

Puritan Bennett™ 980 Ventilator Patient Setup Quick Reference Guide

NEW PATIENT COMPLETE SETUP†

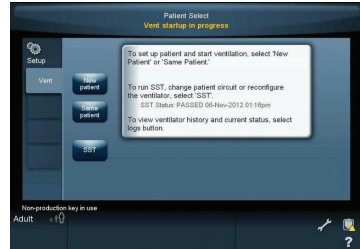
To set up a new patient:

- Open the **Wye connector of the breathing circuit** (the ventilator has a patient detection system).
- Power the ventilator on.
- Touch the **New Patient** button. (see figure 1)
- Select gender and height (once selected, use the knob to adjust). (see figure 2)
- Select **Ventilation type**
- Select **Mode**
- Select **Mandatory or Spontaneous Type**
- Select **Trigger Type**
- Select **Primary Settings** (see figure 3)
 - Rate
 - Tidal Volume
 - Pressure
 - %O₂
 - PEEP
- Press **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. (see figure 1)
- Select **Start**. (see figure 3)



(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) 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.
- Select gender and height.
- Touch **Quick Start**. (see figure 4)

SHORT SELF TEST (SST)

This test checks circuit integrity, calculates circuit compliance and filter resistance, and checks ventilator function.

To run a short self test:

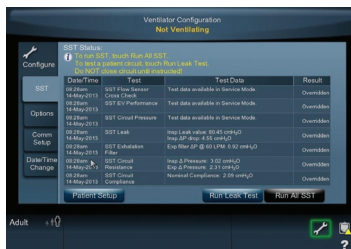
- Enter through the first power-up screen. (see figure 1)
- Select **SST**
- Select **Run all SST**. (see figure 5)
- Choose:
 - Circuit type (Adult and Ped) (see figure 6)
 - Humidifier type
 - Humidifier volume
 - Follow the prompts to completion.
- Select **Accept**.

* Adult/Pediatric ventilators have a specific exhalation filter and door.

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



(figure 4)



(figure 5)



(figure 6)

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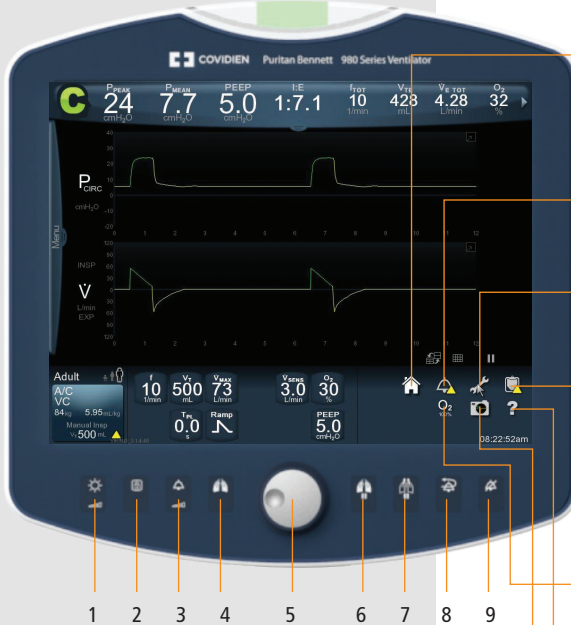


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Puritan Bennett™ 980 Ventilator Touch Screen Quick Reference Guide

Finding your way around and how to use the touch screen



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. Alarm silence key

Icons

Home

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

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 two 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.

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.

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Puritan Bennett™ 980 Ventilator Leak Sync Software Quick Reference Guide

WHAT'S NEW

Puritan Bennett™ Leak Sync software now works with VC+ and VS* (compared to Leak Compensation software on the Puritan Bennett 840 ventilator).

KEY FEATURES

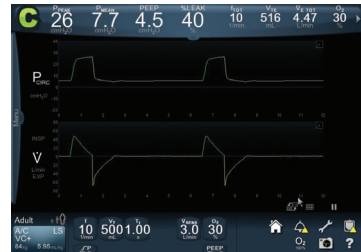
The Leak Sync software automatically detects and compensates for leaks in the breathing circuit. This unique software is designed to differentiate between flow due to leaks and flow due to patient respiratory effort and then to adjust quickly.

LEAK SYNC SOFTWARE

- Can be used with invasive and non invasive ventilation
- Maximum leak compensation flow:
 - Ped 40 L/min
 - Adult 65 L/min
- When the Leak Sync software is active, **LS** is displayed in the lower left-hand side.

INITIAL SETUP

- Select the **Vent Setup** button (lower left) (see figure 2)
- Select **More Settings**
- Select **Enabled** or **Disabled** for Leak Sync
- Select **Accept All**
- Leak Sync software typically adjusts for a leak present within three (3) breaths



(figure 1)



(figure 2)

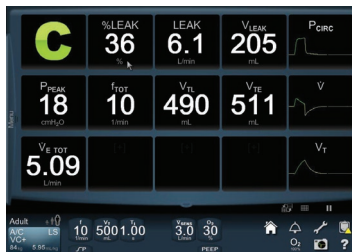
VALUES DISPLAYED

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

- 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 (see figure 3)

KEY ALARMS

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



(figure 3)



(figure 4)



(figure 5)

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Puritan Bennett™ 980 Ventilator PAV™+ Software Quick Reference Guide

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. (see figure 1)

Flow, Volume, Compliance, Resistance and %Support

INTENDED FOR PATIENTS WITH

- Intact Respiratory Drive
- Predicated body weight (PBW) 25 kg or greater
- Tube ID 6.0 or greater

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 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.
- Select **Start**.

PAV™+ + MONITORING

Graphics Screen

(see figure 3)

The PAV+ screen will display:

- WOB_{PT} , WOB_{TOT} , C_{PAV} , R_{PAV} , $PEEP_T$, R_{TOT}
Data Screen displays:
- 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})
- Inspired tidal volume (V_{TI})



(figure 1)



(figure 2)



(figure 3)

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

A simple algorithm was designed 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 $P_{muspeak}$:
 - $P_{awpeak} = 20$, PEEP 5, %Support = 70
 - $P_{muspeak} = (20 - 5) \times ((100 - 70) / 70) = 6.43$
- The %Support given by PAV[™]+ mode was adjusted to maintain $P_{mus,Peak}$ between 5 and 10 cmH₂O¹

KEY ALARMS

- High circuit pressure (High P_{PEAK})
- PAV startup too long
- PAV R&C not assessed
- High V_{TI}

NOTE

- Not intended for leak environments
- Not intended for NIV

Refer to the Proportional Assist[™] Ventilation (PAV[™]+) Management Protocol guide for additional information. (10-VE-5543, VE19408)

1. Carreaux 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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Puritan Bennett™ 980 Ventilator Volume Control Plus (VC+) and Volume Support (VS) Quick Reference Guide

KEY FEATURES

Automatically adjusts inspiratory target pressure from breath to breath in response to changes in the delivered tidal volume.

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

INITIAL SETUP

Patient set up: VC+
(see figure 2)

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

LIMITATIONS OR CONTRAINDICATIONS

- High effort may result in the regulating of pressure down to unacceptable levels

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

WARNING: Because the VC+ pressure control algorithm does not allow the target inspiratory pressure to fall below $PEEP + 3 \text{ cmH}_2\text{O}$, attempting to set the P_{PEAK} alarm limit at or below this level will turn the alarm off.



(figure 1)



(figure 2)



(figure 3)



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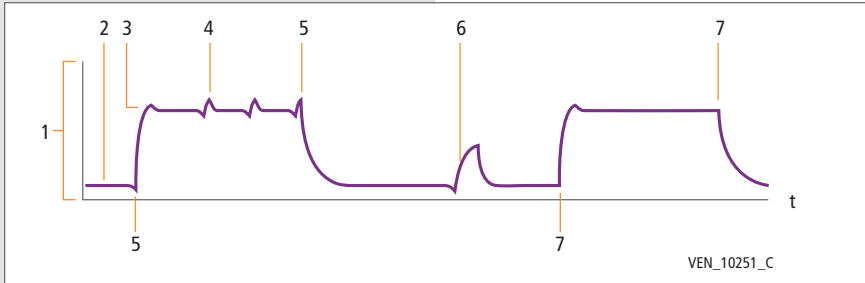
Puritan Bennett™ 980 Ventilator

BiLevel 2.0 Software

Quick Reference Guide

WHAT IS BILEVEL

The Puritan Bennett™ 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 pressure. The patient is free to initiate spontaneous breaths at either pressure level during BiLevel mode. (see figure 1)



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 = $P_L + P_{SUPP}$

(figure 1 BiLevel Mode)

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

Primary Settings Description

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

NOTE:

The pressure support level is always referenced to P_L

INITIAL SETUP

- Enter 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.
- Choose the spontaneous type (**PS** or **TC**).
- Choose trigger type (P_{TRIG} or \dot{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_{Hh} , or the ratio of T_{Hh} to T_L . To select settings that would result in a $T_{Hh}:T_L$ ratio greater than 1:1 or 4:1, you must touch the **Continue** button to confirm. (see figure 1 and then figure2)
- **Accept All.** (see figure 3)

All spontaneous breaths are assisted by a pressure of 1.5 cmH_2O . However, to add additional pressure support at P_{Hh} , P_{SUPP} set must be $> (P_H - P_L)$.

APRV SPECIFICS

In APRV:

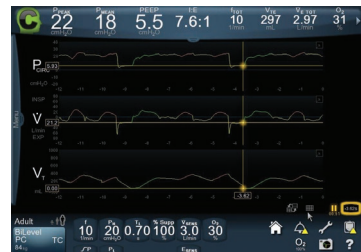
- The P_H and P_L level is set to optimize pulmonary compliance and increase mean airway pressure, which may improve oxygenation. The f setting also impacts the mean airway pressure.
- The differences between P_H and P_L levels, T_L and the number of releases per minute (f setting) help manage CO_2 and 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)

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Puritan Bennett™ 980 Ventilator Data Management Quick Reference Guide

VITAL PATIENT DATA BANNER

Patient data is displayed across the top banner (see figure 1). Up to eight (8) variables are visible at one time with the ability to scroll left- and right- to view an additional six (6) 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:

1. Select a patient data preset you want to configure (see figure 2)
2. Double tap on any one of the patient data cells displayed (see figure 3)
3. Select the new display data value you want to display



(figure 1)



(figure 2)



(figure 3)

LARGE FONT SCREEN

A drop-down display is available with cells shown in a larger font for ease of viewing. You may configure which 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's tab downward or touch the Additional Patient Data banner's 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 parameters to pick from. (see 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.

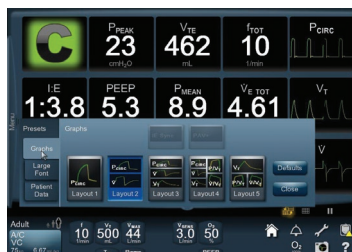
WAVEFORM DISPLAY

To configure the waveforms and loops:

- Touch the **Waveform Layout** icon. (see 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)

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Puritan Bennett™ 980 Ventilator Proximal Flow System Option Quick Reference Guide

FEATURES

- The Puritan Bennett™ Proximal Flow system option is used for measuring flows, pressures and tidal volumes of invasively ventilated neonatal patients with predicted body weights (PBW) of 0.3 kg (0.66 lb) to 7.0 kg (15.4 lb) using ET tube sizes from 2.5 mm to 4.0 mm. 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 delivered and exhaled volumes, are derived from Proximal Flow sensor measurements at the patient circuit wye. In addition, proximal flow data are displayed on the waveform plots with a Y appearing in inverse video next to the measurement symbol.

HOW TO KNOW WHEN PROXIMAL FLOW IS ENABLED:

- Proximal Flow Sensing is enabled when a “-Y” is 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} in inverse video.

Data Symbol	Description
V_{Ti-Y}	Inspired tidal volume (mandatory or spontaneous at patient circuit wye)
V_{TE-Y}	Exhaled tidal volume (at patient circuit wye)
$V_{TE\ SPONT-Y}$	Exhaled spontaneous tidal volume (at patient circuit wye)
$V_{TE\ MAND-Y}$	Exhaled mandatory tidal volume (at patient circuit wye)
$\dot{V}_{E\ TOT-Y}$	Exhaled total minute volume (at patient circuit wye)
\dot{V}_Y	Flow throughout the breath cycle (at patient circuit wye)
V_T	Tidal volume (at patient circuit wye)
$P_{CIRC\ Y}$	Pressure throughout the breath cycle (at patient circuit wye)

(table 1) Proximal Flow Option Patient Data Symbols

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. (see 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 Prox 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*, p. F-11.

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. Reference the figure below. 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.

To access this function, see above.

CALIBRATIONS

Manual calibration is done during 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)

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