

USER'S
MANUAL



F-OEM

Modular Pressure & Flow controller

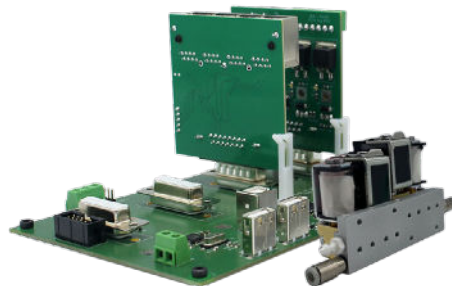
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INTRODUCTION

Our F-OEM offers our highest performance, efficiency, and widest pressure and flow rate ranges to support the most demanding industrial applications, including microfluidic and nanofluidic applications.

It is a standalone, modular platform that will perform complex fluidic operations. The platform allows one to choose the number of pressure modules, valve modules, and flow sensors.



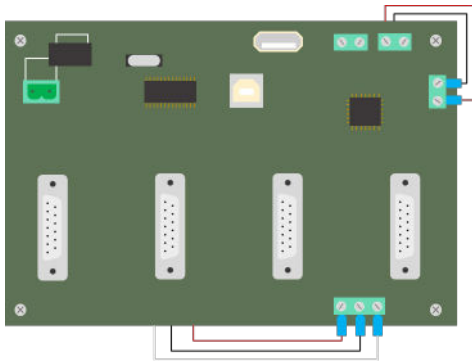
The F-OEM consists of a main platform – the integration board – that supports up to 8 modules: pressure modules (different ranges, push-pull) and switch modules (for valve integration).

P/N: INT-FOEM-4 / INT-FOEM-EXT-X

INTEGRATION BOARD

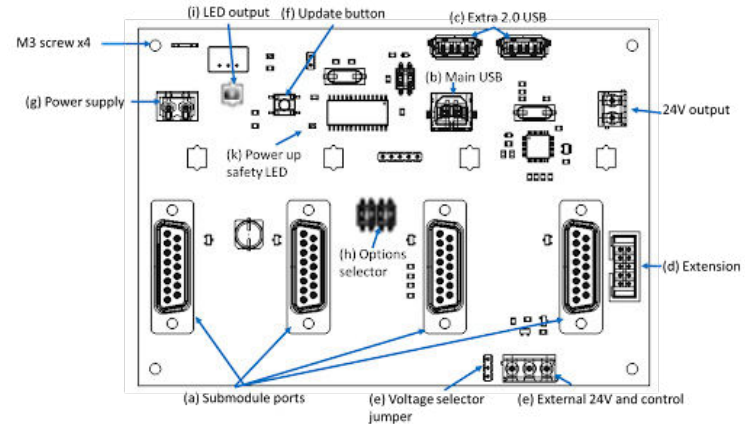
Precaution: Do not plug/unplug the modules or touch the switches while the system is powered on. It can cause the system to work unstably. Moreover, the options on the option switch are only used at system start.

The switches labelled prog should never be changed positions, as it can cause the system to work unstably. If so, please contact the [support](#) for further guidance.



The integration board is the main platform that supports the F-OEM modules. The schematic below shows the main components of the board.

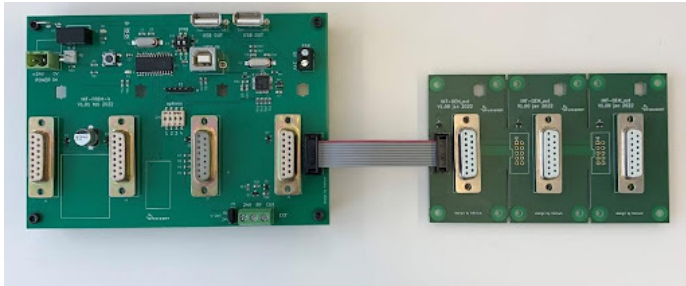
The board consists of the following elements:



- a 4 submodules ports (DB15 connectors) to welcome pressure and switch modules
- b Main USB port for PC connection and Fluigent software use (RS-232 version on demand)
- c Hub for managing 2 USB 2.0 devices Full speed 12 Mb/s | Low-speed: 1.5 Mb/s
- d Extension board port extends up to 8 modules
- e External 24V and control or 5V, depending on the jumper's position on voltage selector
- f Update button
- g Power supply port to connect a 2-pin terminal block + wires (provided in prototyping kit)
- h Options selector 1: default external control state | 2: default LED state (both at system start)
- i LED output to connect a LED
- k Power up safety LED

INTRODUCTION

If additional submodule ports are required, it is possible to connect an extension board (from 1 to 4 additional submodules port) to the main module.



P/N: PRM-FOEM-XXXX

PRESSURE MODULES

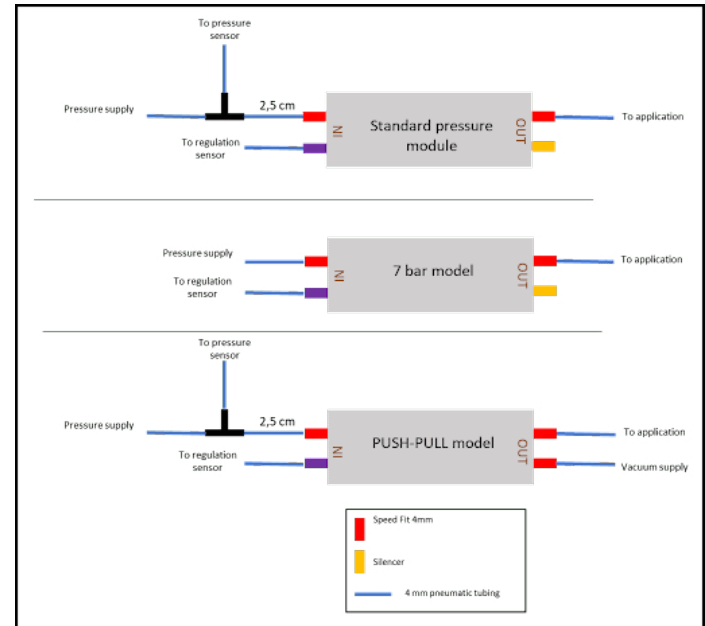
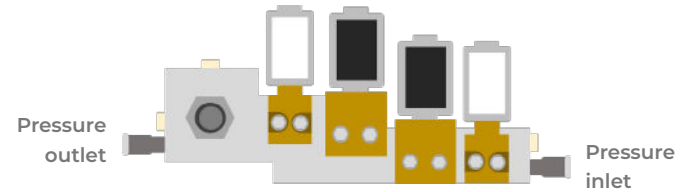
The pressure modules consist of pneumatic and electronical sub-modules.

a. Pneumatic sub-module

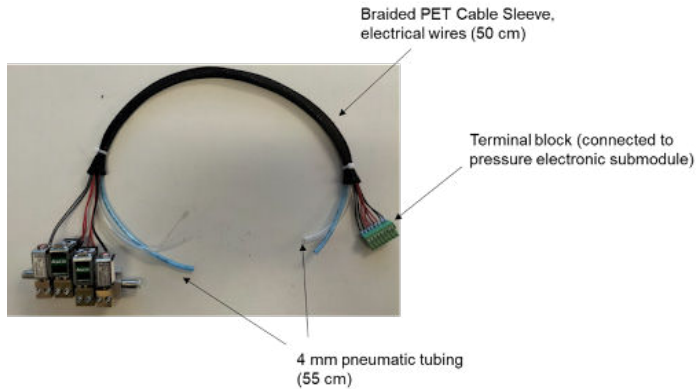
The pneumatic sub-module consists of a manifold and pneumatic valve. Pressure supply and output are connected using 4 mm OD pneumatic tubing.

Different types of pressure modules depending on the pressure ranges are available. One can mix together different pressure ranges (see pressure range adapt part).

INTRODUCTION



INTRODUCTION



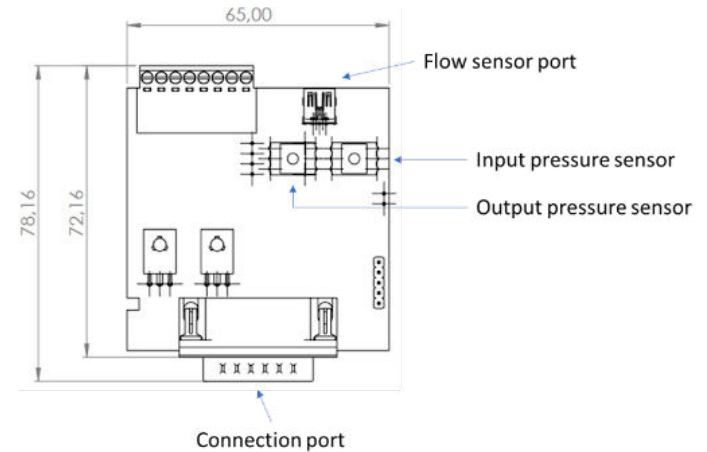
INTRODUCTION

a. Electrical submodule

The electrical submodule consists of the input and output pressure sensors (connected to the pneumatic sub-module), and the flow sensor port to support Fluigent flow sensors. A flow sensor can directly be connected to the pressure module. Flow sensor range: from 0 - 1.5 $\mu\text{L}/\text{min}$ to 0 - 5 mL/min (see our flow sensor offer).



Control range	Required pressure supply range
7000 mbar	7100 mbar
2000 mbar	2100 mbar
1000 mbar	1100 mbar
345 mbar	150 mbar
69 mbar	
25 mbar	
-25 mbar	
-69 mbar	-800 mbar
-345 mbar	
-800 mbar	



P/N: SWM-FOEM-4

SWITCH MODULES



The switch module can be directly connected to the Integration board. It consists of 4xRJ45 ports, allowing to control up to 4 valves. It can for instance control the following valves:

- **Fluigent 2-X:** 3-port/2-way microfluidic valve
- **Fluigent M-X:** 11-port / 10-way microfluidic valve for injection or selection of up to 10 different fluids.
- **Fluigent L-X:** 6-port/2 position microfluidic valve. It is designed for precise sample injection or fluid recirculation in cell culture applications.

P/N: SWM-FOEM-4

PROTOTYPING KIT

All the necessary components to start right-away your operations. Consists of the following elements: USB cable, domino and electrical wires, 4 mm and 6 mm pneumatic tubing (4 m).

SUMMARY

F-OEM components	
Integration board [INT-FOEM-4]	Main electronic board. 4 slots for pressure or switch modules. Extension slots available (INT-FOEM-EXT-X)
Pressure modules [PRM-FOEM-XXXX]	Pressure: 25 mbar (0.36 psi) / 69 mbar (0.9 psi) / 345 mbar (5 psi) / 1000 mbar (14.5 psi) / 2000 mbar (29 psi) / 7000 mbar (101 psi) Vacuum: -25 mbar (-0.36 psi) / -69 mbar (-0.9 psi) / -345 mbar (-5 psi) / -800 mbar (11.6 psi) "Push-Pull" pressure & vacuum module: -800 mbar (-11.6 psi) to 1000 mbar (14.5 psi) Pressure regulator [PRG-FOEM] if modules with different pressure supply is needed
Switch modules [SWM-FOEM-4]	F-OEM Switch control 4 x RJ45 ports
(Optional) Prototyping kit [FOEM-PROTO-KIT]	USB cable, domino, electrical wires, 4 mm and 6 mm pneumatic tubing (4m)

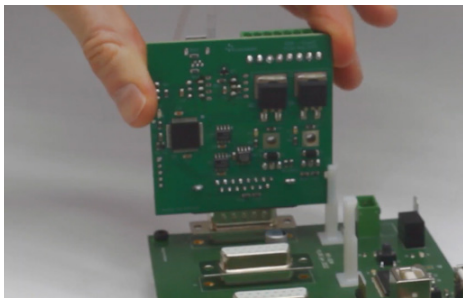
SETTING UP

Precaution: Peripherals/submodules should never be plugged or unplugged while the system is powered on. This could result in malfunctions or system failures. Power supply is the last step of the set-up.

PRESSURE MODULES CONNECTION

1. Connecting the pressure module to the integration board

To connect the pressure module to the integration board, simply connect the electronic sub-module to the DB15 ports of the integration board (see picture below).



NOTE: make sure that the main board is powered off when plugging or unplugging submodules, as it could result in malfunctions.

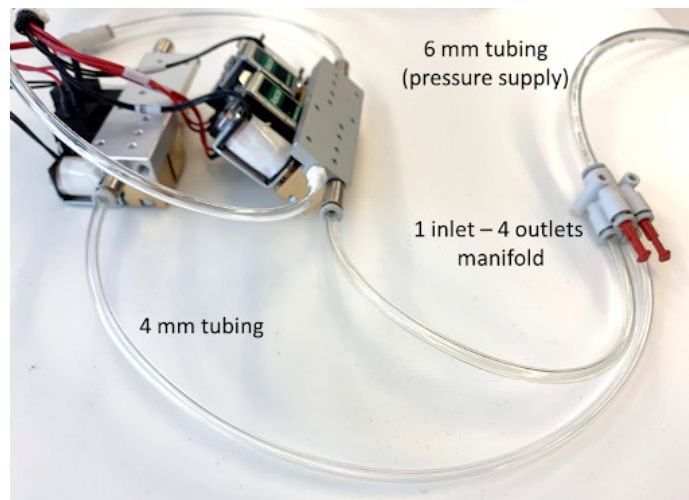
SETTING UP

2. Pressure inputs and outputs

Connect the pressure inlet and outlet using 4 mm pneumatic tubing. For the Push-Pull model, connect your vacuum supply with the additional 4 mm speed-fit dedicated to the vacuum.

a. Connect one pressure source to several pressure modules

If using several pressure modules, one can connect them together using a manifold (we can provide you manifolds with different types of connection if required, contact us).

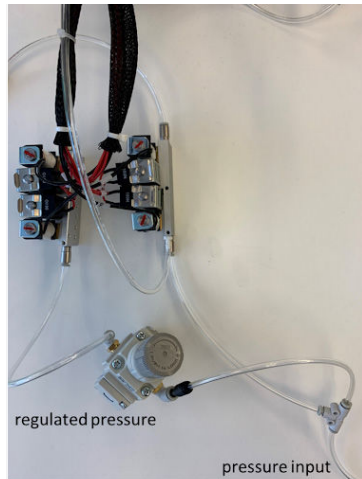


SETTING UP

b. Using different pressure supply ranges

If one mixes pressure modules with different working input pressure (e.g., mixing a 0 – 69 mbar pressure module that requires 150 mbar pressure input, and a 0 – 2000 mbar pressure module that requires 2100 mbar pressure input), one can use a pressure regulator.

Fluigent can provide a pressure regulator with suitable fittings if necessary (reference: **PRG-FOEM**).



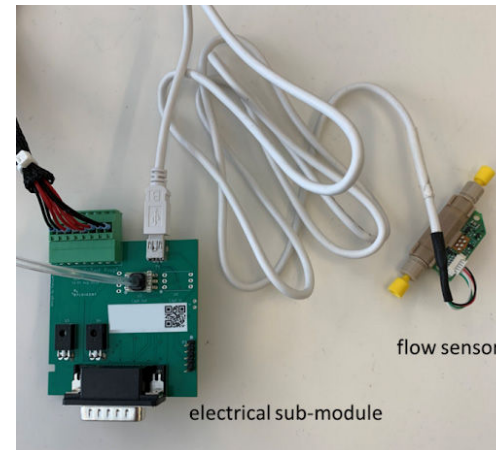
Control range	Required pressure supply range
7000 mbar	7100 mbar
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69 mbar	150 mbar
25 mbar	
-25 mbar	-800 mbar
-69 mbar	
-345 mbar	
-800 mbar	

SETTING UP

3. Connecting Fluigent flow sensors

To connect the pressure module to the integration board, simply connect the electronic sub-module to the DB15 ports of the integration board (see picture below).

Note: We recommend to plug or unplug anything **ONLY** when the main board is powered off. Not doing so could damage the equipment or result in malfunctions.

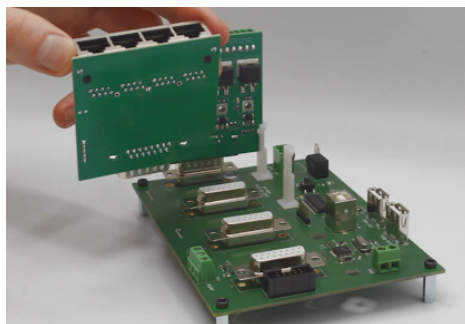


4. Connecting third party sensors

Third party sensors can be connected using the USB 2.0 ports of the F-OEM.

SWITCH MODULES CONNECTION

To connect the switch module to the integration board, simply connect the module to the DB15 ports of the integration board (see picture below).



Note: always plug or unplug submodules while the main board is powered off.

Connecting Fluigent microfluidic valves

If one wants to use microfluidic valves with the F-OEM, simply connect the microfluidic valve directly to the F-OEM Switch module using the RJ-45 cable of the valve. The system will automatically be detected by our software (SDK and Oxygen)

DIGITAL CONTROLLED OUTPUT (5V OR 24V)

NOTE: these are digital outputs, which means they only control ON and OFF states. Always use the same group connector points.

To use the following functions, report to the appropriate section in the Fluigent **Software Development Kit user manual**.

The two digital outputs available are mainly to serve two purposes:

Ext. is designed to control a 2 or 3 wire system (e.g., small pump, 24V valve with power draw, ...) using a main power feeding and a control voltage.

The main power is 24V, whereas the control can be 24 or 5V.



It is selected using the small jumper labelled "V ctrl" next to the terminal block. Its default state can be changed using the first switch of the 4way switch labelled "options". Note that the 5V is current limited

P8: Control an external LED. This port is 0-5V and 5 mA

USB PERIPHERALS & OTHERS

The FOEM platform is equipped with a 2.0 USB Hub that can handle 2 additional peripherals, which will then be bundled along with the FOEM's USB. There is no recognition by the FOEM as it only passes the information through.

For setting up regulation with Third party sensors, please refer to the appropriate section in the SDK manual.

The FAN labelled output is a constant 24V output. It cannot be turned off.

POWER SUPPLY

Connect your power supply to a 2-pin PCB terminal block, which is connected to the power supply port of the F-OEM integration board (a terminal block and the red/blue electrical wires can be provided separately in the prototyping kit). The LED between the second submodule port and the button (indicated as (k) on the scheme of the INT-FOEM) should blink 3 times (indicating the system is correctly started up. If not, disconnect the power supply right away and contact the support).

NOTE: peripherals/submodules should never be plugged or unplugged while the system is powered on. This could result in malfunctions or system failures.

SOFTWARE

SDK (SOFTWARE DEVELOPMENT KIT)

The F-OEM is fully supported by Fluigent SDK. It has been ported to the most popular programming language within the instrumentation field (LabVIEW, C++, C# .NET, Python and MATLAB). This SDK merge all Fluigent pressure controllers and sensor instruments and provide an advanced regulation loop. A specific function has been implemented for the F-OEM, which allows to set a digital output ON or OFF on a controller:

fgt_set_digitalOutput : see page 42 of the SDK user manual

For all the functions and the user manual, visit the following webpage:
<https://github.com/Fluigent/fgt-SDK>

OXYGEN

Fluigent OxyGEN software supports the F-OEM and its submodules. The F-OEM will be identified and the same level of features of our end-user products is available.

For more information, visit OxyGEN webpage available here: <https://www.fluigent.com/research/software-solutions/oxygen/>

SPECIFICATIONS

Fluigent OxyGEN software supports the F-OEM and its submodules. The F-OEM will be identified and the same level of features of our end-user products is available. For more information, visit OxyGEN webpage available here:

<https://www.fluigent.com/research/software-solutions/oxygen/>

WARRANTY TERMS

Fluigent warrants to Customer that for a period of one (1) year following delivery of the Product to Customer, the Products, and the Software embedded, shall be free from defects in material or workmanship and shall substantially conform to Fluigent's specifications for such Products and Software.

For additional information, visit our "Terms & Conditions of Sale" webpage available on the following URL:

<https://www.fluigent.com/legal-notices/>

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