



Puritan Bennett 840™ Ventilator System

Innovative technology, breathtaking performance



The Puritan Bennett 840 Plus ventilator is the flagship product in our line of critical care ventilators. It is highly responsive and offers superior comfort, delivering sensitive, precise breaths to critically ill neonatal through adult patients.

Covidien offers one of the most comprehensive field service programs in the ventilator industry, providing the highest quality service to customers.

Technological Sophistication—The Puritan Bennett 840 Plus ventilator offers high-performance pneumatics, dual microprocessor electronics and DualView™ touchscreens.

Upgradeable—The Puritan Bennett 840 ventilator system can be upgraded and customized to meet your clinical needs, today and in the future.

Low Cost of Ownership—The Puritan Bennett 840 ventilator system is designed with rugged and reliable components. Its modular design provides easy serviceability.

Puritan Bennett 840 Ventilator System

Ventilator performance

Ideal body weight (IBW): 7.7 to 330.7lb (3.5 to 149kg), 1.1 to 330.7lb (0.5 to 149kg) with NeoMode™ Option

Modes: Assist/Control (A/C), synchronous intermittent mandatory ventilation (SIMV), or spontaneous (SPONT), BiLevel™, Volume Ventilation PLUS™ (Volume Control Plus™ and Volume Support™), Tube Compensation. Proportional Assist™ Ventilation Plus (PAV™+) software and NeoMode software option.

Mandatory breath types: Volume Control (VC), pressure control (PC) or Volume Control Plus with Volume Ventilation Plus.

Spontaneous breath types: Pressure supported (PS), Volume supported (VS), Proportional Assist (PA), none or Tube Compensation.

Vent type: INVASIVE or NIV

Pressure support (P_{SUPP}): 0 to 70cm H₂O

Rise time %: 1% to 100%

Expiratory sensitivity (E_{SENS}): 1% to 80%; 1l/mn to 10l/mn with PAV+

Tidal volume (V_T): 25 to 2500ml, 5 to 315ml with NeoMode option

Respiratory rate (f): 1 to 100/min, 1 to 150/min with NeoMode option

Peak Inspiratory Flow (V_{MAX}): 3 to 150l/min for IBW > 24kg; 3 to 60l/min for IBW ≤ 24kg, 1 to 30l/min with NeoMode option

Flow pattern: Square or descending ramp

Plateau time (T_{PL}): 0.0 to 2.0 seconds

Inspiratory pressure (P_I): 5 to 90cm H₂O

Constant during rate change: Inspiratory time (T_I), I:E ratio or expiratory time (T_E)

Inspiratory time: 0.2 to 8.0 seconds

I:E ratio: ≤ 1:299-4.00:1

Expiratory time (T_E): T_E ≥ 0.2 second

Trigger type: Pressure (P_{TRIG}) or flow V_{TRIG} Flow-by™ flow triggering)

Pressure sensitivity (P_{SENS}): 0.1 to 20cm H₂O below PEEP

Flow sensitivity (V_{SENS}): 0.2 to 20l/min, 0.1 to 10l/min with NeoMode

O₂%: 21% to 100%

PEEP: 0 to 45cm H₂O

Apnea ventilation: Apnea mandatory type-volume control (VC) or pressure control (PC)

Apnea flow pattern: Square or descending ramp

Apnea peak flow (V_{MAX}): 3 to 150l/min for IBW > 24 kg; 3 to 60l/min for IBW ≤ 24kg

Apnea inspiratory pressure (P_I): 5 to 90cm H₂O

Apnea inspiratory time (T_I): 0.2 to 8.0 seconds

Apnea interval (T_A): 10 to 60 seconds

Apnea respiratory rate (f): 2.0 to 40/min

Apnea O₂%: 21% to 100%

Apnea I:E ratio: ≤ 1.00:1

Apnea expiratory time (T_E): ≥ 0.2 second

Disconnect sensitivity (D_{SENS}): 20% to 95% or OFF in NIV

Humidification type: Heat moisture exchanger (HME), nonheated expiratory tube or heated expiratory tube

Humidification volume: 100 to 1000ml

Patient circuit type: Pediatric, adult or neonate with NeoMode option

SmartAlert™ alarm system (limits)

High circuit pressure (P_{CIRC}): 7 to 100cm H₂O

High exhaled minute volume (V_{E TOT}): 0.1 to 99.9l or OFF

High exhaled tidal volume (V_{TE}): 50 to 3000ml or Off, 5 to 300ml or OFF with NeoMode option

High respiratory rate (f_{TOT}): 10 to 110/min or OFF

High inspired mandatory tidal volume (V_{TI MAND}):

Low exhaled mandatory tidal volume (V_{TE MAND}): 5 to 2500ml or OFF, 1 to 300ml or OFF with NeoMode option

Low exhaled minute volume (V_{E TOT}): 0.05 to 60.0l, 0.01 to 10.0l or OFF with NeoMode option

Low exhaled spontaneous tidal volume (V_{TE SPONT}): 5 to 2500ml or OFF, 1 to 300ml or OFF with NeoMode option

Low inspiratory pressure (P_{PEAK}) (with VC+ and NIV)

Monitored Data

Breath type: indicates the type (control, assist or spontaneous) and phase (inspiration or exhalation) of the breath being delivered

Delivered O₂%

End expiratory pressure (PEEP)

End inspiratory pressure (P_{I END})

Exhaled minute volume (V_{E TOT})

Exhaled tidal volume (V_{TE})

Inspired tidal volume (V_{TI}) (with NIV only)

Mandatory inspired tidal volume (V_{TI MAND}) (with VC+ only)

I:E ratio

Maximum circuit pressure (P_{PEAK})

Mean circuit pressure (P_{MEAN})

Spontaneous minute volume (V_{E SPONT})

Total respiratory rate (f_{TOT})

Rapid shallow breathing index (f/V_T)

Spontaneous inspiratory time (T_{I SPONT})

T_I/T_{TOT} ratio

Typical compliance (C_{PAV}) (with PAV+ only)

Inverse of compliance in cm/l (E_{PAV}) (with PAV+ only)

Dynamic display of intrinsic PEEP (PEEP_I) (with PAV+ only)

Patient resistance (Total-Airway) (R_{PAV}) (with PAV+ only)

Patient + artificial airway (R_{TOT}) (with PAV+ only)

Inspired spont tidal volume (V_{TI SPONT}) (with PAV+ only)

Normalized f/V_T to IBW (f/V_T/kg) (with PAV+ only)

Work of breathing by patient (Joules/l) (WOB_{PT}) (with PAV+ only)

Total work of breathing (WOB_{TOT}) (with PAV+ only)

Negative Inspiratory Force (NIF)

P_{0.1} or Occlusion Pressure (P100)

Vital Capacity (VC)

Dynamic Compliance (C_{DYN})

Dynamic resistance (R_{DYN})

Peak Expiratory Flow (PEF)

End Expiratory Flow (EEF)

Peak spontaneous (PSF)

Trending Function:

53 parameters monitored over a 72 hr period

7 Clinical Scenario Presets

15 Manual event markers

Automatic event markers

3 graph display, 360 rows of tabular data

Fast cursor to allow fine analysis

Integral waveforms function includes choice of:

- Pressure-time curve, flow-time curve, volume-time curve, or pressure-volume loop (one or two waveform curves or one pressure-volume loop can be displayed at the same time). Pressure-volume loop automatically calculates inspiratory area. All waveforms can be frozen.
- Adjustable baseline and vertical/horizontal axis scales.
- Waveforms are automatically displayed and frozen when you press INSP PAUSE or EXP PAUSE. In INSP PAUSE, the Plateau Pressure, the calculated values for compliance and, when possible, resistance, are displayed after the inspiratory pause. In EXP PAUSE, the measured values for intrinsic and total PEEP are displayed during and after the expiratory pause.

Ventilator Status Indicators

High-urgency alarm: blinking if active, steadily lit if autoreset

Medium-urgency alarm: blinking if active, turns off if autoreset

Low-urgency alarm: steadily lit if active, turns off if autoreset

Normal operation

Normal breath delivery unit operation

Ventilator inoperative

Normal graphic user interface operation

Loops of graphic user interface

Safety valve open

Backup Power Source (BPS) ready

Ventilator operating on BPS

BPS charged/BPS charging

Compressor ready

Compressor supplying air to the ventilator

Other keys and Indicators

Screen lock key: when lit, touching the screen or offscreen controls has no effect until you press screen lock again. New alarms automatically unlock the screen and controls.

Alarm volume key: adjusts alarm volume (alarm volume cannot be turned off)

Alarm silence key: silence alarm sounds for minutes

Alarm reset key: clears active alarms or autoresets high-urgency alarms, cancels an active alarm silence, and is recorded in the alarm log

? key: displays basic operating information about the ventilator

100%O₂/ CAL 2 min key: delivers 100% oxygen (if available) for 2 minutes and calibrates the oxygen sensor

MANUAL INSP key: delivers one manual breath to the patient according to the current mandatory settings

EXP PAUSE key: Allows you to measure auto-PEEP (not functional in SPONT, and has no effect during the inspiratory phase of breath)

INSP PAUSE key: allows you to perform static mechanics maneuvers

Knob: adjusts the value of a setting. A button that is highlighted means that the knob is linked to that setting

CLEAR key: cancels a proposed setting

ACCEPT key: applies proposed settings

Warranty

One year parts and labour

Environmental Specifications

Pneumatic Gas Sources

Air and oxygen: must be supplied at 35-100 psi (241-690 kPa)

Temperature

Operating: 50°F to 104°F (10°C to 40°C) at 10% to 95% relative humidity, noncondensing

Storage: -4°F to 122°F (-20°C to 50°C) at 10% to 95% relative humidity, noncondensing

Atmospheric pressure

Operating: 10.2 to 15.4 psi (700 to 1060 hPa)

Storage: 7.3 to 15.4 psi (500 to 1060 hPa)

Altitude

Operating: -1350ft to 10 000ft (-443m to 3280m)

Storage: up to 20000ft (up to 6560m)

Physical Characteristics

Weight

Breath delivery unit (BDU): 40.1lb (18.2kg)

Graphic user interface (GUI): 12.6lb (5.7kg)

Backup power source (BPS) : 14.6lb (6.6kg)

Cart: 34.2lb (15.5kg)

Compressor: 55lb (55kg)

Dimensions

BDU: 13" H x 18" W x 10" D (330mm H x 457mm W x 254mm D)

GUI: 18.1" H x 15.5" W x 6.7" D (460mm H x 394mm W x 170mm D)

BPS: 3.25" H x 9.6" W x 10" D (83mm H x 244mm W x 254mm D)

Cart: 39.3" H x 22.9" W x 23.7" D (998mm H x 582mm W x 602mm D)

Compressor: 16.4" H x 18" W x 14.25" D (417mm H x 458mm W x 362mm D)

Connectors/Communications

Inspiratory limb connector: ISO 22-mm conical male

Expiratory limb connector (on expiratory filter): ISO 22-mm conical male

Air and oxygen inlets: DISS

Oxygen sensor life: two years or 10000 hours of use, nominal (actual life depends on operating environment; operation at higher temperature or FIO₂ levels will result in shorter sensor life)

Three RS232 (number 1 can be configured for printer)

Nurse call outlet

Gas mixing system

Range of flow from the mixing system: can be set to 150l/min standard temperature and pressure, dry (STPD) for patients >24kg and up to 60l/min for patients ≤24kg. Additional flow is available up to 200l/min for compliance compensation.

Leakage from one gas system to another:

Meet standard EN 794-1

Operating pressure range: 35 to 100 psi (241 to 690 kPa)

Alarm volume

Approximately 45 db(A) to 85 db(A)

Compliance and Approvals

The 840 Ventilator System was developed in accordance with pertinent FDA guidances, and North American and International standards.

The ventilator's IEC 60601-1:1998 Clause 5 classification is Protection Class I, Type B Applied Part, mains internally powered, drip-proof (IPX1) equipment, continuous operation.

The ventilator meets all requirements for Electromagnetic Compatibility (EMC) under the IEC 60601-1-2 standard including CISPR 11, Group I, Class B.

Authorized to bear the Canadian Standards Association (CSA) certification mark with NRTL/C indicator, signifying the product has been evaluated to the applicable Underwriters Laboratories Inc. (UL) and CSA standards, for use in the US and Canada.

Certified by CSA to the following North American standards (120V unit):

CSA C22.2 No. 601.1 M90 + 2003 update

CAN/CSA-C22.2 No. 601.2.12-94

UL 2601-1 2nd edition

Certified by CSA to the following International standards and requirements under the CB scheme:

IEC 60601-1:1988 + A1 + A12

IEC 60601-2-12:1988

Power

Input power

Ventilator operation without compressor and with Fisher and Paykel MR850 Humidifier : 200V AC, 50HZ; 2.2A

Ventilator operation with compressor and with Fisher and Paykel MR850 Humidifier : 200V AC, 50HZ; 5A

Main overcurrent release

Ventilator: 5A

Auxiliary mains: 10A

NOTE: above values obtained using the following ventilator settings at 72°F (22°C) ambient temperature; mode, A/C; mandatory type, PC; IBW, 85kg; f, 20/min; P_{SUPP}, 30 cm H₂O; TI, 1 second; flow acceleration %, 50%; O₂%, 50%; P_{CIRC MAX}, 50cm H₂O; P_{SENS}, 3cm H₂O.

Leakage current:

Earth leakage current: 200V AC operation: 300µA max

Enclosure/patient leakage current: 100µA max; 100µA max

Humidifier leakage current: 200 to 240V AC operation: 50µA max

802 Backup Power Source (BPS) : 24V DC, 6.5Ah

Operating time (for a new, fully charged battery): at least 60 minutes (actual duration depends on ventilator settings, battery age and level of battery charge)

Recharge time: automatically recharges within 8 hours maximum while is connected to AC power

Shelf life: 24 months from date of manufacture

Storage conditions: store at -4°F to 122°F (-20°C to 50°C), 25% to 85% humidity, avoid direct sunlight

Recharge requirements: recharge every 6 months when storage temperature is 5°F to 84°F (-15°C to 29°C), every 3 months when storage temperature is 86°F to 104°F (30°C to 40°C), every 2 months when storage temperature is 105°F to 122°F (41°C to 50°C)

NOTE: BPS battery life specifications are approximate. To ensure maximum battery life, maintain full charge and minimize the number of complete discharges.

Ordering Information

Standard Accessories	Catalog Number
Flex arm assembly	4-032006-00
• Inspiratory bacteria filter	
Disposable filter (D/Flex™, carton of 12)	4-074601-00
• Expiratory bacteria filter and collector vial	
Disposable filter (D/X800™, carton of 12)	4-076887-00
Test hose	4-018506-00
Test lung	4-000612-00
802 Backup power source (BPS)	4-070520-SP
Oxygen hose assembly	**
Power cord (European)	4-078108-SP
Power cord (UK)	4-078144-00
• Operator's and technical reference manual	
International English	4-070088-00
Upgrade Kits	
PAV™+ Upgrade Kit, International English	4-078204-00
Trends Upgrade Kit, International English	10020407
Respiratory Mechanics Upgrade Kit, International English	10019217
BiLevel™ Upgrade Kit, International English	4-076270-00
Tube Compensation Upgrade Kit, International English	4-076370-00
Volume Ventilation Plus™ Upgrade Kit, International English	4-078128-00
Neomode™ Upgrade Kit, International English	4-076440-00
Optional Accessories	
• Inspiratory bacteria filter	
Reusable filter (Re/Flex™ each)	4-074600-00
Covidien provides a whole range of disposable inspiratory filters	**
Dar Sterivent™ mechanical filter	351/5856
• NeoMode filter and adapter	
NeoMode disposable filter (carton of 12)	4-076408-00
NeoMode filter adapter	4-076405-00
• Expiratory bacteria filter and collector vial	
Reusable filter (Re/X800™, each)	4-070305-00
Reusable collector vial (Re/X800™, each)	4-074647-00
Drain bag, disposable (package of 25)	4-048491-00
Drain bag tubing, disposable (package of 10)	4-048493-00
Clamp, reusable (package of 5)	4-048492-00
Drain cap	4-070311-00
Seal, expiratory filter	4-074613-00
• Maintenance	
Service manual, English	4-070496-00
Oxygen sensor*	4-072214-00
Battery replacement kit	4-070523-SP
10,000-hour preventive maintenance kit*, BDU/GUI	4-078179-00
10,000-hour preventive maintenance kit*, compressor	**
Filter, compressor inlet	4-074374-00
Wall air water trap kit	4-076371-00
• Nebuliser	
Aeroneb™ Pro Nebulizer (Specify UK/International)	AG-AP6000-IN or AG-AP6000-UK
Aeroneb Solo Nebulizer Starter Kit (Specify UK/International)	AG-AS3000-IN or AG-AS3000-UK
• Active Humidification	
Aerodyne 2000™ (UK) active humidifier	200001
Aerodyne 2000 (International) active humidifier	200006
Mounting kit for Aerodyne 2000 active humidifier	58531
F&P MR 410 humidifier	**
F&P MR 850 humidifier	**
Mounting kit for Fisher & Paykel 410/480/730/850 humidifiers	4-075313-00
• Passive Humidification	
Covidien provides a whole range of HME and HME/filter combined	**
Dar Hygroster™ FHME	354/5876
Dar Hygrobac S™ FHME	352/5877
Dar Hygrobac™ FHME	352/5805
Dar Hygroster™ Mini FHME	354519028
• Patient breathing circuits and accessories	
Covidien provides a whole range of Single Use and Reusable Circuits compatible with passive and active humidification (with and without heated wire), accessories as catheter mounts, filters, HMEF, Y pieces, connectors, Closed Suction Systems and a complete range of Endotracheal and Tracheostomy tubes.	**
Covidien will also help you prevent Ventilation Associated Pneumonia with a complete solution	**

™* Trademark of AeroGen, Inc.
 * Oxygen sensor to be replaced every 2 years or as necessary by a qualified service technician. Preventive maintenance kits must be installed by a qualified service technician.

**For specific part numbers, call your local Covidien Puritan Bennett sales representative

Specifications subject to change without notice

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C-VE-840+Vent/GB



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