



# HiOx Non-Rebreather with Filter

**The problem is, how to deliver oxygen to a patient who is in isolation for febrile respiratory infection (FRI) or airborne precautions such as COVID-19?**

The HiOx NRB mask with a filter accomplishes this task by a closed patient breathing system that delivers oxygen enriched gas with no exhaled aerosols.

- Delivers the highest FiO<sub>2</sub> at the lowest O<sub>2</sub> flow rates. 8lpm delivers >80% O<sub>2</sub> at the alveolar level. Typical NRB delivers 45% max.
- A respiratory filter can be added to the HiOx to filter exhaled breath. Low resistance HEPA filters are recommended and sold separately.
- Optional nebulizer elbow adapter allows for nebulized treatments to be delivered to patient requiring high levels of oxygen or in isolation for FRI.
- Oxygen conserving. Ideal for transports. Lower flow rates means longer lasting tanks.
- Ideal for Heliox delivery.



*Invented by Dr. Joseph Fisher,  
department of anesthesia UHN Toronto*

**Form Follows Function**

— Louis Sullivan, 1896

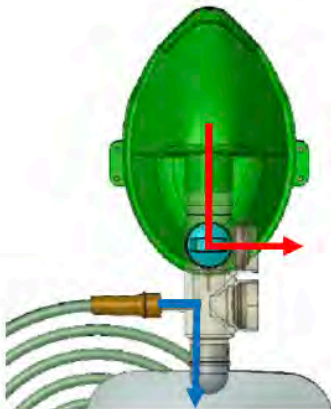


**SUPPORT THROUGH EXPERIENCE**

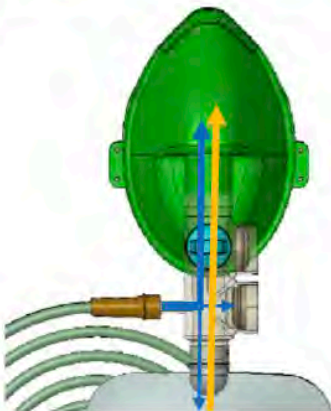
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## How the Hi-Ox - High FiO<sub>2</sub> Oxygen Mask Works

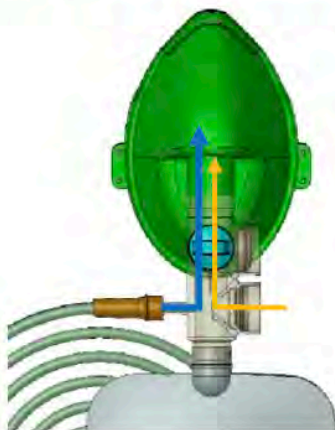
To maximize delivered inspired oxygen, exhalation holes in the mask which, also dilute inspired oxygen, were removed. The 3-valve system separates the reservoir bag inspired oxygen from the exhalation path to the room. The Hi-Ox's third dilution valve's slightly higher cracking pressure, opens only once the reservoir bag is emptied, so that room air is sequentially added at the end of the inspired breath. Taking advantage of the patient's approximate 150 ml anatomic deadspace, which does not participate in gas exchange, the oxygen concentration of that gas in the airways becomes immaterial to the delivered FiO<sub>2</sub> to the alveoli.



During exhalation, the patient's breath flows only out the exhalation valve. There are no holes in the mask for exhaled flow. During this time, the oxygen flow entering the Hi-Ox fills the inspiratory reservoir.



During the patient's inspiration, 100% oxygen entering the Hi-Ox flows up through the inspiratory valve to the facemask without the dilution from holes in conventional masks. The oxygen source also applies closing pressure against the dilution valve and fills the inspiratory reservoir.



If the patient's inspiratory demand exceeds the .75-liter reservoir (and the reservoir has emptied), the dilution valve will open and fill the patient's deadspace with room air. Filling non-gas exchange deadspace limits reductions in alveolar oxygen.

## Why use HiOx to deliver nebulized medications?



Mini Nebulizer treatment without a HiOx Mask

The addition of the HiOx Nebulizer adapter onto the HiOx Mask with a filter, allows for the attachment of a small volume nebulizer for nebulized medication treatments without the aerosol and the dangers associated with aerosol born pathogens. The HiOx Mask with a filter can also be used to deliver drugs that could be harmful to healthcare workers and family.



CE22-90022 Nebulizer adapter 50/box

## Does the filtered NRB you are using have references?

HiOx reference can be found at <http://www.twelfthmantec.com/reference-articles/>

[1977 Redding\\_O2 Concentrations Common Delivery Systems South Anesth](#)

[1980 Woolner\\_Variable Venturi Type Oxygen Masks\\_AIC](#)

[2002 Somogyi\\_Hi-Ox Case Report\\_RT](#)

[2004 Ontario Ministry Health Directive\\_Hi-Ox Use High Risk Non-Outbreak](#)

[2004 Ontario Ministry Health Directive\\_Hi-Ox Use High Risk Outbreak](#)

[2004 Somogyi\\_Dispersal Respiratory Droplets Oxygen Delivery\\_Hi-Ox Use\\_Chest](#)

[2005 Hinkelbein\\_Hi-Ox-Inflight Evaluation\\_Mannheim](#)

[2005 Canadian Defense Force\\_Hi-Ox Evaluation for Mass Casualty](#)

[2006 Slessarev\\_Hi-Ox Performance Evaluation\\_CCM](#)

[2007 Canadian Defense Force\\_Hi-Ox Aeromedical Evacuation at 8000 Feet](#)

[2011 Roche-Capo, Brochard\\_Helium Oxygen Delivery with the Hi-Ox\\_ICM](#)

[2012 Martin\\_Helium Oxygen Delivery with the Hi-Ox vs NRM\\_MGR](#)

[2007\\_Harris\\_Aerosolized iloprost with the Hi-Ox\\_RC](#)

[2005\\_Gilmore\\_Retinal Vascular Testing with the Hi-Ox\\_AmJPhysiolHeart](#)

## HiOx REFERENCES

- [2008 Gilmore Retinal Hemodynamics with the Hi-Ox InvestOphal](#)
- [2009 Balaban Hi-Ox for CO2 Control Resp Med](#)
- [2010 Kabon Hi-Ox Increases Tissue Oxygen Obes Surg](#)
- [2008 Hinkebein Hi-Ox Oxygen Performance for Helicopters Air Med J](#)
- [2004 Bouak Hi-Ox Advanced Oxygen Delivery Can Defence](#)
- [2006 Bouak Hi-Ox for Mass Casualty Can Defence](#)
- [2006 Hinkelbein Comparing the Hi-Ox to NRBM EJ Anesth](#)
- [2008 Khaw Hi-Ox for SARS in Hong Kong HK J Med](#)
- [2006 Slessarev Hi-Ox in the Emergency Department Israeli J Emer](#)
- [2007 Hui Exhaled Aerosol Dispersal with Simple O2 Masks Chest](#)
- [2013 Chang Comparing the Hi-Ox with Southmedic and BLS Masks RT](#)