

USER'S
MANUAL

LINEUP™ SWITCH EZ



PRECAUTIONS

Do not open SWITCH EZ, 2-SWITCH™, M-SWITCH™ or L-SWITCH™ devices. Please refer all service issues to our Support department (support@fluigent.com)

Prevent any objects or liquid from entering the SWITCH EZ. This may cause a short-circuit or other malfunction. Failing to follow these instructions may:

- Expose the user to direct current/voltage if the device is powered. This may lead to damages.
- Void device's warranty
- Discharge our company from any liability regarding physical or device damages.

Place the product in an stable location with a level surface and good support.

Do not use other power supply than the one provided with the LineUp™ series. The power supply provided with the LineUp™ series has been carefully selected to meet the power requirements of the LineUp™ series in all configurations and to comply with all safety standards.

If using the SWITCH EZ with other flow control systems, please check that the pressure in your fluidic system does not exceed the maximum pressure of the valve being used.

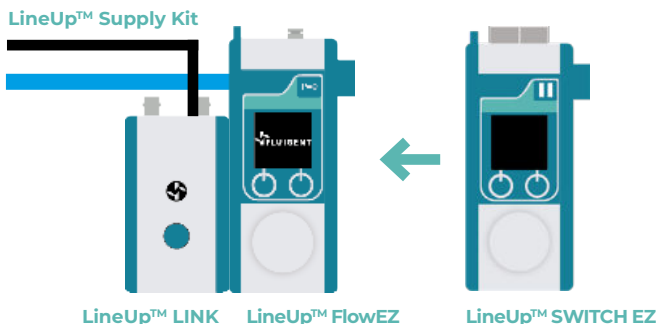
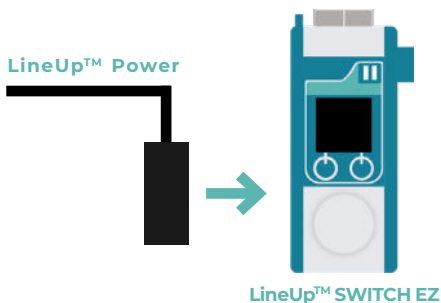


SWITCH EZ USER'S MANUAL

QUICK START GUIDE	4
PRODUCT OVERVIEW	8
SETTING UP	10
Power supply	10
Microfluidic valve connection	11
LineUp™ integration	12
MANUAL USE	13
Operation window	13
Local control	14
Hold mode	17
SOFTWARE CONTROL	18
LineUp™ Link	18
OxyGEN	19
REMOTE OPERATION	21
TECHNICAL SPECIFICATIONS	24
WARRANTY TERMS	25
TECHNICAL SUPPORT	26

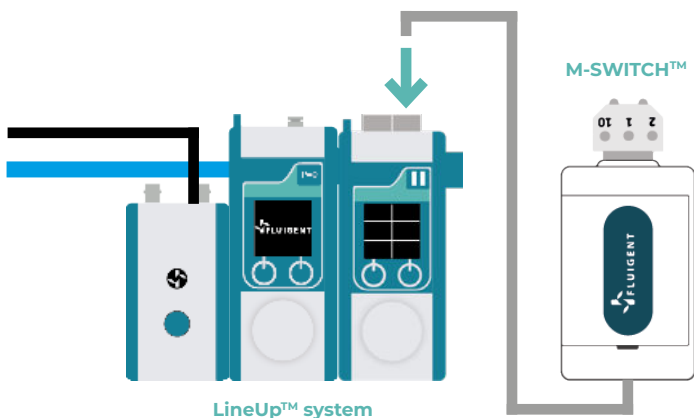
QUICK START GUIDE

Provide power supply to the **LineUp™ SWITCH EZ** using the **LineUp™ Power Kit** (P/N : LPK001) or by combining it to a supplied LineUp™ chain



QUICK START GUIDE

Plug the Fluigent microfluidic valves to the dedicated ports. The valves are automatically detected by the module and displayed on the screen

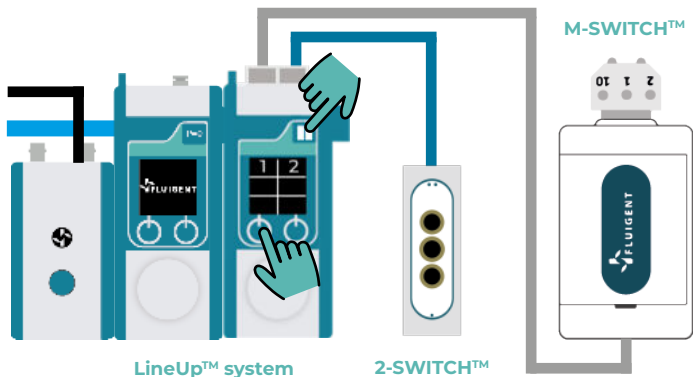


The **LineUp™ SWITCH EZ** is compatible with Fluigent microfluidic valves:

2-SWITCH™ : 3-port/2-way (2SW002)

M-SWITCH™ : 11-port/10way (ESSMSW003)

Use the local control interface to actuate the valves or to program simultaneous orders using the pause button

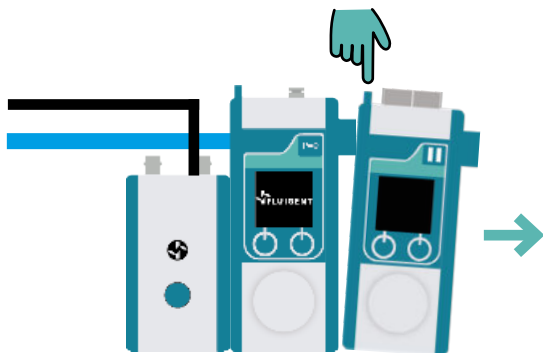


If one wishes to automate the valve actuation timing, connect the LineUp™ chain to a PC using the LineUp™ LINK and process on Fluigent OxyGEN



QUICK START GUIDE

To shut down the module, simply detach it from the chain by pressing the « unlock » button at the top. The connected valves will shut down

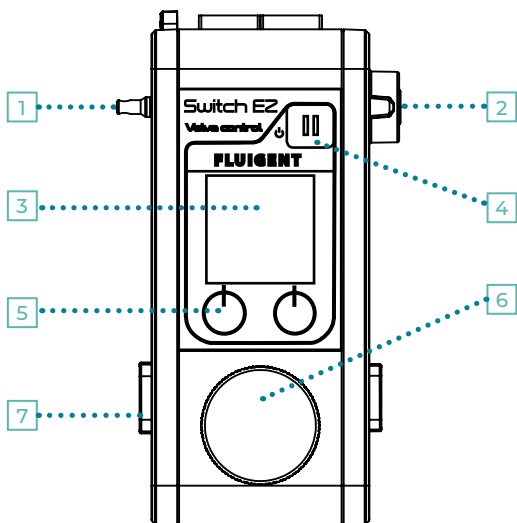


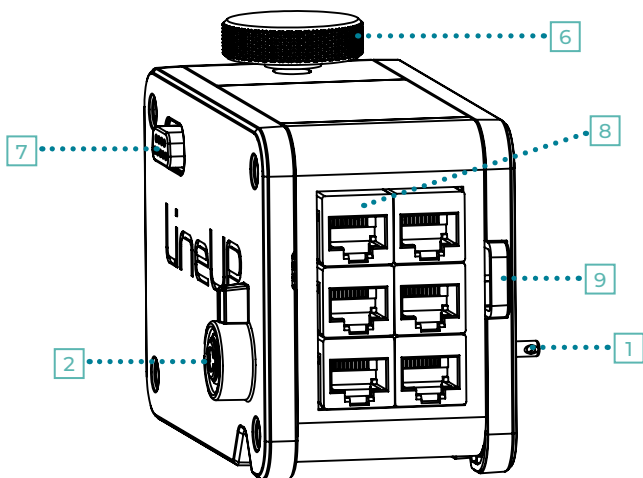
The **user's manual** starts on the next page:

Allowing one to get the most out of the **LineUp™ SWITCH EZ** device.

PRODUCT OVERVIEW

The **LineUp™ SWITCH EZ** is a module allowing one to control Fluigent's microfluidic valves. The module has **6 ports** and can be combined with other LineUp™ products such as pressure and vacuum controllers to have a **complete and compact system** for benchtop use. Connected microfluidic valves can be controlled or programmed either by using the **local control** directly on the device or by creating a protocol in real-time to **automate valve actuation timing** with **OxyGEN**.



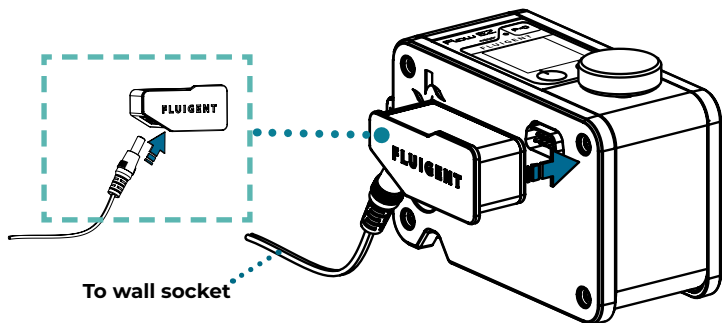


- 1 Pressure supply inlet used with pressure controllers
- 2 Pressure supply transmission used with pressure controllers
- 3 Operation window displays connected valves and positions
- 4 Pause button used to program several orders and set them simultaneously
- 5 Interface buttons to set the valves positions and validate/deny orders
- 6 Rotative dial to navigate and to select the valve on which operate
- 7 Power and data transmission used for multi-channel configuration
- 8 microfluidic valve ports to power and control the connected valves
- 9 Unlock button press it to separate a LineUp module from another

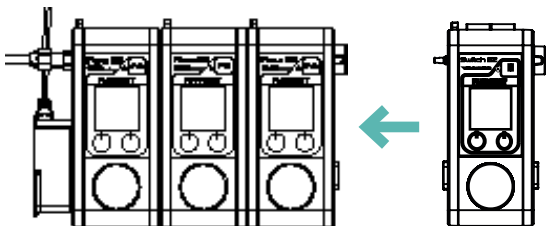
SETTING UP

POWER SUPPLY

To provide power supply to the module, use the **LineUP™ Power kit** (P/N : LPK001) or the **LineUP™ supply kit** (P/N : LU-SPK-0002). The **SWITCH EZ** will start and display the connected valve information on the operation window.

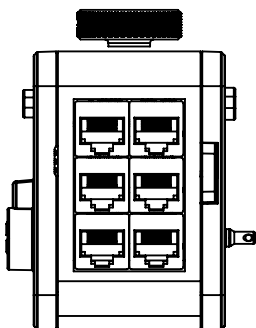


If the module is combined to other powered **LineUp™** modules, the power will be supplied through the chain.



MICROFLUIDIC VALVES CONNECTION

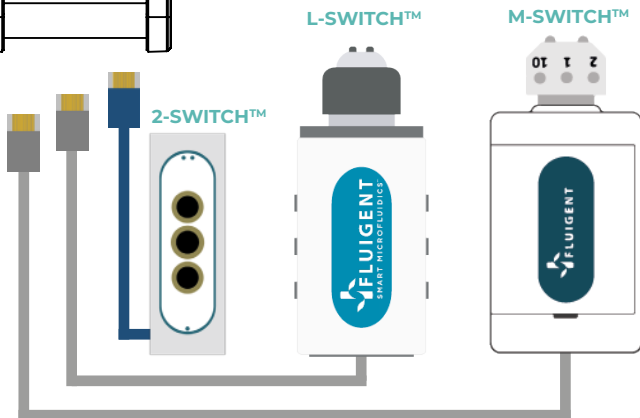
Plug the Fluigent microfluidic valves to the dedicated ports at the top of the SWITCH EZ. Once the valves are connected, and once the SWITCH EZ is powered ON, the module displays the information of the corresponding valves on the operation window.



The **LineUp™ SWITCH EZ** can support:

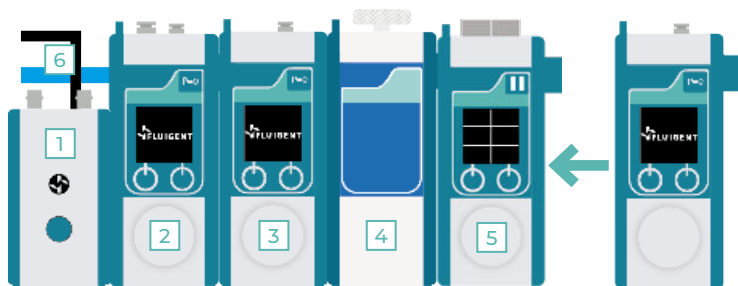
Up to six **2-SWITCH™**

Up to three rotary valve (including the **M-SWITCH™** or the **L-SWITCH™**)



LINEUP™ INTEGRATION

The **SWITCH EZ** can be combined with other **LineUp™ series** modules such as **Flow EZ™** and **Push-Pull** to have a **complete and compact** system. Simply stack a module to another and benefit from a single power supply source or pressure source for the whole chain. If a **LINK** is connected to a PC, one can access to Fluigent **OxyGEN** and **program pressure or flow rate orders** as well as **valve actuation timing**.

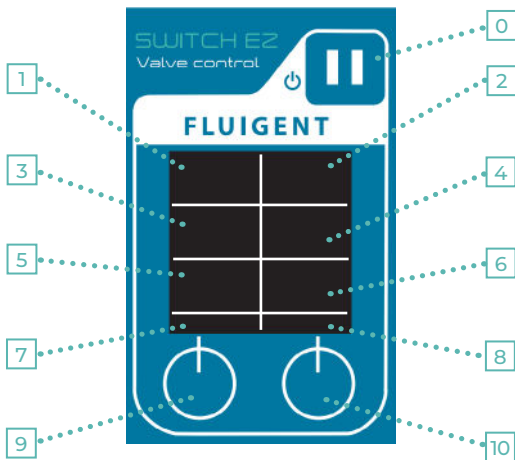


- 1 LineUp™ LINK allows PC control and access to Fluigent or custom software
- 2 LineUp™ Push-Pull Pressure and vacuum controller for flow rate application
- 3 LineUp™ Flow EZ Pressure-based flow controller (exists in vacuum version)
- 4 LineUp™ Adapt Pressure reducer ensuring proper pressure supply to modules
- 5 LineUp™ SWITCH EZ Microfluidic valve controller
- 6 LineUp™ Supply Kit Provide power and pressure supply to the whole system

MANUAL USE

OPERATION WINDOW

One can control and actuate microfluidics valves directly on the **SWITCH EZ** using the **local control interface** and the **operation window**.



0 Pause button for hold mode (p.17) 6 Port 6 information

1 Port 1 information 7 Left button action

2 Port 2 information 8 Right button action

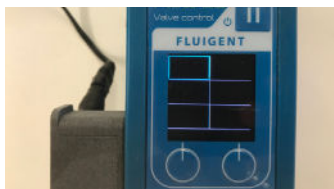
3 Port 3 information 9 Left button

4 Port 4 information 10 Right button

5 Port 5 information

LOCAL CONTROL

Fluigent microfluidic valves can be actuated without a PC by using the SWITCH EZ local control. Once a valve is connected to a port, its information is displayed on the module and one can control it directly.



If **no microfluidic valve is connected** to the **SWITCH EZ**, the operation window will be splitted in **8 sections** (6 for each port, 2 for each button action) but no valve information is displayed.



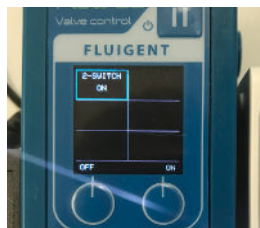
2-SWITCH™ in position 1

When a **valve is connected**, on the screen will be displayed the **name and current position**.

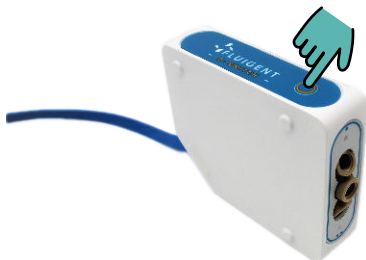


2-SWITCH™ in position 2

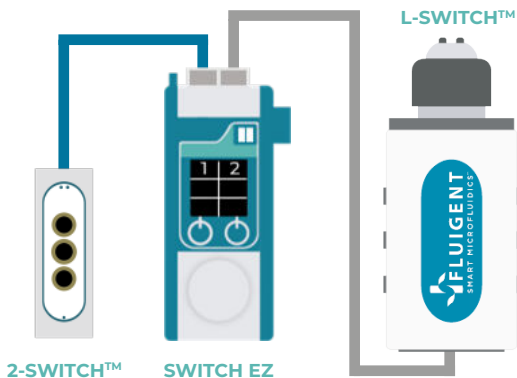
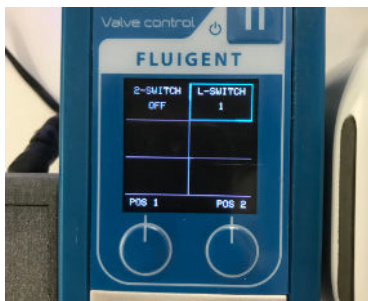
To switch from a position to another, click on the corresponding button. The valve will immediately go to the selected position and display it on screen.



The Fluigent **2-SWITCH™** has also a local button at the top of the valve which can be used as well to switch the valve position.

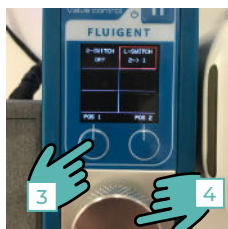
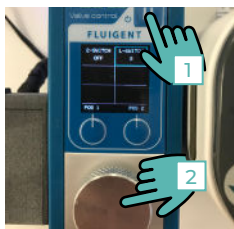


The **SWITCH EZ** can support **6 valves** with a limitation of **3 rotary valves**. Each port is **universal** and correspond to a section on the operation



HOLD MODE

If one wants to **switch several valves at the same time**, the **pause button** at the top right of the **SWITCH EZ** allows to enter the "**hold mode**". During this phase, the selection square on the screen will become red and each order defined on the valves positions will be **recorded but not applied**.



Use the **rotative dial** to select a specific valve, **click on the dial** to access to the position options, then use the **left and right buttons** to define the order.

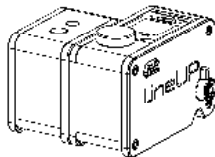


Once the orders are defined, select the "**apply**" option with the corresponding button or **cancel the orders** with the other button.

SOFTWARE CONTROL

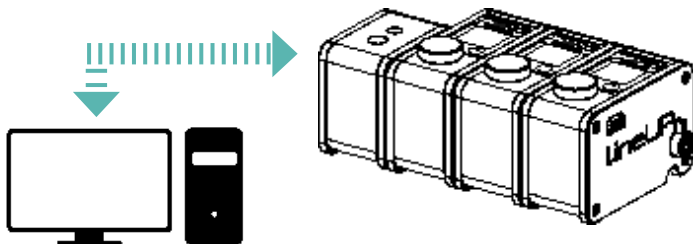
LINEUp™ LINK

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



The **Link** allows the LineUp™ system to benefit full advanced functionalities from **Fluigent's software** suite.

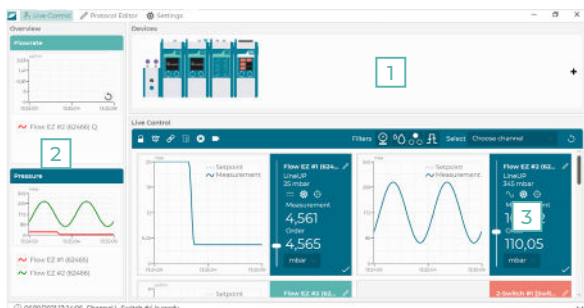
- **OxyGEN** for real-time control and automation
- **SDK** (Software Development Kit) for developing custom applications



OXYGEN

Fluigent's OxyGEN software is a complete interface allowing one to control, monitor and automate Fluigent product line. This dedicated dashboard can be used as a tool for real-time control of pressures, flow rates and valve actuation in microfluidic experiments. Its modular interface is designed for independent and simultaneous monitoring of all instruments and channels. The software is also dedicated for developing and running time based microfluidic protocols. Easily edit protocols for complete automated experiments, including a wide range of operations and function loops as well as TTL input/output. Live control data can be exported and protocol runs recorded for further use.

Below is an overview of the OxyGEN interface:



- 1 **Device panel** see the instruments that have been detected, hover to get basic information
- 2 **Overview panel** graphs of all pressure and flow rate sensors in real time
- 3 **Live Control panel** graphical list of instruments widgets that allow controlling instruments in the simplest way possible.

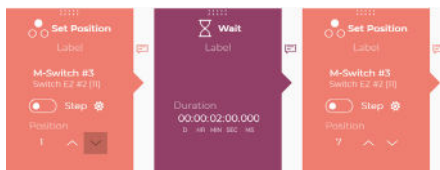
Here are examples of OxyGEN protocols to have an overview of the specific functions of each Fluigent microfluidic valve.



In this protocol, the **2-SWITCH™** will **toggle position**, then **wait for 1 min 30 sec**, and **toggle position** again.



In this protocol, the **L-SWITCH™** will **toggle position**, then **wait for 30 sec**, and **toggle position** again.

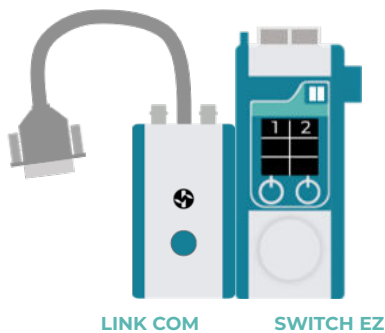


In this protocol, the **M-SWITCH™** is set to rotate with the **shortest path**. The valve is set on **position 1**, **wait for 2 min**, and will rotate until **position 7**. (The rotation direction can be clockwise or anticlockwise.)

REMOTE OPERATION

The following part details the serial RS-232 communication information for the use of the LineUp™ SWITCH EZ with the LINK COM.

The RS-232 interface is a 9-pin D-Sub socket used for remote communication. The voltage level is $\pm 10\text{ V}$ (pin 5: GND; pin 2: RX $\pm 10\text{V}$; pin 3: TX $\pm 10\text{V}$).



Serial communication parameters should be set as follows:

Baud Rate	115 200 bps
Stop Bits	1
Parity	No parity
Flow control	None

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 "?". 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.

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 or the instrument at the index is not compatible with the query (e.g a query for a Flow EZ™ will not work if there is a SWITCH EZ at the index poled).

REMOTE OPERATION

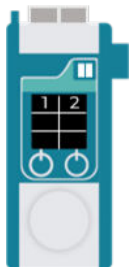
The following table describes the SWITCH EZ remote commande set:

Query	Data	Function / Response
SWEZ		
:X:READ:Y?	<type> <pos>	<p>Returns informations about the valve at index X (position on the LineUP™ chain) in port Y of the SwitchEZ</p> <p>type = "2SW", "MSW", "LSW" or "N/C" respectively for 2-Switch, M-Switch, L-Switch and not connected</p> <p>pos = returns the state of the valve :</p> <ul style="list-style-type: none"> - For 2SW : "OFF","ON" - For MSW : "1", ..., "10" - LSW : "1", "2" - N/C : "N/C" (not connected)
:X:SET:Y:<value>		<p>Sets the valve Y on module X at the value specified :</p> <ul style="list-style-type: none"> - 2SW : "ON" or "OFF" - LSW : "1" or "2" - MSW : "1", ..., "10" <p>Note : for M-Switch, it rotates the shortest way.</p>
:X:CCW:Y:<value>		<p>Sets the valve Y on module X at the value specified, forcing a counterclockwise rotation</p>
:X:CW:Y:<value>		<p>Sets the valve Y on module X at the value specified, forcing a clockwise rotation</p>

Example of remote commands: SWEZ:1:CCW:4:7 : forces the valve on port 4 of the module at index 1 to go to position 7 in a counterclockwise rotation.

TECHNICAL SPECIFICATIONS

Valve requirements	
Maximum valves supported	Up to six 2-SWITCH™ Up to three rotary valves: <ul style="list-style-type: none">- 3 M-SWITCH™ or- 3 L-SWITCH™
Hardware specifications	
Dimensions	91,9 x 71,8 x 131 mm
Weight	317 g
Electrical specifications	
Electrical consumption	2A peak
Power supply	LineUp Power Kit (LPK001) LineUp Supply Kit (LU-SPK-002)
Software compatibility	
OxyGEN	ver. 2.2.0.0



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

TECHNICAL SUPPORT

Any questions? E-mail us at:

support@fluigent.com

Or call our technical support team directly



Fluigent S.A.S +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, 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:

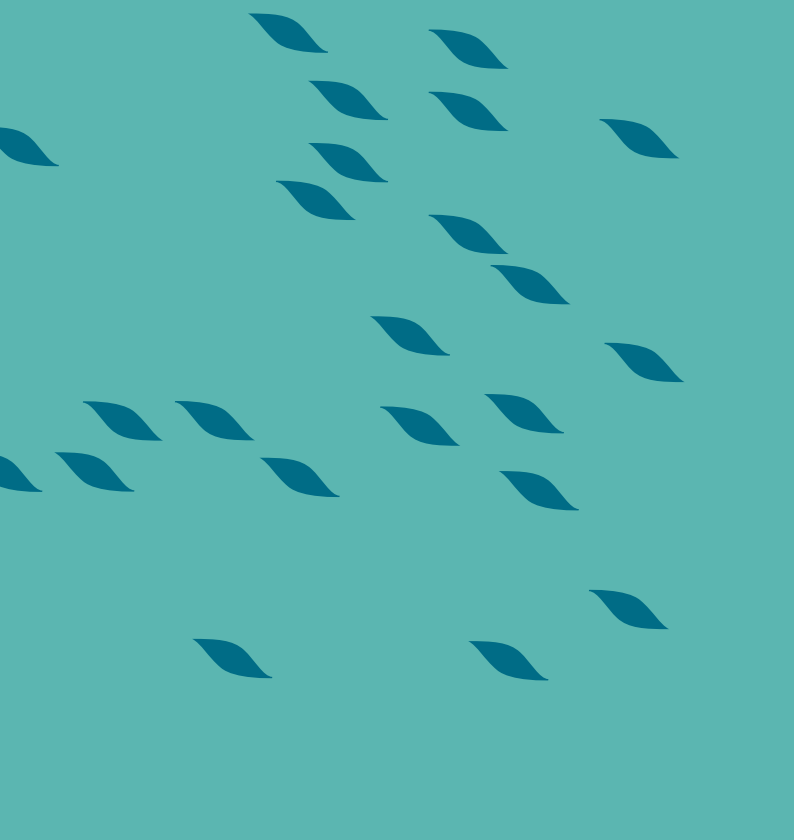


contact@fluigent.com or your local office

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



Fluigent



VERSION
JUN. 2023

