

## Handling and Assembly Instructions

### Applicable to following sensors

SFM3xxx

### Key content

- ESD protection measures
- Environmental considerations
- Mounting, sealing, cleaning and additional recommendations

### Summary

This document provides guidelines on how to handle the sensor during storage, assembly, and use. Qualification of the assembly process as well as the correct implementation and usage, in agreement with the specified conditions noted in the respective datasheet of the sensor is the sole responsibility of the customer.

Please note that handling the SFM3xxx sensor in harsh environmental conditions, e.g. violating the specified operating and storage conditions may impact the sensor's reliability or performance. Every sensor is uniquely factory calibrated and the specified conditions of the respective datasheets shall not be violated during storage, assembly and use of the sensor. Specifically, if the physical characteristics of the sensor change due to mechanical or thermal stress, the calibration may not remain valid or in extreme cases the sensor may be damaged. The same applies to contamination of the sensor. Please always refer to the sensor datasheet for instructions specific to the chosen version of the SFM3xxx sensor.

## 1 ESD protection

As part of the qualification process SFM3xxx sensors passed ESD (Electrostatic Discharge) tests; please refer to the individual datasheet for the actual ESD rating of the sensor. Although the sensors are ESD resistant within the specified rating, it does not mean they are immune against any kind of ESD.

For safe storage and shipping the sensors are packaged in antistatic trays and packaging. During manufacturing and assembly, it is recommended to use ESD precautions and handle the sensors in ESD protected areas and under protected and controlled conditions (wrist-straps, ground all non-insulating and conductive objects, exclude insulating materials from the EPA (Electrostatic Protected Area), operate on grounded and conductive floors, etc.). Outside the EPA protect the sensor using ESD protective packaging.

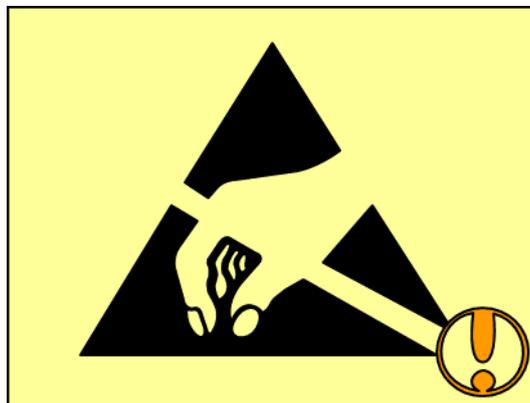


Figure 1. Protection against ESD is mandatory

## 2 Contamination during manufacturing

For best performance of the SFM3xxx sensor, it is recommended that the flow channel of the housing and specifically the sensing element remain clean. Dust or contaminants may lead to an offset or flow reading error. Especially during assembly and soldering it is recommended to ensure that the gas inlet and outlet connectors of the flow channel are protected against:

- dust, particles, and fibers
- fat, oil droplets and aerosols
- hydrocarbons
- other liquids

Spraying or coating of the sensor should be avoided whenever possible.

Always work in a clean working environment and ensure gases entering the sensor are clean and dust-free.

## 3 Harsh environment

Generally, it is recommended to avoid condensation inside the sensor in storage as well as in operation. If the condensed water inside the sensor completely evaporates without leaving residuals, the sensor will be fully functional again.

The sensor is specified for operation in the specific gases mentioned in the respective sensor datasheet. Aggressive or etching substances such as NH<sub>3</sub> shall be avoided. Aggressive and corrosive gases can alter the sensing element and may also damage the sealing or the plastic housing.

The use of explosive or toxic gases requires exceptional care and precautions as leakages may result in dangerous situations. Sensirion solely guarantees the safe use of the SFM3xxx sensors for inert, in-explosive, and non-toxic gases. Please inquire with Sensirion for any exceptions (e.g. NO).

It is recommended to carefully test and qualify all applications using Sensirion sensors, especially when sensors are exposed to harsh environments. The responsibility for qualification of the sensor in any application, lies entirely with the customer (equipment developer and manufacturer designing in and using the sensor).

## 4 Storage conditions and shelf life

All SFM3xxx sensors shall be stored in the original and unopened shipment package under the temperature and humidity conditions specified in the respective datasheet. Please ensure that condensation is always avoided.

The single-use flow sensors series SFM3x00-D additionally have a maximum specified shelf-life (see respective datasheet).

## 5 Mechanical stress

No mechanical stress shall be applied to the sensor during mounting, assembly, or usage. Especially, no force shall be applied to the sensor pins, the pads, the sensor body, or the mesh.

Never attempt to modify or remove the mesh or to remove dirt behind the mesh using a sharp tip. Any mechanical damage of the mesh or the housing may lead to reduced sensor performance.

## 6 Vibration and shock

The SFM3xxx sensors are designed to be robust and vibration resistant. Nevertheless, the accuracy of the high-precision sensors may be degraded by rough handling and exposure to extreme vibration and mechanical shocks.

## 7 Mounting

For mounting recommendations for optimal performance please refer to the AppNote [SFM-01](#) "Engineering Guidelines for Mass Flow Meters". Generally, we recommend a horizontal alignment of the flow sensor with the connectors pointing upwards for optimal measurement performance.

### 7.1 Products with screw holes

In case the sensor is fixed with screws, we recommend a torque of 0.1 Nm. A maximum of 0.2 Nm shall not be exceeded. It is recommended to mount the sensors on a flat bearing area without any pressure mark. Screws should be fixed before soldering the pins to avoid mechanical forces to the pins.

### 7.2 Products with electrical connector cap

Proximal sensors rely on electrical connection using a connector cap to contact the electrical pads. For the use and handling of the connector cap, please refer to the AppNote [SFM-22](#) "Clip-On Cap/Cable Evaluation Kit".

## 8 Sealing

Depending on the chosen sensor configuration, different sealing options may apply.

### 8.1 Products with pneumatic connectors

In case the SFM3xxx sensor is connected to the flow circuit pneumatic flanges using Legris connectors, no additional sealing is required. Please consult the documentation of the push-in fittings for details.

### 8.2 Products with medical cone connectors

SFM3xxx sensors featuring medical cones comply to the international standard ISO5356-1:2004. Details about this type of connection can be found in the description of the standard. Please refer to the sensor datasheet to determine which surfaces of the SFM3xxx product are intended for sealing.

### 8.3 Products with O-ring sealing

SFM3xxx products with O-ring sealing will feature a groove for placement of the O-ring around the sensor inlet and outlet. Ensure that the parts connected to the sensor only expose a radial force on the sensor inlet and outlet (see Figure 2).

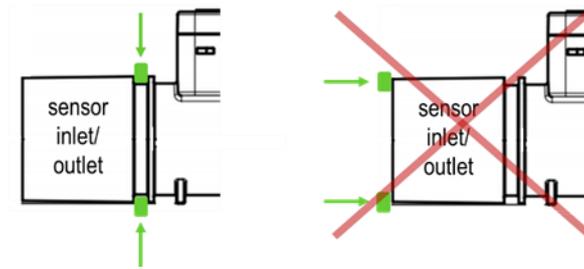


Figure 2. The O-ring (green) should be placed in the intended groove and sealing should occur through a radial force (left image).

The selection of an O-ring is recommended to be based on the compatibility with the present gases. For air and O<sub>2</sub> applications, Sensirion often recommends FKM or EPDM-Peroxide cured O-ring materials.

The O-ring dimensions are recommended in the respective product datasheet.

## 9 Cleaning

Only the SFM3x00-AW sensor series is designed to be washable and autoclavable. Please refer to the AppNote [SFM-21](#) "Cleaning Methods" for details.

Other SFM3xxx sensors are not intended to be washed or autoclaved. Applying such a procedure may damage the sensor materials.

## 10 Contact with water

SFM3xxx sensors use direct flow and by-pass measurement principles. In the direct flow type the sensing element is located directly in the main flow pass. In the by-pass type a fraction of the gas passes through a narrow peripheral flow channel, the bypass, where it is measured and fed back into the main pass.

For sensors having a by-pass architecture (e.g. SFM3019, SFM3003, ...), contact with liquids may clog the by-pass channel. After evaporation, the liquids may leave residues or contaminations behind which may impact sensor performance. Please note that evaporation may take a prolonged amount of time due to the small cross section of the bypass channel.

For sensors using a main-pass architecture (e.g. SFM3200, SFM3300, ...), contact with liquids may also leave residues or contaminations behind which may impact sensor performance.

In case the SFM3x00-AW or SFM3x00-D sensors were in contact with clean water, for example from condensed but otherwise clean water, the sensor can be kept at low-humidity conditions at elevated temperatures to facilitate drying by evaporation. Please refer to the AppNote [SFM-21](#) "Cleaning Methods" for more information. Always ensure drying conditions are within the storage conditions of the sensor.

Always allow any liquid to evaporate entirely before re-connecting and using the sensor.

Specifically, the SFM3x00-AW sensors may be cleaned in order to remove dust or other contaminants following the AppNote [SFM-21](#) "Cleaning Methods".

## 11 Additional recommendations for solderable products

Following recommendations concern the SFM3xxx products featuring connection pins that can be soldered.

### 11.1 Soldering method

Standard wave soldering systems are recommended for soldering. Reflow and vapor phase soldering must NOT be used.

### 11.2 Depaneling

Any depaneling or separation process of the PCB after soldering of the sensor should be carried out with special care. The sensor inlet and outlet connectors shall be protected from dust and any other contaminants created during the process.

## 12 Disclaimer

All provided recommendations, materials, considerations, and restrictions are not exhaustive and do not cover all possible applications and intended uses of the sensor. All recommendations are intended to be used as guidelines. Always follow all safety precautions of the involved equipment. In case of any questions or doubts with respect to the flow sensors, please contact your Sensirion representative.

## 13 Revision history

Date	Version	Author	Changes
Nov 2020	0.0	PSIM/JKEL	First draft
Nov 2020	0.1	PSIM	SFM3xxx version
Jan 2021	0.2	PSIM/HBEN	Full revision

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