PHILIPS

Hospital
respiratory care

Pocket guide

Philips Respironics V60 ventilator

Dedicated to successful NIV

Introduction

We are passionate about providing solutions that lead to healthier patients, healthier practices, and healthier businesses. This pocket guide is designed to help familiarize clinicians with the set-up and application of the Philips Respironics V60 ventilator.

The Philips Respironics V60 ventilator is a microprocessor-controlled, bi-level positive airway pressure ventilatory assist system that provides noninvasive and invasive ventilatory support for adult and pediatric patients (> 20 kg).

Use this guide for a step-by-step explanation of how to use the V60 ventilator, from initial setup to mask and port settings to changing modes. This guide also includes suggestions for increasing tank life during transport.

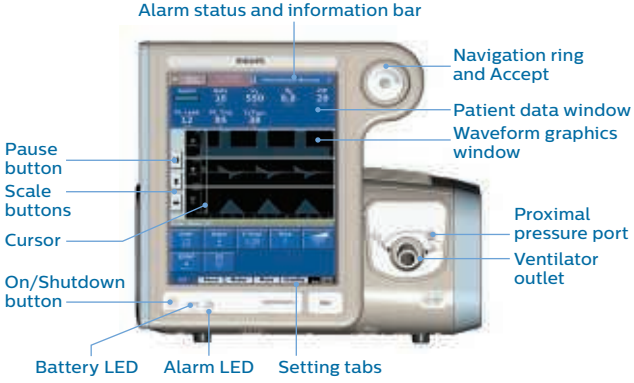
The value of NIV

Noninvasive ventilation (NIV) has been shown to significantly reduce many of the complications associated with conventional mechanical ventilation, including the incidence of ventilator-acquired pneumonia,[1] while at the same time reducing the overall cost of care by shortening lengths of stay.[2,3]

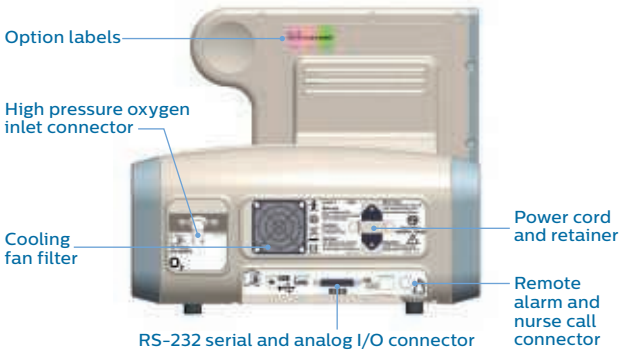
Table of Contents

Device overview

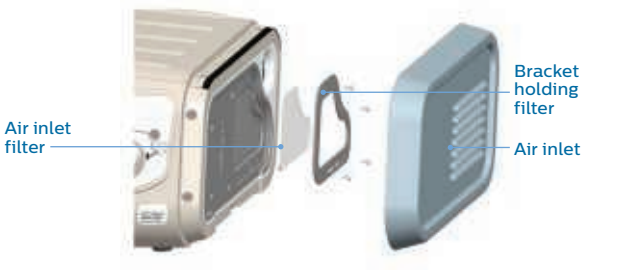
Front



Back



Side



Air inlet filter

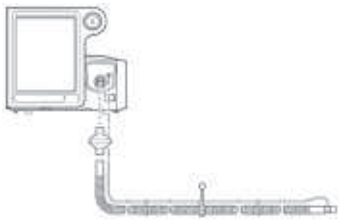
The air inlet filter should be inspected every month and replaced if needed.

To change the air inlet filter

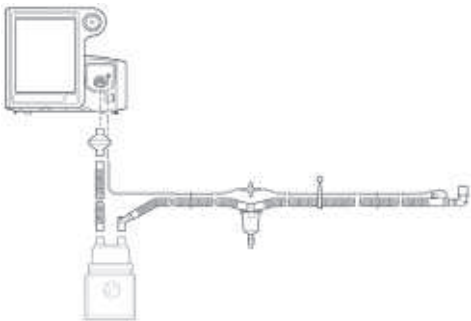
1. Power down the V60 ventilator and disconnect it from AC power.
2. Turn the D-ring fastener (bottom of side panel) counter-clockwise one-quarter turn and release.
3. Remove the side panel.
4. Remove the air inlet filter by pinching it out of the recess in the bracket.
5. Install the new air filter by tucking it into the recessed area.
6. Replace the side panel, push in the D-ring fastener, then turn one-quarter rotation or until it locks.

Patient circuits

Assemble the patient circuit, including main flow bacterial filter, proximal line, and humidifier (if desired).



Standard patient circuit includes main flow bacterial filter and proximal pressure line. Not for use with a humidifier.



The standard humidifier patient circuit includes a main flow bacterial filter, a short tube, water trap, proximal pressure line, and elbow.

General operation

Once the circuit and filter are attached, press the **On/ Shutdown** button. Informational messages are displayed on the screen; one that informs the clinician to ensure a bacterial filter has been added to the machine outlet*, the second message indicating which mask and leak port match the displayed data. Continue to Mode settings. Otherwise, follow the instructional steps to change the mask and port settings.

Mask and port settings

1. Press the **Menu** setting tab.
2. Press the **Mask** and **Port** button.
3. Press desired patient interface type (see *Mask leak symbols* for more information) and press **Accept** to apply.
4. Press the desired exhalation port (see *Exhalation port settings* for more information) and press **Accept** to apply.
5. Run the exhalation port test only if required.

Setting changes

1. In the **Settings** window, touch the setting to be changed.
2. Adjust the setting by using either the arrow keys or the navigation ring.
3. Once the correct value has been chosen, press **Accept**.

Setting rate

Because the V60 is intended to augment ventilation in patients who are spontaneously breathing, the rate should be set as a back-up rate in the case of apnea. If the patient fails to trigger a breath through Auto-Trak within the interval determined by the rate setting, the ventilator triggers a mandatory breath.

*Available with 2.30 software only - not available in all countries.

Rise time

Rise time is the speed at which inspiratory pressure rises to the set (target) pressure. Set to the fastest rise time tolerated (1 for the fastest rise; 5 for the slowest rise).

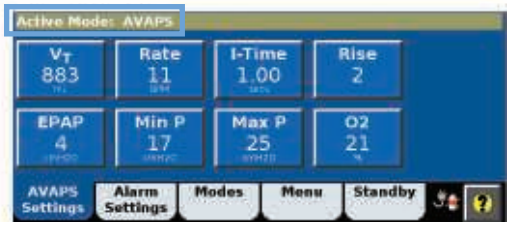
- Too slow of a rise may exacerbate dyspnea in the ARF patient, possibly depriving the patient of needed flow.
- If rise time is insufficient to reach the desired inspiratory pressure or time, decrease the rise time setting (e.g., change from 5 to 3, therefore resulting in a faster rise time).

I-Time

Setting I-Time adjusts the inspiratory time for a machine-triggered breath, therefore influencing the I:E ratio in V60 machine-triggered breaths. Inspiratory time is controlled by the patient in a patient-triggered breath.

Mode changes

The active ventilation mode is displayed in the upper left corner of the screen. To set or change a mode, do the following:



1. Select the **Modes** setting tab.
2. Select the desired mode (active mode will be displayed in blue).
3. Adjust settings as desired. Newly adjusted setting values will be displayed in yellow.
4. Select **Activate Mode** to apply.

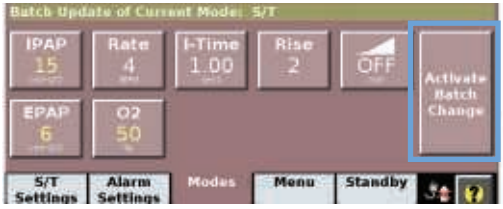
General operation

Batch changes

Batch changes are available in only the active mode. Batch changes allow simultaneous activation of multiple ventilation setting changes. To make batch changes follow these steps.

1. Press the **Modes** setting tab.
2. Press the active mode (it will state “Batch” and be displayed in blue).

3. Adjust settings as desired so that newly adjusted values are displayed in yellow.
4. Press **Activate Batch Change** to apply all changes at once.



Alarm message navigation

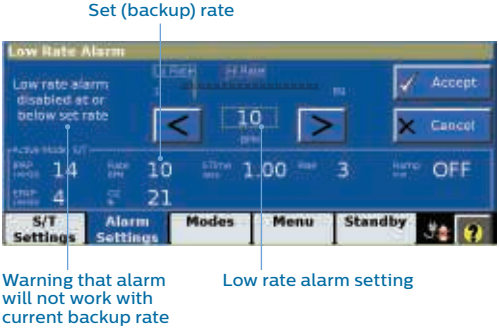
To hide alarms or informational messages in the Alarms or Messages list, press the **Alarm** button (flashing if high priority) or the **Informational Messages** button when up arrows are present. To display messages, touch the **Informational Messages** button when down arrows are present. For a list of alarms, see the *Philips Respironics V60 Ventilator User Manual*.

Alarm settings

1. Press the **Alarm** settings tab.
2. Press and change the appropriate alarm value.
3. Press **Accept**.

Low rate

On the V60 ventilator, the low rate alarm may also serve as an apnea alarm. It is recommended to set the low rate alarm higher than the backup rate but lower than the patient's spontaneous rate. If the low rate alarm value is set at or below the set rate, the low rate alarm cannot be triggered, and the alarm is essentially disabled. A text warning will appear on the left side of the Settings screen if the user sets the low rate at or below the set (backup) rate.



General operation

Menu tab

User preferences can be adjusted using the Menu window. There is a **Brightness** setting button for day or night view. The **Loudness** setting button adjusts the volume of alarms and the audible feedback click. The **Alarm Volume Escalation** feature*, if enabled, will escalate alarm volume when a high priority alarm is not responded to within 40 seconds. Ventilator alarm volume increases to maximum volume over a 20-second period. When the function is active and a touchscreen or a button press is detected, the ventilator automatically returns the alarm volume to the user setting.

There is a **Mask/Port** menu button to choose various mask leak values and to choose the correct port (see *Mask Leak symbols*). The **Vent Info** menu button displays the software version and other information specific to the ventilator. There is also a **Screen Lock** button.

Screen Lock

Screen Lock deactivates all buttons and tabs on the touchscreen except the **100% O_2** key (available in 2.30 software*), **Alarm Silence, Alarm Reset,** the **Alarm Message** button, and **Help** icon. The tabs will be grayed out.

To unlock the screen, press the **Accept** button (√) in the center of the navigation ring.

*Available with 2.30 software only – not available in all countries.

Patient data and waveforms

The data screen displays alarms and patient data, which include rate, estimated tidal volume, estimated minute ventilation, peak inspiratory pressure, patient trigger %, T_i/T_{TOT} %, and leak. The breath-type indicator color corresponds to waveform color: turquoise for spontaneously triggered, orange for timed triggered and blue for exhale.

- **Pt. Trig:** Patient-triggered breaths as a percentage of total breaths over the last 15 minutes.
- **Rate:** Total breath rate (Spont and Timed), a moving average over the last 6 breaths or 15 seconds.
- **T_i/T_{TOT} %:** Inspiratory time divided by the total cycle time over the last 8 breaths.
- **Pt. or Tot. Leak:** Estimated unintentional leak (Pt. Leak) or total of intentional plus unintentional leak (Tot. Leak).
- **Breath indicator bar:** Changes color depending on breath type and inspiratory phase. Spontaneous breath is turquoise (Spont), machine-triggered breath is orange (Timed), and exhalation is blue (Exhale).

General operation

Standby

Standby suspends ventilation and retains current settings when the clinician wants to temporarily disconnect the patient from the ventilator. Ventilator settings and most menu functions can be changed during the Standby mode.

To activate Standby

1. Press the **Standby** tab. The **Entering Standby** window appears.
2. Disconnect the patient from the ventilator.

The ventilator will not enter Standby until the patient is disconnected. It continues ventilation while waiting for the patient to be disconnected. The Standby mode gives the clinician up to 60 seconds to disconnect the patient from the ventilator. If after 60 seconds no disconnection is detected, the Standby mode cancels.

Help button

Press the **Help** icon (**?**) to display additional information. Touch the screen anywhere to return to normal operation.

Mask leak symbols

Leak symbol (printed on mask)	Patient interface
Leak 1 (no exhalation port on mask)	PerformaTrak full-face mask PerformaTrak nasal mask Image 3 full-face mask Contour Deluxe nasal mask AF811 (CapStrap gel mask) AF531 (EE or SE Leak 1) AF421 (EE or SE Leak 1) AF541 (EE or SE Leak 1)
Leak 2 (exhalation port within mask)	PerforMax with EE elbow AF531 (EE elbow Leak 2) AF421 (EE elbow Leak 2) AF541 (EE elbow Leak 2)
Leak 3	AP111 (OptiLife Interface)
Leak 4 (exhalation port within mask)	Respironics total face mask

The Leak symbol represents the intentional leak characteristics of the mask, and the proper V60 mask/port settings will ensure the greatest accuracy and optimum performance. If the Leak symbol does not appear on a Respironics patient interface, use the chart above to determine the proper V60 setting. When using an interface other than a Respironics mask, choose the Leak setting Other. This selection results in Total Leak, not Patient Leak, being displayed on the patient data screen.

Leak 1 symbol on mask

General operation

Exhalation port settings

After pressing the appropriate mask setting, press the correct exhalation port setting. The chart below references the various exhalation port settings and when an exhalation port test is recommended. An exhalation port test is only recommended when using a PEV (plateau exhalation valve) or non-Respironics exhalation ports with unknown leak characteristics.

	Port selections	Exhalation port test recommended
	Respironics Disposable Exhalation Port (DEP)	No
	Respironics Whisper Swivel	No
	Respironics Plateau Exhalation Valve (PEV)	Yes
	Other exhalation port	Yes

Exhalation port test

If a port test is required, follow the instructions provided on the screen.

Features, modes, and options

Auto-Trak/Auto-Trak+

Auto-Trak automatically maintains appropriate trigger and cycle thresholds to maintain patient-ventilator synchrony even with changing leak. An optional upgrade, Auto-Trak+ allows the clinician to customize Auto-Trak's trigger and E-cycle sensitivity.

100% O_2 key*

Upon pressing the **100% O_2** key the V60 delivers 100% O_2 for 2 minutes. The clinician is also given the option to cancel the action or add an additional 2 minutes of 100% O_2.

Ramp

The ramp time allows the patient to adapt to ventilation gradually by increasing inspiratory and expiratory pressures (IPAP and EPAP/CPAP) from sub-therapeutic to user-set pressures over a user-set interval (5–45 minutes).

How to set a ramp time

1. Press the **Ramp Time** button in the Mode settings window.
2. As the ramp progresses, the Ramp Time button graphic fills in.
3. To change the ramp interval or end the ramp, press the **Ramp Time** button again, and the Ramp in Progress window opens.
4. To end the ramp and apply the full IPAP and EPAP/CPAP pressures immediately, press **End Ramp**.
5. To end the ramp and start a new one, press **Start New Ramp**, and the Ramp Time setting window opens again to allow a new ramp time to be set.

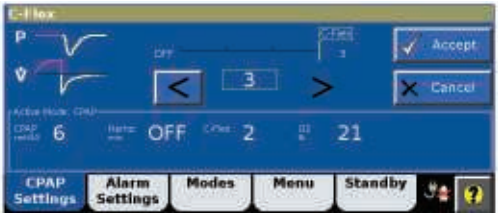
*Available with 2.30 software only – not available in all countries.

Features, modes, and options

C-Flex

C-Flex improves the comfort of traditional CPAP by reducing the pressure at the beginning of exhalation and returning it to the set level before the end of exhalation. C-Flex may not be appropriate for patients where even a transient drop in CPAP is deemed undesirable.

The amount of pressure relief is determined by the C-Flex setting and the expiratory flow of the patient. Pressure relief is increased with a higher setting number (1, 2, or 3) and greater patient expiratory flow. This applies only during the active part of exhalation.



The illustration correlates with the C-Flex setting

Pressure-controlled ventilation

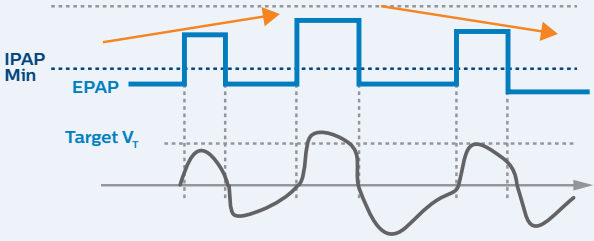
In pressure-controlled ventilation (PCV), breaths with a user-set IPAP and I-Time are delivered to the patient. The patient can trigger an inspiration and, therefore, control the rate. However, the patient does not control the inspiratory time. Also be aware that any changes in EPAP without an equal change in IPAP will change the pressure support.

AVAPS (average volume-assured pressure support)

AVAPS is a volume-targeted mode and is intended for use with stable chronic patients who do not require rapid pressure support changes to maintain a target V_T.
At start-up, AVAPS applies an inspiratory pressure equal to one of the following, whichever is greater

- EPAP + (target volume/60 ml/cmH_2O)
- EPAP + 8 cmH_2O
- P_{min}

The V60 ventilator will automatically adjust IPAP (up to 2.5 cmH_2O per minute), to maintain a tidal volume target.



AVAPS automatically adapts pressure support (< 2.5 cmH_2O per minute) to guarantee an average tidal volume

Note: when adjusting AVAPS minimum and maximum pressures, remember that IPAP is adjusted to meet the target value. If calculated target pressure is outside of the set pressure range, the target volume will not be achieved.

Starting AVAPS

1. When switching from S/T mode to AVAPS, set the Min P at the current IPAP pressure.
2. During AVAPS startup, there may be a period of time before the target tidal volume is achieved. If the target V_T is not achieved at the current Min P setting, increase the Min P until the target V_T is reached. Remember, the V_T displayed on the V60 is a six-breath average, so the effect of a settings change may not be fully reflected for several breaths.
3. Once the target V_T is reached, reduce Min P slightly to allow the AVAPS algorithm to adjust.
4. If target V_T is not achieved due to a low Min P setting, an informational message will appear. Adjust Min P accordingly unless the maximum pressure for the patient has been reached.
5. If target V_T is exceeded because Min P is set too high, an informational message will appear. Adjust Min P accordingly unless the minimum pressure for the patient has been reached.
6. Set the high and low V_T alarms appropriately.
7. In AVAPS, the EPAP setting must be at least 1 cmH_2O below the Min P setting. In some cases, an increase in the Min P setting is required before increasing the EPAP setting.

Features, modes, and options

Patient transport

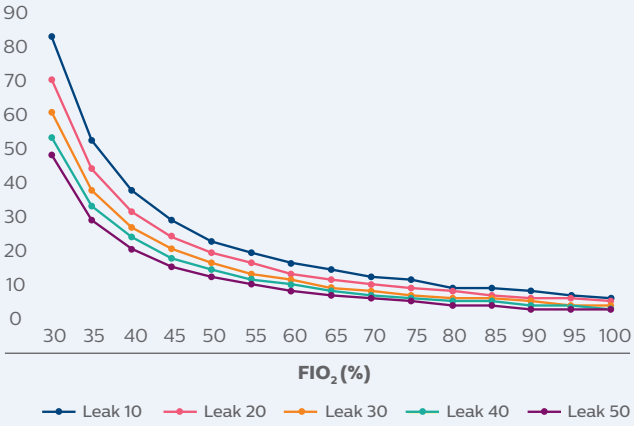
Tips to maximize E-cylinder oxygen tank duration

- Make sure all cylinders are full (2000 psig or more).
- We recommend that you do not use any oxygen delivery devices that will limit flow such as Grab 'N Go cylinder/regulators (flow is limited to 100 l/min). The pressure will be maintained, but the oxygen concentration will be reduced and the low oxygen pressure alarm will activate.
- Make sure the cylinder regulators are turned off while the V60 is connected to wall oxygen.
- Never turn the cylinder regulator on until ready to transport the patient.
- Turn on only one cylinder regulator at a time. If both cylinders are turned on, they may become simultaneously depleted, leaving no backup oxygen.
- Whenever possible, reduce FIO_2 prior to transport. The higher the FIO_2 setting, the greater the oxygen consumption. This is particularly important during transport in high-leak situations such as NIV.
- Minimize all patient leaks. Adjust mask prior to transport, and loosen appropriately when patient is back on wall oxygen.
- Avoid using masks that have an exhalation port built into the mask when there is already an exhalation port in the circuit.

Below are graphs representing oxygen tank duration at various leak values. These are estimates only, based on 2000 psig. Time may vary depending on the V60 settings used and the patient's changing ventilatory demand.

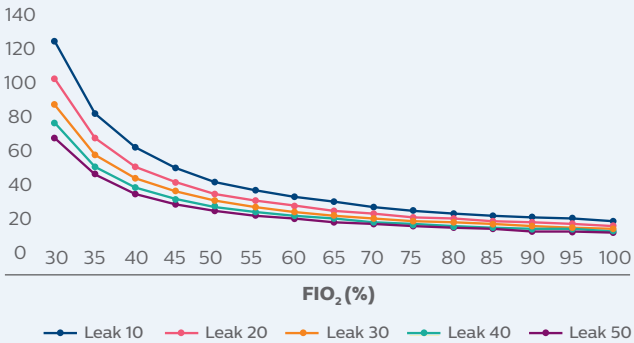
VT 500; RR 40; IPAP 18; EPAP 6

Duration in (minutes)



VT 500; RR 20; IPAP 18; EPAP 6

Duration in (minutes)



1 **Hill NS, Brennan J, Garpestad E, Nava S.** Noninvasive ventilation in acute respiratory failure. *Crit Care Med*. 2007 Oct;35(10):2402-7.

2 **Keenan SP, Gregor J, Sibbald WJ, Cook D, Gafni A.** Noninvasive positive pressure ventilation in the setting of severe, acute exacerbations of chronic obstructive pulmonary disease: more effective and less expensive. *Crit Care Med*. 2000 Jun;28(6):2094-102.

3 **Hubble MW, Richards ME, Wilfong DA.** Estimates of cost effectiveness of prehospital continuous positive airway pressure in the management of acute pulmonary edema. *Prehosp Emerg Care*. 2008 Jul-Sep;12(3):277-85.

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