ARROW

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AC3 Optimus IABP

With FiberOptix Sensor Technology

Product Specifications

Design

- Fiber optic capability
- Proprietary WAVE Algorithm
- AutoPilot Mode of operation
- Microprocessor-based system architecture
- Modular system consisting of display/control module and pneumatic drive unit
- Proprietary Deflation Timing Management

Electrical

- AC requirements:
  - 90 – 264 VAC 47 – 63 Hz
- Typical power consumption: 3.7 Amp at 110 VAC and 2.1 Amp 220 VAC
- Maximum power consumption: 5.1 Amp at 100 VAC and 2.8 Amp at 220 VAC
- Battery operating time:
  - 90 minutes minimum with full charge
  - 180 minutes with optional second battery
- Typical battery recharging time:
  - 80% in 4 hours from full discharge
  - Recharge to 80% indicated by yellow light

Mechanical Dimensions

- Control module with monitor:
  - 10.25" high x 14.5" wide x 2.0" deep (26 cm x 36.8 cm x 5.0 cm)
- Pneumatic drive unit:
  - 33.3" high x 13.0" wide x 24.5" deep (84.6 cm x 33 cm x 62.2 cm)

Mechanical Weight

- Control module:
  - 6 lbs (2.7 kg)
- Pneumatic unit AC3 Optimus IABP:
  - 98 lbs (44.5 kg)
- Total weight for AC3 Optimus IABP:
  - 104 lbs (47.2 kg)

Pneumatics

- Drive system: Stepper motor-driven bellows
- Drive gas: USP-grade helium
- Helium tank:
  - Disposable canister (500 psi) or refillable (2000 psi) cylinder—U.S. approval; (2900 psi) cylinder—European approval
- Pumping volume:
  - 0.5 cc to 50 cc, adjustable in 0.5 cc increments
- Counterpulsation rate: 40 to 200 pulsations/minute
- Assist ratio options

Condensation Removal

- Thermoelectric system removes moisture continuously from pneumatic system without interrupting counterpulsation

System Modes

- AutoPilot Mode:
  - Automatically selects ECG/AP signal, sources, trigger mode, and timing method as well as timing settings
  - Automatically changes settings to optimise assist
  - Proprietary software sets timing to correspond to individual patient needs
- Operator:
  - Allows user control of most pump functions

Trigger Modes

- ECG (PATTERN, PEAK, AFIB):
  - Microprocessor-based R-waveform trigger detection algorithms
- Pacer (VPACE, APACE):
  - Low level (skin) ECG input
    - Pulse width ➔ 0.1 to 0.5 ms and pulse amplitude ➔ +5 to +700 mV
    - Pulse width ➔ 0.5 to 2 ms and pulse amplitude ➔ +2 to +700 mV
  - High-level (monitor) input
    - Pulse width 0.1 to 2 ms and pulse amplitude ➔ 1 V
    - AV pacer detection is <250 msec between pacer pulses
- Arterial pressure (AP):
  - Microprocessor-based waveform trigger detection algorithm
- Internal:
  - Default to 80 bpm; adjustable 40 to 120 bpm
- Filtering:
  - Diathermy, 30 Hz low pass

General Trigger Selection Criteria (AutoPilot Mode)

ECG TRIGGER MODES	
PATTERN	HR <130 bpm, no arrhythmia
PEAK	HR >130 bpm or arrhythmia detected and arrhythmia timing off*
AFIB	Any HR with arrhythmia detected*
VPACE	Single or dual pacer (<250 msec apart) and no QRS or AP waveform detected
APACE	Single pacer with R-wave >100 msec later transition only

*Based upon Deflation Timing Management

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AP Trigger Mode:

- No ECG signal or noisy ECG signal

Inflation/Deflation Timing Methods

INFLATION TIMING METHODS	
Aortic Flow	Proprietary WAVE Algorithm sets the timing intra-beat within +/- 12 msec of aortic valve closure[1]
Predictive	AP waveform analysis to set inflation
Weissler	ECG only, inflation timing based on systolic time intervals
DEFLATION TIMING METHODS:	
R-wave	Real-time deflation on R-wave
Predictive	Deflation set to occur just prior to next systolic rise
Weissler	ECG only, deflation timing based on diastolic intervals
MANUAL	
	User set inflation and deflation timing in Operator Mode

Inflation/Deflation Timing Limits (Operator Mode)

OPERATOR MODE	
ECG	Inflation, 20% – 80% of R-R interval Deflation, 30% – 120% of R-R interval
AP	Inflation, 0 – 35% of peak systole-peak systole interval Deflation, 35% – 75% of peak systole-peak systole interval
AFIB Trigger	Inflation 80 to 430 ms after R-wave trigger event
Mode	Deflation on R-wave

Display

- Type: Colour, high-resolution LCD (Liquid Crystal Display) touchscreen (1208 x 800) 13.3 inch diagonal
- Touchscreen: Glass-film-glass (GFG), resistive 5-wire (finger, gloved finger, stylus)
- Sweep speed: 25 msec (+/-1%)
- Channels: 3-channel multicolour waveforms
  - ECG: Green trace with white highlight on assisted portion
  - AP: Red trace calibrated for direct reading of AP, white highlight on assisted portions when in Operator Mode
  - Balloon pressure: Blue trace calibrated in mmHg and displayed continuously
- Timing reference display: Numerical timing settings in both operating modes
- Cursor: Measurement of AP and balloon pressure waveforms

Alphanumeric Data

- Patient haemodynamics: Heart rate, AP – systolic, augmented, diastolic, and mean arterial. When in 1:2 or lower assist ratio the assisted values are displayed in white, and the unassisted values are displayed in yellow
- Displayed parameters: ECG source and gain state, alarm status with timer, on battery indication, operation mode selection, AP zero status with date and time of last zero for each AP source, AP alarm parameter and limit, timing settings, helium tank level, arrhythmia detection, and timing status
- Operations status: Operational mode, trigger mode, AP zero status with date and time of last zero for each AP source, AP alarm/battery charge status, balloon volume, battery charge icon and status, and zeros status icon
- Diagnostic alarm/help messages: Preprogrammed troubleshooting prompts/help
- Alarm history: Displays and prints the last 100 alarms with time/date
- IABP therapy report: Displays and prints patient haemodynamic data and IABP therapy related settings

Strip Chart Recorder

- Recorder: Dual-channel dot matrix: Dot density 400 dots/inch, 25 mm/s. Selectable recording length: 10, 15, 20, and 30 seconds. Automatic timed prints from 2, 15, 30, and 60 minutes and 2 or 4-hour intervals
- Waveforms: ECG, AP, or balloon pressure (one or two recorded)
- Alphanumeric: Operational mode, trigger mode, ECG lead/source, AP source, AP alarm status, timing settings, assist ratio, balloon volume, timing method, arrhythmia status, alarm condition, date, time, patient haemodynamics. Formatted prints: Alarm log, IABP therapy report, IABP pump status

Display Freeze

- Freezes approximately 7 seconds of patient data on screen

Patient Signal Inputs

- ECG: 5-lead skin cable (I, II, III, aVR, aVL, aVF, and V) high-level monitor input (0 to 5 V)
- AP: Fiber optic signal input from fiber optic IAB catheter (WAVE AP) transducer (spectramed or equivalent), 50 mV/V/cmHg high-level monitor input (1 V = 100 mmHg)

Ordering Information

ORDER NO.	DESCRIPTION
IAP-0700, IAP-0701	AC3 Optimus IABP 1 (IABP) system includes:
	FiberOptix Sensor Technology
	WAVE Algorithm: Physiologically based proprietary timing algorithm
	Aortic flow timing method
	AutoPilot Mode of operation

Note: Additional system specifications are available upon request.

Reference:

1. Schreuder J, Maisano F, Donelli A, et al. Beat-to-beat effects of intra-aortic balloon pump timing on left ventricular performance in patients with low ejection fraction. *Ann Thorac Surg.* 2005;79(3):872-880. Study sponsored by Teleflex.

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