

# AutoCAT 2 WAVE®

WITH FIBEROPTIX® SENSOR TECHNOLOGY

## PRODUCT SPECIFICATIONS

### DESIGN

- FiberOptix® capability:
  - AP signal transmitted at speed of light
- Proprietary WAVE® algorithm
- Proprietary Aortic Flow Timing Method
- 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: 245 watts
- Maximum power consumption: 420 watts
- 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" high (25.4 cm) x 13.75" wide (35 cm) x 2" deep (5 cm)
- Pneumatic drive unit:
  - 31.5" high (80 cm) x 13.5" wide (34.3 cm) x 21" deep (53.3 cm)

### MECHANICAL WEIGHT

- Control module:
  - 5 lbs (2.3 kg)
- Pneumatic unit for AutoCAT 2 WAVE®:
  - 95.5 lbs (42.4 kg)
- Total weight for AutoCAT 2 WAVE:
  - 100.5 lbs (44.7 kg)
- Total weight for AERO® Series:
  - 91.5 lbs (40.7 kg)

### PNEUMATICS

- Drive system: Stepper motor-driven bellows
- Drive gas: USP-grade helium
- Helium tank:
  - Disposable canister (500 psi) or refillable (2000 psi) cylinder—US Approval; (2900 psi) cylinder—European Approval
- Pumping volume:
  - 0.5cc to 50cc, adjustable in 0.5cc 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:
  - Automatically selects ECG/AP signal, sources, trigger mode, and timing method as well as timing settings
  - Automatically changes settings to optimize 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

#### AP TRIGGER MODE:

- No ECG signal or noisy ECG signal

\*Based upon deflation timing management.

## INFLATION/DEFLATION TIMING METHODS

### INFLATION TIMING METHODS:

- **Aortic Flow:** Proprietary WAVE algorithm sets the timing intra-beat on average 12 ms of aortic valve closure<sup>1</sup>
- **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)

- **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:** Color LCD flat screen
- **Channels:** Three-channel multicolor 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 mm Hg and displayed continuously
- **Timing reference display:** Numerical timing settings in both operating modes as well as a bar graph displaying inflate/deflate events in Operator Mode
- **Cursor:** Measurement of AP and balloon pressure waveforms

## ALPHANUMERIC DATA

- **Patient hemodynamics:** 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 alarm parameter and limit, timing settings, helium tank level, arrhythmia detection, and timing status
- **Operations status:** Operational mode, trigger mode, helium tank gauge, alarm/battery charge status, balloon volume
- **Diagnostic alarm/help messages:** Preprogrammed troubleshooting prompts/help

## STRIP CHART RECORDER

- **Recorder:** Dual-channel dot matrix: Dot density 400 dots/inch, 25 mm/s
- **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 hemodynamics

## 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 FiberOptix IAB Catheter (WAVE)  
AP transducer (Spectramed or equivalent), 50 mV/V/cm Hg  
High-level monitor input (1 V = 100 mm Hg)

## ORDERING INFORMATION

ORDER NO.	DESCRIPTION
IAP-0500	<b>AutoCAT 2 WAVE</b> 1 (IABP) System includes: <ul style="list-style-type: none"><li>FiberOptix Sensor Technology</li><li>WAVE algorithm: Physiologically based, proprietary timing algorithm</li><li>Aortic flow timing method</li><li>AutoPilot mode of operation</li></ul>
IAP-0535	<b>AERO Series–AutoCAT 2 WAVE</b>

The products above are also available in multiple languages. Contact Arrow for availability.

Note: Additional system specifications are available from Arrow upon request. Specifications are subject to change without notice. Caution: U.S. Federal law limits this device to sale by or on order of a physician.

**REFERENCE:** <sup>1</sup>Schreuder JJ, Castiglioni A, Donelli A, et al. Automatic intraaortic balloon pump timing using an intrabeat dicrotic notch prediction algorithm. *Ann Thorac Surg.* 2005;79:1017-1022.

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