

## d-flux Series

This document is for use with Sierra's d-flux Multiparameter Mass Flow Meters and Controllers.

### Standard Device Operation

During its production process, the d-flux is setup according to the process conditions of flow, pressure and temperature that have been specified in the order confirmation.

Operating the device in other conditions may lead to a flow measurement or control functions that are not performing as intended. In particular, d-flux mass flow controllers are equipped with a proportional valve direct operated which is precisely set for certain inlet (P1) and outlet (P2) pressure conditions that must be respected.

Operating the device with other pressure conditions may require a different setup of the valve for the valve to work as intended.



- ⚠ **Note** Please contact Sierra or your local sales representative if you need different operating conditions other than the ones you initially ordered.

### Elastomer Compatibility

Sierra can offer FKM, EPDM, or FFKM elastomers for d-flux. While we try to use the best available information to select the most appropriate elastomer compound for our seals, gaskets, and valve plunger depending on the gas to be used, it is ultimately the user's responsibility to select the appropriate elastomer for their application and process conditions.

### Applications with Flammable Gas

When operating d-flux using flammable gases (methane, acetylene, hydrogen, etc.) The user must at least observe primary explosion protection such as:

- Prevent mixing of oxidizer (air, O<sub>2</sub>) with the flammable gas inside the device. This is usually realized by filling up the pipework with an inert gas, before filling it up with the flammable gas. Similarly, when dismantling the instrument for instance for service purposes, the pipework should be flushed thoroughly with an inert gas before dismantling the device from the line.
- Install gas leak detection sensors in the room where the instrument is installed.
- Ensure the PLC commands safety shut-off valve(s) in the gas supply line to be closed whenever a leak is detected by the gas sensor or when instrument is to be dismantled for service purposes, etc. It must be perpendicular to pipe in both planes (see Figure 1 on next page).

- ⚠ **Warning!** It is strictly forbidden to operate the d-flux in an explosive atmosphere, the instrument is not suitable for hazardous locations as defined by UL/CSA or Ex-Zone as defined by IECEx/ATEX.

- ⚠ **Warning!** It is strictly forbidden to operate the d-flux with an explosive gas mix. For example, but not only, a mix of Methane + Air whose methane proportion in the mix would be between the LEL and UEL limits for this gas mix. Similarly, explosive mix of H<sub>2</sub> + O<sub>2</sub> are not allowed. Operating such gas mixes would require all wetted parts of the instrument to be rated for use in permanent explosive atmosphere, which is not the case.

It is the user's responsibility to make sure that such potentially explosive gas mix also never flows back from their process into the instrument. This is especially true when operating two instruments, one with pure flammable gas and one with air and mixing the two gases together at the outlet of the instruments. The mix may become explosive and therefore shall not return inside the instruments located upstream of the mixing chamber.


- ⚠ **Note** Please observe the local regulations applicable to your application and facility.

### Application with Oxygen or Highly Oxidizing Gases

The production process of the d-flux does not use grease or other forms of combustible hydrocarbons. Sierra has realized tests at Air Liquide CTE (adiabatic compression test, particle test) with 100% oxygen at 20 bar<sub>a</sub> and 60°C to evaluate the risk of generating a fire and a kindling chain on five instruments. These instruments were not submitted to a specific cleaning/degreasing prior to the test. The tests were successful as the instruments did not show any sign of ignition despite the pressure being higher than the maximum allowed operating pressure of 14 bar<sub>a</sub>.

In that respect, Sierra does not perform “O<sub>2</sub> cleaning” by default on its instruments and it is the responsibility of the user, as per the standard ASTM G128 chapter 14, to determine whether or not a specific “O<sub>2</sub> cleaning” is required during production or during a periodic maintenance / service for their instrument. “O<sub>2</sub> cleaning” is an option that can be offered on-demand.

For other highly oxidizing gases, such as Cl<sub>2</sub>, F<sub>2</sub> or N<sub>2</sub>O we recommend the “O<sub>2</sub> cleaning” option to be ordered with the device. Again, it is the user’s responsibility to determine whether this option is necessary or not, according to their risk analysis.

 **Note** For more information about the risks of fire when operating highly oxidizing gases, we recommend the user to follow the oxygen training from the European Industrial Gas Association ([www.eiga.eu/elearning-courses/](http://www.eiga.eu/elearning-courses/)).

### Applications with Dangerous and Corrosive Gas

Certain gases can pose a threat to the user or to the service employees of Sierra, as well as to any intermediate person in contact with an instrument that has been operated with such gases. For d•flux, these are especially, but not only, the following gases:


Gas Name	Gas Symbol
Chlorine	Cl <sub>2</sub>
Fluorine	F <sub>2</sub>
Hydrogen Chloride	HCl
Hydrogen Sulfide	H <sub>2</sub> S
Ammonia	NH <sub>3</sub>
Sulfur Dioxide	SO <sub>2</sub>

 **Note** View the complete list of corrosive and dangerous gases on our [Corrosive and Dangerous Gas Policy](#) web page.

**IMPORTANT:** These gases must be 100% dry when used in combination with our instrument. When this is not the case, corrosion may occur inside the instrument and this may present a risk of injury, or worse, for anyone coming in contact with it.

For this reason, it is mandatory for any d•flux that is being returned to our facility for service to be thoroughly purged with an inert gas (e.g N<sub>2</sub>), cleaned and decontaminated prior to the shipment. The protective caps must be mounted on both the inlet and outlet of the instrument before packing it. Please follow the specific RMA procedure for this and fill out the decontamination form accordingly and truthfully. Failure to comply may lead to legal actions against the sender and/or his/her company as this generates a risk of injury to our logistic & service employees as well as to the shipping company employees.

 **Warning!** Due to safety concerns, Sierra has adopted a “Do Not Return” for meters and controllers subjected to gases listed on our “Corrosive and Dangerous Gas Policy. Download for details ([www.sierrainstruments.com/dangerous-corrosive-gas-policy](http://www.sierrainstruments.com/dangerous-corrosive-gas-policy))

 **Note** If our service staff detects corrosion on the device, it may void the warranty and the corroded parts may have to be replaced with the corresponding costs being charged to the customer. If such case occurs, Sierra service team will contact you prior to changing these parts.

### Risk Analysis

It is the user’s responsibility to perform the required risk analysis when operating our instrument with flammable, oxidizing, dangerous or corrosive gases or in any situation where there is a risk of injury to people, risk of damage on infrastructure or risk of damage to the environment.

It is good practice to make a review of such risk analysis with independent professionals so as to make sure nothing has been overlooked.

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