AquaVENT®

Heated Breathing Circuits
Why Humidification?

Normal Respiration

During normal respiration, inhaled gases are warmed and moistened as they pass from the upper respiratory tract to the lower airways of the lungs. When inhaled gases reach the tracheo-bronchial bifurcation they have been heated to 37°C and are fully saturated with water vapour at 44mg/H2O.L of gas - commonly referred to as saturation vapour density.

Mucociliary Transport System

The epithelia of the mucosal lining of the upper and lower airways is designed to provide filtered gases inhaled at optimal humidity levels and received at the alveoli at or close to saturation vapour density. The epithelia also provides defence mechanisms by trapping particles and microorganisms in mucous and transporting these particles by way of cilia vibration to the oropharynx where they can be ingested or expectorated. Interactions between cilia and mucus, which establish the mucociliary transport system, can be disrupted by various factors including inadequate humidification of inhaled gases.

Why Humidification in the Clinical Setting?

Humidity management in patients with bypassed airways is essential to maintain normal lung function and help protect against hospital acquired infections. Active humidification is a gold standard for longer term patients in critical care. Oxygen and medical air delivered invasively as dry gases, over sustained periods of time, will damage the epithelia of the respiratory tract and prevent adequate functioning of the mucosal tissue in contact with the dry gases.

Inadequate humidification, in patients with bypassed airways, can disrupt secretion mobility across the mucociliary transport system, leading to thickening of secretions, infective secretions, atelectasis or systemic infection and has been reported to increase work of breathing and cause dehydration.

Maintaining secretion transport across the mucosal epithelium leads to better patient outcomes. This can be achieved by delivering optimal humidification to the mechanically ventilated patient with bypassed airways.

In respect of non-intubated patients, provision of non-invasive respiratory therapies without adequate humidification can cause patients to experience discomfort and irritation of the upper airway mucosa, causing lack of patient co-operation and poor therapy outcomes.

References:
AquaVENT® Technology for Invasive Ventilation

Heater Humidifier
- For use with heated breathing circuits.
- Invasive or non-invasive mode selection.
- Automatic temperature selection.
- Low and high temperature alarm.
- Over-temperature protection.
- Real-time temperature tracking display allows heated plate chamber and airway temperature to be viewed.
- Digital display.
- Straightforward operation and set up.

Heated Wire
- Unique figure-of-eight heated wire design.
- Electrical heating elements minimize formation of water condensate.
- Heating elements energize the tubing, creating an insulator to heat loss.
- Wire design and configuration within the circuit ensures that inspiratory gases heat to 40°C before cooling to 37°C at >90% humidity at the tracheo-bronchial bifurcation and gas temperature rises along the expiratory limb to minimize formation of water condensate in the tubing or ventilator exhaust path.

Chamber Humidity Output

Chamber
- Internal chamber design ensures ideal conditions to allow optimal humidification of gases from the ventilator.
- Compared to other commonly used chambers the AquaVENT® humidification chamber produces a level of humidity closer to 44mg/H₂O.L over a range of tidal volumes.
- Refills automatically.
- Pinch clamp on feed line allows circuit leak testing with chamber in situ.
- Compatible with many common heater humidifiers.
AquaVENT® Technology for Non-Invasive Ventilation

High flow humidified oxygen therapy

- Provision of high flow humidified oxygen therapy via nasal cannulae reduces CO₂ rebreathing, decreases work of breathing, improves oxygenation through alveolar recruitment and causes less discomfort to the patient than low flow oxygen therapy. [9]
- Armstrong Medical’s circuits for oxygen therapy are compatible with a variety of air oxygen blenders and nasal cannulae patient interfaces.

Bi-Level & CPAP

- Failure to humidify gas, even during short term non-invasive ventilation, results in patient discomfort and may affect the success of therapy. Humidification improves patient comfort and therefore tolerance and enhances airway function and secretion removal [10].
- An extensive range of heated circuits and mask interfaces suitable for the provision of Bi-level ventilatory support and High Flow CPAP are available.
- Circuits can be customised to include masks, headgear and PEEP Valves.
- Customisable circuit kits improve the efficiency of therapy implementation.
- As an alternative flow source to MaxVenturi®, MaxBlend® provides flows up to 120L.min and is available for High Flow CPAP applications.


(2) Branson R, Gentile M. Is humidification always necessary during noninvasive ventilation in the hospital? Respir Care 2012; 57(2):209-216

MaxVenturi®

MaxVenturi® has been specially designed to interface with high flow humidification systems. This unit provides users with the ability to mix ambient air and oxygen without the need for piped medical grade air, making it the perfect solution for high flow therapy in almost any clinical environment.

Key Features

- All-in-one oxygen/air mixer, MaxO₂+ analyser and flow meter.
- Flow rates of up to 60L.min.
- Long battery life (approximately 5,000 hours).
- Independent adjustable O₂% and flow.
- Built-in pole clamp.

MaxVenturi® has been specially designed to interface with high flow humidification systems. This unit provides users with the ability to mix ambient air and oxygen without the need for piped medical grade air, making it the perfect solution for high flow therapy in almost any clinical environment.

Armstrong Medical’s circuits for oxygen therapy are compatible with a variety of air oxygen blenders and nasal cannulae patient interfaces.

High flow humidified oxygen therapy

- Provision of high flow humidified oxygen therapy via nasal cannulae reduces CO₂ rebreathing, decreases work of breathing, improves oxygenation through alveolar recruitment and causes less discomfort to the patient than low flow oxygen therapy. [9]
- Armstrong Medical’s circuits for oxygen therapy are compatible with a variety of air oxygen blenders and nasal cannulae patient interfaces.

Bi-Level & CPAP

- Failure to humidify gas, even during short term non-invasive ventilation, results in patient discomfort and may affect the success of therapy. Humidification improves patient comfort and therefore tolerance and enhances airway function and secretion removal [10].
- An extensive range of heated circuits and mask interfaces suitable for the provision of Bi-level ventilatory support and High Flow CPAP are available.
- Circuits can be customised to include masks, headgear and PEEP Valves.
- Customisable circuit kits improve the efficiency of therapy implementation.
- As an alternative flow source to MaxVenturi®, MaxBlend® provides flows up to 120L.min and is available for High Flow CPAP applications.


Key Features

- All-in-one oxygen/air mixer, MaxO₂+ analyser and flow meter.
- Flow rates of up to 60L.min.
- Long battery life (approximately 5,000 hours).
- Independent adjustable O₂% and flow.
- Built-in pole clamp.
Antimicrobial Silver Technology

AquaVENT® heated breathing circuits are supplied with BioCote®, an antimicrobial silver additive to limit the numbers of microbes on the surface of the breathing circuit, protecting it from microbial colonisation. BioCote® technology in AquaVENT® heated breathing circuits uses inorganic silver ion particles dispersed homogeneously throughout the polymer used to form components of the breathing circuit. BioCote® technology is based on silver, a safe, natural and sustainable antimicrobial.

1. Silver Ions Cause Conformational Changes in Microbial Proteins

Silver ions combine with microbial proteins located in the cell wall and cytoplasm, which interferes with their normal functioning.

These proteins are vital for the healthy functioning of the cell. This loss of function results in an overall inhibition of microbial growth.

2. Silver Ions Interfere with DNA Replication

Silver ions are known to interfere in the way microbes copy their genetic material or DNA. Microbes, like most living cells, have to make copies of their DNA during reproduction.

Silver ions stop the microbes replicating by blocking the copying of their genetic material.

3. Silver Ions Promote Formation of Reactive Oxygen Species

Silver ions are known to promote the formation of harmful chemicals called reactive oxygen species (ROS) inside microbial cells.

ROS are harmful to living cells because they cause significant damage to cell structures. Damage caused by ROS is a major contributor to functional decline, characteristic of aging, that results in further inhibition of microbial growth.

BioCote® antimicrobial protection is effective against a broad spectrum of micro-organisms.
Therapy Solutions

Invasive Ventilation

Non - Invasive Ventilation

AMVC1775/115

AMVC1792/004
Therapy Solutions

Non - Invasive Ventilation

AMCP1409/021

Non - Invasive Ventilation

AMHO1509/001
AquaVENT® Family

Non Invasive Ventilation Face Masks
Comfortable, well fitting, non invasive patient interfaces are key to patient compliance and therapy outcomes. Armstrong Medical’s range of masks and headgear are designed to increase compliance rates with anatomically shaped masks and improved sizing options.

Comfort-Fix
Comfort-Fix tube holders provide a secure method of holding endotracheal and tracheostomy tubes in position. The tube holders use an adhesive-backed tab which affixes easily to the tubes and fits comfortably to the patient.

The Velcro® locking strip securely holds the tube in place without requiring additional fixing methods. The Velcro® fasteners can easily adjust to fit most neck sizes, simply by lifting and placing neckband tabs.

Catheter Mounts
Armstrong Medical offer an extensive range of catheter mounts for anaesthesia and critical care applications.

Catheter mounts are available in limblite corrugated tubing, smooth bore tubing and extendible tubing. A variety of patient elbows are available for gas monitoring, airway suctioning and fibre optic bronchoscopy.

Low deadspace catheter mounts are available in corrugated tubing and smooth bore tubing. Catheter mounts can be further customised by attaching associated products including filters, face masks and Spirale® DDS.

Spirale® DDS
Spirale® DDS is a collapsible volumising spacer device designed to deliver aerosolised micro-drug particles from an MDI canister, specifically intended for the delivery of pulmonary medication in ventilated patients.

Spirale® provides optimal drug delivery while eliminating environmental drug pollution and maintaining a closed breathing circuit.

Spirale® is designed to remain in the patient circuit for up to 7 days and can be used with invasive or non invasive breathing circuits.

HME Filters
This extensive range of filters offers the user high quality devices for delivery of passive humidification. High levels of filtration and humidification efficiency are present throughout the range. The range offers the following features:

- HME filters with humidification efficiency up to 33mg/H2O.L.
- Different filter options including ports, angles and elbows to ensure the right choice of device.
- Conical fittings are in accordance with ISO standards to ensure good connection stability.
- Initial set up is simple, quick and secure.

Combi-Flex®
Combi-Flex® 3-in-1 is a passive humidification alternative to AquaVENT® systems for the management of ventilated patients. A lightweight, single limb coaxial system which generates a thermally efficient micro-climate and provides optimal humidification, drug delivery and filtration.

Combi-Flex® 3-in-1 incorporates a HEPA filter HME and is also available with Spirale® DDS which reduces the need to break the patient circuit for drug nebulisation.
Armstrong Medical manufacture a complete range of disposable respiratory products for anaesthesia and critical care applications. For supply of these products or any product within the Armstrong Medical range, please contact your local representative.

All Armstrong Medical products are manufactured to quality systems under ISO 13485 and EC Directive 93/42/EEC.

Distributed by: