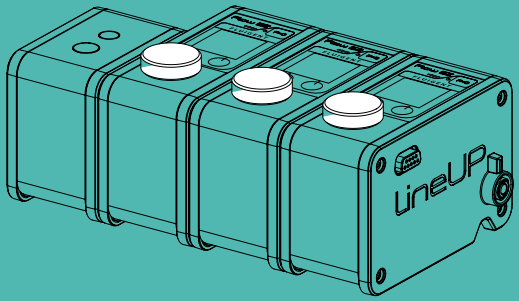
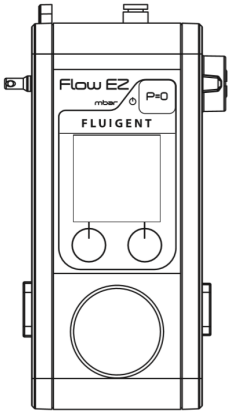
USER'S
MANUAL

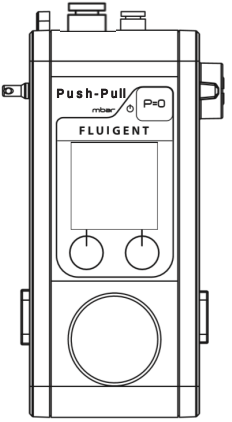
LINEUP™ SERIES



FLUIGENT

QUICK START GUIDE



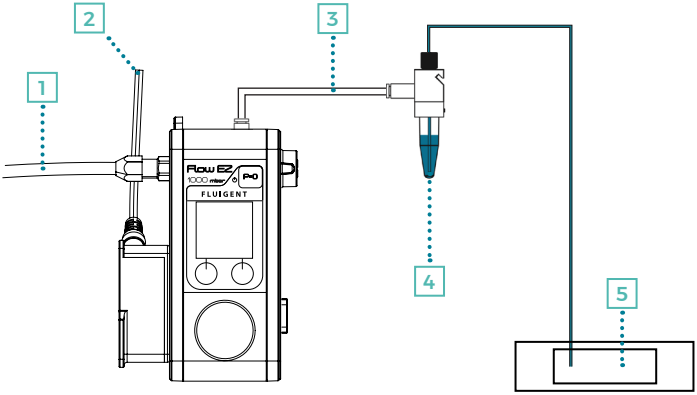


LineUp Flow EZ™
Pressure controller

LineUp™ Push-Pull
Pressure controller

The **quick start guide** is a forward to the LineUp™ Series user's manual

AN OVERVIEW OF PRESSURE-BASED MICROFLUIDIC CONTROL

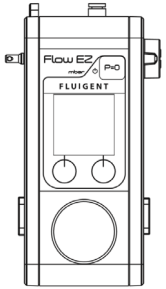


1	Supplied (inlet) pressure from pump or compressed air supply
2	Power supply to the Flow EZ™ / Push-Pull pressure controller
3	Regulated (outlet) pressure from pressure controller to reservoir
4	Pressurized reservoir P-CAP
5	Microfluidic set-up in example a microfluidic chip

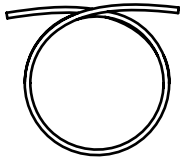
1. The **Flow EZ™ / Push-Pull** regulates the externally supplied (inlet) pressure to a user-defined pressure with **high precision**.
2. This regulated (outlet) pressure **pressurizes the reservoir**, driving the liquid up through the tubing and into the **microfluidic setup**.
3. Controlling the outlet pressure allows one to **control the rate** at which fluid is injected into the microfluidic setup.

What is needed

Contained in the package



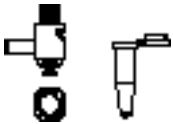
Flow EZ™ or Push-Pull



Outlet tubing (OD 4mm)

*OD: Outer diameter

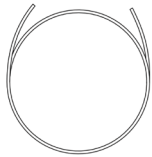
P-CAP Kit or Fluiwell Kit (sold separately)



P-CAP (or Fluiwell) reservoir

Fluiwell: for 15mL or 50mL reservoirs

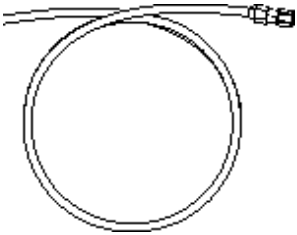
P-CAP for 2mL, 15mL or 50mL reservoirs



Fluidic tubing

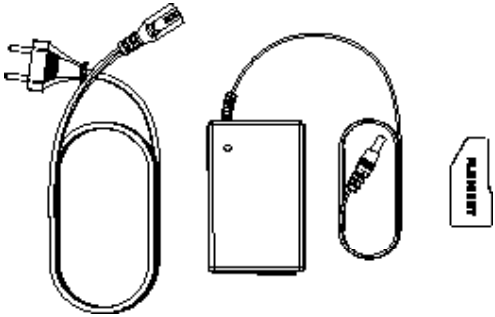
Outer diameter and inner diameter depending on the Kit

LineUp™ supply Kit (sold separately)



Inlet tubing (OD: 6mm)

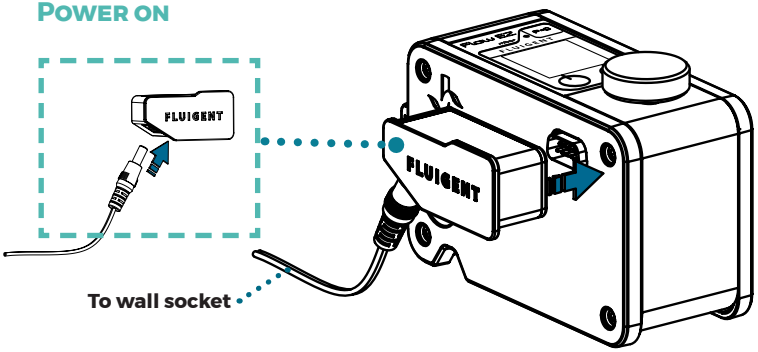
*OD: Outer diameter

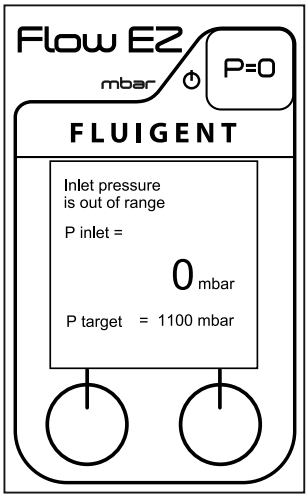


Power supply (24VDC)

Power supply to Sub-D adaptor

POWER ON





Once powered on, the **Flow EZ™** or **Push-Pull** will display the "Inlet pressure check window", giving the **measured pressure** at the inlet (P inlet) and the **supply pressure required** to operate the pressure controller (P target).

For example, left shows a 1000 mbar range **Flow EZ™**

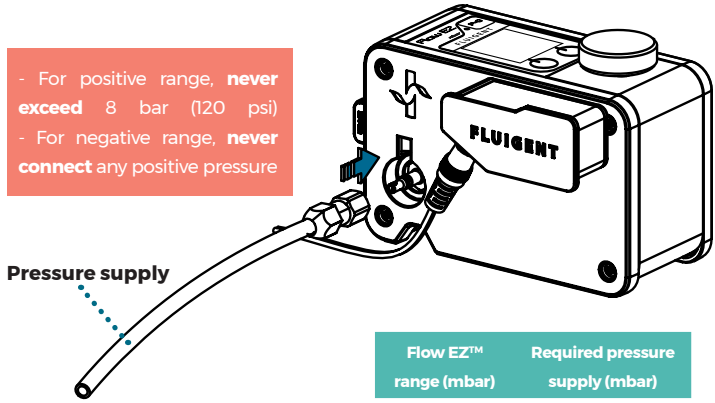
P target : 1100 mbar
P inlet : 0 mbar

Note : For the 7000 mbar range as well as negative pressure ranges Flow EZ™, this window will not appear.

Always wear safety protection when manipulating pressure.

PRESSURE ON

- For positive range, **never exceed** 8 bar (120 psi)
- For negative range, **never connect** any positive pressure



The **Flow EZ™** or **Push-Pull** needs an **external pressure supply** to operate. This can be a lab's compressed air supply, an air compressor, or any clean (filtered < 10 µm) and dry compressed air supply.

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

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

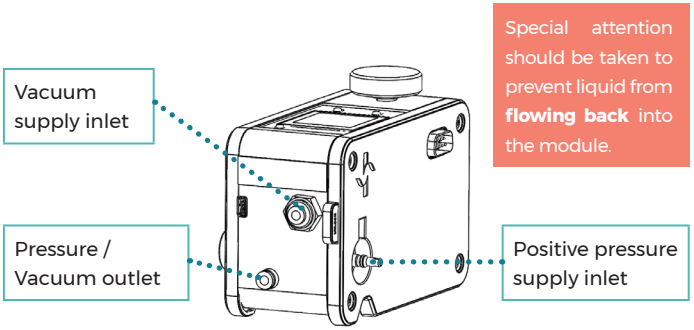
Note : If one intends to use compressed gas other than air, or if the pressure supply is out of the pressure range requirements, please contact Fluigent.

PUSH-PULL SPECIFICITIES

The **Push-Pull** module works the same way as other **Flow EZ™** modules, except that it can output **pressure** (above atmospheric pressure) and **vacuum** (below atmospheric pressure) **through the same port**.

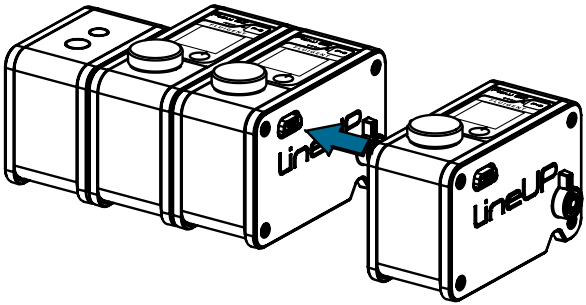
Push-Pull output (mbar)	Required pressure supply (mbar)
1000	1100
-800	-800

To do so, it needs **two inlets**: the positive one, uses the **standard pressure supply** of the **Flow EZ™**, and the negative one, utilizes an **additional connector located** at the front between the **FLOW UNIT** port and the "*unlock*" handle.



Note : Depending on the supply pressures, the performance of the module can vary, especially for the vacuum pressure supply. When connecting the two supplies, only the positive pressure supply will be checked on the "*Inlet pressure check window*". (see page 10)

A **Push-Pull** module can be combined with other **positive pressure LineUP™** modules the same way as a **Flow EZ™** 1 bar. If connecting to **higher pressure modules**, please consider adding an **Adapt** module to reduce the positive pressure supply. (See page 29 for more details)



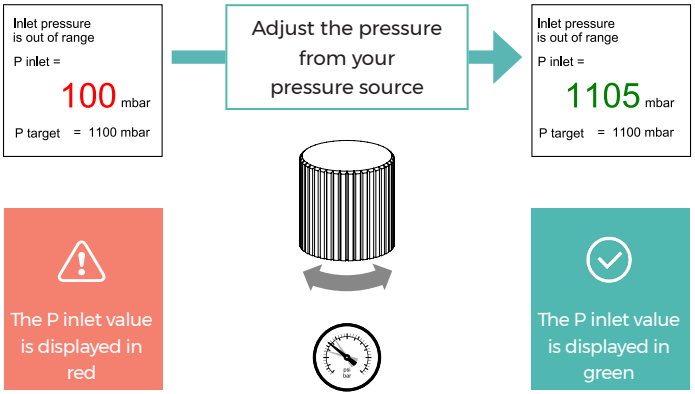
When using a **Push Pull** module, **care** should be taken to avoid drawing liquid into the system. This can seriously damage the module. It is advised to use a **liquid filter** between the outlet and the reservoir as it reduces the risks.

Note: The **pressure supply is mandatory** for the use of the Push-Pull even in vacuum mode only. The vacuum supply is optionnal.

Please, **never stack** a **Push-Pull** module with a **negative Flow EZ™** as it would not work.

ADJUST THE SUPPLIED PRESSURE

(A 1000 mbar range Flow EZ™ is shown as an example)



When connecting the pressure supply, if its value (P inlet) is **not set** at the **required value** (P target), the **Flow EZ™** or **Push-Pull** 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)

If the value is **displayed in red**, please **adjust the pressure supply**.

When the two values are close enough, the **P inlet value** will **turn green** and the display on the **Flow EZ™** or **Push-Pull** will transition to "*Operation window*"

OPERATION WINDOW

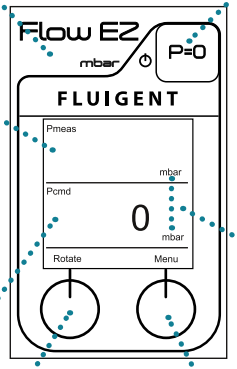
Product name and pressure range

Pmeas

Measurement of the pressure in the reservoirs

Pcmd

User-defined pressure command



Pause button

Press to bring outlet pressure to zero

Press again to recover pressure

Hold to enter sleep mode

Unit can be changed using the menu

Rotates display

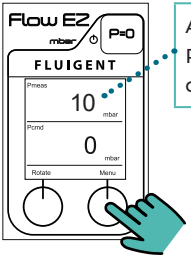
Open menu

The pressure sensor inside the **Flow EZ™** or **Push-Pull** device needs to be **calibrated before the first use** (see next page).

If the system isn't calibrated, the outlet measured pressure (Pmeas) may be incorrect.

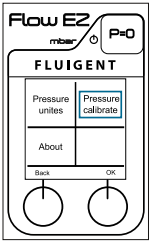
PRESSURE SENSOR CALIBRATION

1

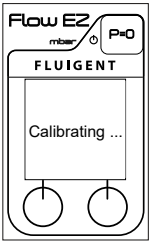


An example of Pmeas before calibration

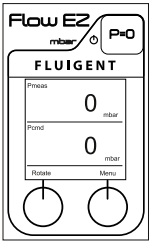
2



3



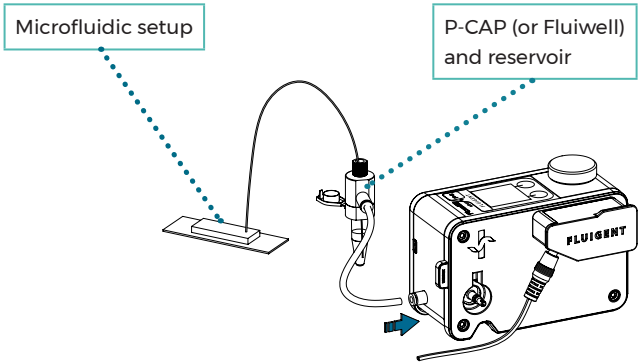
4



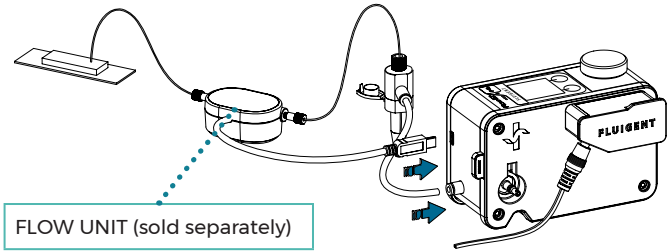
1. Press "*Menu*"
2. Use the dial (turn and press) to select "*Pressure calibrate*"
3. Wait a few seconds
4. The calibration is done

Note: Due to the high sensitivity of the internal pressure sensor, one may observe some small fluctuations of the measured pressure (Pmeas), even after the calibration is complete.

CONNECTION TO THE FLUIDIC SETUP



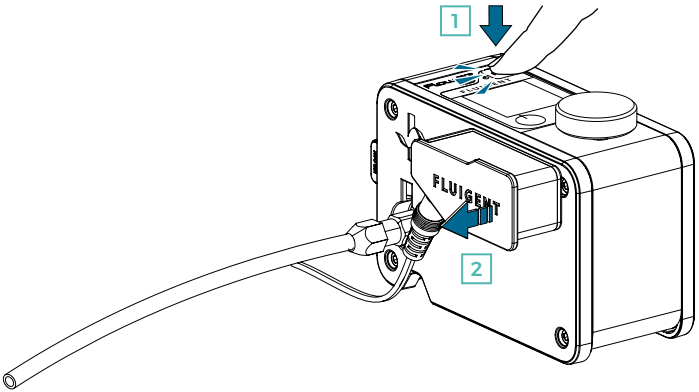
One can connect a **FLOW UNIT** (Fluigent flow sensor) between the reservoir and the microfluidic setup. (See page 22 for more details)



When done with the Flow EZ™ / Push-Pull

When one has finished using the **Flow EZ™** or **Push-Pull**, hold the "*P=0*" button in order to put the device into **sleep mode**.

If one needs to **disconnect the power supply** (e.g. to move or store the unit), please make sure the **Flow EZ™** or **Push-Pull** is already in **sleep mode before disconnecting the power.**

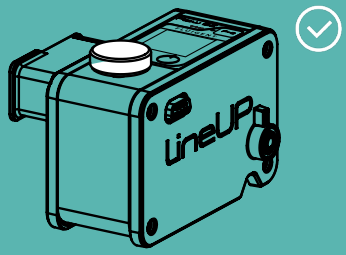


This procedure will **release** all **residual pressure** in the system, preventing any further pressure from being applied to your fluidic setup.

For a fully detailed **shutdown procedure**, please see page 32.

The **Flow EZ™** or **Push-Pull** is ready to be used,

Simply turn the dial to start.



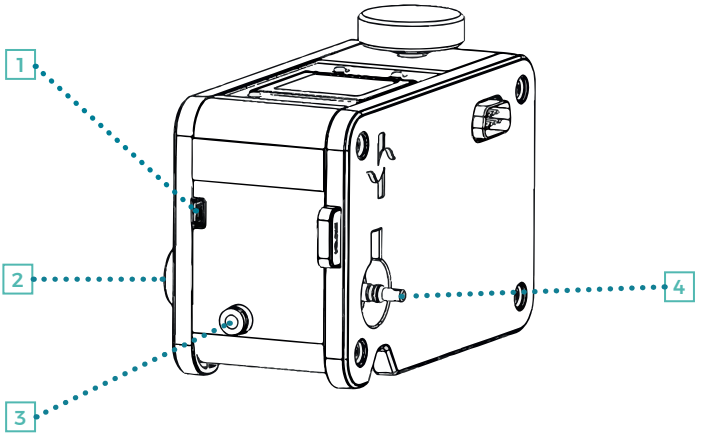
The **user's manual** in on the next page:

Allowing one to get the most out of the **LineUp™ series** devices.

LINEUP™ SERIES USER'S MANUAL

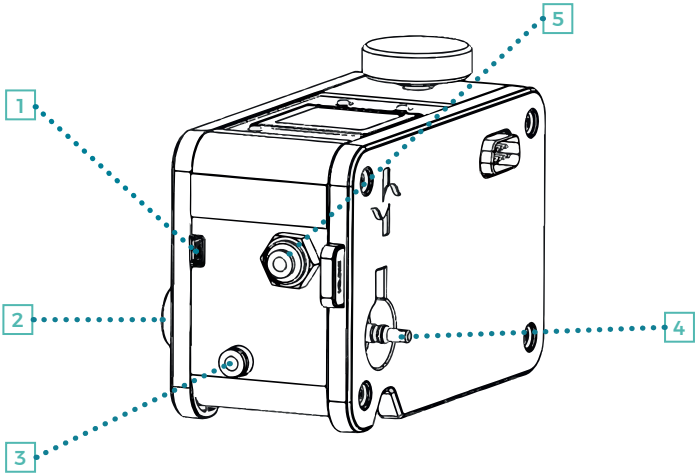
PRODUCT OVERVIEW

LineUp Flow EZ™
Pressure controller

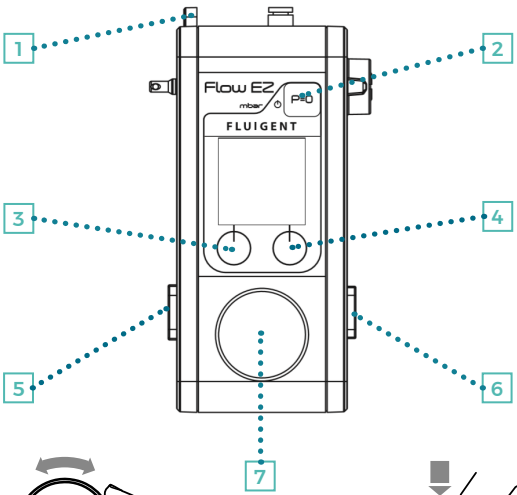


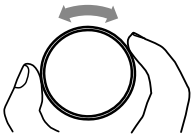
1	FLOW UNIT port to the flow sensor
2	Pressure supply transmission used only in multi-channel configuration
3	Pressure outlet to reservoir
4	Pressure inlet from pump or compressed air supply

LineUp Push-Pull
Pressure controller

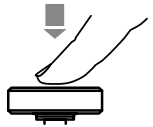


1	FLOW UNIT port to the flow sensor
2	Pressure supply transmission used only in multi-channel configuration
3	Pressure outlet to reservoir
4	Positive pressure inlet from pump or compressed air supply
5	Vacuum inlet from vacuum pump





Change pressure command
Navigate in menu



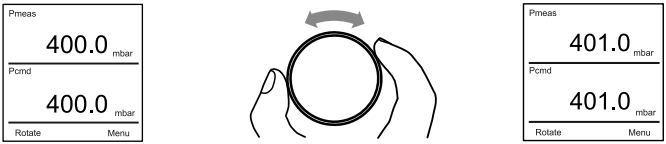
Set/Apply pressure
Command set in menu

1	Unlock button used only in multi-channel configuration
2	P=0 button press once to set pressure to 0, press again to return to original pressure, hold to put into sleep mode
3	Left button press to rotate the display/go back
4	Right button press to open the menu/enter
5	Power / Data connection provide power supply and data connection
6	Power / Data transmission used only in multi-channel configuration
7	Dial for local control

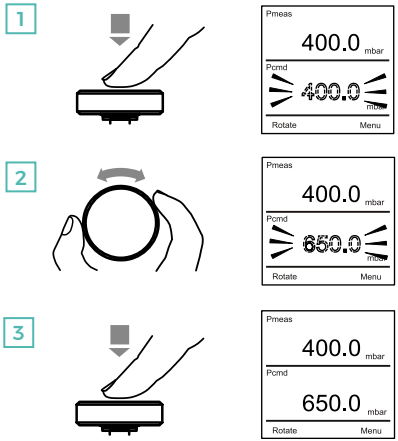
SETTING UP

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™** or **Push-Pull**.



ON/OFF way: **Click** on the **dial**, set the **pressure requested** in advance, and apply it later by **pressing the dial** again. This is a **faster way** to apply a direct pressure command **without overshooting**.



1. Press the dial to enter "*command off*" mode (the Pcmd value blinks).

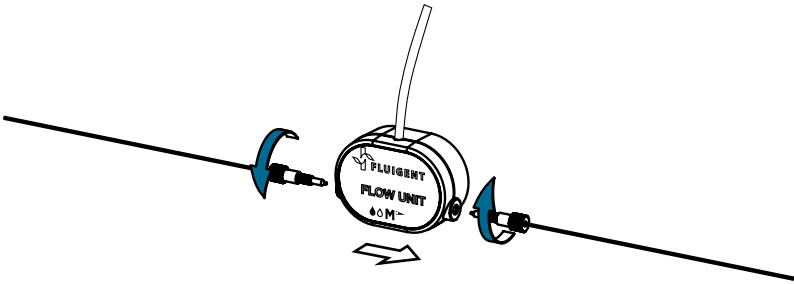
2. Set the desired pressure order (Pcmd) by rotating the dial.

3. When one wants to apply the pressure order, press the dial again.

ADD A FLOW UNIT

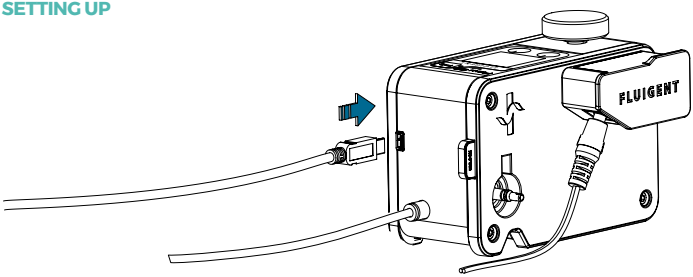
The **FLOW UNIT** is Fluigent's **flow rate sensor**. When a **FLOW UNIT** is added, one can use the **Flow EZ™** or **Push-Pull** to:

- **Monitor** the flow rate in the microfluidic set-up
- Directly control the flow rate **locally**
- Perform an **injection**, based on either **volume or time**



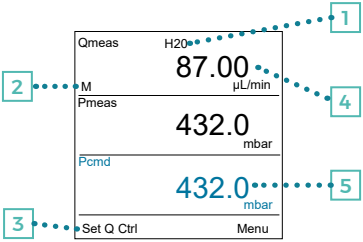
Insert a FLOW UNIT into the fluidic path

Connect the **FLOW UNIT** inline with **the arrow** indicating the **direction of the flow** to get a **positive value**. This is important for the flow rate control to work properly. Please pay extra attention when using a **Flow EZ™** of **negative range**, or when using a vaccum with a **Push-Pull**, in which case the **values will be negative**.



Connect the FLOW UNIT to the Flow EZ™ or Push-Pull

Use the **dedicated port** on the back of the pressure controller to connect the flow sensor. Once a **FLOW UNIT** is connected, the device **automatically detects** it and the "*Operation window*" will display an additional zone including the **flow rate measurement**.

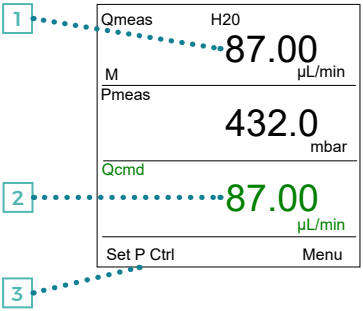


The measured flow rate (Qmeas) is only monitoring purposes. To directly control the flow rate, see next page (Flow rate control)

1	Liquid type H2O or Isopropanol
2	Range of the FLOW UNIT depending on the target flow rate (XS, S, M, L, XL)
3	Switch to flow rate control mode see next page
4	Measured flow rate units can be changed using the menu
5	Pressure command to be set by the user

FLOW RATE CONTROL

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



1	Measured flow rate Units displayed can be chosen
2	Flow rate command To be set by the user
3	Go back to pressure control mode

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

Although the **control mode** is in flow rate, the **live pressure** section value in the reservoir (Pmeas) is **still displayed** in the middle, giving information on the fluidic set-up. Abnormal flow rates may reflect problems in the microfluidic set-up (leakage, clogging, etc.)

See Fluigent FAQs on www.fluigent.com for more information.

Direct flow rate control works only when the value of **measured flow rate** (Qmeas) is **positive**. If it is not the case, please verify that the **FLOW UNIT** is connected in the **direction** with the arrow indicating the fluid path.

INJECT A VOLUME

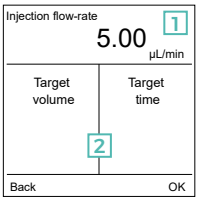
When a **FLOW UNIT** is connected, one can **inject** a certain **volume** into the microfluidic set-up. To do so, select "*Injection method*" in the menu.

1. Turn the dial to set the "*Injection flow rate*" to the desired **injection speed.**

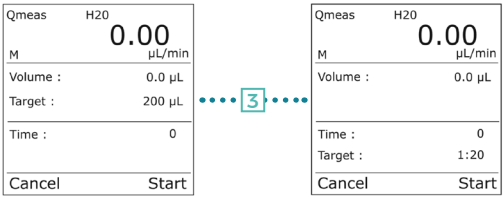
2. Choose "*Target volume*" to inject a **precise volume**, or "*Target time*" to run the injection over a **precise duration**.

3. Once confirmed, the "*Operation window*" will look like the examples shown.

The **Flow EZ™** or **Push-Pull** is ready to inject. Press "*Start*" to begin.



The "*Injection method*" described is **only available** when the **Flow EZ™** or **Push-Pull** is in **stand-alone** mode. When connected to a **PC**, the injection operations need to be initiated by **Fluigent software**.



Example where 200µL is set as the target volume

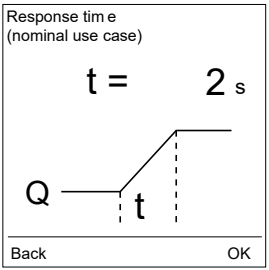
Example where 1:20 min is set as the target time

FLOW RATE SETTINGS

Response time reflects how fast the **pressure controller regulates** the flow to match the **flow rate order** defined by the user.

By default, the response time is set to **2 seconds**. In some circumstances where a **smoother response** is preferred, one can **set a longer response time**.

To do so, select "*Flow rate config*" in the menu



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

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 one sets a longer response time, the flow rate transition will be smoother both in flow rate control and in injection.

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)

Note:

In the case of range **M FLOW UNIT**, additional liquid types are possible:

- **HFE** for HFE 7500/Novec
- **FC40**
- **Oil** for mineral oil, calibrated for Sigma Ref M8410

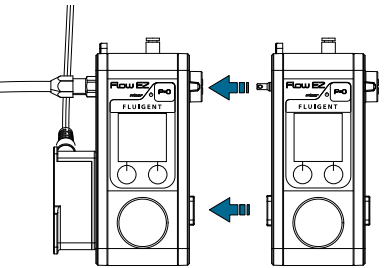
Some older **FLOW UNIT** models support only "*H2O*" as liquid type, therefore the liquid type selection may **not be available**.

SYSTEM EXPANSION

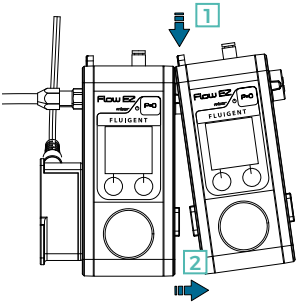
CREATING A MULTI-CHANNEL CONFIGURATION

The **Flow EZ™** and **Push-Pull** have a **hot plug & play** feature:

One can **add or remove** a module **while the device is running**.



Add a channel



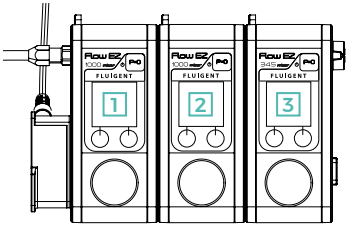
Remove a channel

The power and pressure supply are **automatically passed** to the newly added pressure controller. Up to **8 modules can be stacked** within one chain. (**Link** and **Adapt** modules can be added to those 8)

MIXING DIFFERENT PRESSURE RANGES

If the ranges have the **same required pressure supply**, one can connect them by **directly lining up** the modules.

1. 1000 mbar range Required supply pressure: 1100 mbar
2. 1000 mbar range Required supply pressure: 1100 mbar
3. 345 mbar range Required supply pressure: 1100 mbar



Note: In this configuration, You can connect up to **8 Flow EZ™** or **Push-Pull** considering they all require the **same pressure supply** (1100 mbar).

However, if a **Push-Pull** is integrated, it needs to have a **vacuum supply** in order to perform negative pressure orders.

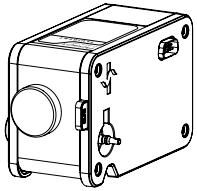
A **Push-Pull** cannot be stacked in with a **negative FlowEZ™**

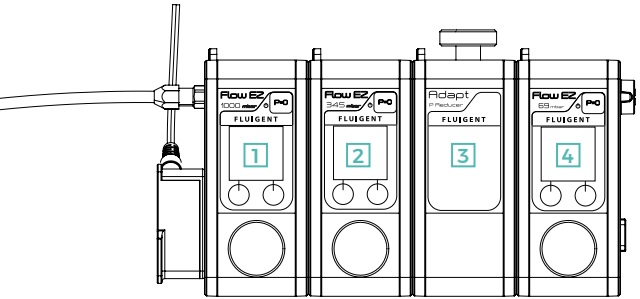
Flow EZ™ range (mbar)	Required pressure supply (mbar)
7000	7100
2000	2100
1000	1100
345	
69	150
25	
-25	-800
-69	
-345	
-800	

LineUp™ Adapt

If the ranges have **different required supply pressures**, one can still have them in the same chain by inserting an **Adapt** module between them.

The **LineUp™ Adapt** 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™** or **Push-Pull** on the right side.





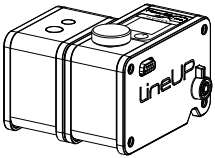
1	1000 mbar range Required supply pressure: 1100 mbar
2	1000 mbar range Required supply pressure: 1100 mbar
3	Adapt module Pressure reducer sold separately
4	69 mbar range Required supply pressure: 150 mbar

The **Flow EZ™** are ordered from **left to right** with decreasing pressure supply requirements, the **LineUp™ Adapt** ensures the pressure reduction.

COMPUTER CONNECTION

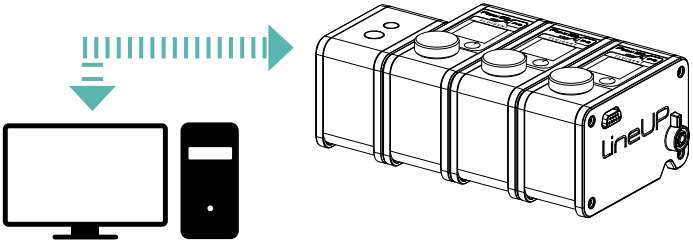
LineUp™ Link

The **LineUp™ Link** allows to connect the **LineUp™ series** modules to a computer.



The **Link** allows the pressure controller to benefit full advanced functionalities from **Fluigent's software** suite.

- **MAT** (Microfluidic Automation Tool) for sequence automation
- **A-i-O** (All-in-One) for live control and data record
- **SDK** (Software Development Kit) for developing custom applications

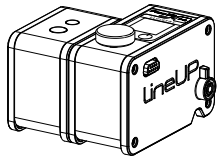


One can connect up to **8 pressure controller modules** in a chain **with or without** a **LineUp™ Link** module.

The **Link** can communicate with a PC using different kind of port:

- **USB** port communication
- **TTL** port communication
- **Serial** port communication (RS-232 port, detailed in the next part)

LINEUP™ LINK COM



The **LineUp™ Link COM** allows to connect the **LineUp™ series** modules to a computer using a serial port (RS-232)

The RS-232 interface is a 9-pin D-Sub socket used for remote communication. The voltage level is ±10 V (pin 5: GND; pin 2: RX +-10V; pin 3: TX +- 10V).

Serial communication parameters should be set as follows:

Braud Rate	115 200 bps
Stop Bits	1
Parity	No parity
Flow Control	None

Serial parameters table

REMOTE COMMAND SET (LINK COM)

This remote command set is the default set available on the instrument. All commands must be terminated with a <CR>. All decimal values use the point "." as decimal separator.

A query command ends with a question mark "?" for queries. The data column represents the response of the instrument. All response strings are terminated with a <CR>. Any response that have multiple parameters return the parameters separated by commas ",".

For all commands (no question mark "?"), the data column represents the required parameters to be sent to the instrument following the string in the command column. Any command that requires multiple parameters must have the parameters separated by commas ",". In case of error in the commands spelling, the command is ignored by the instrument without error code returned.

Commands/Queries related to an instrument connected at index "X" return "*ERROR NO MODULE*" in case there is no instrument at the index they refer to.

Query	Data	Function / Response
SYST		
:IDN?	<vendor> <instrument> <serial number> <version number>	Returns the identification string. SN and VN are in decimal and on 5 characters.
:STATUS?	<status>	Returns the instrument status: 1 = On, 2 = Off
:X:IDN?	<vendor> <instrument> <serial number> <version number>	Returns information about the instrument at index X SN and VN are in decimal and on 5 characters.
:X:STATUS?	<instrument> <status>	Returns information about the instrument at index X 1= Normal, 2= Under pressure, 3= Over pressure
:START		Powers ON the LINK COM module
:STOP		Powers OFF the LINK COM module
:SETBR:<value>		Change baudrate 0=9600, 1=19200, 2=38400, 3=57600, 4=115200
:MEAS:ALL:P?	<pmeasure1> ... <pmeasure n>	As many pressure measurements as there are connected instruments
:MEAS:ALL:Q?	<qmeasure1> ... <qmeasure n>	As many flowrate measurements as there are connected instruments with a FLOW UNIT Returns “ERROR NO Q SENSOR” in case no connected instrument has a FLOW UNIT

SYST remote commands set table

Query	Data	Function / Response
	CHAN	
X:CONF:P?	<pmin> <pmax> <mode>	Returns information about the instrument at index X pmin = pressure min, in mbar, as an integer pmax = pressure max, in mbar, as an integer mode = pressure control mode, 0 = fast, 1 = smooth
X:CONF:Q?	<qmin> <qmax> <qtable>	Returns information about the instrument at index X qmin = flowrate min, in ul/min, as decimal qmax = flowrate max, in ul/min, as decimal qtable = calibration table 0= H20, 1=IPA, 2=HFE, 3=FC40, 4=OIL
X:P:<value>		Sets pressure order for instrument at index X
X:Q:<value>		Sets flowrate order for instrument at index X
X:MODE:<value>		Changes pressure control mode for the instrument at index X.
X: MEAS:P?	<pmeasure>	Returns pressure read by instrument at index X
X: MEAS:Q?	<qmeasure>	Returns flowrate read by instrument at index X
:X:ZERO		Pressure sensor calibration (to atmospheric pressure)
:X:SCALE:<value>		Sets the flowrate table of the FLOW UNIT of the connected instrument at index X
:X: EVO|EVI:ON|FF		Manual control of the electrovalves of the instrument connected at index X
:X:EPI:<value>	Manual control of the input electrovalve of the instrument connected at index X. Value must be provided in hexadecimal 4 digits, ranging from 0000 to FFFF (corresponding to 0% to 100% Note: the is no such feature for the leakage EV.	

CHAN remote commands set table

SHUTDOWN PROCEDURE

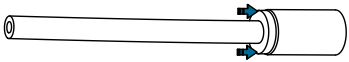
Before disconnecting any **FLOW UNIT**, please be sure to clean it with appropriate solvent detailed in the **cleaning protocols**. Doing so will prevent any blockage and prolong its service life.

1. **Press and hold** (for a few seconds) the "*P=0*" button in order to:
   - Release the residual pressure from the system
   - Put the device into "*sleep mode*"

2. **Disconnect** the **power supply** and the **pressure supply** from the system.

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

3. **Disconnect** all pneumatic tubing by **pressing the ring inward** while **pulling the tubing outward**.

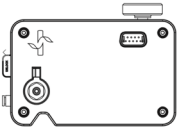


Press the ring inward

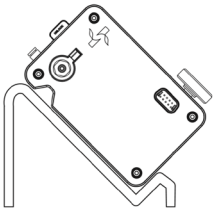
Pull the tubing outward

ADDITIONAL FEATURES

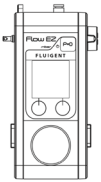
One can use the **Flow EZ™** or **Push-Pull** in **different positions:**



Horizontal

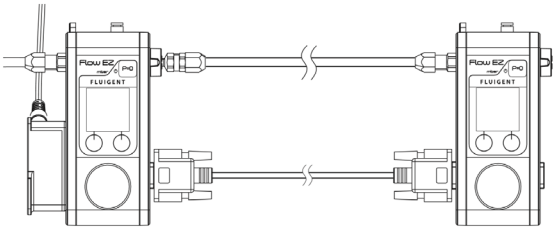


Angled



Vertical

Use the "**Chain to Chain Kit**" (sold separately) to give more flexibility when placing the multichannel configuration on the lab bench.

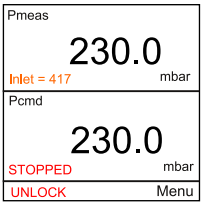


FREQUENTLY ASKED QUESTIONS

The **Flow EZ™** or **Push-Pull** cannot achieve the **requested pressure** or **flow rate**, what should I do?

1. Verify the set-up is **air tight** and there are **no leaks.**
2. Verify that the **pressure supply** is providing the **required pressure** (**Flow EZ™** or **Push-Pull** cannot provide an outlet pressure greater than supplied pressure).
3. If the **flow rate command** cannot be achieved, verify that the fluidic path is **not blocked**.

Why has the **Flow EZ™** or **Push-Pull** stopped responding to **pressure requests** (and a similar window can be seen)?



When the supply (inlet) pressure is **out of the range** during operation, the **Flow EZ™** or **Push-Pull** will stop regulating the pressure and the "*Operation window*" will **lock** (as seen on the left)

Press the "*UNLOCK*" button (left button) and "*Inlet pressure check window*" will be seen. It will **assist** in **adjusting the inlet pressure** to the required value)

FREQUENTLY ASKED QUESTIONS

I bought my **FLOW UNIT** long before I bought my **Flow EZ™** or **Push-Pull**, but when I connect it, my device says it is "*Not Supported*". Why is that?

Some older **FLOW UNITs** are **not supported** by the **Flow EZ™** or **Push-Pull**. In this case, please contact Fluigent at support@fluigent.com

Can I use the **LineUp™ Push-Pull** even if one of the two inlets is not supplied, as a regular positive or negative **Flow EZ™**?

The **LineUp™ Push-Pull** can be used as a **Flow EZ™ 1000 mbar** and as a **Flow EZ™ vacuum -800** mbar independently. A **positive pressure** should always be applied for use. The **vacuum one** is not needed unless one wishes to apply **negative pressure values**.

For **more FAQs**, please visit www.fluigent.com

For **tutorial videos** about the **LineUp™ series**, please visit our **YouTube channel**: Fluigent

WARRANTY TERMS

What this warranty covers

This warranty is granted by Fluigent and applies in all countries. The Fluigent product is guaranteed for one year from the date of delivery at the laboratory against defects in materials and workmanship. If found to be defective within the warranty period, the 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 there is a problem, please contact the Fluigent sales office from where one purchased the product(s). Arrange a mutually convenient time for Fluigent service representative to discuss and find a solution to fix the issue. Repairs will be made remotely whenever possible. If more action is needed, the system will need to be sent back to Fluigent offices (for no additional cost, only if it is under warranty).

Warranty conditions

Do not open any LineUp™ series device (opened devices will not be charged by the customer support)
Do not use cables and power supplies other than the one provided by Fluigent
Prevent foreign objects or liquids from entering the device
Do not place the product in an unstable location
Respect the temperature compatibility (from 5°C to 40°C)
For positive ranges of pressure, please do not apply above 8 bar
For negative ranges of pressure, please do not apply any positive pressure
Use a filtered (<10µm) and dried air supply
Prevent heavy objects from falling on the device
Prevent any corrosive liquid from coming in contact with the device

For questions about specific uses, please contact Fluigent 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

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Fluigent GmbH +49 3641 277 652

For a fully detailed FAQ for all Fluigent products, please visit:

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

Interested in Fluigent products ?

To view the **complete Fluigent product line** and **application notes**:

http://www.fluigent.com

For **commercial requests**, please e-mail:

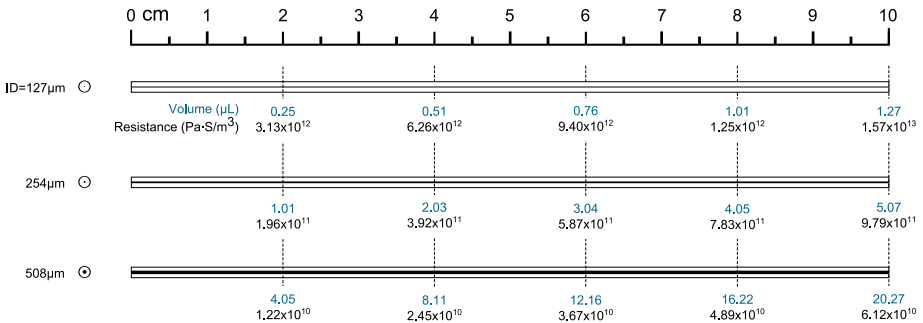
contact@fluigent.com or your local office

For **tutorial videos** about the **LineUp™ series**, please visit Fluigent on YouTube

Fluigent

Volume and Resistance for tubing with different ID (Inner Diameter)

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



OD (Outer Diameter) identification

Printed in real size

● 1/16" (1.6mm)

• 1/32" (0.8mm)

Units Conversion

1psi = 68.95 mbar

1mbar = 1.45 X 10^{-2}psi

1inch = 2.54 cm

1cm = 0.39 inch

VERSION
JAN. 2021

afaq ISO 9001 Qualité AFNOR CERTIFICATION

FLUIGENT