

**ELVE
FLOW**  an **ELVESYS** brand

Bubble trap

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USER GUIDE



Table of contents

Introduction	3
Main Features & Benefits	3
Technical Specifications & Design	3
Which Bubble Trap version better fits your needs?	5
Product package contents	5
Installation & use	6
Application example	6
Tips & tricks - Recommendations	7
The trap is designed to be used with aqueous solutions	7
The bubble trap is not a degasser	7
Using vacuum is not an obligation :	7
Always push liquids towards the bubble trap	7
Choosing Elveflow Bubble trap versions	7
Flow rate considerations :	8
Sterilization of the Elveflow Bubble trap :	8
Maintenance and membrane lifetime :	8
Linked products	8
Customer Support	9

Introduction

The Elveflow Bubble Trap is a simple yet effective device designed for in-line bubble removal in aqueous streams. When a liquid containing bubbles is flowed through the Elveflow Bubble trap, the aqueous fluid is retained, while bubbles are expelled through a microporous hydrophobic PTFE membrane, resulting in a bubble free liquid coming out of the trap.

The simple construction of the trap, combined with the high grade materials used, makes it a very straightforward device that allows quick in-line connection while requiring minimal maintenance.

Main Features & Benefits

- In-line bubble removal in aqueous stream
- Robust, and biocompatible (PVC body and PTFE membranes)
- Low maintenance
- Quick installation in any setup using standard 1/4"-28 Fittings
- Max Operating Pressure: 30 psi / 2 bar
- Suitable flow-rates up to 6 mL/min up to 60ml/min with assistance ¹
- Typical working flow rate range: down to 5µL/min and up to 6 mL/min.

Technical Specifications & Design

The Elveflow Bubble Trap is manufactured from specially selected materials (PVC and PTFE) offers superior performance in terms of bubble trapping efficiency and biocompatibility.

PTFE is often used in many applications in the medical industry, aviation and aerospace, oil and gas-petrochemical industry, semiconductor industry, food and packaging industry and many other demanding industries, due to its exceptional physical and chemical properties. PTFE is often required for critical applications which require, for example, high temperatures, chemical resistance or low friction.

¹ The Elveflow Bubble trap usually gives very good results when used as a stand-alone unit. But connecting a vacuum pump or adding some flow resistance can help improve bubble removal rate, when required.

Specifications

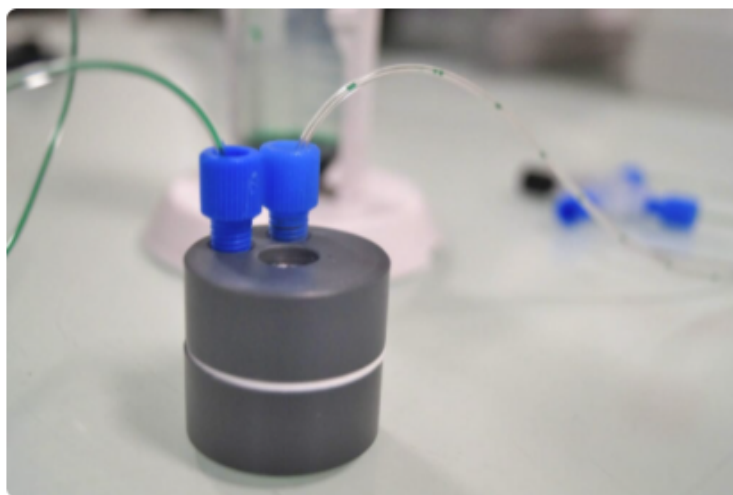
Body Material	PVC
Membrane Material	PTFE
Connection Ports	1/4"-28 UNF
Maximum Operating Pressure	30 psi
Dimensions (mounted)	30 x 28 mm
Internal Volume	23µL (small version) 95µL (medium version) 362 µL (large version)

Design

The Elveflow Bubble uses a micro-porous, hydrophobic PTFE membrane sandwiched between two PVC elements. Connection is made using standard 1/4"-28UNF fittings. Inlet and outlet connections are interchangeable. The trap comes in 3 versions that should be chosen according to internal volume considerations, and to a lesser extent according to the working flow rate targeted by the user.

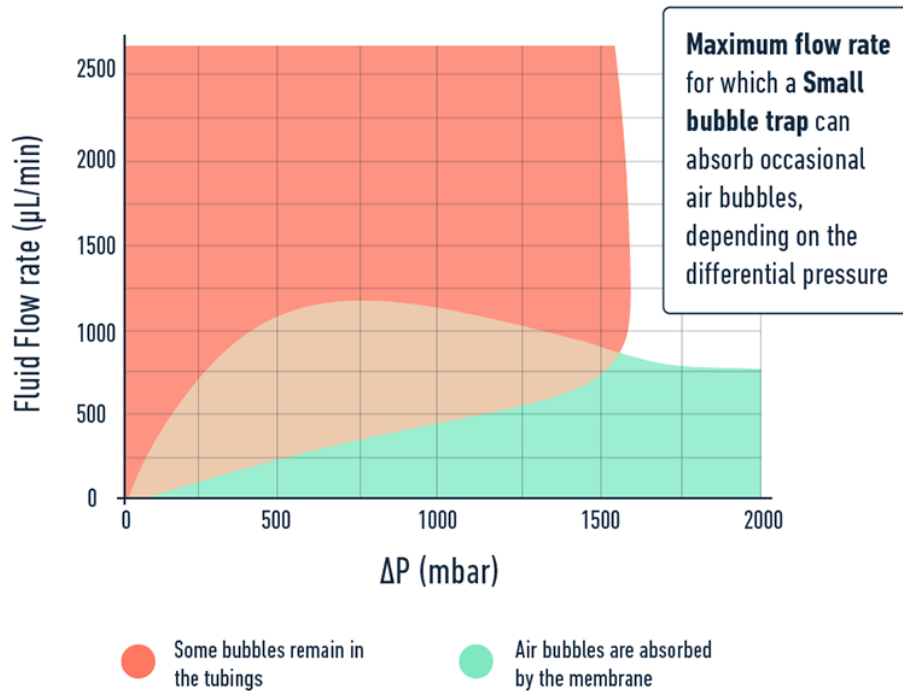
The 3 versions are:

- Elveflow Bubble trap Small: has 23 µL internal volume
- Elveflow Bubble trap Medium: has 95 µL internal volume
- Elveflow Bubble trap Large: has 362 µL internal volume



Which Bubble Trap version better fits your needs?

- Your flow rate is above 5 mL/min: you may use the L bubble trap
- Your flow rate is under 5 mL/min:
 - If you don't mind increasing the total volume of my experiment: you may use the M bubble trap
 - If you want to keep your total volume low: you may use the S bubble trap and adapt the pressure differential according to the flow rate you need. You can refer to the graph below.



Product package contents

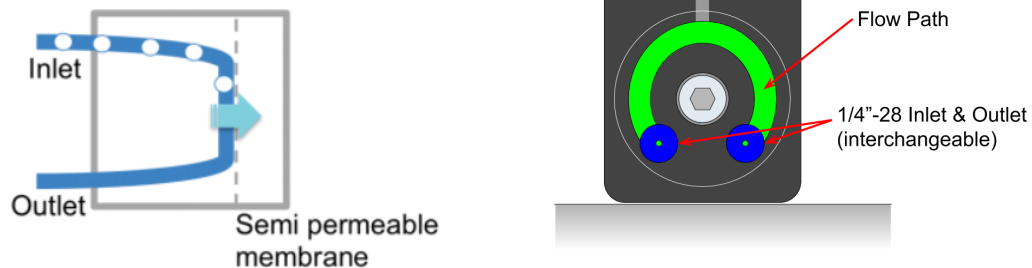
Each Bubble Trap kit includes the following:

- 2 spare PTFE membranes
- 1 x M5 mounting screw
- 2 x 1 / 4-28 fittings for 1/16 OD tubing + ferrules
- bubble trap lower body part in PVC
- bubble trap upper body part in PVC

In addition to the above items. The user should have the necessary fluidic accessories (tubing, additional fittings) to connect the inlets/outlets to the rest of the setup.

Installation & use

The bubble trap should be mounted on its side in order not to obstruct the vent port on the back. The two inlet outlet flow ports should be positioned at the lowest point to enable bubbles to reach the top portion of the air path, for better bubbles removing efficiency.



The Elveflow Bubble trap should be connected to the flow path through the 1/4-28 receiving ports designed on the round PVC part, using the 1/4-28 fittings provided. Inlet and outlet are interchangeable. When a liquid containing bubbles is flown through the Elveflow Bubble trap, the aqueous fluid is retained, while bubbles are automatically expelled through a microporous hydrophobic PTFE membrane, resulting in a bubble free liquid coming out of the device.

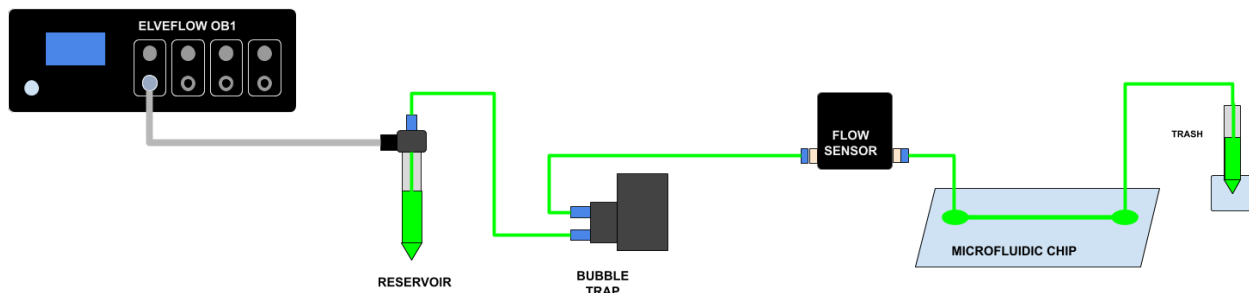
Application example

Air bubbles in the flow stream can negatively impact many applications because they can change the local microfluidic environment unexpectedly. Bubbles can induce compliances variations that could negatively affect dispensing or droplet generation experiments. Bubbles can also lead to shear force changes that may be an issue in a number of experiment involving biological cells.

Bubbles can be an issue in a number of situations, therefore using an Elveflow Bubble trap can be particularly helpful to prevent :

- Volume sampling errors
- Sensors error
- Cytotoxicity, cell sample damage and shear stress issues

Below is shown an example of a setup using a bubble trap to get rid of possible in-line bubbles injected into a microfluidic chip. The liquid coming from the reservoir is flown through a bubble trap to ensure bubble free medium is injected into the chip. This is something often seen in applications involving biological cells injection, for which bubble-free operation is required.



Tips & tricks - Recommendations

The trap is designed to be used with aqueous solutions

Because the membrane function depends on PTFE hydrophobicity, the bubble traps can only be used with aqueous liquids and not with organic solvents. It is not advised to use ethanol with the Elveflow Bubble trap, because this may cause a leakage of the system (ethanol won't be retained by the hydrophobic PTFE membrane).

The bubble trap is not a degasser

These bubble traps do not remove dissolved gases or motionless stuck bubbles trapped in the setup, but rather remove in-line bubbles in the fluidic flow stream with or without vacuum assistance.

Using vacuum is not an obligation :

Using the vacuum line is a possibility, and not an obligation. The Elveflow Bubble trap usually gives very good results when used as a stand-alone unit without connecting a vacuum pump (passive mode).

Pressure difference across the membrane sides has to be large enough to get optimal bubble removal performance. To increase this pressure difference, a vacuum connected to the trap vacuum port can be applied (active mode). Please note that applying vacuum does not draw liquid through the membrane to the vacuum pump if a water based solution is used. Alternatively a length of microfluidic tubing can be connected on the trap outlet port to add flow resistance and increase the back pressure, and bubble removal performance.

Always push liquids towards the bubble trap

Bubbles are removed by positive pressure, and Elveflow advises to always push liquids towards the trap. It is not recommended to aspirate the fluid through the trap using a vacuum, as bubbles would be drawn into the liquid with this mode of operation.

Choosing Elveflow Bubble trap versions

The different Elveflow Bubble trap versions should be chosen according to internal volume considerations, and to a lesser extent according to the working flow rate targeted by the user.

The 3 versions are:

- Elveflow Bubble trap Small: has 23 μ L internal volume
- Elveflow Bubble trap Medium: has 95 μ L internal volume
- Elveflow Bubble trap Large: has 362 μ L internal volume

For rare samples or expensive solutions, the trap with less internal volume should be preferred (Small version). And if high solution usage efficiency is not required any version can be used. As a general rule, if the working flow rate is close to the microliter per minute range, a Small and Medium bubble trap versions should deliver decent performance. On the other hand, the Elveflow Bubble trap Large version gives good results in most situations and particularly at higher flow rates (>5ml/min), and can be advised in any situation in which having a larger dead volume is not an issue.

Flow rate considerations :

Please note that the maximum achievable bubble free flow rate depends on the amount of bubbles within the flow path. The typical working flow rate range is 0.5 to 2.0 ml/min.

While every user setup and conditions are different, flow rates down to 5 μ L/min and up to 6 ml/min can be reached if few bubbles are present within the liquid. Using vacuum assistance can help go beyond these standard values (no data available).

Sterilization of the Elveflow Bubble trap :

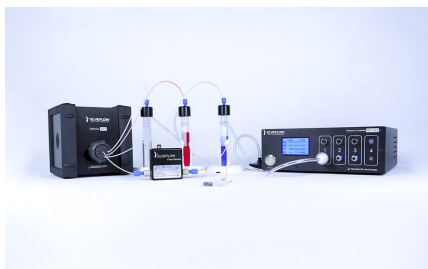
The trap is not autoclavable. It is recommended to disassemble the parts, clean them with Aniosyme solution and reassemble them after.

Maintenance and membrane lifetime :

Membrane lifetime is highly related to the bubble trap conditions of use. Using deionized or distilled water can preserve the membrane properties and performance for months or years, but complex solutions such as saline buffers can drastically reduce the membrane lifetime. Therefore, Elveflow advises to carefully wash the device by flushing deionized or distilled water after each use, to prevent the formation of salt cristal or residue deposition over time that would negatively impact the bubble trap performances. Elveflow recommends to change the PTFE membrane each time a performance decrease is observed, and at least once a year.

Disassembly and reassembly without replacing the membrane is likely to end up with a leakage. Do not dismount the bubble trap until replacement of the membrane is needed.

Linked products



[Live Cell Perfusion Pack](#)

A liquid handling platform for cell-based experimentations



[OB1 MK3+ Flow Controller](#)

The most responsive and stable flow controller on the market



[Microfluidic Reservoirs](#)

microfluidic adapters for eppendorf © , falcon © tubes or gl45 threaded glassware



Customer Support

You are welcome to browse through the Elveflow Support Portal accessible online anytime (<https://support.elveflow.com/support/solutions>). You can find lots of guidance on how to use our product line. It is most likely that the answers you're looking for are already here.

In case there are still some questions and you'd like further clarification, please don't hesitate to let us know by email at customer@elveflow.com.

We are always happy to help.