

PATIENT SETUP QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

NEW PATIENT COMPLETE SETUP†

To set up a new patient:

- Open the **wye connector of the breathing circuit** (the ventilator has a patient detection system).
- Power the ventilator on.
- Touch the **New Patient** button (Figure 1).
- Select gender and height, or predicted body weight. Once selected, use the knob to adjust (Figure 2).
- Select **Ventilation Type**.
- Select **Mode**.
- Select **Mandatory and/or Spontaneous Type**.
- Select **Trigger Type**.
- Select and set **Primary Settings** (Figure 3).
 - Rate
 - Tidal Volume
 - Pressure
 - %O₂
 - PEEP
- Touch **Start** when done.

SAME PATIENT SETUP†

To set up using Same Patient:

- Open the **wye connector of the breathing circuit** (the ventilator has a patient detection system).
- Power the ventilator on.
- Touch the **Same Patient** button (Figure 1).
- Touch **Start** (Figure 3).

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Figure 1



Figure 2



Figure 3

QUICK START†

This feature uses default values or institutionally configured breath delivery settings to ventilate the patient after predicted body weight (PBW), or gender and height, has been entered.

- Open the **wye connector of the breathing circuit** (the ventilator has a patient detection system).
- Power the ventilator on.
- Touch the **New Patient** button.
- Enter PBW, or gender and height.
- Touch **Quick START** (Figure 4).

SHORT SELF TEST (SST)

This test checks circuit integrity, calculates circuit compliance and filter resistance, and checks ventilator breath delivery hardware function (including pressure and flow sensors).

To run a Short Self Test:

- Enter through the first power-up screen (Figure 1).
- Select **SST**.
- Select **Run All SST** (Figure 5).
- Choose:
 - Circuit Type: Adult, Pediatric, or Neonatal (Figure 6)
 - Humidifier Type
 - Humidifier Volume
 - Follow the prompts to completion.
- Touch **Accept**.

Note: Adult/Pediatric ventilators have a specific exhalation filter and door. Neonatal ventilators have a specific exhalation filter and door.

† Short Self Test (SST) shall be conducted in accordance to instructions in the Operator's Manual.

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[medtronic.co.uk/rms](https://www.medtronic.co.uk/rms)



Figure 4



Figure 5



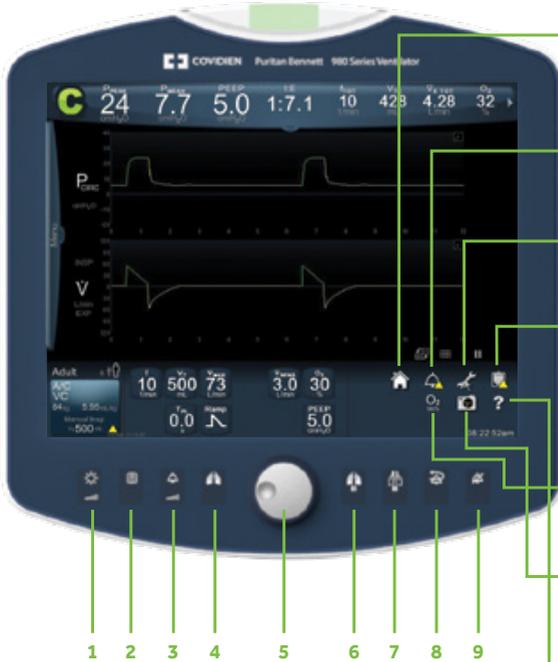
Figure 6

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TOUCH SCREEN QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

Finding your way around and how to use the touch screen



ICONS

Home

Touch this icon to close all open dialogs on the touch screen and return to the main screen (displayed here).

Alarm

Touch this icon to display the alarm settings screen.

Configure

Touch this icon to display the configure screen.

Logs

Touch this icon to display the logs screen, which contains tabs for Alarms, Settings, Patient Data, Diagnostics, EST/SST status, General Event, and Service logs.

Elevate O₂

Touch this icon to configure and increase the oxygen concentration for 2 minutes.

Screen Capture

Touch this icon to capture and store the image displayed on the touch screen.

Help

Drag this icon to the item in question and release. A tooltip will appear describing the item's function.

BEZEL KEYS

1. Display brightness key
2. Display lock key
3. Alarm volume key
4. Manual inspiration key
5. Rotary encoder (knob)
6. Inspiratory pause key
7. Expiratory pause key
8. Alarm reset key
9. Audio pause key

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HOW TO USE THE TOUCH SCREEN

Action	Used for	How to use
Swiping	Opening or closing dialogs or panels, moving waveform data, expanding or collapsing tooltips, scrolling lists, or alarm banners	Swipe toward the center of the screen to open dialogs or panels. Swipe toward the side of the screen (or upward if viewing the additional patient data or large-font patient data panels) to close. A downward swipe anywhere in the patient data area opens the additional patient data panel, and another swipe on the additional patient data tab displays the large-font patient data panel.
Touch and hold	Displaying a tooltip dialog on whatever item is touched; the tooltip appears to glow indicating the touch and hold action	Touch an item and hold for at least 0.5 seconds.
Double touch	Maximizing or minimizing the viewable area of a dialog, control, or waveform, expanding or collapsing tooltips	Double-tapping maximizes the viewable waveform area. Double-tapping again minimizes the viewable waveform area.
Drag	Gaining information about a particular screen parameter	Drag the help icon, located at the lower right of the touch screen, to the item in question and drop. If a blue glow appears, a tooltip is available.
Sweep	Changing x- and y-axis scales, moving the waveform cursor, moving scroll-bars, scrolling lists; scrolling speed varies depending upon how far outside the list boundary the finger is positioned	Touch the axis and drag to the right to increase the waveform x-axis scale, and to the left to decrease. Use similar motions with the y-axis but drag up and down. To move the cursor (when the waveform is paused), touch the cursor and drag it right or left.

LEAK SYNC SOFTWARE QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

WHAT'S NEW

Puritan Bennett™ Leak Compensation now works with VC+ and VS and is called Leak Sync software on the Puritan Bennett™ 980 ventilator.

KEY FEATURES

Puritan Bennett™ Leak Sync software automatically detects and compensates for leaks in the breathing circuit. This unique software is designed to differentiate between flow due to leaks and flow due to patient respiratory effort and then to adjust quickly.

LEAK SYNC SOFTWARE

- Leak Sync software can be used with invasive and noninvasive ventilation.
- Maximum leak compensation flow:
 - Neo 15 L/min
 - Ped 40 L/min
 - Adult 65 L/min
- Leak Sync software is automatically enabled when the ventilator type is NIV or if New Patient is selected and the circuit type is Neonate.
- When the Leak Sync software is active, **LS** is displayed in the lower left-hand screen in the vent setup button.

INITIAL SETUP

- Touch the **Vent Setup** button (lower left) (Figure 2).
- Touch **More Settings**.
- Select Enabled or **Disabled** for Leak Sync.
- Touch **Accept All**.
- Leak Sync software typically adjusts for a leak present within three breaths.

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Figure 1



Figure 2

VALUES DISPLAYED

When Puritan Bennett™ Leak Sync software is enabled the following values will be displayed in the patient data cells.

- An “L” will be present after a measured volume parameters
- V_{LEAK}
Inspiratory leak volume, the total volume delivered during inspiration to compensate for the leak.
- %LEAK
Percent leak, the percentage of total delivered volume during inspiration attributed to the leak over total delivered inspiratory volume.
- V_{TL}
The volume inspired for each breath when Leak Sync is enabled.
- LEAK
Exhalation leak, the leak rate during exhalation at PEEP (Figure 3).

KEY ALARMS

D_{SENS} displays L/min instead of % when the Leak Sync software is enabled (Figures 4 and 5).



Figure 3



Figure 4



Figure 5

PAV™+ SOFTWARE QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

KEY FEATURES

The PAV™+ software provides ventilatory support proportional to the patient's inspiratory effort, letting the patient direct the duration and depth of each breath, enabling:

- Variable flow
- Variable volume
- Pressure delivery proportional to patient demand

KEY VARIABLES

The PAV™+ software uses these key variables to determine patient need (Figure 1):

Flow, Volume, Compliance, Resistance and %Support

INTENDED FOR PATIENTS WITH

- Intact respiratory drive
- Predicted body weight (PBW) 25 kg or greater
- Tube ID 6.0 or greater without circuit or artificial airway leaks

TO SET UP PAV™+ SOFTWARE

(See Figure 2)

- At the ventilator setup screen, enter the patient's gender and height or predicted body weight (PBW).
- Select **Invasive** vent type.
- Select **SPONT** mode.
- Select **PAV+** to select Spontaneous type.
- Select the desired trigger type (P-TRIG, V-TRIG).
- Select the %Support.
- Select tube type.
- Select the tube ID. Initially, a default value is shown based on the PBW entered at ventilator startup.
If this tube ID is not correct for the airway in use, turn the knob to adjust the tube ID setting.
- Touch **Start**.



Figure 1



Figure 2

PAV™+ MONITORING

Graphics screen (Figure 3)

The PAV+ screen will display: WOB_{PT} , WOB_{TOT} , C_{PAV} , R_{PAV} , PEEP_i

Data screen displays available:

- PAV+-based lung compliance (C_{PAV})
- PAV+-based lung elastance (E_{PAV})
- PAV+-based respiratory resistance (R_{PAV})
- PAV+- based total airway resistance (R_{TOT})

HOW TO CALCULATE $P_{MUS,PEAK}$ AND ADJUST % SUPPORT ON THE BASIS OF $P_{MUS,PEAK}$

Authors of the Carteaux study suggest using a simple algorithm to adjust the %Support during PAV™+ mode in order to target a reasonable and predefined range of respiratory muscle pressure.¹

- An estimate of $P_{MUS,PEAK}$ was calculated based on this equation:
 $(P_{AW,PEAK} - PEEP) \times [(100 - \%Support) / \%Support]$
 - $P_{AW,PEAK}$ (peak airway pressure) values are obtained from the ventilator
- Example of the calculation of $P_{MUS,PEAK}$:
 - $P_{AW,PEAK} = 20$, PEEP 5, %Support = 70
 - $P_{MUS,PEAK} = (20 - 5) \times [(100 - 70) / 70] = 6.43$
- The %Support given by PAV™+ mode was adjusted to maintain $P_{MUS,PEAK}$ between 5 and 10 cmH₂O.¹

KEY ALARMS

- High circuit pressure (High P_{PEAK})
- PAV+ startup too long
- PAV+ R&C not assessed
- High inspired tidal volume ($\uparrow V_{Ti}$)

NOTE

- Not intended for patients with leaks.
- Not intended for NIV



Figure 3

Refer to the Proportional Assist™ Ventilation (PAV™+ software) Management Protocol guide for additional information. (16-VE-0032)

1. Carteaux G, Mancebo J, Mercat A, et al. Bedside adjustment of proportional assist ventilation to target a predefined range of respiratory effort. *Crit Care Med.* 2013;41(9):2125-2132.

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VOLUME CONTROL PLUS (VC+) AND VOLUME SUPPORT (VS) QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

KEY FEATURES

Automatically adjusts inspiratory target pressure from breath to breath to achieve the desired tidal volume.

- Variable flow (Figure 1)
- Targeted volume
- Variable pressure
- Breath-by-breath automatic adjustment in delivered pressure based on inspired volume

INITIAL SETUP

Patient setup: VC+ (Figure 2) and VS (Figure 3)

- Touch the **Vent** Setup button
- Select **Invasive**
- Select **VC+**
- Primary setting:
 - Set the frequency (except for VS) (Figure 3)
 - Set tidal volume, even if it was set in a previous breath type
 - Set inspiratory time (except for VS) (Figure 3)
- Set rise time %
- Set alarms
 - High circuit pressure ($\uparrow P_{PEAK}$)
 - Low circuit pressure ($\downarrow P_{PEAK}$) (except for VS)
 - High inspired spontaneous and mandatory tidal volume
 - Low minute and tidal volume

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Figure 1



Figure 2



Figure 3

KEY ALARMS

- Volume Not Delivered (High Peak Circuit Pressure)
- High Inspired Tidal Volume alarm limit
 - The High Inspired Tidal Volume limit terminates inspiration and commences exhalation during VC+, VS
- Low Circuit Pressure
- Compliance limited VT

WARNING: Because the VC+ pressure control algorithm does not allow the target inspiratory pressure to fall below PEEP + 3 cmH₂O, attempting to set the $\downarrow P_{\text{PEAK}}$ alarm limit at or below this level will turn the alarm off.

BILEVEL 2.0 SOFTWARE QUICK REFERENCE GUIDE

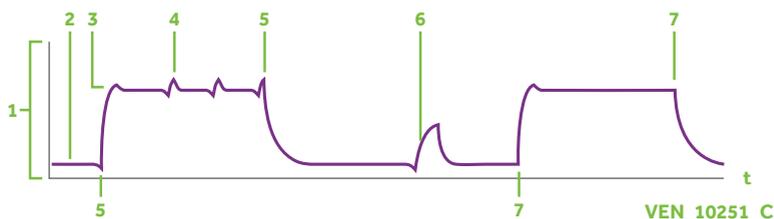
Puritan Bennett™ 980 Ventilator

WHAT IS BILEVEL?

The Puritan Bennett™ ventilator with BiLevel 2.0 software is SIMV Pressure Control with enhancements. Breaths are delivered in a manner similar to SIMV mode with PC selected, but providing two levels of positive airway pressure. The patient is free to initiate spontaneous breaths at either pressure level during BiLevel mode (Figure 1).

Figure 1. BiLevel mode

1. Pressure (y-axis)
2. Low pressure (P_L)
3. High pressure (P_H)
4. Spontaneous breath
5. Synchronized transitions
6. Pressure support
7. Time-based transitions



The two pressure levels are called Low Pressure (P_L) and High Pressure (P_H). At either pressure level, patients can breathe spontaneously, and spontaneous breaths can be assisted with tube compensation or pressure support. BiLevel monitors mandatory and spontaneous tidal volumes separately.

Inspiratory time and expiratory time in BiLevel become Time high (T_H) and Time low (T_L), respectively. During these inspiratory and expiratory times, P_H is maintained during T_H and P_L is maintained during T_L .

APRV APPROACH

As T_L begins to shorten with the $T_H:T_L$ ratio extending beyond 4:1, the breathing pattern assumes a distinctly different shape. In the extreme, the exaggerated time at P_H and abrupt release to P_L would match the pattern patented by John Downs and defined as Airway Pressure Release Ventilation.

Pressure support (P_{SUPP}) can be used to assist spontaneous breaths at P_L and P_H .

P_{SUPP} is always set relative to P_L .

Target pressure = $P_L + P_{SUPP}$.

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Primary settings description

- Low pressure (P_L)
- High pressure (P_H)
- Low pressure time (T_L)
- High pressure time (T_H)
- $T_H:T_L$ ratio

Note

The pressure support level is always referenced to P_L .

INITIAL SETUP

- Enter predicted body weight (PBW) or gender and height.
- Select the **BiLevel** mode button. After selecting BiLevel mode, the ventilator uses the PC mandatory breath type, which cannot be changed.
- Select the spontaneous type (**PS** or **TC**).
- Select trigger type (P_{-TRIG} or V_{-TRIG}).
- The default settings for BiLevel mode appear. Select desired ventilator settings to make changes. P_H must always be at least 5 cmH_2O greater than P_L .
- Set T_L , T_H , or the ratio of T_H to T_L . To select settings that would result in a $T_H:T_L$ ratio greater than 1:1 or 4:1, you must touch the **Continue** button to confirm (Figures 1 and 2).
- Touch Accept All** (Figure 3).
- All spontaneous breaths are assisted by a pressure of 1.5 cmH_2O . However, to add additional pressure support at P_H , P_{SUPP} set must be $> (P_H - P_L)$.

APRV SPECIFICS

In APRV:

- The P_H and P_L level is set to optimize pulmonary compliance and increase mean airway pressure, which may improve oxygenation. The f setting also impacts the mean airway pressure.
- The differences between P_H and P_L levels, T_L and the number of releases per minute (f setting) help manage CO_2 and alveolar ventilation.
- In APRV the operator can configure the BiLevel padlock settings to allow direct control of T_L to assure that changes in the f setting will not inadvertently lengthen the T_L period and result in destabilization of end-expiratory alveolar volume. With the T_L period locked, changes in set f will change the T_H period to accommodate the new f setting while maintaining the set T_L period.



Figure 1



Figure 2



Figure 3

DATA MANAGEMENT QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

VITAL PATIENT DATA BANNER

Patient data is displayed across the top banner (Figure 1). Up to eight variables are visible at one time with the ability to scroll left and right to view an additional six values in the upper right-hand corner. Values may be configured to show different patient data values or may be left intentionally blank to reduce the number of visible patient data cells.

To configure a patient data cell:

To configure the patient data cells on the GUI, complete steps 1 and 2, and repeat for as many parameters as desired.

1. Double tap on any one of the patient data cells displayed (Figure 1).
2. Select the new display data value you want to display (Figure 2).



Figure 1



Figure 2

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LARGE-FONT SCREEN

A drop-down display is available with cells shown in a larger font for ease of viewing. You may configure the available patient data or graphics you would like to display within the large-font screen

To display the large-font patient data panel:

- Swipe the **Vital Patient Data** banner tab downward or touch the **Vital Patient Data** tab. The additional patient data panel appears.
- Swipe the **Additional Patient Data** banner tab downward or touch the **Additional Patient Data** banner tab. Patient data appear in a larger font.

To configure the large-font patient data displayed on the GUI:

- Double tap on any one of the displayed parameters to access the menu list of parameter options (Figure 4).
- Select the patient displayed parameter you wish to display.
- Swipe the **Large-Font Patient Data** panel tab upward or touch the tab to return to the banner to its normal font size.

WAVEFORM DISPLAY

To configure the waveforms and loops:

- Touch the **Waveform Layout** icon. (Figure 5)
- Touch the **Graphs** tab to reveal the five configurations available.
- Touch on the individual waveform configuration you wish to select.



Figure 4



Figure 5

PROXIMAL FLOW SYSTEM OPTIONS

QUICK REFERENCE GUIDE

Puritan Bennett™ 980 Ventilator

FEATURES

- The Puritan Bennett™ proximal flow system option is used for measuring flows, pressures, and tidal volumes of invasively ventilated neonatal patients. The NeoMode 2.0 software option must also be installed on the ventilator.
- When using the proximal flow system option, flow, pressure, and volume waveform, along with the data values for delivered and exhaled volumes, are derived from proximal flow sensor measurements at the patient circuit wye.

HOW TO KNOW WHEN PROXIMAL FLOW IS ENABLED

- Proximal flow sensing is enabled when a "Y" is present after a measured parameter. For example, when exhaled tidal volume is being measured by proximal flow, it will change from V_{TE} to V_{TE-Y} .
- When an "L" is present after a measured parameter, Leak Sync (LS) software is enabled.

Monitored Parameter	Description	Source
V_{TI}	Inspired tidal volume ▪ Mandatory or spontaneous	Internal sensor
V_{TI-Y}	Inspired tidal volume ▪ Mandatory or spontaneous	Proximal sensor
V_{TE-Y}	Exhaled tidal volume	Proximal sensor
$VT_{E\text{SPONT-Y}}$	Exhaled spontaneous tidal volume (at patient circuit wye)	Proximal sensor
$VT_{E\text{MAND-Y}}$	Exhaled mandatory tidal volume (at patient circuit wye)	Proximal sensor
$V_{E\text{TOT-Y}}$	Exhaled total minute volume	Proximal sensor
V_Y	Flow throughout the breath cycle	Flow waveform
V_{TL}	Inspired tidal volume	Internal sensor + LS
V_{TL-Y}	Inspired tidal volume	Proximal sensor + LS
$LEAK_Y$	Exhalation leak at PEEP in the patient	Proximal sensor + LS
$LEAK$	Exhalation leak at PEEP in the patient and circuit	Internal sensor + LS
P_{CIRC-Y}	Graph pressure throughout the breath cycle (at patient wye)	Circuit pressure waveform

In the event you need to disable or enable the proximal flow system option:

- In the constant access icons area, touch the **Configure** icon. A menu containing tabs appears (Figure 1).
- Touch the **Options** tab. A screen appears containing the **Installed Options** and **Prox** tab.
- Touch the **Enabled** or **Disabled** button to enable or disable the proximal flow system option.

To connect the proximal flow sensor to the ventilator:

1. Verify the proximal flow sensor, pneumatic lines, and connector are not damaged in any way.
2. Open the connector panel door and firmly attach the sensor connector to the right-most receptacle in the BDU's front connector port labeled Prox. (Reference "Attaching Proximal Flow Sensor to Ventilator," in operators manual; Proximal Flow Appendix)

To attach the proximal flow sensor between the endotracheal tube and patient circuit:

1. Connect the larger end of the sensor (marked with "UP" and an arrow) to the endotracheal tube. Do not force the connection; when the sensor is oriented correctly, insertion requires little effort.

PURGE

An automatic purge is used to clear the lines at preset intervals. A manual purge control is also available.

CALIBRATIONS

Manual calibration is done during short self test (SST). Automatic calibrations are done at preset intervals during ventilation.

WARNING: Do not install the proximal flow sensor in the patient circuit if the sensor is not also connected to the BDU.

Caution: Do not use aerosolized medications with the proximal flow sensor. Such medications may damage the sensor.



Figure 1