MEMS flow sensors
We have introduced a new generation of MEMS based flow sensors used for gas flow velocity and mass flow rate measurements. The 3D MEMS structure offers outstanding characteristics in terms of resolution and repeatability even at very low flow rates.

The D6F-V, D6F-W and D6F-P products incorporate a patent pending Dust Segregation System (DSS) allowing it to be used to monitor the performance of fans and air intakes and to detect clogged filters in general. Precision performance is maintained over the product life time with an integral DSS that separates up to 99.5% of dry air borne particulates (simulation result).
Inside each D6F there is a highly sensitive MEMS flow chip that is only 1.55mm x 1.55mm x 0.4mm thick. The MEMS flow chip has two thermopiles either side of a tiny heater element used to measure the deviations in heat symmetry caused by the passing gas flow in either direction. A thin layer of insulating film protects the sensor chip from exposure to the gas.

When there is no flow present, temperature distribution concentrated around the heater is uniform and the differential voltage over the two thermopiles is 0V (Diagram 1).

When even the smallest flow is present, temperature on the side of the heater facing the flow cools, and warms up on the other side of the heater - heat symmetry collapses (Diagram 2).

The difference of temperature appears as a differential voltage between the 2 thermopiles - the flow velocity, direction and mass flow rate can be measured.

Omron has been a leading manufacturer of MEMS based components and modules for measurement and control applications since 1990 and has shipped more than 20 million products.

We concentrate on bulk micro-machining such as anodic bonding, electro chemical etch (ECE), silicon processes such as thin film deposition, wet and dry etching, electrode formation & fine plastic replication and glass wafer processes.
Gas and Air Flow Sensors

Our family of MEMS Flow Sensors includes intelligent compact models capable of measuring flow velocity and mass flow rate movement with highly repeatable accuracy at flow rates from 1LPM to 50LPM (Litre per minute). High sensitivity is achieved with the MEMS Flow Chip.

Supersensitive gas flow sensors based on proprietary MEMS technology are able to measure gas velocity, direction and mass flow rate for both extremely low and high flow rates. Capable of highly accurate measurements over a wider temperature range compared with conventional mass flow metering, the D6F can detect mass flows with a repeatability of up to +/- 0.1% and an accuracy of up to +/-3% full scale deflection. The extreme sensitivity is achieved with a tiny heating element, associated with temperature sensors on both sides. Custom specific models could be made for quantities of approx. 100k pcs/year.
**Home Appliance**
- Gas Meter
- Gas Leak Detector
- Building Ventilation
- Boiler/Combustion Control
- Smoke Detector
- Fan Assisted Heater

**Medical**
- Chest Drainage
- Ventilator
- Anaesthetic device
- CPAP
- Oxygen Concentrator
- Ozone Generator
- Laparoscopic Surgery
- Gas Chromatograph
- Capnograph

**Industrial**
- Process Control
- Environmental Monitor/Gas Sniffer
- Pressurised Cable Monitoring
- Ventilator control
- Clogged filter detection
- Gas welding machine
- Pick and Place
- Fuel Cell
- Scientific Devices
- Gas flow controller
- Fans
**D6F-P**

*Uni-directional mass flow sensor*

<table>
<thead>
<tr>
<th>Flow Range</th>
<th>1LPM, PCB terminal type (D6F-P0010A1)</th>
<th>1LPM, connector type (D6F-P0010A2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Size</td>
<td>27.2(L) x 17.2(W) x 35(H)mm</td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>4.75 – 5.25VDC</td>
<td></td>
</tr>
<tr>
<td>Analogue Output</td>
<td>0.5 to 2.5V</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 5% F.S.</td>
<td></td>
</tr>
<tr>
<td>Temp Range</td>
<td>-10 to +60°C</td>
<td></td>
</tr>
<tr>
<td>Gas Type</td>
<td>Air</td>
<td></td>
</tr>
</tbody>
</table>

* Bi-directional mass flow sensor available on request.

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**D6F-01A1 / 02A1**

*High accuracy mass flow sensor*

<table>
<thead>
<tr>
<th>Flow Range</th>
<th>1LPM (D6F-01A1-110)</th>
<th>2LPM (D6F-02A1-110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Size</td>
<td>66(L) x 36(W) x 15.1(H)mm</td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>10.8 - 26.4VDC</td>
<td></td>
</tr>
<tr>
<td>Analogue Output</td>
<td>1 to 5V</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 3% F.S.</td>
<td></td>
</tr>
<tr>
<td>Temp Range</td>
<td>-10 to +60°C</td>
<td></td>
</tr>
<tr>
<td>Gas Type</td>
<td>Air</td>
<td></td>
</tr>
</tbody>
</table>

---

**Operating Characteristics**

**D6F-P0010A1/D6F-P0010A2**

![Operating Characteristics Graph](image)

**D6F-01A1-110**

![Operating Characteristics Graph](image)

**D6F-02A1-110**

![Operating Characteristics Graph](image)
### D6F-03A3

**High accuracy mass flow sensor**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Range</td>
<td>3LPM (D6F-03A3-000)</td>
</tr>
<tr>
<td>Ultra-Compact Size</td>
<td>36.6(L) x 8(W) x 16.8(H)mm</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>10.8 - 26.4VDC</td>
</tr>
<tr>
<td>Analogue Output</td>
<td>1 to 5V</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/-5% F.S.</td>
</tr>
<tr>
<td>Temp Range</td>
<td>0 to 50°C</td>
</tr>
<tr>
<td>Gas Type</td>
<td>Air</td>
</tr>
</tbody>
</table>

![Operating Characteristics](image)

### D6F-01N2 / 02L2 / 05N2

**High accuracy mass flow sensor**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Range</td>
<td>1LPM (D6F-01N2-000), 2LPM (D6F-02L2-000), 5LPM (D6F-05N2-000)</td>
</tr>
<tr>
<td>Compact Size</td>
<td>62 (L) x 21.6(W) x 22.1 (H)mm</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>10.8 - 26.4VDC</td>
</tr>
<tr>
<td>Analogue Output</td>
<td>1 to 5V</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/-3% F.S.</td>
</tr>
<tr>
<td>Temp Range</td>
<td>-10 to +60°C</td>
</tr>
<tr>
<td>Gas Type</td>
<td>N2 type LNG (Liquified Natural Gas) L2 type LPG (Liquified Propane Gas)</td>
</tr>
</tbody>
</table>

![Operating Characteristics](image)
Mass Flow Sensors

D6F-10A5 / 20A5 / 50A5-10A6 / 20A6 / 50A6

High accuracy mass flow sensor

<table>
<thead>
<tr>
<th>Flow Range</th>
<th>10LPM (D6F-10A5/10A6-000)</th>
<th>20LPM (D6F-20A5/20A6-000)</th>
<th>50LPM (D6F-50A5/50A6-000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Size</td>
<td>78(L) x 30(W) x 30 (H)mm</td>
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<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>10.8 - 26.4VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogue Output</td>
<td>1 to 5V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 3% F.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp Range</td>
<td>-10 to +60°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Type</td>
<td>Air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Air Velocity Sensors

Our D6F-W and D6F-V Sensors incorporate a Dust Segregation System (DSS) that helps maintain sensing performance in a variety of applications.

The housing design is based on a centrifugal principle to segregate particulates from the air. Most particulates cannot pass through the sensing area and are discharged through the exhaust route. As a result of the numerical analysis, the efficiency of the Dust Segregation System separates up to 99.5% of dry particulates. The D6F-W01A1 and D6F-W04A1 airflow sensors can measure air velocity from 0-1m/s and 0-4m/s with an accuracy of +/-5% full scale deflection. The D6F-V03A1 measures 0-3m/s. Each is supplied as standard, optimally adjusted at the factory so easy and rapid user application is guaranteed.
Cassette (ceiling/suspended) Multimodular Air Conditions
Duct Connected Heating and Air Conditioning Systems
Alternative for Single Point Pitot tube
Air & Water Air Conditioning Systems
Air Purifiers/ Dehumidifiers
Fan Assisted Heaters
Air Cooled, High Power Indoor Lighting
Mission Critical PC, Workstation Ventilation
19” Rack Ventilation Systems
LCD Projectors
AV Electronics Equipment
Air Velocity Sensors

D6F-W01A1 / W04A1

Precision air flow detection sensor

- Flow Range
  - 1m/s (D6F-W01A1)
  - 4m/s (D6F-W04A1)
- Ultra Compact Size
  - 20(L) x 39(W) x 9(H)mm
- Supply Voltage
  - 10.8 - 26.4VDC
- Analogue Output
  - 1 to 5V
- Accuracy
  - +/- 5% F.S.
- Temp Range
  - -10 to +60°C
- Gas Type
  - Air

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D6F-V03A1

Precision air flow detection sensor

- Flow Range
  - 3m/s (D6F-V03A1)
- Ultra Compact Size
  - 24(L) x 14(W) x 8(H)mm
- Supply Voltage
  - 3.15 - 3.45VDC
- Analogue Output
  - 0.5 to 2V
- Accuracy
  - +/- 10% F.S.
- Temp Range
  - -10 to +60°C
- Gas Type
  - Air
Clogged Filter Detection (Configuration 1)

The sensor detects the pressure drop over the filter. The moment this drop exceeds a given threshold, a warning signal indicating the need for filter replacement is sent out.

Clogged Filter Detection (Configuration 2)

Filter clogging can be detected, also using the bypass-like configuration. The differential pressure between upstream and downstream of the filter grows in proportion to the accumulation of dirt in the filter, and the output voltage of the sensor located on the bypass channel increases.

Omron Electronic Components Europe BV reserves the right to make any changes to the specifications of the products described in this brochure at its sole discretion and without prior notice.