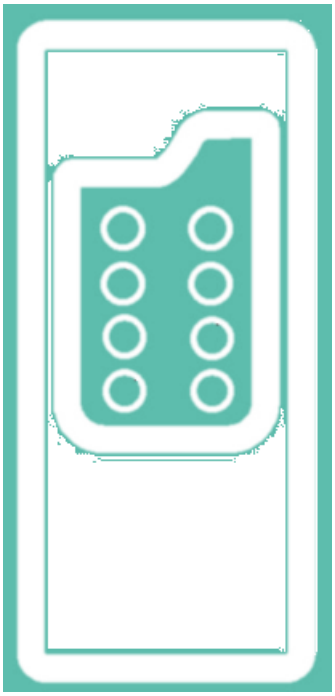
FLUIGENT LINEUP P-SWITCH Pneumatic Valve Controller User Manual

FLUIGENT

USER'S MANUAL
LINEUP™P-SWITCH



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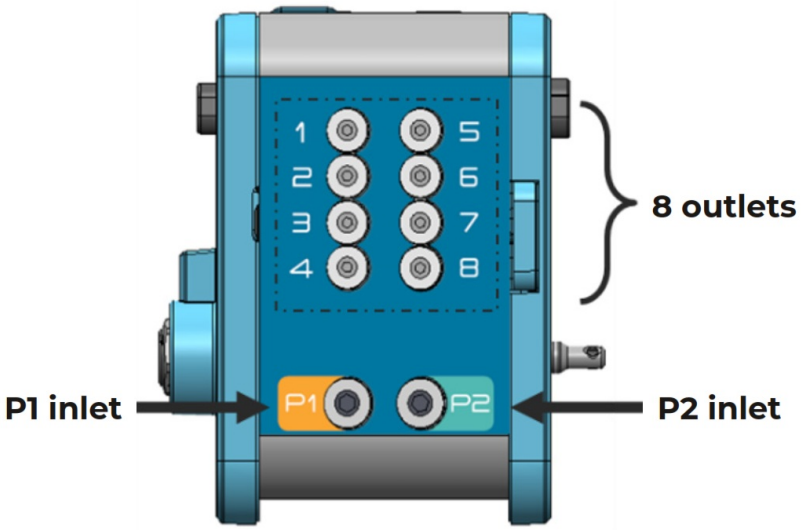
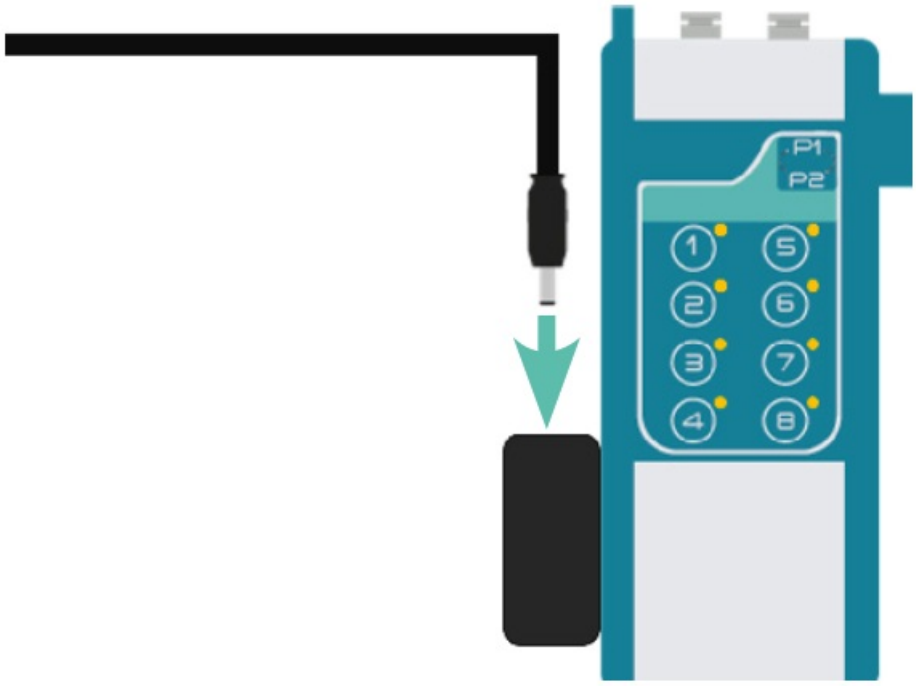
Contents

LINEUP P-SWITCH Pneumatic Valve Controller

The P-SWITCH is a LineUp Aria is a perfusion system that automates perfusion or timed injection protocols. It allows for the sequential delivery of up to 10 different solutions at the desired flow rate into a microfluidic chip, perfusion chamber or petri dish. TM module containing eight 3-port / 2-position solenoid valves. It can be used to actuate pneumatic or quake valves and to deliver different pressures or vacuum. It can be used to pressurize up to 8 reservoirs per module.



The LineUp P-SWITCH ™
allows one to switch 8 pressure outlets between two different supplied pressures P1 and P2. Those pressures are common to all the valves and can be dispensed within the range
-800 mbar to 2000 mbar.
Manual control
Power ON



Power ON the module using the LineUp Supply Kit and/or LINK module. Once done, the P-SWITCH LEDs will turn orange, and the default dispense pressure is set on P1.

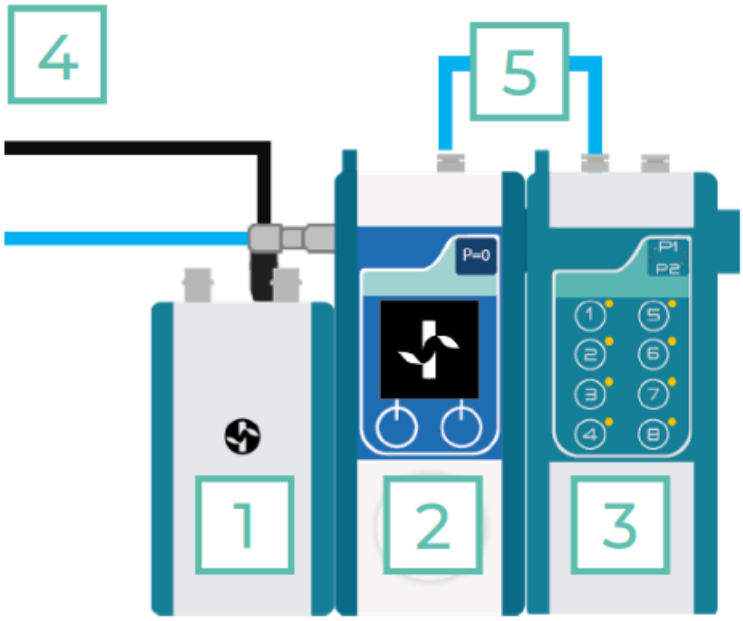
Pressure supply

The LineUp TM P-SWITCH requires pressure or vacuum supply to be used. Each inlet can be supplied with positive pressure up to 2000 bar, a vacuum down to -800 mbar. **Note:** If an inlet remains unsupplied, the atmospheric pressure will be dispensed through this one.

The LineUp P-SWITCH TM is designed to work with another LineUp module such as Push-Pull or Flow EZ TM to provide regulated pressure or vacuum. Provide supply to the pressure controllers and connect their outlets to the P-SWITCH inlets.

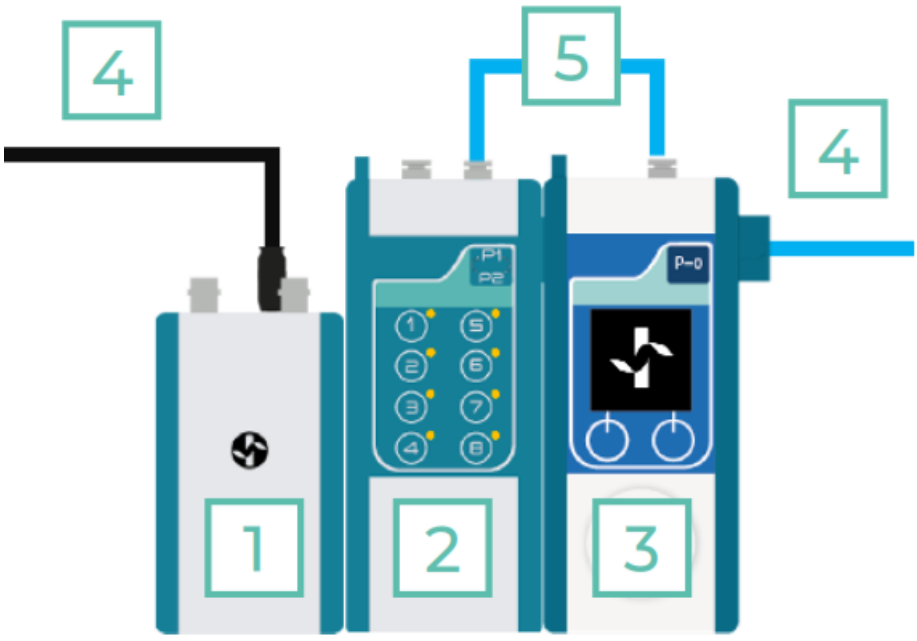
Configurations

1. LINK module
2. Flow EZ TM / Push-Pull
3. P-SWITCH
4. LineUp Supply Kit to the compressor
5. Supply P1 inlet from Flow EZ / Push-Pull



In the configuration above, the LineUp P-SWITCH TM allows one to switch between the P1 regulated pressure supplied by the Flow EZ TM or Push-Pull and the P2 atmospheric pressure.

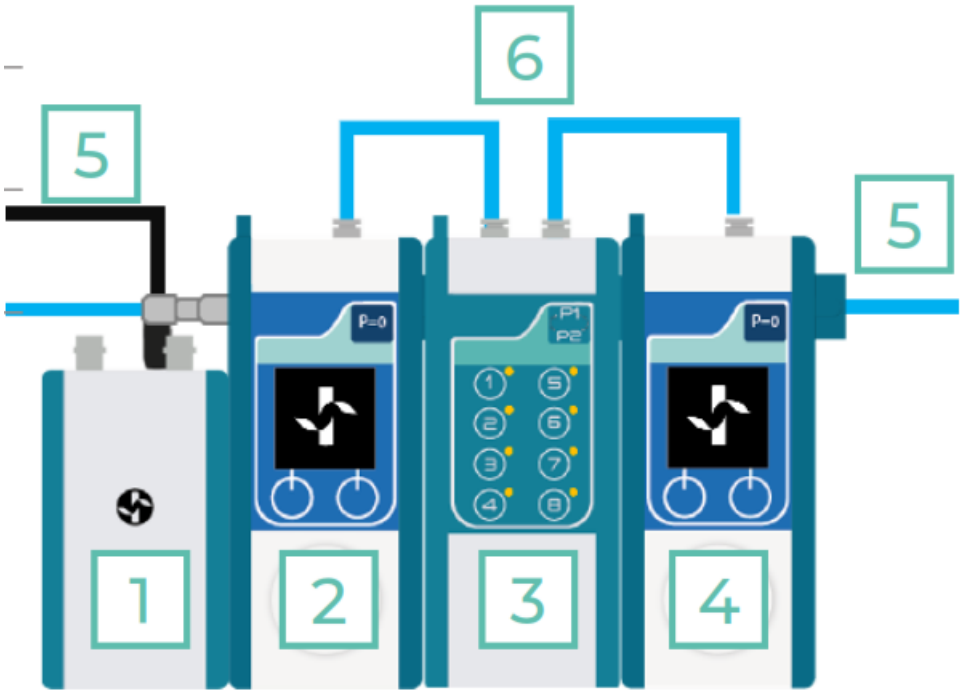
1. LINK module
2. P-SWITCH
3. Negative Flow EZ TM / Push-Pull
4. LineUp Supply Kit to a vacuum pump
5. Supply P2 inlet from Flow EZ neg / Push-Pull



In the configuration above, the LineUp P-SWITCH TM allows one to switch between the P2 vacuum supplied by the negative Flow EZ TM or Push-Pull and the P1 atmospheric pressure.

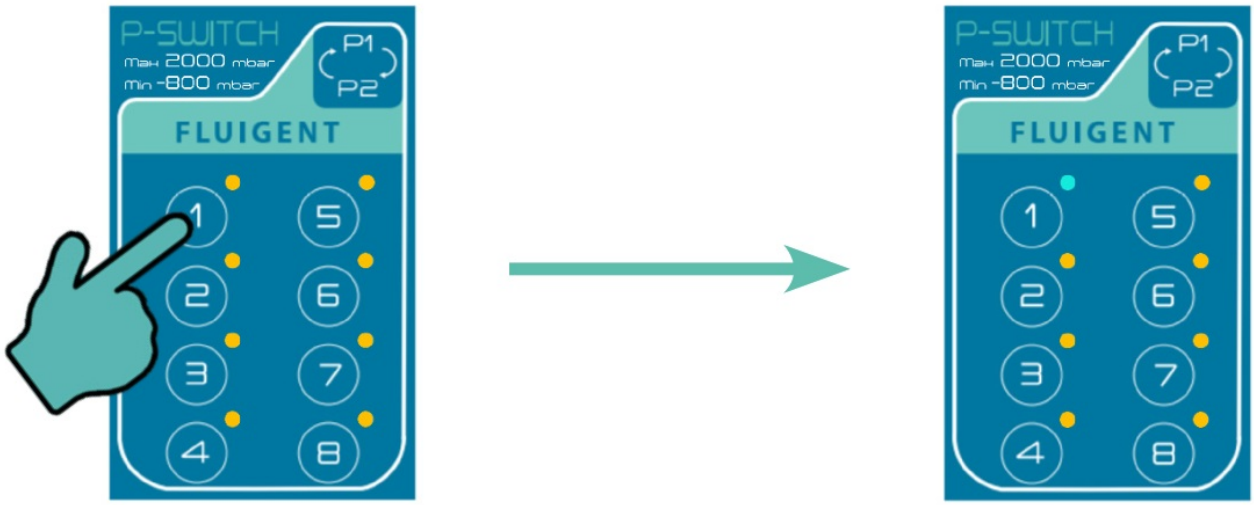
1. LINK module
2. Flow EZ TM / Push-Pull
3. P-SWITCH
4. Negative Flow EZ TM / Push-Pull

5. LineUp Supply Kit to the requested compressor
6. Supply P1 and P2 from Flow EZ / Push-Pull



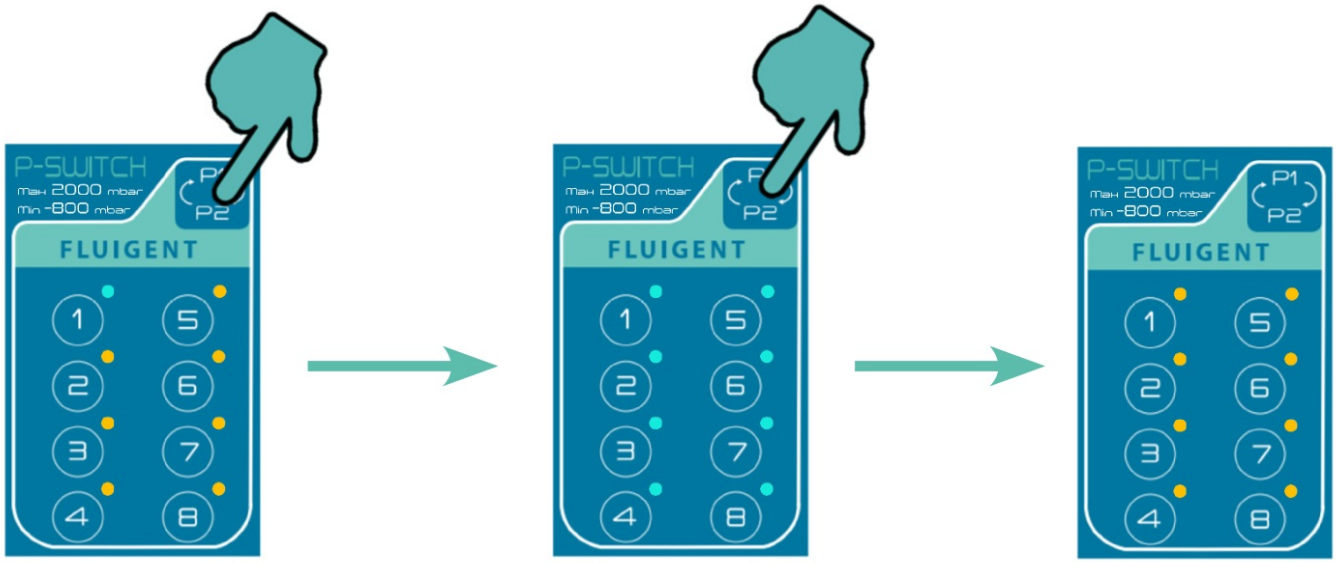
In the configuration above, the LineUp P-SWITCH TM allows one to switch between the P1 regulated pressure or the P2 vacuum both supplied by each Flow EZ TM or Push-Pull.

Switching valve position



To switch any valve position from P1 to P2 or P2 to P1, press the corresponding button of the valve. Once done, the led will change color either in orange or in blue to indicate the new current position. **Note:** Several valves can be actuated at the same time.

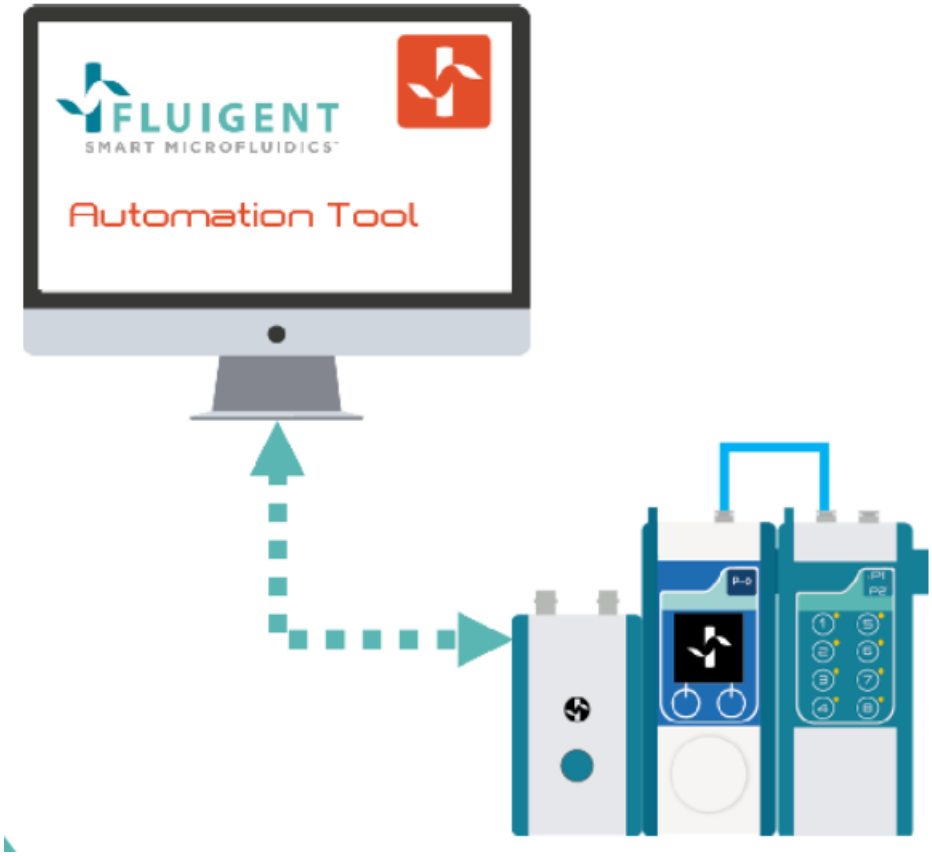
P1 to P2 button



By pressing the “P1 <-> P2” button, one can set every valve at the same time to the same position. By pressing it again, one can set every valve on the second position. (LEDs color indicates the supplied pressure)

Computer first ensure

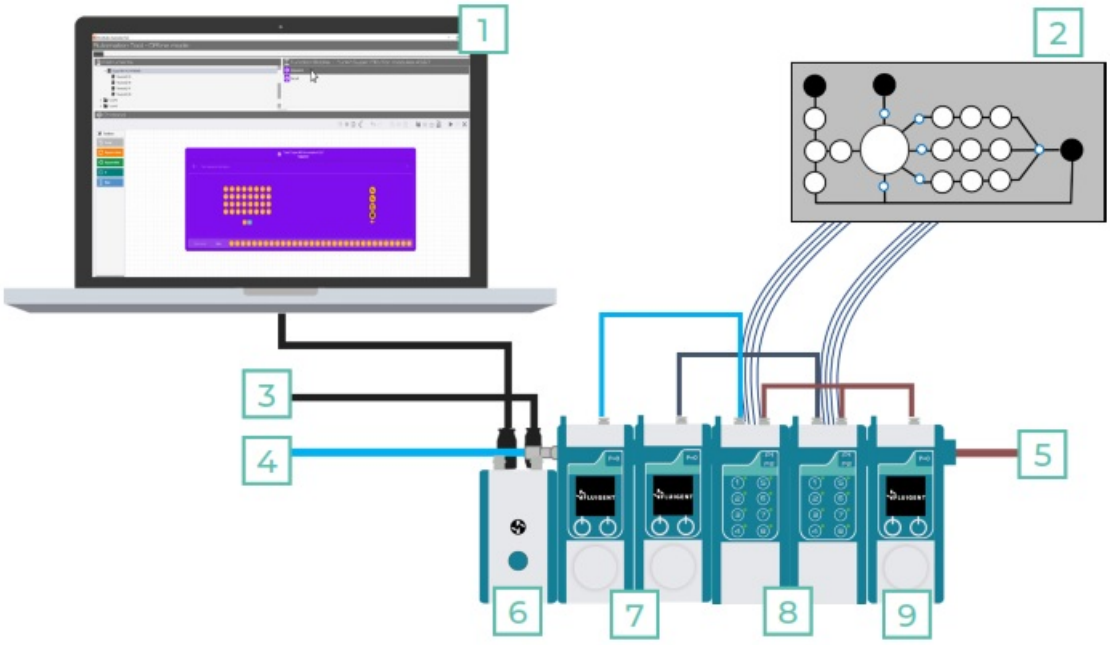
First of all, ensure the P-SWITCH is stacked to a LINK connected to the computer.
In addition to the local control, Fluigent newest software allows one to automate any protocol and easily program sequences of pressure steps.
Note: A cable is provided with the LINK to enable connection to PC.



To be compatible with the LineUp TM P-SWITCH, the LINK module version needs to be at least ver 1.06

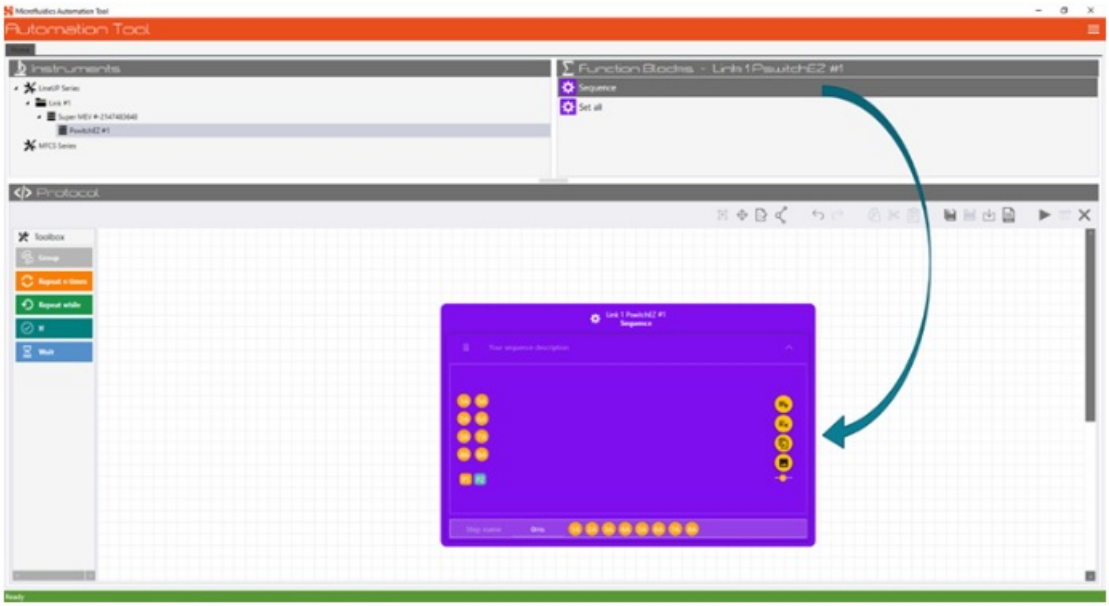
Microfluidic Automation Tool (MAT)

In this section will be presented the use of Fluigent Microfluidic Automation Tool (MAT) in order to automate LineUp TM P-SWITCH pressure steps.
For this example will be considered the following set-up

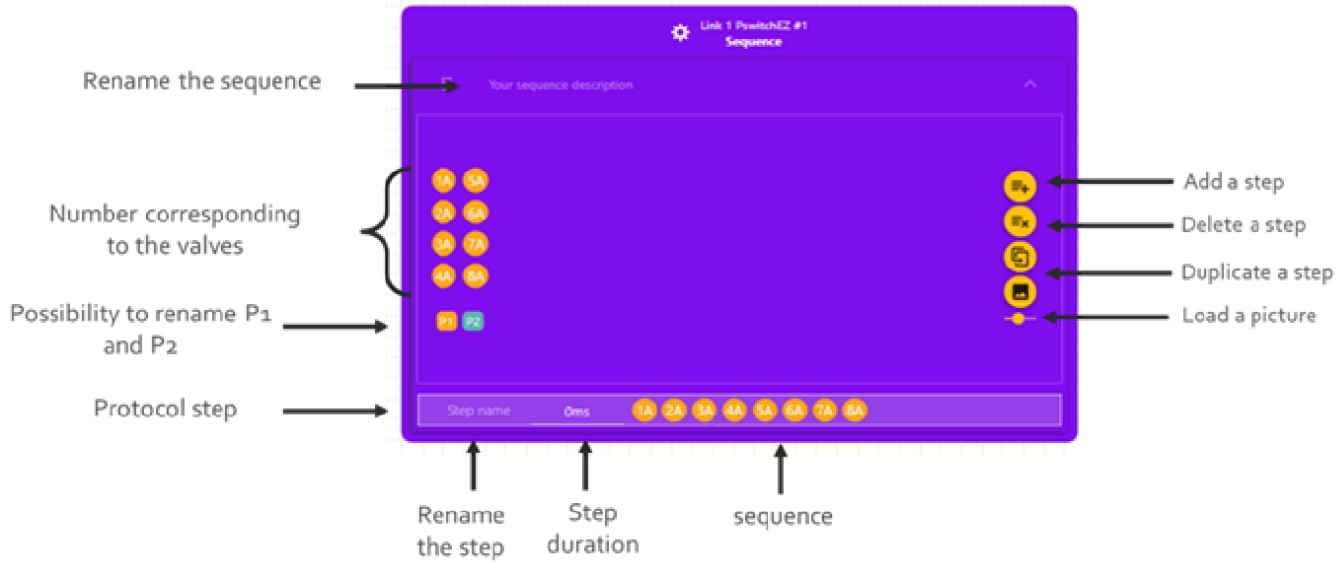


1 PC with MAT software 2 Flowstretch chip (CEA) 3 Power supply 4 Pressure supply 5 Vacuum supply	6 LINK module 7 2 * Flow EZ TM 8 2 * P-SWITCH (A and B) 9 Negative Flow EZ TM

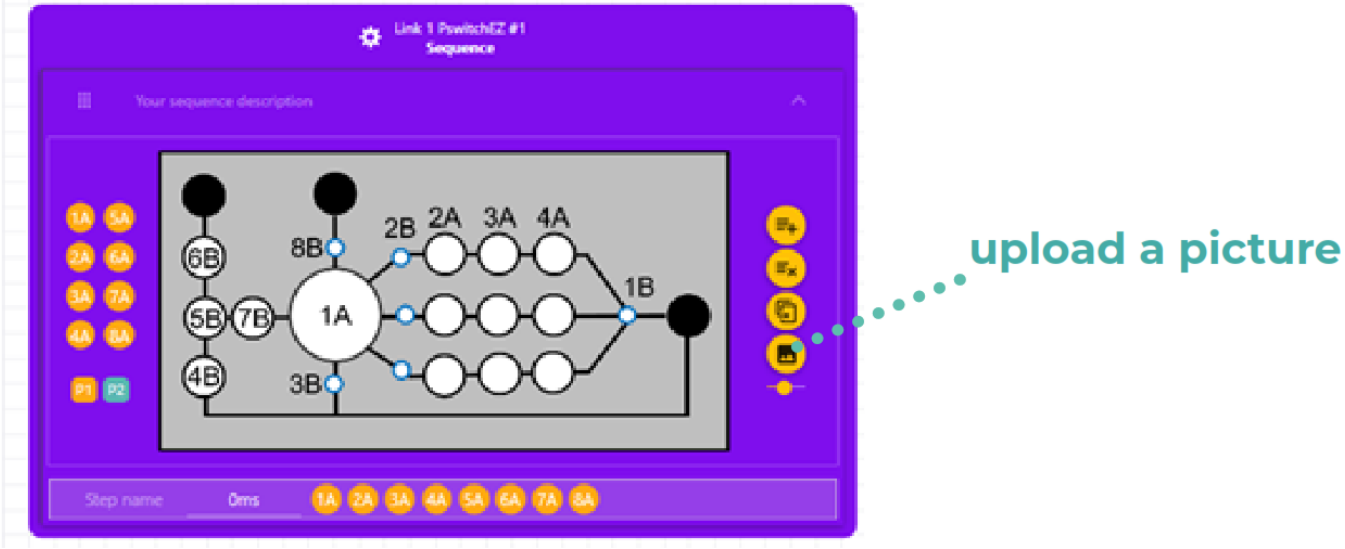
Step 1 Select the sequence block in the Function blocks section, then drag and drop it on the protocol section.



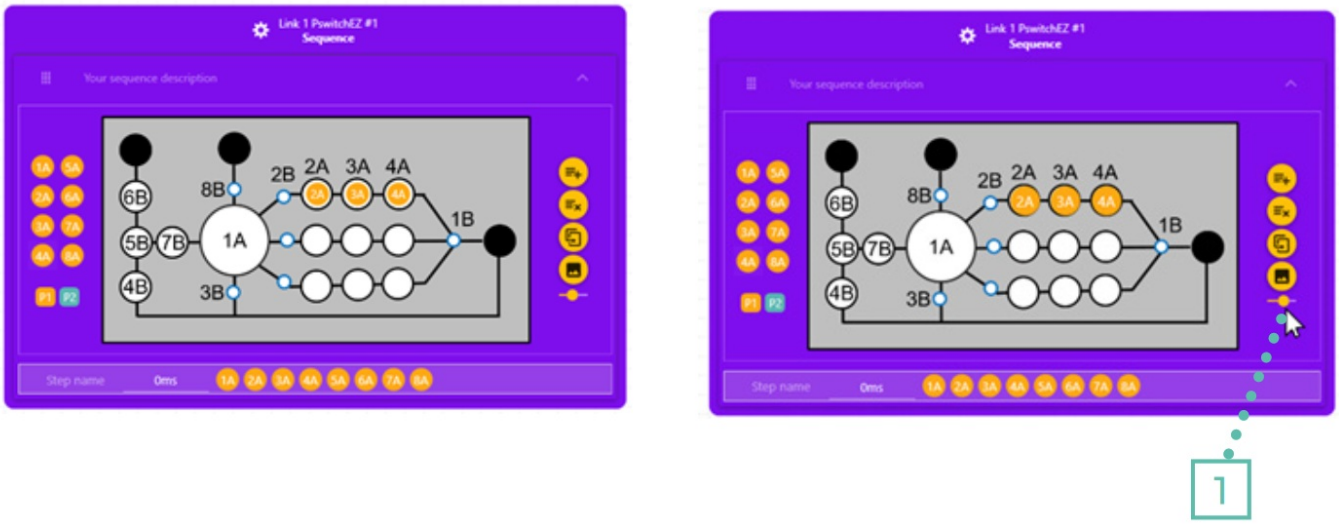
Block Description



Step 2 To create a sequence, first one can upload any picture from a directory as a guide to building the protocol. This picture is a reminder to know which part of the chip/microfluidic set-up is connected to which valve.

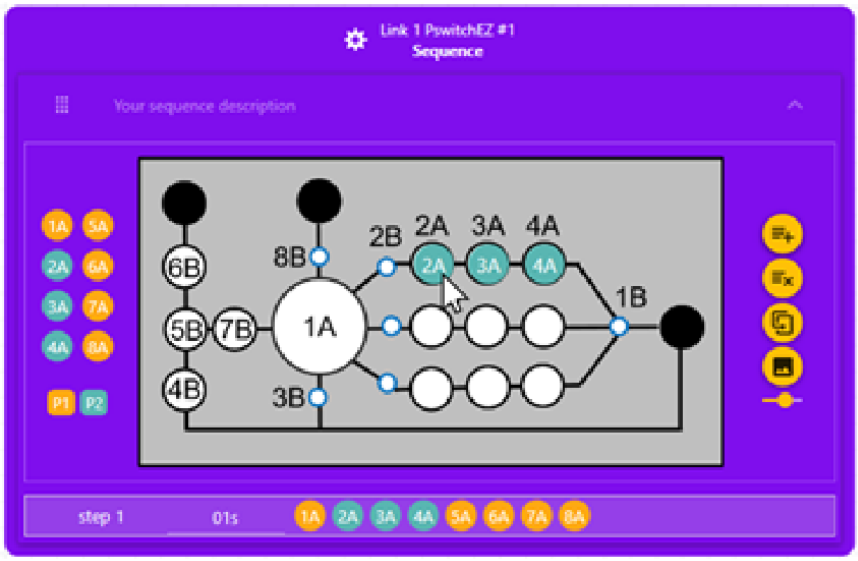


Step 3 Drag and drop the valve numbers on the picture. By using the slider (1) on the right one can resize the numbers.

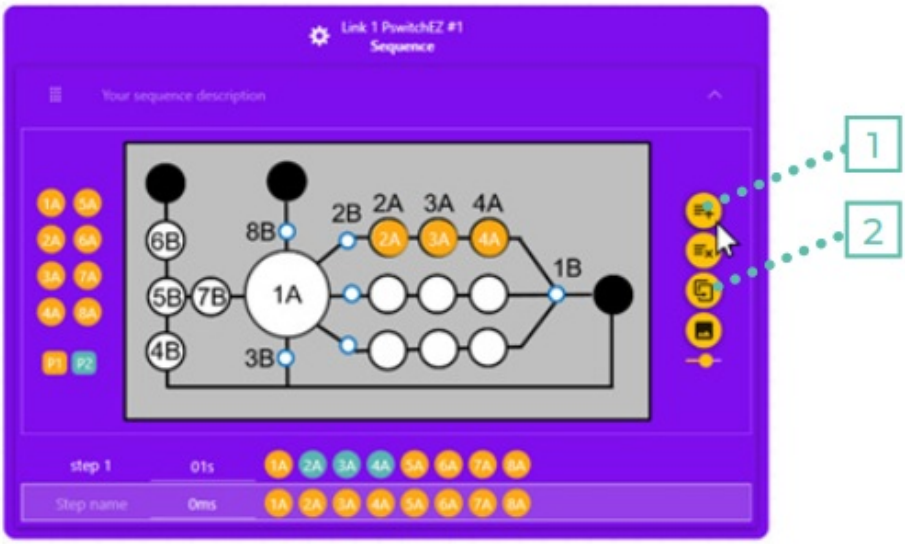


Step 4 Use the right click or double click to change the valve position and edit the step sequence. When the

valves are displayed in green, it corresponds to the pressure P2, on the contrary, if displayed in orange the pressure dispensed is P1. One can edit the step name and set a duration

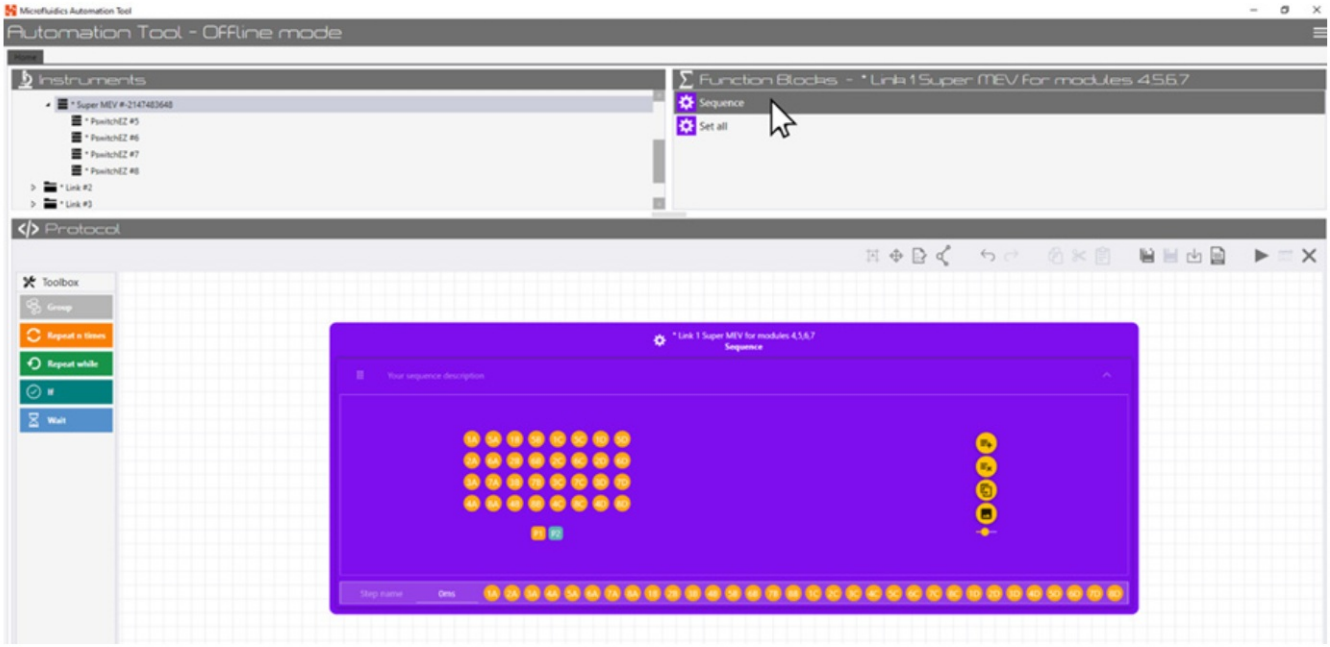


Step 5 To add a step, click on the “add step” button (1) or “duplicate step” button (2) on the right.



Create a sequence on several modules

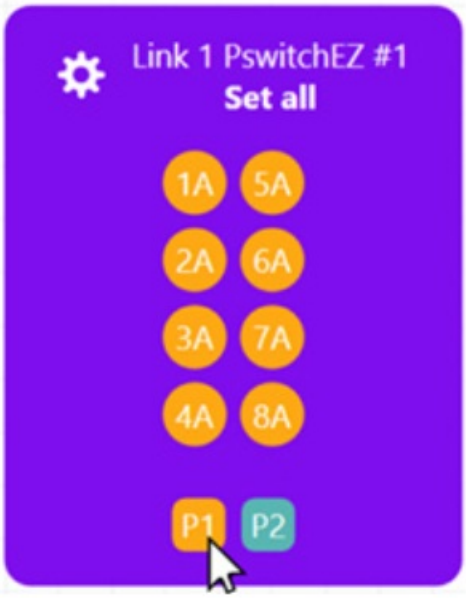
Click on “Super P-SWITCH”, then drag and drop the sequence. The block will adapt to the number of modules connected to the LINK.



Switch every valve at once

Use the “set all” block to switch every valve to the same position at once. Click on P1 to set every valve to P1 position and click on P2 to set every valve to P2 position.

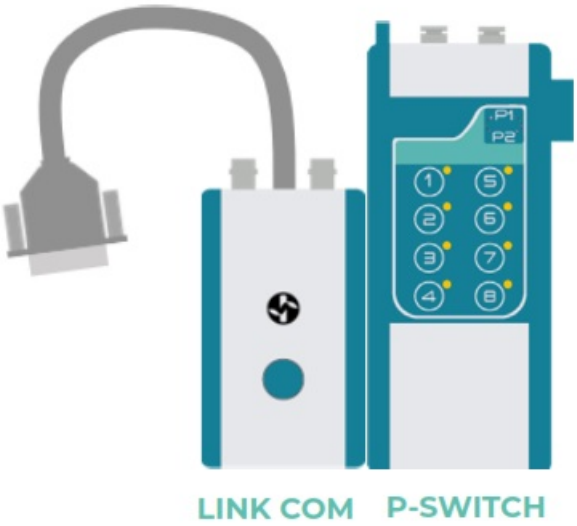
Note: Once a valve is set on a position, it will dispense the supplied pressure through the corresponding outlet.



Remote operation

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

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:

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 a 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 has multiple parameters returns 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 an error in the spelling of the command, the command is ignored by the instrument without the 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 TM will not work if there is a P-SWITCH at the index poled).
The following table describes the P-SWITCH remote command set:

Query	Data	Function / Response
SWEZ		
:X:READ:Y?	<pos>	Gives the state of the 8 valves of the P-Switch at index X on 8 bits, displayed as 2 hexadecimal code. Valve ON : position bit is 1 Valve OFF : position bit is 0. Examples : 00 : all valves are OFF 01 : only valve 1 is ON FF : all valves are ON F0 : only valves 5 to 8 are ON
:X:SET:<mask>:<value>		<mask> : ZZ (hexadecimal code, from 00 to FF). Sets the valve that will be allowed to be controlled 0 leaves the valve as is, 1 makes it switch to the corresponding bit of <value>. <value> : YY (hexadecimal code, from 00 to FF) Sets the valve to the value of the bit. 0 : valve OFF, 1 : valve ON.
:X:INVERT:<mask>		Inverts the state of the valves selected by the mask. <mask> : ZZ (hexadecimal code from 00 to FF). Sets the valves to invert. 1 will invert the valve, 0 will leave it as is.

Example of remote commands : PSWI:1:SET:F0:80 : Forces the valves 5 to 7 to OFF state, valve 8 to ON state, and valves 1 to 4 unchanged on the P-Switch at index 1. (Note : F0 = 1111 0000 and 80 = 1000 0000 in binary). If state was 0101 0101 (55), after this command it is now 1000 0101 (85)

VERSION
MAR. 202

Documents / Resources

	FLUIGENT LINEUP P-SWITCH Pneumatic Valve Controller [pdf] User Manual LINEUP P-SWITCH, Pneumatic Valve Controller, Valve Controller, Pneumatic Controller, Controller, LINEUP P-SWITCH