0.2 μm FILTER CAPTURES AIRBORNE BACTERIA
Capnography monitors are used to assess breathing by measuring the level of CO₂ in the breathing cycle and calculating the end-tidal CO₂ (etCO₂) and CO₂ validated respiration. Microstream™ capnography monitors sample CO₂ with a single-patient use FilterLine™ sampling line, which integrates a 0.2 μm (micron) hydrophobic filter. Cross-contamination between patients cannot occur using FilterLine™ sampling lines because:

- FilterLine™ sampling lines are labeled for single-patient use.
- The 0.2 μm hydrophobic filter is designed to prevent entry of patient-exhaled vapor and bacteria into the monitor.
- Sampled gas from the patient flows to the monitor for analysis, then the sampled gas is exhausted out of the monitor, away from the patient. Gas passed to the monitor will not be inhaled by the patient.

ORGANIZATIONS RECOMMENDING FILTERS IN SAMPLING LINE DESIGN

- The Centers of Disease Control and Prevention Guidelines for Preventing Healthcare Associated Pneumonia:
  Pulmonary function testing devices (e.g., spirometers, peak flow meters) have not been considered an important source of bacterial contamination of inhaled gas. Due to concerns regarding potential infiltration of infectious bacteria from one patient to the next, filters that remove exhaled bacteria is advised.³

- The American Society of Anesthesiologists, Recommendations for Infection Control in the Practice of Anesthesiology (Third Edition):
  The ASA recommends using filter on anesthesia breathing circuits when anesthetizing a patient with confirmed or suspected tuberculosis. The ASA theorizes that placing a bacterial filter between the anesthesia circuit and the patient’s airway will prevent contamination of anesthesia equipment or discharge of tubercle bacilli into the ambient air. The ASA recommends high-efficiency particulate air filters which remove 99.7 percent of all particles greater than or equal to 0.3 μm.²

In 2005, a laboratory study was commissioned to test the effectiveness of the filter in preventing infiltration of bacteria. During the study, FilterLine™ products, used with a capnograph, were challenged by two common bacterial types (Staphylococcus aureus and Brevundimonas diminuta). The study was performed under simulated clinical use over a five year period. The simulated challenge or laboratory challenge was intended to test the effectiveness of the filter in preventing contamination of the capnograph with these bacteria.³

The Staphylococcus aureus organism was chosen for this study because it represents one of the most common hospital problems, and the Brevundimonas diminuta organism was chosen because of its small size. Brevundimonas diminuta is a standard organism for validation of sterilizing-grade membrane filters. Bacterial cell size is critical for the determination of retention.³
In the study, capnograph monitors were run continuously using FilterLine™ sampling lines with the 0.2 μm filters, and control sampling lines without filters. Results showed that where control sampling lines were used, bacterial growth was found at the entrance to the monitor. When the capnograph was used with FilterLine™ sampling lines, no growth of the organisms was found.  

The study concluded that the 0.2 μm filters used in the FilterLine™ products sampling lines, when exposed to repeated inoculations of the test organisms, constituted an effective barrier to both challenge organisms.  

**POTENTIAL BACTERIAL HAZARDS OF INCORRECT SAMPLING LINE USE**  
To help prevent bacterial contamination, it is important to follow the FilterLine™ sampling line Instructions for Use. Incorrect use may lead to contamination of the monitor. Specifically, reuse or cleaning the FilterLine™ sampling line will damage or destroy the 0.2 μm filter, and may damage the monitor due to fluid ingress.  

Misuse includes:  
- Using the sampling line on more than one patient. FilterLine™ sampling lines are engineered for single-patient use.  
- Cleaning the sampling line with air pressure or liquids.