Vision Alpha High Frequency Oscillator & Conventional Ventilator

The Novalung Vision Alpha ventilator combines both high frequency ventilation and conventional ventilation in one device. The device is intended for adult and infant use. In the conventional ventilation modes the minimum tidal volume available in volume control mode is 50ml. Infant or adult mode selection is available in the conventional ventilation modes only.
The ventilator is left in HFOV mode and the default conventional mode set to Pressure Control.

Please note that every time you change a setting on the machine, including the Oxygen concentration you must accept the changes with the ⏎ **confirm / accept key, the machine will alarm if this is not done.**

Modes of Ventilation

The Mode selection switch on the front of the machine has three options. HFOV, Spont and Vent.
Spont provides CPAP or CPAP Pressure Support. Vent provides pressure and volume control modes along with SIMV. The current mode of ventilation is always shown in the green bar at the top left of the screen.

High Frequency Oscillatory Ventilation (HFOV)

HFOV Applies a constant mean airway pressure to the lung using a ventilation volume that is smaller than the dead space volume. HFOV Makes use of a high speed, high oscillation gas diffusion and provides ventilation while the pressure changes for each respiration are reduced.

The high frequency oscillation component of the vision alpha has only 4 controls that need to be set and adjusted:
- Oxygen concentration
- Frequency
- Mean airway pressure
- Cycle volume (equivalent to power dial and amplitude on the sensormedics machine)

  Cycle volume and frequency to control the ventilation Oxygenation and mean to control O_2

  In addition to the 4 main controls the HFO base flow can also be adjusted. The flow is independent of all other settings and will not affect the mean airway pressure. The default setting will be 20 LPM. The Inspiratory time is fixed at 50%

NB: The frequency should be approximately 2 higher than you would use on the sensor medics oscillator.

SI Setting – This is an Inspiratory Hold function for the HFOV. You set the pressure that will be maintained on the main screen (SI Setting) and to activate press and hold the manual breath key (lung symbol between the PC and VC buttons) The pressure will be maintained for as long as you hold the key, the hold time is indicated on the screen, when released normal HFOV resumes.

Spont (Spontaneous Breathing Mode)

The spontaneous mode selection allows you to provide CPAP or CPAP pressure support to your patient. The apnoea time is set on the IMV alarm screen and if the ventilator detects no inspiratory effort from the patient backup ventilation will start. The settings will be determined by what is set on the front screen but the respiration rate is determined by the Apnea rate set in the IMV setup screen.
CPAP or CPAP pressure support is delivered in both PC and VC modes, however, the mode you are in will determines what backup ventilation the machine provides. If you are in VC the backup ventilation with be volume support.
The following need to be set:
- PEEP/CPAP
- Trigger

- PS (if required) the pressure support needs to be added to your PEEP to give you your peak pressure. If the PEEP is 5 and the pressure support 20 your pressures will be 25/5.
- Ti for backup ventilation
- Appropriate value of Tidal volume or ΔP for backup ventilation

Vent (Control and Support modes of Ventilation)

The two primary modes of ventilation are: Volume Control (VC) and Pressure Control (PC), the mode you want is selected with the keys on the front panel. You will be asked to confirm your selection. Press the accept key to confirm of the cancel key if not required. With each of these modes CMV or SIMV will be used. The 4 modes of ventilation available are:

- Volume Control Ventilation – Controlled Mandatory Ventilation (PCV – CMV)
- Pressure Controlled Ventilation – Controlled Mandatory Ventilation (PCV-CMV)
- Volume Control Ventilation– Synchronised Intermittent Mandatory Ventilation (VCV – SIMV)
- Pressure Controlled Ventilation - Synchronised Intermittent Mandatory Ventilation (PCV – SIMV)

Volume Control Ventilation (VCV) This is mandatory volume ventilation, the following parameters need to be set:

- Tidal Volume Vt
- Peak flow
- Ti
- Frequency
- PEEP
- Trigger
- Pressure Support (if required)

Pressure Control Ventilation (PCV) PCV is mandatory pressure controlled ventilation; the following parameters need to be set:

- ΔP
- Ti
- Frequency
- PEEP
- Trigger
- Pressure Support (if required)

In both VC and PC a CMV or SIMV option will be selected. These options are found in the IMV setup screen. The green bar at the top left of the display will show you your current mode.

CMV Option

The way the ventilator will operate is dependant on your trigger sensitivity and any triggering efforts from the patient. If the patient is unable to trigger the ventilator a control mode of ventilation will occur delivering the set breath rate with the set Ti, volume or pressure. The patient cannot breathe spontaneously in the control mode
If the patient is able to trigger the ventilator every respiratory effort that the patient makes will be assisted by the ventilator and a full breath will be delivered with the set Ti and pressures or volume.

SIMV Option

SIMV provides mandatory ventilation synchronised with the patients respiratory efforts. A trigger window is established based on the frequency and Ti. If there is no respiratory effort from the patient mandatory breaths are delivered, however if the patient is triggering the ventilator one breath will be delivered per trigger window in synchronisation with the patient. The remaining trigger window time is then available for spontaneous breathing. The set breath rate will always be delivered.

<u>Setting up the Humidifier</u>

The humidifier must be primed before you switch it on. This will take a couple of minutes. Use an appropriate giving set to connect up a bag of water for inhalation to the port on the humidifier. Open the clamp and the humidifier will automatically top up. The chamber is auto fill so you just need to change the bag when it is empty. The humidifier can now be turned on.

<u>Setting up the Ventilator</u>

Connect the ventilator to the mains and gas supply and turn on with the main switch on the front of the device. Use the operating mode selection switch to select the mode of ventilation you require. The machine will be left in the HFO mode and the conventional ventilation default is pressure ventilation (PSV)

There is no start/stop button or standby option on the ventilator and ventilation will begin as soon as you switch the device on.

The select dial on the left hand side of the front panel controls the screen and the two important keys for setting up the machine are the accept / Confirm key; ↵ and the cancel key; ⊘

The control panel is not touch screen; all controls are selected and adjusted with the select dial on the front of the machine and confirmed / accepted with the ↵ button.

See the Operating Panel page for information on the function keys for the ventilator.

Every time you change a setting the confirm key must be pressed to accept the settings. This will also cause the alarms to automatically adjust.

The select control knob is used to highlight areas of the screen, when the function you want is highlighted press the select control knob to access the setting or screen.

To cancel any operations or answer no to a question use the cancel key. ⊘

<u>Adjusting the Controls & Displays</u>

The 4 main settings for the HFOV mode are made using the dials on the front of the machine. The HFOV section containing the Frequency, mean airway pressure and cycle volume dials is marked in red. The 4th control, the oxygen, is in the middle of the panel.
For conventional ventilation all the basic settings are adjusted with the dials on the right hand side of the control panel. There are some additional functions in the IMV setup menu which is accessed through the display.

Any change to a setting including the oxygen concentration must be confirmed with the accept / confirm key. If you don't accept changes to the settings the alarm will sound.
All the alarms will be automatically set when you press the confirm key. Manual adjustment is also available. This is explained in the alarms section.

<u>Alarms</u>

Pressing the alarm silence key silences the alarms for 2 minutes. The top right of the screen will show and ALARMS OFF message and turn red. Red alarms such as high pressure can not be silenced. Current Alerts will be shown in a box on the display screen, the alarm information will be written in red or yellow for active alarms, alarms that are no longer active will be grey. To reset cleared alarms press and hold the alarm silence key for a few seconds.
The alarms are automatically set around the current parameter and this will take effect once you confirm your settings. Each alarm can be adjusted manually if required by selecting the value on the screen and adjusting with the select control knob. You must confirm the value.

The following alarms need to be set for HFOV:

- HIGH MAP_1 – At the high map_1 pressure the machine will alarm to indicate a high pressure
- HIGH MAP_2 – At the high map_2 alarm the machine will open a safety valve to release the pressure in the circuit. This will stop the ventilation
- LOW MAP
- Hi Amplitude
- Low Amplitude

Loss of Pressure - if the ventilator is disconnected form the patient it will stop and alarm to indicate a leak, once the patient is reconnected ventilation will automatically restart, there is no start / stop button.

Apnea ventilation / Backup mode – If the ventilator goes in to backup mode an apnea alarm will occur and backup ventilation will take over, backup ventilation will continue along with a audible alarm. The ventilator will return to normal ventilation if there are 2 patient triggers before the next mandatory ventilation or if a reset is performed. To reset the backup ventilation press and hold the alarm silence key for 2 seconds.

Switching off the device – Turn the device off with the switch on the front of the machine which is located on the right hand side just under the operating panel. The ventilator will alarm and you will need to hold down the silence key to stop the alarm

Vision Alpha Operating Panel

The Vision α's front panel is divided into the following sections according to their operations.
(1) LED bar graph
(2) LCD
(3) Normal ventilation (CMV) setup section
(4) HFOV setup section
(5) Operating mode selection section