FLEXIFLO® QUANTUM™
Enteral Pump

OPERATING MANUAL

For Enteral Use Only
Not For Parenteral Use

ROSS
MEDICAL
NUTRITIONAL
SYSTEM®

ROSS PRODUCTS DIVISION
ABBOTT LABORATORIES
COLUMBUS, OHIO 43219-1224 USA
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SPECIFICATIONS

Power
Voltage: 100 to 130 VAC, 47-63 Hz, 1 Phase
Power: 4 watts (average)
Fuse: 3/4 A, 30 V, 5 type
Line Cord: Hospital-grade, nondetachable [10 feet]
Leakage: Less than 100 microamps

Mechanical
Height: 8.25 inches
Width: 7.5 inches
Depth: 6.0 inches (6.0 inches with pole clamp)
Weight: 7.7 lbs

Operational Specifications — Flow Rates
Range: 1-300 ml/hr
Increments: 1 ml/hr
Accuracy: ± 10% (refer to CHECKING PUMP ACCURACY, page 13)
Pressure: Pumps against 15 psi (mean) back pressure before occlusion alarm

Battery Operation
Type: 2, 1 rechargeable nickel cadmium
Voltage: 14V, the pump will fully recharge in a maximum of 8 hours
Expected Life: When fully charged, 8 hours at 125 ml/hr

Standards
Designed and manufactured to meet requirements of UL 548 (1976).

PUMP CHARACTERISTICS

The FLEXIFLO QUANTUM™ Enteral Pump is a microprocessor-controlled pump that provides for accurate, controlled enteral feeding in a safe, user-friendly system. The Quantum Pump is a volumetric pump that uses a specially designed feeding set, which includes a cassette that delivers measured amounts of enteral product. As an optional feature, the Quantum Pump will flush the feeding set and reswelling feeding tube each hour with a 25-ml flush.

PRECAUTIONS: This pump is designed to deliver only a liquid enteral feeding product (standard liquid product, infant formula or reconstituted powdered product that has been thoroughly mixed into solution).

The Quantum Pump offers these features:
1. Automatic priming (no manual priming is necessary)
2. Automatic flush feature
3. Dose setting
4. Protection against over-delivery:
   a. Motor speed is continuously monitored
   b. Senses malfunctions that could result in gravity flow
5. Volume feed accumulation displays for enteral product and flush solution
6. Flow-rate selection from 1 to 300 ml/hr in 1 ml/hr increments
7. Accuracy ± 10% (refer to CHECKING PUMP ACCURACY, page 13)
8. 8-hour battery operation at 125 ml/hr, when fully charged
9. Alarms:
   a. OCCLUSION
   b. EMPTY
   c. DOSE COMPLETE
   d. TURN TO RUN
   e. LOW BATTERY
   f. DOOR CASS
   g. SET RATE
10. System self-check
11. Adjustable alarm volume
12. User-friendly operating controls
13. Simple setup (no hand cassette loading)
14. Memory—Automatic retention of the following values until turned off and disconnected from AC power:
   a. FEED and FLUSH volume accumulations (VOL. RED)
   b. SET RATE
   c. SET DOSE values
## PRECAUTIONS

**External Battery Storage**

- Please store the external battery in a cool, dry place. Avoid direct sunlight or high temperatures.
- Ensure the battery is not exposed to water or moisture.
- Do not dispose of batteries in the trash. Follow local regulations for proper disposal.

<table>
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<th>Battery Type</th>
<th>Storage Conditions</th>
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<tr>
<td>Li-ion</td>
<td>Cool, dry</td>
</tr>
<tr>
<td>Ni-MH</td>
<td>Cool, dry</td>
</tr>
<tr>
<td>NiCd</td>
<td>Cool, dry</td>
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**Service**

- For service, please contact your local distributor or the manufacturer.
- Always use genuine replacement parts when servicing the device.

**Storage**

- The device should be stored in a cool, dry place when not in use.
- Avoid exposing the device to extreme temperatures.

**NOT FOR INTRAVENOUS USE**

- This device is not intended for intravenous use. Only use the device as intended by the manufacturer.
- Always follow the manufacturer's instructions for use.
CLEANING

There are no routine calibration or adjustment procedures required with the Quantum Pump. All servicing or adjustments should be referred to qualified technical personnel (refer to service Manual).

For trouble-free operation, check the pump daily and clean immediately after spills occur.

While cleaning, pump should be turned off and unplugged.

Do not submerge, autoclave, heat, steam, etc. or radiation sterilize the pump.

THE PUMP CAN BE CLEANED AS FOLLOWS:

HOUSING

- Clean outside surface with soft cloth and warm, soapy water.
- For general cleaning, use dishwashing detergent (nonchlorine-based) or isopropyl alcohol.
- For general disinfecting, use 70% concentration isopropyl alcohol.
- For disinfecting after exposure to AIDS or hepatitis, use 10% concentration of 5.29% sodium hypochlorite (household bleach). This solution may discolor the pole clamp. DO NOT SPRAY THIS SOLUTION INTO PUMP CAVITY. After exposure to Tuberculosis, use 70% concentration isopropyl alcohol. These recommendations are not substitutes for official procedures that may differ among institutions.

PUMP CAVITY

To facilitate cleaning, the cassette receptacle door may be disconnected from the face of the pump. However, this should be removed only by a qualified service technician, in the following manner:

- Lift pump back.
- Lift blue lever so cassette door is in open position.
- Push out on door-release tab to release cassette door.
- Allow door to open fully.
- Lift up on door to remove completely from brown hinge.

Reinstall cassette door by following above procedures in reverse order.

- Do not spray water or cleaning solution into pump cavity.
- Clean with a cotton swab, soft brush or soft cloth and warm soapy water.
- Dry thoroughly.
- Be sure no soap film or residue is left in the pump cavity.

PANEL DISPLAYS

Here is a simple explanation of the panel displays. Understanding them is necessary for successful operation of the pump.

FRONT PANEL

PEEDING Display

Pump On?

Light will flash when pump is in N/M mode

BACK PANEL

PoCl Clamp

Ground Test Point

HOSPITAL-GRADE POWER CORD

BOTTOM VIEW

BATTERY ACCESS DOOR
TROUBLE-SHOOTING

The Quantum Enteral Pump is designed to be highly reliable. As with any electro-mechanical device, however, problems may occur. The following tips will help correct minor in-service problems that may arise.

Intermittent audio alarms are accompanied by messages on the front panel indicating the cause of the alarm for all alarm conditions except LOW AUDIO (visual only), which indicates low alarm volume has been selected.

VISUAL DISPLAY OR PROBLEM:  CORRECTIVE ACTION:

OCCLUSION—Flow has stopped.
- Clear obstruction/check for kinked tubing or closed clamps
- Turn dial to RUN to start pump.

EMPTY—Feed or flush bag empty.
- Turn dial to HOLD.
- Refill container(s).
- Turn dial to RUN to start pump.

DOSE COMPLETE—VOL FED A equal to the SET DOSE. Pump stops.
- Turn dial to SET DOSE.
- Press keypad arrows to increase dose OR to zero dose setting OR turn dial to CLEAR VOL.
- To silence alarm, turn dial to HOLD, then RUN.

SET RATE—Dial turned to RUN without entering rate.
- Select flow rate (1 to 300 mL/hr).
- To silence alarm, turn dial to HOLD, then RUN.

TURN TO RUN—Pump dial in setting other than RUN or OFF more than 5 minutes.
- Turn the dial to HOLD or RUN to reset.

DOOR/CASSETTE—Door open, cassette not properly loaded or excess foam or air in cassette.
- Confirm cassette in place and close door.
- Manually reprime to remove foam or air from cassette.
- Replace set.
- If alarm condition persists, pump requires service.

CONTROL DIAL SETTINGS (continued)

<table>
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<tr>
<th>DIAL:</th>
<th>FUNCTION:</th>
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<tr>
<td>HOLD</td>
<td>Stops pumping action and audio alarms. HOLD is used when correcting an alarm condition or whenever temporary cessation of pumping action is desired (such as when connecting a new feeding container). If pump dial is left on HOLD for more than 5 minutes, an alarm will sound and the message TURN TO RUN will be displayed.</td>
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VOL FED
- Stops pumping action. The FEEDING display will show feed volume delivered and the FLUSH display will show flush volume delivered. Pump accumulates feed volume delivered up to 9999 mL and flush volume up to 999 mL unless these volumes are reset to zero by turning to CLEAR VOL (the pump is unplugged while in the OFF [CHARGE] mode). Upon exceeding the maximum feed or flush volume allowed on the display, the value returns to zero and a new accumulation begins.

CLEAR VOL
- Stops pumping action and clears to zero both the feed and flush volume. NOTE: The pump will “ beep” four times before erasing volumes to alert the user that the dial has been turned to CLEAR VOL. The user must turn dial away from CLEAR VOL (to any other setting) before the fourth beep to avoid an unintentional erasure of volume totals. CLEAR VOL does not work while pump is priming.
INSTRUCTIONS FOR USE (continued)

NOTE: Automatic priming expels air from the set, which results in a small amount of fluid being expelled beyond the adapter.

9. Confirm proper placement and function of enteral feeding tube.

10. Attach adapter to enteral feeding tube.

11. Select flow rate, from 1 to 300 ml/hr, by pressing individual arrows. Never use sharp objects such as pens, pencils, fingernails or paper clips to depress the keypad arrows.

12. If desired, turn dial to SET DOSE and select dose by pressing individual arrows.

NOTE: If zero dose is selected (0000), this feature is deactivated.

13. Turn dial to RUN to start feeding.

14. To see feeding volume delivered (and flush volume delivered, if this feature is used), turn dial to VOLL FEED.

15. To clear the feeding and flush volume delivered, turn dial to CLEAR VOL. (This occurs after four hours.)

NOTE: If alarm sounds, turn pump dial to OFF. Correct alarm condition indicated by visual display, then turn pump dial to RUN to restart feeding. (For explanation of alarms, see pages 14-15.)

16. When desired, disconnect pump-set tubing from patient's enteral feeding tube. Close clamp on feeding bag (and flush bag, if used). Lift blue lever on face of pump, remove cassette and discard set and container.

17. When feeding is complete, turn pump dial to OFF.

NOTE: Pump stops and sounds an alarm automatically when the container is empty. If the DOSE function is in use, the pump will stop sound the alarm and display the DOSE COMPLETE message when the selected dosage is reached.

PRECAUTION: The pump set and container should be replaced as needed or at least every 24 hours, to avoid product-contamination problems. For single-patient use only.

PUMP SETS

The Quantum Pump offers a wide choice of feeding sets with either a Pump Set without Flush Bag (single-inlet cassette) or a Pump Set with Flush Bag (dual-inlet cassette).

PUMP SET (without Flush Bag)—Single Inlet Cassette

EXAMPLE SHOWN:

FLEXI-HOLD™ Low-Fill External Nutrition Bag With Pic-Attached Quantum™ Pump Set

PUMPING CHAMBER

SINGLE INLET CASSETTE

INFORMATION REMINDER WHEN USING A PUMP SET (without Flush Bag):

* FLUSH display will be blank when a single-inlet cassette is used.