



Breathing Filters, HMEs and HMEFs



Use of Breathing Filters

Breathing filters provide an effective barrier that prevent cross contamination between patients, respiratory breathing systems, equipment and the clinical environment. Their use is widely recognized as beneficial and is recommended by a number of Anaesthetic Associations¹.

The threat to patients is varied

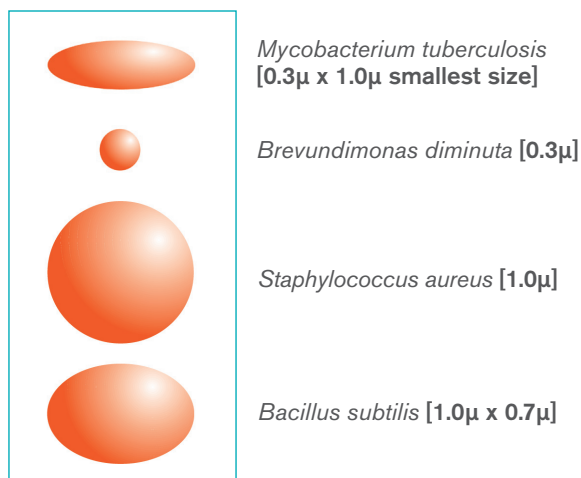
Patients who require an artificial airway have their natural physiological protection bypassed. This will increase the risk of cross contamination between patients and healthcare equipment. The cross contamination of patients via an anesthetic system has been reported, and documented areas of concern regarding infection includes *Hepatitis C* and *Mycobacterium tuberculosis*.

Critically ill patients are commonly at risk of infection, particularly from Ventilator Associated Pneumonia (V.A.P.). This nosocomial infection increases morbidity and potential mortality as well as the cost of treatment costs. The strategic use of an efficient breathing filter will provide an effective barrier between patients, breathing systems and ventilatory equipment.

Proven efficiency

The Intersurgical range of breathing filters has been designed for the protection of the patient, breathing system and equipment. They have been independently tested and proven to be highly efficient in preventing the passage of bacteria and viruses. Clinically relevant testing is carried out on all products using *Bacillus subtilis* (1.0µm x 0.7µm) and Ø174 bacteriophage. Additional testing includes *Mycobacterium tuberculosis* (0.3µm x 1.0µm), *Hepatitis C* (0.03µm) and *MS-2 coliphage* (0.02µm). These tests provide you with clinically relevant information to allow evidence-based decisions to be made on the most appropriate product to meet your clinical requirements.

Potential infectious bacteria [Particle sizes µ microns]



Essential requirements

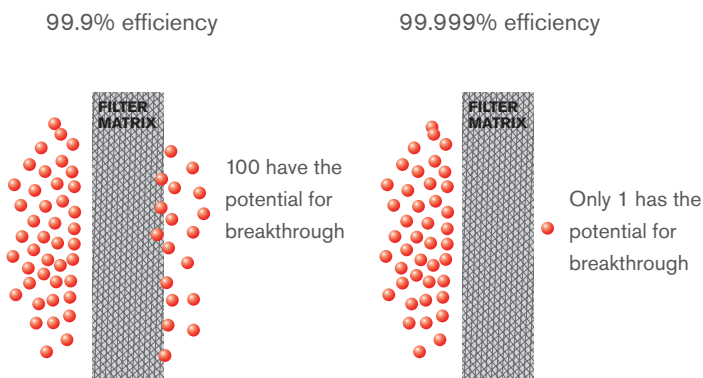
The Intersurgical range of breathing filters offers a choice of electrostatic and pleated mechanical filters with a range of patient connections, providing a choice of products to meet various clinical situations.

- Independently validated Filtration Efficiency²
- Proven filtration against *Mycobacterium tuberculosis* and *Hepatitis C*
- Proven efficiency not affected by anesthetic agent
- Safe inert material
- Option of patient connections – conveniently packed and ready for use
- Lightweight – reducing patient trauma
- Low compressible volume – reducing rebreathing of CO₂
- Low resistance to flow – over 24 hours
- Safe, secure ISO connectors
- Compliance to all relevant international standards

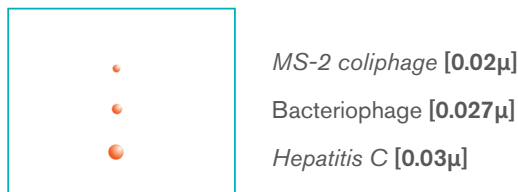
Filtration efficiency

Filtration performance is determined by independent microbiological testing against clinically relevant bacterial and viral challenges. The level of breakthrough of the challenge determines the efficiency. This efficiency is reported as a percentage based upon this breakthrough.

Filtration Efficiency based on a challenge of 100,000 Microbes



Potential infectious viruses [Particle sizes µ microns]



1. Association of Anaesthetists of Great Britain and Ireland 1996. Danish Society of Anaesthetists 1998. French Society of Anaesthetists 1998.

2. All filters are independently validated for filtration efficiency at the Health Protection Agency, Porton Down, Salisbury, Wiltshire, U.K and Nelson Laboratories Inc, USA.

All quoted performance figures are mean values.

The breathing filter range

The Intersurgical range of breathing filters has been designed for the protection of the patient, breathing system and equipment.

Filta-Guard™

High-efficiency

The high-efficiency Filta-Guard is a dedicated breathing filter designed for use in breathing systems in anesthesia and intensive care, for the protection of the patient, hospital personnel and the equipment from potential microbial contamination. The Flow diffuser improves performance and optimizes resistance to flow.




Code	1944000
Box Qty.	70
Filtration efficiency	>99.999%
Resistance to flow at 30L/min	1.0cm H ₂ O
Resistance to flow at 60L/min	2.3cm H ₂ O
Compressible volume	67ml
Weight	40g
Connectors	22ID – 22OD/15ID
Minimum tidal volume	>200ml

Inter-Guard™ range

Sterile

The Inter-Guard range of sterile breathing filters is designed for use in breathing systems in the operating room and the intensive care unit for the protection of the patient, breathing system and equipment. The perfect combination between size and performance.



Code	1344007S 	1344000S 	1344711S 
Box Qty.	50	50	50
Luer lock port		✓	
Filtration efficiency	>99.998%	>99.998%	>99.998%
Resistance to flow at 30L/min	0.8cm H ₂ O	0.8cm H ₂ O	1.1cm H ₂ O
Resistance to flow at 60L/min	2.0cm H ₂ O	2.0cm H ₂ O	2.7cm H ₂ O
Compressible volume	41ml	42ml	41ml*
Weight	22g	23g	36g
Connectors	22ID/15OD - 22OD/15ID	22ID/15OD - 22OD/15ID	22ID/15OD - 22OD/15ID
Minimum tidal volume	>150ml	>150ml	>150ml
Accessories			Superset™ catheter mount

 Sterile

* Filter Only

Clear-Guard™ range


The Clear-Guard range of breathing filters includes a number of options. This range has been designed for use in breathing and anesthetic systems for the protection of the patient, hospital personnel and the equipment from potential microbial contamination. Designed with a rounded ergonomic polypropylene housing, the Clear-Guard 3 represents our most cost-effective filter option. The Clear-Guard Midi low-volume filter provides a further option with minimum deadspace; it is ideal for use in anesthesia.



Clear-Guard Midi



Clear-Guard 3

Code	1644000 	1544000
Box Qty.	100	150
Luer lock port	✓	✓
Filtration efficiency	>99.9%	>99.99%
Resistance to flow at 30L/min	0.7cm H ₂ O	0.8cm H ₂ O
Resistance to flow at 60L/min	1.8cm H ₂ O	1.9cm H ₂ O
Compressible volume	34ml	60ml
Weight	19g	28g
Connectors	22ID – 22OD/15ID	22ID/15OD – 22OD/15ID
Minimum tidal volume	>100ml	>200ml



 illustrated

Hydro-Guard™ Mini

Pleated membrane filter

A versatile, low-volume breathing filter with a pleated mechanical membrane for use in anesthesia as an HMEF (moisture return: 24.3mg H₂O/L at VT 500ml), or in ICU as a filter only.

Code	1745000
Box Qty.	40
Luer lock port	✓
Filtration efficiency	>99.999%
Resistance to flow at 30L/min	1.3cm H ₂ O
Resistance to flow at 60L/min	2.9cm H ₂ O
Compressible volume	63ml
Weight	30g
Connectors	22ID/15OD – 22OD/15ID
Minimum tidal volume	>200ml



Flo-Guard

Low-resistance breathing filter for CPAP and bilevel

The Flo-Guard provides a combination of filtration performance with low-resistance. It is ideal for use in both the hospital and the home, where high flow rates may be used, including CPAP, bilevel and cough-assist applications. The Flo-Guard breathing filter is designed to be used at the machine-end of a breathing system to protect the patient and machine against cross contamination, while maintaining a low resistance across a wide range of flow rates.

Code	1690000
Box Qty.	50
Filtration efficiency	>99.99%
Resistance at 30L/min	0.4cm H ₂ O
Resistance at 60L/min	0.8cm H ₂ O
Resistance at 90L/min	1.4cm H ₂ O
Resistance at 120L/min	2.0cm H ₂ O
Resistance at 150L/min	2.7cm H ₂ O
Resistance at 180L/min	3.4cm H ₂ O
Resistance at 210L/min	4.3cm H ₂ O
Resistance at 240L/min	5.1cm H ₂ O
Compressible volume	80ml
Weight	27.8g
Connectors	22ID – 22OD

Electrostatic filter media

Providing an excellent filtration efficiency

Large surface area

To reduce resistance to flow

Clear housing

For good visibility

Conical shape

To aid airflow



Air-Guard Clear

For use in respiratory systems and oxygen concentrators

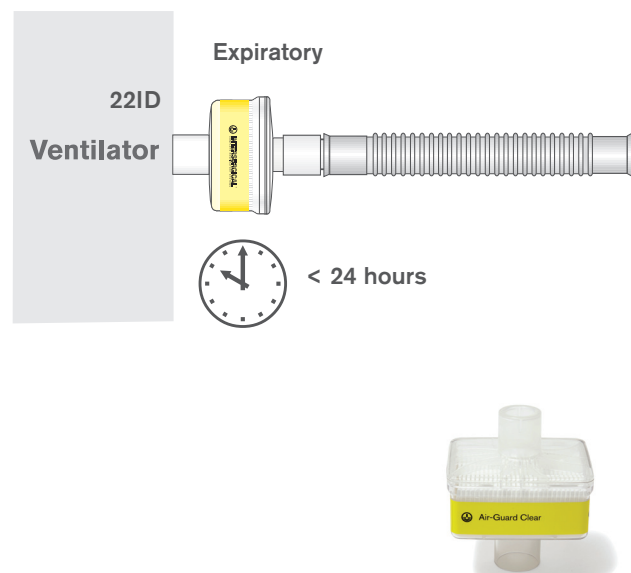
The Intersurgical Air-Guard Clear is a hydrophobic pleated mechanical filter, designed for the protection of oxygen concentrators and other respiratory equipment.

Providing an excellent level (>99.9999%) of protection against bacterial and viral challenges, the Air-Guard Clear's product performance has been tested, validated and verified at independent microbiological laboratories.

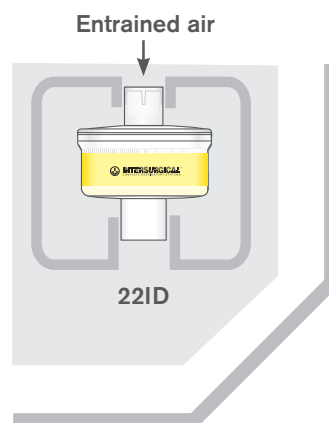
The Air-Guard Clear's pleated mechanical filter is validated for 24-hours use, but this can be extended when used in non-humidified gas flow. The product can be used for extended periods of time for the protection of oxygen concentrators, upon the discretion of the clinician.

Please note: this product is contraindicated for use at the patient connection end of the breathing system.

Respiratory system protection



Oxygen concentrator protection



Code	1790000
Box Qty.	50
Filtration efficiency	>99.9999%
Resistance to flow at 30L/min	0.9cm H ₂ O
Resistance to flow at 60L/min	1.9cm H ₂ O
Compressible volume	120ml
Weight	56g
Connectors	22ID – 22OD/15ID
Minimum tidal volume	>360ml

Inter-Therm™ T+

The Inter-Therm T+ is a heat and moisture exchange device designed for use with spontaneously breathing patients to reduce loss of heat and moisture during respiration.

When a patient has a tracheostomy, the normal process of temperature and moisture maintenance is bypassed by the insertion of the tracheal tube. The possible loss of heat and moisture can lead to serious complications, notably damage to

cilia and the mucous glands.

This in turn may result in retention of sputum and atelectasis, production of mucous plugs and potential tube occlusion.

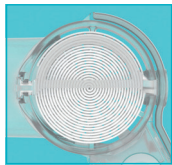
The Inter-Therm T+ has a number of unique features that make it an ideal product for prolonged use with spontaneously breathing patients.

Clipped suction port

Allows easy access for suctioning without removing the device

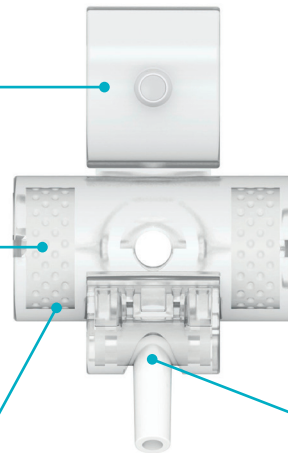
Clear housing and white HME elements

Optimizes visualization of possible pulmonary secretions



Unique corrugated paper design

Provides perfect combination between humidification output and low resistance to flow



Small and lightweight

Reduces pull and drag on the patient's airway

Optimal humidification

Reduces the side effects associated with breathing cold dry gases over a prolonged period of time

Integrated swivel oxygen connector

Allows for quick and convenient connection of supplemental oxygen and can be folded away when not in use

Code	Description	Length	Box Qty.
1875000	Inter-Therm T+ HME		100*
1875000S	Inter-Therm T+ HME - Sterile		100
1875001	Inter-Therm T+ HME with oxygen tube	1.8m	40
1875001S	Inter-Therm T+ HME with oxygen tube - Sterile	1.8m	20




Average Fi O₂ at variable O₂ flow rates

Code	1875000(*S)	1875001(*S)
Moisture loss	13.1mg H ₂ O/L	13.1mg H ₂ O/L
Moisture return	26.1mg H ₂ O/L	26.1mg H ₂ O/L
Resistance at 30L/min	0.4cm H ₂ O	0.4cm H ₂ O
Resistance at 60L/min	1.1cm H ₂ O	1.1cm H ₂ O
Compressible volume	19ml	19ml
Weight	9g	9g
Connectors	15ID	15ID
Minimum tidal volume	>60ml	>60ml
Accessories		1.8m oxygen tube

Oxygen (L/min)	Fi O ₂ at 15 BPM
1	26.4%
2	31.8%
3	35.0%
4	38.2%
5	41.8%
6	44.9%
7	47.4%
8	49.6%

* Case Qty.

 Sterile option available

(*S) Add an S to the seven digit code number for the sterile version of this product eg.1875000S (sterile box quantity is shown in brackets).

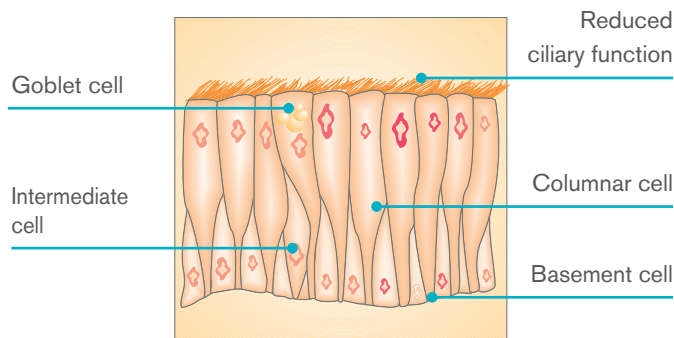
Heat and Moisture Exchangers (HMEs)

In normal respiration the anatomy of the upper airway helps to warm and humidify inspired air, and to retain the warmth and moisture contained in expired air. During inspiration, even cold or dry air is typically heated to 37 °C and, fully saturated, contains 44mg H₂O per liter. In mechanical ventilation or anesthesia, the patient's upper airway may be bypassed by the introduction of a tracheal tube. As a result, the patient's lungs may be confronted with cold, dry, inspired gas.

Prolonged exposure to dry ventilatory gases can lead to:

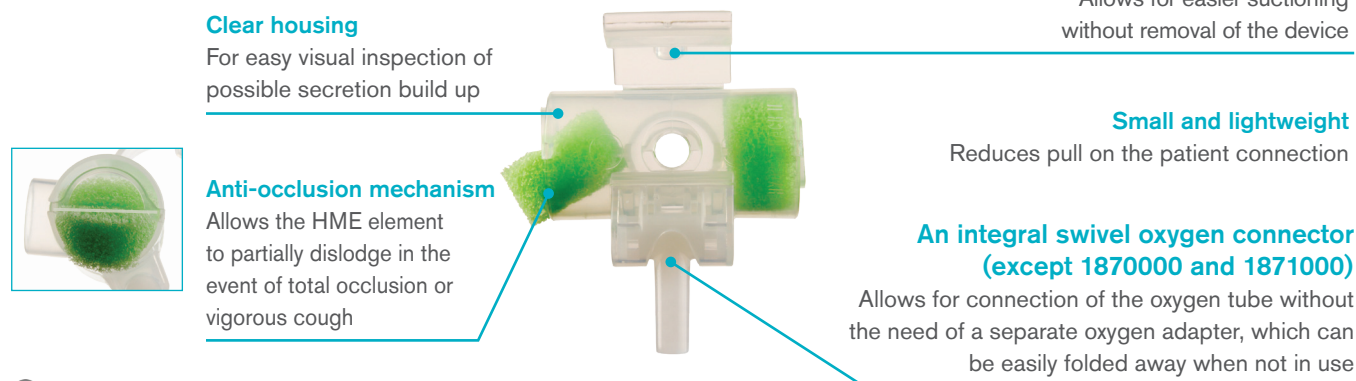
- Localized inflammation of the trachea
- A reduction in ciliary function
- Retention and thickening of secretions
- Lowering of patient temperature
- Reduction in cardiopulmonary function
- Increased risk of tracheostomy tube occlusion
- Extended duration and cost of care

Respiratory epithelium adversely affected by heat & moisture loss



Hydro-Trach™ T range

A heat and moisture exchanger designed for use on tracheostomized patients. The Hydro-Trach T is an ideal product for prolonged use with spontaneously breathing patients.



▶ Video available at www.intersurgical.com

Code	1873000	1874030	1870000	1871000
Box Qty.	25	40	100**	40
Moisture loss	13.2mg H ₂ O/L	13.2mg H ₂ O/L	13.2mg H ₂ O/L	13.2mg H ₂ O/L
Calculated moisture return	26mg H ₂ O/L	26mg H ₂ O/L	26mg H ₂ O/L	26mg H ₂ O/L
Resistance at 30L/min	0.3cm H ₂ O	0.3cm H ₂ O	0.3cm H ₂ O	0.3cm H ₂ O
Resistance at 60L/min	0.6cm H ₂ O	0.6cm H ₂ O	0.6cm H ₂ O	0.6cm H ₂ O
Compressible volume	19ml	19ml* + O ₂ tube	19ml	19ml* + O ₂ tube
Weight	8g	8g*	6g	6g*
Connectors	15ID	15ID*	15ID	15ID*
Minimum tidal volume	>60ml	>60ml*	50ml	50ml*
Accessories		1.8m oxygen tube		1.8m oxygen tube

* HME Only

** Case Qty.

Hydro-Therm™ HME range

A dedicated range of Heat and Moisture Exchangers designed to replicate the functions of the body's upper airway by conserving expired heat and moisture and returning these to the patient during inhalation. The Hydro-Therm is a small-volume, lightweight device which is clinically suitable over a wide range of patient sizes.



Code	1850000	1855000
Case Qty.	80	80
Luer lock port		✓
Moisture loss	7.8mg H ₂ O/L	7.8mg H ₂ O/L
Calculated moisture return	30.8mg H ₂ O/L	30.8mg H ₂ O/L
Resistance to flow at 30L/min	0.5cm H ₂ O	0.5cm H ₂ O
Resistance to flow at 60L/min	1.6cm H ₂ O	1.6cm H ₂ O
Compressible volume	20ml	20ml
Weight	11.8g	11.8g
Connectors	15OD – 22OD/15ID	15OD – 22OD/15ID
Minimum tidal volume	>60ml	>60ml

Hydro-Therm™ 3 HME range

A dedicated range of heat and moisture exchangers designed to replicate the functions of the body's upper airway by conserving expired heat and moisture and returning these to the patient during inhalation. The Hydro-Therm 3 is a large-volume HME with rounded housing for use in anesthesia and intensive care.



Code	1560000	15606500
Box Qty.	150	20
Luer lock port	✓	✓
Moisture loss	6.7mg H ₂ O/L	6.7mg H ₂ O/L
Calculated moisture return	31.6mg H ₂ O/L	31.6mg H ₂ O/L
Resistance at 30L/min	0.2cm H ₂ O	0.2cm H ₂ O
Resistance at 60L/min	0.7cm H ₂ O	0.7cm H ₂ O
Compressible volume	59ml	59ml*
Weight	31g	31g*
Connectors	22ID/15OD – 22OD/15ID	22ID/15OD – 22OD/15ID
Minimum tidal volume	>200ml	>200ml
Accessories		Flextube™ 22ID - 15ID

* HME only

The Heat and Moisture Exchanging Filters (HMEFs)

Our range of Heat and Moisture Exchanging Filters (HMEFs) combines the filtration efficiency of dedicated breathing filters with optimum moisture return provided by the addition of an HME element. Designed for use at the patient connection.

Filta-Therm™ range



Code	1942000	19426500	19426502
Box Qty.	70	20	20
Moisture loss	9.3mg H ₂ O/L	9.3mg H ₂ O/L	9.3mg H ₂ O/L
Calculated moisture return	29.5mg H ₂ O/L	29.5mg H ₂ O/L	29.5mg H ₂ O/L
Filtration efficiency	>99.999%	>99.999%	>99.999%
Resistance at 30L/min	1.1cm H ₂ O	1.1cm H ₂ O	1.1cm H ₂ O
Resistance at 60L/min	2.5cm H ₂ O	2.5cm H ₂ O	2.5cm H ₂ O
Compressible volume	66ml	66ml*	66ml*
Weight	42g	42g*	42g*
Connectors	22ID – 22OD/15ID	22ID – 22OD/15ID*	22ID-22OD/15ID*
Minimum tidal volume	>200ml	>200ml	>200ml
Accessories		Flextube™ 22ID - 15ID	Flexible catheter mount 22ID - 22OD/15ID



Code	1941000	19416500	1906000
Box Qty.	70	20	70
Luer lock port	✓	✓	✓
Moisture loss	9.3mg H ₂ O/L	9.3mg H ₂ O/L	9.9mg H ₂ O/L
Calculated moisture return	29.5mg H ₂ O/L	29.5mg H ₂ O/L	28.9mg H ₂ O/L
Filtration efficiency	>99.999%	>99.999%	>99.999%
Resistance at 30L/min	1.0cm H ₂ O	1.0cm H ₂ O	1.2cm H ₂ O
Resistance at 60L/min	2.4cm H ₂ O	2.4cm H ₂ O	2.4cm H ₂ O
Compressible volume	65ml	65ml*	70ml
Weight	43g	43g*	45g
Connectors	22ID – 22OD/15ID	22ID – 22OD/15ID*	22OD – 22OD – 22OD/15ID
Minimum tidal volume	>200ml	>200ml	>210ml
Accessories		Flextube™ 22ID - 15ID	

* HMEF only

Inter-Therm™ range

Sterile

The Inter-Therm range of sterile HMEFs is designed for use in breathing systems in the operating room and intensive care unit.

The Inter-Therm includes a wound paper HME media, providing excellent humidification and low resistance properties.

The Inter-Therm Mini Angled offers an easy to use option with an integral 90° elbow for pediatrics, reducing the need for an additional catheter mount or separate patient elbow.

Turbo webs

Evenly distributes the air flow to ensure all of the filter media is utilized

Wound paper HME element

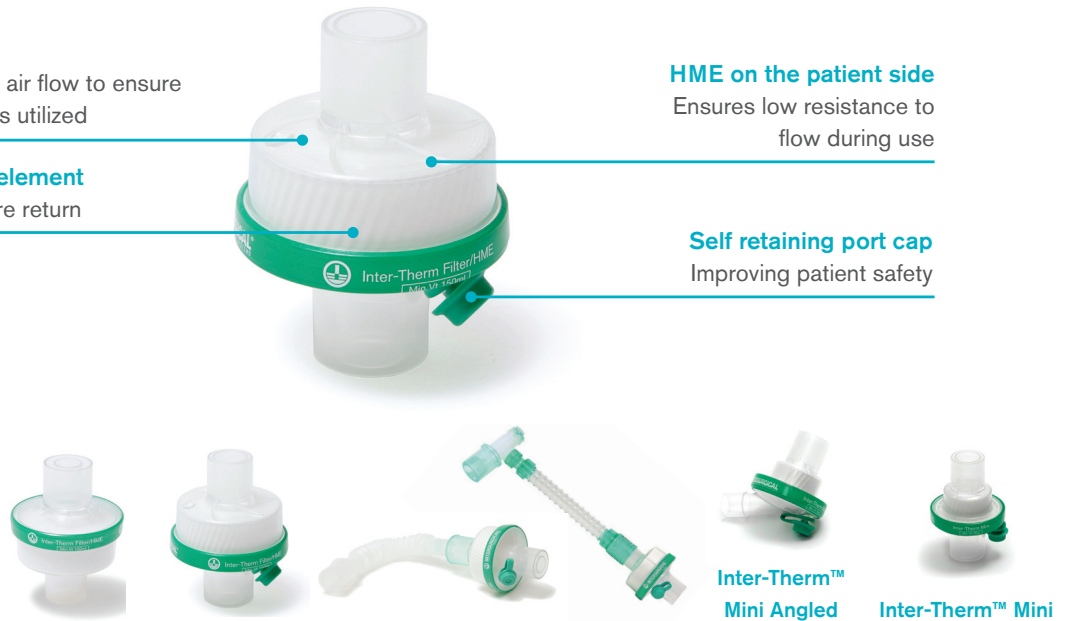
Provides high moisture return







HME on the patient side

Ensures low resistance to flow during use

Self retaining port cap

Improving patient safety



Code	1341007S 	1341000S 	1341011S 	1341580S 	1332000S 	1331000S 
Box Qty.	50	50	50	50	50	50
Luer lock port		✓	✓	✓	✓	✓
Moisture loss	6mg H ₂ O/L	6mg H ₂ O/L	6mg H ₂ O/L	6mg H ₂ O/L	8.5mg H ₂ O/L	8.4mg H ₂ O/L
Calculated moisture return	32.3mg H ₂ O/L	32.3mg H ₂ O/L	32.3mg H ₂ O/L	32.3mg H ₂ O/L	30.1mg H ₂ O/L	30.2mg H ₂ O/L
Filtration efficiency	>99.998%	>99.998%	>99.998%	>99.998%	>99.99%	>99.99%
Resistance at 30L/min	1.6cm H ₂ O	1.6cm H ₂ O	1.4cm H ₂ O	1.6cm H ₂ O	2.2cm H ₂ O	2.2cm H ₂ O
Resistance at 60L/min	2.7cm H ₂ O	2.7cm H ₂ O	3.5cm H ₂ O	3.9cm H ₂ O	N/A	N/A
Compressible volume	57ml	57ml	57ml*	57ml*	29ml	28ml
Weight	30g	31g	45g	58g	19g	20g
Connectors	22ID/15OD - 22OD/15ID	22ID/15OD - 22OD/15ID	22ID/15OD - 22OD/15ID	22ID/15OD - 22OD/15ID	15OD-22OD/15ID	22ID/15OD - 22OD/15ID
Minimum tidal volume	>180ml	>180ml	>180ml	>180ml	>90ml	>90ml
Accessories			Superset™ catheter mount	Smoothbore catheter mount with double swivel elbow and double flip-top cap		

 Sterile

* HMEF only

Clear-Therm™ range

Medium efficiency

Designed with a rounded ergonomic polypropylene housing, Clear-Therm 3 represents our optimal combination of performance and cost-effectiveness.



Clear-Therm 3



Clear-Therm 3

Code	1541000	15416500
Box Qty.	150	20
Luer lock port	✓	✓
Moisture loss	7.8mg H ₂ O/L	7.8mg H ₂ O/L
Calculated moisture return	30.8mg H ₂ O/L	30.8mg H ₂ O/L
Filtration efficiency	>99.99%	>99.99%
Resistance at 30L/min	0.8cm H ₂ O	0.8cm H ₂ O
Resistance at 60L/min	2.1cm H ₂ O	2.1cm H ₂ O
Compressible volume	59ml	59ml*
Weight	29g	29g*
Connectors	22ID/15OD – 22OD/15ID	22ID/15OD – 22OD/15ID
Minimum tidal volume	>200ml	>200ml
Accessories		Flextube™ 22ID - 15ID



Clear-Therm Mini



Clear-Therm Micro

Code	1831000	1441030
Box Qty.	40	50
Luer lock port	✓	✓
Moisture loss	6.8mg H ₂ O/L	12.3mg H ₂ O/L
Calculated moisture return	31.7mg H ₂ O/L	26.8mg H ₂ O/L
Filtration efficiency	>99.99%	>99.99%
Resistance at 30L/min	1.5cm H ₂ O	N/A
Resistance at 11L/min	N/A	1.0cm H ₂ O
Compressible volume	26ml	11ml
Weight	22g	11g
Connectors	22ID/15OD – 22OD/15ID	15OD – 15ID
Minimum tidal volume	>90ml	>35ml

* HMEF only