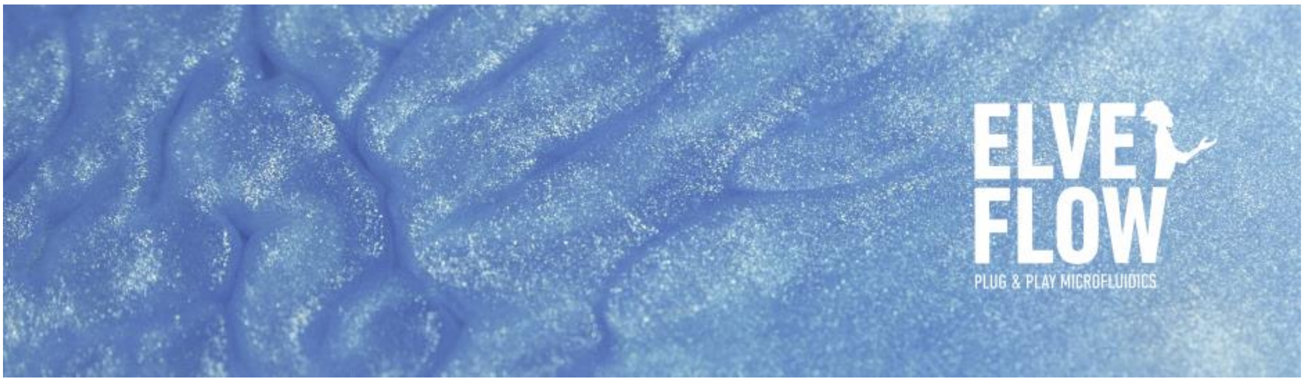


Application Note:

How to calibrate an MFS sensor?

When using solutions other than water or isopropanol (already integrated into the software), it is necessary to calibrate your MFS sensors to measure reliable flow rates. This application note describes how to calibrate an MFS flow sensor in the ESI software using the flow integration module and a precision scale. Please ensure that the calibration is performed across the entire range of the sensor (and correspondingly the OB1 channel).

Equipment required:

- OB1 pressure controller
- A precision scale
- An MFS with an appropriate microfluidic resistance (MFS-D-4 with 100µm fluidic resistance in this application note)
- An inlet and outlets reservoirs
- ESI software (Version 3.09.02 in this application note)

Experimental set-up:

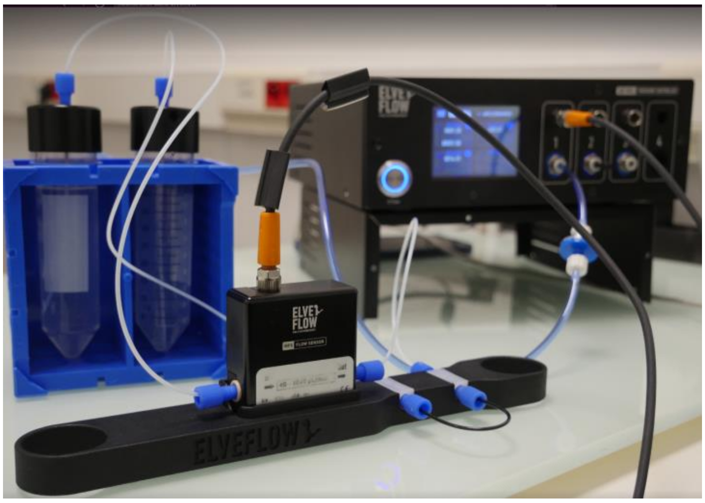


Figure 1 – Illustration of the experimental set-up used to calibrate an MFSD4 using an OB1 MK4 pressure controller (0-2bar channels), 100µm fluidic resistance and 1/16" OD PTFE tubing

Experimental protocol:

- Add your OB1 pressure controller and MFS sensor in the ESI software.
- Fill the system with your solution of interest. Please ensure there is no bubble in your set-up.
- Once your system is filled, empty the outlet reservoir and weigh it using a precision scale. Note the mass **m1**.
- Open the flow injection module in the ESI software (See Figure 2). **Choose a Target Volume** (for example: 1mL). **Apply the pressure** (for example 200mbar for the first experiment, using a 0-2 bar channel). Then, **click on Start injection**.

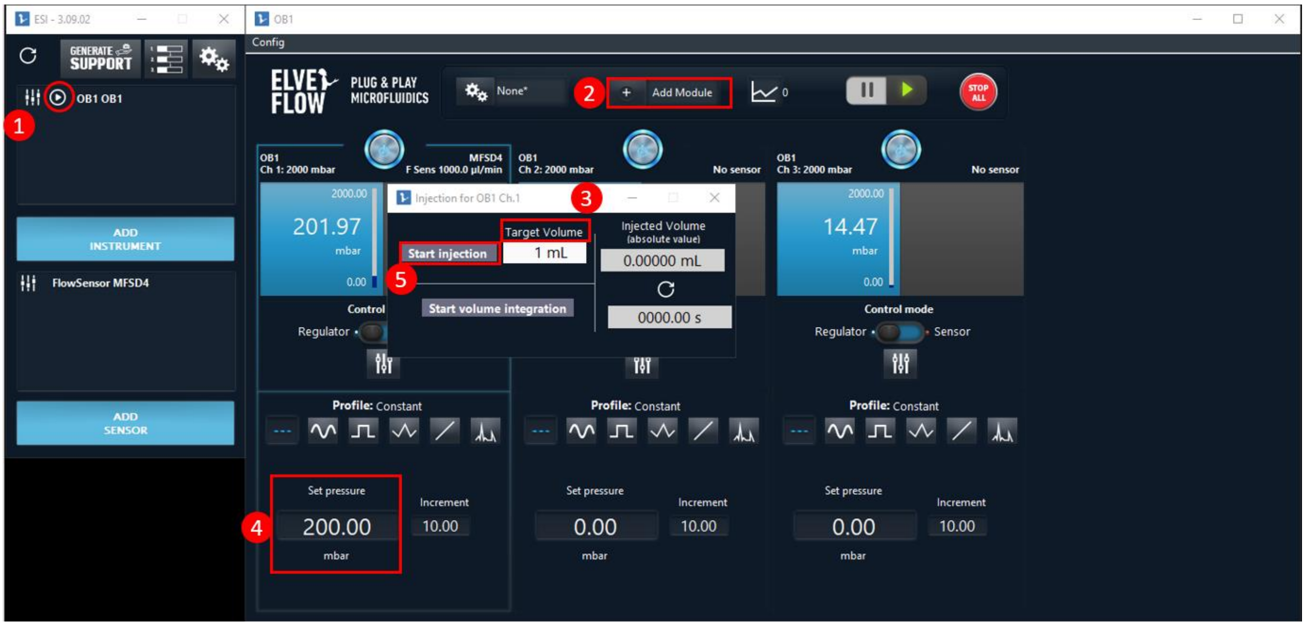


Figure 2 - Flow injection module

- The module stops once the target volume is reached (see Figure 3). Note the volume **V_injected** and the time, **t_injected**.

Figure 3 – Injected volume: 1mL

- Weigh the outlet reservoir and note the mass **m2.** Be cautious of potential evaporation in the outlet reservoir.
- Calculate the real flow rate **Y** and the measured flow rate **X** using the following equations:

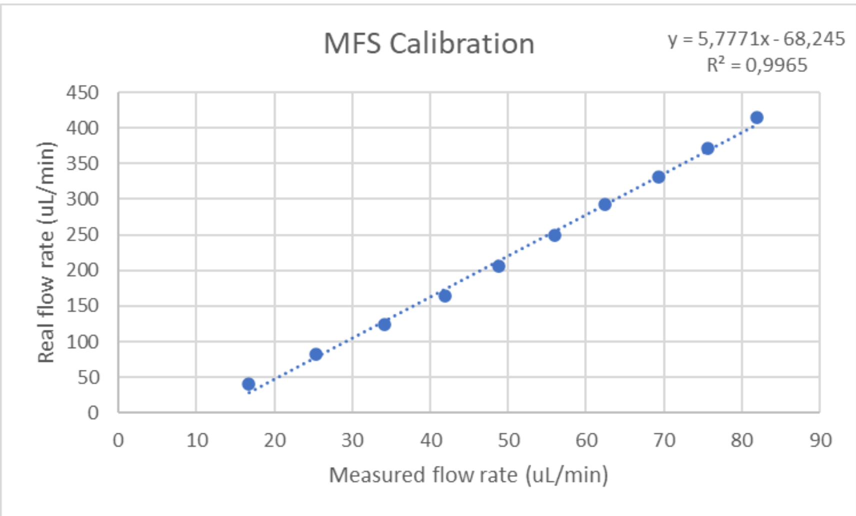
- $Y = \frac{(m2-m1)}{(\rho * \Delta t)}$ with ρ the density of your liquid.
- $X = \frac{V\_injected}{\Delta t}$

- Repeat the process for a minimum of four different pressures. Please note that it is recommended to cover the full range of your MFS.

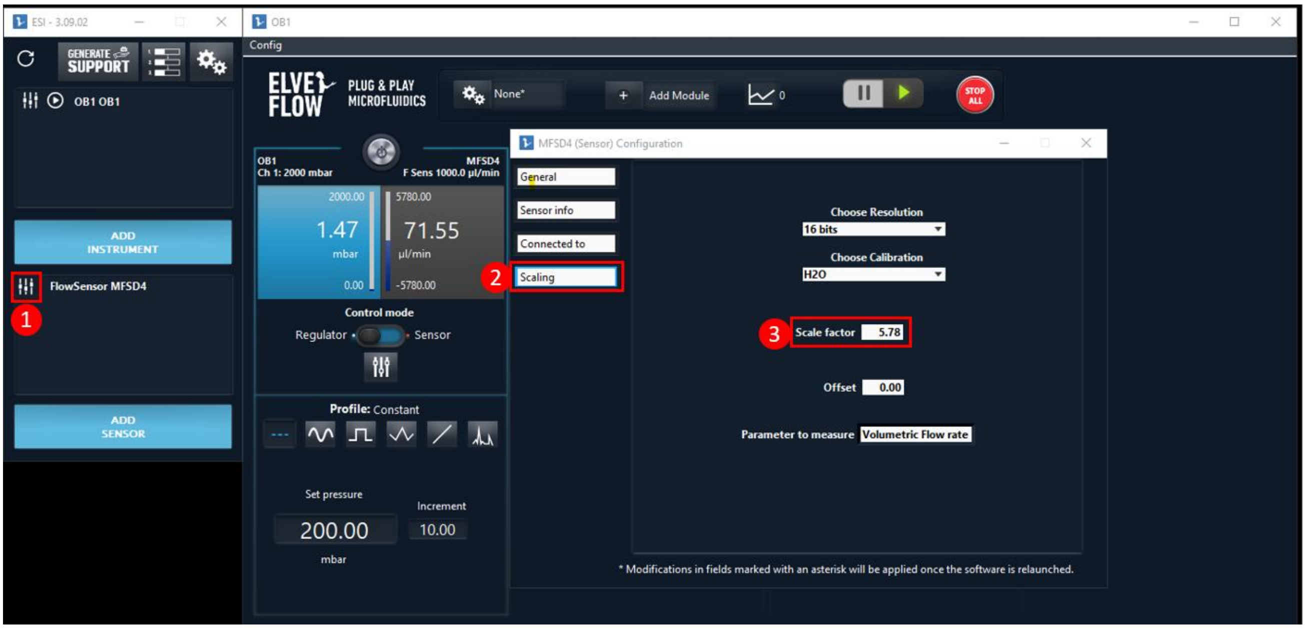
Example:

Pression (mbar)	m1 (g)	m2 (g)	t_injected (s)	V_injected (mL)	X (µL/min)	Y (µL/min)
200	10,2055	10,8714	1242,95	0,34653	16,7277847	40,896304
400	10,1907	10,8331	595,39	0,25186	25,3810108	82,3631031
600	10,162	10,8673	433,25	0,24694	34,1982689	124,269347
800	10,1803	10,8103	292,32	0,20433	41,9396552	164,516978
1000	10,1603	10,8352	250,6	0,20374	48,7805267	205,582937
1200	10,1646	11,041	268,8	0,25048	55,9107143	248,886768
1400	10,1591	11,2619	288,25	0,29999	62,4437121	292,049284
1600	10,1652	11,1435	225,76	0,26052	69,238129	330,791058
1800	10,1575	11,0093	174,89	0,22044	75,6269655	371,793131
2000	10,1521	11,0161	158,85	0,21687	81,9150142	415,197976

- Plot Y as a function of X. The scale factor corresponds to the slope of the curve.



- Change the scale factor in the ESI software. In our example, set the scale factor to 5.78.



- Once the calibration is complete, you can proceed with adjusting the offset.