

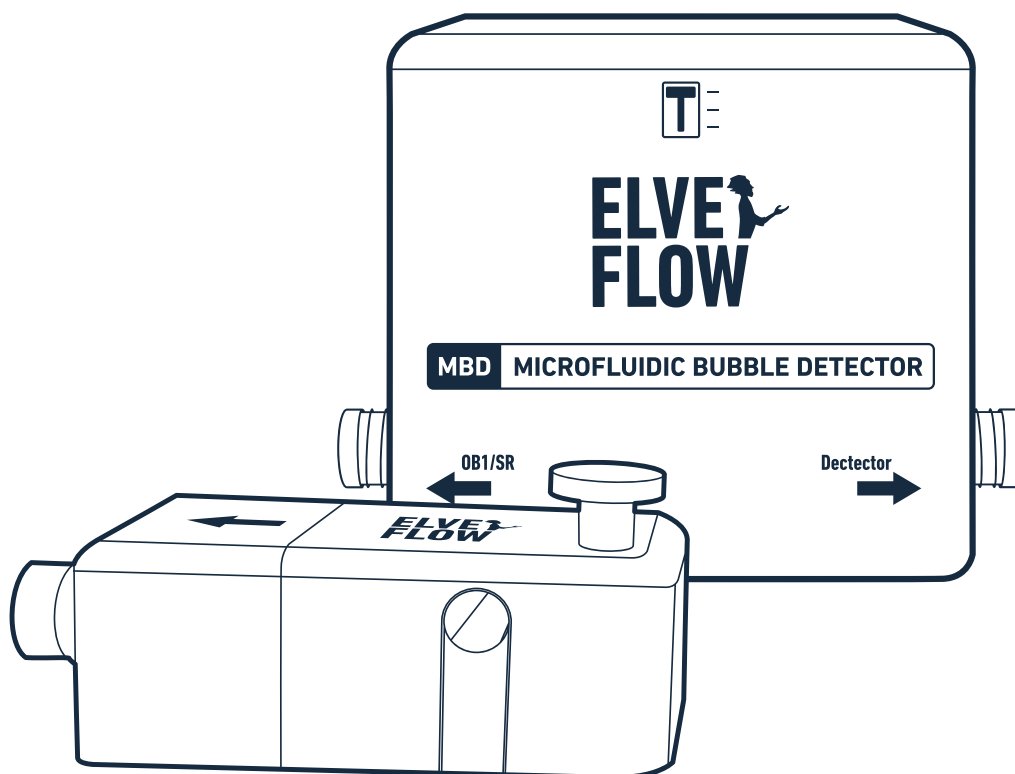
USER GUIDE



MBD Microfluidic bubble detector

Liquid interface optical sensor

Elveflow.com/microfluidic-flow-control-products/microfluidic-flow-control-module/microfluidic-liquid-sensor/





READ THIS MANUAL CAREFULLY BEFORE USING THE INSTRUMENT

This manual must be read by any person who is or will be responsible for using, maintaining or repairing the Bubble detector. Due to the continual development of the products, the content of this manual may not correspond to the new product. Therefore, we retain the right to make alterations without prior notification.

Important bubble detector safety notices:

1. Do not put the bubble detector inside a **humid incubator**.
2. Do not put **sharp objects** in front of the detector's opening. It may damage the optical detector.
3. Do not put your hand inside the electrical M8 connector when connected to the OB1 (MK3+/
MK3) or the Sensor Reader.

If the conditions listed here are not met, the user is exposed to dangerous situations and the instrument can undergo permanent damage. Elveflow and its partners cannot be held responsible for any damage related to the incorrect use of the instruments.

User safety



Working with systems or equipment containing liquids or gases under pressure can entail risks, especially with pressurized reservoirs containing corrosive, toxic or explosive liquids and even with water.

Due to the nature of the materials used, transport, and handling of reservoirs by the end user, Elvesys cannot guarantee the integrity and strength of the provided reservoirs (for any type: Eppendorf, Falcon, glass...) beyond atmospheric pressure.

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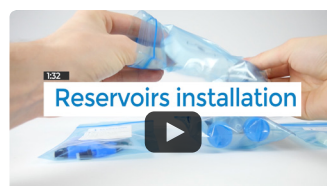
Need help to install?

A series of videos produced specifically to provide our customers with the best experience.

How to install:

Elveflow.com/unboxing-OB1/

Step by step, we guide you to install your OB1 pressure controller, install and connect reservoirs and flow sensors. A dedicated part shows the ESI software installation and the calibration needed as you use it for the first time.

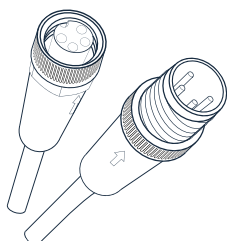
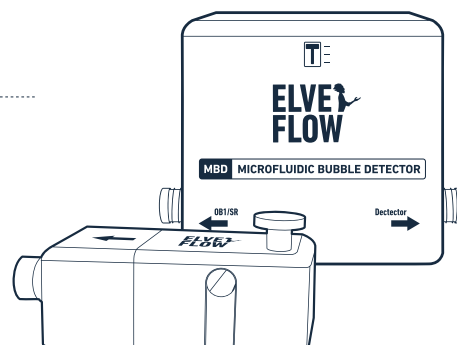


Prior to use

Package content checking

Before setting up your MBD, please check the package contents to make sure that you received all the items below:

1. Microfluidic bubble detector



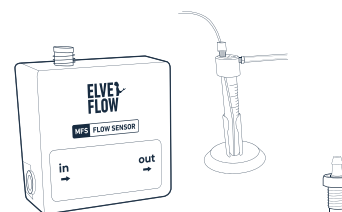
2. Connection cable (two pieces)

3. USB key with Elveflow® Smart Interface software ESI

and user guides inside



Optional Accessories:



You may have ordered some additional elements (e.g. pressure controller, reservoirs, tubing) so please check that you have received all the corresponding items.

If any parts are missing or damaged, please get in touch with Elveflow® support immediately:

customer@elveflow.com

or contact@elveflow.com

to complete a new purchase

Setup and use

Getting started

Technical specifications might change depending of your order. We showcase here one bubble detector, however your detector might have a smaller tubing input.

Instrument description

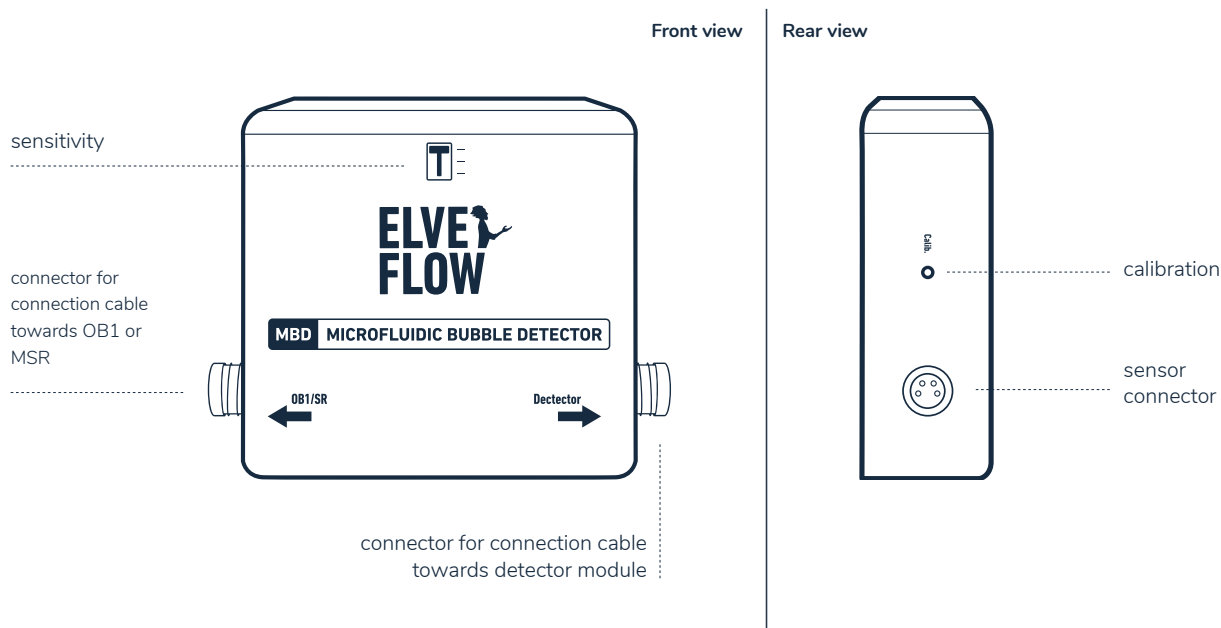
The bubble detector is composed of two units: the amplification module and the detector module. It can be plugged directly onto our OB1 (MK3+/MK3) flow controller, or it can be used as a standalone unit with the sensor reader and another instrument. Due to its design, the bubble detector is non-invasive. It comes in two different casings compatible with either with a 1/4" outer diameter (OD) or 1/16" OD transparent tubing.

Furthermore, the bubble detector allows to quickly calibrate and to directly change the sensitivity using the available buttons.

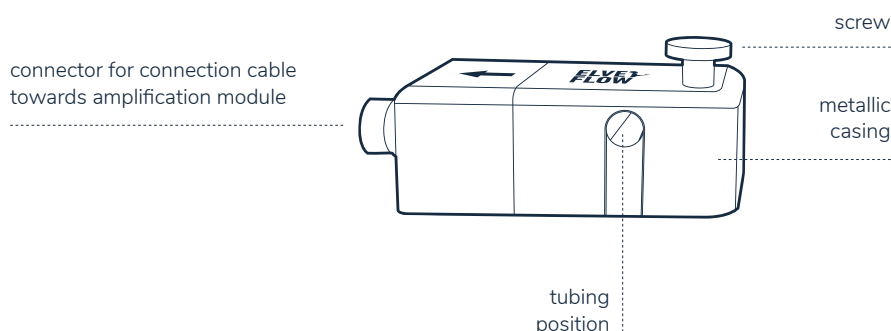
The bubble detector is monitored by a computer through an interfacing device such as the microfluidic sensor reader (MSR) or the OB1 (MK3+/MK3) pressure controller.

Using the Elveflow Smart Interface (ESI), you can record the signal and trigger a response in another Elveflow instrument, or use directly the instrument's specific module.

Amplification module



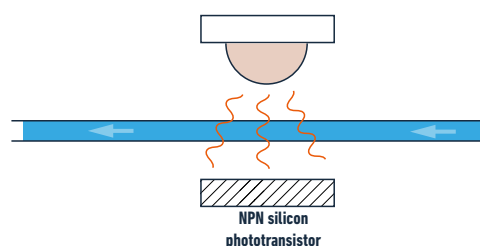
Detector module



Principle

The Elveflow microfluidic bubble detector is intended to detect interfaces between gas and liquid or between two immiscible liquids.

A light beam is emitted by a LED at known power. This light beam goes through the capillary and the fluid passing through. It is then collected by an NPN silicon phototransistor. This phototransistor converts the light power into an electrical power. When a fluid changes, the optical index and the light absorption coefficient change accordingly. It induces a change in the electrical power and allows to detect changes in the fluid.

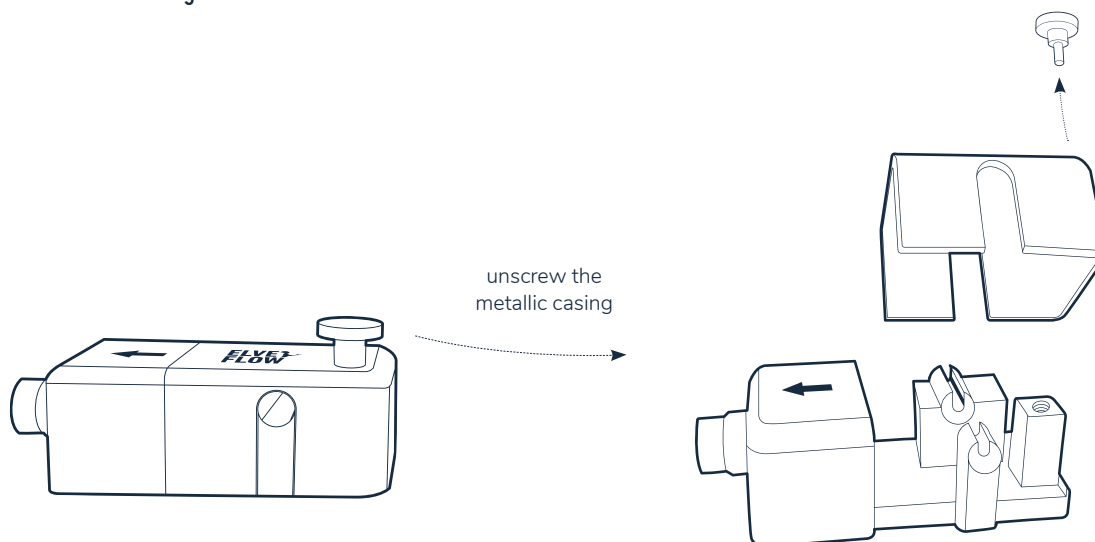


Instrument connection

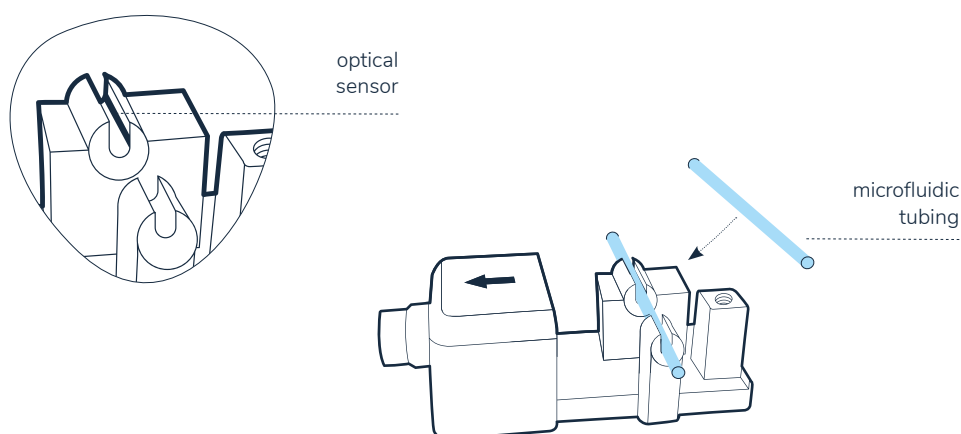
Setting up the bubble detector

The microfluidic bubble detector comes in two different casings with 1/16" or 1/4" outer diameter tubes. These casings are provided in the detection part of the bubble detector.

1 Microfluidic tubing connection



To connect the microfluidic tubing, you have to **unscrew the metallic casing** and put your microfluidic tubing in the same way as the illustration figure. Make sure the tubing is well positioned **in the middle** of the optical sensor.



Once the microfluidic tubing is in position, **close the detection part** by putting back the cover and tightening the screw. The cover will maintain the tubing position.

Electronic and electric connections

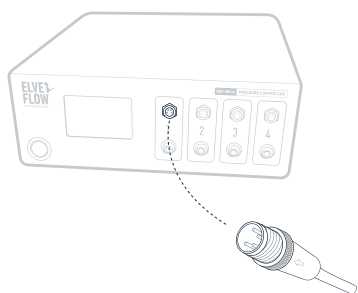
The two parts of the bubble detector are connected together using the electrical M8 connectors provided in the box.

2 Electronic and electric connections

A

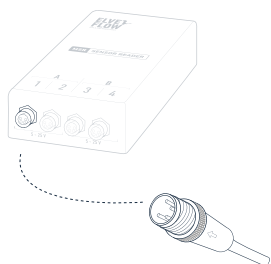
Connect the male part of the cable to the female connector **on your instrument**.

Directly on your OB1 MK3+



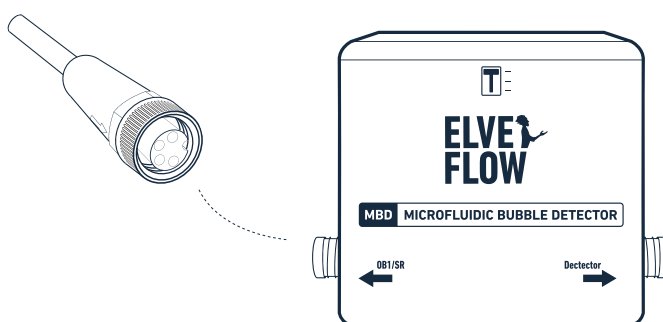
or

With a MSR sensor reader connected to the computer only for analog sensors



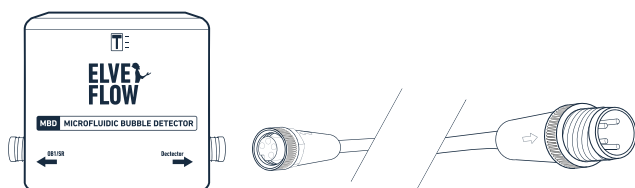
B

Then connect **the female part** of the cable to the male connector of the amplification module.



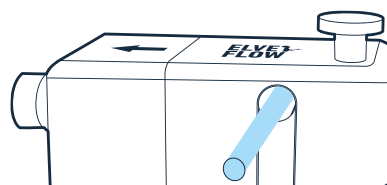
C

Connect the female part of the second cable to the male connector on your **amplification module**.



D

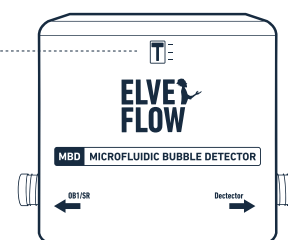
Then connect the male part of the cable to the female connector on your **detector module**.



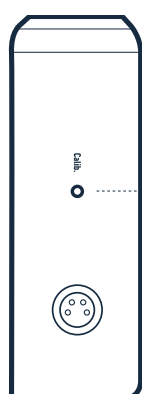
Sensitivity selection: (High, Low, Medium)

The electronic part of the bubble detector has a switch that allows the user to **change the sensitivity** of the detector. The switch is located in the front side. Three presets are available (High, Medium, Low). Beware: higher sensitivity means that the bubble detector **may saturate**.

sensitivity



Sensor calibration



optical signal
in the middle
of the range
of the output

Rear view of the
amplification module

Calibration helps to **adjust the optical detection output** to your desired working range. The calibration button is on the side of the bubble detector's electronic part. When the bubble detector is ON and you are within your working range (if there is liquid in front of the sensor when you want to detect bubbles), push the calibration button, it will automatically adjust the optical detected signal to the **middle electrical detected output**. You may need to adjust your sensitivity afterwards in order to use the maximum range of the detection signal.

Control the instrument

ESI Software and SDK

You are now ready to use your instrument. It can be either controlled by the Elveflow® Smart Interface software or by software development Kit (C++, Python, MATLAB® and LabVIEW® libraries). The Elveflow® Smart Interface's and the SDK main features and options are covered by specific guides. Please refer to those guides for a detailed description.

Using **the dedicated module** of the bubble detector, you will be able to visualize easily the presence of bubbles inside clear tubing (and record and count those events).

You can also interface with other Elveflow instruments and trigger specific actions using the sequencer.

Cleaning and storing

Cleaning

Please avoid cleaning the sensor of the bubble detector. In case the signal saturates or you see a major degradation in performance, please clean the microfluidic detection part using an optical cleaning wipe with some ethanol.

Storing conditions

You can store the Bubble detector in a dry environment. Remove the microfluidic tubing from the bubble detector and close the cover with the screw in order to prevent dust from obscuring the optical excitation and detection parts.

MORE USER GUIDES ?

You will also find dedicated user guides for:

- The other instruments of the Elveflow® product line;
- Sensors and feedback loops;
- Accessories for microfluidics (reservoirs, flow restrictors, etc.).



Inside USB
flash drive

Technical specifications

DETECTION MODULE SIZE (length x width x height): 68 x 29 x 33 mm **AMPLIFICATION MODULE SIZE:** 69 x 59 x 22 mm

Supplementary information

Conditions of use

Terms and conditions of use

We strongly believe in the intrinsic quality of our microfluidic instruments line and we hope that you will be pleased with your purchase. However, in the unlikely event that you should receive damaged or incorrect goods in your delivery, please notify us within 7 days.

You will be offered the option of a refund or an exchange (provided the goods are in stock).

You may be asked to return goods for inspection. In this case we will refund the shipping fees.

Should the damaged or incorrect item be no longer available, you will be given the option of a refund. Please note that goods that become damaged or broken after 7 days of receipt cannot be returned.

Unwanted items

If for any reason you do not wish to keep your purchase and would like a store credit, then please notify us within 7 days.

We cannot accept unwanted returns that have been opened, used or damaged by the customer.

For unwanted goods, we allow up to 14 days for the return of goods. We will only issue a credit

upon receipt of all returned goods.

Please note that we are unable to refund your costs in returning unwanted goods or the delivery costs of sending the goods to you in the first place.

Cancellations

If you wish to cancel your order please email us immediately: contact@elveflow.com.

Privacy Policy

Customer details remain private and confidential and will not be released to a third party unless required to do so by law.

We use the information we collect about you to process orders, to provide a more personalized shopping experience and, if you request it, to notify you about new products, special offers or other information that may be of interest to you. We do not sell or pass on any personal information to any other Companies or Organizations.

Payments & Procedures

Payment from private customers must be paid upfront. Trade orders from registered companies or organizations can be invoiced. Payment is

due strictly within 30 days of the invoice date.

Products & Prices

Please note that some goods may vary in style, color or detail from the image shown. We reserve the right to change prices at any time.

Transport and storage

Be careful not to harm or shake Elveflow® products while moving. Elveflow® products must not be transported when plugged in. Store products in standard conditions in an adapted box (typically the one used to send you the product).

Humidity and temperature must not exceed those of the specifications.

Exclusive remedies

The remedies provided herein are the customer's sole and exclusive remedies. Elveflow® shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Safety Information

THE FOLLOWING GENERAL SAFETY PRECAUTIONS MUST BE FOLLOWED DURING ALL PHASES OF OPERATION, SERVICE, AND REPAIR OF THIS INSTRUMENT. FAILURE TO COMPLY WITH THESE PRECAUTIONS OR WITH SPECIFIC WARNINGS ELSEWHERE IN THIS MANUAL VIOLATES SAFETY STANDARDS OF DESIGN, MANUFACTURE, AND INTENDED USE OF THE INSTRUMENT. ELVESYS ASSUMES NO LIABILITY FOR THE CUSTOMER'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.

Important advice

Elveflow® products are for research use only.

No liquid should get into the OB1, otherwise this would void the warranty.

The pressure source connected to the OB1 must be dry, dust and oil free, and of a maximum of 10 bar. Please take the required action to ensure that these conditions are met and maintained.

Conditions of use

This instrument is intended for indoor use. It is designed to operate at a maximum relative humidity of 60% and at altitudes of up to 2000 meters. Operating temperature range is +5 °C to 50 °C.

Do not operate in wet/damp conditions: to avoid electric shock, do not operate this product in wet or damp conditions.

Do not operate in an explosive environment. Do not operate the equipment in the presence of explosive or flammable gases or fumes.

Warning: Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. The protective features of this product may be impaired if it is used in a manner not specified in the operating instructions. Before installing, handling, using or servicing this product, please consult the data sheet and user manual.

Failure to comply with these instructions could result in death or serious injury. If the buyer purchases or uses Elveflow® products for any unintended or unauthorized application, the buyer shall defend, indemnify and hold harmless Elveflow® and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if Elveflow® is allegedly negligent with respect to the design or the manufacture of the product.

Pressurized Equipment

Care must be taken when the Elveflow® pump is pressurized to ensure that the instrument is not damaged in any way.

Protection

Safety glasses and lab coats should be worn at all times when using an Elveflow® pressure pump due to the use of pressurized equipment. This is particularly important when hazardous liquids are used.

Electricity Advice

Use Elveflow® instruments with the provided power unit only. Maintenance should only be attempted by qualified Elveflow® personnel. Removal of the back panel may invalidate any warranty.

Before applying power: verify that the line voltage matches the product's input voltage requirements and that the correct fuse is installed. Use only the specified line cord for this product and make sure the line cord is certified for the country of use.

Fuses: only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.

Keep away from live circuits: operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel. Do not replace components with a power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed.

To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

ESD precautions: the inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take

customary and statutory ESD precautions when handling this product.

Maintenance advice

Maintenance should only be attempted by qualified Elveflow® personnel. Removal of the back panel will invalidate any warranty.

Do not service or adjust alone: do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do not substitute parts or modify the instrument: because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument.

Return the instrument to an Elveflow® Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Instruments which appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified Elveflow® personnel.

CE compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Electromagnetic Compatibility

COUNCIL DIRECTIVE 89/336/EEC of 3 May 1989

This directive has been amended by the following Council Directives:

1. 92/59/EEC of 29 June 1992 (General Product Safety)
2. 93/68/EEC of 22 July 1993 (CE Marking directive)
3. 99/5/EC: Directive of Radio Equipment & Telecommunications Terminal Equipment (R&TTE).

Warranty



ELVEFLOW is a brand of ELVESYS Microfluidics innovation center.

The ELVESYS hardware products are warranted against defects in materials and workmanship for a period of one year from the date of delivery. ELVESYS software and firmware products, that

are designated by ELVESYS for use with a hardware product and when properly installed on that product, are warranted not to fail to execute their programming instructions due to defects in material and workmanship for a period of 60 days from the date of delivery. During the warranty period ELVESYS will either repair or replace products that prove to be defective. ELVESYS does not warrant that the operation for the software, firmware or hardware shall be uninterrupted or error free. For warranty service, this product must be returned to a service facility designated by ELVESYS. The customer shall prepay shipping charges (and shall pay all duties and taxes) for products returned to ELVESYS for warranty service. Except for products returned to a Customer from another country, ELVESYS

shall pay for return of products to the Customer.

ELVESYS does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer application by the customer's technical experts. Recommended parameters can and do vary in different applications. ELVESYS reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

Limitation of warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Customer, Customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation and maintenance. In particular, clogging of the sensors or electrical short circuit due to leaking cannot be in any case covered by the warranty.



Technical support

customer@elveflow.com

General information

contact@elveflow.com

+33(0).184.163.807

ELVESYS – Microfluidics innovation center

83 avenue Philippe Auguste
75011 Paris, FRANCE

www.elveflow.com

Product:

Elveflow.com/microfluidic-flow-control-products/microfluidic-flow-control-module/microfluidic-liquid-sensor/



MAY THE FLOW BE WITH YOU