ELVEFLOW an ELVESYS brand

SENSOR READER

DOCUMENT REF: UGMSR-210721

USER GUIDE

Symbols used in this document

Important information. Disregarding this information could increase the risk of damage to the equipment, or the risk of personal injuries.

Helpful information. This information will facilitate the use of the instrument and/or contribute to its optimal performance.

Additional information available on the internet or from your Elveflow representative.

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Introduction

The Elveflow® Sensor Reader is a device specifically designed to be used with our pressure or flow sensor for measurements inside your microchannels. The sensor reader can be used to monitor flow/pressure range from any type of flow control instrument (syringe pump, peristaltic pump, perfusion, pressure controller).

The sensor reader is an interface allowing the acquisition of many kinds of analog and digital sensors, including Elveflow pressure and flow sensors. Connect the sensor reader to your computer via USB and monitor the flow rate using the Elveflow® Smart Interface.

You can connect your microfluidic sensor either to the sensor reader or directly to the Elveflow microfluidic flow controller (which already integrates a flow reader).

Main Features & Benefits

- Simultaneous reading of 4 sensors
- Fast acquisition frequency 1 KHz
- From 9 to 16 bits resolution
- 3 ranges : 0-1V, 0-5 V, 0-10V
- Real-time control and feedback loops
- Measurement noise below resolution
- Noise reduction function with a 3rd order 60 Hz low-pass filter

Technical Specifications & Design

Fast and precise

With an acquisition sampling rate of up to 100 Hz and an 11 bit resolution, the Sensor Reader allows you to easily conduct experiments involving monitoring or controlling a physical parameter with analog and digital sensors in real time.

Wide sensors compatibility

Sensor Reader integrates two independent power supplies ranging from 5 to 25 V (one for the channels 1-2, one for the channels 3-4). This allows the use of a wide variety of sensors functioning with different voltages for their power supply. Thus, up to 4 sensors working with 2 different power supply voltages can be monitored simultaneously.

Noise reduction

An embedded analog 60 Hz low pass filter function can be activated on each channel independently to reduce sensor noise.

Performance

Our Sensor Reader achieves an 11 bits resolution at up to 1 kHz sampling rate and a sub-resolution noise, for accuracy levels on your sensor measurements down to 0.05% of the full scale and a response time down to 1 ms.

SENSOR READER UNIT	SPECIFICATIONS		
Number of sensors connections	up to 4		
Sensor connectors	M8 female (4 pins)		
USB reading current min - max	100 mA - 500 mA		
Sensor power supplies voltage (2 power supplies tunable independently each of which feeding 2 sensors)	5 - 25 V		
Total power on the 4 channels	0.9 W		
SENSOR INPUTS			
Impedance	1 MΩ		
Acquisition frequency	1 KHz		
Acquisition resolution	from 9 to 16 bits		
Input range	0- 10 V	0 - 5 V	0 - 1 V
Resolution (1 bit)	5 mV	2.5 mV	0.5 mV
Noise (full band)	5 mV rms	2.5 mV rms	0.5 mV rms
ANALOG LOW-PASS FILTER FUNCTION CHARACTERISTICS			
Cutoff frequency	60 Hz		
Filter order	3		

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

Product package contents

Before setting up your Sensor Reader, please check the package contents to verify that you have received the items below:

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

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.

All our sensors are provided with an M8 electrical connection and can be used with the Sensor Reader. We also provide all the microfluidic connector kits necessary to start your experiment.

Optional Accessories:

You may have ordered some additional elements (e.g. flow sensor units, 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: contact@elveflow.com

Installation & use

Instrument description

Front side (left) with four 4-pin female connectors to be used with any Elveflow pressure or flow sensor model. Rear side (right) with a USB connector.

Minimum computer requirements

The instructions displayed in this guide are based on features proposed by ESI V3.04.00 and later releases. Be sure your ESI version is up to date before implementing the solutions displayed in this guide. See ESI download link below. Using the ESI requires complying with the following minimum computer configuration requirements.

ESI V3_04_00 or later versions:

- Window XP SP3 or later - both 32 and 64-bit versions are supported;
- USB 2.0 port or faster
- 1 GB RAM
- 3.0 GHz Pentium 4
- 1 GB of free hard disk space.

ESI Installation

1. Plug the Elveflow® USB flash drive into the computer, or download the latest version from Elveflow website.
2. Open the Elveflow® folder
3. Locate the ESI software zip file (e.g. ESI_V3_04_01.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 prompted, restart your computer to finish the installation process

The instructions displayed in this guide are based on features proposed by ESI V3.04.00 and later releases. **Be sure your ESI version is up to date before implementing the solutions displayed in this guide.**
Do not install ESI directly from the Zip file, and do not install directly from the USB key, this is likely to cause issues. Always copy the ESI.zip source to your computer, then unzip it before launching the installation process.

The Elveflow® Smart Interface's latest stable version can be downloaded from the Elveflow website.
To alleviate bandwidth and access issues, two links for the same file are provided. The mirror link is the same file hosted on another server. So that you always have an accessible version to work with, 24/7.

Electronic connections

1. Connect the female part of the cable to the male connector of the sensor.

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

Warning 1: Particular attention must be paid when connecting several sensors on the same sensor reader output connectors couple. Sensor reader output connectors #1 and #2 are coupled to one another and the same goes for Sensor reader output connectors #3 and #4. Therefore, be careful to use the same voltage on each unit of a couple (e.g. 5V on output #3 and #4).

Warning 2: You should verify your total sensor power does not exceed 0.9 W.

Control the sensor reader with a computer

To Control the Sensor reader from a computer, either ESI software or Elveflow library (SDK) can be used. Please refer to those guides for a detailed description.

Sensors compatibility chart with Elveflow instruments

		MFS		MPS	MFP	Bubble Detector	Custom
		Analog	Digital				
OB1	Mk2	✔	✘	✘	✘	✔	
	Mk3	✔	✘	✘	✘	✔	✔
	Mk3+	✔	✔	✔	✔	✔	✔
	Essential	✔	✔	✔	✔	✔	✔
AF1	Pressure	✔	✘	✘	✘	✘	✔
	Dual	✔	✘	✘	✘	✘	✔
MSR	V1	✔	✘	✔	✔ (1)	✔	✔
	V2	✔	✔	✔	✔ (1)	✔	✔
	Flow Reader	✔	✔	✔	✔	✔	✔

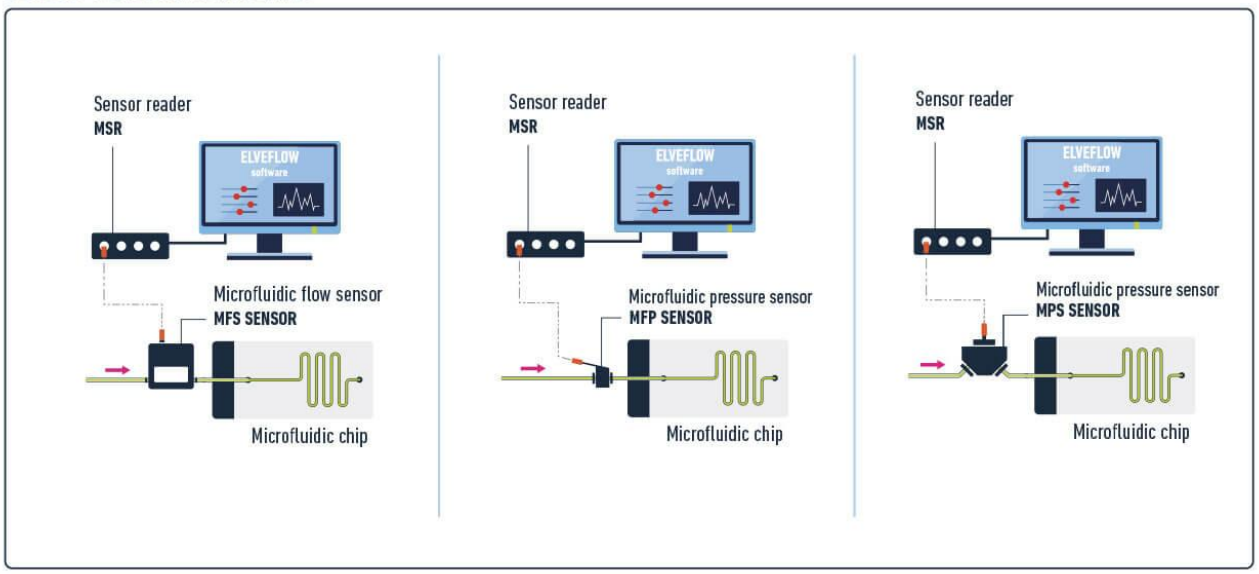
✔ compatible
✘ not compatible

(1) USB 3.0 is recommended if more than 3 sensors are connected.

Application example

Monitor the measurement of all your microfluidic sensors

The MSR sensor reader is an acquisition interface for all your sensors inside your setup. You can connect the sensors (pressure, flow rate...) 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 software allows to control several Sensor Readers. It is an ideal supplement of the OB1 flow controller if you need to control all your experimental parameters.



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.

1. Elveflow's Software (ESI)

Monitor and automate your setup using our esi software that allows you to measure, control and automate your experiment using only one interface.

2. Flow sensor (MFS) or pressure sensor (MPS)

Place the sensors anywhere you want on your fluidic path and electrically connect your sensors to the microfluidic sensor reader.

Thanks to their small footprint, sensors can be placed anywhere within your fluidic system.

3. Microfluidic sensor reader (MSR)

Connect the sensor reader to your computer via usb and monitor it using the elveflow® smart interface

4. Chip / capillary

Add your chip to complete the standard setup. In this position, the sensor directly measures the pressure entering the microfluidic chip. You can add another pressure sensor at the chip outlet in order to get the difference in pressure and/or the microfluidic resistance.

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.