



SmartFlo Manual

PC / Desktop version for LabVIEW

Flow control for ExiGo, UniGo & 4U Pumps

Table of Contents

1 SmartFlo installation.....4

1.1 Windows 7.....4

1.2 Windows 10.....6

2 SmartFlo Overview9

3 Selecting the correct COM port.....10

3.1 More than 2 pumps detected10

3.2 Pump not automatically detected10

3.3 How to manually find the correct COM port11

4 Controlling an ExiGo pump.....12

4.1 How to initialize the pump.....12

4.2 How to set the Syringe type13

4.2.1 Defining a custom syringe.....14

4.3 Clamping the syringe.....16

4.4 Move the plunger to the initial required position18

4.5 Manual mode: How to set the flow rate.....19

4.5.1 Flow Rate Units19

4.5.2 Shear Stress Units20

4.6 Defining channel dimensions and viscosity for Shear Stress units21

4.7 ECO mode.....21

4.8 Pump Manifold.....22

5 Controlling a UniGo or 4U pump24

5.1 Setting the feedback24

5.2 Manual mode: How to set the flow rate or pressure25

5.2.1 Flow Rate Units25

5.2.2 Pressure Units25

6 Flow Sensor: Visualizing the flow rates27

7 Setting the PID parameters28

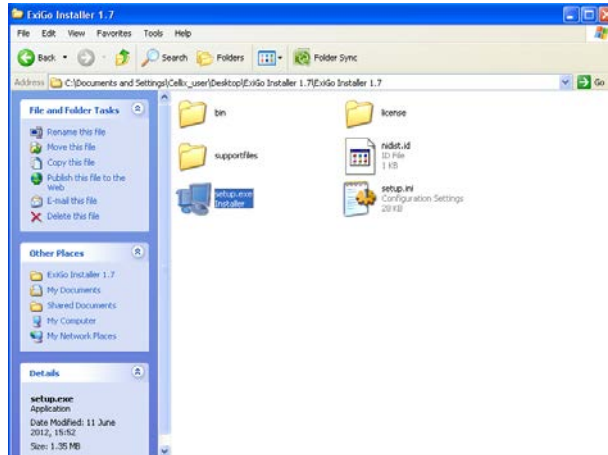
7.1 How to tune in the PID:.....29

8	Program mode: Defining a custom flow profile	30
9	Waveform Editor	31
9.1	Open/Save custom waveforms	34
10	Recording the flow rates/pressures data	35
11	Flow sensor coefficients.....	37
12	LED Status colours explanation.....	40

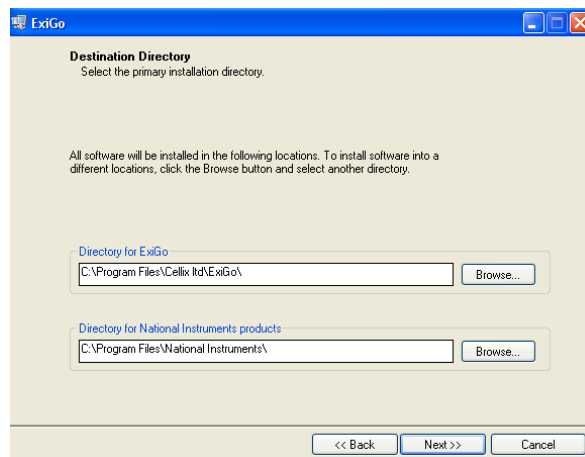
1 SmartFlo installation

1.1 Windows 7

Please complete the following steps:

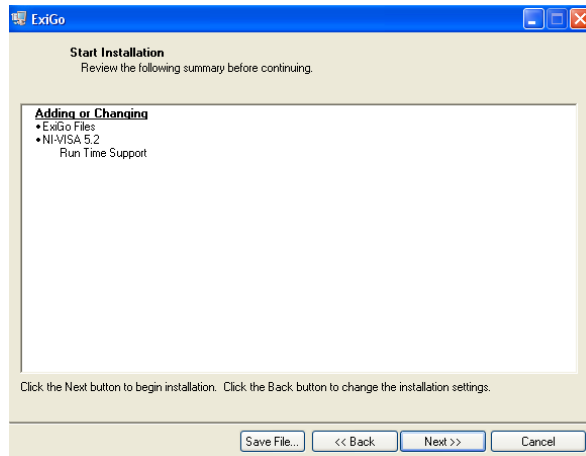


1. Open the LabVIEW installation CD or USB and open the file **Setup.exe**¹. Alternatively you can download the files from our website at: www.wearecellix.com/SmartFlo

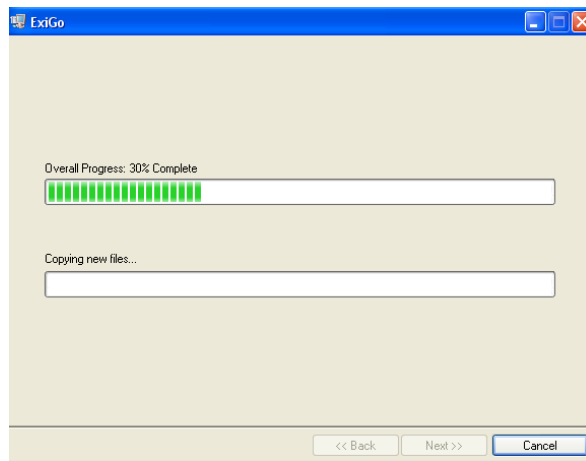


2. Select the destination folder and click *Next*.

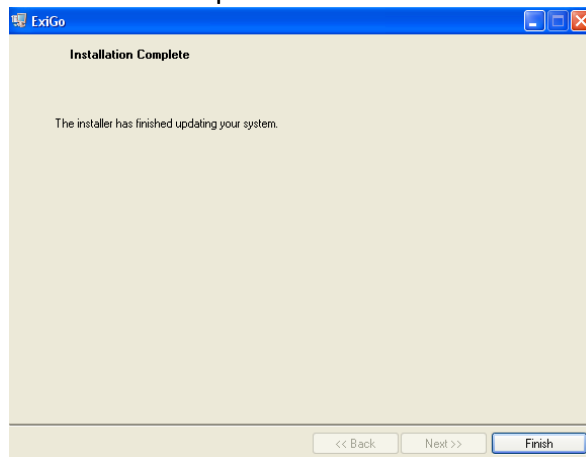
¹ You may require Administrator rights. Please contact your system administrator in case you cannot perform the installation.



3. Click *Next*²



4. Wait until the installation is complete.



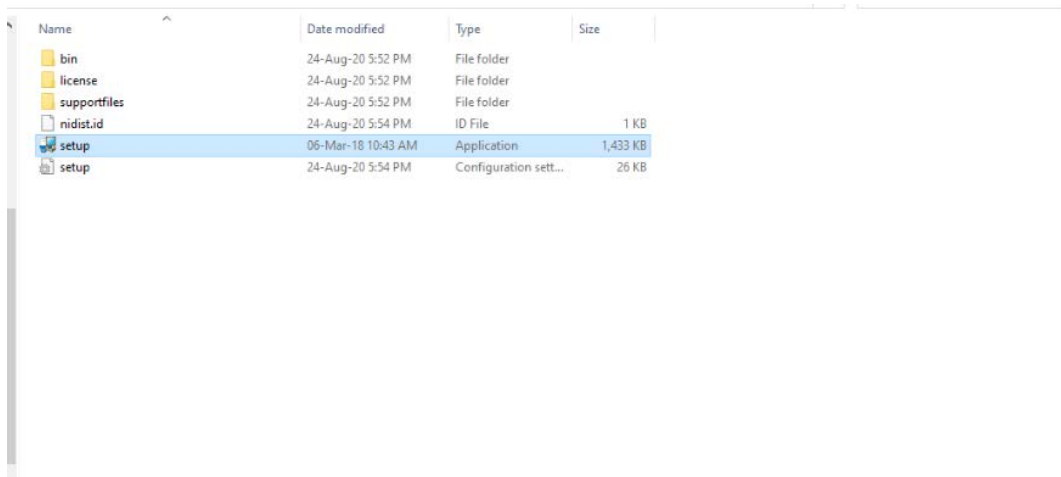
5. Once the installation is complete, click *Finish*.

² Please note that the content of this window may vary on each computer, depending on previous versions installed.

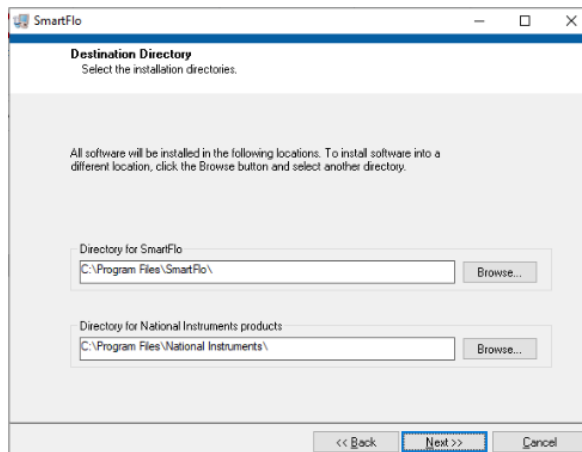
- Restart your computer if required.

1.2 Windows 10

Please complete the following steps:

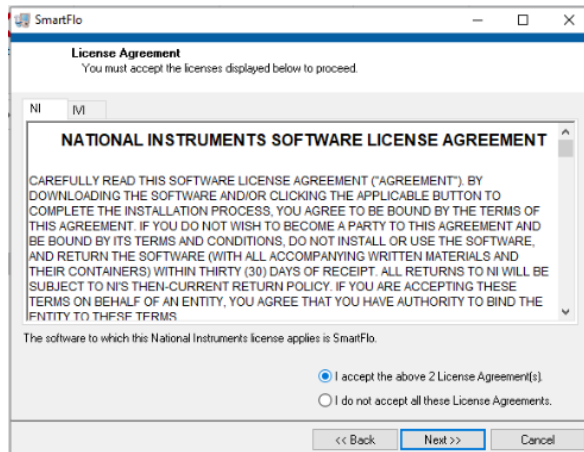


- Open the LabVIEW installation CD or USB and open the file **Setup.exe**³. Alternatively you can download the files from our [website](http://www.wearecellix.com/SmartFlo) at www.wearecellix.com/SmartFlo

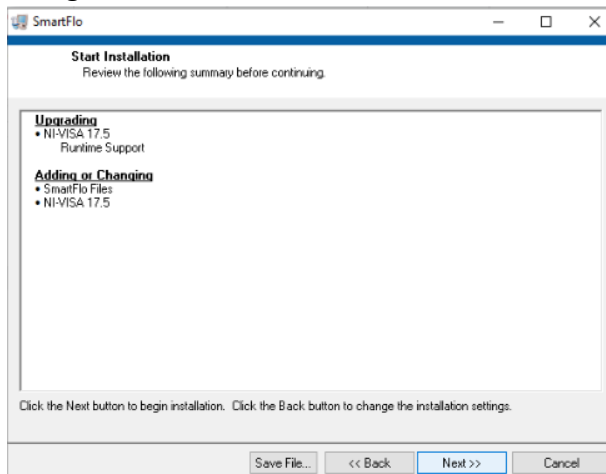


- Select the destination folder and click *Next*.

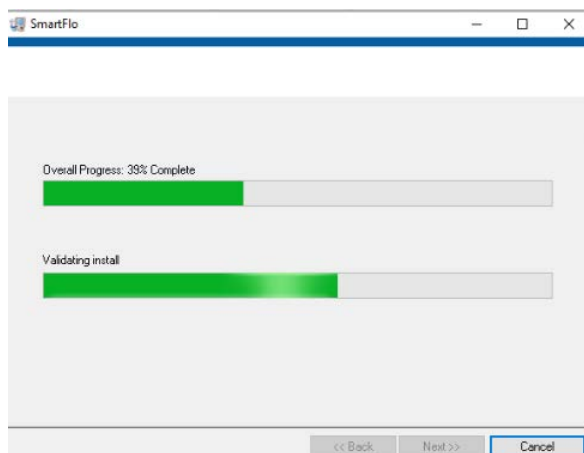
³ You may require Administrator rights. Please contact your system administrator in case you cannot perform the installation.



3. Accept the license agreement and click Next

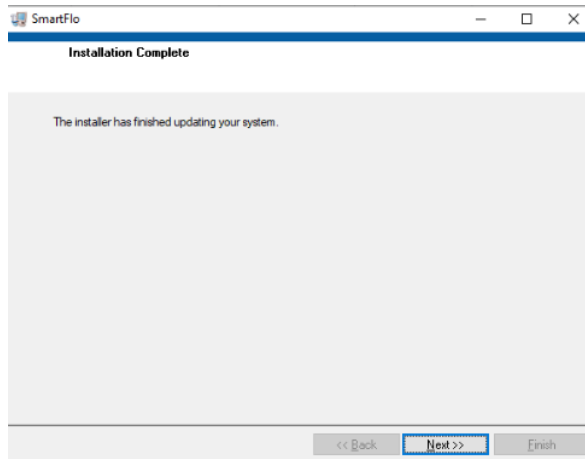


4. Click Next⁴

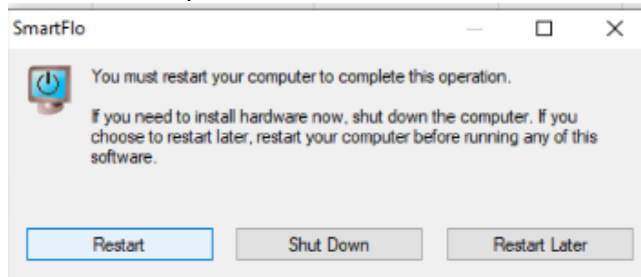


5. Wait until the installation is complete.

⁴ Please note that the content of this window may vary on each computer, depending on previous versions installed.



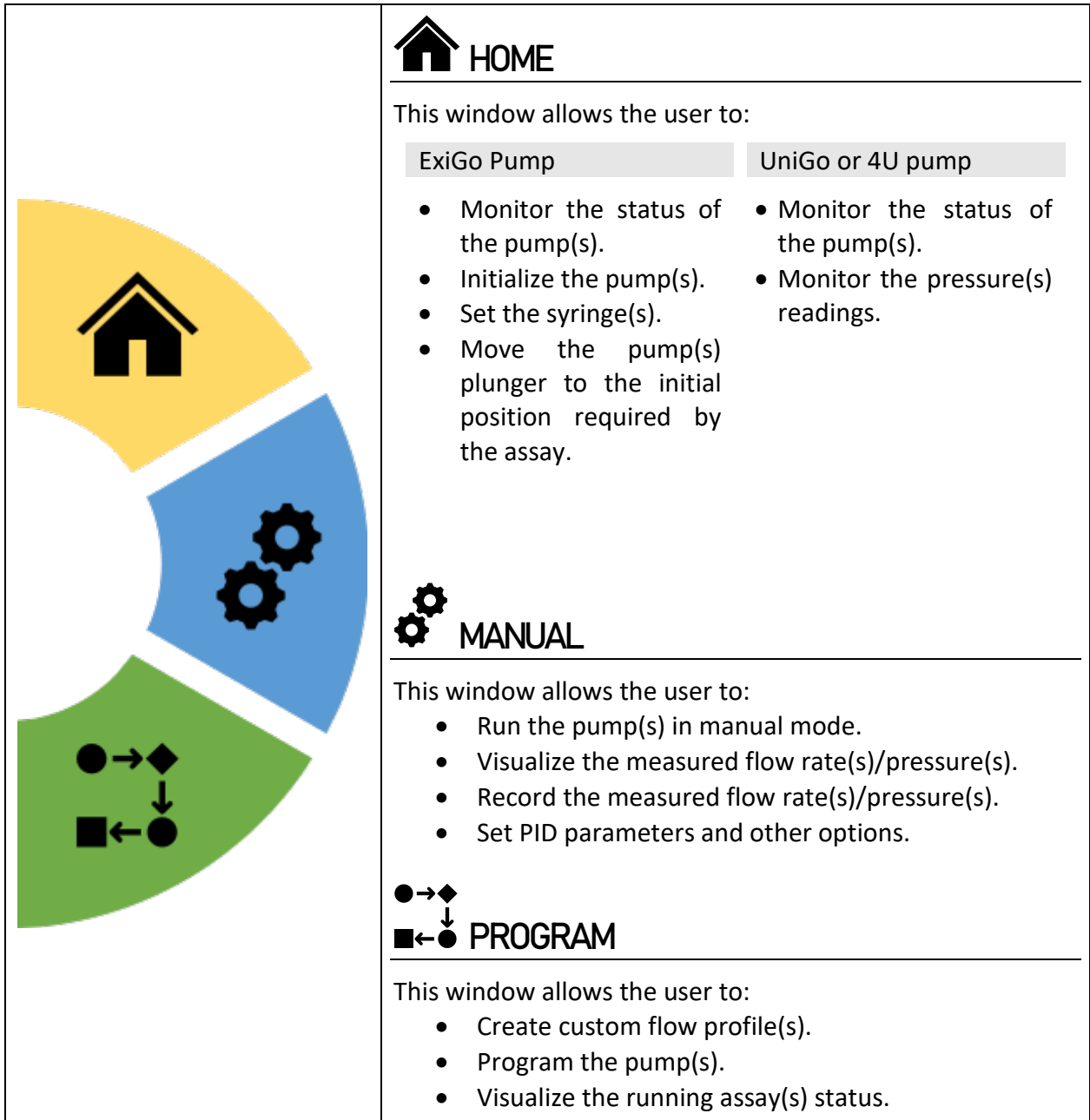
6. Once the installation is complete, click *Next*.



7. Restart the computer if prompted.

2 SmartFlo Overview

SmartFlo is comprised of three main sections:

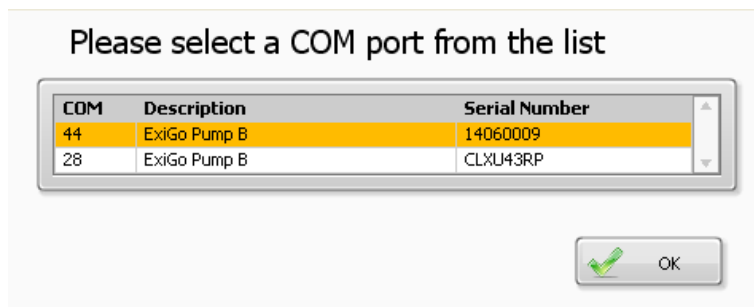


3 Selecting the correct COM port

SmartFlo should detect the correct COM port and establish communication with the pump automatically. However, in some cases, it may be required for the user to select the adequate COM port, for example, if two or more pumps are connected to different USB ports in the PC.

3.1 More than 2 pumps detected

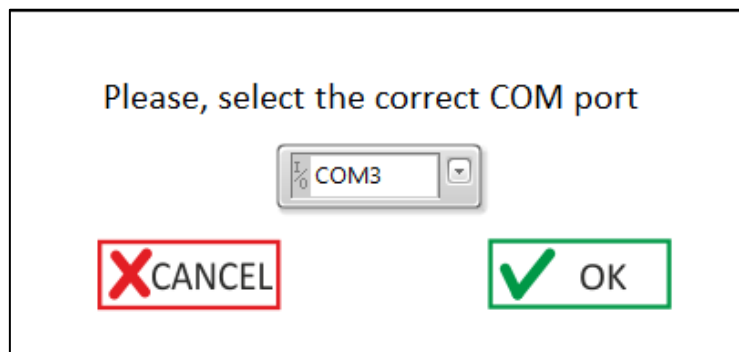
If there are more than 2 pumps connected (each to an independent USB port), the following dialog should appear.



Please, select the correct COM port for the pump you would like to connect to.

3.2 Pump not automatically detected

When the SmartFlo user interface is not able to detect that a pump is connected, a manual COM port selection menu should appear.



Please, select the correct COM port for your pump by clicking the “drop down arrow” and click ok.⁵

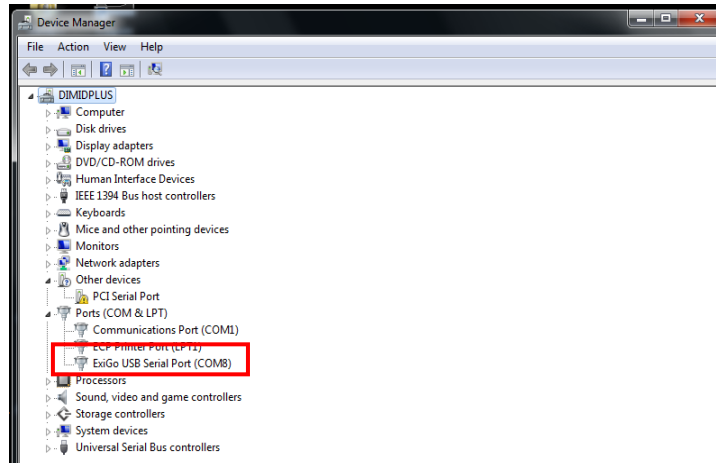
⁵ If your COM port is not in the list, please ensure that the USB cable is properly connected between the pump and the PC, then click Refresh and try again.

3.3 How to manually find the correct COM port

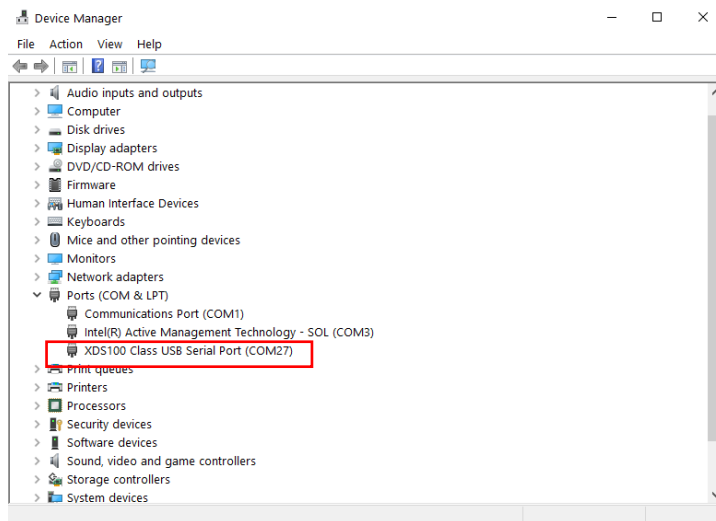
To manually check the COM port assigned to a pump, open the **Device Manager** of the PC. Within the section **“Ports (COM & LPT)”**, the COM port should appear under the name **“USB Serial Port”** or **“ExiGo USB Serial Port”**.

Windows 7

To Open the Device manager click Start → Control Panel → System → Device Manager

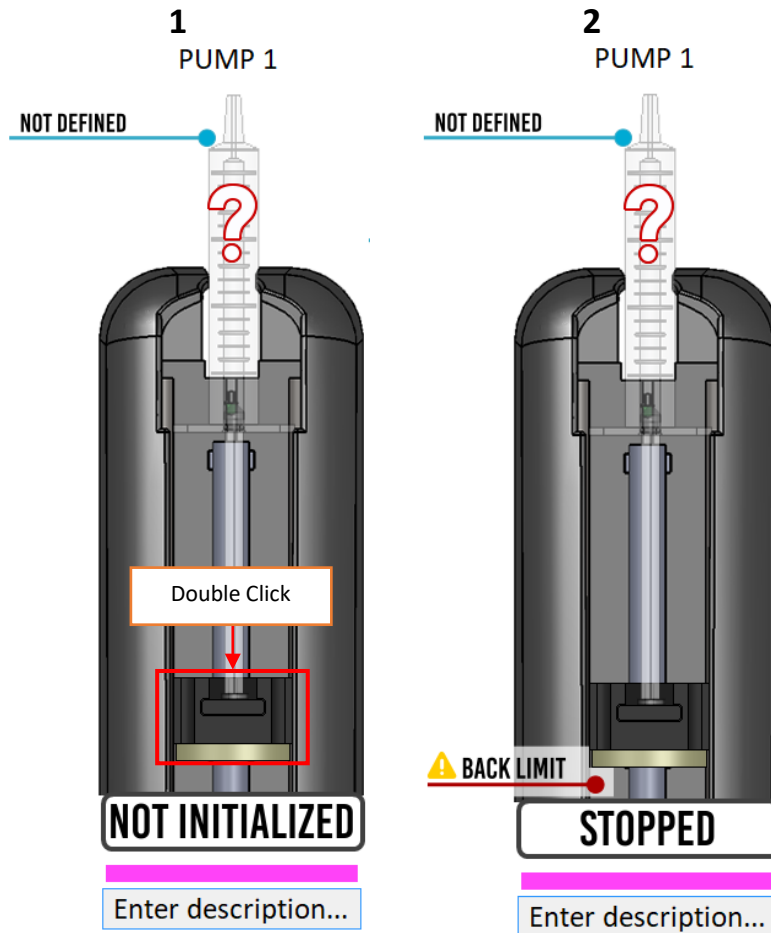


Windows 10



4 Controlling an ExiGo pump

4.1 How to initialize the pump



The NOT INITIALIZED status means that the pump MUST be initialized prior to starting the assay. In order to initialize the pump, please follow the next steps:

1. Remove any installed syringe on the pump⁶. Then double click on the pump's plunger image to begin the initialization.
2. The user interface will ask for confirmation and then it will move the pump drive to the home position. Once the pump is initialized, the status will change to STOPPED.

⁶ **⚠Warning:** Failure to remove any installed syringe may cause the pump to malfunction during the initialization.

4.2 How to set the Syringe type

The type of syringe to be used during the experiment must be defined prior to starting the assay. To set the syringe, please complete the following steps:

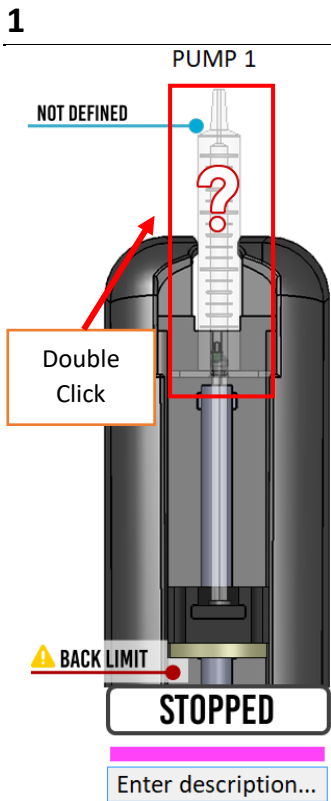


Figure 1: Double click to open the Syringe selector

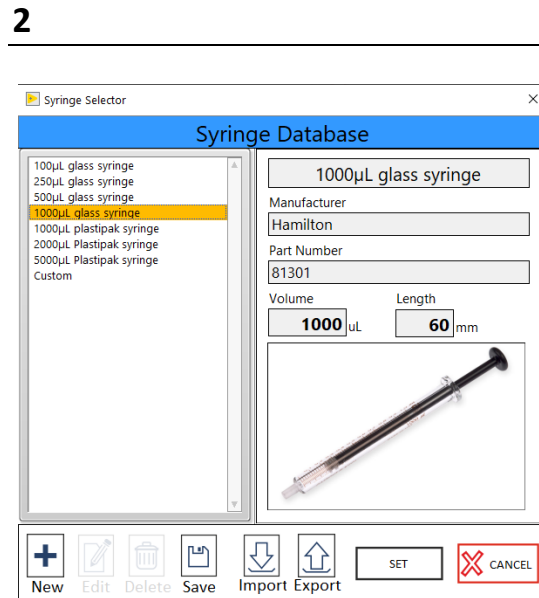


Figure 2: Syringe Selector main page

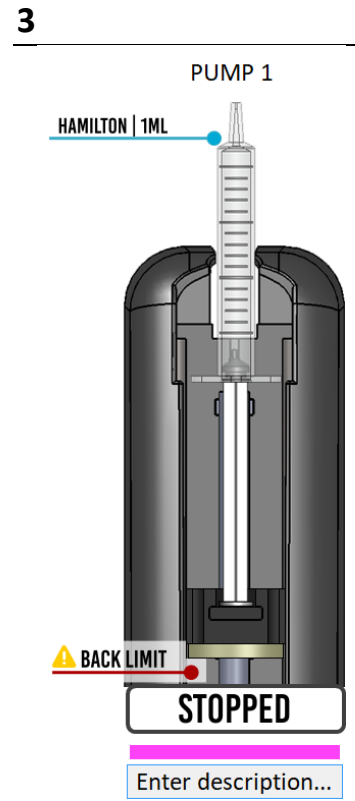


Figure 3: Syringe set

1. Double click on the syringe image in the user interface.
2. A Syringe Selector window will appear.*
3. Select the desired syringe and click SET or double click on the selected syringe to set it.

*Note: compatible syringes pre-loaded in the SmartFlo program include:

Hamilton Syringes	
700 Series	
Part Number	Description
80601	100 µL, Model 710 LT SYR
80701	250 µL, Model 725 LT SYR
80801	500 µL, Model 750 LT SYR

1000 Series	
Part Number	Description
81301	1mL, Model 1001 LT SYR
BD Plastipak Syringes	
Part Number	Description
300013	1 mL Syringe. Luer tip
300185	2.5 mL Syringe. Luer tip
302187	5 mL Syringe. Luer tip

4.2.1 Defining a custom syringe

To create a “new” syringe, open the Syringe Selector by double clicking the Syringe Icon on the Home page (see [Figure 1](#)).

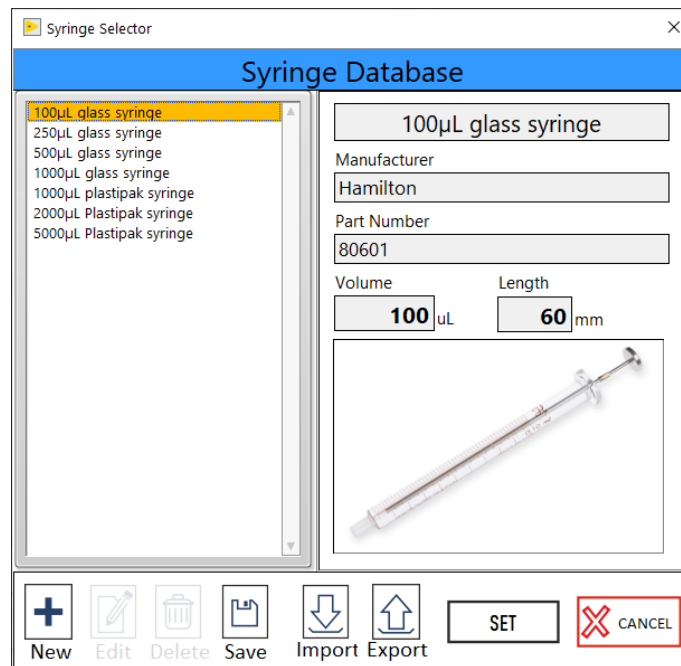



Figure 4: Syringe Selector window

1. Click  to create a new custom syringe.
2. In the pop up window, enter the name, manufacturer and part number.

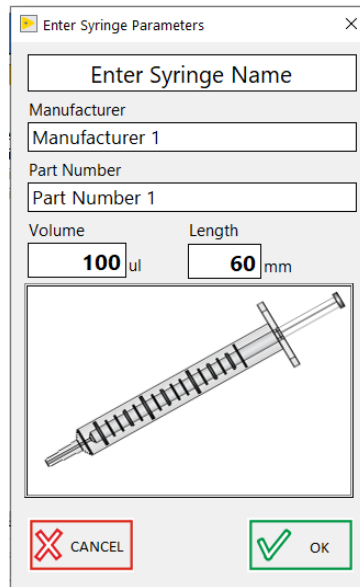



Figure 5: Custom syringe window

3. Enter the volume and the length⁷ of the syringe.
4. Click OK



5. Click  Save to keep the changes.

⁷ The length usually corresponds to the graduated area only. Check with the syringe's manufacturer for more details.

4.3 Clamping the syringe

1

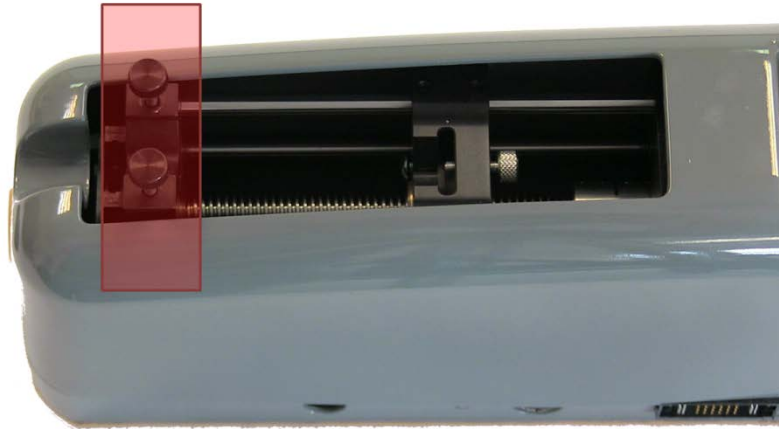


Figure 6: Syringe clamp

Remove the syringe clamp.

2

16

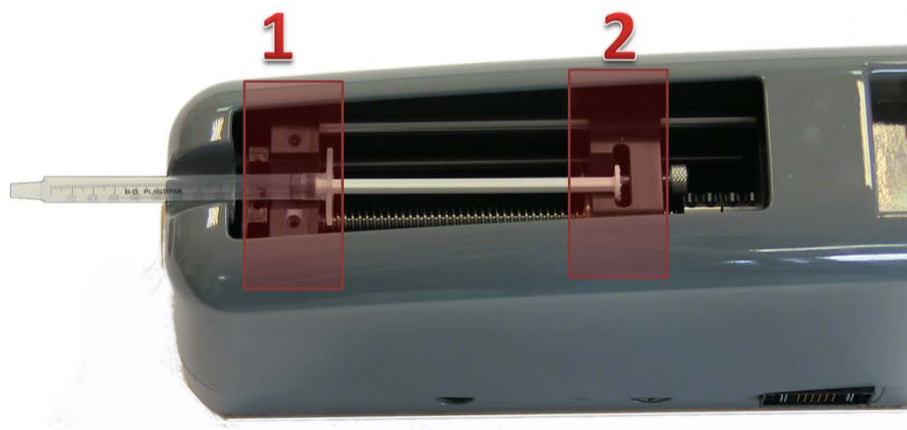


Figure 7: Clamping points:. 1 for the barrel and 2 for the plunger.

Place the syringe in the pump with the body resting on the front of the pump (position 1 in Figure 7) and the plunger resting in position 2. Move the position of the pump's plunger if required (see section 4.4).

3

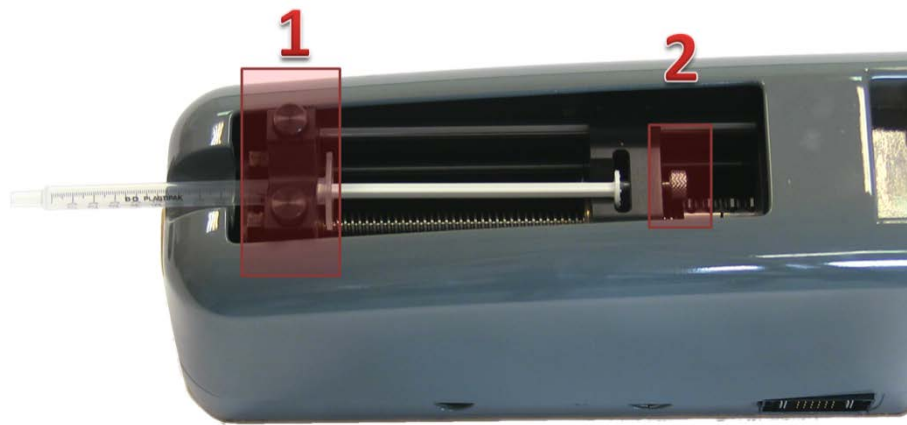





Figure 8: Syringe clamped using the clamp (1) and the thumb screw (2)

Put the syringe clamp back in place (Figure 8 position 1) and tighten the screws firmly. Tighten the thumb screw (Figure 8 position 2) to secure the syringe plunger.

Please note that the syringe clamp is reversible, depending on the syringe to be installed. See table below:

5ml Syringe	Smaller Syringes	Clamping Direction
		

4.4 Move the plunger to the initial required position

In most cases, the position of the pump after initialization will not be suitable for placing the syringe. To move the pump, simply drag the pump plunger on the user interface and drop it to the required position. An indicator of the approximate volume displaced during the pump movement will appear.

1

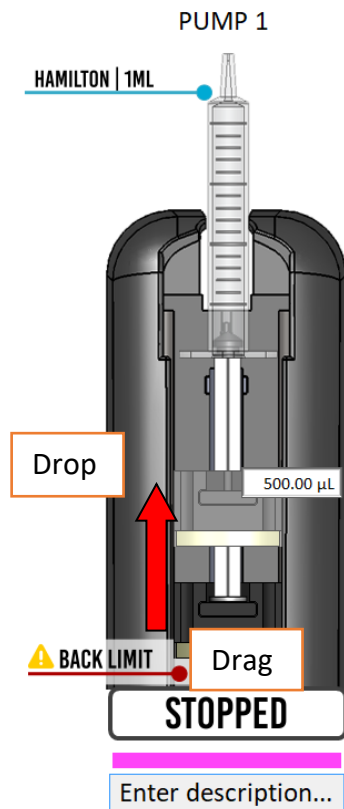


Figure 9: Drag and drop the plunger to move it to the initial position

2

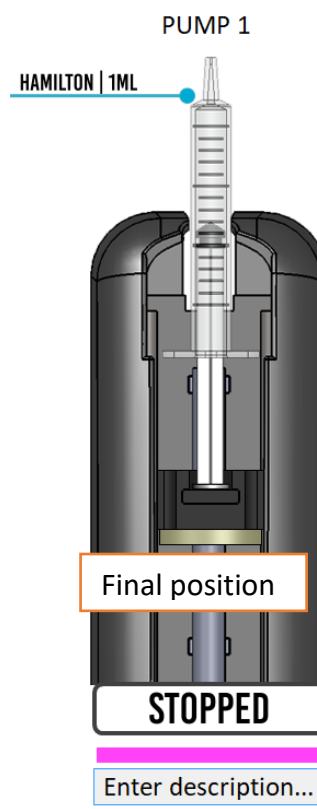


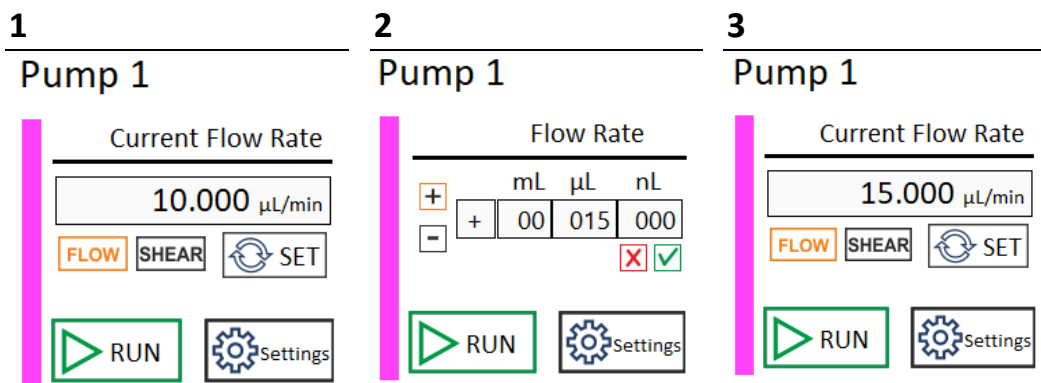
Figure 10: Final position

4.5 Manual mode: How to set the flow rate

There are two different units you may choose to set the flow rate manually:

- Flow Rate Units (L/min) *or*
- Shear Stress units (dyne/cm²)

4.5.1 Flow Rate Units



1. Click in the flow rate indicator
2. Set the desired flow rate value. Use the and controls to change to positive or negative flow rate. Click to accept the changes
3. The flow rate you set should now appear within the flow rate indicator. Press in order to update the pump flow rate.
4. Once the flow rate has been set, press the button to start the assay.

4.5.2 Shear Stress Units

In order to set the flow rates in Shear Stress units, the following conditions must be met:


1. The channel dimensions of your fluidic channel must be defined (see Section 4.6)
2. The viscosity of your media/sample/buffer must be set.

1	2	3	4
<p>Pump 1</p> <p>Current Flow Rate</p> <p>15.000 $\mu\text{L}/\text{min}$</p> <p>FLOW SHEAR SET</p> <p>RUN Settings</p>	<p>Pump 1</p> <p>Current Shear Stress</p> <p>37.500 dyne/cm^2</p> <p>FLOW SHEAR SET</p> <p>RUN Settings</p>	<p>Pump 1</p> <p>Shear Stress</p> <p>dyne/cm^2</p> <p>+ - + 40 X ✓</p> <p>RUN Settings</p>	<p>Pump 1</p> <p>Current Shear Stress</p> <p>40.000 dyne/cm^2</p> <p>FLOW SHEAR SET</p> <p>RUN Settings</p>

1. Change the indicator to dynes by clicking the **SHEAR** button
2. Introduce the desired shear stress. Use the **+** and **-** controls to change to positive or negative shear stress. Click **✓** to accept the changes.
3. The shear stress value you set should now appear within the flow rate indicator. Press **SET** in order to update the pump flow rate set point. Once the shear stress is set press the **RUN** button to start the assay.

4.6 Defining channel dimensions and viscosity for Shear Stress units

To define the dimensions of your fluidic channel and the viscosity of your media/sample/buffer:

1. In the Manual Tab, click 
2. In the settings window, click on the Biochip Icon
3. Select your Celix Biochip or define the geometry for your custom biochip/channel
4. Select your media or input the viscosity of your custom media in dyne x s /cm²
5. Click

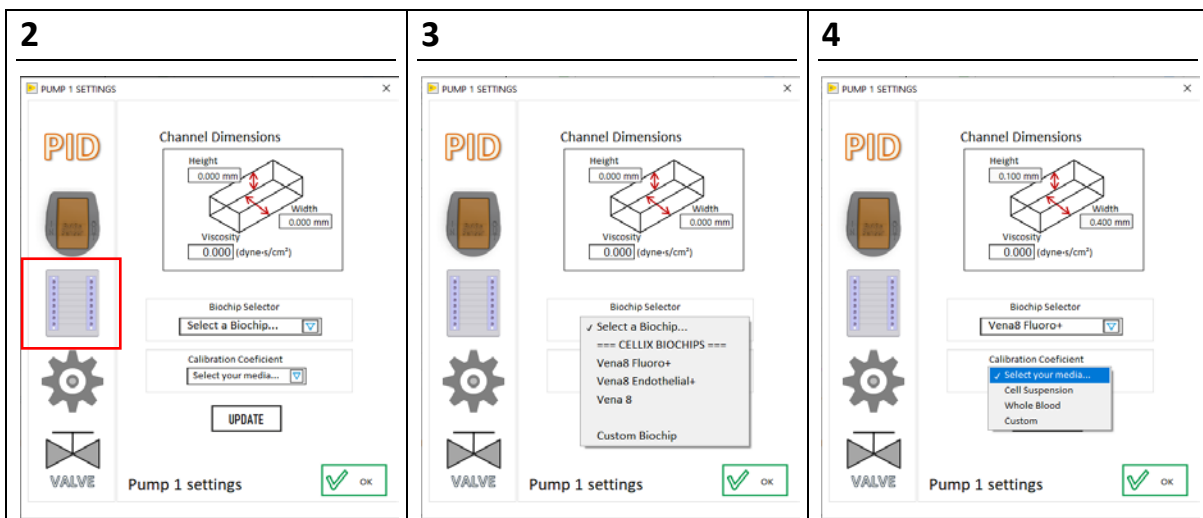


Figure 11: Channel dimensions and Viscosity

4.7 ECO mode

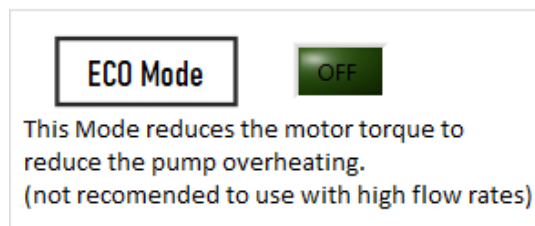





Figure 12: ECO mode

If the ExiGo pump is overheating, it is possible to set the ECO mode to reduce the torque and thus, reducing the heat generated by the motor.

This is only recommended if the heat generated by the motor is affecting your sample or having an impact on your setup. The recommended option is to have the ECO mode disabled.

To change the pump to ECO mode:

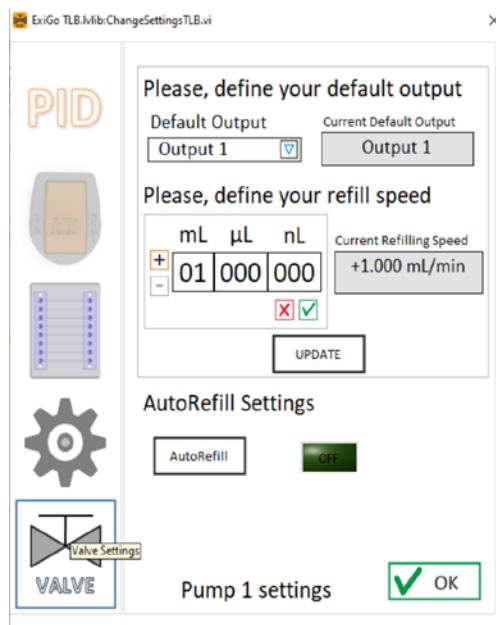
1. In the Manual Tab, click 
2. In the settings window, click on the Advanced settings Icon 
3. Click  to turn the ECO mode ON or OFF

4.8 Pump Manifold

The Pump Manifold is a 3-way valve, compatible with the ExiGo syringe pump or UniGo pressure pump, which facilitates the pumping of fluid into one of three microfluidic channels⁸ at a time. The pump manifold can be programmed to automatically switch between fluidic channels and is extremely useful for applications which require:

- Automatic refilling of the syringe (e.g. with ExiGo syringe pump)
- Asynchronous injection of a reagent in multiple channels
- Continuous perfusion over long periods of time including sample recirculation.⁹

1



⁸ Each channel can be used as an input or an output.

⁹ Additional equipment may be required.

Figure 13: Defining valve settings

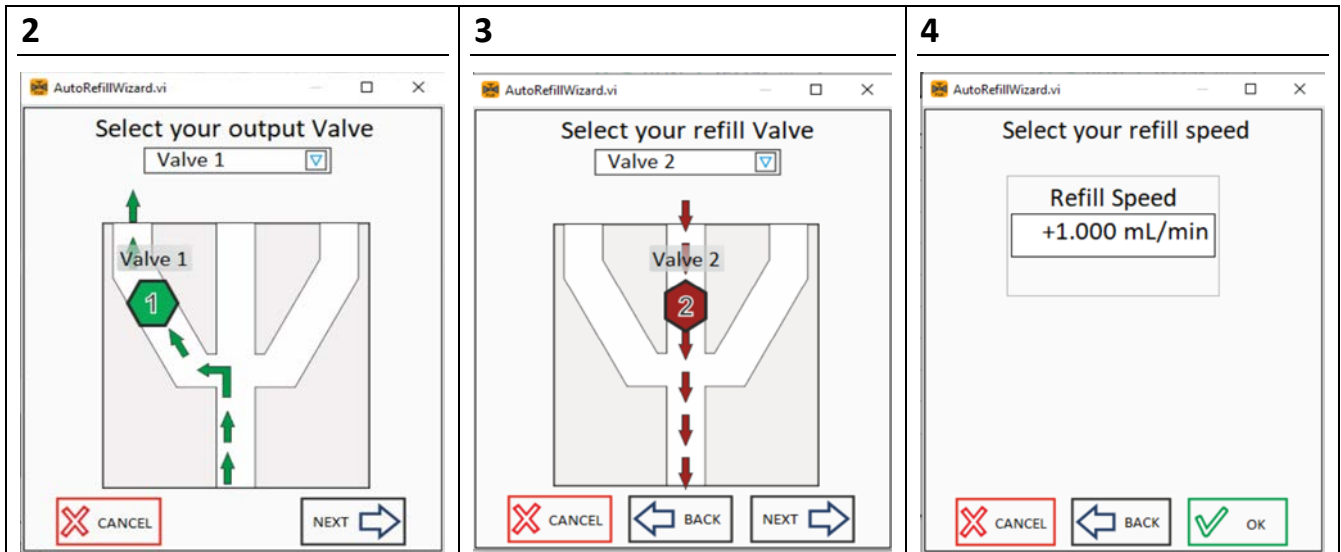






Figure 14: Defining valve settings and refill speed

To operate the pump manifold for recirculation:

1. In the Manual Tab, click 
2. Select the Output valve (you can select from three available channels), click 
3. Select refill valve (you can select from three available channels), click 
4. Select the refill speed, click 



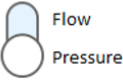

5 Controlling a UniGo or 4U pump

The UniGo or 4U pumps do not require an initialization. A manual flow rate or a custom flow profile can be applied and executed directly after booting up.

5.1 Setting the feedback

The recommended option is to use Flow rate as a feedback parameter for your UniGo or 4U pump. However, advanced users have the option to switch to a pure pressure control by selecting pressure as a feedback parameter.¹⁰

To change the feedback parameter:

1. In the Manual Tab, click 
2. In the settings window, click on the Advanced settings Icon 
3. Click  to switch between Flow and Pressure
4. Click 

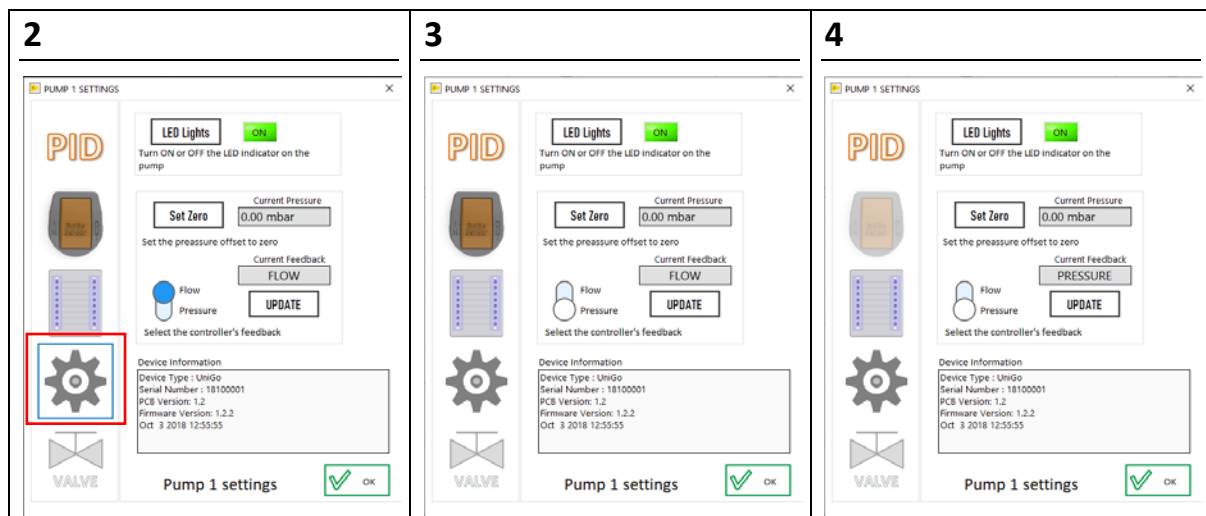



Figure 15: Feedback selector

 Note that when pressure is selected as a feedback, all the units are automatically updated from nL/min to mbar.

¹⁰ Cellix recommends to keep flow rate as a feedback parameter. Using pressure control only might lead to having a different flow rate than expected as it would depend on the fluidic resistance of your setup, viscosity of the media, etc.

5.2 Manual mode: How to set the flow rate or pressure

Depending on the selected feedback parameter, the set-point can be specified in flow rate (L/min) or pressure units (bar):

5.2.1 Flow Rate Units

The screenshots show the following steps:

- 1** Pump 1: Current Flow Rate is 10.000 mL/min. Buttons: FLOW, SHEAR, SET, RUN, Settings.
- 2** Pump 1: Flow Rate is being set to 15.000 mL/min. Buttons: +, -, mL, μL, nL, SET, RUN, Settings.
- 3** Pump 1: Current Flow Rate is updated to 15.000 mL/min. Buttons: FLOW, SHEAR, SET, RUN, Settings.



1. Click in the flow rate indicator
2. Set the desired flow rate value. Click to accept the changes
3. The flow rate you set should now appear now within the flow rate indicator. Press in order to update the pump flow rate set point.
4. Once the flow rate has been set, press the button to start the assay.

5.2.2 Pressure Units

The screenshots show the following steps:

- 1** Pump 2: Current Pressure is 1000 mbar. Buttons: PRESS, SHEAR, SET, RUN, Settings.
- 2** Pump 2: Current Pressure is being set to 2000 mbar. Buttons: +, -, mbar, SET, RUN, Settings.
- 3** Pump 2: Current Pressure is updated to 2000 mbar. Buttons: PRESS, SHEAR, SET, RUN, Settings.

1. Click in the pressure indicator
2. Set the desired pressure value. Click to accept the changes

3. The pressure set-point should appear now within the indicator. Press  in order to update the pump's set point.
4. Once the set-point has been set, press the  button to start the pump.

6 Flow Sensor: Visualizing the flow rates

The performance of the pump(s) can be significantly increased by using a flow sensor to obtain real-time flow rate feedback. The flow sensor can be connected to ExiGo pump (optional) and it is compulsory for UniGo/4U pumps.

Each flow sensor is plug-and-play; therefore it can be connected to the pump(s) at any moment.

Once the sensor is connected and recognized by the pump, a “Flow Sensor” indicator will appear in SmartFlo.

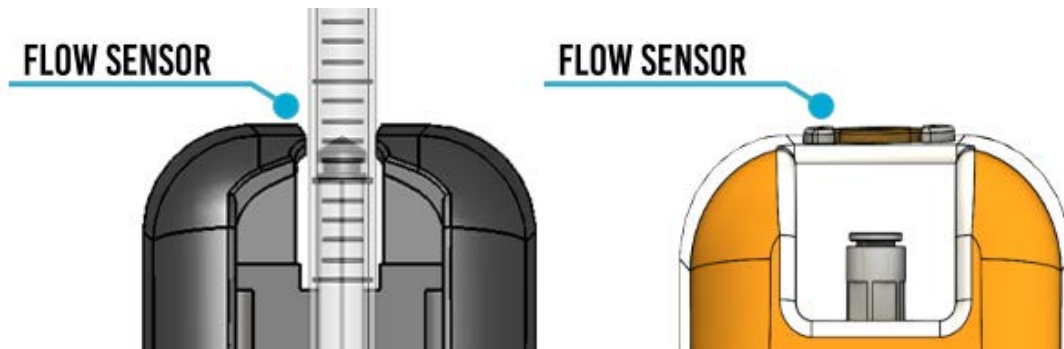


Figure 16: Flow sensor deteted in an ExiGo pump (left) and UniGo pump (right)

Immediately after plugging-in the flow sensor, the real time flow rate measurements will appear within the Manual Tab.



It is possible to record the measured flow rates within a particular assay and when running in manual mode. Please refer to section 10 for more details.

When running a UniGo or 4U pump, it is possible to switch to pressure readings. Just switch between flow rate and pressure by clicking 

7 Setting the PID parameters

In order to get the best performance and accuracy of the ExiGo/UniGo/4U pumps as well as a fast dynamic response, the PID controller must be turned on.¹¹

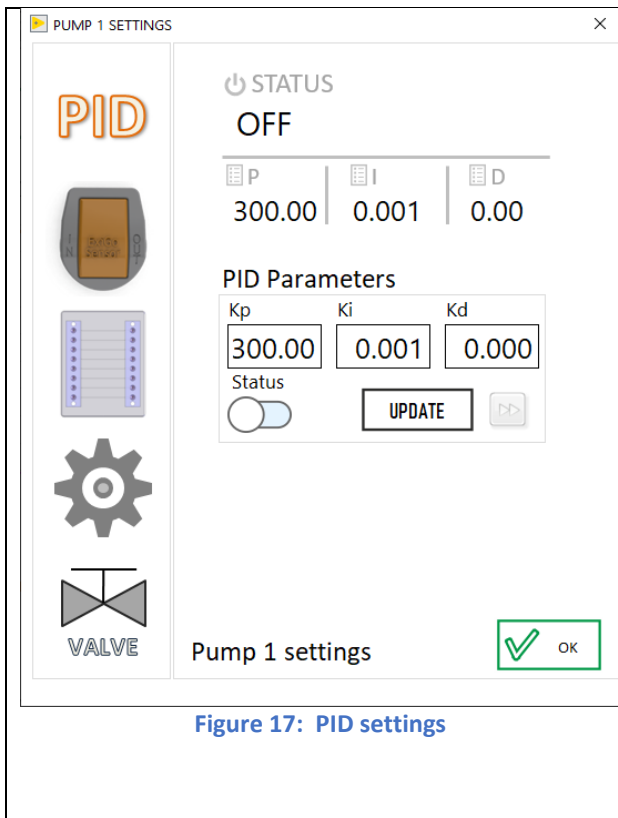


Figure 17: PID settings

Proportional (Kp): The proportional gain defines how quickly the system will change its output to reduce the existing error (Flow rate set point minus current flow rate). Therefore, the proportional parameter will increase the speed of the control system response. However, if the proportional value is too large, the system will begin to oscillate. Using **P** parameter on its own may lead to a Steady-State error (offset) between desired flow rate and current flow rate.

Integral (Ki): The integral term sums the instantaneous flow rate error over time and gives the accumulated offset that should have been corrected. Thus, its main purpose is to drive the flow rate Steady-State error to zero. A large value of the Integral parameter may cause the system to overshoot the set point value and even oscillate.

Derivative (Kd): The derivative term is proportional to the rate of change of the system output (pump flow rate). Therefore it “predicts” the system behaviour decreasing the system output if the flow rate is changing rapidly. This parameter helps to reduce overshoot and settling time but an incorrect value may cause the system to become unstable.

¹¹ If controlling an ExiGo pump, the PID can only be turned on when a flow sensor is connected. If you purchased an ExiGo pump without a flow sensor you can still use the pump without the PID controller. Please contact Cellix if you wish to purchase one.

7.1 How to tune in the PID:

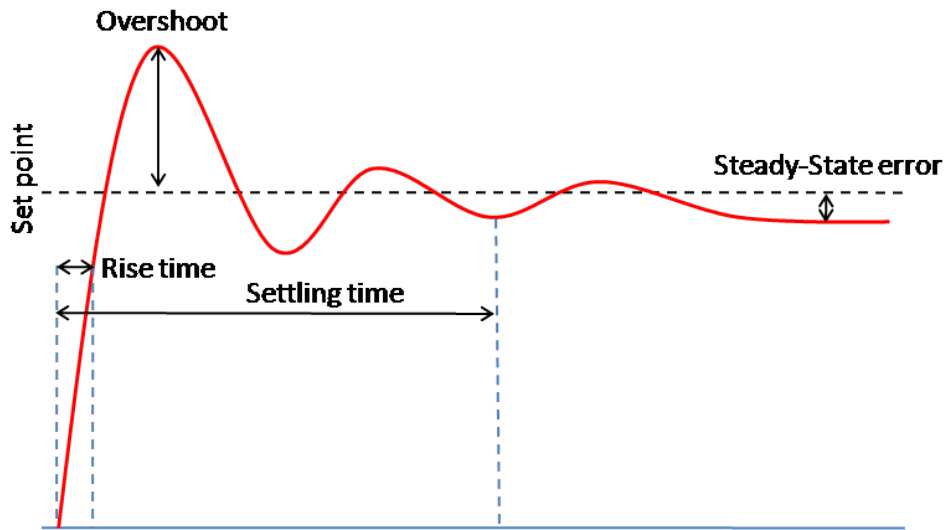


Figure 18: Typical response to a set point change

1. Set all parameters to 0.
2. Increase **P** and change the set point until the dynamic response of the pump is fast enough without oscillating.
3. Increase gradually **I** value in order to minimize the Steady-State error. Integral parameter can be any value between 0 and 1 but it is very sensitive and may cause the system to oscillate. Therefore it is recommended to start using a value of 0.001. A value over 0.1 will probably lead the system to become unstable.
4. In case of a large overshoot when changing the set point, increase the **D** value gradually until the optimal ratio overshoot/response time is achieved. However, a large value of **D** may slow down the dynamic response of the system.

8 Program mode: Defining a custom flow profile

It is possible to program a pump with a custom flow profile in order to have a precise control of the flow rates and duration of a certain experiment.

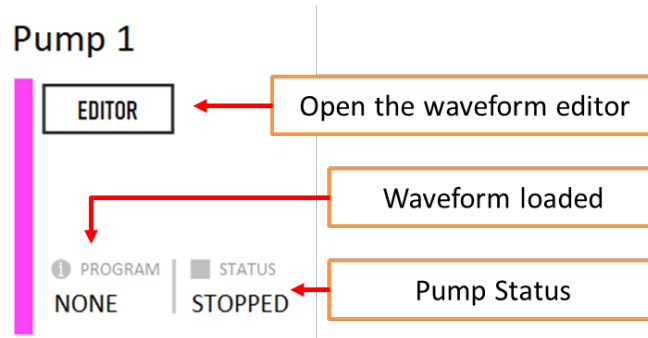



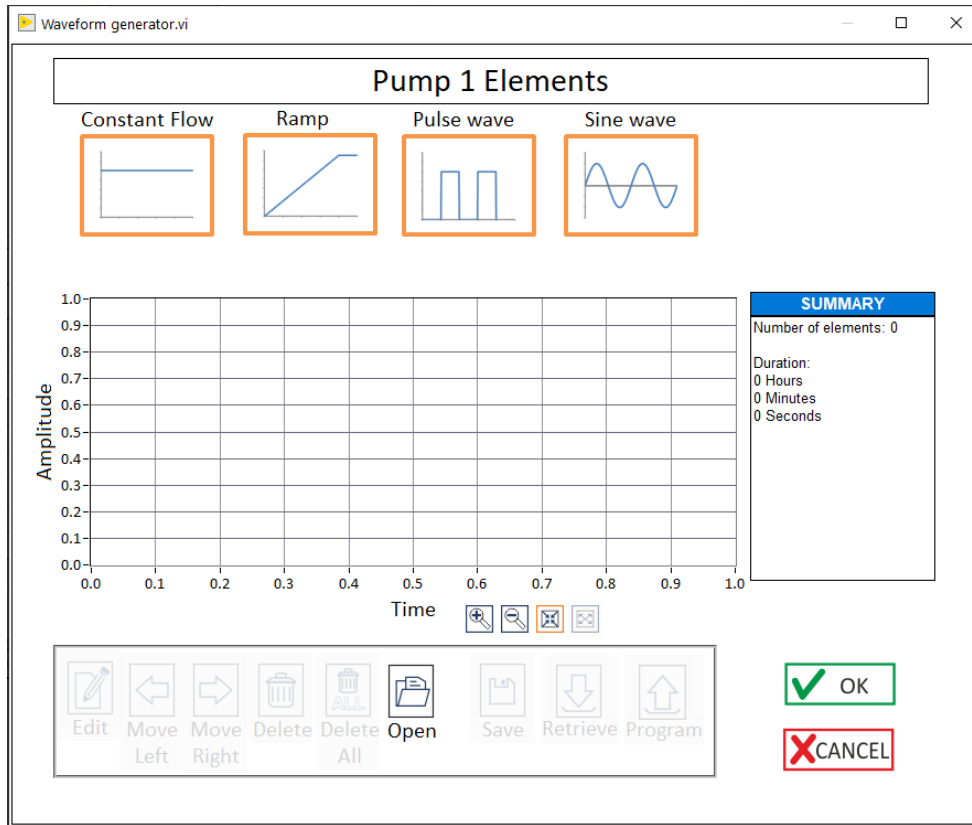


Figure 19

1. Click  in order to open the Waveform Editor.
2. Enter your waveform elements
3. Click button to program the selected pump.
4. Repeat steps 1 to 3 for the remaining pumps.
5. Click  to run a particular pump or  to run all the programmed pumps simultaneously.


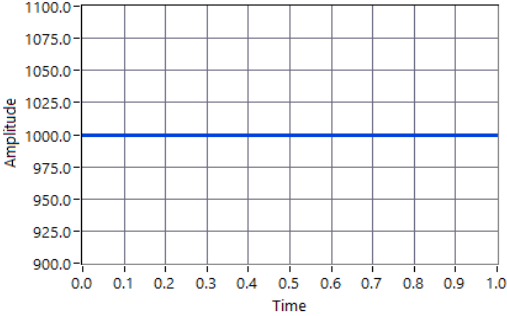
9 Waveform Editor


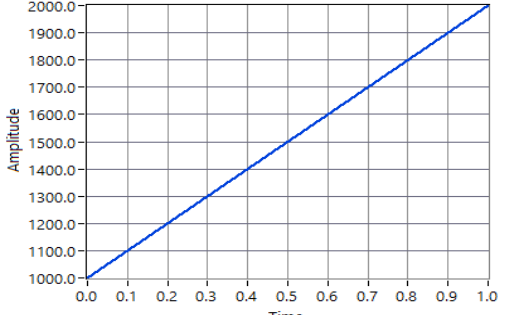
The waveform Editor allows you to create a custom flow profile for your pump(s).




You can add 4 different elements to your waveform:

- Constant Flow/Pause
- Ramp
- Pulse wave
- Sine wave

<p>Constant Flow</p> 	<div style="text-align: center;"> <h3>Constant Flow Rate Settings</h3> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Flow Rate</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">+1.000 $\mu\text{L}/\text{min}$</p> </div> <div style="width: 50%;">  </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Duration</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">1 min</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">0 sec</p> </div> <div style="width: 50%; text-align: right;"> <p>✗ CANCEL ✓ OK</p> </div> </div>
<p>Flow Rate</p>	<p>Flow rate set point for the constant step. Set to 0 if you would like to create a pause.</p>
<p>Duration</p>	<p>Duration of the constant step in minutes and seconds.</p>

<p>Ramp</p> 	<div style="text-align: center;"> <h3>Ramp Flow Rate Settings</h3> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Initial Flow Rate</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">+1.000 $\mu\text{L}/\text{min}$</p> </div> <div style="width: 50%;">  </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Final Flow Rate</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">+2.000 $\mu\text{L}/\text{min}$</p> </div> <div style="width: 50%; text-align: right;"> <p>✗ CANCEL ✓ OK</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Duration</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">1 min</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">0 secs</p> </div> </div>
<p>Initial Flow Rate</p>	<p>Initial Flow Rate of the Ramp</p>
<p>Final Flow Rate</p>	<p>Final Flow Rate of the Ramp</p>
<p>Duration</p>	<p>Duration of the ramp in minutes and seconds</p>

Pulse wave



Train Pulses Flow Settings

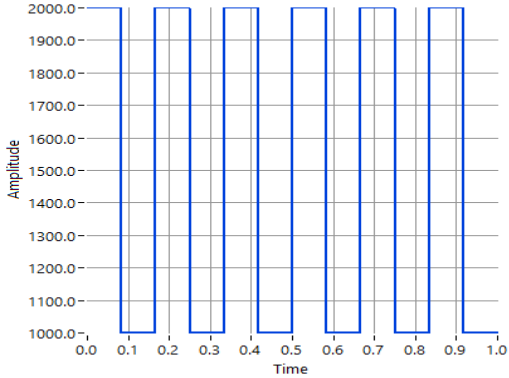
Max Flow Rate
+2.000 µL/min

Min Flow Rate
+1.000 µL/min

Period min
 min
 secs

Repetitions
 steps


Duty Cycle
 %






✕ CANCEL
✓ OK


Max Flow Rate	Maximum flow rate of the Pulse(s)
Min Flow Rate	Minimum flow rate of the Pulse(s)
Period	Duration of one full cycle of the Pulses in minutes and seconds
Repetitions	Number of Pulses of the Train Pulse Step
Duty Cycle	Ratio between the maximum and minimum flow rate of the Pulse(s). For example, Duty Cycle = 60 means that the Pulse(s) will remain 60% of the period on minimum flow rate and 40% of the period on maximum flow rate

33



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Sine wave



Sine Flow Settings

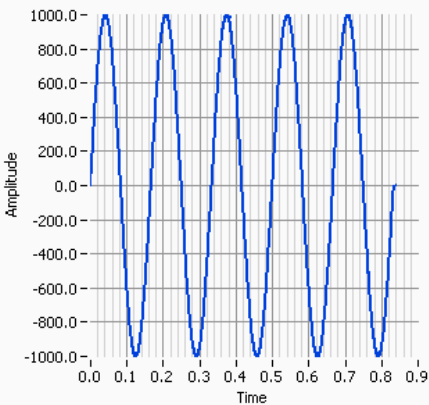
Amplitude
 nL/min

Period
 min
 secs

Repetitions
 steps

Phase
 %

Offset
 nL/min



Amplitude	Amplitude is measured between the centre of the sine wave and its maximum value
Period	Duration of one full cycle of the sine wave in minutes and seconds ¹²
Repetitions	Number of full cycles of the sine wave step
Phase	The starting angle of the sine wave cycle (from 0 to 360 degrees)
Offset	Defines the position of the centre of the sine wave regarding the zero position.

9.1 Open/Save custom waveforms

You can load and/or save a custom waveform into your PC using the following buttons:



Open

To load a previously saved protocol and program it into your pump.



Save

To save your custom waveform into your computer.



Retrieve

If your pump is currently programmed with a custom waveform, you can retrieve it and modify it.

¹² The full duration of the sine wave is determined by Period x Repetitions

10 Recording the flow rates/pressures data

It is possible to record the measured flow rates/pressures during an experiment in a log file. In order to generate the log file, please complete the following steps:

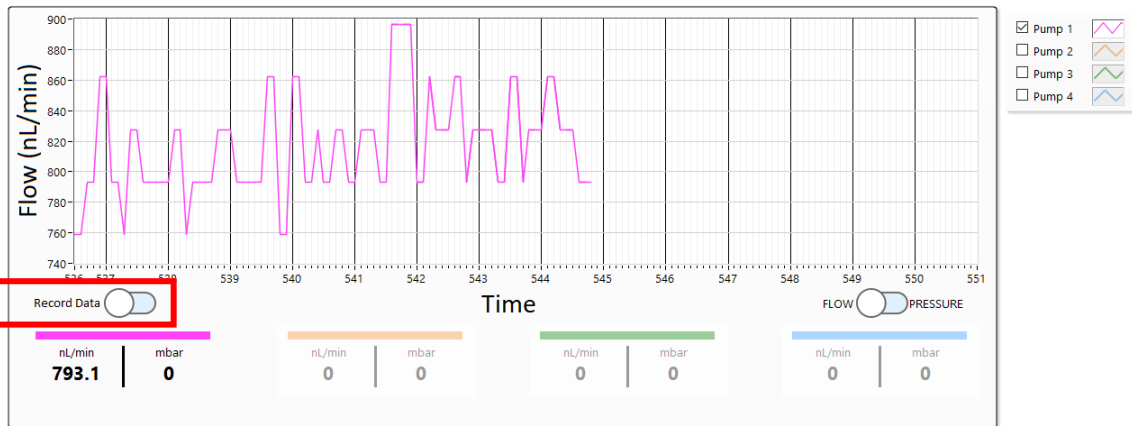


Figure 20: Location of the Record Data button on the Manual section

1. In the manual section click Record Data to start recording the data
2. A pop-up window will appear. Enter your filename and destination.

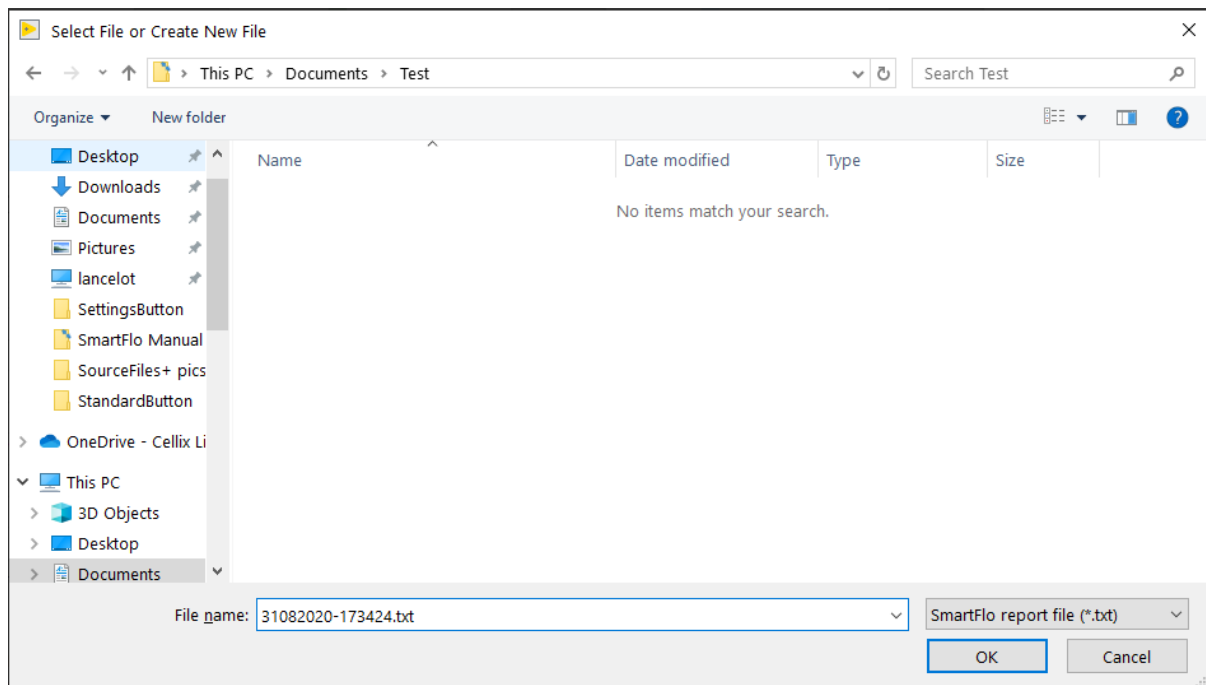
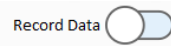
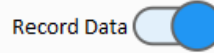


Figure 21: Select the path and filename

3. Click OK



4. To finish the data recording, press Record Data again

5. The created log file will have a format similar to the following example

```

1 =====
2 | | | SmartFlo Experiment Report v2.0 | | |
3 =====
4 Created on: 27/08/2020 at 15:18:51.592
5
6 -----
7 Total pumps connected: 2
8 -----
9 Pump 1 type: ExiGo
10 Serial Number: 19040010
11 FW Version: 2.2.5
12 -----
13
14
15 Pump 2 type: UniGo
16 Serial Number: 18100001
17 FW Version: 1.2.2
18 -----
19
20
21 Date Time P1 Flow Rate P1 Set Point P2 Flow Rate P2 Set Point P2 Pressure
22 27/08/2020 15:18:51.774 -81.48 NOT RUNNING 793 NOT RUNNING 0.00
23 27/08/2020 15:18:51.824 -81.48 NOT RUNNING 793 NOT RUNNING 0.00
24 27/08/2020 15:18:51.837 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
25 27/08/2020 15:18:51.888 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
26 27/08/2020 15:18:51.932 -66.66 NOT RUNNING 897 NOT RUNNING 0.00
27 27/08/2020 15:18:51.937 -66.66 NOT RUNNING 897 NOT RUNNING 0.00
28 27/08/2020 15:18:51.989 -66.66 NOT RUNNING 897 NOT RUNNING 0.00
29 27/08/2020 15:18:51.992 -81.48 NOT RUNNING 759 NOT RUNNING 0.00
30 27/08/2020 15:18:52.043 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
31 27/08/2020 15:18:52.094 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
32 27/08/2020 15:18:52.096 -81.48 NOT RUNNING 828 NOT RUNNING 0.00
33 27/08/2020 15:18:52.143 -81.48 NOT RUNNING 828 NOT RUNNING 0.00
34 27/08/2020 15:18:52.193 -81.48 NOT RUNNING 828 NOT RUNNING 0.00
35 27/08/2020 15:18:52.196 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
36 27/08/2020 15:18:52.246 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
37 27/08/2020 15:18:52.297 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
38 27/08/2020 15:18:52.297 -81.48 NOT RUNNING 828 NOT RUNNING 0.00
39 27/08/2020 15:18:52.347 -81.48 NOT RUNNING 828 NOT RUNNING 0.00
40 27/08/2020 15:18:52.357 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
41 27/08/2020 15:18:52.407 -114.81 NOT RUNNING 828 NOT RUNNING 0.00
42 27/08/2020 15:18:52.441 -100.00 NOT RUNNING 862 NOT RUNNING 0.00
43 27/08/2020 15:18:52.492 -100.00 NOT RUNNING 862 NOT RUNNING 0.00
44 27/08/2020 15:18:52.497 -100.00 NOT RUNNING 862 NOT RUNNING 0.00
45 27/08/2020 15:18:52.543 -133.33 NOT RUNNING 759 NOT RUNNING 0.00
    
```

Figure 22: Example of Data file

11 Flow sensor coefficients

Cellix's flow sensors are calibrated for aqueous solutions by default. Running other liquids such as oils, IPAs etc, through the sensor using the default coefficient would result in an incorrect flow rate reading. However it is possible to add a custom calibration coefficient to correct the reading.¹³

To add a custom calibration coefficient:

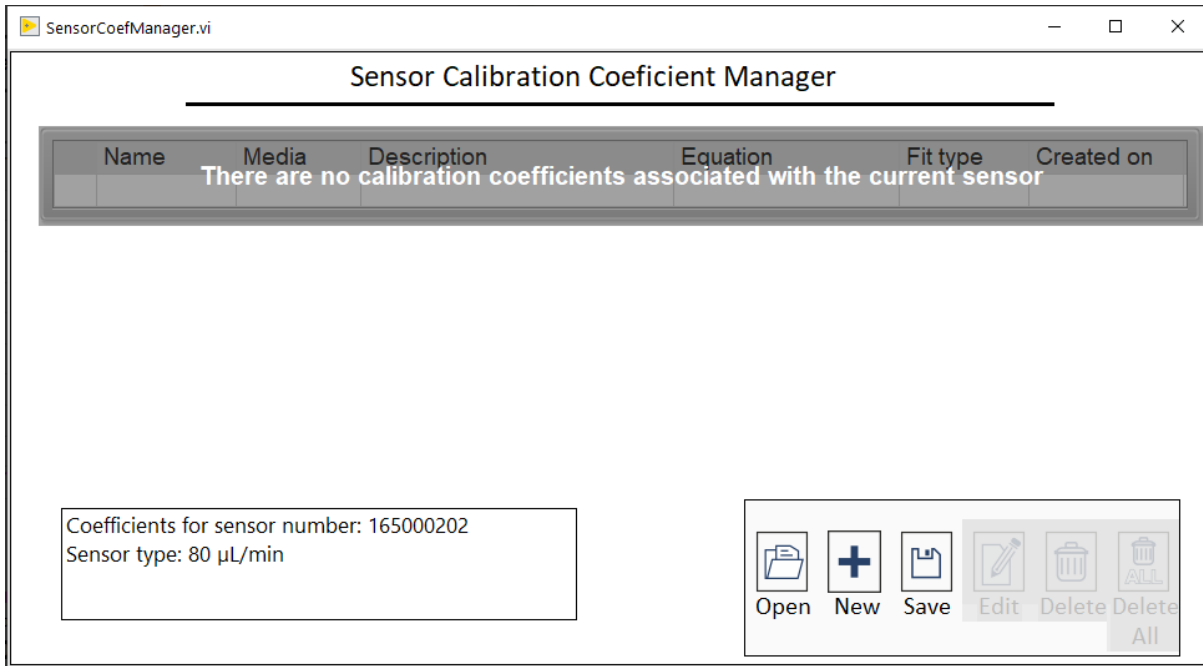
1. In the Manual Tab, click 
2. In the settings window, click on the Sensor settings Icon 



Figure 23 : Sensor settings window

3. Open the Coefficients manager

¹³ **Warning:** Introducing the wrong coefficient might lead to an incorrect flow measurement and cause damage to your pump and/or your setup. Please, contact Cellix for more information on how to use custom calibration coefficients.



4. Click  New

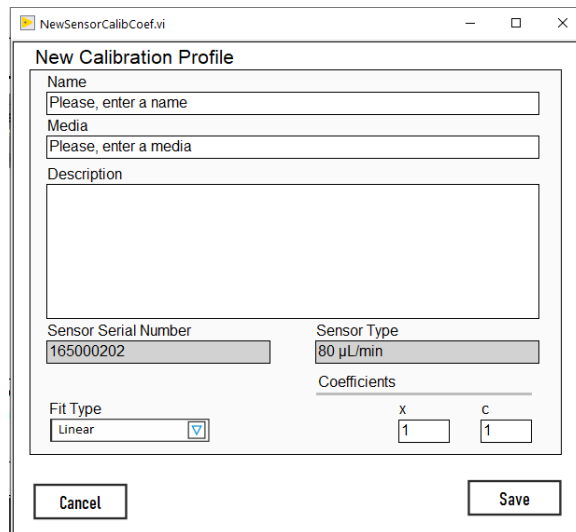
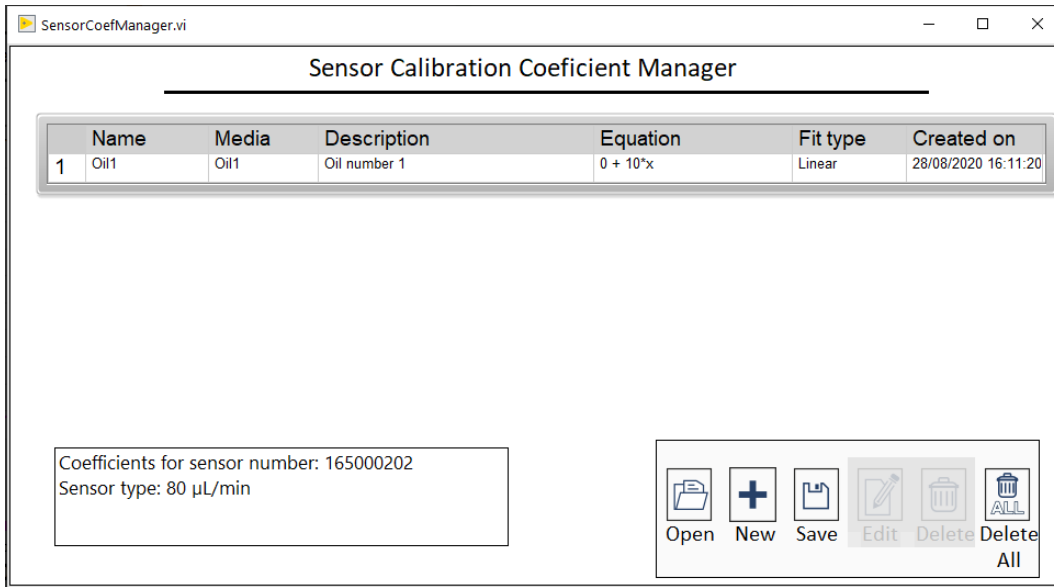
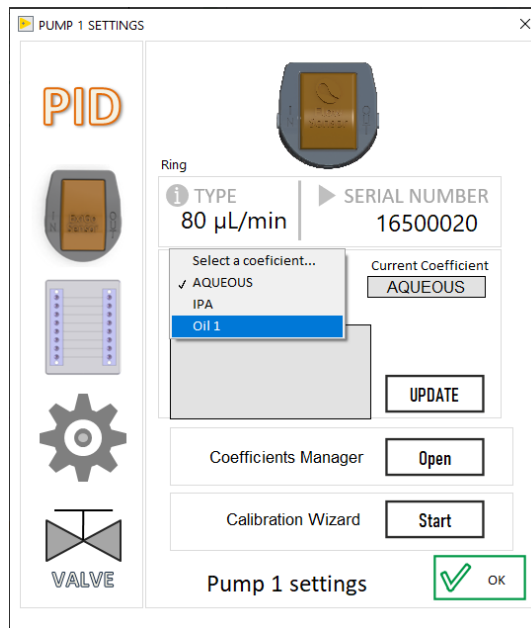


Figure 24: New calibration coefficient window

5. Enter the name, media and a description of the media.
6. Select the type of coefficient Fit type (lineal or polynomial).
7. Type in the coefficients.
8. Click Save.
9. Once your coefficient has been created, it will be available in the Coefficients manager window











10. To select the created coefficient, close the Coefficient Manager and select it on the Sensor settings window:



11. Select the created coefficient and click 

12 LED Status colours explanation

Color	Effect	Meaning
	Flashing	Pump is booting up. Please wait until Status LED changes its colour prior to connect the pump.
	2 Flashes and fades out	Pump not initialized and no sensor detected at boot time.
	2 Flashes and fades out	Pump not initialized and sensor detected at boot time.
	Flashing	Initializing Pump
	Static	Pump ready with no assay programmed.
	Rotating	Pump running in manual mode.
	Static	Pump ready with assay programmed.

 The icon shows a central orange and yellow shape representing a pump head, flanked by two blue curved shapes representing the pump arms. The entire icon is set against a white background within a black-bordered cell.	Rotating	Pump running in assay programmed mode.
 The icon is identical in shape to the one above, but the curved shapes flanking the pump head are red. It is set against a white background within a black-bordered cell.	Flashing	Critical error. Please contact Cellix technical support.