# HIGH FLOW OXYGEN THERAPY VIA AIRVO

<table>
<thead>
<tr>
<th><strong>TITLE</strong></th>
<th>HIGH FLOW OXYGEN THERAPY VIA AIRVO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Version:</strong></td>
<td>V.1</td>
</tr>
<tr>
<td><strong>Approved by:</strong></td>
<td>.............Sub Group</td>
</tr>
<tr>
<td><strong>Date:</strong></td>
<td></td>
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<tr>
<td><strong>Author/lead responsible for guideline:</strong></td>
<td>IG</td>
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<td><strong>Date issued:</strong></td>
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</tr>
<tr>
<td><strong>Target audience:</strong></td>
<td>All staff</td>
</tr>
</tbody>
</table>

**Amendments and Additions**

**Replaces/supersedes:**

**Associated Policies:**

**Equality Impact Assessment Y/N Date:**
1. Guideline Statement

This guideline is intended for use by critical care staff, critical care outreach team and other clinical staff who are trained and assessed as being competent, to allow treatment of patients experiencing respiratory failure with high flow humidified oxygen therapy that is delivered nasally.

The guideline documents the basic principles of therapy, expected standards of care and highlights areas of best practice for consideration by the appropriately trained clinicians.
2. Definitions

**High Flow Oxygen Therapy System - Optiflow™ system (Fisher & Paykel)**

Term used to describe the system required to deliver humidified high flow oxygen therapy via a nasal cannulae or a tracheostomy or mask attachment. The system comprises of a humidifier with an integrated flow generator that delivers warmed and humidified respiratory gases to spontaneously breathing patients through a variety of patient interfaces.

**Optiflow™ Nasal Cannulae (Fisher & Paykel)**

Wide bore nasal prongs used as the interface between the delivery system and the patient.

**High Flow Oxygen Therapy other interfaces**

There are 2 other connectors for this therapy, one that attaches directly to a tracheostomy tube and another one that attaches itself to a mask.

**Airvo2 ™ (Fisher & Paykel)**

Humidifier with integrated flow generator that delivers warmed humidified oxygen and air mixture.

**Critical Care Outreach Team**

The remit of this team is to support ward staff in the identification and management of the patient at risk and the acutely ill ward patient.
3. Introduction

Humidified high flow nasal oxygen therapy (HFNT) has become an increasingly utilised modality for the management of patients with Type 1 respiratory failure\textsuperscript{1,2}. HFNT constitutes delivery of high inspiratory gas flow (up to 60 L/min with Airvo 2 \textsuperscript{TM}), warmed to body temperature, pressure saturated for optimal humidification and titrated oxygen content\textsuperscript{3} (21 – 85%).

Beneficial effects include:

- Reversal of hypoxaemia\textsuperscript{4,6}
- Reduced work of breathing\textsuperscript{5}
- Improved secretion clearance\textsuperscript{6}
- Possible avoidance of intubation
- Improved patient tolerance / comfort\textsuperscript{5}
- Unhindered feeding / speaking\textsuperscript{7}
4. Indications

- Adult patients with hypoxaemic / Type 1 respiratory failure
- Patients with an increased work of breathing
- Poor compliance with mask therapy where oxygen requirements are in excess of 4 L/min
- Increased secretion viscosity with an impaired ability to clear secretions
- Post-extubation oxygen therapy
- Weaning of or as a break from non-invasive ventilation

HFNT is comfortable and can be consider a bridge between standard oxygen therapy and CPAP. It does not deliver measurable CPAP. It removes some CO₂ due to the high flow washing off dead space. It can be use post extubation, as a break for NIV to facilitate feeding, physiotherapy, and speaking and mouth toileting. It can also be use in palliative care. It should not be use outside critical care as it can deliver over 50% oxygen, unless under critical care outreach supervision and responsibility.
5. Contraindications

ABSOLUTE

- Hypercapnic / Type 2 respiratory failure (e.g. pH < 7.35 with a PaCO2 >6kPa)
- Patients at risk of acute hypercapnic / Type 2 respiratory failure secondary to oxygen delivery
- Basal skull fractures
- Cerebro-spinal fluid (CSF) leaks
- Nasal passage abnormalities or recent nasal surgery
- Trauma, such as tracheal tear and oesophageal tear
- Severe epistaxis
- Respiratory arrest or peri-arrest / apnoea

RELATIVE

- Post-oesophagectomy/gastrectomy: discuss with surgeons and start flow at 30L/min
- Pneumothorax: discuss with senior doctor prior commencement of therapy. Patient to be care in critical care area.
6. Equipment

- Fisher & Paykel Airvo 2™ humidifier
- Optiflow™ nasal cannulae (OPT 844E, medium size) or Tracheostomy Direct Connection (OPT870)
- Heated breathing tube MR290 auto-fill chamber and adapter (900PT501)
- Oxygen green tubing (approx. 0.5 m)
- 1 litre bag sterile water for humidification
7. Principles of use in critical care

a. Discuss prior to commencement of high flow nasal oxygen therapy escalation strategy for patient.

b. Explain procedure to patient and offer reassurance. Obtain consent to treat.

c. Wash hands. Wear apron and gloves in line with Trust infection control standards.

d. Switch equipment on and check Airvo2™ is ready for use (check disinfection status).

e. Prepare equipment as per diagram and manufacturer’s instructions. Equipment should only be assembled by critical care staff or other appropriately trained and competent staff. All pieces of disposable equipment are single patient use only. Choose appropriate interface for patient.

f. Label equipment with date tubing change due (7 days).

g. Switch equipment on and configure target temperature and flow (up to 60 l/min flow). Adjust oxygen flowmeter to patient need (21-85% oxygen). For example, set temperature to 37°C (ideal if tolerated), and total flow to 35-40 L/min. Then adjust oxygen flowmeter to target oxygen saturation for patient. Increase or decrease total flow (increments of 5 L/min) aiming to match peak inspiratory flow for patient. If oxygen flowmeter is set at too high for the flow the equipment will alarm. Usually maximum FiO₂ is about 85-90%.

h. Allow Airvo2™ heated humidifier to reach required temperature.

i. Connect patient to equipment using appropriate interface.

j. Continuous monitoring of patient SpO₂, respiratory rate, blood pressure, heart rate, temperature, conscious level and fluid balance.

k. Document patient as on HFNT, FiO₂ and gas flow.
I. Repeat arterial or capillary blood gases within 30 minutes (sooner if patient conscious level deteriorates). Titrate FiO₂ to patient response.

m. Once therapy has been discontinued discard all disposables in appropriate waste and water for humidification in sluice. Equipment should be cleaned as per manufacture instructions.
8. Principles of use on non-critical care areas

a. High flow oxygen therapy will only be used outside critical care areas if the ward team has been trained for its use, is competent with the equipment and has clinician directed guidelines for its use. As an example ENT has been using high flow therapy via tracheostomy attachment on their post operative laryngectomy patients.

b. High flow oxygen therapy may be used on other ward areas only under the supervision of the critical care outreach team and only following agreement with the ward team after evaluating the risk/benefit to the patient.

c. The use of high flow oxygen therapy via nasal cannula (Optiflow) on the ward has to follow the principles of the oxygen guidelines for the trust. Patients needing continuous oxygen therapy at more than 50% for more than 4 hours should be escalated to a critical care area where his/her progress can be monitored safely. If the patient is not deemed to be for escalation to critical care, the ward team and the critical care outreach team should aim to achieve a compromise on the decision to continue high flow oxygen on a patient that is not improving and requiring continuing increases in oxygen therapy (FiO₂ more than 0.6) as this may be a reflection of a terminal process.
References


Competencies for the use of High Flow Oxygen Therapy

Pending
Manufacturer instructions

Setting up AIRVO 2™

1. BEFORE YOU BEGIN
The AIRVO 2 should be fixed on a pole mounting tray (900PT405) below patient head height. Open the packaging of the tube & chamber kit (heated breathing tube, MR290 auto-fill chamber and adapter).

2. INSTALL WATER CHAMBER
Remove the blue port caps from the chamber by pulling the tear tab upwards then remove the bracket holding the water supply tube. Fit the supplied adapter over the two vertical ports on the chamber and push on fully then clip the water supply tube into position.

Fit the water chamber to the unit by pressing down the finger guard and sliding the chamber on, carefully aligning with the blue chamber port ends. Push the chamber on firmly. When the chamber is fitted correctly the finger guard will click into place and there should be a gap of about 2 mm (1/16”) between the finger guard and the rim on the base of the chamber.

WARNINGS

- Do not start the unit without the water chamber in place.
- Do not use the auto-fill MR290 chamber if it has been dropped, or been run dry and the “water out” alarm has been activated.
- Do not touch the heater plate, water chamber or chamber base, as they become hot in normal use.
- When handling the unit with the water chamber in place, avoid tilting the machine to prevent any chance of water entering the unit enclosure.
- Empty all the water from the water chamber before transporting the unit.
- The water in the chamber becomes hot during use. Exercise caution when removing and emptying the chamber.

3. CONNECT WATER BAG
Attach the sterile water bag to the hanging bracket 20cm (8”) above the unit, and push the bag spike into the fitting at the bottom of the bag. Open the vent cap on the side of the bag spike. The chamber will now automatically fill to the required level and maintain that level until the water bag is empty. To ensure continual humidification, always ensure that the water chamber and/or water bag are not allowed to run out of water.

Check that water flows into the chamber and is maintained below the fill line. If the water level rises above the fill line, replace the chamber immediately.

<table>
<thead>
<tr>
<th>L/min</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>hrs</td>
<td>167</td>
<td>86</td>
<td>57</td>
<td>43</td>
<td>34</td>
<td>28</td>
<td>24</td>
<td>21</td>
<td>19</td>
<td>17</td>
</tr>
</tbody>
</table>
4. INSTALL HEATED BREATHING TUBE

One end of the heated breathing tube has a blue plastic sleeve. Lift the sleeve and slide the connector onto the unit. Push the sleeve down to lock.

⚠️WARNINGS

- Do not modify the breathing tube or interface in any way.
- Do not allow the breathing tube to remain in direct contact with skin for prolonged periods of time.
- Adding heat above ambient levels, to any part of the breathing tube or interface e.g., covering with a blanket, or heating it in an incubator or overhead heater for a neonate, could result in serious injury.
- Do not use an insulating sleeve or any similar accessories which are not recommended by Fisher & Paykel Healthcare.
- Position the heated breathing tube away from any electrical monitoring leads (EEG, ECG/EKG, EMG, etc), to minimize any possible interference with the monitored signal.

5. SELECT PATIENT INTERFACE

The AIRVO 2 can be used with a variety of patient interfaces. Read the separate user instructions for the patient interface that will be used, including all warnings.

<table>
<thead>
<tr>
<th>Nasal cannula</th>
<th>Tracheostomy Interface</th>
<th>Mask Interface Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPT842</td>
<td>OPT316</td>
<td>OPT870</td>
</tr>
<tr>
<td>OPT844</td>
<td>OPT318 (Refer to “Using AIRVO 2” - “Junior Mode”)</td>
<td>RT013 (with mask)</td>
</tr>
</tbody>
</table>

The following table shows the target dew-point temperature settings and target flow settings able to be used with these interfaces.

<table>
<thead>
<tr>
<th>900FT531</th>
<th>OPT316</th>
<th>OPT318</th>
</tr>
</thead>
<tbody>
<tr>
<td>900FT501</td>
<td>OPT842</td>
<td>OPT844</td>
</tr>
<tr>
<td></td>
<td>OPT846</td>
<td>OPT870</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RT013</td>
</tr>
</tbody>
</table>

⚠️WARNINGS

- Do not modify the breathing tube or interface in any way.
- Note that the RT013 Mask Interface Adapter is designed to be used with vented masks only. Do not use sealed masks.
- Do not use any patient interfaces not listed here.
Using AIRVO 2™

1. SWITCH ON UNIT
Plug the unit’s power cord into the mains power supply. The connector at the other end of the power cord should be well secured to the rear of the unit.

WARNING
- Ensure that the unit is dry before plugging into the power socket.

Switch on the unit by pressing the On/Off button.

2. CHECK DISINFECTION STATUS
The unit will show you whether it is safe for use on a new patient.

- This AIRVO 2 is safe for use on a new patient.
- This AIRVO 2 has not been cleaned and disinfected since last use.
- This AIRVO 2 is NOT safe for use on a new patient.

3. WARM-UP
The unit will begin to warm up. You will see numbers showing the current output dew-point temperature, flow and oxygen values. These numbers will pulse until they approach their target settings.

This screen is called the “Summary screen”.

4. JUNIOR MODE
If the patient will be using an Optiflow Junior nasal cannula (OPT316/ OPT318), you must activate Junior Mode.

Junior Mode limits the target settings to: 34 °C and 5 - 20 L/min.

To activate Junior Mode:
Hold the Mode button for 5 seconds.

New target settings
The target settings for dew-point temperature and flow will be changed automatically. The butterfly and bird in the corners of the screen indicate that this unit is in Junior Mode.

No “Check water” alarm in Junior Mode
The “Check water” alarm will not operate in Junior Mode due to the lower flows used. To ensure continual humidification, always ensure that the water chamber and/or water bag are not allowed to run out of water.

To deactivate Junior Mode, follow the same procedure: hold the Mode button for 5 seconds.
5. CONFIGURE TARGET SETTINGS
Press the Mode button to view target settings.
Those settings are locked by default.

TARGET DEW-POINT TEMPERATURE
You can set the AIRVO 2 to three target dew-point temperature settings:
• 37°C (98.6°F) [recommended]
• 34°C (93°F) [if compliance at 37°C is a problem]
• 31°C (88°F) [for face masks only].
You may not have access to all settings, if:
• the unit is in Junior Mode (limited to 34 °C),
• the unit was initially set up with tighter limits.
The AIRVO 2 will return to its default setting (37°C) after every disinfection cycle.

To change the target dew-point temperature setting:
Hold the Up and Down buttons for 3 seconds to “unlock” the setting.
The lock will disappear and be replaced by an arrow showing the minimum and maximum accessible settings.
Press the Down button.
The “37” changes to “34”.
When you have finished, press the Mode button to lock the setting again.
The lock will reappear.

Press the Mode button to move on to the next screen.

TARGET FLOW
You can set the AIRVO 2 to flows between 15 L/min and 50 L/min, in increments of 5 L/min.
You may not have access to all settings, if:
• the unit is in Junior Mode (limited to 5 - 20 L/min).
• the unit was initially set up with tighter limits.
The AIRVO 2 will remember its target flow setting when you switch it off.

To change the target flow setting:
Follow the same sequence of steps as above in “To change the target dew-point temperature setting.”
6. CONNECT YOUR PATIENT
Wait until the “Ready for use” symbol is displayed on the Summary screen.

“Ready for use” symbol

Connect the patient interface to the heated breathing tube. Monitor the flow and oxygen values displayed on the Summary screen. Adjust the level of oxygen from the oxygen source as necessary.

When the patient first uses the unit, the air will feel warm. This is normal. The patient should continue to breathe normally through the nose and/or mouth, or tracheostomy.

7. DURING USE
If the “Ready for use” symbol has been displayed for 5 minutes and no button has been pushed in this time, a screen saver will be launched.

If excess condensate accumulates in the heated breathing tube, drain by lifting the patient end of the tube, allowing the condensate to run into the water chamber.

8. AFTER USE
Switch off the unit by pressing the On/Off button.
# ALARMS

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault (E####)</td>
<td>A fault has occurred and the unit has been shut down. Switch the unit off and then restart. If the problem persists, note the fault code and contact your Fisher &amp; Paykel Healthcare representative.</td>
</tr>
<tr>
<td>Check for leaks</td>
<td>The most likely cause is that the water chamber has been removed or has not been pushed into place correctly. Check that the filter is fitted. Junior Mode: Check that the nasal interface is fitted.</td>
</tr>
<tr>
<td>Check for blockages</td>
<td>Check the heated breathing tube or patient interface for blockage. Check the air filter and filter holder for blockage. Check whether the unit should be in Junior Mode. If the patient will be using an Optiflow Junior nasal cannula (OPT316/OPT318), you must activate Junior Mode.</td>
</tr>
<tr>
<td>Check tube</td>
<td>The unit cannot detect the heated breathing tube. Check that the heated breathing tube is not damaged and that it is plugged in correctly. If the problem persists, then change the heated breathing tube.</td>
</tr>
<tr>
<td>Check water</td>
<td>Note that this alarm is not activated until the chamber has been dry for approximately 30 minutes. The chamber has run out of water. When a chamber runs dry, the chamber float may be damaged. Replace the chamber and water bag. Twenty seconds after the chamber is removed, the “Check for leaks” alarm is activated (see above). When the chamber is replaced, the unit enters Warm-up Mode and resumes normal operation. The “Check water” alarm will not operate in Junior Mode. To ensure continual humidification, always ensure that the water chamber and/or water bag are not allowed to run out of water.</td>
</tr>
<tr>
<td>O₂ too high</td>
<td>The measured oxygen level has exceeded the allowed limit. Adjust the level of oxygen from the oxygen source as necessary.</td>
</tr>
<tr>
<td>Cannot reach target temperature</td>
<td>The most likely cause for this is that the unit is operating at a high flow rate in low ambient conditions. You will be prompted for acknowledgement.</td>
</tr>
<tr>
<td>Cannot reach target flow</td>
<td>Check whether the target flow setting is too high for the patient interface being used (refer to “Setting up AIRVO 2” - “Select Patient Interface”). The unit will choose appropriate new target settings. You will be prompted for acknowledgement. Note: The oxygen concentration delivered to the patient can be affected by changes to the flow setting.</td>
</tr>
<tr>
<td>Check operating conditions</td>
<td>Do not use the device when the ambient temperature is less than 10°C. Do not use the device when the ambient temperature is greater than 30°C.</td>
</tr>
<tr>
<td>[Power out]</td>
<td>No visual alarm. The auditory alarm will sound for at least 120 seconds.</td>
</tr>
</tbody>
</table>
AIRVO ² ™ cleaning, disinfection and reprocessing

1. Cleaning the filters
2. Disinfecting the device
3. Rinsing the components
4. Drying the parts
5. Reassembling the unit
6. Sanitizing the patient interface
7. Checking the time
8. Adjusting the parameters
9. Setting the timer
10. Assembling the device
11. Reviewing the instructions
### Maximum period of use

<table>
<thead>
<tr>
<th>Part number and description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 week (single-patient use)</strong></td>
</tr>
<tr>
<td>All patient interfaces</td>
</tr>
<tr>
<td>OPT316 Nasal Cannula - Infant</td>
</tr>
<tr>
<td>OPT318 Nasal Cannula - Pediatric</td>
</tr>
<tr>
<td>OPT842 Nasal Cannula - Small</td>
</tr>
<tr>
<td>OPT844 Nasal Cannula - Medium</td>
</tr>
<tr>
<td>OPT846 Nasal Cannula - Large</td>
</tr>
<tr>
<td>OPT870 Tracheostomy Interface</td>
</tr>
<tr>
<td>RTO13 Mask Interface Adapter - 22mm</td>
</tr>
<tr>
<td><strong>2 weeks (single-patient use)</strong></td>
</tr>
<tr>
<td>All tube &amp; chamber kits</td>
</tr>
<tr>
<td>900OPT501 Heated breathing tube, MR290 auto-fill chamber and adapter</td>
</tr>
<tr>
<td>900OPT531 Heated breathing tube, MR290 auto-fill chamber and adapter (for use with OPT316/OPT318 only)</td>
</tr>
<tr>
<td><strong>3 months or 1000 hours</strong></td>
</tr>
<tr>
<td>900OPT424 Air filter</td>
</tr>
</tbody>
</table>

**FILTER REPLACEMENT**

If the unit tells you that a filter change is due:

1. Take the filter holder from the back of the unit and remove the filter.
2. Replace the old filter with a new one.
3. Reattach the filter holder to the unit (clip the bottom of the filter holder in first, then rotate it upwards until the top clips into place).
4. Press the Mode button to move on to the next screen.

**SERVICING**

This device contains no serviceable parts.