





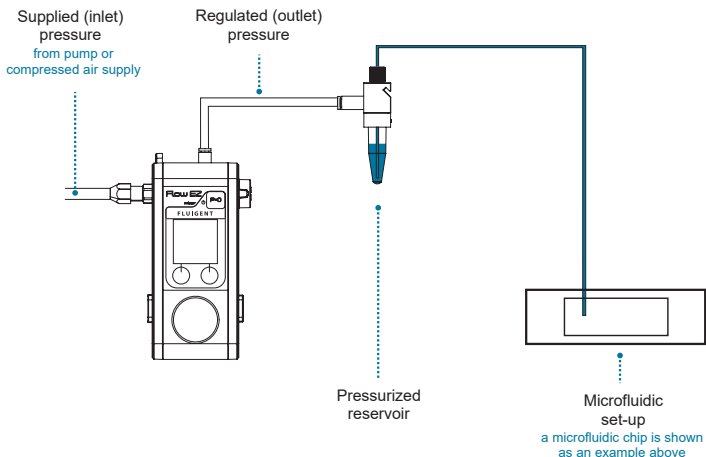
LineUP™ Series

Flow EZ™ Pressure Controller

Quick Start Guide

A forward to the user's manual

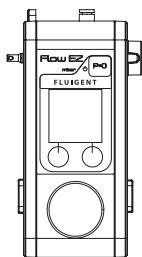
An overview of pressure-based microfluidic control



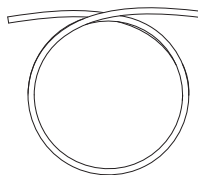
- 1 Your Flow EZ regulates the externally supplied (inlet) pressure to a user-defined pressure with high precision.
- 2 This regulated (outlet) pressure pressurizes the reservoir, driving the liquid up through the tubing and into your microfluidic set-up.
- 3 Controlling the outlet pressure allows you to control the rate at which fluid is injected into your microfluidic set-up.

What you will need

Contained in the package



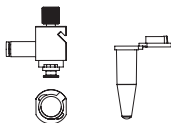
Flow EZ



Outlet tubing
(OD 4mm)

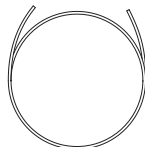
※ OD : Outer diameter

P-Cap Kit or Fluiwell Kit (sold separately)



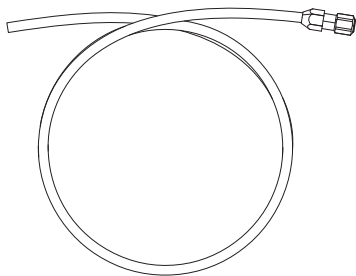
P-Cap (or Fluiwell) and reservoir

Fluiwell : for 15mL or 50mL reservoir
P-Cap : for 2mL reservoir

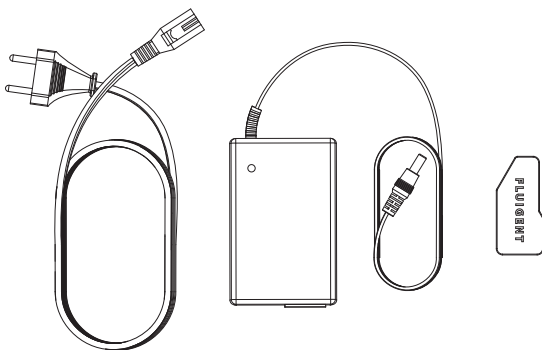


Fluidic tubing

Supply Kit (sold separately)



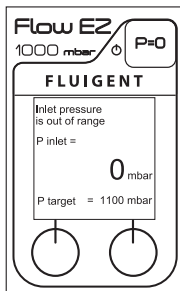
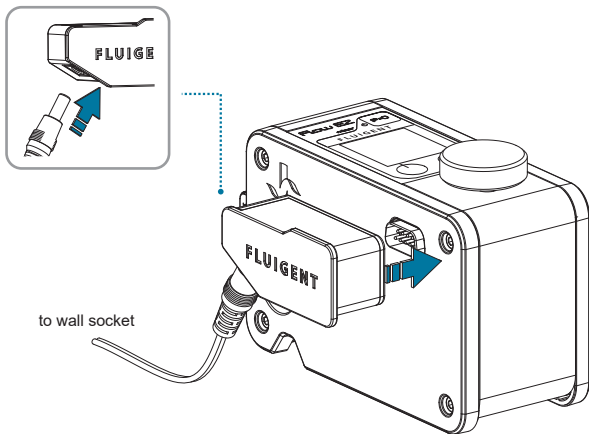
Inlet tubing
(OD 6mm)



Power supply

Let's get started!

Power ON



Once powered on, your Flow EZ will display the "Inlet pressure check window", giving the measured pressure at the inlet (P inlet) and the supply pressure required to operate your Flow EZ (P target).

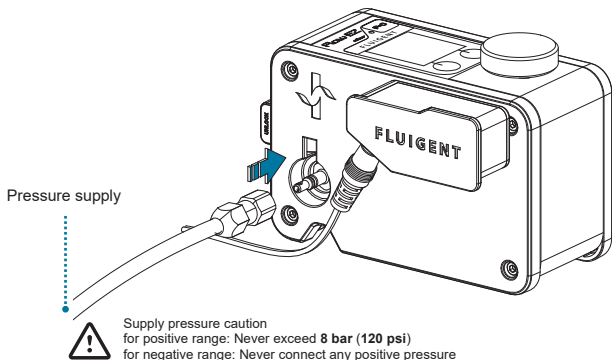
For example:
Left shows a 1000 mbar range Flow EZ
P target: 1100 mbar
P inlet : 0 mbar

✘ For the 7000 mbar range Flow EZ as well as all negative pressure ranges, you will not see this window.

Pressure ON



Always wear safety protection when manipulating pressure



Your Flow EZ needs an external pressure supply to operate. This can be your lab's compressed air supply, an air compressor, or any clean (filtered $<10\mu\text{m}$) and dry compressed air supply.

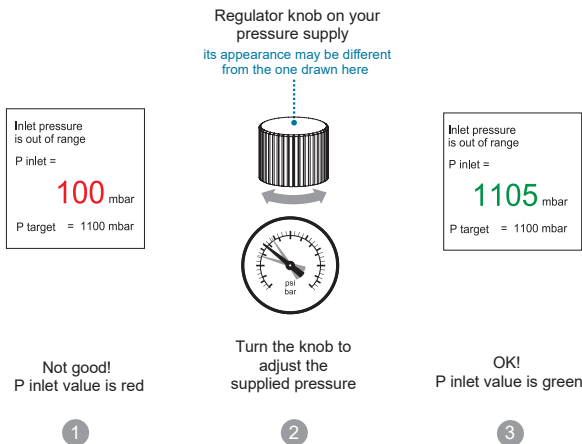
Different Flow EZ ranges require different supply pressures (shown to the right).

Flow EZ range (mbar)	Required supply pressure (mbar)
7000	7100
2000	2100
1000	1100
345	
69	150
25	
-25	
-69	-800
-345	

- ✘ If you don't have a air pressure supply capable of the required supply pressure, please contact Fluigent
- ✘ If you intend to use a compressed gas other than air, please contact Fluigent for more information

Adjust the supplied pressure

A 1000mbar range Flow EZ is shown below as an example.

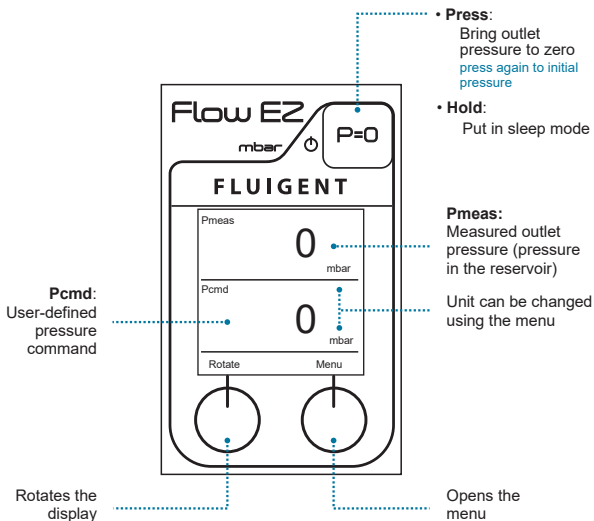


When connecting your pressure supply, if its value (P inlet) is not at the required value (P target), the Flow EZ will continue to display the "Inlet pressure check window" (with the exception of the 7000 mbar range and the negative ranges which don't have this window).

Adjust your pressure supply.

When the two values are close enough, the P inlet value will turn green and the display on the Flow EZ will transition to the "Operation window".

Operation window

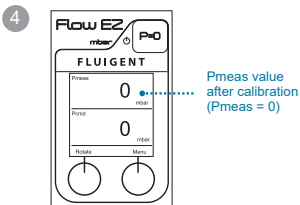
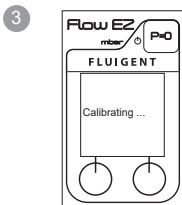
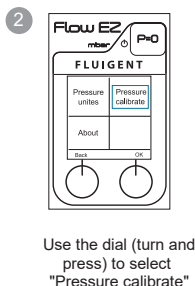
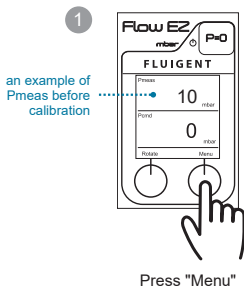


The pressure sensor inside your Flow EZ needs to be calibrated before the first use (See next page).

Before this calibration, the outlet measured pressure (Pmeas) may not be correct.

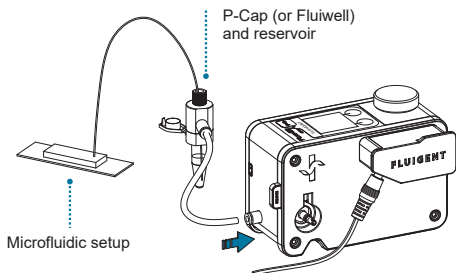
Pressure sensor calibration

To be done before the first use

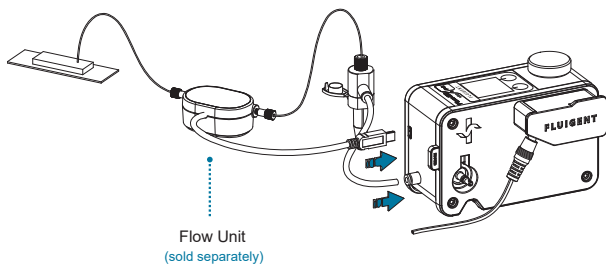


Due to the high sensitivity of the internal pressure sensor, you may observe some small fluctuations of the measured pressure (P_{meas}), even after the calibration is complete.

Connect to your fluidic setup



Or connect to your fluidic set-up with a Flow Unit (Fluigent's flow sensor, see the user's manual for more details).

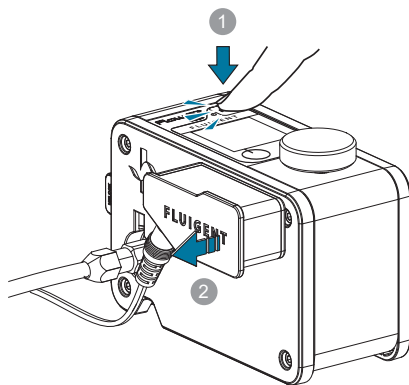


When you are done using your Flow EZ

When you have finished using the Flow EZ, hold the "P=0" button to put it into **sleep** mode.



If you need to disconnect the power supply (e.g. to move or store the unit), make sure the Flow EZ is already in sleep mode.



This procedure will release all residual pressure in the system, preventing any further pressure from being applied to your fluidic set-up.

For a fully detailed shutdown procedure, please see the user's manual.

**You are now
good to go,
turn the dial
and begin your
experience**



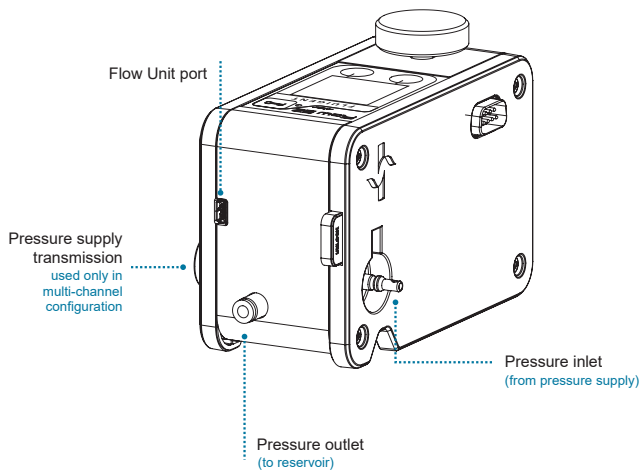
The user's manual is on the next page:
allowing you to get the most out of your Flow EZ

Flow EZ™ Pressure Controller

User's Manual

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A closer look of your Flow EZ

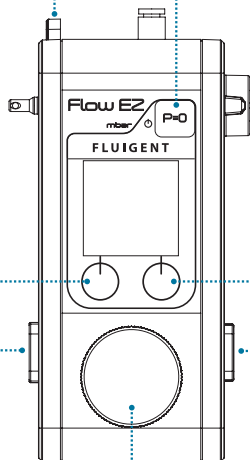


Module separation
aid button

used only in
multi-channel
configuration

Left button

Power / data
connection



• **Press once:**
to zero pressure

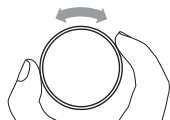
• **Press again:**
to return to original
pressure

• **Hold:**
to sleep

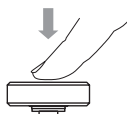
Right button

Power / data
transmission
used only in
multi-channel
configuration

Dial



Change pressure command
Navigate (in menu)

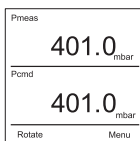
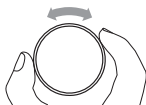
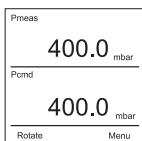


Set/Apply pressure command
Select (in menu)

A faster way to change the pressure

Classic way

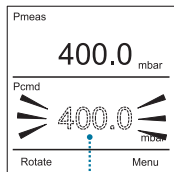
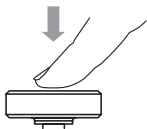
Turn the dial in the "Operation window" to change the requested pressure, this command is immediately and continuously applied by the Flow EZ.



ON/OFF way

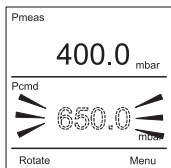
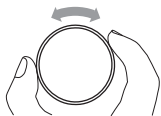
You can also prepare a pressure request in advance, and apply it later with the push of a button. In some circumstances, this is a faster way to change pressure.

- 1 Press the dial to enter "command off" mode.

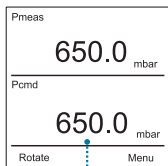
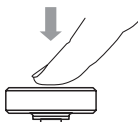


Pcmd value blinks, indicating Flow EZ is in "command off" mode (Pcmd is not applied)

- 2 Set your desired pressure command (Pcmd).



- 3 When you want to apply the pressure command, simply press the dial again.



Pcmd value is no longer blinking, indicating that this value is now applied

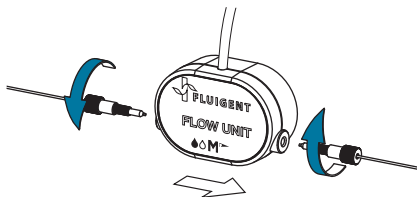
Add a Flow Unit

The Flow Unit is Fluigent's flow rate sensor.

When a Flow Unit is added, you can use the Flow EZ to:

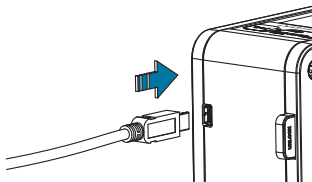
- Monitor the flow rate in your fluidic set-up.
- Directly control the flow rate.
- Perform an injection based on volume or time.

- 1 Insert a Flow Unit into your fluidic path.

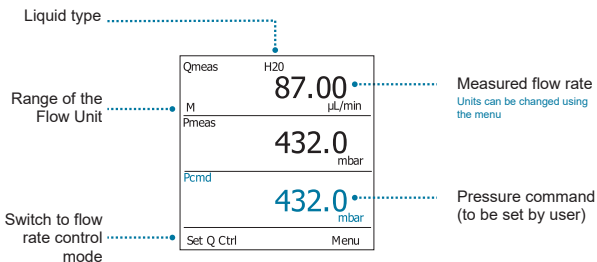


Connect flow in the direction of the arrow to read a positive value. This is important for the flow rate control to work properly. Please pay extra attention when you use a Flow EZ of negative range, in which case the fluid is running in the opposite direction.

- 2 Connect your Flow Unit to your Flow EZ.



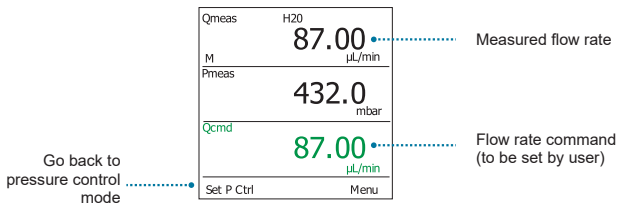
Once a Flow Unit is connected, the "Operation window" will include the flow rate measurement:



Here the measured flow rate (Qmeas) is only for monitoring purposes. To directly control the flow rate, see next page (Flow rate control).

Flow rate control

When a Flow Unit is connected, press the left button "**Set Q Ctrl**" to switch to the flow rate control mode.



The user can now directly control the flow rate, by setting the flow rate command (Qcmd).

Although we are in flow rate control mode, the live pressure value in the reservoir (Pmeas) is still shown in the middle, giving information on the fluidic set-up. Abnormal changes may reflect problems in your fluidic set-up (leakage blockage, etc.). See our website's FAQ section for more information.

- ✘ The flow rate control works only when the value of Measured flow rate (Qmeas) is positive. If it is not the case, verify if the Flow Unit is connected in the right direction. (See page 6)

Inject a volume

When a Flow Unit is connected, you can inject a certain volume into your fluidic set-up. To do so, select "**Injection method**" in the menu.*

Injection flow-rate	
5.00 μL/min	
Target volume	Target time
Back	OK

First, turn the dial to set the "Injection flow-rate" to the desired injection speed.

Then choose "Target volume" if you want to inject a precise volume, or "Target time" if you want the injection to run over a precise duration of time. Once confirmed, the "Operation window" will look like this:

Qmeas	H2O
0.00 μL/min	
M	
Volume :	0.0 μL
Target :	200 μL
Time :	0
Cancel	Start

An example where 200μL is set as the target volume

Qmeas	H2O
0.00 μL/min	
M	
Volume :	0.0 μL
Time :	0
Target :	1:20
Cancel	Start

An example where 1:20 is set as the target time

The Flow EZ is ready to inject. Press "Start" to begin.

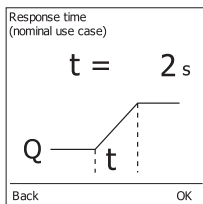
※ The "Injection mode" described here is only available when the Flow EZ is in stand-alone mode. When it is connected to a PC, the injection operations need to be initiated by Fluigent software.

Flow-related settings

Flow rate config (response time setting)

Response time reflects how fast the Flow EZ regulates the flow to match the flow rate defined by the user.

By default, the response time is set to 2 seconds. In some circumstances where a smoother response is preferred, you can set a longer response time. To do so, select "**Flow rate config**" in the menu:



Turn the dial to set a longer response time (between 2 seconds and 1000 seconds).

This setting is applied to all flow-related operations. For example, if you set a longer response time, the flow rate transition will be smoother both in flow rate control and in injection.

- ⊗ The response time is valid for many microfluidic set-ups. However, in some complex fluidic set-ups (high reservoir volume, high viscosity fluids, etc.), the actual response time may vary.

Liquid type

The type of liquid is set manually using the menu. Selecting the corresponding liquid type makes the flow rate measurements more accurate.

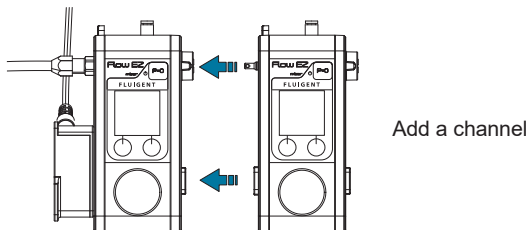
- For water-based solutions: select "H2O" (water)
- For oil-based solutions: select "iPA" (isopropanol)

In the case of range M Flow Units, additional liquid types are possible: "HFE" (for HFE 7500/Novec), "FC40" and "Oil" (for mineral oil, calibrated for Sigma Ref M8410).

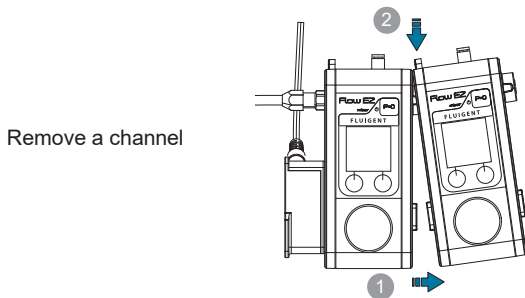
✘ Some older Flow Unit models support only "H2O" as liquid type, therefore the liquid type selection is not available.

Create a multi-channel configuration

Your Flow EZ has a **Hot Plug & Play** feature: you can add or remove a module while your Flow EZ is running.



The power and the pressure supply are automatically passed to the newly added Flow EZ (shown on the right). You can connect up to 8 Flow EZ modules within one chain.



Can I mix different ranges in a same chain?

Yes

Case 1: If these ranges have the same required supply pressure, you can connect them to one another directly.

An example of a configuration:

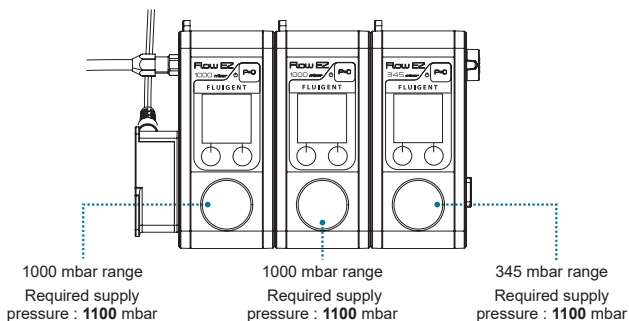


Table of required supply pressure for each range

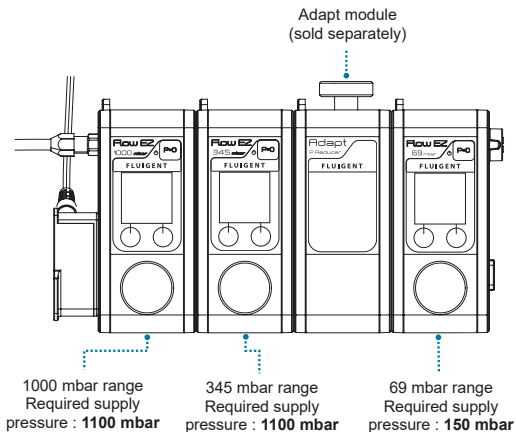
Flow EZ range (mbar)	Required supply pressure (mbar)
7000	7100
2000	2100
1000	1100
345	
69	150
25	
-25	-800
-69	
-345	

Can I mix different ranges in a same chain?

Case 2 : If the two ranges have different required supply pressures, you can still have them in the same chain by inserting an Adapt module (sold separately) between them.

The Adapt module is a manual pressure regulator, it reduces the supply pressure passed from the left side to the lower supply pressure needed for the Flow EZ on the right side.

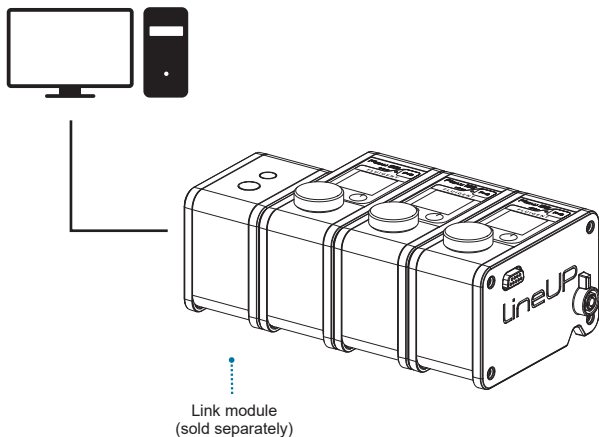
An example of a configuration:



Work with a computer

The Link module (sold separately) allows to connect the Flow EZ to a computer.

This allows the Flow EZ to benefit full advanced functionalities from Fluigent's software suite: MAT for sequence automation, A-i-O for live control and Fluigent SDK for developing custom applications.



- ✘ You can connect up to 8 Flow EZ modules in a chain with Link module (same as without Link module)

When you are done using your Flow EZ (complete version)

- 1 Before disconnecting any Flow Unit, be sure to clean it with the appropriate solvent(s) detailed in the cleaning protocols. Doing so will prevent any blockage and prolong its service life.

Cleaning protocols available at:
<http://www.fluigent.com/faqs/#faq/how-can-i-clean-the-flow-unit-after-use>

- 2 Press and hold the "P=0" button on your Flow EZ. This will:
 1. Release the residual pressure from the system
 2. Put the Flow EZ into sleep mode

- 3 Disconnect the power supply and the pressure supply from your Flow EZ.



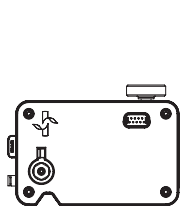
Always press the "P=0" button before disconnecting the power supply. Failure to do so can result in unwanted pressure applied to the fluidic setup

- 4 Disconnect all pneumatic tubing by pressing the ring inward while pulling the tubing outward.

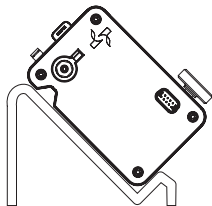


Things you may not know about Flow EZ

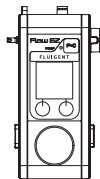
You can use your Flow EZ in different positions:



horizontal

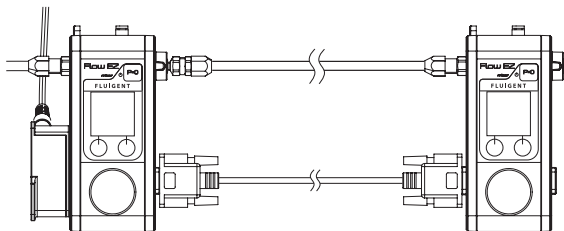


angled



vertical

Use the "Chain to Chain Kit" (sold separately) to give your more flexibility when placing your multi-channel configuration on your lab bench.



Frequently Asked Questions (FAQ)

My Flow EZ cannot achieve the requested pressure or flow rate, what should I do?

1. Verify the whole setup is air tight.
2. Verify that your pressure supply is providing the required pressure (Flow EZ can never provide a outlet pressure greater than supplied pressure)
3. If the flow rate command cannot be achieved, verify if the fluidic path is not blocked.

Why has my Flow EZ stopped responding to my pressure request (and I see a window like this)?

Pmeas	230.0	mbar
Inlet = 417		
Pcmd	230.0	mbar
STOPPED		
UNLOCK		Menu

When the supplied (inlet) pressure is out of the range during operation, your Flow EZ will stop regulating the pressure and the "Operation window" will lock (as seen on the left).

Press the "UNLOCK" button (left button) and you will see "Inlet pressure check window" which will guide you in adjusting the inlet pressure to the required value (see page IV for more details).

I bought my Flow Unit long before I bought my Flow EZ, but when I connect it, my Flow EZ says it is "Not Supported". Why is that?

Some older Flow Unit are not supported by the Flow EZ. In this case, please contact Fluigent at support@fluigent.com

Warranty terms

What This Warranty Covers

This warranty is granted by Fluigent and applies in all countries.

Your Fluigent product is guaranteed for one year from the date of delivery at your laboratory against defects in materials and workmanship.

If found to be defective within the warranty period, your Fluigent product will be repaired or replaced free of charge.

What This Warranty Does Not Cover

This warranty does not cover routine maintenance, or damage resulting from the failure to maintain the product in accordance with instructions provided by Fluigent. This warranty also does not cover damage that arises from accidental or intentional misuse or abuse, alteration or customization, or repairs by unauthorized persons.

How to Get Service

If something goes wrong, contact the Fluigent sales representative from whom you purchased your product. Arrange a mutually convenient time for Fluigent service representative to discuss the problem and find a solution to fix the issue. Repairs will be made remotely whenever possible, but in the case that more action is needed, the system will be sent back to Fluigent offices (for no additional cost, only if it is under warranty).

The warranty conditions are:

- Do not open the Flow EZ device.
- Do not use cables and power supplies other than the ones provided by Fluigent.
- Prevent foreign objects or liquids from entering the Flow EZ.
- Do not place the product in an unstable location.
- Respect the temperature compatibility (from 5°C to 40 °C).
- For positive ranges of Flow EZ: do not apply a pressure above 8 bar.
- For negative ranges of Flow EZ: do not apply any positive pressure.
- Use a filtered (<10µm) and dry air supply.
- Prevent heavy objects from falling on the Flow EZ device.
- Prevent any corrosive liquid from coming in contact with the Flow EZ device.

For questions about specific uses not mentioned, please contact our support team at support@fluigent.com

Technical support

Still have questions? E-mail us at:

support@fluigent.com

or call our technical support team directly:

Fluigent S.A.

+33 1 77 01 82 65

Fluigent Inc.

+1 (978) 934 5283

Fluigent GmbH

+49 3641 277 652

For a fully detailed FAQ for all Fluigent products visit:

<http://www.fluigent.com/faqs/>

Interested in our products?

To view our complete product line along with application notes, please visit:

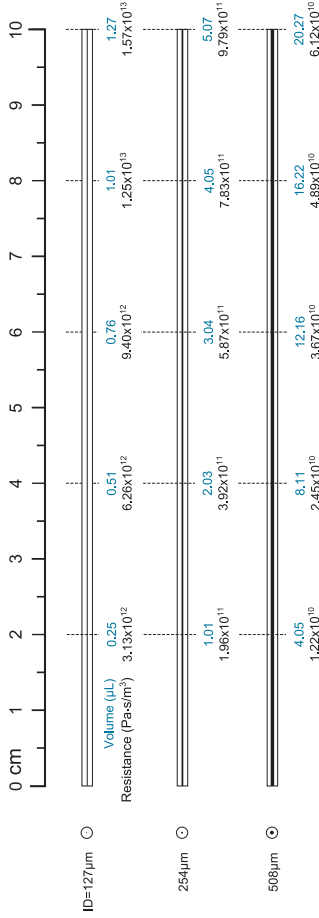
www.fluigent.com

For commercial requests, please e-mail:

sales@fluigent.com

Volume and resistance for fluidic tubing with different ID (Inner Diameter)

Place your tubing on the page for a quick reference (printed in actual size)



※ values for illustrative purpose only

OD (Outer Diameter) identification

Printed in actual size

- 1/16" (1.6mm)
- 1/32" (0.8mm)

Units Conversions

1 bar = 14.5 psi | 1 mbar = 1.45 X 10⁻² psi
 1 psi = 6.90 X 10⁻² bar | 1 psi = 68.95 mbar

1 inch = 2.54 cm
 1 cm = 0.39 inch



Printed in France

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