

USER'S
MANUAL



NON **I**NVASIVE **F**LOW **S**ENSOR

PRECAUTIONS

— Do not open or dismantle the NIFS device.

Please refer all servicing to after-sales service department (support@fluigent.com)



Prevent any objects or liquid from entering the NIFS device, this may cause a short-circuit failure or other malfunction. Failing to respect this advice would:

- Expose you to direct current/voltage in case the device is under voltage which may lead to severe damages
- Void device's warranty
- Discharge our company from any liability regarding physical or device damages.

Do not place the product in an unstable location. Place it in a location with a level surface and a strong and stable support.

Do not use other power supply than the one provided, it has been carefully selected to meet the power requirements of the NIFS in all configurations and to comply with all safety standards.

WARRANTY TERMS

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 for defects in materials and workmanship. If found to be defective within the warranty period, your 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 repair by unauthorized persons.

How to Get Your Device Serviced

If something goes wrong, contact the Fluigent dealer from whom you purchased your product. Arrange a mutually convenient time for a Fluigent service representative to discuss the problem and find a solution to fix the issue. In case more action needs to be taken, the system will be shipped to Fluigent offices (for no additional cost, if it is under warranty).

The warranty conditions are:

- Only use cables provided by Fluigent.
- Prevent foreign objects or liquids from being in contact with the F-OEM, the P-OEM or the PX.
- Prevent foreign objects from entering the NIFS.
- Do not open the NIFS. Refer all servicing to the after-sales service department (support@fluigent.com).
- Do not place the product in an unstable location. Place it in a location with a level surface and a strong and stable support.
- Respect the pressure compatibility (max 2 bar).
- Respect the temperature compatibility (from 5°C to 50 °C).
- The customer is responsible for the gas used with the NIFS. It is recommended to put an air filter to protect the sensor.
- The customer is responsible for the use of the NIFS with any product that is not from Fluigent.

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INTRODUCING NIFS

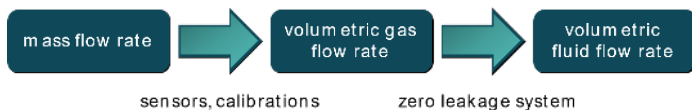
The NIFS is dedicated to flow rate measurement and control when combined with Fluigent pressure controllers. It allows for pressure-based flow rate control without contact with the liquid.

For applications that require a contamination-free environment, several types of fluids, continuous operation with slow flow response time, and flow rates ranging from 100 $\mu\text{L}/\text{min}$ to 10 mL/min , we recommend the NIFS.



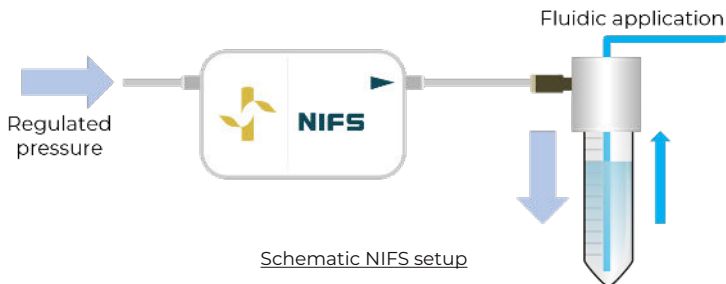
This manual will show you how to assemble the NIFS. It will describe the product's functionalities and will teach you how to connect and use it with its required components.

GENERAL INFORMATION



Measure principle

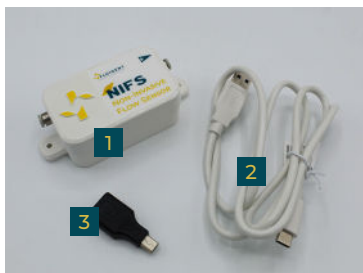
The NIFS allows flow rate measurement over the range of 100 $\mu\text{L}/\text{min}$ to 10 mL/min . The liquid flow rate delivered is computed from the measurement of the gas flow rate sent to the reservoir.



NIFS DESCRIPTION

CONTENTS

When purchasing a NIFS [1], you receive one ready-to-use flow sensor with one electric cable [2] (USB-C to USB-A) and an adaptor [3] (USB-A to micro-USB) to connect it to the software. The sensor consists of sensing elements and electronics integrated into a compact case. Standard M3-sized screws can be used for fixing the device.



Here are the PN to order related accessories (please refer to the following paragraphs for more details):

- [P-CAP-L-2] 2 mL reservoir + P-CAP lock + male luer integral lock ring
- [P-CAP-S-15] 15 mL reservoir + P-CAP screw + male luer integral lock ring
- [P-CAP-S-50] 50 mL reservoir + P-CAP screw + male luer integral lock ring
- [P-CAP-L-2-PCK] 2 mL reservoir + P-CAP lock + 80 cm OD 4 mm tubing + male luer integral lock ring
- [P-CAP-S-15-PCK] 15 mL reservoir + P-CAP screw + 80 cm OD 4 mm tubing + male luer integral lock ring
- [P-CAP-S-50-PCK] 50 mL reservoir + P-CAP screw + 80 cm OD 4 mm tubing + male luer integral lock ring

PNEUMATIC CONNECTION

COMPATIBLE RESERVOIRS

Reservoirs of three volumes are available with the NIFS: 2 mL, 15 mL and 50 mL. In order to function properly, the NIFS requires 15 mL and 50 mL reservoirs with a P-CAP screw (a P-CAP lock is not compatible with the use of the NIFS for these volumes).

PNEUMATIC TUBING

The NIFS has two (2) pneumatic ports that are compatible with 4 mm OD (outer diameter) tubing. To get started, FLUIGENT can provide different kits that include tubing, and a male luer integral lock ring.

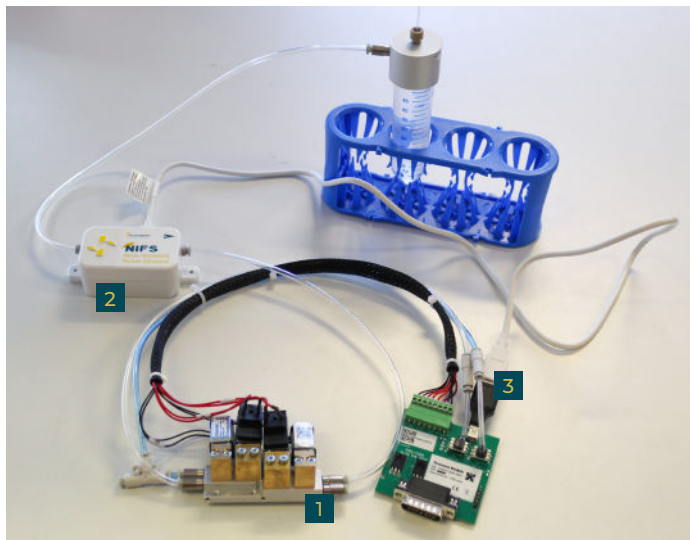
CONNECT TUBING TO NIFS

- 1 Cut the OD 4mm tubing to the desired length, leaving a square-cut face.
- 2 Insert the tubing into the receiving port and press as far as it will go.
- 3 To check the tightness of the connection, pull gently on the tubing: it should slightly move but stay fitted in the rubbing part of the port.
- 4 Do the same thing on the 2nd port.
- 5 To disconnect the NIFS, push on the rubber part while pulling the tubing out of the port for each side.

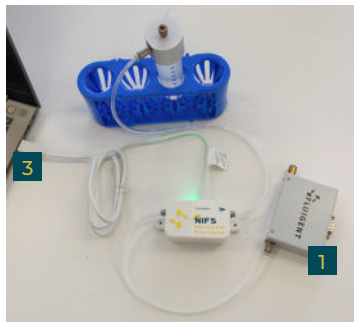
USING THE NIFS WITH PRESSURE CONTROLLERS

NIFS & F-OEM

If using the Fluigent F-OEM [1], users can directly connect the NIFS [2] to the pressure module using the micro-USB connector [3]. They can also connect the NIFS to the integration board or the computer using the USB-A connector. It will be automatically detected (the LED near the USB-C socket becomes green).

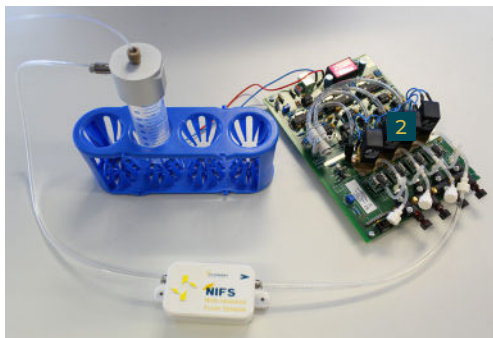


NIFS & PX SERIES / P-OEM



If using the Fluigent PX [1] or P-OEM [2], users can connect the NIFS to the computer using the USB-A connector [3].

It will be automatically detected (the LED near the USB-C socket becomes green).



Precaution: To use a NIFS with a P-OEM, a male luer integral lock ring is required, to adapt the P-OEM outlet tubing to 4 mm OD tubing.

FLUIGENT SDK AND SOFTWARE

SDK (SOFTWARE DEVELOPMENT KIT)

The NIFS 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 merges all Fluigent pressure controllers and sensor instruments and provides an advanced regulation loop. Specific functions have been implemented for the NIFS:

- fgt_get_sensorValue
- fgt_get_sensorBypassValve and fgt_set_sensorBypassValve

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

OxyGEN

Fluigent OxyGEN software supports the NIFS with version 2.2.0 or higher. The sensors will be identified and the same level of features of our end-user products are available.

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

START WORKING

QUICK START PROCEDURE

Here is a quick setup guide to get your NIFS up and running.

- 1 First, insert the NIFS between the pressure controller and the reservoir with the correct tubing.
- 2 Connect the NIFS to the computer for use with the PX, the P-OEM or the F-OEM, or directly connect it to the F-OEM.
- 3 The NIFS is now ready for your application.

HANDLING RECOMMENDATIONS

The NIFS can be used in a large range of temperature, but some elements need to be taken into account:

- The tubing between the pressure controller and the NIFS and the tubing between the NIFS and the reservoir should be < 1 m to optimize response time.
- Do not touch the NIFS when operating for measurement stability.
- Performance is not guaranteed for temperatures below 15°C or beyond 37°C.
- The temperature should remain constant during operation.
- It's recommended to use an air filter to protect the sensor.
- Calibration is required for gases other than clean air.
- The regulation performance is not guaranteed for liquids which flow rate is not linear with the pressure applied (ex: alginate) but measurement is not affected.

USING THE BYPASS VALVE

When air flows in the NIFS, it can go through two paths. One has a sensor that measures the air flow rate and the other has a bypass valve. If pressure is applied, the sensor reduces the passage of air, which increases the response time.

When the NIFS is used for regulation or when a manual pressure command is made, the algorithm automatically optimizes the response time/stability ratio by controlling the opening/closing of the valve to facilitate the passage of air.

Please note that when the valve is opened, the LED near the USB-C socket becomes blue (when the valve is closed, the LED is green) and the flow rate monitoring is stopped as no air goes through the sensor.

Manual control of the opening of the valve is possible via the dedicated function of the SDK or the dedicated button on OxyGEN.



FAQ

Is it possible to use the NIFS with other manufacturer's pressure controllers?

Flow rate monitoring is possible, but performance is not guaranteed.

HARDWARE SPECIFICATIONS



Characteristics	Value	Unit
Dimensions	99.85 x 45.0 x 33.5	mm x mm x mm
Weight	117	g
Pneumatic fittings	4 mm OD	
Maximum pressure	2	bar

TECHNICAL SUPPORT

Still have a question?

Email us at : contact@fluigent.com

Email our technical support team : support@fluigent.com

Or call our technical support team directly



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