

MSRV3

SENSOR READER



User Guide

DOCUMENT REF: UGMSR-230822

SYMBOLS USED IN THIS DOCUMENT



IMPORTANT INFORMATION. Disregarding this information may increase the risk of damage to the equipment, the risk of personal injuries, or degrade your user experience.



HELPFUL INFORMATION. This information facilitates the use of the instrument and contributes to its optimal performance.



ADDITIONAL INFORMATION IS available on the internet or from your Elveflow representative

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Introduction

The Microfluidic Sensor Reader (MSR) is an acquisition interface for sensors (pressure sensor, flow sensor, etc.) composing your experiment design. Connect the sensors (to monitor pressure or flow rate accurately) anyplace in your setup to fully control your microfluidic experiment.

The Sensor Reader module lets you control four sensors simultaneously via the Elveflow software. It is an ideal complement to monitoring and managing all your experimental parameters when using the OB1 flow controller.

Instrument description

The MSR can host up to 4 sensors connected with a 4-pin cable to the front of the instrument (Fig 1).

This Sensor Reader sends data from the sensors to a computer via a USB connection and interacts with other connected instruments through a Transistor-Transistor Logic (TTL) communication to trigger a device or activate a sequence. The serial number could be found on a sticker under the instrument.



Fig 1: Front side (left) with four-pin female connectors. Rear side (right) with a USB connector.

Product package contents

Before setting up your Sensor Reader, check the package contents (Fig 2) to ensure you received all the items listed below:

- a USB flash drive containing the Elveflow® Smart Interface software and the user guides
- 1x MSR Sensor Reader
- a USB cable



Fig 2: The USB flash drive, the MSR sensor reader, and the USB cable.



Defects or missing items.

Please report any defects or missing items **within one month** of receiving your order via email at customer@elveflow.com.

Installation and use

Electrical connections

Computer connection

The MSR sensor reader can be connected to the computer using the provided USB cable.



Direct connection of the MSR to the computer is advised: connecting the MSR directly to a PC is more stable than via a USB hub.



Fig 3. The rear side of the MSR: the USB port is used to connect the device to a computer

Sensor connection

The Elveflow sensors can be connected to the MSR Sensor Reader using the 4-pin cable provided with each sensor. This cable should be connected to the 4-pin connection ports on the front of the instrument.

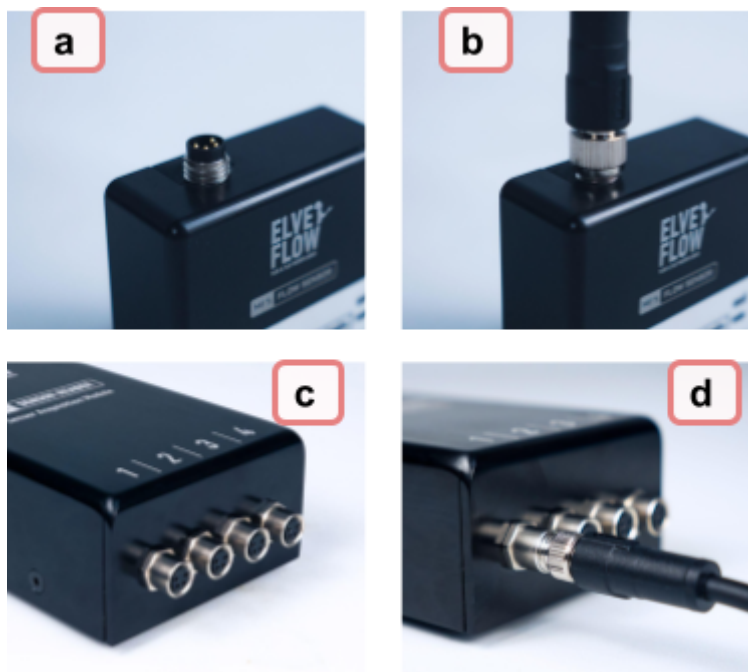


Fig 4. Sensor connection to the MSR: Connect the cable's female part to the sensor's male connector (Fig 3a, 3b) and the male part of the cable to the female connector on your MSR device (Fig 3c, 3d).



Independent sensor voltage: each sensor connected to an MSR sensor port can be powered from 5 to 24V independently.



Power limit: the total power of the sensors connected simultaneously on an MSR device should not exceed 0.9W in total. Beyond this limit, USB power disconnection may happen.

TTL Trigger connections

The MSR has two TTL Trigger connections that can be used to operate the MSR in coordination with other TTL-equipped devices.

- Trigger output : the MSR send an 0-5V signal to another instrument (e.g. an OB1)
- Trigger input : the MSR receives an 0-5V signal from another instrument (e.g. an OB1)

These two functions can be reached and used in the ESI sequencer.

ESI Installation

You can [download the ESI software 24/7 by clicking here](#).

You will find the software operation instructions in the ESI guide in the .zip folder downloaded with the software or [on the support portal](#).

1. Plug the Elveflow USB flash drive into the computer, or [download the latest version from the Elveflow website](#).
2. Open the Elveflow folder
3. Locate the ESI software zip file (e.g. ESI_V3_06_05.zip)
4. Copy the installation zip file to a location of your choice (e.g. desktop), and unzip the file
5. Run setup.exe and follow the instructions displayed by the installation assistant
6. When ready, restart your computer to finish the installation process



- Be sure your ESI version is up to date before implementing the solutions displayed in this guide.
- The ESI software should not be installed directly from the Zip file or the USB key.
- Always copy the ESI.zip source to your computer, then unzip it before launching the installation process.



The latest version of the Elveflow® Smart Interface can be downloaded anytime [from the Elveflow website](#). To facilitate access to the installation files, two links for the same file are provided. The mirror link is the same file hosted on another server. So that you have a 24/7 accessible version to work with.



Do not install ESI directly from the Zip file, and do not install it directly from the USB key, as this is likely to cause issues. Always copy the ESI.zip source to your computer, then unzip it before launching the installation process.

Control through ESI

Connecting a sensor to the MSR in ESI

When adding a new MSR, click on ADD INSTRUMENT (Fig 5a). Once in the New Instrument window, select the MSR and name it. Use only letters from A to Z (both upper and lower cases), numbers from 0 to 9, and underscores. The instrument name should not contain any space (Fig 5b). Once you click OK, your new MSR will appear in the main window.

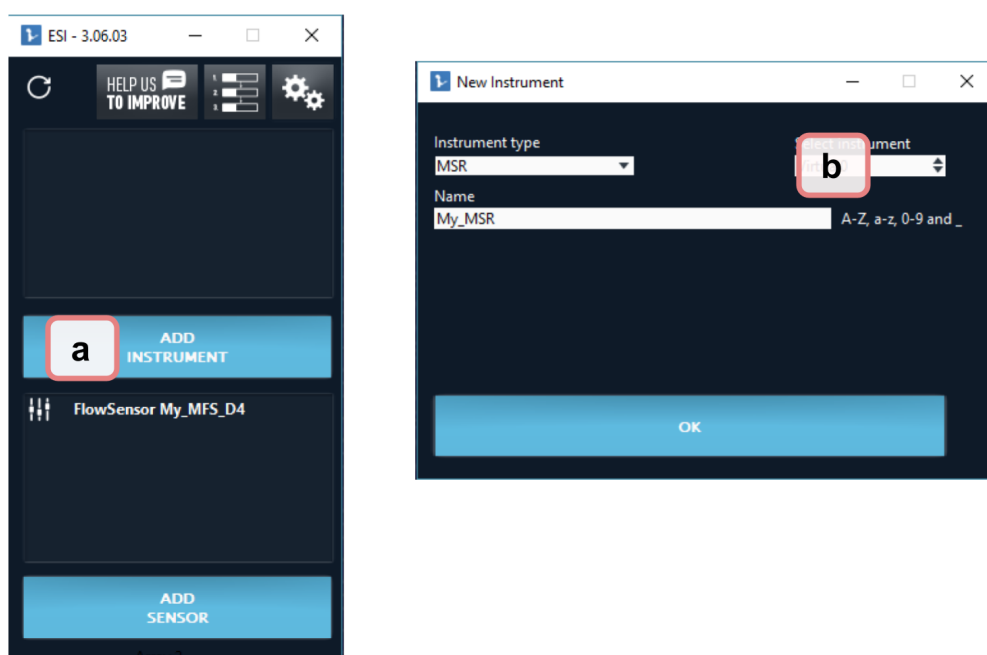


Fig 5: Adding and naming a new flow sensor to the ESI software. Click on ADD INSTRUMENT (a), select the instrument type, and name it accordingly (b).

To add a sensor to the MSR, check first if the sensor is correctly connected (see section installation and use) then, add a sensor by clicking on “ADD SENSOR” or select a sensor from the sensors list and reach the settings window (Fig 6a). Next, go to the “Connected to” tab and select the MSR and the MSR channel you would like your sensor to be connected to (Fig 6b). Your connected sensor will then appear in the MSR visualization window and start displaying the sensor values (Fig 6c).

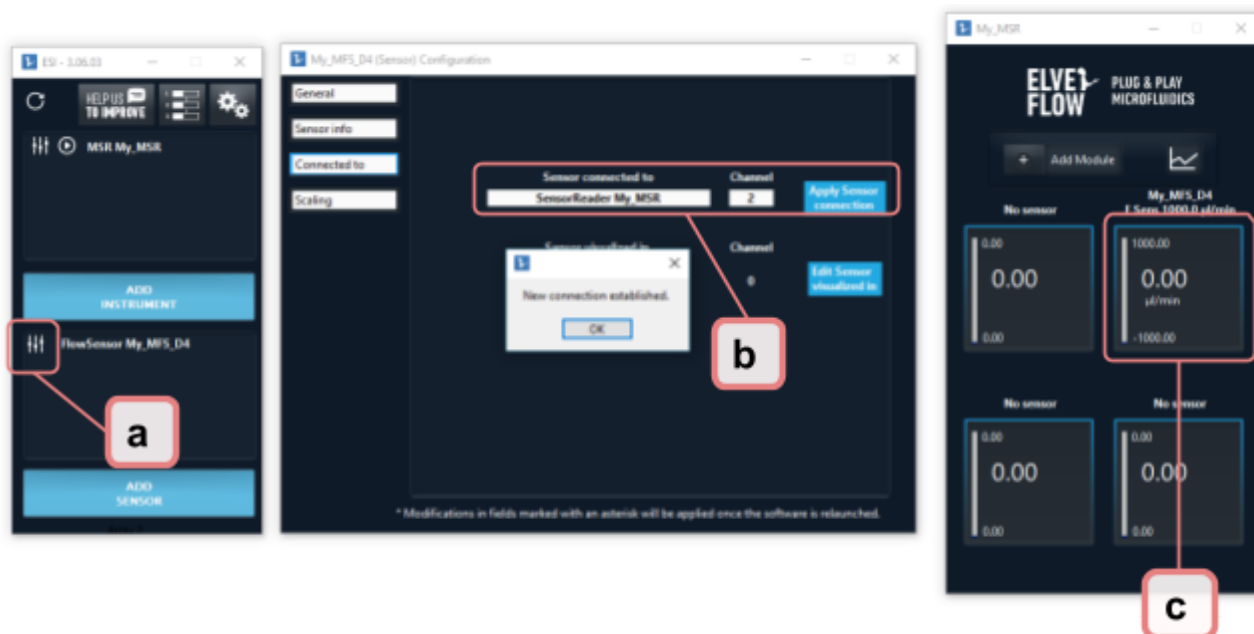


Fig 6: Adding a new sensor to the MSR list. Click on ADD SENSOR (a), and select the MSR it is connected to (b). Your connected sensor will appear in the MSR visualization window and start displaying the sensor values (c).

Removing a MSR, or sensor connected to the MSR in ESI

If for some reason you would like to remove your MSR from the devices list (Fig 7a), or a sensor connected to your MSR (Fig 7b) you can do so by clicking the “delete” red button under the ESI MSR settings tab (Fig 7c).

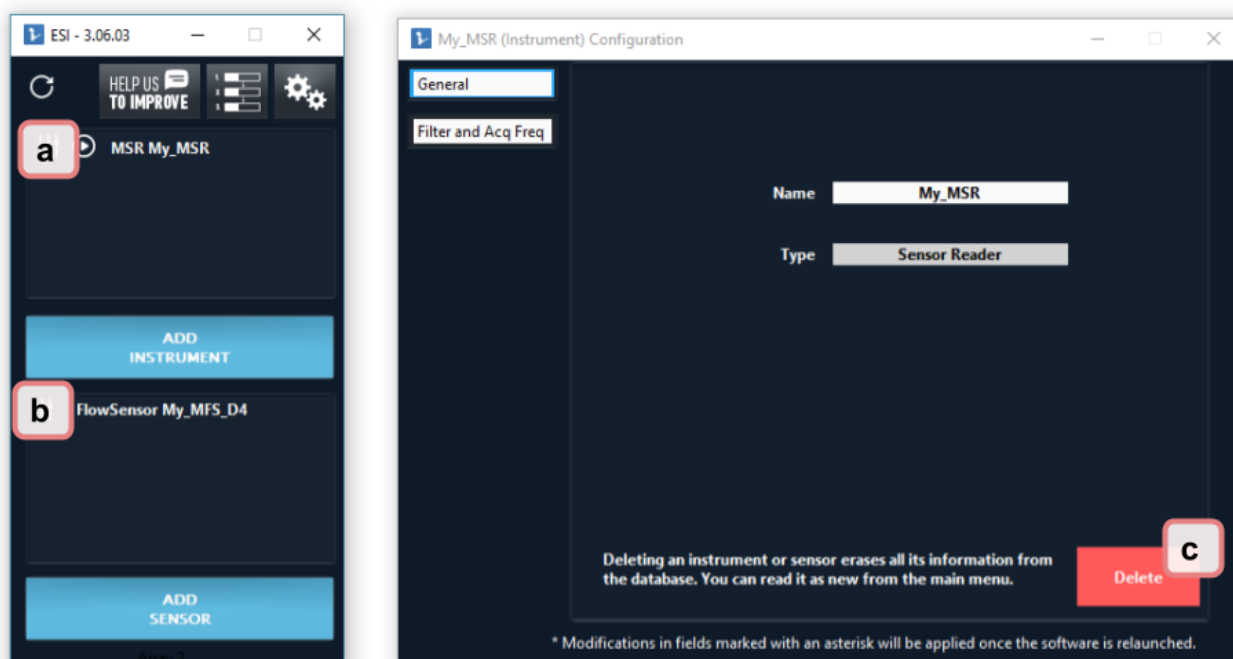


Fig 7: Removing a device (e.g., sensor reader) from the devices list. Select the instrument (a) or sensor (b) you would like to delete, and click on the red Delete button on the bottom right of your screen (c).

Using TTL Triggers in ESI

These functions can be accessed through the ESI sequencer, which you can reach from the top of the main window.

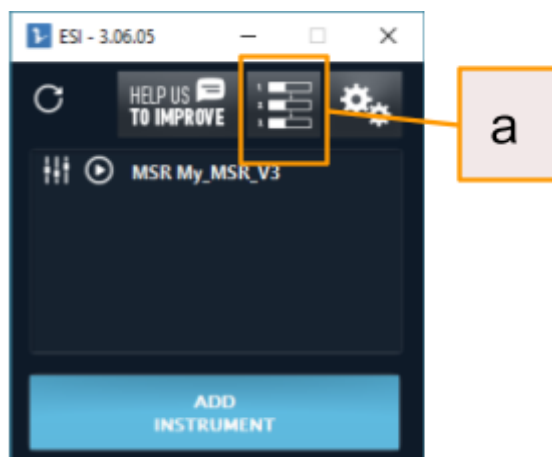


Fig 8: the ESI sequencer can be reached from the top of the ESI main window (8.a).

Trigger Input:

This function refers to a signal sent to the MSR by another device, and can only be accessed through the "IF" condition of the ESI sequencer (Fig 9.a). If Trigger is selected, select the type of trigger to be detected (Fig 9.b). For rising and falling edge the time out should be set (for High and Low the trigger status is only read once). Reading an edge has its own timeout of 100 ms.

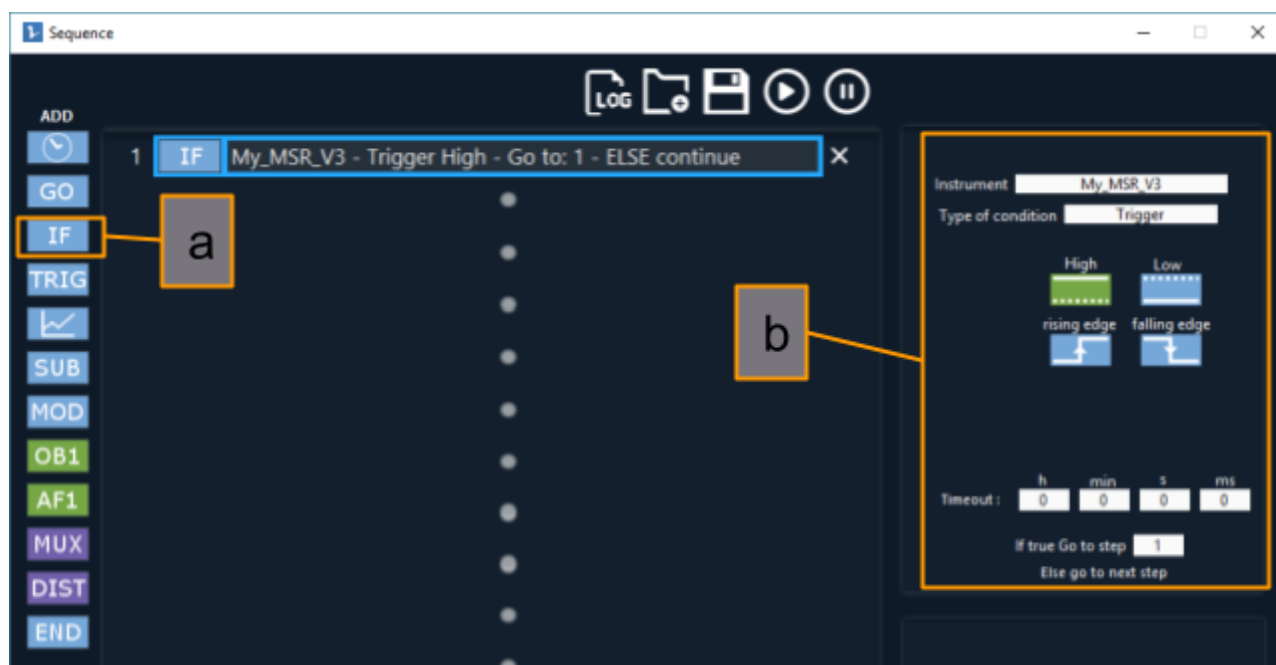


Fig 9: the trigger input can be reached (9.a) and set (9.b) through the functions available in the ESI sequencer.

Trigger Output:

This function refers to a signal sent by the MSR to another device, and can only be accessed through the "TRIG" condition of the ESI sequencer (Fig 10.a) If a high pulse or low pulse is selected, the pulse length can be set in this tab (Fig 10.b). For the MSR OB1 the high value is set to 5 V.

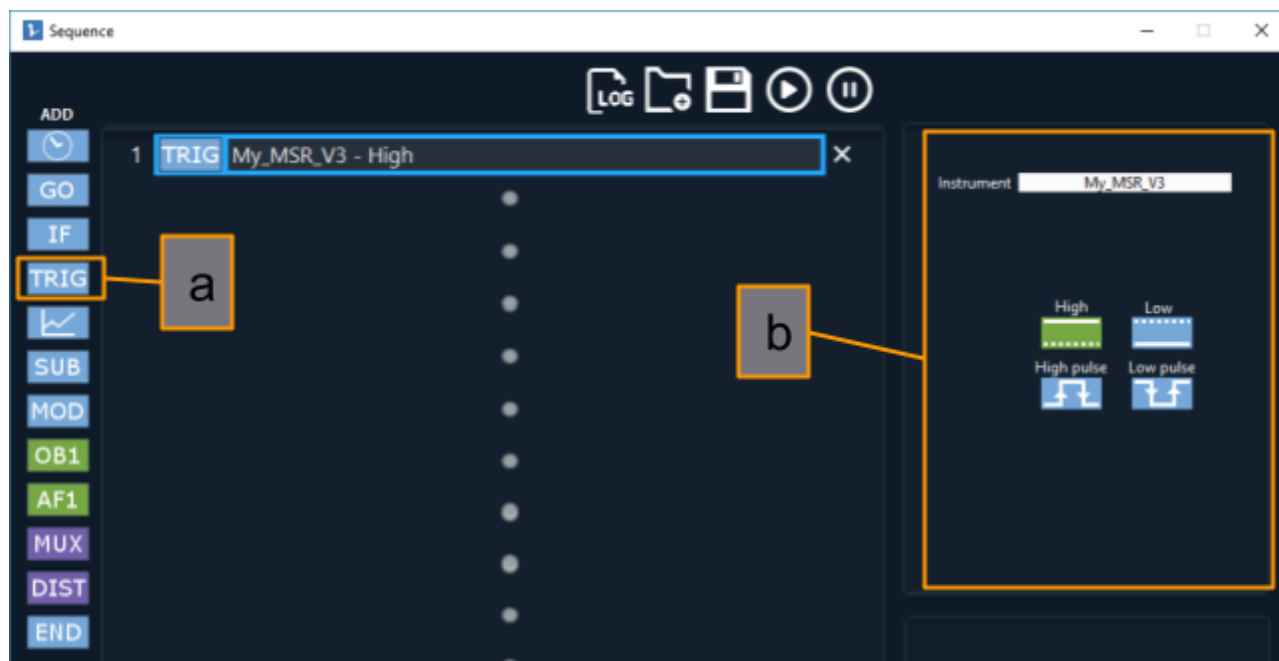


Fig 10: the trigger output can be reached (10.a) and set (10.b) through the functions available in the ESI sequencer

Control through the Elveflow Software Development Kit (SDK)

The use of the SDK to control the MSR is described in detail in the SDK user manual. Please read this guide in full before starting any experiment involving the SDK. Doing so will save you a lot of time and effort to reach what you would like to achieve.

Applications

Pressure or flow sensor monitoring in real time

You can connect the Elveflow sensors, such as the MFS flow rate sensor (see Fig 11.a in the figure below), the MFP pressure sensor (Fig 11.b), or the MPS pressure sensor (Fig 11.c) wherever you want in the setup in order to monitor your microfluidic experiment. The Sensor Reader module allows you to control 4 sensors simultaneously via our software. If needed, the ESI software allows controlling several Sensor Readers. It is an ideal supplement of the OB1 flow controller if you need to control all your experimental parameters.

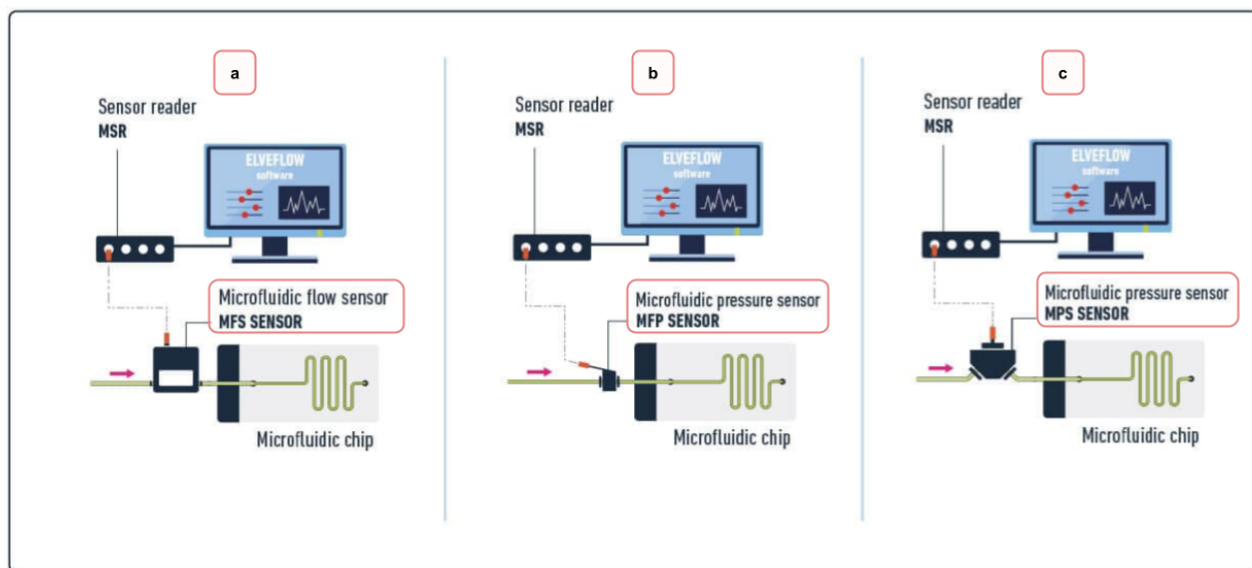


Fig 11: Connecting an MFS flow rate sensor (a), an MFP pressure sensor (b), and an MPS pressure sensor (c) to your microfluidic setup.

Benefit in an optimal manner from the performance of Elveflow sensors with the sensor reader acquisition interface. The open interface sensor reader also allows you to use third-party sensors.

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.

Information required for troubleshooting

With critical context information readily at hand, Elveflow Support employees will be better prepared to help you.

The elements usually required for troubleshooting are:

1. the serial number of the Elveflow device(s) used (Sensors, Instrument).
2. the ESI Report and the ESI initialization file (see how to create an ESI report in the next section)
3. the screenshots of the error messages received, if applicable.
4. Some pictures, or movies of your setup and your issue. You can [use WeTransfer to send us a big folder and files up to 2Go](#), just make sure to add the download link to your reply.

Generate and send ESI reports

ESI reports are used to create a snapshot of software configuration on your system. This can be used for the analysis of your system in the context of a support interaction when requested by an Elveflow Support agent.

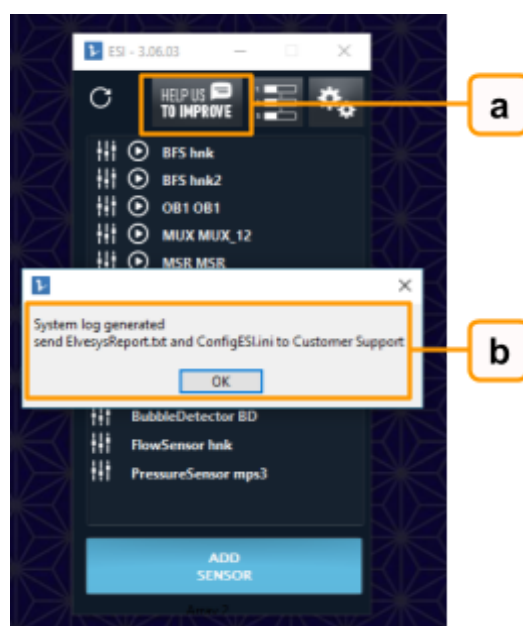
To generate a report, follow these steps:

- 1- Open ESI software






ESI.exe

- 2- Click on "Help us to improve" (1) on the ESI main window, to generate the report (2)



3- Click OK to open the ESI data folder. They are usually located in C: \ Users \ Public \ Documents \ Elvesys \ ESI \ data.

Nom	Taille
 ElvesysReport.txt	6 Ko
 ConfigESI.log	63 Ko
 ConfigESI.ini	3 Ko

4- Add these 2 files to your email at customer@elveflow.com:

- ElvesysReport.txt
- ConfigESI.ini

Technical Specifications

SENSOR READER UNIT	SPECIFICATIONS
Number of sensors connections	up to 4
Sensor connectors	M8 female (4 pins)
USB reading current min - max	200 mA - 800 mA
Sensor power supplies voltage (2 power supplies tunable independently each of which feeding 2 sensors)	5 - 24 V
Max total power on the 4 channels	0.9 W
SENSOR INPUTS	
Impedance	1 MΩ
Acquisition frequency	200 Hz
Acquisition resolution	from 9 to 16 bits
Input range	I2C, 0- 10 V analog
Resolution (1 bit)	5 mV
Noise (full band)	5 mV rms
Compatible sensors	Elveflow MFS flow sensor, MPS pressure sensor, MFP FlowPlus pressure sensor, MBD bubble detector
LOW-PASS FILTER FOR ANALOG SENSORS	
Filter type	Chebyshev
Cutoff frequency	10 Hz
Filter order	2

SENSOR READER SIZE: without connectors (length x width x height): 91 x 69 x 29 mm **WEIGHT:** 320 g



Technical support

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General information

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