PERMA PURE

Capnography

Capnography is used in a wide range of medical applications to obtain critical information about the patient's health. This can include CO_2 excretion, pulmonary perfusion, alveolar ventilation, respiratory patterns, and elimination of CO_2 from the anesthesia breathing circuit and ventilator.

How Capnography Works

End-tidal capnography ($EtCO_2$) is the measurement of the concentration of carbon dioxide (CO_2) in exhaled breath. The exhaled breath travels through a sample line from the patient to the capnography monitor, also known as capnographs. These monitors usually work on the principle that CO_2 absorbs infrared radiation (IR). A beam of infrared light is passed across the gas sample to fall on a sensor. The presence of CO_2 in the gas leads to a reduction in the amount of light falling on the sensor, which changes the voltage in a circuit. The analysis is rapid and accurate. Capnographs display a numerical value as well a waveform, which is a graphical depiction of the CO_2 concentration in each exhaled breath.

Challenges Associated with Capnography

Water vapor interferes with the proper operation of analytical equipment in a variety of ways:

Moisture Interference in Infrared Analysis used for CO_2 Monitoring & Measurement

Water vapor appears on the scale in the same region as the CO_2 peak, making the results difficult to read and introducing inaccuracies based on the operators' interpretation of the results. Removal of the water, in vapor phase, preserves the CO_2 level while eliminating interference.

Moisture build-up in Sample Lines

Condensation from the breath gas sample stream can collect in the sample lines, a problem normally found when the fully saturated sample at body temperature is brought into contact with the lines at standard room temperature.

Moisture Collection in the Sensor Cell

Condensation in the sample will eventually reach the analyzer, and will cause irreparable harm to the sensor and render the equipment unusable. This is a problem commonly found when the fully saturated breath sample (at 37C body temperature) is brought to the analyzer at a colder room temperature.



Protect Life | **Eliminate The Water Trap** | **Improve Accuracy**

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The Perma Pure Solution: ME Series Highly –Selective Permeation Tubing

Perma Pure's ME tubing products can reduce reliance on, or even eliminate, water traps in capnographs where exhaled air creates condensation that can reduce accuracy of measurements, damage equipment, and create patient discomfort. Water traps can fill with liquid, leading to alarms, blocking of sample lines, and damaging expensive and sensitive medical monitoring systems. Our Nafion®-based permeation tubing solutions are simple, cleaner, and healthier – improving accuracy and reducing alarms to support a better environment for practitioners and patients.

Delivering the Perma Pure Medical Advantage for Breath Drying

- Fast response time – instantaneous and continuous moisture transfer
- Fully bio-compatible for surface contact with patient skin
- Utilizes Nafion® membrane tubing technology
- Removes up to 90% of moisture in breath samples
- Improves accuracy of IR-based $EtCO_2$ measurements by eliminating moisture interference
- Highly selective – removes water vapor while retaining sample analytes
- Prevents condensation to protect medical monitoring equipment
- Reduces dead volume in sample circuit when compared with a water traps

For more than forty years, Perma Pure has provided solutions for managing moisture in critical applications related to health and environmental safety. Our medical solutions include highly-selective permeation tubing products which are used by industry leading OEMs of medical diagnostic equipment and patient consumable products. We are proud to partner with our broad and diverse customer base to make the world healthier and cleaner. Our commitment to protect life starts with a focus on quality and partnership with our customers to meet the challenges of a dynamic global marketplace while making the world safer and healthier.

Perma Pure is the exclusive manufacturer of Nafion® tubing, a highly-selective permeation membrane that is uniquely suited for medical moisture management. It can be used to remove moisture from breath samples prior to analysis. Our Nafion®-based solutions take advantage of the material's unique properties that allow the removal of water vapor without the loss of any other compounds, such as CO_2 or anesthetic agents. Removal of moisture improves accuracy of IR-based CO_2 measurements by eliminating interference.

Providing the Highest Quality and Reliability

We are a proven supplier to industry-leading medical device OEMs. Our manufacturing process and quality meet the high standards required for medical applications.

- 100% leak and flow testing of dryers and sample lines
- ISO9001 and ISO13485 certified
- FDA registered
- All ME Series products are manufactured, tested and packaged in an ISO 8 clean room
- Braided polypropylene monofilament protects Nafion® tubing
- Flexible for easier integration into the module
- Kink-resistant for bending and coiling

Offering Advanced Assembly Services

More than just tubing – we offer a full array of assembly capabilities to meet your specifications.

- Sample lines with or without dryers
- Custom labeling and packaging
- Design optimization for better flow and moisture exchange
- Standard or custom connectors
- Test capabilities
- Overmolding and solvent bonding of connectors

A Quality-Driven, Innovative Partner

Perma Pure is a trusted supplier to thousands of customers. Our Nafion®-based solutions have enabled our customers to reduce cost, improve reliability, increase accuracy, and bring new and innovative medical products to market. You can turn to Perma Pure with confidence for proven moisture management solutions, backed by decades of experience, to enable your next breakthrough.



PERMA PURE

Serving a Wide Range of Applications

Perma Pure ME Series products are an enabling technology for:

CAPNOGRAPHY • ANESTHESIA MONITORING • PULMONARY FUNCTION TESTING • INHALED GAS THERAPY

Part #	
ME Moisture Exchanger Series	**ME**
Nafion® Tubing Size and Typical Sample Flow Rates	
1.07mm ID x 1.35mm OD – samples up to 200cc/min	50
1.32 ID x 1.60mm OD – samples up to 400cc/min	60
1.52mm ID x 1.83mm OD – samples up to 600cc/min	70
2.18mm ID x 2.74mm OD – samples up to 1L/min	110
Standard Dryer Lengths	
6" (15 cm)	6
12" (30 cm)	12
18" (45cm)	18
24" (60 cm)	24
48" (120 cm)	48
End Fittings	
DEHP-free medical tubing attached to each end of ME Series	TT
Thermoplastic tube with nylon barb coupling	BT
Nylon barbed fitting (ME-070 and ME-110 only)	BB
1/16" molded polypropylene barb fitting (ME-050, ME-060 only)	MB
Stainless steel tube in molded polypropylene header	ST
Molded male locking luer fitting (not available on ME-110)	ML
Male locking luer with push-in barb attached with heat shrink	BML
Molded female luer fitting (not available on ME-110)	FL
Female locking luer with push-in barb attached with heat shrink	BFL
Molded male slip luer fitting (not available on ME-110)	MS
With 1/8" stainless steel compression fittings (ME-060 only)	COMP2
Molded headers for 1/4" compression fittings (ME-110 only)	COMP4









ME	050	12	BB
Series	Tubing	Length	Fittings

Perma Pure LLC • A Halma Company • info@permapure.com • www.permapure.com

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