY DEDICATED)

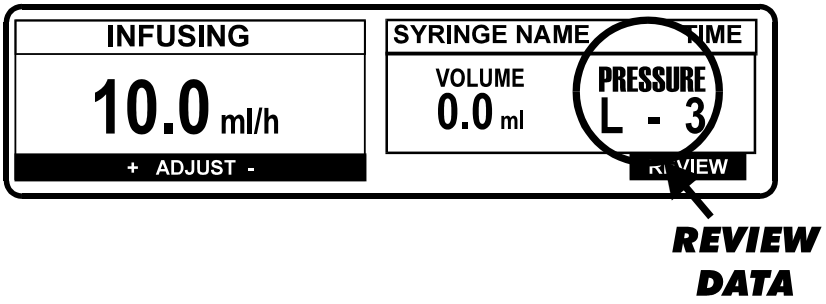
1. To check and adjust the pressure level press the ◪ button. A bar graph will be displayed showing the pressure alarm level and the current pressure level.
2. Press the ⩓⩔ keys to increase or decrease the alarm level. The new level will be indicated on the display.
3. Press **QUIT** to exit the screen.

The interpretation of pressure readings and occlusion alarms are the responsibility of the clinician depending on the specific application.



Review

1. To review the protocol data press the **REVIEW** softkey.
2. The protocol data will be displayed in the main display.
3. Press the **REVIEW** softkey to toggle between the pressure setting and the VTBI status.
4. Repeat until the protocol data required is displayed in the main display.



Basic Features (Continued)

Drugs and Dosing

The following options enable the pump to be set-up for use with a specific drug and/or dosing protocol. Drugs are pre-configured in a drug library (see Configured Options) to enable rapid selection of the drug name, dosing units and default rate. For increased security using a configured drug, maximum and minimum safety limits are programmable for concentration and dose rates.

To access the Drugs and Dosing menu:

1. Press the [?] button to first access the options menu.
2. Select **DRUGS AND DOSING** from the list using the [^^][vv] keys.
3. Press the **OK** softkey to confirm the selection.

The mass infused display is a sum of all drug masses infused which may be of different concentrations and even drug type. Therefore it should be noted that the relationship between currently displayed volume infused and mass infused may not directly relate to the current concentration.

Drug Name Only:

1. Select a drug name from the list and press the **YES** softkey.
2. If no protocol is required press the **NO** softkey.
3. If no dosing is required press the **NO** softkey.

Pre-configured drug dosing protocol:

1. Select the drug name from the list displayed using the [^^][vv] keys. Press the **YES** softkey to confirm the selection.
2. Press the **YES** softkey indicated on the screen to select **DOSING**.
3. Press the **YES** softkey to select **PROTOCOL**. This will select the pre-defined protocol for the selected drug.
4. Enter the dosing information prompted on the display for the selected drug using the **OK** softkey.
5. Press the **CONFIRM** softkey to enter the drug name, dosing information and the protocol selected.

When a protocol is used the drug name will be followed by an *. The set by ml/h / set by doserate option is now available.

User-programmed drug dosing:

1. Select the drug name from the list displayed using the [^^][vv] keys. Press the **YES** softkey to confirm the selection.
2. Press the **YES** softkey to select **DOSING**. This now enables user-programmed information to be entered.
3. Press the **NO** softkey to avoid selecting **PROTOCOL**.
4. Enter the required dosing information as prompted on the display, using the [^^][vv] keys and the **OK** softkey.
5. Press the **CONFIRM** softkey to enter the drug name, dosing information and the protocol selected.

Volume to be Infused (VTBI)

This option allows a specific volume to be infused to be set.

The rate at the end of this VTBI can also be set, selecting from stop, 1ml/h, 2ml/h, or continuous infusion at the set rate.

1. Press the [?] button to access the options menu.
2. Select the **SET VTBI** option using the [^^][vv] keys and press the **OK** softkey indicated on the screen.
3. Enter the volume to be infused using the [^^][vv] keys and press the **OK** softkey.
4. Select the rate at the end of the VTBI using the [^^][vv] keys to scroll through the on-screen choices. The default is **STOP**.
5. Press the **OK** softkey to exit the VTBI menu.
6. When the pump has delivered the set volume it will alarm. Press the **CANCEL** softkey to clear the alarm.
7. Press the **CLEAR** softkey to turn the VTBI function off, or set a new VTBI using the [^^][vv] keys.

Clear Volume

This option enables the volume infused to be cleared.

1. Press the [?] button to access the options menu.
2. Select the **CLEAR VOLUME** option using the [^^][vv] keys and press the **OK** softkey indicated on the screen.
3. Press the **YES** softkey to clear the volume. Press the **NO** softkey to retain the volume.

? Set VTBI over Time

This option allows a specific VTBI and delivery time to be set (if enabled in configured options). The rate necessary to deliver the required volume within the specified time is calculated and displayed.

1. Stop the infusion. Press the ? button to access the options menu.
2. Select the **SET VTBI OVER TIME** option using the keys and press the **OK** softkey.
3. Adjust the volume to be infused using the keys. When the desired volume has been reached press the **OK** softkey.
4. Enter the time over which the volume is to be infused. The infusion rate will automatically be calculated. Press the **OK** softkey to enter the value.
5. Select the rate at VTBI end from the list using the keys and press the **OK** softkey. The default is **STOP**.

? Set by Doserate / Set by ml/h

To set rates accurately in doserate or flowrate increments it may be necessary to switch between the rate adjust options **SET BY DOSERATE** and **SET BY ml/h**. An arrow to the left of the rate display indicates the rate that will change when the keys are used to increase/decrease the infusion rate.

To set a doserate precisely the arrow must be pointing to the doserate (mg/kg/h); the flowrate will be calculated from the doserate.

To accurately set a flowrate the arrow must be pointing to flowrate (ml/h); the doserate will be calculated from the flowrate.

Selecting the Set By Doserate Option

1. Stop the infusion. Press the ? button to access the options menu.
2. Select the **SET BY DOSERATE** option using the keys and press the **OK** softkey.
3. This will select the set by doserate option and an arrow will automatically point to the doserate on the display. If necessary the doserate can be increased or decreased using the keys.

Selecting the Set By Doserate Option

1. Stop the infusion. Press the ? button to access the options menu.
2. Select the **SET BY ml/h** option using the keys and press the **OK** softkey.
3. This will select the set by flowrate option and an arrow will automatically point to the flowrate on the display. If necessary the flowrate can be increased or decreased using the keys

? Induction

This option allows an Induction to be set (if enabled in configured options).

1. Press the ? button to access the options menu.
2. Select the **INDUCTION** option using the keys
3. Press the **OK** softkey indicated on the screen to confirm the selection.
4. Adjust the induction **RATE** using the keys, then press the **OK** softkey.
5. Select the induction **VOLUME** using the keys, then press the **OK** softkey. If an incorrect value has been entered, press the **BACK** softkey to return to the previous stage.
6. Enter the **MAINTENANCE** infusion rate using the keys, then press the **OK** softkey.
7. Review the induction data on screen, then press **CONFIRM**. If necessary use the **BACK** softkey to return to the data. Once confirmed, the pump will return to the main display.
8. The induction can be cleared. Stop the infusion then press the ? button. Select **CLEAR INDUCTION** with the keys and press the **OK** softkey to confirm.

? Multidose

This option allows a Multidose to be set (if enabled in configured options).

1. Press the ? button to access the options menu.
2. Select the **MULTIDOSE** option using the ⏶⏷ keys
3. Press the **OK** softkey indicated on the screen to confirm the selection.
4. Adjust the multidose **RATE** using the ⏶⏷ keys, then press the **OK** softkey.
5. Select the multidose **VOLUME** using the ⏶⏷ keys, then press the **OK** softkey. If an incorrect value has been entered, press the **BACK** softkey to return to the previous stage.
6. Enter the **MAINTENANCE** infusion rate using the ⏶⏷ keys, then press the **OK** softkey.
7. Select the FREQUENCY (hr:mins) of each multidose using the ⏶⏷ keys, then press the **OK** softkey.
8. Review the multidose data on screen, then press **CONFIRM**. If necessary use the **BACK** softkey to return to the data. Once confirmed, the pump will return to the main display. The review section of the display will show either multidose volume remaining or time between multidoses remaining.
9. The multidose can be cleared. Stop the infusion then press the ? button. Select **CLEAR MULTIDOSE** with the ⏶⏷ keys and press the **OK** softkey to confirm.

? 24 Hour Log

This option allows the 24 hour log of volume infused to be reviewed.

1. Press the ? button to access the options menu.
2. Select the **24H LOG** option using the ⏶⏷ keys and press the **OK** softkey.
3. Press the **NEXT** softkey to access the hourly volume infused log.
4. Press the **QUIT** softkey to exit the log.

? Event Log

This option allows the event log to be reviewed.

1. Press the ? button to access the options menu.
2. Select the **EVENT LOG** option using the ⏶⏷ keys and press the **OK** softkey.
3. Scroll through the log using the ⏶⏷ keys. Press the **QUIT** softkey to exit the log.

Rate Lock

If Rate Lock is enabled, when the infusion rate has been set and the infusion started (or following a bolus infusion) the rate lock prompt will appear on the main display.

To select the rate lock function press the **YES** softkey. Press the **NO** softkey if the rate lock is not required.

When rate lock is enabled, the following are unavailable:

- ***Changing the infusion rate***
- ***Bolus / purge***
- ***Switching the pump off***
- ***VTBI over time infusions.***

To disable the rate lock if selected:

1. Press the ? button to access the options menu.
2. Select the **UNLOCK RATE** option using the ⏶⏷ keys and press the **OK** softkey.

To enable the rate lock if not selected:

1. Press the ? button to access the options menu.
2. Select the **RATE LOCK** option using the ⏶⏷ keys and press the **OK** softkey.

Alarms and Warnings

Alarms and warnings are indicated by a combination of an audible alarm, flashing amber **STOP** light and a descriptive message in the display.

1. First press the **MUTE** softkey to silence the alarm for a maximum of 2 minutes, then check the display for a message. Press **CANCEL** to cancel the message.
2. If the infusion has stopped, rectify the cause of the alarm/warning then press the ⏲ button to resume the infusion.

Display	*Description and Troubleshooting Guide*
DRIVE DECLUTCHED	The drive system has been disengaged during operation. Check the finger grips and the position of the syringe.
OCCLUSION	Excessive pressure measured at the syringe plunger exceeding the alarm limit. Identify and remove the cause of the blockage in the drive, syringe, or administration system before restarting the infusion.
LINE OCCLUSION	Excessive pressure measured in the extension set at the pressure sensing disc exceeding the alarm limit. Identify and remove the cause of the blockage in the drive, syringe, patient access site, or administration system before restarting the infusion.
CHECK SYRINGE LOCATION	Incorrect size of syringe has been fitted, the syringe has not been positioned correctly or has been disturbed during operation. Check the syringe location and the position.
CHECK PLUNGER LOCATION	The syringe plunger is not correctly fitted in the plunger holder. Check the syringe plunger location.
PRESSURE SET NOT FITTED	The pressure disc has been removed from the pressure transducer during the infusion. The infusion will stop. Replace the pressure disc then restart the infusion.
BATTERY LOW	Battery charge low with 30 minutes operation remaining. Battery indicator will flash and after 30 minutes a continuous audible alarm will indicate that the battery is exhausted. Reconnect to the AC power supply to continue operation and charge the internal battery.
BATTERY WAS LOW AT LAST POWER OFF. HAS PUMP BEEN RECHARGED	Battery may be low/empty - When the pump was last turned off the battery was low. If the pump has not been charged since then operate on AC power only.
BATTERY EMPTY	The internal battery is exhausted. Connect the pump to the AC power supply.
NEAR END OF SYRINGE	The pump is nearing the end of the infusion. This value can be configured.
SYRINGE EMPTY	The pump has reached the end of the infusion. A pre-set volume will remain in the syringe to minimise the risk of the infusion of air bubbles into the set. This value can be configured.
VTBI DONE	The pre-set Volume To Be Infused is complete.
AC POWER FAIL	AC Power has been disconnected and the pump is operating on battery power. Reconnect AC power supply or press the ⏲ button to silence the alarm and continue with battery operation. The alarm will automatically cancel if the AC power supply is reconnected.
ERROR Code and Message	The alarm system has detected an internal malfunction. Note the malfunction code. Remove pump from service for examination by a qualified service engineer.
ATTENTION *(with "3 Beeps")*	Three beeps will sound if the pump has been left on for more than 2 minutes without starting the operation. Press the ⏲ button to silence the alarm for a further 2 minutes. Alternatively press and hold down the ⏲ button and wait for 3 beeps in succession, this will put the warning alarm on standby for 15 minutes.

Configured Options

This menu comprises a list of options which are configurable by the user.

1. Turn the pump **OFF**.
2. Whilst holding down the button turn the pump **ON**.
3. The main display will show **000**. Enter the access code for Configured Options using the keys, pressing **NEXT** to move through the digits. A full list of access codes can be found in the Technical Service Manual.
4. When the complete code shows on screen, press **OK** to enter. The Configured Options menu will be displayed.

General Options

1. Select **GENERAL OPTIONS** from the menu using the keys and press the **OK** softkey.
2. Select the option required to be enabled/disabled or adjust and press the **MODIFY** softkey.
3. When all the desired modifications have been carried out press the **OK** softkey.
4. Either select the next configuration option from the menu or turn the pump **OFF**, returning it to operation as required.

FAST START & BACK OFF	Enables drive slack fast start and the motor to reverse to relieve line pressure when an occlusion occurs.
SET VTBI OVER TIME	Enables or disables the VTBI function.
VTBI	Sets a specific volume to be infused over a fixed period of time.
INDUCTION	Enables or disables the induction option.
MULTIDOSE	Enables or disables the multidose option.
RATE LOCK	When enabled the rate can be locked to prevent unwanted changes of the set infusion rate.
QUIET MODE	When enabled the low priority alarms and the button beeps are muted.
PRESSURE ALARM	Sets the default pressure alarm level.
MAX PRESSURE ALARM	Sets the maximum pressure alarm level.
AUTO PRESSURE ALARM	Enables / disables the automatic pressure alarm level option.
AC FAIL	When enabled the AC Power Failure Alarm will sound if the AC power is disconnected.
RATE TITRATION	When enabled the rate can be changed whilst the pump is infusing.
NEOI WARNING	Sets the Near End Of Infusion warning time, as time left to End Of Infusion.
EOI POINT	Sets the End Of Infusion point.
KVO AT EOI	When enabled the pump will switch to running at the KVO rate when EOI is reached.
BEAM ALARM	Sets the default beam alarm level.
PATIENT WEIGHT	Sets the default patient weight in kg.
PURGE RATE	Sets the purge rate.
BOLUS	Enables / disables the bolus feature.
DEFAULT BOLUS	Sets the default bolus rate.
CAP BOLUS RATE	Sets the maximum value for bolus rate.
CAP RATE	Sets the maximum value for the infusion rate.
EVENT LOG DISPLAY	Enables / disables the event log to be accessed via the options menu.
LOG LAST PATIENT ONLY	If enabled the event log shows only the last patient (since new patient selected). If disabled the complete log can be viewed.
NURSE CALL	Enables / disables the Nurse Call feature.
NURSE CALL INVERTED	When enabled, the nurse call output is inverted.
COMMS PUMP ADDRESS	Sets the Pump Communications Address.
COMMS MONITOR ONLY	When disabled, allows remote control of the pump from the communications link. Monitor is always possible.
COMMS ODD PARITY	If enabled, communications parity is odd.
COMMS ASCII	If enabled, communications protocol is in ASCII.

IVAC® P7000 Syringe Pump Configured Options Record

Enter the pump-specific information for your records on a copy of this page.

Software Version: V3R2

Option	Range	Default	Setting
FAST START & BACKOFF	Disabled/Enabled	Enabled	
SET VTBI OVER TIME	Disabled/Enabled	Disabled	
VTBI	Disabled/Enabled	Enabled	
INDUCTION	Disabled/Enabled	Disabled	
MULTIDOSE	Disabled/Enabled	Disabled	
RATE LOCK	Disabled/Enabled	Disabled	
QUIET MODE	Disabled/Enabled	Disabled	
PRESSURE ALARM	1 - 750mmHg	300mmHg	
MAXIMUM PRESSURE ALARM	1 - 750mmHg	750mmHg	
AUTO PRESSURE ALARM	Disabled/Enabled	Disabled	
AC FAIL	Disabled/Enabled	Enabled	
RATE TITRATION	Disabled/Enabled	Disabled	
NEOI WARNING	1 - 15 minutes	5 minutes	
EOI POINT	0.5 - 5.0%	1%	
KVO AT EOI	Disabled/Enabled	Enabled	
BEAM (Occlusion)	L0 - L7	L3	
PATIENT WEIGHT	0.1kg - 150kg	70kg	
PURGE RATE	100 - 500ml/h	500ml/h	
BOLUS	Disabled/Enabled	Enabled	
DEFAULT BOLUS	10 - 1200ml/h	200ml/h	
CAP BOLUS RATE	10 - 1200ml/h	1200ml/h	
CAP RATE	1 - 1200ml/h	1200ml/h	
EVENT LOG DISPLAY	Disabled/Enabled	Enabled	
LOG LAST PATIENT ONLY	Disabled/Enabled	Enabled	
NURSE CALL	Disabled/Enabled	Disabled	
NURSE CALL INVERTED	Disabled/Enabled	Disabled	
COMMS PUMP ADDRESS	1 -254	1	
COMMS MONITOR ONLY	Disabled/Enabled	Enabled	
COMMS ODD PARITY	Disabled/Enabled	Disabled	
COMMS ASCII	Disabled/Enabled	Enabled	

Syringes Enabled

Make	Size(s)	Make	Size(s)

Hospital Name: ***Serial No:*** ***Software Version:***

Approved by: ***Configured by:***

Date: ***Date:***

Configured Options (Continued)

Clock Set

This option allows the user to set the pump's internal clock.

1. Select **CLOCK SET** from the Configured Options menu using the ⏫🔼 keys and press the **OK** softkey.
2. Use the ⏫🔼 keys to adjust the date displayed, pressing the **NEXT** softkey to access the next field.
3. When the correct time and date are displayed press the **OK** softkey to return to the Configured Options menu.

Hospital Name

This option allows the user to programme in the name of the hospital, ward or department. This will appear during the power-up display sequence.

1. Select **HOSPITAL NAME** from the Configured Options menu using the ⏫🔼 keys and press the **OK** softkey.
2. Use the ⏫🔼 keys to adjust the character displayed, pressing **NEXT** to access the next field.
3. When the correct name is displayed press **OK** to return to the Configured Options menu.

Enable Syringes

This option is used to pre-configure the type and size of syringe permitted for use on the pump. Select all possible syringes which may be used and disable any that should not be used.

1. Select **ENABLE SYRINGES** from the Configured Options menu using the ⏫🔼 keys and press the **OK** softkey.
2. Use the ⏫🔼 keys to scroll through the list of syringes, pressing **MODIFY** to enable/disable a syringe brand and individual models within the brand.
3. When all modifications are complete press **OK** to return to the Configured Options menu.

Enable Units

This option is used to pre-configure the type of units permitted for use on the pump. Select all possible units which may be used and disable any that should not be used.

1. Select **ENABLE UNITS** from the Configured Options menu using the ⏫🔼 keys and press the **OK** softkey.
2. Use the ⏫🔼 keys to scroll through the list of units, pressing **MODIFY** to enable/disable a unit.
3. When all modifications are complete press **OK** to return to the Configured Options menu.

Drug Set-up

1. Select the **DRUG SETUP** option from the Configured Options menu and press the **OK** softkey.
2. Select the required drug with the ⩓⩔ keys and press the **OK** softkey.
3. To use a drug it must be enabled. Press the **YES** softkey to enable the selected drug.
4. To add or change a drug name use the ⩓⩔ keys to scroll through the alphabet. To select a letter press the **NEXT** softkey. On completion press the **OK** softkey.
5. Follow the flow chart, using the ⩓⩔ keys to select values. Use **OK** to enter selected values and move on to the next stage. The **BACK** softkey may be used at any time to return to the previous screen of the drug set-up procedure.

   Dosing Conversion:

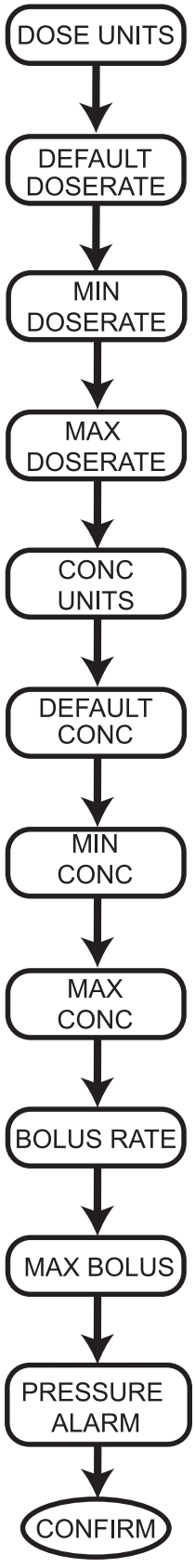
   1.0 µg = 1000 ng

   1.0 mg/h = 24.0 mg/24 h

   1.0 mg/min = 60.0 mg/h

   1.0 mg = 1000 µg

6. Review the drug set-up data on the display, then press the **OK** softkey to confirm.



IVAC® P7000 Syringe Pump Drug Protocol Setup

Hospital _____ *Ward/Unit* _____

No. (1-50)	Drug Name (27 Chars max)	Dose Rate				Concentration				Bolus		Pressure Alarm
		Dose Units	Max	Default	Min	Units	Min	Default	Max	Max (ml)	Rate (ml/h)	

Serial Number _____ *Software Version* _____

Approved by _____ *Configured by* _____

Date _____ *Date* _____

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Drug Protocol Record

Specifications

Infusion Specifications -

Maximum infusion rate can be set as part of the configuration.

0.1ml/h - 150ml/h	5ml syringes
0.1ml/h - 300ml/h	10ml syringes
0.1ml/h - 600ml/h	20ml syringes
0.1ml/h - 900ml/h	30ml syringes
0.1ml/h - 1200ml/h	50ml & 100ml syringes

The Volume Infused range is 0.0ml - 9990ml.

Bolus Specifications -

Maximum Bolus rates can be set as part of the configuration. Bolus rates are user adjustable.

10ml/h - 150ml/h	5ml syringes
10ml/h - 300ml/h	10ml syringes
10ml/h - 600ml/h	20ml syringes
10ml/h - 900ml/h	30ml syringes
10ml/h - 1200ml/h	50ml & 100ml syringes

Bolus volume limit

25.0ml

During BOLUS the pressure limit alarms are temporarily increased to their maximum level.

Critical Volume -

The bolus which can occur in the event of a single internal fault condition with a 50ml syringe is :

Maximum Overinfusion - 0.5ml

Purge Specifications -

The purge rate is limited to the maximum rate for the syringe.

100ml/h - 500ml/h.

The purge volume limit is 2ml.

During PURGE the pressure limit alarms are temporarily increased to their maximum level.

VTBI Complete Keep Vein Open (KVO) Rate -

Stop, 1ml/h, 2ml/h, or continue at set rate.

End Of Syringe KVO Rate -

Stop, 1ml/h or set rate if lower than 1ml/h.

Volume To Be Infused (VTBI) -

0.1ml - 100ml,

1min - 24h

Near End Of Infusion Alarm -

1min - 15min to end of infusion.

End Of Infusion (EOI) Alarm -

0.5% - 5% of syringe volume

Maximum Pumping Pressure Limit -

Highest alarm level 650mmHg (nominal at L-7)

Electrical Classification -

Class II product with functional earth. Continuous Mode Operation, Transportable

System Accuracy -

Volumetric Mean +/- 2% (nominal).

Important: System accuracy is +/-2% typical by volume as measured using the trumpet curve test method defined in IEC/EN60601-2-24 at rates of 1.0ml/h (23°C) and above when the pump is used with the recommended syringes. Differences in factors such as size and plunger force in compatible syringes can cause variations in accuracy and trumpet curves. See also trumpet curves section in this manual.

Battery Specifications -

Rechargeable Sealed Lead Acid Automatically charges when the pump is connected to AC power.

Battery life is typically 4h from fully charged @ 5.0ml/h and 20°C under normal conditions. Charging takes 10 hours from discharge to 80% charge and 24 hours to 100% charge.

Memory Retention -

The electronic memory of the pump will be retained for more than 6 months when not powered up.

AC Power Supply -

115 - 230VAC, 50-60Hz, 20VA (nominal).

Dimensions -

400mm (w) x 115mm (h) x 180mm (d). Weight: 3.5 kg (excluding pole clamp and power cable).

Protection against fluid ingress -

IPX4 - Protected against splashing fluid.

Alarm Conditions -

Drive Declutched	Occlusion
Check Syringe Location	Battery Low / Battery Empty
Near End Of Syringe	Syringe Empty
VTBI Done	AC Power Fail
Internal Malfunction	Attention (Nurse Callback)
Pressure Set Not Fitted	Check Plunger Location
Line Occlusion	

Environmental Specifications -

Operating Temperature	**+5°C - +40°C**
Operating Relative Humidity	**30% - 90%**
Operating Atmospheric Pressure	**700hPa - 1060hPa**
Transport & Strorage Temperature	**-20°C - +50°C**
Transport & Strorage Relative Humidity	**5% - 95%**
Transport & Strorage Atmospheric Pressure	**600hPa - 1060hPa**

Electrical/Mechanical Safety -

Complies with IEC/EN60601-1 and IEC/EN60601-2-24.

EMC -

Complies with IEC/EN60601-1-2 and IEC/EN60601-2-24.

Compatible Syringes

The pump is calibrated and labelled for use with single-use disposable Luer-lock syringes. Only use the size and type of syringe specified on the pump display.

	5ml	10ml	20ml	30ml	50ml	100ml
IVAC®					✓	✓
AstraZeneca			✓		✓	
B Braun Omnifix	✓	✓	✓	✓	✓	
B Braun Perfusor			✓		✓	
BD Perfusor					✓	
BD Plastipak	✓	✓	✓	✓	✓	
BD Precise			✓		✓	
Fresenius Injectomat					✓	
Monoject*	✓	✓	✓	✓	✓	
Nipro	✓		✓	✓	✓	
Once					✓	
JMS						✓
Terumo		✓	✓	✓	✓	

* - Ξ TYCO / Healthcare KENDALL - MONOJECT.

Compatible Extension Sets

The pump uses standard, single-use, disposable extension sets and syringes with Luer-lock connectors. The user is responsible for verifying the suitability of a product used, if it is not recommended by Cardinal Health.

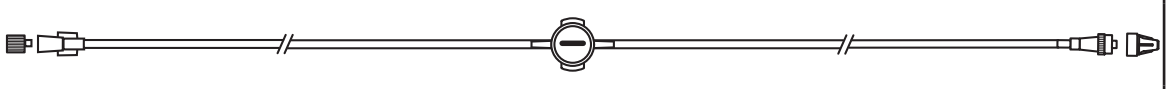
Standard Sets

G40015 Standard PVC Syringe Extension Set (150 cm).
Priming Volume: 2.6ml

G40020B Standard PVC Syringe Extension Set (200 cm).
Priming Volume: 1.5ml

G402EP Extension set, luer lock connectors. Kink resistant DEHP free PVC yellow striped tubing. Bore 1mm. Length 200cm.
Priming volume 1.6ml.

G30402M Standard PVC Syringe Extension Set with occlusion sensing disc. (200 cm).
Priming Volume: 1.5ml



G302EP Extension set, with pressure sensing disc, luer lock connectors. **Kink resistant** DEHP free PVC yellow striped tubing. Bore 0.9mm. Length 200cm. Priming volume 1.5ml

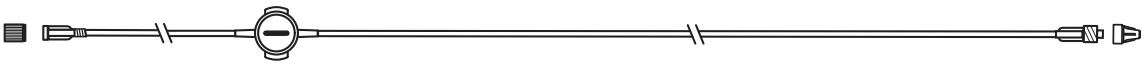
Low Sorbing Sets

G40615 Polyethylene Syringe Extension Set (150 cm).
Priming Volume: 1.5ml

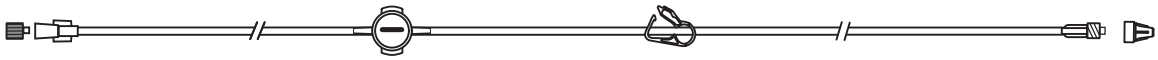
G40620 Polyethylene Syringe Extension Set (200 cm).
Priming Volume: 1.6ml

G30303M Polyethylene Syringe Extension Set with occlusion sensing disc. (200 cm).
Priming Volume: 1.5ml

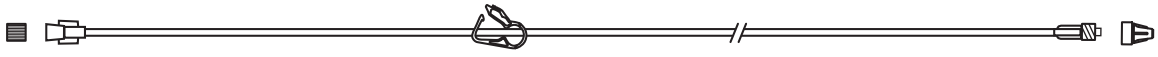
G30453M Opaque White PVC low sorbing Syringe Extension Set with occlusion sensing disc. (200 cm).
Priming Volume: 1.5ml



G30302M Polyethylene Lined Syringe Extension Set with occlusion sensing disc and clamp. (200 cm).
Priming Volume: 1.6ml



G40720 Polyethylene Lined Syringe Extension Set with clamp. (200 cm).
Priming Volume: 1.5ml



It is recommended that extension sets are changed in accordance with the Directions for Use.
Carefully read the Directions For Use supplied with the extension set prior to use.

Please note these drawings are not to scale

Compatible Extension Sets (Continued)

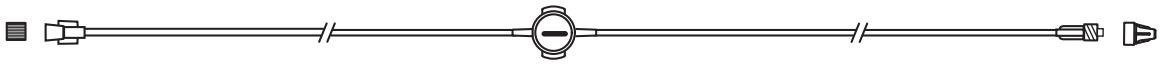
The pump uses standard, single-use, disposable extension sets and syringes with Luer-lock connectors. The user is responsible for verifying the suitability of a product used, if it is not recommended by Cardinal Health.

Light Protected Sets

G40215 Amber PVC Syringe Extension Set (150 cm).
Priming Volume: 1.2ml

G40320 White PVC Syringe Extension Set (200 cm).
Priming Volume: 3.6ml

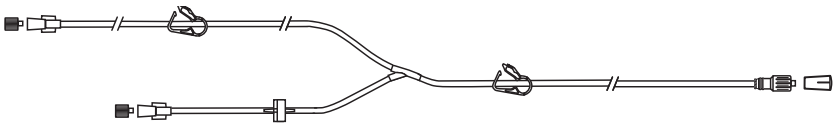
G30653M Opaque White PVC Syringe Extension Set with occlusion sensing disc. (200 cm).
Priming Volume: 1.5ml



Patient Controlled Analgesia (PCA) Sets

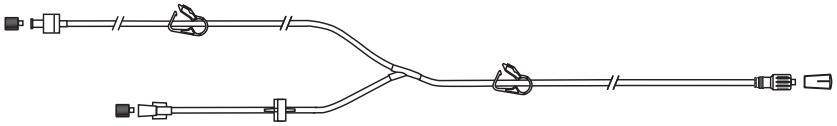
30822 PVC Syringe Extension Set with clamp (152 cm).
Priming Volume: 0.5ml

30832 PVC 'Y' Syringe Extension Set with back check valve and 2 clamps (178 cm).
Priming Volume: 1.5ml

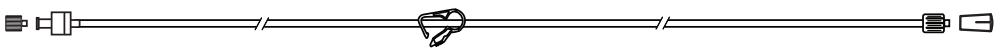


30842E PVC Syringe Extension Set with back check valve, 'Y' Site and clamp (32 cm).
Priming Volume: 1.2ml

30852 PVC 'Y' Syringe Extension Set with anti-siphon valve, back check valve and 2 clamps (183 cm).
Priming Volume: 1.8ml



30862 PVC Syringe Extension Set with anti-siphon valve and clamp (156 cm).
Priming Volume: 0.6ml



It is recommended that extension sets are changed in accordance with the Directions for Use.
Carefully read the Directions For Use supplied with the extension set prior to use.

Please note these drawings are not to scale

Maintenance

Routine Maintenance Procedures

To ensure that this pump remains in good operating condition, it is important to keep it clean and carry out the routine maintenance procedures described below. All servicing should only be performed by a qualified service engineer with reference to the Technical Service Manual (TSM).

Circuit diagrams and components parts lists and all other servicing information which will assist the qualified service engineer in performing repair of the parts designated as repairable are available upon request from Cardinal Health.

If the pump is dropped, damaged, subjected to excessive moisture or high temperature, immediately take it out of service for examination by a qualified service engineer.

All preventative and corrective maintenance and all such activities shall be performed at a compliant work place in accordance with the information supplied. Cardinal Health will not be responsible should any of these actions be performed outside the instructions or information supplied by Cardinal Health.

Refer to the Technical Service Manual for the access code for technical service features.

Interval	***Routine Maintenance Procedure***
As per Hospital Policy	Thoroughly clean external surfaces of the pump before and after prolonged period of storage.
At least once per year (Refer to TSM for identification of parts)	1. Inspect AC power supply plug and cable for damage. 2. Perform functional tests as outlined in the Technical Service Manual. 3. Operate the pump on battery power until the battery low alarm then charge the battery to confirm battery operation and charging.

Please refer to Technical Service Manual for calibration procedures. The units of measurement used in the calibration procedure are standard SI (The International System of Units) units.

Replacing the AC Fuses

If the pump continually illuminates the battery symbol and the AC power indicator light does not illuminate when the pump is connected to the AC power supply and switched ON, either the power supply fuse in the AC plug, if fitted, or the internal fuses have blown.

First check the power supply fuse in the AC mains plug, if fitted. If the AC power indicator light does not illuminate remove the pump from service.

It is recommended that only a qualified service engineer replaces the AC fuses. For further information regarding the replacement of internal AC fuses refer to the Technical Service Manual.

If the fuses continue to blow, suspect an electrical fault and have the pump and power supply checked out by a qualified service engineer.

Battery Operation

The internal rechargeable battery allows continued operation when the AC power is unavailable, for example during patient transfer or AC power failure. A fully charged battery will provide over 4 hours of operation at typical infusion rates. From the battery low alarm it will take about 24 hours to fully charge when reconnected to the AC power supply, whether the pump is in use or not.

The battery is maintenance free, Sealed Lead Acid and requires no routine servicing. However, to achieve optimum operation, ensure that the battery is fully recharged after full discharge, before storage, and at regular 3 month intervals during storage.

Cardinal Health recommend verification that the pump operates on battery power once the pump has been removed from the AC power supply, refer to 'Starting the Pump' section.

Charge retention will eventually degrade. Where retention is critical the internal battery should be replaced every 3 years.

It is recommended that only a qualified service engineer replaces the battery. For further information regarding the replacement of batteries refer to the Technical Service Manual.

Test Routines

The test routines are designed to allow confirmation of many of the pump functions, defaults and calibrations without requiring internal inspection. They do not represent a full calibration check.

See the Technical Service Manual for a complete list of the test procedures, access codes and calibration procedures.

Maintenance (continued)

Cleaning and Storage

Before the transfer of the pump to a new patient and periodically during the use, clean the pump by wiping over with a lint-free cloth lightly dampened with warm water and a standard disinfectant / detergent solution.

Recommended cleaners are:

Brand	Concentration
Hibiscrub	20% (v/v)
Virkon	1% (w/v)

Do not use the following disinfectant types:

- Disinfectants which are known to be corrosive to metals must not be used, which include:
    - NaDcc (such as Presept),
    - Hypochlorites (such as Chlorasol),
    - Aldehydes (such as Cidex),
    - Cationic Surfactants (such as Benzalkonium Chloride).
- Use of Iodine (such as Betadine) will cause surface discoloration.
- Concentrated Isopropyl alcohol based cleaners will degrade plastic parts.

The syringe and extension sets are disposable single use items and should be discarded after use according to their manufacturers' instructions.

If the pump is to be stored for an extended period it should be first cleaned and the internal battery fully charged. Store in a clean, dry atmosphere at room temperature and, if available, employ the original packaging for protection.

Once every 3 months during storage, carry out functional tests as described in the Technical Service Manual and ensure that the internal battery is fully charged.

Before cleaning always switch OFF and disconnect from the AC power supply. Never allow liquid to enter the casing and avoid excess fluid build up on the pump. Do not use aggressive cleaning agents as these may damage the exterior surface of the pump. Do not steam autoclave, ethylene oxide sterilise or immerse this pump in any fluid.

Ensure the pressure transducer is free from residues, which may prevent correct operation of the disc detector.

Disposal

Information on Disposal for Users of Waste Electrical & Electronic Equipment

This  symbol on the product and/or accompanying documents means that used electrical and electronic products should not be mixed with municipal waste.

If you wish to discard electrical and electronic equipment, please contact your Cardinal Health affiliate office or distributor for further information.

Disposing of this product correctly will help to save valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling.

Information on Disposal in Countries outside the European Union

This symbol is only valid in the European Union. The product should be disposed of taking environmental factors into consideration. To ensure no risk or hazard, remove the internal rechargeable battery and the battery from the control board and dispose of as outlined by the local country regulations. All other components can be safely disposed of as per local regulations.

Occlusion Pressure Limits for IVAC® 50ml Syringes

The following tables show the worst case values for line pressure, time to alarm and bolus volume that can be expected in the event of an occlusion when the IVAC® 50ml syringe is selected, G40020B administration set.

Alarm level	Rate (ml/h)	Maximum time to occlusion alarm (h:min)	Nominal occlusion alarm pressure (mmHg)	Maximum bolus volume (ml)
0*	1.0	0:02	0 +50 / -50	0.1
1*	1.0	0:09	90 +50 / -90	0.2
2*	1.0	0:22	190 +50 / -150	0.3
3	1.0	0:34	280 +100 / -100	0.5
4	1.0	0:56	370 +100 / -100	0.7
5	1.0	1:10	460 +100 / -100	0.9
6	1.0	1:30	560 +100 / -100	1.0
7	1.0	1:45	650 +100 / -100	1.3
0*	5.0	0:01	0 +50 / -50	0.1
1*	5.0	0:02	90 +50 / -90	0.2
2*	5.0	0:06	190 + 50 /-150	0.4
3	5.0	0:08	280 +100 / -100	0.6
4	5.0	0:12	370 +100 / -100	0.8
5	5.0	0:14	460 +100 / -100	1.0
6	5.0	0:17	560 +100 / -100	1.2
7	5.0	0:19	650 +100 / -100	1.4

* Tests at these levels may alarm immediately - the force at these levels is commonly less than the friction in the syringe (with no additional fluid pressure). The result is that the pressure relating to the low forces will be less than the nominal quoted occlusion pressure.

Bolus volume following occlusion will be minimised by the back off feature if enabled. The back off will reduce the line pressure by removing the volume stored in the occluded extension set and deducting this volume from volume infused.

The following tables show the worst case values for line pressure, time to alarm and bolus volume that can be expected in the event of an occlusion when the IVAC® 50ml syringe is selected, G30402M administration set.

Alarm Pressure (mmHg)	Rate (ml/h)	Maximum time to occlusion alarm (h:min)	Nominal occlusion alarm pressure (mmHg)	Maximum bolus volume (ml)
50	1.0	0:06	50 +25 / -25	0.2
100	1.0	0:12	100 +25 / -25	0.3
200	1.0	0:26	200 +25 / -25	0.4
300	1.0	0:36	300 +25 / -25	0.6
400	1.0	0:54	400 +25 / -25	0.8
500	1.0	1:10	500 +28 / -28	1.0
600	1.0	1:20	600 +31 / -31	1.2
750	1.0	1:40	750 +35 / -35	1.4
50	5.0	0:03	50 +25 / -25	0.2
100	5.0	0:04	100 +25 / -25	0.3
200	5.0	0:06	200 +25 / -25	0.4
300	5.0	0:09	300 +25 / -25	0.6
400	5.0	0:12	400 +25 / -25	0.8
500	5.0	0:14	500 +28 / -28	1.0
600	5.0	0:16	600 +31 / -31	1.2
750	5.0	0:20	750 +35 / -35	1.4

RS232 and Nurse call Specification

RS232 / Nurse call Feature

The RS232 / Nursecall feature fitted to this IVAC® P7000 Syringe Pump allows the pump to be monitored remotely and/or controlled via a suitable central monitoring or computer system.

When the pump is started by a command from the serial interface, communication must take place over the serial interface, a communication must take place every 15 seconds or the pump will alarm, display communications failure and stop infusing. This failure protects against failure of the communications, including the removal of the RS232 cable.

The nurse call interface provides a remote backup to the internal audible alarm. It should not be relied upon to replace monitoring of the internal alarm.

Refer to the Technical Service Manual for further information regarding the RS232 interface. Since it is possible to control the syringe pump using the RS232 interface at some distance from the pump and hence remote from the patient, responsibility for the control of the pump is vested in the software run on the computer control system.

The assessment for the suitability of any software used in the clinical environment to control or receive data from the pump lies with the user of the equipment. This software should include detection of the disconnection or other failure of the RS232 cable. The protocol is detailed in the Technical Service Manual and is for general information only. This relates to IVAC® P7000 Syringe Pumps fitted with the RS232 communication interface.

Any connected analogue and digital components are required to meet IEC/EN60950 for data processing and IEC/EN60601 for medical devices. Anyone connecting additional devices to the signal input or output is a system configurator and responsible for meeting the requirements of the system standard IEC/EN60601-1-1.

RS232 / Nurse call Connection Data

Nurse call Specification -

Connector	D Type - 9 Pin
TXD/RXD	EIA RS232-C Standard
TXD Output Voltage Range	Minimum: -5V (mark), +5V (space) Typical: -7V (mark), +7V (space) with 3K load to ground
RXD Input Voltage Range	-30V - +30V max.
RXD Input Thresholds	Low: 0.6V minimum / High: 3.0V maximum
RXD Input Resistance	3K minimum
Enable	Active, Low:-7V to -12V Active, High:+7V to +12V, powers up the isolated RS232 circuitry Inactive: Floating/open circuit, allows isolated RS232 circuitry to power down.
Isolation Socket/Pump	4kV (dc, or ac peak)
Baud Rate	9600 Baud
Start Bits	1 Start Bit
Data Bits	8 Data Bits
Parity	Odd Parity / No Parity
Stop Bits	1 stop bit
Nurse Call Relay Contacts	Pins 1, 6 + 9, 30V dc, 1A rating

Typical Connection Data -

1 Nurse call (Relay) Normally Closed (NC C)

2 Received Data (RXD) Input

3 Transmit Data (TXD) Output

4 Not used

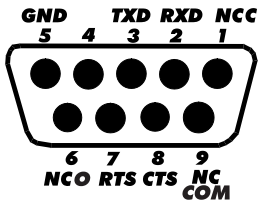
5 Ground (GND)

6 Nurse call (Relay) Normally open (NC O)

7 Request To Send (RTS) Input

8 Clear To Send (CTS) Output

9 Nurse call (Relay) Common (NC COM)



IBM COMPATIBLE (9 PIN)		PUMP		IBM COMPATIBLE (25 PIN)
PIN 3 (TXD)	——	PIN 2 (RXD)	——	PIN 2 (TXD)
PIN 2 (RXD)	——	PIN 3 (TXD)	——	PIN 3 (RXD)
PIN 5 (GND)	——	PIN 5 (GND)	——	PIN 7 (GND)
PIN 7 (RTS)	][	PIN 8 (CTS)	][	PIN 4 (RTS)
PIN 8 (CTS)	][	PIN 7 (RTS)	][	PIN 5 (CTS)
PIN 4 (DTR)	⌐		⌐	PIN 20 (DTR)
PIN 6 (DSR)	⌐		⌐	PIN 6 (DSR)

The IBM connector pins grouped in pairs above should be linked at the connector.

Trumpet Curves & Start-up Curves

In this pump, as with all infusion systems, the action of the pumping mechanism and variations in individual syringes cause short-term fluctuations in rate accuracy.

The following curves show typical performance of the system in two ways: 1) the delay in onset of fluid flow when infusion commences (start-up curves), and 2) the accuracy of fluid delivery over various time periods is measured (trumpet curves).

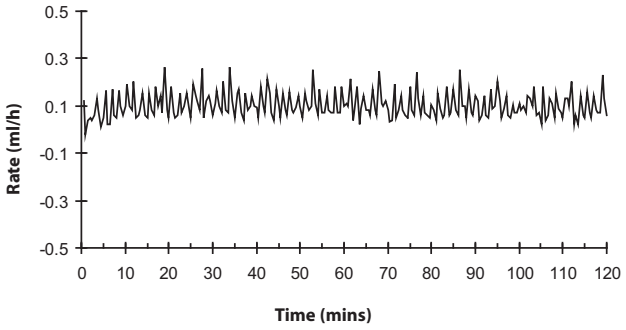
The start-up curves represent continuous flow versus operating time from the start of the infusion. They exhibit the delay in onset of delivery due to mechanical compliance and provide a visual representation of uniformity. Trumpet curves are derived from the second hour of this data. Tests performed per IEC/EN60601-2-24 standard.

Trumpet curves are named for their characteristic shape. They display discrete data averaged over particular time periods or 'observation windows', not continuous data versus operating time. Over long observation windows, short term fluctuations have little effect on accuracy as represented by the flat part of the curve. As the observation window is reduced, short term fluctuations have greater effects as represented by the "mouth" of the trumpet.

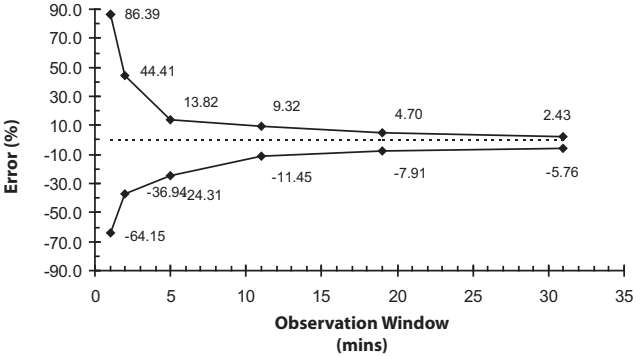
Knowledge of system accuracy over various observation windows may be of interest when certain drugs are being administered. Short term fluctuations in rate accuracy may have clinical impact depending on the half-life of the drug being infused, therefore the clinical effect cannot be determined from the trumpet curves alone.

Start-up and trumpet curves may not be indicative of operation under negative pressure.
Differences in factors such as size and plunger force in compatible syringes produced by other manufacturers can cause variations in accuracy and trumpet curves as compared to those represented. Additional curves for compatible syringes are available upon written request.
For applications where flow uniformity is a concern, rates of 1.0ml/h or above are recommended.

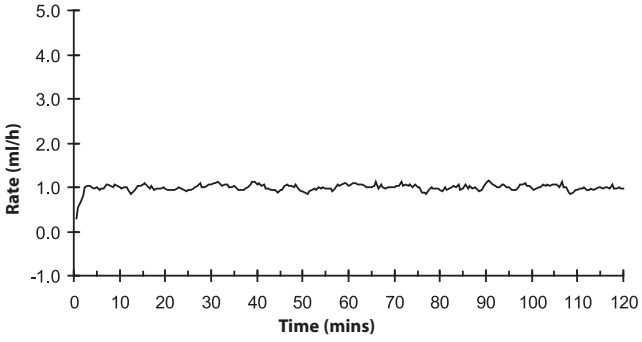
Start-up Trend. BD Plastipak 50ml @ 0.1ml/h



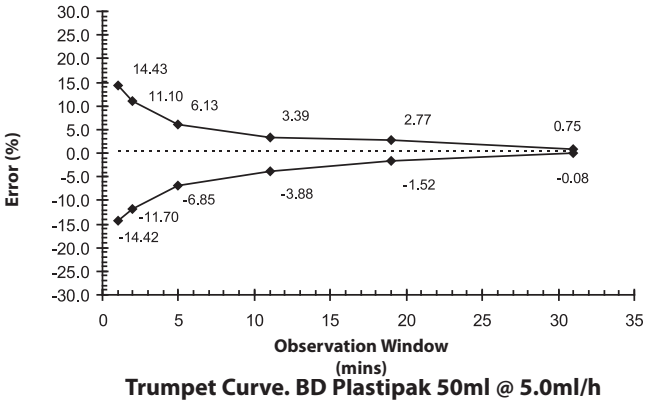
Trumpet Curve. BD Plastipak 50ml @ 0.1ml/h



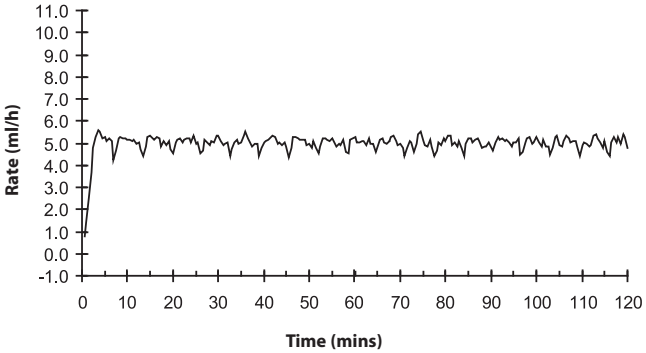
Start-up Trend. BD Plastipak 50ml @ 1.0ml/h



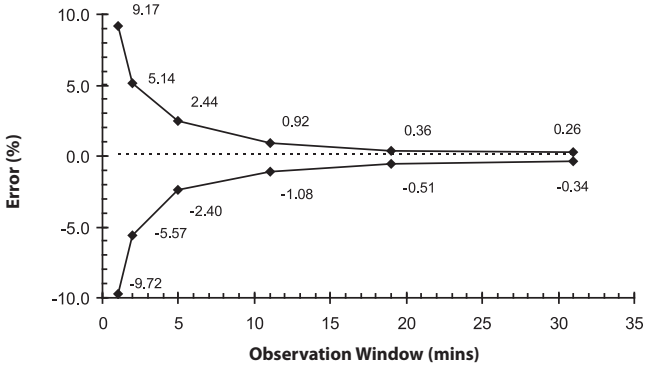
Trumpet Curve. BD Plastipak 50ml @ 1.0ml/h



Start-up Trend. BD Plastipak 50ml @ 5.0ml/h



Trumpet Curve. BD Plastipak 50ml @ 5.0ml/h



Service Contacts

For service contact your local Affiliate Office or Distributor.

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Document History

Revision	*CO Number*	*Date*
1	6934	September 06
2	8701	July 08

Warranty

Cardinal Health, Alaris® Products ("Cardinal Health") warrants that:

(A) Each new infusion instrument (pump, controller or peripheral instrument) is free from defects in material and workmanship under normal use and service for a period of two (2) years from the date of delivery by Cardinal Health to the original purchaser.

(B) Each new accessory is free from defects in material and workmanship under normal use and service for a period of ninety (90) days from the date of delivery by Cardinal Health to the original purchaser.

(C) Each Mains Cable, Battery, Flow Sensor (ECD) and non-disposable probe is free from defects in material and workmanship under normal use and service for a period of ninety (90) days from the date of delivery by Cardinal Health to the original purchaser.

(D) Each new Thermometer is free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of delivery by Cardinal Health to the original purchaser.

If any product requires repair during the applicable warranty period, the purchaser should communicate directly with its local Cardinal Health service centre to determine the appropriate service facility. Except as provided otherwise in this warranty, repair or replacement will be carried out at Cardinal Health's expense. The product requiring service should be returned promptly, properly packaged, and postage prepaid by purchaser. Loss or damage in return shipment to Cardinal Health shall be at purchaser's risk.

In no event shall Cardinal Health be liable for any incidental, indirect or consequential damages in connection with the purchase or use of any Cardinal Health product. This warranty shall apply solely to the original purchaser. This warranty shall not apply to any subsequent owner or holder of the product.

Furthermore, this warranty shall not apply to, and Cardinal Health shall not be responsible for, any loss or damage arising in connection with the purchase or use of any Cardinal Health product which has been:

(A) repaired by anyone other than an authorised Cardinal Health service representative;

(B) altered in any way so as to affect, in Cardinal Health's judgement the stability or reliability of the product or has had the product's serial or lot number altered, effaced or removed;

(C) subjected to misuse or negligence or accident; or

(D) improperly maintained or used in any manner other than in accordance with the written instructions furnished by Cardinal Health.

This warranty is in lieu of all other warranties, express or implied, and of all other obligations or liabilities of Cardinal Health, and Cardinal Health neither assumes nor authorises any representative or other person to assume for it any other liability in connection with the sale of Cardinal Health products.

CARDINAL HEALTH DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Spare Parts

Spare Parts

A comprehensive list of spare parts for this pump is included within the Technical Service Manual.

The Technical Service Manual (1000SM00012) is now available in electronic format on the World Wide Web at :-

www.cardinalhealth.co.uk/alaris

A username and password are required to access our manuals. Please contact local customer services representative to obtain login details.

Part Number	Description
0000EL00004	Internal Battery Pack
1001FAOPT91	AC Power Lead - UK
1001FAOPT92	AC Power Lead - European

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1000DF00136 Issue 2

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