USER'S
MANUAL

EASY SWITCH SOLUTIONS

MICROFLUIDIC VALVES

FLUIGENT

PRECAUTIONS

Do not open SWITCHBOARD, 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 SWITCHBOARD. 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 ESS™ The power supply provided with the ESS™ has been carefully selected to meet the power requirements of the ESS™ in all configurations and to comply with all safety standards.

If you are using the ESS™ platform 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.

SUMMARY

INTRODUCTION 4
QUICK START GUIDE 7

2-SWITCH™ VALVE 8
Fluidic principles 8
Product overview 10
Fluidic connections 12
Positioning 14

M-SWITCH™ VALVE 15
Fluidic principles 15
Product overview 17
Fluidic connections 19
Positioning 21

L-SWITCH™ VALVE 22
Fluidic principles 22
Product overview 24
Fluidic connections 26
Positioning 31

SWITCHBOARD 32
Product overview 32
Connection 34

FLUIDIC CIRCUIT EXAMPLES 37
CLEANING PROCEDURE 42
FREQUENTLY ASKED QUESTIONS 44
TECHNICAL SPECIFICATIONS 46
SERVICING & WARRANTY 48
Schedule 48
Warranty terms 49

INTRODUCTION

The **Easy Switch Solution™ platform** (ESS™) provides solutions for path selection in microfluidics. The Easy Switch Solutions™ platform enables one to implement **3 different kind of valves** in a microfluidic circuit.

1. The **2-SWITCH™** is a **3-port/2-position** solenoid valve: 2 ports can alternatively be connected to a third one.



1

2. The **M-SWITCH™** is a **11-port/10-position** rotary valve: 10 peripherical ports connected to a central one.



2

3. The **L-SWITCH™** is a **6-port/2-position** valve to inject precise volume of fluid or for switching fluid to different channels.



3

4. The **SWITCHBOARD** is a hub that hosts up to **4 M-SWITCH™** or **4 L-SWITCH™** and up to **8 2-SWITCH™**. The device allows for communication of the SWITCHes to a PC with Fluigent software : **OxyGEN** for live control or to automate protocols. It also ensures power supply to the connected valves.



4

Combining the **2-SWITCH™**, **M-SWITCH™** and **L-SWITCH™** valves into one experiment, using the **SWITCHBOARD** allows one to access new possibilities to easily design and build even the most **complex microfluidic circuits**.

The **ESS™ platform** has been designed to work at its best performance with FLUIGENT pressure-based flow control solutions (**LineUp™ series MFCS™ series** and **Flow-Rate Platform**).

It is possible to use the **ESS™ platform** with other flow control systems provided that the pressure applied to the ESS™ devices does **not exceed** the **maximum pressure rating** of the valves.

Note: To ensure product longevity, the **M-SWITCH™** should **not be used** with an operational pressure **above 5 bar** (~72,5 psi)

This **manual** explains how to use the **ESS™ series** for one's daily work.

QUICK START GUIDE

Here is a **quick set-up** and **quick start guide** to summarize of the **main steps** to get the ESS™ platform **up and running**.

1 Fluidic connections on the **2-SWITCH™** , **M-SWITCH™** and **L-SWITCH™** that user wants to use:

See page 13 for the 2-SWITCH™ fluidic connection how-to

See page 20 for the M-SWITCH™ fluidic connection how-to

See page 27 for the L-SWITCH™ fluidic connection how-to

2 Position the devices in the most practical configuration for the application.

See page 14 for the different 2-SWITCH™ mounting options

See page 21 for the different M-SWITCH™ positionning options

See page 31 for the different L-SWITCH™ positionning options

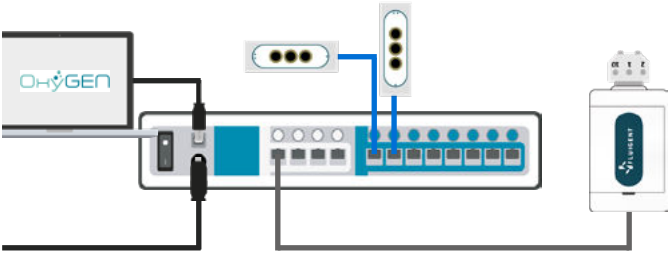
3 If using a L-SWITCH™, connect the device RJ45 port with the provided flat RJ45 white cable.

Note: If one is using a **2-SWITCH™** or **M-SWITCH™**, the RJ45 cables are **integrated into the device**. There is **no need to connect another cable** to the valve.

4 Connect the **SWITCHBOARD** to the power supply as explained **page 37** and then connect the RJ45 cables to the **dedicated SWITCHBOARD RJ45 ports** (white RJ45 cables for M-SWITCH™ and L-SWITCH™ and blue RJ45 cables for 2-SWITCH™).

5 If one wishes to use Fluigent **OxyGEN** downloadable from the Fluigent website, connect a **USB cable** from the **SWITCHBOARD to the computer** where OxuGEN is installed (see **page 38**)

The **ESS™** is now ready to operate either by **automating a protocol** or in **live control** using the OxyGEN software.



After the experiment, do not forget to **rinse** the **2-SWITCH™**, **M-SWITCH™** and **L-SWITCH™** with distilled water and then isopropanol, to avoid any clogging in the fluidic parts that could damage the device and cause malfunction.

2-SWITCH™ VALVE

The **2-SWITCH™** is a **3-port / 2-position** valve. Each of the three ports can be connected with fittings and tubing to microfluidic set-up or other device. The fluids can be directed **bidirectionally** into the device with a **maximum pressure of 2.5 bar** (36 psi).



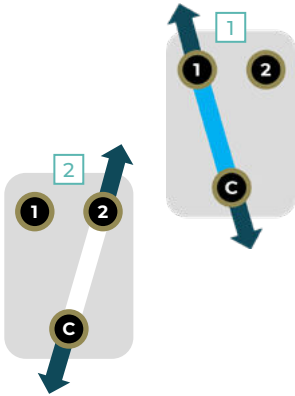
FLUIDIC PRINCIPLES

FLUIDIC 2-WAY SWITCH

The dark blue "C" port at the bottom of the diagram is the **common central port:** it can be either **connected to port #1** or to **port #2** depending on the **selected position.**

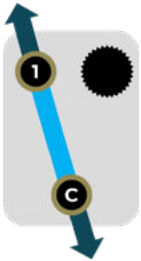
At **position #1**, the common central (C) port is linked to the **port #1**. The **flow is bidirectional** between those two ports. A **blue LED** on the device indicates this current position.

By pressing the **local button** or using **software**, the valve will **change position** from 1 to 2. A **white LED** will now indicate the **position #2**.



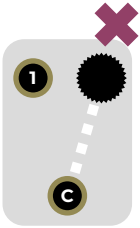
Fluidic ON/OFF switch

Another possibility for using the **2-SWITCH™** is to **plug one of the two ports** (#1 or #2). This way, one of the positions of the 2-SWITCH™) becomes a **closed position**, and the 2-SWITCH™ acts as an **"ON/OFF" switch**.



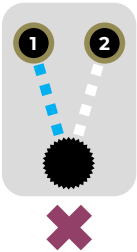
Position 1





Position 2

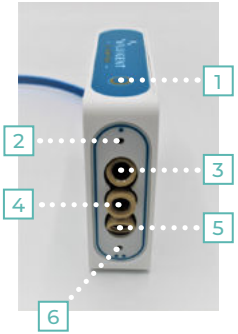
The **fluidic "ON/OFF" switch** configuration only works if port #1 or port #2 is plugged. If the **common C port is plugged** then **no flow can circulate** through the **2-SWITCH™** (see bottom diagram).



PRODUCT OVERVIEW

PRODUCT DESCRIPTION

The front of the **2-SWITCH™**.



The **3 fluidic ports** are located at the front face of the device. The **common port is the central one**. When looking at the front of the **2-SWITCH™**, one can see the **LED indicators**, 2 points to indicate the **port number 2** and a single point to indicate the **port number 1**.

1 Position switch button	4 Central common port
2 Blue LED for position 1	5 Port number 2
3 Port number 1	6 White LED for position 2

Two **LED indicators** on the front show the **current position** of the **2-SWITCH™**.

A **blue LED for position 1** linking the common port to **port #1**.
A **white LED for position 2** linking the common port to **port #2**.

The top of the **2-SWITCH™** also includes a **push button** to **manually switch** between **position 1** and **position 2**.

Connection and Features

Back of the **2-SWITCH™**.





A **RJ45 cable** connects the **2-SWITCH™** to the **SWITCHBOARD**. Plug the cable into a dedicated port on the SWITCHBOARD (**blue cable** should be plugged in **blue port**).

FLUIGENT recommends to **only use the cables provided** with the ESS™.

The **bottom** and the **top faces** of the **2-SWITCH™** are **complementary**: two or more **2-SWITCHes™** can be **assembled together** by inserting the top face of one 2-SWITCH™ into the bottom face of another one. A **magnet holds** the two 2-SWITCH™ together.







FLUIDIC CONNECTIONS

P/N *CTQ-KIT-2SW2*



The **2-SWITCH™** has **3 fluidic ports**, described as “Common port”, “Port #1” and “Port #2”.

Common characteristics of the 3 ports are:

- Thread-size: ¼-28
- Flat-bottom type (FB).
- Tubing compatibility: 1/16’’ external diameter (1/16’’ OD).

Fluigent provides the following contents:



12 * Flat bottom ferrules 1/16''



2 * Plug Delrin® - ¼-28 Flat Bottom



6 * ¼-28 connectors for 1/16’’ OD tubing



2m of FEP tubing: 1/16’’OD and 0.010’’ID

NB: There is a wide variety of materials and internal diameters available with 1/16’’ tubing from fittings suppliers to suit ones application.

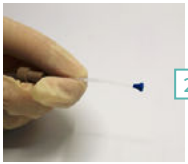
These fittings have been specifically selected by FLUIGENT to ensure good 2-SWITCH™ operation. FLUIGENT advises you to use only these fittings on the **2-SWITCH™**. Please note that only tubing of 1/16’’ external diameter should be used with the 2-SWITCH™. Use of other tubing sizes with or without tubing sleeves, can damage the 2-SWITCH™ and (or) leak.

How to connect fluidic tubing

1. Cut the 1/16" OD tubing to the desired length, leaving a square-cut face.



2. Slide the ¼ -28 fitting over the tubing, with the thread facing outwards. Slip the ferrule over the tubing, with the tapered portion of the ferrule facing the fitting.



3. The connectors and ferrules are specifically designed to work together. Use the provided ferrules and nuts together.



4. Insert the assembly into the receiving port, and while holding the tubing firmly against the bottom of the port, tighten the connector.



5. To check the tightness of the connection, you may pull gently on the tubing and verify that it remains secure.



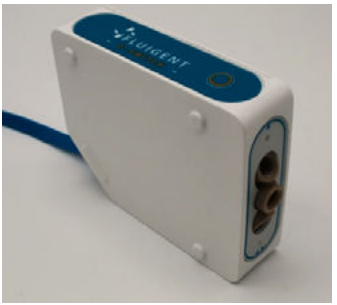
Positioning

There are several ways to position the **2-SWITCH™**.

The 2-SWITCH™ can be used in **any spatial configuration**.



Vertically



Horizontally



Stacked



On side

M-SWITCH™ VALVE

The **M-SWITCH™** is an **11-port / 10-position** valve. This means that eleven (11) ports can be connected with tubing, such that it is possible to choose between ten (10) individual positions linking one of the ten (10) external ports to the central port of the valve.



Fluidic principles

Fluidic rotary switch

The fluid paths of the **M-SWITCH™** are shown below. In yellow is the **common port at the centre** of the M-SWITCH™. The **numbered ports** are the **external ports**. The central port can be **connected to any of the external port**, from port #1 to port #10 depending on the **chosen position** (respectively from position 1 to position 10).



Position 1

On the left, the valve is in position 1, the central port is connected to the external port #1.

On the right, the valve is in position 4.



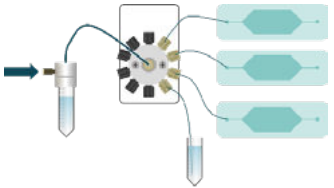
Position 4

Note: When the M-SWITCH™ is not powered the last actuated position is there it will be.

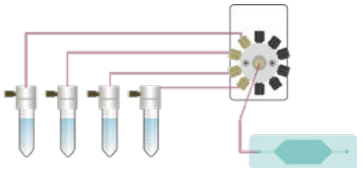
Bidirectional

The **M-SWITCH™** is a **bidirectional valve**. The fluid can flow inside the M-SWITCH™ in **both directions**. This feature plus the rotary capabilities allow different ways of use.

Distributor mode: fluid flows from the central port to one external port (according to the selected position). One has the possibility to inject solutions into up to 10 chips or reservoirs.



Selector mode: Fluid flows from one of the external ports (according to the selected position) to the central port. One can select and deliver a solution from ten reservoirs sequentially.



Unused ports must be **closed with plugs** (provided within the connection kit). It is possible to use a plugged position to close a fluidic path.

Product overview

Description

Photo of the **M-SWITCH™**.



1 Rotary valve head

2 RJ47 cable

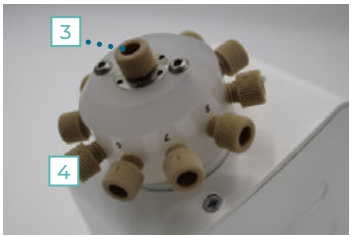
3 Common port

4 External port (1 to 10)

The connection ports are located on the head of the valve. **10 external ports** are placed radially, and the **common central port** is located vertically at the center of the head. To connect tubing, **standard flangeless connectors** are required.







Connection and Features

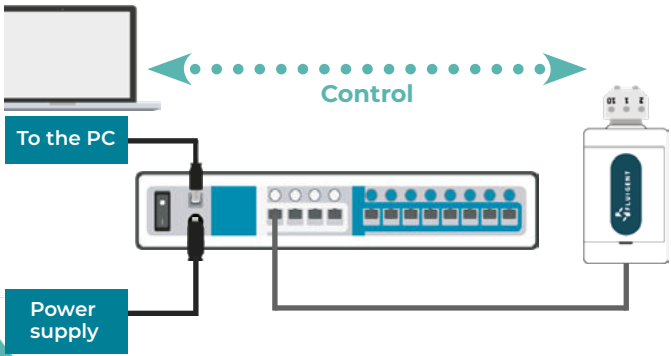
The rear of the **M-SWITCH™**.



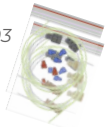


An **RJ45 cable** connects the **M-SWITCH™** to the **SWITCHBOARD**. Plug the cable into dedicated port on the SWITCHBOARD (**white cable** should be plugged in **white port**).

Only use the cables provided with the ESS™ for ESS™ operation.



P/N *CTQ-KIT-ESSMSW003*



FLUIDIC CONNECTIONS

The **M-SWITCH™** has **11 fluidic ports**, described as “Common port”, and “Port #1” to “Port #10”.

The characteristics of the ports are:

- Thread-size: ¼-28
- Flat-bottom type (FB).
- Tubing compatibility: 1/16’’ external diameter (1/16’’ OD).

Fluigent provides the following contents:



20 * Flat bottom ferrules 1/16''



11 * Plug Delrin® - ¼-28 Flat Bottom



11 * ¼-28 connectors for 1/16’’ OD tubing



2.5 m of FEP tubing: 1/16’’OD (500µm ID)

NB: There is a wide variety of materials and internal diameters available with 1/16’’ tubing from fittings suppliers to suit ones application.

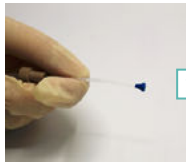
We advises you to use only these fittings on the **M-SWITCH™**. Only tubings of 1/16’’ external diameter should be used with the M-SWITCH™.

How to connect fluidic tubing

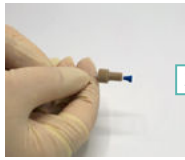
1. Cut the 1/16" OD tubing to the desired length, leaving a square-cut face.



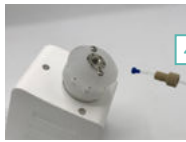
2. Slide the ¼ -28 fitting over the tubing, with the thread facing outwards. Slip the ferrule over the tubing, with the tapered portion of the ferrule facing the fitting.



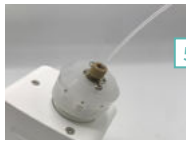
3. Only use the provided ferrules together with the provided nuts.



4. Insert the assembly into the receiving port, and while holding the tubing firmly against the bottom of the port, tighten the connector.



5. To check the tightness of your connection, you may pull gently on the tubing and verify that it remains secure.



Positioning

The **M-SWITCH™**is lested in order to have the best stability when placed on a surface. The M-SWITCH™ can be used in **standing position or horizontally** as long as it is stable.



Horizontally



Standing

L-SWITCH™ VALVE

The **L-SWITCH™** is a **6-port / 2-position, bidirectional** valve for **injection or switching different fluids**. The switch position and timing may also be automated using Fluigent **OxyGEN** software.



Fluidic principles

Fluidic switching mode

The fluid paths of the **L-SWITCH™** are shown below. The valve can either be in **position 1** or in **position 2**.



Position 1

Connected together are:

- port #1 with port #6
- port #5 with port #4
- port #3 with port #2

Switch



Position 2

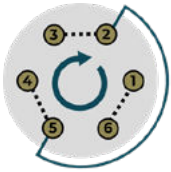
Connected together are:

- port #1 with port #2
- port #3 with port #4
- port #5 with port #6

Fluidic injection mode

It is possible to use the **L-SWITCH™** with a **sample loop**. In this configuration, **position 1** of the L-SWITCH™ becomes a **load position**, and the **position 2** is an inject position. In this mode, the L-SWITCH™ enables to **inject a precise volume of fluid**, corresponding to the sample loop size

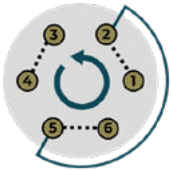
Load sample position



Sample loop

Position 1

Inject position



Sample loop

Position 2

Unused ports should be **closed with plugs** (provided within the connection kit). It is possible to use a plugged position to close a fluidic path.

Product overview

Description

Photo of the **L-SWITCH™**.



1 Valve head

2 Gripping pad

3 Ram holding ports

4 Fluidic port 10-32

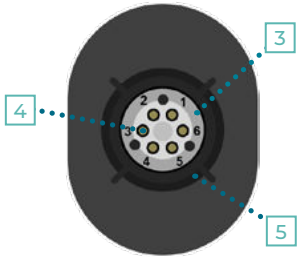
5 Spanner

The 6 connection ports are located on the head of the valve. To connect fluidic tubing, one must use **PEEK fingertight connectors** 10-32.

The head of the L-SWITCH™ is made up of the **Ram** which holds the fluidics ports and a **Spanner**.







Connection and Features

A **RJ45 cable** allows for connection between the **M-SWITCH™** and the **SWITCHBOARD**. Connect the cable into dedicated port on the SWITCHBOARD (**white cable** should be plugged in **white port**).

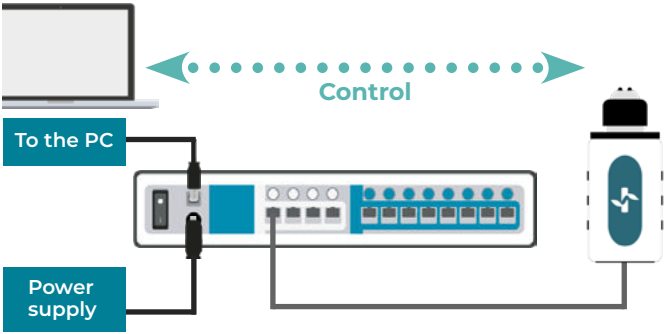




A. The **orange LED** lights up when the **valve is powered**.

B. The **green LED** lights up if a "*connection check*" has been requested by the **SWITCHBOARD**.

Only use the cables provided with the ESS™ for operation.



FLUIDIC CONNECTIONS

P/N *CTQ-KIT-LSW*



The **L-SWITCH™** has **6 fluidic ports**, and has **2 positions**.

The characteristics of all ports are:

- Thread-size: 10-32
- Tubing compatibility: 1/16'' external diameter (1/16'' OD).

To get started, Fluigent provides the following contents:



7 * 10-32 Coned fingertight fittings 1/16'' OD



2 * 10-32 Delrin® Coned blue plug



1 * 10-32 to Female Luer connector



1 m of FEP tubing: 1/16''OD (0.20'' ID)

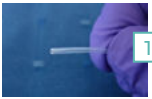
NB: There is a wide variety of materials and internal diameters available with 1/16'' tubing from fittings suppliers to suit ones application.

Only use these fittings on the L-SWITCH™. When the L-SWITCH™ is **not used or stored**, **cover the L-SWITCH™** with the **red cap provided** to protect the fluidic ports from dust.

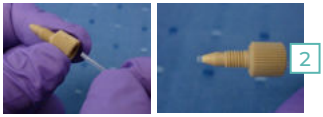


How to connect fluidic tubing

1. Cut the 1/16" OD tubing to the desired length, leaving a square-cut face.



2. Insert the tubing into a nut until it passes 1.5 - 3mm

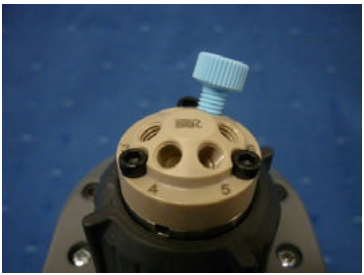


3. Insert into a port of L-SWITCH™, twist until it is tightened. You can pull gently the tubing to verify that it is securely connected to the port.



Connecting a plug to the valve

Before using the **L-SWITCH™**, if there are still **open ports** after connecting tubing, these should be **closed using the blue plugs provided**.



Connecting a sample loop

In order to connect a **sample loop** to the **L-SWITCH™**, one will need two nuts and two ferrules, in addition to the sample loop itself (nuts and ferrules are provided with the sample loop).



There is a **large selection of sample loops** of different volumes. Please contact us at contact@fluigent.com for more information.

1. Pass one end of the sample loop through a nut



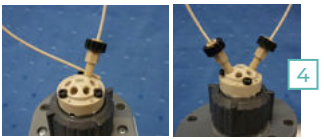
2. Add a ferrule



3. Hold the set together and insert it into a port of the L-SWITCH™ (for example port 1 here)



4. Twist until the set is tightened. One can pull gently the sample loop to verify that it is securely connected



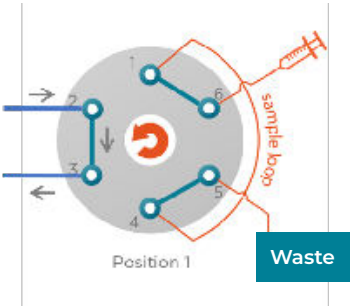
Repeat the steps to connect the sample loop end into another port

Using the sample loop

A sample loop is used to inject a precise volume of liquid.

In this example, the fluid circuit enters from the port 2 and exits from the port 3.

In **position 1**, the sample can be **loaded into the loop**. Extra liquid will go into the waste. We suggest **slightly over-filling** the loop to ensure that the same volume is injected every time.



Switch position

In **position 2**, the loaded sample can be **injected** into the microfluidic set-up.



Connecting a syringe injector to the valve

Syringes are often used to **load a sample loop** (See the previous example p.32)

To do so, one needs to use the **adaptor** provided to connect a syringe needle to the **L-SWITCH™**

1. Unscrew the adaptor set to separate the nut from the adaptor

1



2. Insert 1/16'' OD tubing into the nut and screw together the nut and adaptor

2



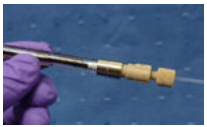
3. Insert the adaptor set into the syringe and twist to tighten securely

3



4. Here are two examples of connected syringe

4





5. Connect the other end of the tubing to the L-SWITCH™ with a nut

5



Positioning

There are several possibilities to set the **L-SWITCH™** up. The L-SWITCH™ can be **used in any spatial configuration**.



Horizontally



Vertically





Other possibilities

The ¼-20'' insert on the bottom face of the L-SWITCH™ can be used to mount the L-SWITCH™ on a frame or other support with ¼-20'' pins.

SWITCHBOARD

The **SWITCHBOARD** is needed to operate the ESS™. This device hosts up to **four (4) M-SWITCH™** or **L-SWITCH™** and **eight (8) 2-SWITCH™** and provides them power and connectivity/control to the PC and software.

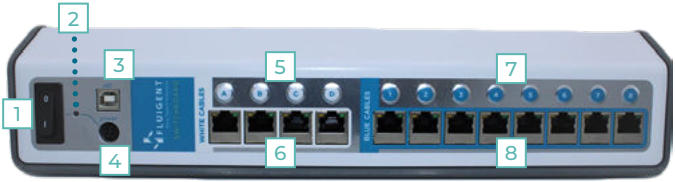
The ESS™ are compatible with the **OxyGEN software**.

To download it, visit the Fluigent website.



PRODUCT OVERVIEW

Photo of the **SWITCHBOARD**.



1 ON/OFF power switch	5 Connection check button for M/L-SWITCH™
2 Power LED	6 Ports A to D for M/L-SWITCH™ only
3 USB port	7 Connection check button for 2-SWITCH™
4 Power supply socket	8 Ports 1 to 8 for 2-SWITCH™ only

Description

Power switch on the "O" : power OFF
Power switch on the "O" : power ON

A **green indicator** (power LED) lights up when the SWITCHBOARD is powered. A **USB port** (type B) links the SWITCHBOARD to a computer for **software control**. It is labeled “usb” on the front panel of the SWITCHBOARD.

Below the USB port is the **power supply socket** to connect the SWITCHBOARD to electrical power. It is labeled “power” on the front panel of the SWITCHBOARD

Then there are **two groups of RJ45 ports**:

- A first group of four RJ45 ports (Port A to Port D), called “White cables” to connect up to **four (4) M-SWITCH™ or L-SWITCH™**
- A second group of eight RJ45 ports (Port 1 to Port 8), called “Blue cables” to connect up to **eight (8) 2-SWITCH™**

Two light indicators are associated with each RJ45 ports:

- The orange indicator lights up when an M-SWITCH™, an L-SWITCH™ or a 2-SWITCH™ is connected to the port.
- The green indicator lights up if a “Check connection” identification has been requested for the device connected to the port from the corresponding Check connection push button on the SWITCHBOARD or from the OxyGEN software (cf. OxyGEN User Manual).

Connection

Power supply connection

1. The ON/OFF power switch must be on position "O" (OFF).



2. Connect the plug of the power supply provided with the ESS™ into the socket on the front of the SWITCHBOARD labeled “power”. The flat side of the power supply plug must face upwards to connect the socket to the SWITCHBOARD.



3. One can now actuate the ON/OFF power switch to turn the SWITCHBOARD ON and OFF.



Only use the power supply provided with the ESS™.

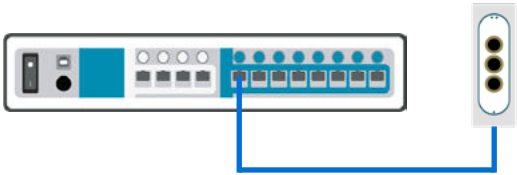
CONNECTION TO PC



Connect the type B plug of the USB cable provided with the ESS™ into the type B USB port on the front of the **SWITCHBOARD** labeled “USB”. Connect the other end of the USB cable (type A standard plug) to the computer where the **OxyGEN software** is installed.

2-SWITCH™ CONNECTION

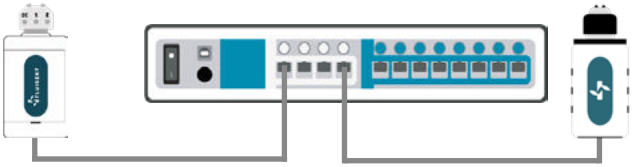
To connect a 2-SWITCH™ to the SWITCHBOARD, plug the end of the blue RJ45 cable to one of the eight (8) 2-SWITCH™ RJ45 ports on the SWITCHBOARD. When the SWITCHBOARD is powered ON the orange indicators of the linked RJ45 ports on the SWITCHBOARD and the 2-SWITCH™ LED light up, indicating a good connection.



Check connection feature: To check the communication between the 2-SWITCH™ and the SWITCHBOARD, push the button located above the used RJ45 port on the SWITCHBOARD. If the communication is good, the green indicators of the linked RJ45 ports on the SWITCHBOARD and the 2-SWITCH™ light up while the push button is pressed. This is also a tool to identify RJ45 ports that are linked on the SWITCHBOARD and a 2-SWITCH™.

M-SWITCH™ AND L-SWITCH™ CONNECTION

To connect a M-SWITCH™ or L-SWITCH™ to the SWITCHBOARD, plug the end of the white RJ45 cable to one of the four (4) L/M-SWITCH™ RJ45 ports on the SWITCHBOARD. When the SWITCHBOARD is powered ON the orange indicators of the linked RJ45 ports on the SWITCHBOARD and the L/M-SWITCH™ LED light up, indicating a good connection.



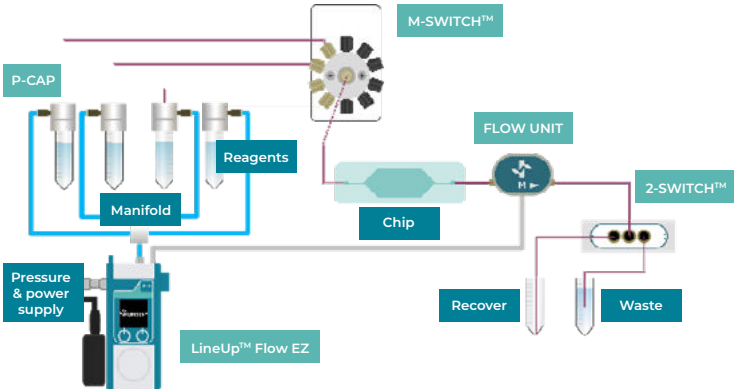
Check connection feature: To check the communication between the L/M-SWITCH™ and the SWITCHBOARD, push the button located above the used RJ45 port on the SWITCHBOARD. If the communication is good, the green indicators of the linked RJ45 ports on the SWITCHBOARD and the L/M-SWITCH™ light up while the push button is pressed. This is also a tool to identify RJ45 ports that are linked on the SWITCHBOARD and a L/M-SWITCH™.

Connect the **M-SWITCH™** and the **L-SWITCH™** to RJ45 to ports located in the 'White cable' SWITCHBOARD section (A to D) and connect the **2-SWITCH™** RJ45 to ports located in the 'Blue cable' SWITCHBOARD section (1 to 8) on the SWITCHBOARD. If one connects a **valve to a wrong port**, it can **damage the ESS™ devices**.

FLUIDIC CIRCUIT EXAMPLES

SEQUENTIAL INJECTION

In this application example, **up to 10 liquids** (4 on the schematic) are **selected sequentially** to be delivered to the chip by the **M-SWITCH™**. The samples at the outlet of the chip may also be **sorted** by using a **2-SWITCH™** either into a collection tube or to waste. Each step can be **automated** or **live controlled** using **OxyGEN** software.

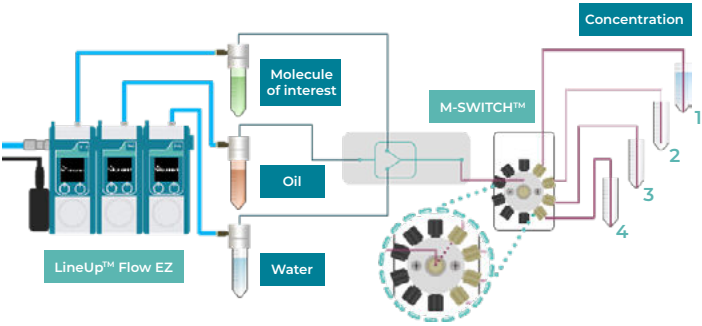


This type of set-up can be used for applications including:

- **Cell analysis**
- **Cell lysis and DNA extraction** (for PCR or NGS analysis)
- **Drug testing**
- **Calibration curve generation**

Sample generation and collection

In this application example, **different concentrations** of the molecule of interest are combined into **water in oil droplets**. These droplets are then **sorted** at the outlet of the chip using the M-SWITCH™.

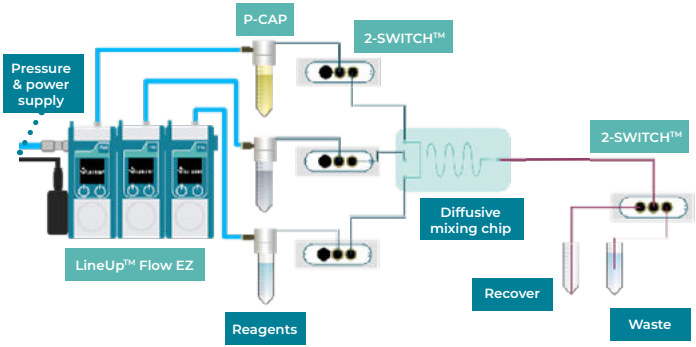


This type of configuration can be applied to applications such as:

- **Droplet generation**
- **Concentration dosage**
- **Sample preparation**

SAMPLE PREPARATION

Several samples are **injected simultaneously or separately** within a **Y-shaped chip** by changing the position of the three **2-SWITCH™** placed at the chip inlets. The **mix by diffusion** and the samples at the outlet are then **sorted** by a fourth **2-SWITCH™**. Each step can be **automated** or **live controlled and monitored** using **OxyGEN** software.

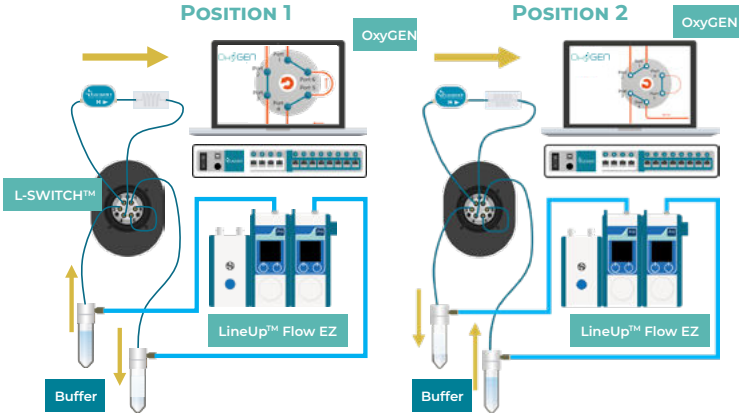


This type of set-up suits for applications such as:

- **Chemical mixing reactions**
- **Stoichiometry studies**

Fluid recirculation

The **L-SWITCH™** can be used when a small volume of buffer can be **recirculated** within a closed loop into the chip for **several hours or days**. Combined with the **LineUp™** pressure regulation it can achieve **highly stable flow** with a **positive impact** on the **shear stress**. The **OxyGEN software** allows one to switch the valve position and the pressurized reservoir so that the **flow is maintained unidirectionally** without being stopped except for the brief period of the switching time.

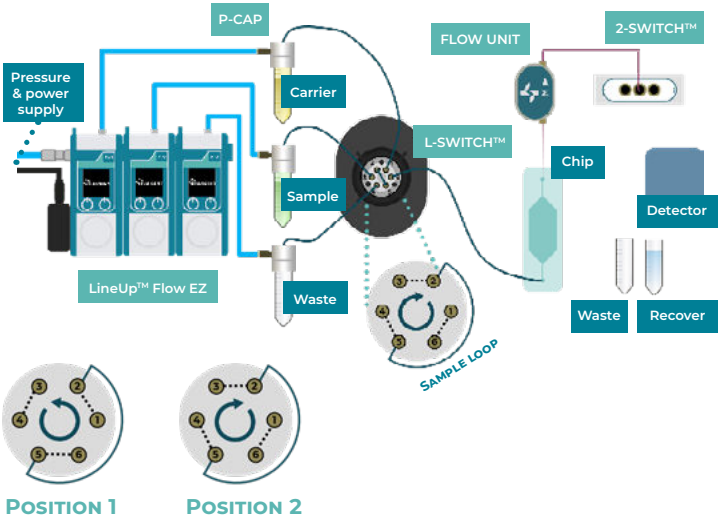


This type of set-up suits applications such as:

- **Cell culture**
- **Shear-stress control**

Accurate volume injection

Sample from the reservoir is **loaded into a "sample loop"** between two outlets of the **L-SWITCH™** while carrier buffer is directly injected into the chip. When the **L-SWITCH™** position is switched the **sample loop volume** is injected into the chip along with carrier buffer. The sample is then **sorted** by the **2-SWITCH™** at the outlet of the chip.



This can be used for applications with small amounts of sample with minimum waste.

CLEANING PROTOCOL

General handling

The following section describes the steps to perform the cleaning of Fluigent microfluidic valves **(2-SWITCH, L-SWITCH and M-Switch**) depending on your application.

This protocol should be performed **daily**.

Following these cleaning procedures is essential to **maintain the device's precision** and **achieve optimum results**.

GENERAL RECOMMENDATIONS

- Use **clean tubing** upstream of the valve to clean. This procedure can also be used to clean the tubing if they are reused for extended periods of time.
- Use tubing that have a **smaller iner diameter** (ID) than the microfluidic valve to clean. This will ensure that no clogging occurs due to unfiltered particles, as tubing can be cut or replaced.

MANDATORY PRACTICES

- **Always clean** the valve **between experiments** or at the **end of each day**.
- **Always filter the solutions used,** including the cleaning solutions with proper filters and with the appropriate solvent compatibility.
- **Never** let a **solution dry in a valve.**

DAILY PROTOCOL FOR BIOLOGICAL APPLICATIONS

6 steps

1. Filter your solutions.
2. Rince each port of your valve with your **buffer** for **1 min**
3. Wash each port with a **detergent** for **10 min**. For biological applications, we recommend using **Tergazyme**.
4. Wash each port of the system with **DI Water** for **5 min**.
5. Wash each port with **Isopropanol** for **5 min**.
6. Flush **air** at **maximum pressure** for **5 min** to dry the system.

Make sure to clean every port of the valve that was used during the experiment. Repeat each cleaning step for each channel.

DAILY PROTOCOL FOR OTHER APPLICATIONS

(DROPLET, CHEMICAL...)

4 steps

1. Rince each port of your valve with your **buffer** for **1 min**
2. Wash each port of the system with **DI Water** for **5 min**.

Note: If working with oils, this step is unnecessary. Go to step 3 and wash your system directly with IPA or ethanol.

3. Wash each port with **Isopropanol** or **Ethanol** for **10 min**.
4. Flush **air** at **maximum pressure** for **5 min** to dry the system.

FREQUENTLY ASKED QUESTIONS

1 With a **fluidic "ON/OFF" switch configuration**, should I fill with liquid the plugged path inside the **2-SWITCH™** before screwing the plug?

If you are planning to use a 2-SWITCH™ as a fluidic ON/OFF switch, you will need to plug either port #1 or port #2 on the 2-SWITCH™.

As an example if you plug port #2, when in Position 2 the common port will be connected to the plug inside the 2-SWITCH™. As there is still some internal volume inside the 2-SWITCH™ (12µL per position), it is better to fill the 2-SWITCH™ in Position 2 with distilled water before connecting the plug to close the position.

This way, during the experiment when the valve is actuated in Position 2 to close a path, there will be minimal liquid displacement in the Position 2 internal volume, as it will have already been filled with liquid.

2 How can I make a junction between a **2-SWITCH™** and tubings with **external diameters different from 1/16"**?

The 2-SWITCH™ device can only be connected with 1/16" OD tubing and the provided fittings. There is a wide variety of materials and internal diameters available with 1/16" tubing to suit your application. However, if you have constraints on your fluidic setup that force you to use tubings of other external diameters than 1/16", a wide range of adaptors and unions are available from the fittings suppliers, to make a junction between your specific tubing and the 2-SWITCH™ tubing.

Please note that sleeves cannot be used directly in the 2-SWITCH™ fluidic ports (risks of trapping the smaller tubing and possible leakage).

3 How can I make a junction between an **M-SWITCH™** and tubings with **external diameters different from 1/16''**?

The M-SWITCH™ can only be connected with 1/16'' OD tubing. The same strategy as for the 2-SWITCH™ can be followed if it is needed to use tubing with other external diameters on the fluidic setup. Explained in the previous FAQ.

Please note that sleeves cannot be used directly in the M-SWITCH™ fluidic ports (risks of trapping the smaller tubing and possible leakage).

4 I do not remember **which device is connected to a SWITCHBOARD** RJ45 port. How could I determine it ?

To identify the linked SWITCHBOARD RJ45 ports and devices, you can use the "check connection feature" by pushing the corresponding check connection buttons on the SWITCHBOARD (one for each RJ45 port)

This will light up the green RJ45 indicators on the associated SWITCHBOARD RJ45 port and on the RJ45 port of the device connected to it.

Other methods are applicable if using Fluigent software.

TECHNICAL SPECIFICATIONS

2-SWITCH™



Pressure rating	Up to 5 bar	
Internal volume	28 µL	
Wetted materials	Fluidic housing : PEEK Seal: FFKM	Mineral oil compatible with EPDM
Response time	3 ms	
Dimensions	80 * 65 * 20 mm	
Weight	89 g	

M-SWITCH™



Pressure rating	Up to 7 bar (100 psi)
Internal volume	3,5 µL
Wetted material	CTFE,UHMW-PE
Response time	400 ms
Dimensions	60 * 110 * 110 mm
Weight	746 g

L-SWITCH™



Pressure rating	Up to 7 bar (100 psi)
Internal volume	660 nL
Wetted materials	PEEK
Response time	100 ms
Dimensions	70 * 90 * 150 mm
Weight	475 g

SWITCHBOARD



Input	24V	6.67 A	160 W max
Dimensions	343 * 99,4 * 58,4 mm		
Weight	1228 g		

SERVICING & WARRANTY

SCHEDULE

Component	Servicing interval
All system	Regular inspection for external damage / leaks
SWITCHBOARD	Regular inspection for external damage / leaks
2-SWITCH™	Regular inspection for external damage / leaks
M-SWITCH™	Regular inspection for external damage / leaks
L-SWITCH™	Regular inspection for external damage / leaks

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, it 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, abuse, alteration or customization, or repaired by unauthorized persons.

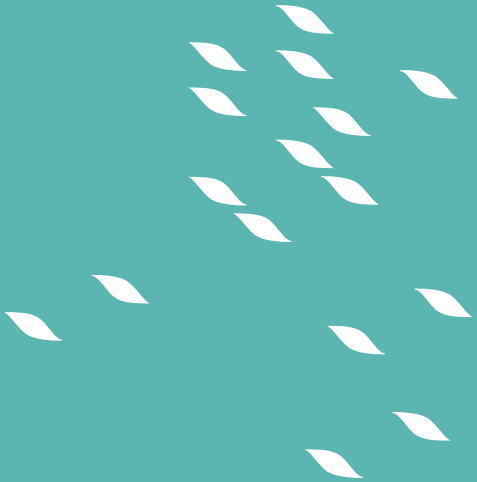
How to Get Service

Contact the Fluigent dealer 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. Remote repair will be tried, if more actions need to be taken, the system will need to be returned to the nearest Fluigent office (no shipping cost if under warranty).

Warranty Conditions

Never open the SWITCHBOARD, 2-SWITCH™, L-SWITCH™ and M-SWITCH™ devices.
Do not use other cables than cables provided by Fluigent.
Prevent foreign objects or liquids from entering the SWITCHBOARD.
Prevent foreign objects from entering the 2-SWITCH™, L-SWITCH™ and M-SWITCH™ devices.
Connect the power cord to an AC outlet of the correct voltage.
Use the right RJ45 port on the SWITCHBOARD with the right device.
Do not place the product in an unstable location, place the unit in a location with a level surface and a strong and stable support.
If you are using the ESS™ platform with other flow control systems, please check that the pressure in your fluidic system does not exceed 100 psi.
Respect the temperature compatibility (from 5°C to 50 °C).
Use the specific connectors provided by Fluigent (Teflon fittings and nuts for the 2-Switch™).
Only use 1/16'' OD tubing with the valves (each type).

For specific use, please contact our Support team at support@fluigent.com



VERSION
JUL. 2026

FLUIGENT