**COVIDIEN**

Operator Manual

Kangaroo™

Connect Enteral Feeding Pump

Thank you for purchasing the Kangaroo™ Connect enteral feeding pump system. With proper care, this system will provide you with years of precision service.

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Section 1 – Pump Overview

The Kangaroo Connect enteral feeding pump is a portable rotary peristaltic enteral feeding pump, intended to provide enteral nutrition to a patient. It can be programmed to provide patients with continuous, dose, or bolus feeding when used with Kangaroo Connect feeding sets. The feeding pump and its standard accessories (the AC power adapter, feeding set and pole clamp) are considered medical electrical equipment. The pump may also be used with additional optional accessories like the Kangaroo Connect car charger and either a Kangaroo Connect wireless communication hub (WCH) or a Kangaroo Connect WiFi/Ethernet communications module (WiFi module). The pump used in conjunction with one or more of these optional accessories comprises the medical electrical equipment system. All components in the system are suitable for use within the patient environment.

The Kangaroo Connect enteral feeding pump is intended for hospital and acute care settings, as well as for long term and home care use. It is intended to be used in both stationary and ambulatory conditions.

The Kangaroo Connect pump can be used for both adult and pediatric patients, age infant and above, provided the patient can tolerate the flow rates and accuracy level of the pump. Not for use with neonates.

Use only commercially available pre-packed or commercially prepared feeding solutions prescribed by a licensed health care provider, dietician or nutritionist. **Do not use homemade blenderized or liquidized foods or other non-prescribed, noncommercially available feeding solutions.**

User Interface:

- Large, color LCD display
- Step-by-step prompts and animated illustrations to guide pump operation
- "Stoplight" LED array visually indicates pump status in a bright or darkened room

Ergonomics:

- Quiet pump operation
- Compact, lightweight design
- Tabletop, bed rail or IV pole mounting
- Simple, one-handed loading of pump cassette
- Pump is designed for cleaning under running water
- Rubberized casing for better grip
- Pole clamp can detach from either pump or WCH without removing from IV pole

Features:

- Magnetic feeding set identification system to ensure a match between the pump's user interface and feeding set type
- State of the art STOP (Safety Threshold Overflow Protection) valve automatically prevents free flow conditions, even when feeding set is unloaded from the pump
- Audible alarm to indicate errors or feeding set loading conditions
- Pump orientation-independent design eliminates need for drip chamber on feeding set
- Sensor technology detects both upstream and downstream flow conditions
- Continuous feed and dose feed capability
- Auto-prime feature reduces the need for time-consuming manual priming
- "Keep Tube Open" (KTO) feature
- View previous 72 hours of feeding history
- 17 Languages
- ~24 hour battery life at 125 mL/hr (using Power Save and Airplane Mode)
- If enabled, unique wireless technology allows for:
  - Remote troubleshooting for user support
  - Future software upgrades and new features
  - Long term historical trending to better meet patient needs

1. Soft Keys

Press a key to select the option that appears next to it on the screen.

2. Flow Indicator (Droplet)

Moving droplet flowing down the screen shows that the pump is running.

3. Power Button

Press once to power on.
Press and hold to power off.

4. Power Source

Shines a green light when the pump is connected to AC power.

5. Pump Rotor

The circular black wheel that drives fluid through the feeding set.

6. Pump Status

- 🔴 = Warning Alarm
- 🟡 = Notice or Caution Alarm
- 🟢 = Standby or Feeding

7. Cassette

The feeding set component that attaches to the pump.
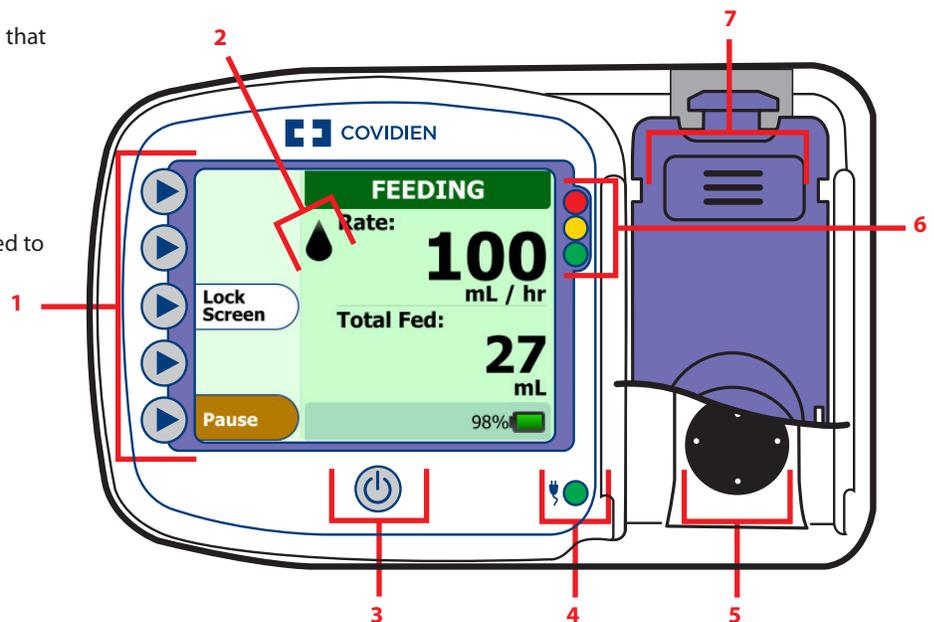
Wireless Features

The wireless feature of the Kangaroo Connect pump is initially disabled unless activated by a specific type of feeding set. Through the use of a wireless enabled Kangaroo Connect pump and a communications hub, clinicians will be provided with the ability to acquire and display nutritional delivery data from the pump within a website called the Kangaroo Connect Portal.

The wireless technology used within the Kangaroo Connect pump and communications hub is built on the IEEE 802.15.4 standard which transmits in the ISM band (2.4GHz). A patented combination of short range and long range wireless provides seamless wireless capability for the pump.

The following are required in order to utilize the wireless capability of the Kangaroo Connect Pump:

1. Kangaroo Connect pump with short range wireless chip (located in but initially disabled in ALL Kangaroo Connect pumps)

2. Either a:
   - Kangaroo Connect wireless communication hub (WCH) with 3G wireless capability, or
   - Kangaroo Connect WiFi/Ethernet communications module (WiFi module) with WiFi/Ethernet capability

3. Kangaroo Connect ENtelliSet Feeding Set (designed to enable the short range wireless chip in the pump when loaded in the pump)

4. Internet access

Wireless Quality of Service

The wireless communication feature of the Kangaroo Connect pump was designed to add multiple features and benefits without compromising pump safety. In the event of an intermittent or failed wireless connection, the pump feeding operation is designed to work independently of any wireless connection and will continue to operate normally and safely. Therefore, the patient can be confident their pump will continue to work properly even if there is a wireless delay, loss of signal, or wireless failure. The communication system is designed to take advantage of the time when a connection is available and wait for a connection to be restored when it is not. The pump will store data for up to 30 days, for upload when a connection is available. As the pump is designed to be ambulatory, loss of wireless capability is expected to be a common occurrence.

The Kangaroo Connect pump wireless system has an acceptable latency of 25 seconds for message exchanges. (Typical latency is approximately 5 seconds.) However, this latency is not a concern because the data is not being used in real time. Since the pump confirms that all transmitted data is received by the Kangaroo Connect Portal before it is deleted, any data not acknowledged will be resent at a later time within the 30 day window. Considering the acceptable latency and a low signal priority on the network, the following table shows the network access time required by the pump to prevent any loss of stored data based on the probability of network data loss:

Probability of Network Data Loss Network Access Time Required (Hours)

Probability of Network Data Loss	Network Access Time Required (Hours)
0%	6.3
10%	6.9
20%	7.8
30%	8.9
40%	10.4
50%	12.5
60%	15.6
70%	20.8
80%	31.3
90%	62.5

Wireless Safety

The following pump features were specifically designed to ensure patient safety related to use of the wireless communication feature:

1. The pump only provides alarms directly from the pump to a user/ clinician. The pump does not provide real time communication of alarms though the wireless communications feature, but rather logs historical alarm events. This prevents confusion as to how the pump alarms (only through the pump itself) and prevents the condition where loss of wireless connection could cause a missed alarm.

2. The pump is designed to operate independently of any wireless communications, allowing it to continue to provide safe and effective enteral nutrition to a patient. Therefore, the patient can be confident their pump will continue to work properly even if there is a wireless delay, loss of signal or wireless failure.

3. The wireless data communicated by the pump is encrypted for patient security and protection. No confidential patient information is communicated from the pump to internet, so privacy remains intact and secure.

4. With medical device hacking being a heightened concern, this pump has been designed from the ground up to prevent wireless intrusions seen on older medical devices. This pump was tested to the latest standard of penetration testing to help safeguard against possible intrusions.

System Configuration / Operation

No additional system configuration is required to operate the wireless communication feature. Refer to Section 5 – System Setup for instructions on how to install the WCH or WiFi module.

Operating Distances and Ranges

For the wireless capability to work properly, the pump must be within 300 feet of the WCH or WiFi module with direct line of sight. Obstructions such as walls and doors will reduce this range. Strength of the wireless signal between the pump and WCH or WiFi module can be determined by looking at the wireless icon on the pump screen.

Wireless Coexistence

Wireless coexistence testing has been performed on the wireless communication feature of the Kangaroo Connect pump. Testing established on the intended environment included multiple sources of possible interference such as Wi-Fi connections, Bluetooth devices, cellular connections, cordless phones, and microwaves, with no degradation of signal noted. Should a coexistence issue be suspected, turn off or relocate any other electronic devices located near the pump or WCH or WiFi module which might generate interference.

Wireless Features

Wireless Communication Delay

In the event of an unexpected wireless disruption:

1. Move the pump closer to the WCH or WiFi module

2. Reduce or remove obstructions between the pump and WCH or WiFi module. Having direct line of sight between the pump and WCH or WiFi module is important to a good wireless signal.

The pump will store its data waiting for the system to come back online for a maximum of 30 days while the pump is disconnected from the communication system. Data older than 30 days will be deleted from the pump to conserve data storage resources on the pump. Once communication is restored, the pump will send the backlogged data (up to 30 days) to the Kangaroo Connect Portal.

Wireless Security

The wireless communications of the pump are designed to utilize a multitude of methods to protect data in every stage of the communication pathway. In addition to the use of a proprietary communications data protocol, the serial number assigned to each pump is encoded both at rest and while in transit. Pump data is encrypted at the pump before transmission to the WCH or WiFi module. At the WCH or WiFi module, the data is decrypted and then re-encrypted via AES before transmission to the Kangaroo Connect Portal.

Section 2 — Safety and Warnings

Note to healthcare personnel who provide training to lay operators or lay responsible organizations:

Be sure to include all of the Warnings below when providing training to lay operators, especially in a Home Care Environment. Lay users should be instructed to contact Customer Service if there is a change in the performance of the pump, WCH or WiFi module. Additionally, Lay Operators should be instructed on proper cleaning procedures to avoid hazards such as electric shock. Lay users should also be trained on inappropriate environments for use (e.g. bathtub) of the pump, WCH or WiFi module. For guidance on training, please contact Customer Service.

General warnings

1. **Caution:** Read this booklet thoroughly before using the pump.

2. **Caution**: Federal (USA) law restricts this device to sale by or on the order of a physician.

3. **Danger**: Strangulation Hazard. Avoid leaving power adapter cord, feeding set tubing or other choking hazards where infants or young children can become caught. If these objects get wrapped around a child's neck, strangulation and death can occur.

4. **Danger:** Explosion Hazard. Do not use the pump, WCH or WiFi module in the presence of flammable anesthetics. Flammable anesthetics can ignite due to a spark within the unit, which could result in fire or explosion.

5. **Danger:** The pump, WCH or WiFi module, and disposable feeding set all contain small parts which could become detached and pose a choking hazard. Some of these components could be inhaled or swallowed by a small child, toddler, or infant, which could result in suffocation and death. Keep all small components out of reach of small children.

6. Use only Kangaroo connect feeding sets with this device. This pump is designed to be incompatible with other feeding sets. **Danger**: Use of other feeding sets with this pump can create hazardous situations, including free-flow conditions that can result in overfeeding, underfeeding, formula in the lungs, and death to a patient.

7. **Warning**: Do not modify this equipment without authorization of the manufacturer. Modification of any devices or accessories can result in physical hazards including delayed therapy, over delivery, under delivery, electrocution, and fire. These hazards could result in patient injury or death.

8. **Warning**: Not for intravenous use. **Do not use for intravenous infusion into a patient**. Intravenous infusion of enteral fluids can result in serious complications up to and including death.

9. **Warning:** This enteral feeding pump should only be used for patients who can tolerate the flow rates and accuracy levels delivered by the pump. Neonates may require higher accuracy rates than specified for this enteral feeding pump. Delivery of fluid to patients who cannot tolerate the pump accuracy can result in over or under delivery with the possibility of aspiration.

10. **Warning:** The use of non-commercially prepared or other non-prescribed feeding formulas is not appropriate for use with the Connect Pump. Formulas made in blender present variability of unknown ingredients and inconsistency regarding the degree of mixing. Therefore these homemade formulas cannot be adequately tested to validate their usage with this enteral feeding pump. Use ONLY commercially available pre-packed or commercially prepared feeding solutions prescribed by a licensed health care provider, dietician or nutritionist. DO NOT USE HOMEMADE BLENDERIZED OR LIQUIDIZED FOODS OR OTHER NON-PRESCRIBED, NON-COMMERCIALLY AVAILABLE FEEDING SOLUTIONS.

11. **Warning:** The pump, WCH and WiFi module should not be used with additional multiple socket-outlets or extension cords. The use of multiple socket-outlets or extension cords will compromise electrical safety and/or increase the risk of electrical shock.

12. **Caution:** The power adapter cord, feeding set tubing, and pump accessories may cause a tripping hazard. Avoid leaving wires, cords, or tubing in a pathway where a person could trip on them and sustain an injury.

13. **Caution:** Do not store the pump, WCH, WiFi module, power adapter or car charger at temperatures >50°C (122°F). This can damage the equipment sensors, which will prevent the pump from operating under normal conditions.

14. **Caution:** Avoid using accessories, detachable parts and materials with the pump, WCH and WiFi module that are not recommended in this manual. Use only approved Kangaroo Connect accessories with the pump, WCH and WiFi module. Failure to use Covidien accessories could result in damage to the pump or physical injury.

15. **Caution:** Use the pump, WCH and WiFi module only as directed in this user manual. Do not interconnect this device with other devices or modify the equipment in any way outside of the recommendations in this manual. Failure to comply could result in incorrect delivery of formula to the patient and could result in damage to the pump, WCH and WiFi module.

16. **Caution:** Always disconnect the power adapter before cleaning or servicing. Failure to do this could result in electric shock to the user performing the cleaning function. In some cases, electric shock can be fatal.

17. **Caution:** Ensure buzzer hole is unobstructed during normal operation so as to allow clear recognition of alarm. Inability to hear the alarms could pose a serious risk to the patient, since the operator may not hear a critical alarm.

18. **Caution:** This pump, WCH and WiFi module is not intended to be used in MRI environments or in the presence of strong magnetic fields. Do not use this device in any areas with strong magnetic fields. The pump, WCH and WiFi module contain metal components which could cause unintended movement. This unexpected movement could cause harm due to falling objects or collisions.

19. **Caution**: There are significant hazards associated with accidental misconnections with other infusion devices, which could lead to patient harm or death.

    For more information about hazards and risk reduction strategies associated with misconnections, see the following:
    The Joint Commission
    Sentinel Event Alert
    Issue 36 - April 13, 2006

20. Use only the supplied power adapter to charge your feeding pump, WCH or WiFi module. See Section 13 – Service Part Numbers for replacement of power adapter and the associated part number.

21. For pump certification, see Section 7 - Certification of Performance. For other integrity checks, consult with a qualified Biomedical Technician or contact the manufacturer (Section 11 - Customer Service).

Section 2 — Safety and Warnings

22. For service or for technical information, please contact Customer Service (Section 11).

23. Do not open the pump, WCH or WiFi module, as there are no user-serviceable parts inside. Opening may affect function of device and voids the warranty.

24. Cleaning frequency and practices must be consistent with institutional policy for cleaning of non-sterile devices. See Section 8 - Cleaning, for instructions on cleaning the pump.

25. See icon descriptions in Section 3 - User Interface and Section 4 - Symbols for additional safety information.

26. This device is designed and tested to minimize the effects of uncontrolled electromagnetic interference and other types of interference from external sources. Avoid use of other equipment that may cause erratic operation or degradation in the performance of this device. Electromagnetic interference could make the display unreadable or prevent the pump from being able to feed.

27. Do not use feeding solutions or formula other than that prescribed by a qualified physician, nurse, registered dietician, or other licensed practitioner.

28. For optimal accuracy, the top of the starting volume of formula should be 10 inches above the top of the pump. Do not reuse feeding sets.

29. Should feeding sets require rinsing, it is recommended that the feeding sets be rinsed while they are loaded in the pump.

30. The feeding set should be replaced after 24 hours from initiation of feeding. This ensures that the system is operating within specified parameters and prevents bacterial growth that could be a hazard to the patient.

31. Do not clean the pump, WCH, WiFi module, or the accessories while these items are plugged into an electrical outlet. Clean only as recommended in this manual. Failure to clean in accordance with this manual could result in damage or failure of the pumping system.

32. Do not use the pump for delivery of any fluids or substances that are not enteral solutions prescribed by qualified medical personnel.

33. Used feeding sets should be disposed of in accordance with current hospital procedure or local disposal guidelines. For disposal of the pump, WCH, WiFi module, be sure to contact local authorities to determine the proper method of disposal of these items, keeping in mind that the pump contains a rechargeable Lithium-Ion battery.

34. The pump and WCH is designed to be used outdoors for short periods of time (no more than 24 hours). Leaving these devices outdoors for extended periods of time (exceeding 24 hours) can result in damage and/or fading of the pump and WCH.

35. This device is designed for use on a conventional IV pole. As with any medical device, it is possible for the weight of the pump and/or WCH to cause the IV pole to tip over. This could result in injury to a patient or operator. When attaching the pump and/or WCH to the IV pole, take precautions to ensure the IV pole remains stable while in use.

36. This enteral feeding system was designed to meet IEC 60601-1 safety standards. For clarification purposes, the feeding set is considered an Applied Part and has been tested and evaluated accordingly.

37. The rear label is intended to provide tamper protection and liquid ingress protection. Do not use the pump if the rear label contains puncture marks or looks like it has been removed and replaced. Pump functionality cannot be guaranteed.

38. The Kangaroo Connect WCH and WiFi/Ethernet Module are not intended to be ambulatory.

Battery pack warnings

1. **Caution**: The battery cells used in this device may present a fire or chemical hazard if mistreated. Do not disassemble, heat above 60ºC (140ºF), or incinerate. Avoid exposing the battery pack to heat or fire since a fire or explosion hazard could result.

2. The pump and WCH utilize a medical grade power supply adapter specifically designed for use only with this pump's Lithium-Ion battery charging circuit. Caution: Use of an alternate consumer style power adapter or DC car adapter may cause damage to the charging circuit and battery of the pump.

3. The pump contains a rechargeable lithium-ion battery. When disposing of the pump unit, be sure to discard this equipment in a manner consistent with institutional policy for expired battery operated equipment.

4. The stated battery life is approximate. Performance of the battery may degrade due to excessive temperatures, frequent recharging, and other factors.

5. Avoid using battery packs from other providers. Only Covidien pump battery packs are approved for use in this pumping system.

6. After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain optimum performance.

Section 3 — User Interface
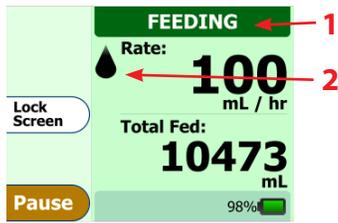
1. Title Bar
The Title Bar tells current running status of the pump.

2. Moving Droplet
Vertically moving droplet shows the pump is delivering fluid and is working normally.

1. Set Usage > 24 Hrs
Indicator shows if the feeding set has been in use for more than the recommended 24 hrs.

2. Lock Settings
Shows if the pump settings have been locked out to prevent tampering.

3. Airplane Mode
When Airplane Mode symbol is showing, indicates that the wireless function is disabled.

4. Battery Charge Status
Shows the percentage of charge remaining on the pump battery.
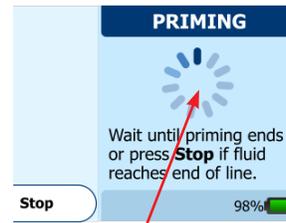
Auto Priming Progress Indicator
When auto priming, the bar will progress to show auto prime feature is active.
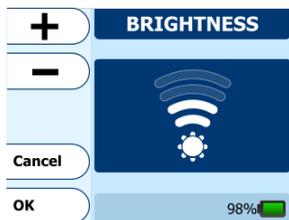
Brightness Level Indicator
Indicates the brightness level for the pump's LCD color screen's backlighting. The brightness setting can be adjusted using the + or - buttons.
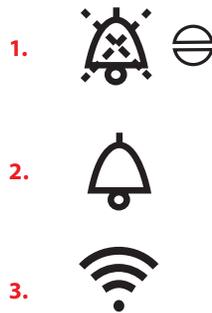
1. Alarm Acknowledged Indicator
Pressing this button will temporarily silence the alarm.

2. Pressing this button reactivates a previously acknowledged alarm.

3. Wireless Signal Strength

Section 4 — Symbols

Symbol	Definition	Symbol	Definition	Symbol	Definition
NON STERILE	Non-sterile	Keep Dry	Keep Dry		Identification of a substance that is not contained or present within the product or packaging.
LATEX	This product does not contain natural rubber latex.	20	China RoHS (reduction of hazardous substances)	EC REP	Authorized representative in the European Community
Rx ONLY	Federal (USA) law restricts this device to sale by or on the order of a physician		Dispose of as Electrical and Electronic Waste	REF	Catalog number
DEHP	DEHP free	XX12345	UI recognized component certification symbol		Manufacturer
	Do not use if package is opened or damaged	Li-ion	Lithium Ion Battery	Use by	Use by or expiration date
	Consult instructions for use		Caution for indoor use only	LOT	Batch code
!	Caution, consult accompanying documents		Type BF applied part	SN	Serial Number
	Follow instructions for use. Symbol appears blue on device.		Class II Equipment		Date of manufacture
MR	MR unsafe (magnetic resonance)	IP21	Protection against fluid ingress: Drip-proof		Power Symbol
	Feed	IP26	Water Jet resistant		Network Connection
>24h	Do not use for greater than 24 hours	IPX0	Not water resistant		ZigBee™* wireless
122°F 50°C / 32°F 0°C	Temperature limitations		Non-ionizing electromagnetic radiation		Cellular Signal Strength
122°F 50°C / -13°F -25°C	Avoid temperature extremes	TÜV SÜD C NRTL US	NRTL Mark		
	Keep away from sunlight	CE 0123	CE Mark		
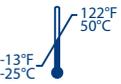
Section 5 — System Setup

Important Note: The basic Kangaroo Connect enteral feeding setup consists of the pump, AC power adapter, feeding set and pole clamp. If necessary, the car charger may be used to supplement the AC power adapter. The pump can provide remote communications if one of the wireless accessories (either the WCH or WiFi module) is installed along with the pump, and a Kangaroo Connect ENtelliSet Feeding Set is being used. The pump and WCH or WiFi module, along with feeding sets and accessories need to be installed and put into service in accordance with the information provided by this manual and accompanying documents.

Attaching the power adapter

The pump may be charged directly or through use of the WCH.

1. The pump can be charged directly.

    a. Plug the power adapter into the power adapter port located on the left side of the pump (Fig. 1). Plug the other end of the power adapter into a nearby A/C outlet. Or if using the car charger power adapter, plug the cylindrical connector into the car charger port.

    b. Check to see that the A/C Indicator Light is on to confirm that the pump is receiving power.

    c. Since the pump batteries are shipped with less than full charge, be sure to charge the pump for a minimum of 7 hours before initial use.

2. The WCH is designed to serve as a docking station to re-charge the pump batteries. Quick disconnection is facilitated with the clearly visible eject button located on the left side of the WCH.

**Note:** The WCH uses the same power adapter that is provided with the pump.

To re-charge the pump in this configuration, simply:

1. Place the WCH on a tabletop surface or attach to pole clamp.

2. Plug the pump power adapter into the port on the back of the WCH (Fig. 2).

3. Slide the pump from right to left into the WCH until you hear a click (Fig 3). The WCH is designed to automatically latch the pump to the base when the pump is fully seated in the base.

4. Check to see that the Power Indicator Light is on to confirm that the pump is receiving power from the wall outlet. See page 3, number 4, to find the location of the A/C Indicator Light.

5. Since the pump batteries are shipped with less than full charge, be sure to charge the pump for a minimum of 7 hours before initial use.

6. Since the WCH also provides wireless capability to the pump, check that the wireless module is activated by looking through the window on the back of the wireless communications hub (WCH). Confirm that the Power icon in the window is lit up. Reference Section 5 for icon descriptions and pictures.

The Kangaroo Connect enteral feeding pump and WCH can be attached to a vertical pole using the pole clamp which is included with the pump. The pole clamp can easily retain the pump or the WCH. This can be done using the "slide and click" attachment feature located on the back of the pump (Fig. 4).

To attach the pole clamp to an IV pole, place the inside elbow of the clamp against the IV pole. Turn the knob to tighten the pole clamp against the IV pole. Turn the knob hard enough so the pole clamp does not slide down the pole. Next, rotate the plastic latch plate of the pole clamp so that the "slide and click" feature looks like an upside down letter "U". Once this step is complete, you are ready to attach the pump or WCH to the pole clamp.
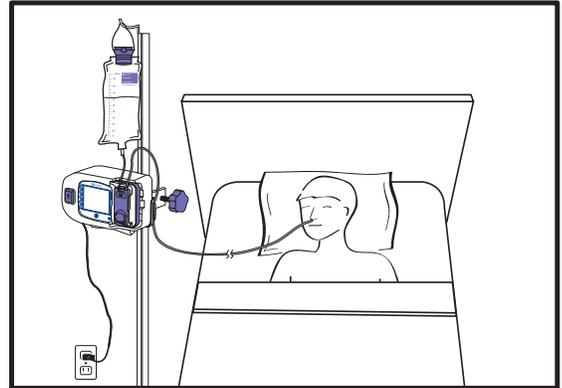

Fig. 1
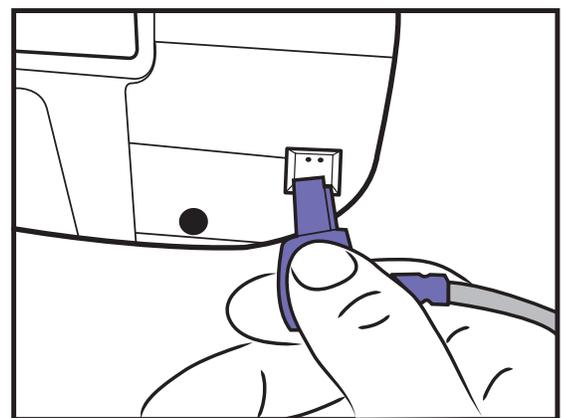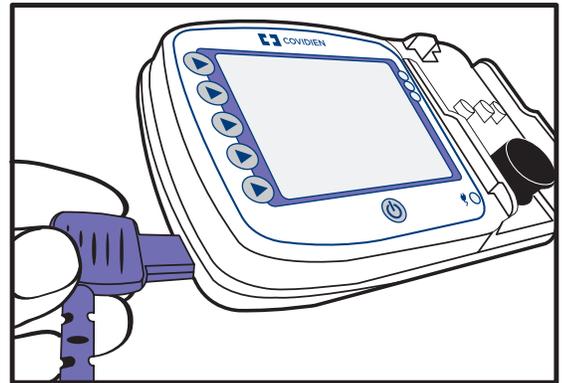
Fig. 2
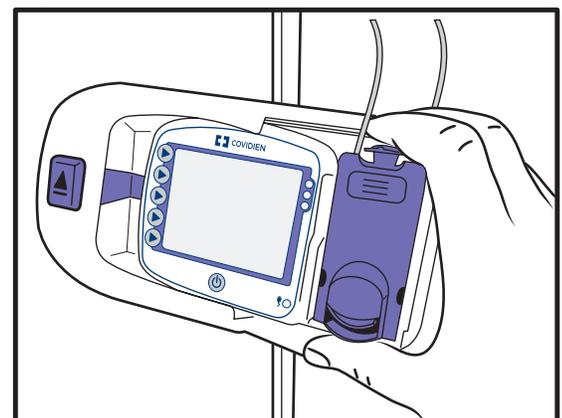

Fig. 3

Section 5 — System Setup
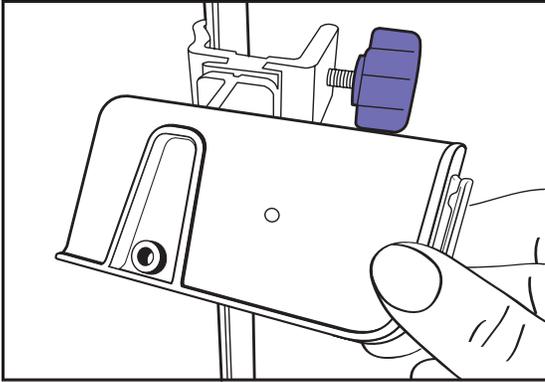

Fig. 4
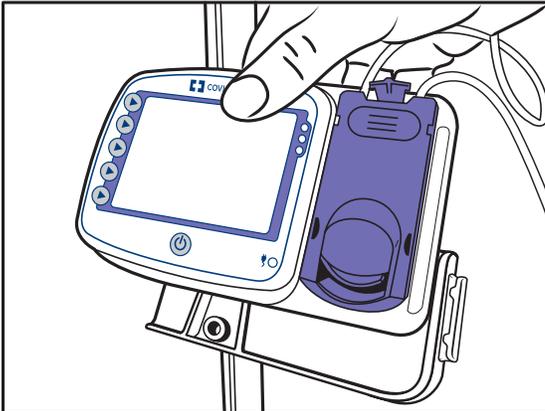
Fig. 5
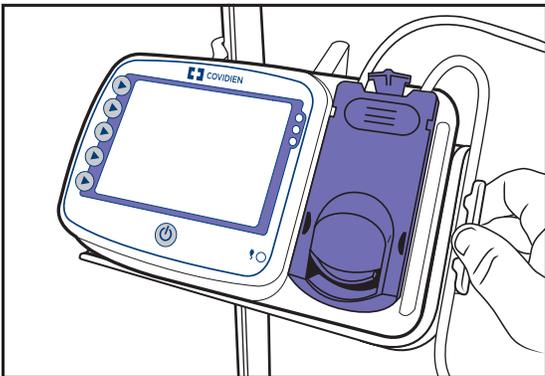
Fig. 6

Hold the pump and place the back face of the pump against the flat portion of the pole clamp latch plate. Slide the pump to the right until the pump hits the latch plate guide. Keeping contact with the guide, slide the pump downward until you hear a positive "click". This indicates that the pump has been properly seated. To remove the pump, gently pull upward on the pump until it "pops" upward off the latch plate (Fig 5).

Follow the same procedure as above for attachment of the WCH to the pole clamp. The pole clamp is designed to work universally with either the pump or the WCH (Fig. 5 and Fig. 6).

Note: The plastic retention plate is designed to be rotated in 90 degree increments to allow attachment to a horizontal tabletop surface or a horizontal bed rail. This rotation is done by grasping the latch plate and twisting until the latch plate "pops" into the next angled position.

If assistance is needed in setting up, using, or maintaining the pump, please contact Customer Service for additional support.

Using the Pole Clamp tube support guide

The Pole Clamp tube guide is designed as an additional support for the tubing.

To install the tube into the tube guide, complete the following steps:

1. Ensure the Cassette is properly loaded.

2. Select the tube that goes to the patient (tube exiting the right side of the cassette).

3. Press the tubing into the tube guide creating a loop above the pump (see fig. 6).

4. Ensure that the loop has sufficient length to make a gradual curve.

Installing a Wireless Communications Hub (WCH)

The WCH is designed to work with the Kangaroo Connect pole clamp and Kangaroo Connect power adapter that are packaged with the pump. The WCH may also be powered using the Kangaroo Connect car charger. If it is desired to have the WCH powered or attached independent from the pump, contact Customer Support to order additional accessories.

Note: The Kangaroo Connect WCH is not intended to be ambulatory.

To Install the WCH, complete the following steps:

1. Remove packaging materials from the WCH.

2. Place the WCH on a tabletop surface or affix to the pole clamp.

3. Plug power adapter into wall outlet.

4. Plug the keyed end of the power adapter into the back of the WCH.

5. Look through the transparent window on the back of the WCH to confirm its operating status. Reference the table in this section for icon descriptions and pictures.

    a. The power indicator ⏻ should be lit up to indicate that power is being supplied to the WCH.

    b. The signal strength indicator 📶 should be yellow or green to indicate presence of a cellular signal. If the signal strength indicator is not lit, reposition the WCH to a location with a better cellular signal.

    c. The Zigbee indicator ⦿ should be flashing green. If the Zigbee indicator is not green, relocate the pump closer to the WCH.

    d. The network indicator 🌐 should be solid green. This light indicates when the WCH has a good network connection. If this light is not green, reposition the WCH until a green light is achieved.

Section 5 — System Setup

Installing a WiFi/Ethernet Module

The WiFi/Ethernet module shall be packaged with its own AC power adapter, CAT5 cable and Gateway quick start guide. Follow the directions provided in the quick start guide to connect and configure the WiFi module for use.

Note: The Kangaroo Connect WCH is not intended to be ambulatory.

Indicator Light	Light Symbol	Indicator Light Status	WCH State
Power Light		Off	WCH does not have power
		Solid Green	WCH is receiving power
ZigBee™* Light		Off	Radio Disabled
		Blinking Green (Slow)	Ready to connect to pump
Cellular Signal Strength		Off	No Signal
Solid Yellow	Adequate signal		
Solid Green	Good signal		
Network Light		Off	Powered Off
		Blinking Yellow (slow)	Powered ON, no network link
		Blinking Yellow (fast)	Network link, no IP address
		Solid Yellow	IP address assigned
		Blinking Green (slow)	Attempting a connection to the server
		Blinking Green (fast)	Server found, authenticating
		Solid Green	Connected to the server
		Alternating between Green and Yellow	Cannot connect to server

If assistance is needed in setting up, using, or maintaining the wireless communications hub (WCH or WiFi module), please contact Customer Service for additional support.

Section 6 — User Screen

The pump comes with the following default setting:

Default Settings	Settings
Continuous (Rate) Mode	On
Screen Brightness	Level 3 of 4
Feed Rate	0 mL/hr

Preparing for a feed

Step 1: Ensure the cassette portion of the feeding set is not loaded on the pump.

Step 2: Press the Power button to power up the pump.

Step 3:

If you have used the pump previously, your last settings were automatically retained for you. Press **Keep Settings** to keep the settings from the last feeding, otherwise, press **Clear Settings**.

Step 4:

Upon power up, you will see the **Load Set** screen. Press **More Options** to adjust pump preferences -OR- **Press Adjust Rate** to input feeding settings prior to loading the set -OR- Load a feeding set on the pump to continue.

Step 5:

To load the cassette portion of the feeding set onto the pump, follow the animated instructions on the screen.

Step 6:
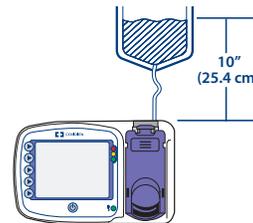
Hang the feeding set bag or fluid container so the starting volume of fluid is 10" (25.4 cm) above the top of the pump as shown.

Step 7:

The **Set Loaded** screen will confirm that pump has correctly identified the feeding set. You will now be ready to prime the feeding set. Press the **Prime** button to continue.

Cassette Loading Sequence
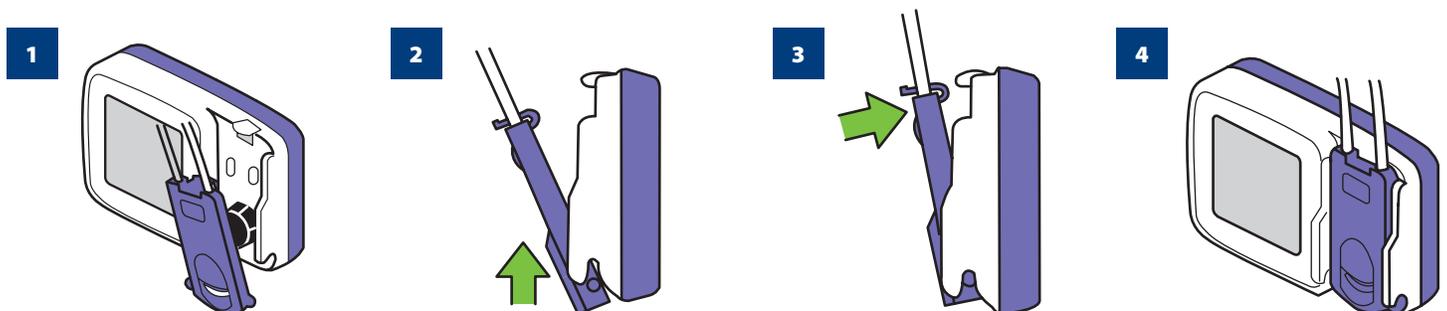
Section 6 — User Screen

Priming the pump

Auto Prime / Hold to Prime — CAUTION: Disconnect patient from tubing before priming. To prime, press Auto Prime or Hold to Prime. 98%

PRIMING — Wait until priming ends or press Stop if fluid reaches end of line. Stop 98%

Hold to Prime / Done — CAUTION: Disconnect patient from tubing before priming. To prime, press Hold to Prime. 98%
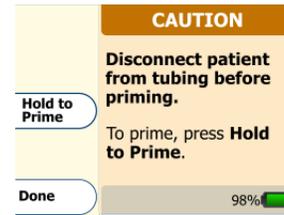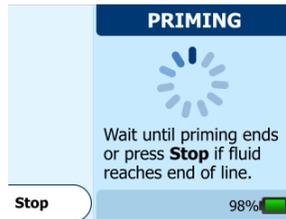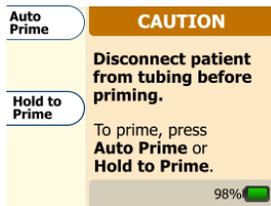
Step 8

Once you press the **Prime** button, you will see the screen above. Note the warning on the screen, fill the feeding container/bag with feeding solution, then press **Auto Prime**. **Auto Prime** will automatically prime the feeding set. If desired, **Hold to Prime** can be used instead for a manual prime.

Note: When using **Hold to Prime** feature; **Feed Bag Empty, Patient Tube Blocked** and **Supply Tube Blocked** alarms are disabled.

Step 9

The pump will show an animated timing sequence indicating the prime is in process. Wait for the priming to complete.

Step 10

Once the **Auto Prime** is complete, the feeding solution will stop short of the feeding set connector. To "top off", press and hold the **Hold to Prime** button. To continue with pump set-up, press **Done**.

Note: Due to the head pressure of the formula within the feeding set bag, the tube may fill with fluid up to and including the cassette. In this case, the **Auto Prime** feature will not function and **Manual Prime** will have to be used to prime the set.

Entering feed rate settings

Adjust Rate / More Options / Start — READY TO FEED: Rate: 125 mL / hr, Total Fed: 0 mL, 98%

+ / − / Cancel / OK — ADJUST RATE: Rate: 125 mL / hr, Maximum: 600, 98%

Adjust Rate / More Options / Start — READY TO FEED: Rate: 125 mL / hr, Total Fed: 0 mL, 98%
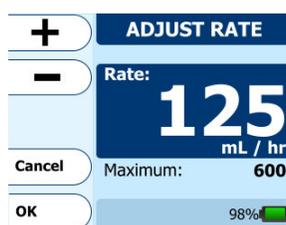
Step 11

Upon completion of the prime, the **Ready to Feed** screen will appear. Press **Adjust Rate** to enter the feeding rate.

Step 12

Press the + OR – buttons to increase or decrease the rate. Push and hold on either button to accelerate the numbers. Press OK when finished.

Step 13

The screen should now say **Ready to Feed**. Press the **Start** button to begin feeding. Once started, you must press the **Pause** button to change the feed rate.

Section 6 — User Screen

More Options (Clear Amount Fed, History, Airplane Mode, Brightness)
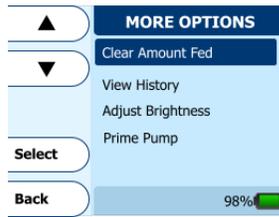
To access the features of **Clear Amount Fed, Airplane Mode, View History, Adjust Brightness**, or **Prime Pump**, press the **More Options** button. Use the arrow keys to highlight the feature you want to activate. Once highlighted, press the **Select** button to activate the highlighted feature. Hit the **Back** button to resume feeding.

The following is a summary of each feature:

- Clear Amount Fed = Resets the feeding counter to zero for starting a new patient or a new feeding
- View History = Allows the user to retrieve the last 72 hours of pump history
- Airplane Mode = Allows the user to disable the wireless connectivity of the pump
- Adjust Brightness = Allows the user to configure the brightness of the display backlight
- Prime Pump = Allows the user to prime the pump after initial setup.

How to lock/unlock the input screen

The pump allows the user to lock the input screen to prevent accidental button presses during portable use. This is especially helpful when transporting the pump in a backpack.

To use the **Lock Screen** option, press and hold the **Lock Screen** button for 5 seconds. A countdown will appear to show how long to hold the button.

Once activated, a Lock symbol will appear on the **Feeding** screen, showing that the buttons are disabled.

To disable the Lock Screen so the buttons can be re-activated, press and hold the **Unlock Screen** button for 5 seconds.

When pressing the **Unlock Screen** button, a countdown will once again appear to indicate how long to hold the button.

The screen should then appear as seen above. The buttons will now be re-enabled.

Section 7 — Certification of Performance/Calibration

The pump does not require periodic calibration. It is recommended to conduct a performance test every 2 years, or as recommended by facility protocol. The certification procedure requires access to the Biomed Menu and should be performed by appropriate personnel.

Section 8 — Cleaning

Caution: The pump, WCH, WiFi module and power adapters are not designed to be immersed underwater. Do not immerse the pump, WCH, WiFi module or power adapters in water or other cleaning solutions. Failure to follow the cleaning procedures described herein could result in hazards to users, patients, and clinicians. As with any A/C powered electrical device, care must be taken to prevent liquid from entering the pump, WCH and WiFi module to avoid electrical shock hazard, fire hazard, or damage to electrical components.

Caution: Disconnect pump, WCH and WiFi module from A/C power source before cleaning. After cleaning, do not connect to an A/C power source until thoroughly dry.

If any of the following events occur, **do not use** the pump, WCH and WiFi module until it has been properly cleaned and dried. For assistance, please contact Customer Service:

- Wetting of the power adapter
- Leakage into the pump interior
- Leakage into the WCH Interior
- Leakage into the WiFi module interior

General cleaning directions

Cleaning Chemicals:

A mild, common dish washing liquid detergent should be used for general cleaning. This detergent should be used with a 20:1 ratio water to detergent mixture.

Wipe down the pump with a paper towel moistened with the cleaning solution, removing all visible soil. Use a brush to remove soil from hard to reach crevices.

Caution: The use of cleaners and disinfectants other than the ones described in the instructions for use may cause significant damage to the pump, WCH or WiFi module and may void warranty.

Cleaning Frequency:

It is recommended that the pump and WCH be cleaned after each feeding set use for a minimum duration of 30 seconds, to prevent bacterial contamination of the pump. Further, failure to clean the pump can interfere with the function of the pump rotor, which can increase the occurrence of errors and warning alarms. See below for methods for cleaning each component.

Directions for Cleaning the WCH:

- Refer to General Cleaning Directions before starting.
- Clean the outside surface with a damp cloth or sponge using a mild detergent.
- **Caution: Washing the WCH under running water or through submersion will result in damage to the unit!** The WCH is designed to a water resistance of IP21 per the IEC 60529 standard, which does not allow for submersion in water or under a running faucet.

Directions for Cleaning pump Housing

- Refer to General Cleaning Directions before starting.
- Clean outside surface with a damp cloth or sponge using a mild detergent.
- For difficult to clean areas, it is permissible to wash the pump under running water. Avoid submerging the pump or washing with high pressure nozzles, which exceeds the water proof rating of the pump. The pump casing has a water proof rating of "water jet resistant". This allows for washing under running water or wiping with a damp cloth.

Directions for Cleaning Power Adapter and WiFi Module

- Refer to General Cleaning Directions before starting.
- Unless soiling is observed, the power adapter and WiFi Module should not be cleaned.
- If cleaning of the power adapter or WiFi Module is necessary, unplug and wipe the exterior surfaces with a cloth dampened with isopropyl alcohol.
- Allow excess moisture to evaporate prior to use.
- **Caution: Washing the power adapter or WiFi module with a wet cloth, under running water, or through submersion will result in damage to the unit!** The power adapter and WiFi module are rated IPX0, which means they are not water resistant.

Caution: Avoid exposing the power adapter or WiFi module to excess moisture, as this can lead to an electrical shock or fire hazard.

Preventative maintenance

This pump may be periodically tested to assure proper functioning and safety. Testing may be done at the user's Biomedical Engineering Department, an outside service, or by Covidien Factory Service.

To arrange for Covidien Factory Service in the US, call 1-800-448-0190. In Canada, call 1-877-664-8926. Outside of the US and Canada, please contact your local Customer Service for more information.

If a pump malfunctions, please contact your Covidien Representative or call Customer Service for instruction.

General disinfection directions

Disinfection chemicals:

The pump and the WCH can be disinfected by wetting their surfaces with a 10:1 water and chlorine bleach mixture. To wet the devices, use at least two bleach wetted lint-free wipes and wipe as necessary to maintain visual wetness. Visual wetness should be maintained for a minimum duration of 10 minutes for the pump, and a minimum duration of 1 minute for the WCH.

Repeated disinfection with this solution can damage the plastic housings.

Disinfection frequency:

It is necessary to clean and disinfect the pump and WCH after each use when these devices are used for multiple patients. This is to prevent spreading bacteria, viruses, and other germs between patients that interact with the same pump and WCH.

Section 9 — Alarms and Troubleshooting

LED Indicator Lights

The pump status LED Indicator lights on the upper right of the pump provides a quick visual indication of the pump status, especially in darkened rooms.

A solid green light indicates the pump is feeding.

A blinking green light indicates the pump is ready for operation but not feeding.

A solid yellow light indicates an informational notice.

A blinking yellow light indicates a caution.

A blinking red light indicates a critical warning.

See the information below for detailed descriptions of each warning. If an unexpected operation or event occurs while using the pump, please report any findings to Customer Service.

Caregiver Alarm Notification

All alarms are intended to be heard by operators that are within hearing range of the pump buzzer. The pump buzzer is located on the back of the pump. The pump is designed so the alarm can be heard within the patient's room, at a minimum. The display and LED alarm indicators are intended to be seen by an operator within the room, facing the front of the pump. Since audible alarms are limited by distance, it is recommended that the operator conduct a check to determine at what distance the alarm can still be heard.

Note: Going outside of the patient's room may make hearing the alarms more difficult.

Verifying functionality of the alarm system

The best method to confirm the proper functionality of the alarm system is to run a Performance Certification cycle (See Section 7: Certification of Performance). Another quick test that can be performed to confirm audibility and function of alarms is:

1. Load a new feeding set onto the pump
2. **Leave the feeding set empty!**
3. Run Auto Prime
4. Once the pump begins priming, it will detect a Feed Bag Empty condition and alarm
5. Confirm that the audible alarm, color display, and colored LEDs all properly indicate a Feed Bag Empty condition

Caution: To allow proper operation of audible alarms, avoid blocking or obstructing the series of buzzer holes located in the back of the pump.

How to temporarily silence/clear the alarm

The alarms cannot be permanently silenced or muted. However, by pressing the Silence Alarm button, the alarm audio can be temporarily silenced for two minutes. After two minutes, the alarm audio will restart. To re-engage the audio alarm before the two minutes is up, press the Bell button. This will restart the audible alarm and end the temporary pause of the alarm.

Feeding Set Usage > 24 Hours Condition

LED indicator: Solid Green

The feeding set usage indicator is a reminder that will appear on the bottom of the **FEEDING** screen if a Feeding Set has been used for 24 or more hours (hours actually running). It is recommended to replace feeding sets after this length of usage. This icon is only an informational message and does not require immediate action.

Settings locked Notification

LED indicator: blinking green
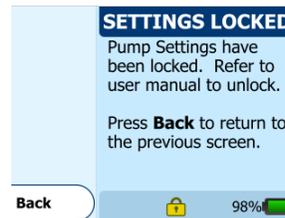
The **SETTINGS LOCKED** screen will appear if the **Lock Settings** feature has been activated in the **Biotech** Mode. By design, no settings can be changed while the pump is in this state. To disable the **Lock Settings**, you must disable this feature in the **Biotech mode**.

Section 9 — Alarms and Troubleshooting

FEED COMPLETE Notification

LED Indicator: blinking green

The **FEED COMPLETE** screen will appear if a **Dose** or **Bolus** feeding meets the specified amount. In the pictures above, you will see two different screens that may appear in this case. The screen on the top shows a completed **Dose**. The screen on the bottom shows a completed **Bolus**. Note that during continuous feeds (no dose, no bolus), you will not receive a feeding complete notification. Since this is only a notification and not an alarm, no beep will sound to avoid disturbing the patient. If a sound indication is desired, you can enable feed complete audio in the **More Options** menu.

Press **Done** to clear the notification.

FEED INCOMPLETE Notification

LED Indicator: blinking green

The **FEED INCOMPLETE** screen will appear if a **Dose** or **Bolus** feeding is interrupted prior to completion of the allocated amount. In the pictures, you will see two different screens that may appear in this case. The screen on the top shows an Incomplete Dose. The screen on the bottom shows an Incomplete Bolus.

Press **Resume Dose** or **Resume Boluses** to continue feeding from the current pump state. This often is needed if the pump was temporarily interrupted and the user wants to complete the feed that they started with. If needed, press **Restart Bolus** or **Restart Dose** if you are beginning a new, full feeding regimen.

PUMP INACTIVE Alarm
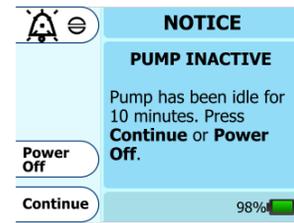
The pump inactive error screen will appear if the pump has been without input for more than 10 minutes.

Press **Continue** to return to the previous screen.

Detection of this alarm condition may take up to ten minutes to occur under normal operating conditions.

LOW BATTERY Alarm

LED Indicator: solid yellow
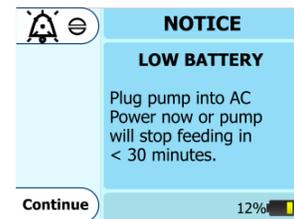
The **LOW BATTERY** screen appears and the alarm beeps continuously when the battery needs to be recharged. There is approximately 30 minutes of battery life remaining when this screen appears

Plug the power adapter in to a wall outlet to begin charging. The pump will automatically return to the screen that was active prior to the error. The battery will charge continuously whenever the pump is plugged into a wall outlet. The pump will continue to operate normally while the battery in the pump is recharging. 7 hours of charging is required to fully recharge the battery pack.

If this screen appears while the power adapter is plugged in to the pump, check to make sure the power adapter plug is pushed all the way in so it fully inserted into the side of the pump.

If this screen appears while the pump is attached to the WCH, check to make sure the power adapter plug is pushed all the way in so is fully inserted into the back of the WCH and ensure that the pump is fully seated into the base to resume charging the pump.

Detection of this alarm condition may take up to 30 minutes to occur under normal operating conditions.

Section 9 — Alarms and Troubleshooting

FEED BAG EMPTY Alarm

LED Indicator: blinking yellow
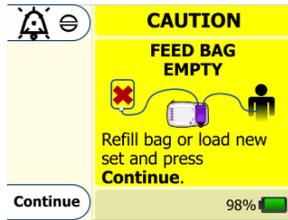
The **FEED BAG EMPTY** screen appears when the enteral formula is no longer being delivered because the bag is empty. Large amounts of foam or bubbles in the feeding solution can also be a cause for this alarm. Check the bag to see if it is empty and re-fill the bag as required. If the bag still contains feeding solution, remove cassette and check the bag side tubing for excessive foam or bubbles. Clear bubbles from line and reload the feeding set or replace with a new feeding set.

Detection of this alarm condition may take up to 130 minutes to occur at 1 mL/hr.

Detection of this alarm condition may take up to 5 minutes to occur at flow rates greater than 50 mL/hr.

If the error still cannot be resolved, press the **Power** button to stop operation of the pump and put a different pump into service.

ROTOR STUCK Alarm

LED Indicator: blinking yellow
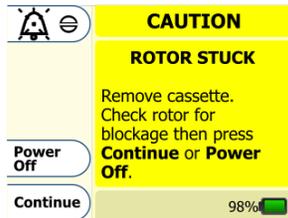
The **ROTOR STUCK** error screen appears when the pump detects an unusual amount of resistance to the rotation of the rotor. (The rotor is the black circular wheel attached to the motor that rotates to move fluid through the feeding set). This error is typically attributed to formula or contaminant build-up on the rotor shaft, which can be corrected by cleaning the rotor. In rare circumstances, this problem could be due to a faulty motor/gearbox assembly.

Detection of this alarm condition may take up to 31 minutes to occur at 1 mL/hr.

Detection of this alarm condition may take up to 1 minute to occur at flow rates greater than 50 mL/hr.

If cleaning of the rotor and rotor shaft does not resolve this error, press **Power Off** to stop operation of the pump and put a different pump into service.

PATIENT TUBE BLOCKED Alarm

LED Indicator: blinking yellow
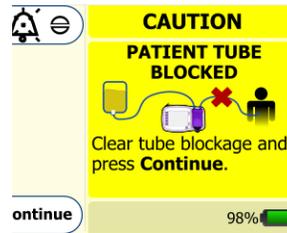
The **PATIENT TUBE BLOCKED** error screen appears when the feeding solution is no longer being delivered because of a clog between the pump and the patient. If the error cannot be resolved, remove the cassette from the pump. Check the line to find and clear the blockage. While the cassette is removed, clean and dry the sensor pocket on the right side of the pump. Re-load the feeding set onto the pump, which could clear the error. If the error still cannot be resolved, load a new pump set, prime it, and press **Continue** to restart the feeding.

Detection of this alarm condition may take up to 95 minutes to occur at 1 mL/hr.

Detection of this alarm condition may take up to 3 minutes to occur at flow rates greater than 50 mL/hr.

If the error still cannot be resolved, press the **Power** button to stop operation of the pump and put a different pump into service.

SUPPLY TUBE BLOCKED Alarm

LED Indicator: blinking yellow
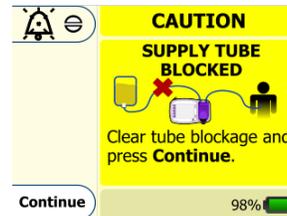
The **SUPPLY TUBE BLOCKED** screen will appear if there is a blockage, obstruction, or kinked tubing between the feeding bag and the pump. Check the tubing between the bag and the pump to see if cause of the blockage can be located and cleared. If the error cannot be fixed, remove the blocked pump set and load a new pump set onto the pump.

Detection of this alarm condition may take up to 350 minutes to occur at 1 mL/hr.

Detection of this alarm condition may take up to 9 minutes to occur at flow rates greater than 50 mL/hr.

If the error still cannot be resolved, press the **Power** button to stop operation of the pump and put a different pump into service.

Section 9 — Alarms and Troubleshooting

CASSETTE DISLODGED Alarm

LED Indicator: blinking yellow

```
          CAUTION

          CASSETTE
          DISLODGED

          Cassette is dislodged.
          Reload cassette or
 Power    Power Off.
 Off

                    98%
```
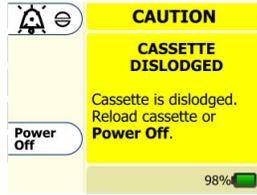
The **CASSETTE DISLODGED** screen will appear if the magnet in the cassette is not properly loaded in the pump set loading area. Reload the cassette to ensure the correct positioning of the cassette on the pump. Check the cassette to see if the black magnet is missing from the cassette. If the error cannot be resolved, load a new pump set, prime it, and press Continue to restart the feeding.

Detection of this alarm condition may take up to 1 sec to occur at all flow rates.

If the error cannot be resolved, press **Power Off** to stop operation of the pump and put a different pump into service.

CASSETTE ERROR Alarm

LED Indicator: blinking yellow

```
          CAUTION

          CASSETTE ERROR

          Tube slip detected.
          Reload cassette or
 Power    Power Off.
 Off

                    98%
```
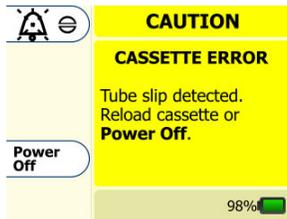
The **CASSETTE ERROR** screen appears during **Feeding** or **Priming**, when the pump has detected an unusual operating condition with the rotor. A **CASSETTE ERROR** is typically issued when feeding or priming is attempted after a power up sequence during which a primed feeding set was already installed. To resolve, simply unload and reload the cassette. The **Cassette** Error can also occur due to a problem with the pump set tubing around the rotor. This can be a result of the bottom deflection arm on the cassette failing to push the feeding tube against the rotor.

Detection of this alarm condition may take up to 31 minutes to occur at 1 mL/hr.

Detection of this alarm condition may take up to 1 minute to occur at flow rates greater than 50 mL/hr.

Check that the pump set is not damaged and reload the cassette. Press

CONTINUE to Start. If the error cannot be resolved, load a new pump set, prime it, and press **Continue** to restart the feeding. If the error still cannot be resolved, press **Power Off** to stop operation of the pump and put a different pump into service.

DEAD BATTERY ERROR Alarm

LED Indicator: blinking red

```
          WARNING

          DEAD BATTERY
          ERROR

          Plug pump into AC
          Power now or press
 Power    Power Off.
 Off

                    5%
```
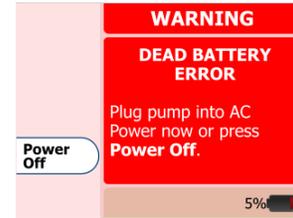
If the **Low Battery** screen has been displayed for some time without a response, the pump will switch to a **DEAD BATTERY ERROR** alarm status. This error notifies the user that failure of battery power is imminent. This alarm is "Red" (or critical) because interruption of feeding to the patient has occurred. As seen above, the display and indicator light will turn red when this alarm sounds. When you see this alarm, plug the pump into a wall outlet. This will allow continued operation of the pump and will recharge the battery.

Detection of this alarm condition may take up to 20 minutes to occur under normal operating conditions.

SYSTEM ERROR Alarm

LED Indicator: blinking red

```
          WARNING

          SYSTEM ERROR XX

          Contact authorized
          distributor and provide
 Power    error number (XX).
 Off

                    98%
```
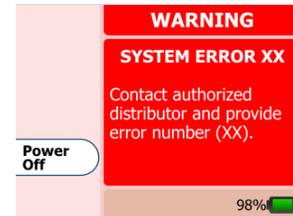
The system error screen is the most general form of error. Also, the Indicator LED on the front of the pump will change to a "Red" status. As seen above, the screen will turn red when this error occurs. **Note: The only way to exit from a System Error is to power down.** An error number is displayed on the screen, for reference purposes. This number should be used when calling Customer Service.

Detection of this alarm condition may take up to 1 minute to occur under normal operating conditions.

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Section 10 — Specifications

Specifications

Medical equipment

Kangaroo Connect enteral feeding pump

(1) Classified with respect to electrical shock, fire, and mechanical hazards in accordance with ES60601-1 (3rd edition) and UL60601-1 (2nd edition).

(2) Classified with respect to electrical shock, fire, mechanical and other specified hazards in accordance with CAN/CSA C22.2 No. 601.1

Type Infusion Device

Volumetric Enteral

Pumping Mechanism

Rotary Peristaltic

Service Life

The pump, WCH, WiFi Module and accessories are designed to provide a minimum of 5 years of service life

Shelf Life

The pump, WCH, WiFi Module and accessories are designed to provide a minimum of 5 years of shelf life

Feeding Sets

All feeding sets are designed to operate only with the Kangaroo Connect enteral feeding pump

Feeding Formula Delivery Rate

1-600 mL/hr in 1 mL increments

Priming Rate

1310 ± 75 mL/hr

Feeding Formula Dose

1 - 3000 mL in 1 mL increments

Bolus Volume

1 - 3000 mL in 1 mL increments

Number of Boluses

1 - 99

Bolus Interval

1 - 24 hours in 1-hour increments

Accuracy

5% or 0.5 mL/hr, whichever is larger, for all delivery rates no matter the type of Kangaroo Connect feeding set.

The top of the fluid column should be at a starting height of 25.4 cm (10") ± 0.76 cm (0.3") above the top of the pump.

Accuracy testing is run at a room temperature of 22°C ± 2°C (72°F ± 3°F), using a new Kangaroo Connect feeding set for no longer than the recommended hours of usage. Confirmation of accuracy is conducted per the IEC 60601-2-24 standard for Infusion Devices, as applicable for enteral feeding. For more information on pump accuracy, see Appendix A.

Occlusion Pressure

Maximum Occlusion Pressure: 20 psi (138 kPa)

Dimensions

Pump: Height: 9.9 cm (3.9") Width: 15.4 cm (6.1")
        Depth: 4 cm (1.6")

WCH: Height: 12.8 cm (5") Width: 19.2 cm (7.6")
        Depth: 9 cm (3.5")

Weight

0.33 kg (.73 lbs), 0.635 kg (1.4 lbs) with pole clamp

Material

Soft-Touch Coating: Latex-Free Thermoplastic Urethane
Pump Housing: Flame resistant Polyester/Polycarbonate blend
WCH Housing: Flame resistant ABS/Polycarbonate blend

High Priority Alarm Volume

Minimum of 65 dBA at 1 meter in maximum volume orientation

Medium Priority Alarm Volume

Minimum of 60 dBA at 1 meter in maximum volume orientation

Operating Temperature for All System Components

5° - 40° C (41° - 104° F)

Operating Humidity for All System Components

15% - 93% R.H. non-condensing

Packaged Storage and Transport Temperature for All System Components

0° - 50° C (32° - 122° F) 93% R.H. non-condensing

Unpackaged Storage and Transport Temperature for All System Components

Store between 0º – 50º C (32º F- 122º F) at < 93% RH (non-condensing); Excursions permitted to -25º C for up to 24 hours.

The pump requires 25 minutes to warm up to its normal operating temperature from low storage temperatures.

The pump requires 6 minutes to cool down to its normal operating temperature from high storage temperatures.

Do not operate until the pump is within its operating temperature range.

Ambient Air Pressure

Operating atmospheric pressure range from 62 kPA to 106 kPA

Maximum Altitude

The maximum altitude for using the pump and wireless accessories is 4000m. Be sure to meet ambient air pressure and battery charging limits stated in this manual.

Section 10 — Specifications

Type of Protection against Electrical Shock

Class II, Internally-powered Equipment

Degree of Protection against Electrical Shock

Type BF

Mode of operation

Continuous or programmed dose operation (dose)

Degree of Protection against Ingress of Fluids

Pump: Water-jet proof (IP26) per IEC 60529

WCH: Drip Proof (IP21) per IEC 60529

WiFi Module: No protection against fluid ingress (IPX0)

AC Power Adapter: No protection against fluid ingress (IPX0)

Car Charger (IP22) per IEC 60529

Power

For both the pump and the WCH, use the provided power adapter.

Caution: Use only Kangaroo Connect power adapter when powering the WCH or the pump with power from an A/C outlet.

The specifications for the Kangaroo Connect power adapter are as follows:

- Input: 100-240 V~, 50-60 Hz, 1.0A (1.0 A – 0.5 A)
- Output: +5 V, 4.0 A

The specifications for the Kangaroo Connect car charger power adapter are as follows:

- Input: 12-16V, 3.5A
- Output: +5V, 5.0A

For the WiFi module use only the provided power adapter.

- Input: 100-240V~, 50-60Hz, 0.2A
- Output: +5V, 1.0A

Battery

A new, fully charged Kangaroo Connect lithium-ion battery pack delivers ~24 hrs of battery life at 125 mL/hr feed rate (when using Power Save and Airplane modes).

At the intermediate flow rate of 50 mL/hr, the pump provides ~26 hrs of battery life (when using Power Save and Airplane modes). At the maximum flow rate of 600 mL/hr, the pump provides ~19 hrs of battery life (when using Power Save and Airplane modes).

At around 30 minutes prior to complete battery discharge, a Battery Low notification will occur. The Battery Low notification will continue every ten minutes before the battery goes dead. Three minutes before the battery loses charge, you will be alerted by a Dead Battery alarm. Upon receiving either the notification or the warning, be sure to plug the pump into the nearest power outlet to ensure continued pump operation. If powering the pump from an A/C outlet does not restore charge to the battery pack, the battery pack is no longer functional and should be replaced by a qualified technician. Please contact Customer Service for servicing a dead battery.

The battery will charge continuously whenever the pump is plugged into a wall outlet. 7 hours of charging is required to fully recharge the battery pack. Note: The pump can continue to be used in normal operation while the battery is recharging. The expected service life of the Kangaroo Connect battery is 3 to 5 years of life, depending on usage. As with all rechargeable batteries, a high number of charge/discharge cycles or high temperature usage will result in some reduction in battery life. The specifications for the battery pack inside the pump are as follows:

- Lithium Ion Rechargeable Battery Pack
- Nominal Voltage = 3.6V
- Charge Voltage = 4.2 V
- Maximum Charge Current = 1200 mA
- Maximum Discharge Current = 1200 mA
- Nominal Capacity: 2950 mAh

Alarms

System Error

Feed Bag Empty

Supply Tube Blocked

Patient Tube Blocked

Cassette Dislodged

Cassette Error

Rotor Stuck

Dead Battery

Notifications

Feeding Complete

Feeding Incomplete

Low Battery

Pump Inactive

Section 11 — Customer Service

The circuitry of the pump and WCH should not be repaired or serviced by a customer. Electronic assembly rework by unauthorized technicians can affect accuracy and void the product warranty. Certain replacement items, as listed in Section 13 – Service Part Numbers, are available from the service centers listed below.

All service personnel must be properly trained and qualified with operation of the pump and WCH. Improper service may impair operation of the pump.

Return for Repair

1. Call Customer Service for an Authorized Return Number and shipping instructions, using the appropriate phone number below.

2. Only send the item needing repair. If the WCH or WiFi module is working properly and the pump requires repair, do not send the WCH or WiFi module with the pump. Pack the instrument carefully and ship the insured parcel to your local service center:

   United States

   Phone: 1-800-448-0190

   Canada

   Phone: 1-877-664-8926

   Outside of U.S. and Canada

   Phone: +44-1869-328065

Section 12 — Maintenance

For general maintenance issues not discussed below, contact Customer Service.

Warning: Do not open the main housing on the pump, WCH or WiFi module, as there are no user-serviceable parts inside. Opening of device may affect function of the device and voids the warranty.

The following maintenance items/parts can be replaced by the customer on the pump and WCH. See Section 13 for Service Part Numbers and Section 11 for contacting Customer Service.

Wireless Charging Hub Button

If damaged, the Kangaroo connect WCH button can be replaced. Important Note: It is not necessary to remove any screws from the WCH to replace the Button!

1. Carefully remove the damaged button and spring from the front recess of the WCH.

2. Obtain Kangaroo connect WCH replacement button from Covidien using the order code in this manual.

3. Lay the WCH on its back. Insert the replacement spring inside the button cavity in the front of the WCH. There is a retention feature inside to help hold it in place.

4. Insert the pointed tip of the replacement button into the hole in the front of the WCH.

5. Rotate the replacement button until the button face is nearly parallel with the front of the base.

6. Press on the button face until the button snaps into the hole. The replacement button should now be fully retained.

Power Adapter

See Section 5 for initial setup, including the power adapter attachment. The power adapter can be used interchangeably with the pump or the WCH.

Pole Clamp

See Section 5 for initial setup, including attachment of the pole clamp to the pump and WCH.

Pole Clamp Latch Clip Kit

To replace the pole clamp latch clip on the pump:

Using a Phillips head screwdriver, remove the two small screws that hold the clip into place. Remove the old parts and discard according to local disposal regulations. Purchase a Covidien Kangaroo Connect pole clamp latch clip kit. Take the new clip and place over the two brass inserts in the pump's clip pocket. Use the new screws from the kit to screw the new clip in place. Do not over tighten the screws.

Cassette Latch Clip Kit

To replace the cassette latch clip from the pump:

Using a Phillips head screwdriver, remove the two small screws that hold the clip into place. Remove the old parts and discard according to local disposal regulations. Purchase a Covidien Kangaroo cassette latch clip kit. Take the new clip and place over the two brass inserts in the pump's clip pocket. Use the new screws from the retention plate kit to screw the new clip in place. Do not over tighten the screws.

Section 13 — Service Part Numbers

To place an order for parts, or if technical assistance is required, please call Customer Service.

The Kangaroo Connect pump contains a limited number of parts that can be repaired.

Visit our web site at: www.covidien.com

The following item numbers can be used for ordering service or accessory components:

SKU	Description
Kangaroo Connect Enteral Feeding Pumps & Accessories	
384400	Kangaroo Connect Enteral Feeding Pump with Pole Clamp & Power Adapter Model: Kangaroo Connect (Input Power: 5V, 1.5A)
584400	Kangaroo Connect Enteral Feeding Pump with Pole Clamp & Power Adapter (International) Model: Kangaroo Connect (Input Power: 5V, 1.5A)
384491	Kangaroo Connect Power Cord with Adapter
584491	Kangaroo Connect Power Cord with Adapter (International)
384492	Kangaroo Connect Pole Clamp
384494	Kangaroo Connect Car Charger
Kangaroo Connect Feeding Sets	
77000FD	Kangaroo Connect ENPlus Spike Set, Non-Sterile
77100FD	Kangaroo Connect 1000ml Bag Set, Non-Sterile
77500FD	Kangaroo Connect 500ml Bag Set, Non-Sterile
970000FD	Kangaroo Connect ENPlus Spike Set, Sterile
971000FD	Kangaroo Connect 1000ml Bag Set, Sterile
970500FD	Kangaroo Connect 500ml Bag Set, Sterile
971600FD	Kangaroo Connect 1600ml Bag Set, Sterile
970157FD	Kangaroo Connect Vented Spike Set, Sterile
970497FD	Kangaroo Connect Dual ENPlus Spike Set, Sterile
Kangaroo Connect ENtelliSet Feeding Sets (for use with wireless connectivity)	
0KCP	Kangaroo Connect ENPlus Spike ENtelliSet, Non-Sterile
1000KCP	Kangaroo Connect 1000ml Bag ENtelliSet, Non-Sterile
500KCP	Kangaroo Connect 500ml Bag ENtelliSet, Non-Sterile
Kangaroo Connect Backpacks	
770035S	Kangaroo Connect Backpack, Purple, Small
770035M	Kangaroo Connect Backpack, Purple, Medium
770035L	Kangaroo Connect Backpack, Purple, Large
770037S	Kangaroo Connect Backpack, Black, Small
770037M	Kangaroo Connect Backpack, Black, Medium
770037L	Kangaroo Connect Backpack, Black, Large
Kangaroo Connect Wireless Hubs and Pump/Hub Combo Kits	
384500W	Kangaroo Connect Enteral Feeding Pump Kit with WiFi/Ethernet Communications Module
384500C	Kangaroo Connect Enteral Feeding Pump Kit with GSM Wireless Communications Hub
384500CBW	Kangaroo Connect WiFi/Ethernet Communications Module
384500CBC	Kangaroo Connect GSM (Wireless Communications Hub)

Section 14 — Warranty

Limited Warranty:

1. Covidien warrants to the original purchaser ("Customer") that this newly manufactured enteral feeding pump, WCH and WiFi module will be free of defects in materials and workmanship, under normal use, for three (3) years from the date of shipment from Covidien. This Limited Warranty as applied to pump batteries and power cords is limited to one (1) year from the date of shipment from Covidien for all pumps.

2. This Limited Warranty does not extend to routine maintenance of pumps, WCHs and WiFi modules such as cleaning and all recommended Performance Tests set forth in this Pump Operation and Service Manual which remain the sole responsibility of Customer. Failure of Customer to perform cleaning, routine maintenance and recommended performance testing on any pump, WCH and WiFi module as outlined in this Pump Operation Manual may void this Limited Warranty.

3. Customer agrees that, with the exception of customer serviceable parts and troubleshooting steps outlined in this Pump Operation Manual, Covidien or its authorized repair center must perform pump repairs.

4. This Limited Warranty does not cover any pump, product or part that:

    (a) has been operated in an unsuitable environment or used for purposes other than intended;

    (b) has been subjected to unauthorized or non-Covidien repair or use of non-Covidien supplied parts;

    (c) has been altered, misused, abused or neglected;

    (d) has been subjected to fire, casualty or accident;

    (e) suffers damage caused by Customer's negligent acts or omissions; or

    (f) suffers damage beyond normal wear and tear.

5. For purposes of this Limited Warranty, "damage beyond normal wear and tear" includes without limitation:

    (a) Damage to housing, LCD, display overlay or power supply;

    (b) PCBA damage due to fluid ingress;

    (c) Use of non-qualified power supply or battery; or

    (d) Use of unauthorized cleaning fluids.

6. If a pump does not operate as warranted during the applicable warranty period, Covidien may, at its option and expense,

    (a) repair or replace the defective part or pump; or,

    (b) refund to Customer the purchase price for the defective part or pump.

7. Dated proof of original purchase is required to process warranty claims. Removal, defacement or alteration of serial lot number voids this Limited Warranty.

8. Shipping costs for pumps being returned to Covidien shall be borne by Customer. Customer is responsible for proper packaging for return shipment. Loss or damage in return shipment to Covidien shall be at Customer's risk.

9. Covidien disclaims all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose or application other than as expressly set forth in the product labeling. In no event shall Covidien be liable for any incidental, indirect or consequential damages in conjunction with the purchase or use of the pump, even if advised of the possibility of the same.

Section 15 — Electromagnetic Conformity Declaration

The Kangaroo Connect pump, WCH and WiFi module has been built and tested according to UL 60601-1 (2nd Edition), ES60601-1(3rd Edition), CAN/CSA C22.2 No. 60601-1-08, and EN60601-1-2 Standards.

The pump, WCH and WiFi module are intended for use in the electromagnetic environment specified below. The user of the pump should assure that it is used in such an environment.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
The Kangaroo Connect pump is intended for use in the electromagnetic environment specified below. The user of the Kangaroo Connect pump should assure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment - Guidance**
RF emissions (CISPR 11)	Group 1	The pump, WCH and WiFi module use RF energy for its internal function. The Kangaroo Connect pump, WCH and WiFi module must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.
RF emissions (CISPR 11)	Class B	The pump, WCH and WiFi module are suitable for use in all establishments, including domestic establishments and those directly connected to the public low- voltage power supply network that supplies buildings used for domestic purposes.
Radiated Disturbance Immunity (EN60601-1-2 / IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010)	Complies	
Conducted Disturbance Immunity (EN60601-1-2 / IEC 61000-4-6:2013)	Complies	
Power Frequency Magnetic Field Immunity (EN60601-1-2 / IEC 61000-4-8:2009)	Complies	
Voltage dips and sags Immunity (EN60601-1-2 / IEC 61000-4-11:2004)	Complies	
Electrical Fast Transient / Bursts Immunity (EN60601-1-2 / IEC 61000-4-4:2012)	Complies	
Electrostatic Discharge Immunity (EN60601-1-2 / IEC 61000-4-2:2008)	Complies	
Surge Immunity (EN60601-1-2 / IEC 61000-4-5:20005 +Cor 1: 2009)	Complies	

Section 15 — Electromagnetic Conformity Declaration

	Guidance and Manufacturer's Declaration – Electromagnetic Immunity		
The Kangaroo Connect pump, WCH and WiFi module are intended for use in the electromagnetic environment specified below. The user of the Kangaroo Connect pump, WCH and WiFi module should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment -Guidance**
Electrostatic discharge (ESD) (EN 61000-4-2 per EN 60601-1-2: 2007)	± 8 kV contact ± 15 kV air	**Pump and WCH** ± 8 kV contact ± 15 kV air **WiFi Module** ± 8 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode	± 1 kV differential mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	**Nominal Mains Voltage** (V_{NOM}) 100 VAC and 240 VAC @ 50 Hz **Voltage Dips** 100% of V_{NOM} for 10 mSec (0.5 Line Cycles) at 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° 100% of V_{NOM} for 20 mSec (1 Line Cycle) at 0° 30% of V_{NOM} for 500 mSec (25 Line Cycles) at 0° **Interruptions** 100% of $V_{NOM°}$ for 5000 mSec (250 Line Cycles)	No degradation of performance or loss of function.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Kangaroo Connect pump, WCH and WiFi module require continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field (EN 61000-4-8 per EN 60601-1-2: 2007)	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Section 15 — Electromagnetic Conformity Declaration

Guidance and Manufacturer's Declaration – Electromagnetic Immunity				
The Kangaroo Connect pump, WCH and WiFi module are intended for use in the electromagnetic environment specified below. The customer or the user of the Kangaroo Connect pump, WCH and WiFi module should assure that it is used in such an environment.				
Immunity Test	**IEC 60601 test level**		**Compliance level**	**Electromagnetic environment –guidance**
Conducted RF IEC 61000-4-6	6 Vrms 150 kHz to 80 MHz		6 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Kangaroo Connect pump, WCH and WiFi module, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance Not applicable $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:
Radiated RF (EN 61000-4-3 per EN 60601-1-2: 2007)	**Band** **Frequency Modulation**			
	380-390 MHz	385 MHz PM, 18 Hz, 50% 27 V/m	27 V/m	
	430-470 MHz	450 MHz PM, 18 Hz, 50% 28 V/m	28 V/m	
	704-787 MHz	710 MHz PM, 217 Hz, 50% 9 V/m	9 V/m	
		745 MHz		
		780 MHz		
	800-900 MHz	810 MHz PM, 18 Hz, 50% 28 V/m	28 V/m	
		870 MHz		
		930 MHz		
	1700-1990 MHz	1720 MHz PM, 217 Hz, 50% 28 V/m	28 V/m	
		1845 MHz		
		1970 MHz		
	2400-2570 MHz	2450 MHz PM, 217 Hz, 50% 28 V/m	28 V/m	
	5100-5800 MHz	5240 MHz PM, 217 Hz, 50% 9 V/m	9 V/m	
		5500 MHz		
		5785 MHz		
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.				
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.				
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Kangaroo Connect enteral feeding pump is used exceeds the applicable RF compliance level above, the Kangaroo Connect pump, WCH and WiFi module should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Kangaroo Connect enteral feeding pump.				
[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.				

Section 15 — Electromagnetic Conformity Declaration

Guidance and Manufacturer's Decelaration - Reception and Transmission of RF				
The Kangaroo Connect pump, WCH and WiFi module receive and transmit RF electromagnetic energy as specified below:				
Device	Pump, WCH, WiFi Module		WiFi Module	WCH
Communication Type	Zigbee IEEE 802.15.4		WiFi IEEE 802.11 b/g/n	Cellular GSM (3G/UMTS)
Transmit/ Receive Frequency	Channel	Frequency (GHz)	Channel Frequency (GHz)	Frequency Band (MHz)

Channel	Frequency (GHz)	Channel	Frequency (GHz)	Frequency Band (MHz)
11	2.405	1	2.412	800
12	2.410	2	2.417	850
13	2.415	3	2.422	900
14	2.420	4	2.432	1700
15	2.425	5	2.432	1900
16	2.430	6	2.437	2100
17	2.435	7	2.442	
18	2.440	8	2.447	
19	2.445	9	2.452	
20	2.450	10	2.457	
21	2.455	11	2.462	
22	2.460	12	2.467	
23	2.465	13	2.472	
24	2.470	14	2.484	
25	2.475			
26	2.480			

Recommended separation distances between portable and mobile RF communications equipment and the Kangaroo Connect pump, WCH and WiFi module			
The Kangaroo Connect pump, WCH and WiFi module is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Kangaroo Connect pump, WCH and WiFi module can help prevent electromagnetic interference by maintaining the minimum distance between portable and mobile RF communications equipment (transmitters) and the Kangaroo Connect pump, WCH and WiFi module recommended below, according to the maximum output power of the communication equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2,5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Section 16 — Glossary of Terms

Rotor: The black circular wheel on the pump that rotates to push fluid through the feeding set.

Bolus: A feature that allows a fixed amount of fluid to be delivered at varying intervals of time.

Dose: A feature that allows a fixed amount of fluid to be delivered during a feeding. The pump will stop operation when the programmed amount of fluid is delivered.

KTO: Keep Tube Open. A feature that effectively pauses the pump, but keeps the rotor turning very slowly to prevent fluid from clogging in the feeding set tube.

IPX: The degree of water protection of a medical device per the IEC 60529 standard.

Occlusion Pressure: The pressure that can be created in the feeding set when the tubing becomes blocked.

Head Height: The distance from the top of the fluid in the feeding set bag (or container) to the top of the pump.

Sensor Pocket: The pair of projections sticking out from the pump in a "U-shaped" configuration. These projections sit under the cassette and monitor the tubing on either side of the rotor when loaded.

Appendix A - Accuracy Graphs

The following graphs illustrate the accuracy of the pump and 2nd and 23rd hours, per the IEC 60601-2-24 standard. The graphs are shown for both the Minimum Rate (1 mL/hr) and the Intermediate Rate (50 mL/hr).

## Start Up Curve on Accuracy
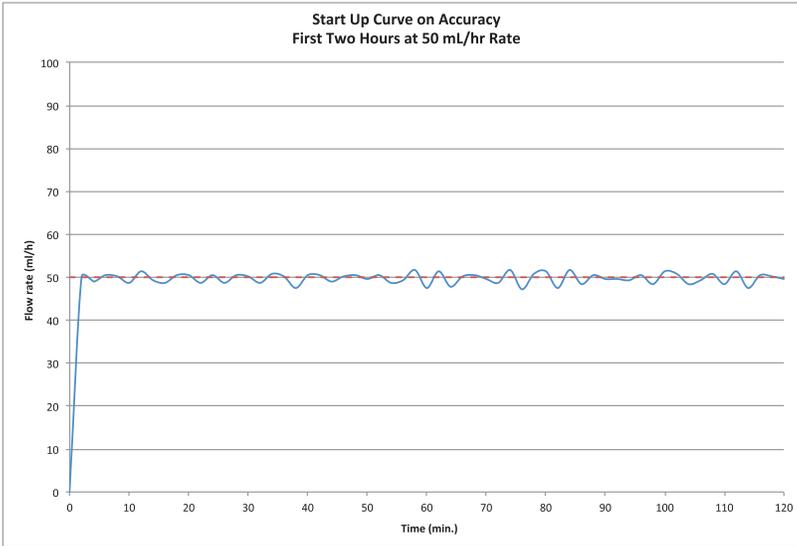
The percent variation of flow rate accuracy over an observation period may be shown with a trumpet graph. Following IEC 60601-2-24, trumpet graphs of the mean flow rate are provided.

Appendix A - Accuracy Graphs

Start Up Curve on Accuracy
**First Two Hours at 1mL/hr Rate**

Accuracy Trumpet Curve
2nd Hour at 1 mL/hr Rate
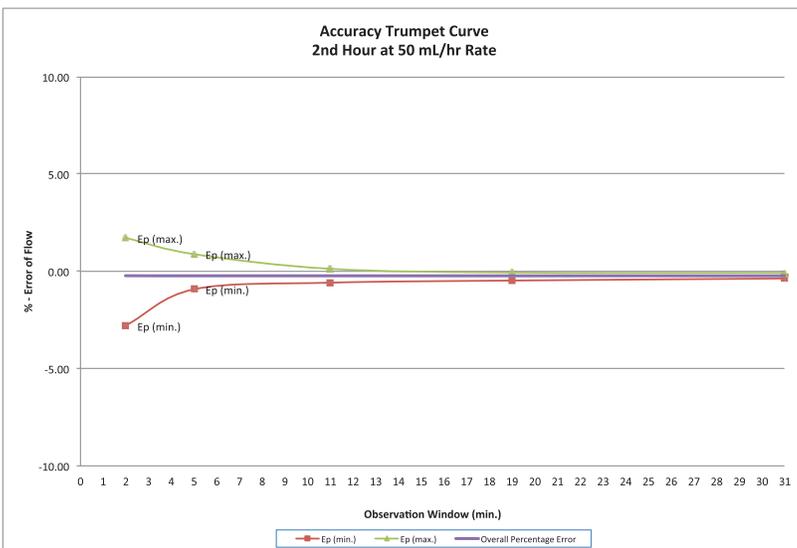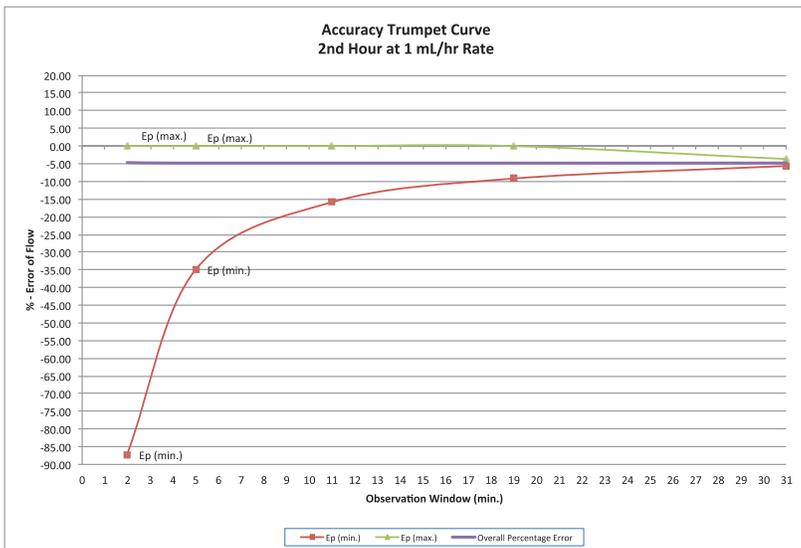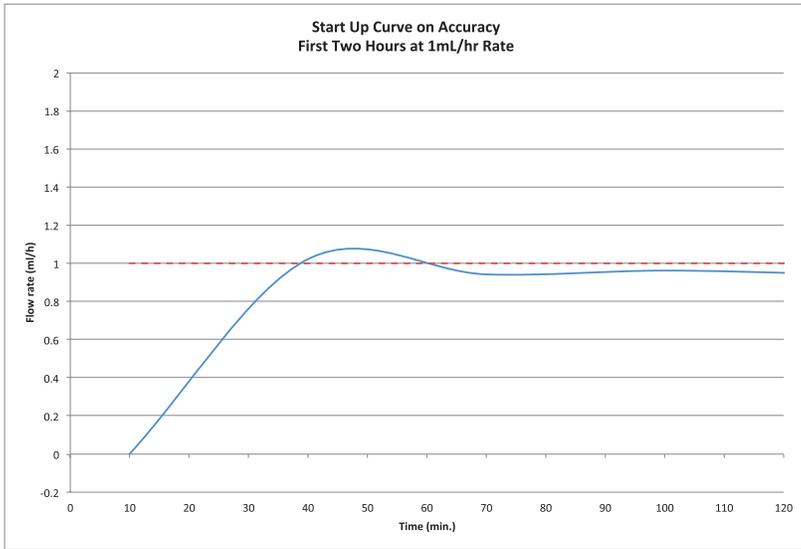
23rd Hour Curve on Accuracy

23rd Hour Accuracy Curve at 50 mL/hr Rate

Appendix A - Accuracy Graphs

Accuracy Trumpet Curve
23rd Hour at 50 mL/hr Rate

23rd Hour Accuracy Curve at 1 mL/hr Rate

Accuracy Trumpet Curve
23rd Hour at 1 mL/hr Rate
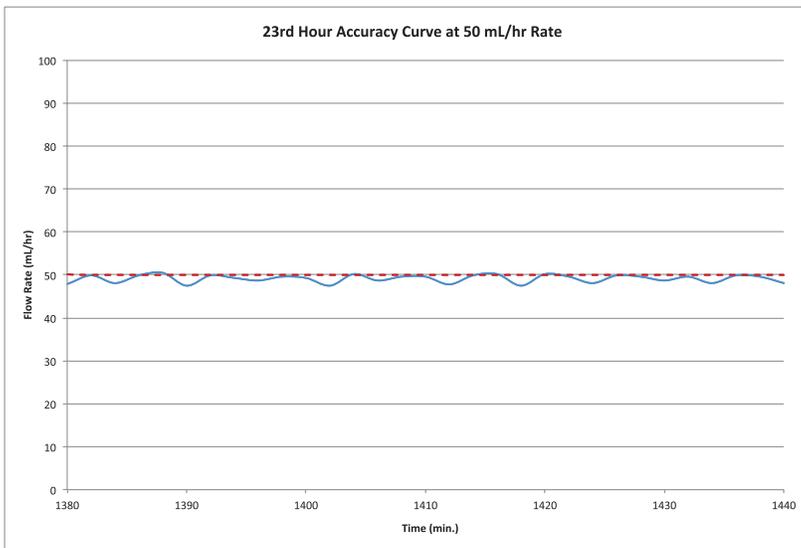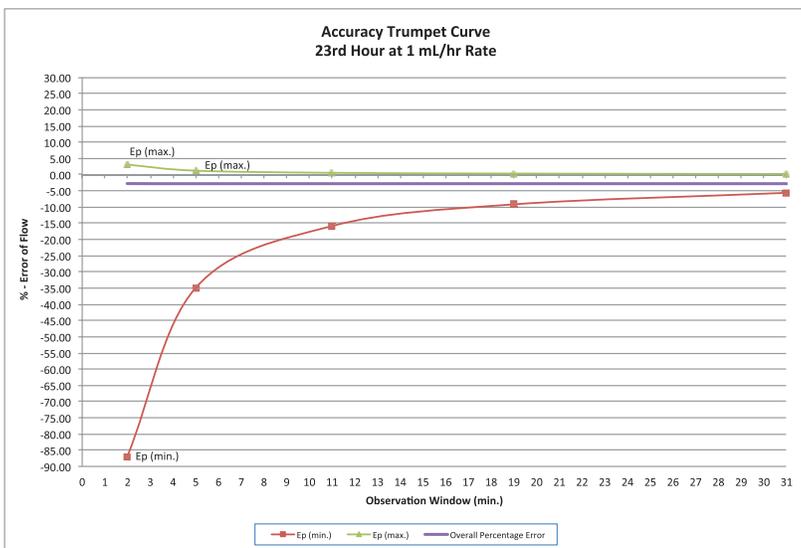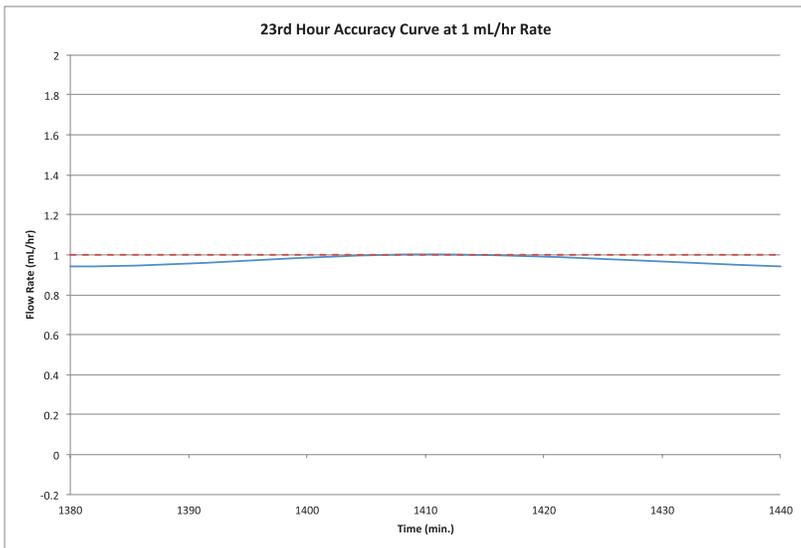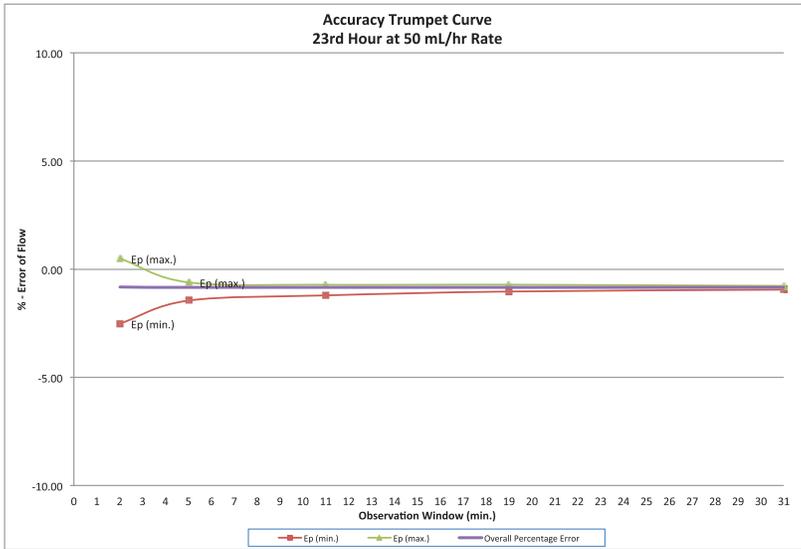
Appendix A - Accuracy Graphs

## Ambient Temperature Effect on Accuracy

The diagrams below show how ambient temperature affects accuracy.

Ambient Temperature Effect on Accuracy of Water and Low Density Formulas (≤ 1.07 g/mL)

Ambient Temperature Effect on Accuracy of Water and High Density Formulas (> 1.07 g/mL)
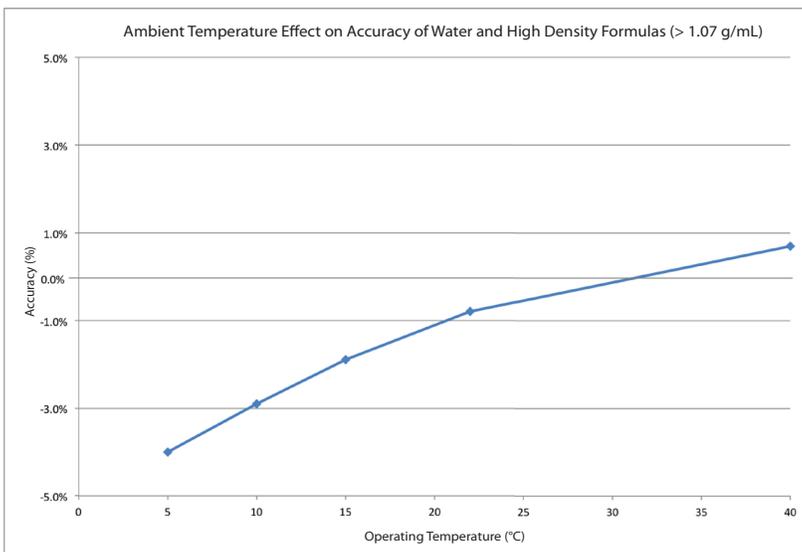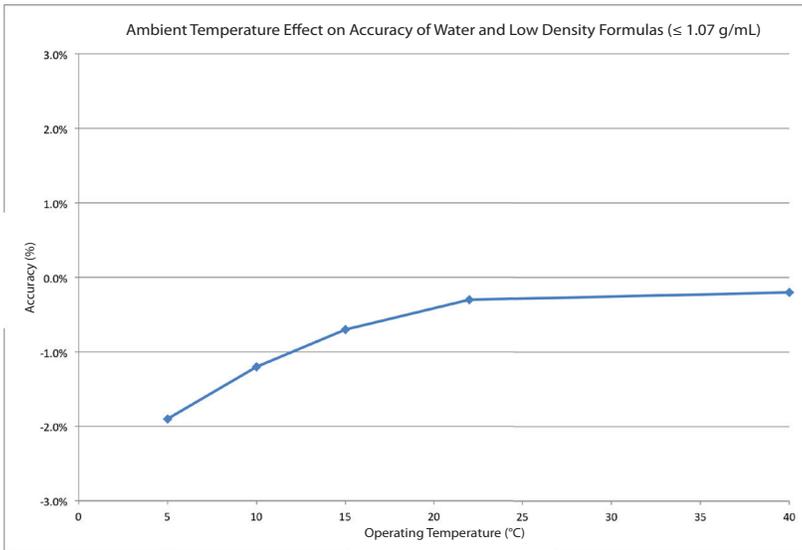
Appendix A - Accuracy Graphs

Head Height Effect on Accuracy

The diagram below show how variation from the recommend head height affects accuracy.

Head Height Effect on Accuracy
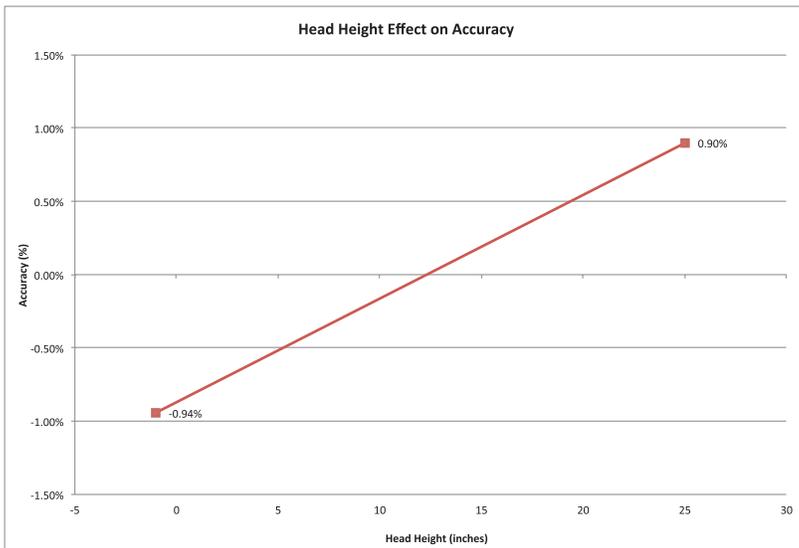
Effects of Back Pressure on Accuracy

The nominal back pressure for pump accuracy testing is established at the distal connector on the end of the feeding set. The is compared with the back pressure that would be experienced when the distal connector is plugged into a 6.5 fr, 36" long nasogastric tube. Operating the pump at the limits of this back pressure range can exhibit the accuracy effects seen in the graph below:

Back Pressure Effect on Accuracy
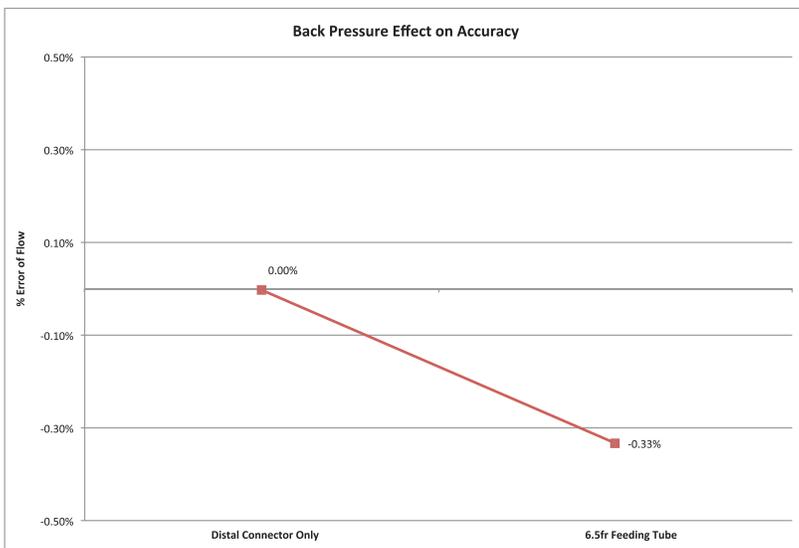
Single Fault Condition Effect on Accuracy

In the event of a single fault short circuit in the pump electronics, a maximum bolus of 3.33 mL of extra fluid delivery may occur.

Appendix B - Explanation of Alarms

The purpose of this appendix is to provide an overview of how the Kangaroo connect alarm system works and what priorities are assigned to each alarm.

Overview

The Kangaroo connect pump has alarms that are broken into three different priorities: High Priority (Red Blinking Indicator Light), Medium Priority (Yellow Blinking Indicator Light), and Low Priority (Solid Yellow Indicator Light). These alarms occur based upon feedback from different sensor inputs from the pump. Key inputs for the alarms include the following:

- Motor Current
- Battery Voltage
- Upstream Ultrasonic Sensor Voltage
- Downstream Ultrasonic Sensor Voltage
- Magnetic Sensor Voltage
- Microprocessor Timer

The breakdown for each alarm is as follows:

- Pump Inactive Alarm

  Sensor Input: Microprocessor Timer

  The pump uses the microprocessor timer to know when 10 minutes of inactivity has elapsed.

- Low Battery Alarm

  Sensor Input: Battery Voltage

  The pump determines if the battery reaches a set low voltage level. When this voltage level is reached, the alarm will activate.

- Feed Bag Empty Alarm

  Sensor Input: Upstream Ultrasonic Sensor Voltage; Downstream Ultrasonic Sensor Voltage

  The pump determines if there is a bag empty alarm if the downstream and upstream sensor voltage drops below a set minimum voltage level.

- Rotor Stuck Alarm

  Sensor Input: Motor Current

  The pump determines there is a Rotor Stuck alarm when the motor current reaches a certain maximum level.

- Patient Tube Blocked Alarm

  Sensor Input: Downstream Ultrasonic Sensor Voltage

  The pump will alarm for Patient Tube Blocked based upon voltage value levels it receives from the Downstream Ultrasonic Sensor.

- Supply Tube Blocked Alarm

  Sensor Input: Upstream Ultrasonic Sensor Voltage; Downstream Ultrasonic Sensor Voltage

  The pump determines Supply Tube Blocked based upon the voltage values it receives from each sensor. The Upstream Ultrasonic Sensor Voltage will reach a set minimum voltage level and the Downstream Ultrasonic Sensor Voltage will reach a maximum voltage level at the same time.

- Cassette Dislodged Alarm

  Sensor Input: Magnetic Sensor

  The pump will alarm for Cassette Dislodged when it a low voltage level is received from the magnetic sensor.

- Cassette Error Alarm

  Sensor Input: Motor Current

  The pump will alarm for Cassette Error when motor current variation is below a set minimum level while the pump is running.

- Dead Battery Error Alarm

  Sensor Input: Battery Voltage

  The pump will alarm when the battery voltage reaches a set minimum level .

Priority Handling of Alarms

In all cases, High Priority alarms are the most important and override any other alarm conditions. A medium or low priority alarm will never disable a High Priority alarm. Medium Priority alarms all have equal weighting. There should never be a situation when medium priority alarms are occurring at the same time, so there is no need to assign a weighting within the medium alarm priority.

The pump never changes the priority of alarms based on situational or environmental conditions. Alarm priority of the pump remains fixed. Additionally, the pump does not change Alarm Signal Generation Delay or Alarm Condition delay as a result of situational or environmental conditions. Finally, the pump does not change the characteristic of the generated alarm signals. Below is the listing of alarm priorities for the pump:

High Priority

  0: System Alarm Condition

  1: Dead Battery Alarm Condition

  2: All Other Critical Alarm Conditions

Medium Priority

  3. All Error Alarm Conditions

Low Priority

  4. Low Battery Warning Alarm Condition

  5: Other Warning Alarm Conditions

In this case, the number 0 represents the Highest Priority.

Appendix C - Fluid/Occlusion Detection Overview

The Kangaroo Connect Enteral Feeding Pump uses dual ultrasonic sensors for fluid detection. One sensor is positioned on the upstream side of the rotor and the other sensor is positioned on the downstream side of the rotor. The dual sensor system also provides the capability to distinguish between upstream occlusions, downstream occlusions and bag empty conditions. When an occlusion occurs in the tubing on the fluid supply side of the pump rotor, fluid will be evacuated from the upstream silicone tubing but not from the downstream tubing. In this scenario, the pump will continually detect fluid at the downstream sensor, but detect no fluid at the upstream sensor. As a result, a Supply Tube Blocked error will be generated. When the fluid supply is exhausted (bag empties), fluid will drain out of the upstream tubing then out of the downstream tubing. In this scenario, the pump will initially detect fluid on both sensors, then observe a period where there is fluid at the downstream sensor but not at the upstream sensor, and then finally observe no fluid at either sensor. When this occurs, a Bag Empty error will be generated. When an occlusion occurs in the tubing on the patient side of the pump rotor, the silicone tubing at the sensor will expand improving the conductivity of the signal through the fluid. In this scenario, the pump will see a significant rise in the receive signal and issue a Patient Tube Blocked error.

Identification of a substance that is not contained or present within the product or packaging.

Rx ONLY

NON STERILE

Follow instructions for use. Symbol appears blue on device.

MR MR unsafe – an item that is known to pose hazards in all MR environments.

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