Ventrain®, for small lumen ventilation
Ventilation principle

The unique and proprietary Expiratory Ventilation Assistance (EVA<sup>®</sup>) technology enables active expiration by suction. As such, EVA<sup>®</sup> shortens expiration time, increases the achievable minute volume and reduces the risk of air trapping and the associated risks of barotrauma and circulatory collapse.

The mechanism of EVA<sup>®</sup> is explained by the cross section of Ventrain<sup>®</sup> above. The gas flows via the inlet ① through a very narrow nozzle ② and exhaust pipe ③ to the outside. This flow entrains gas from port ④, which is connected to the catheter, inducing active expiration. Closing exhaust pipe ③ results in inspiration through port ④. The bypass ⑤ functions as an on/off switch. When opened, there is no significant positive or negative pressure at the catheter tip, resulting in equilibration/safety mode. While conventional ventilation depends on relatively high gas flows to obtain an effective gas exchange in the lungs and jet ventilation relies on high inspiration pressures, the EVA<sup>®</sup> technology enables both active inspiration and active expiration, promoting gas exchange by the resulting turbulences in the lungs.

The advantages of Ventrain:
- more therapeutic options in cases involving difficult airways;
- effective, full ventilation of a patient with an obstructed upper airway;
- connection for side-stream capnometry.
Ventrain

Ventrain® is a single-use ventilation device based on a fundamentally new ventilation principle: EVA®. Dedicated to manage difficult airway situations, Ventrain is easy in use as inspiration and expiration are initiated by using just a thumb (see figures on the left). Only requirement is O₂ from a high pressure gas source, with a pressure compensated flow meter. Flow may range from 4 L/Min for pediatric to 15 L/Min for adult patients. The pressure at the catheter’s distal end will not be higher than needed to provide the desired inspiration flow.

Effective, full ventilation in case of an obstructed upper airway
Ventrain® is the only ventilation device that provides for full ventilation in an obstructed airway situation. Ventrain® supplies O₂ during inspiration and actively removes the expiratory gases during expiration. The latter significantly reduces the risk of barotrauma and circulatory collapse and results in proper CO₂ clearance from the lungs. Ventrain® in combination with the transtracheal catheter Cricath® re-establishes adequate oxygenation levels quickly as an I/E of 1:1 and a minute volume of 6 L/min can be obtained.

Connection for capnometry
Ventrain® has an additional connector for a side-stream capnometer*.

* Not applicable in the USA
Cricath®, our cricothyrotomy catheter with an inner diameter of 2 mm, is specially designed to be used with Ventrain®. Following the standard procedure, the airway is accessed by inserting the needle through the cricothyroid membrane. The flange of the catheter will then adjust itself to the anatomical characteristics of each patient.

**female luer** for connection to ventilation devices

**flexible flange** with different options for proper fixation (strap, suture)

flange with a **tilting mechanism** which adapts to the patient’s neck and which reduces the risk of kinking of the lumen

**anatomically curved needle** for easy insertion

strong and flexible 70 mm lumen of **high grade Teflon®**

**Cricath, the smart choice:**
- tilting mechanism: reduced risk of kinking;
- small bore: minimally invasive;
- curved needle: easy insertion.

*Ventrain® and Cricath® are protected by a patent application and a design registration.*
Applications

Upper Airway Surgery
To increase working space and view of the surgeon and to prevent an airway emergency, Ventrain® can be connected to a small lumen tube, such as an airway exchange catheter, hollow “gum elastic bougie” or the working channel of a bronchoscope. Alternatively, Ventrain® can be connected to a transtracheal catheter such as Cricath®, bypassing the upper airway obstruction (e.g. a carcinoma).

Ventilation of the non-dependent lung
Ventrain® enables full ventilation of the non-dependent lung without notable re-inflation, decreasing the risk of hypoxemia and hemodynamic instability due to shunt, while maintaining working space and view for the surgeon. Also, Ventrain® can be applied to enhance collapse initiation, ultimately resulting in a more effective lung collapse, and to re-inflate the lung.

Emergency
Ventrain® is the only ventilation device that provides for effective ventilation in “Cannot Intubate, Cannot Ventilate” situations, diminishing the risk of barotrauma. As such, Ventrain® is a life saver. A fast tracheal entrance is assured using the minimally invasive, small bore cricothyrotomy catheter Cricath® Adult. For pediatric cases the use of a small endotracheal catheter with a firm guide wire is advised, such as a 1.6 mm ID pediatric airway exchange catheter.
The creators

Prof. Dr. Enk, MD (anesthesiologist) is kindly acknowledged for inventing Ventrain®. Prof. Enk, specialized in airway management for 20 years, has committed himself to enable safe and efficient ventilation through a ‘straw’. In close collaboration with Prof. Enk and his research group, Ventinova® has translated his initial idea into Ventrain®. Ventinova® has also developed Cricath®.

Ordering information*

1. Ventrain®
2. Ventrain® Emergency Kit containing:
   • Ventrain®
   • Cricath®
3. Cricath® (packed with syringe and neck strap)

* All products are single use and sterile

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