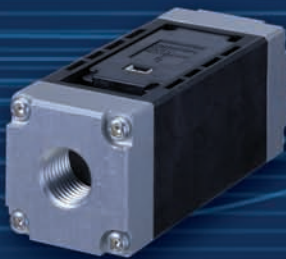


# Air & Gas FLOW SENSORS



MEDICAL

Gas Metering  
Laboratory Equipment  
Instrumentation  
Medical  
HVAC  
Clogged Filter Detection  
Welding  
Fuel Cells



Featuring Omron's MEMS Flow Chip

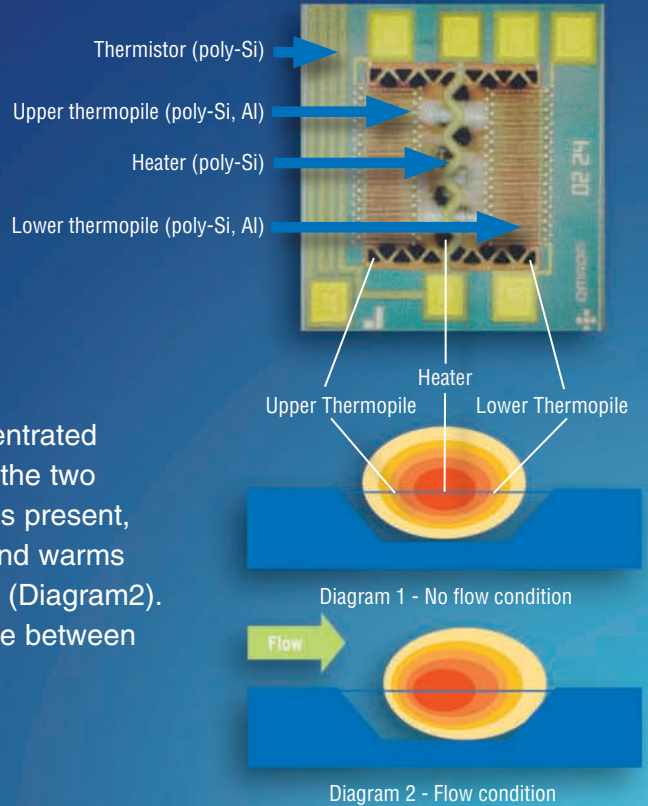
**OMRON**  
ELECTRONIC COMPONENTS

# Air & Gas Flow

## Flow measurement principle

Inside each D6F there is a highly sensitive MEMS flow chip that is only 1.5 mm<sup>2</sup> x 0.4 mm thick. The MEMS flow chip has two thermopiles on either side of a tiny heater element used to measure the deviations in heat symmetry caused by gas flowing 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 0 V (Diagram1). 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 (Diagram2). The difference of temperature appears as a differential voltage between the two thermopiles, proportional to the mass flow rate.

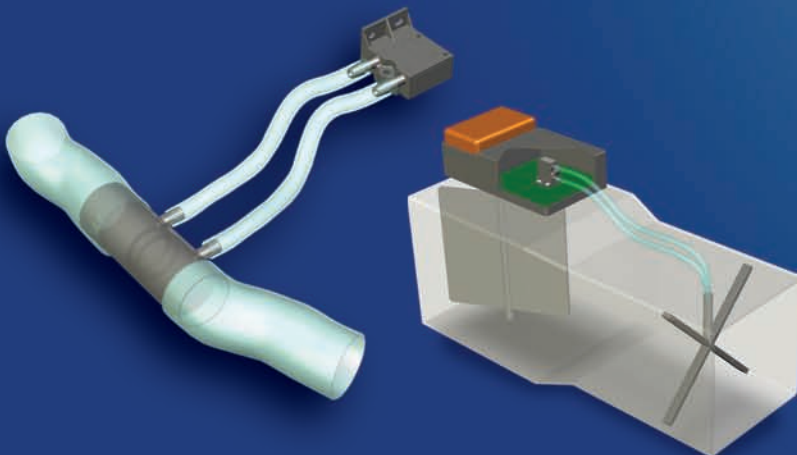


MEMS Flow Chip Actual Size

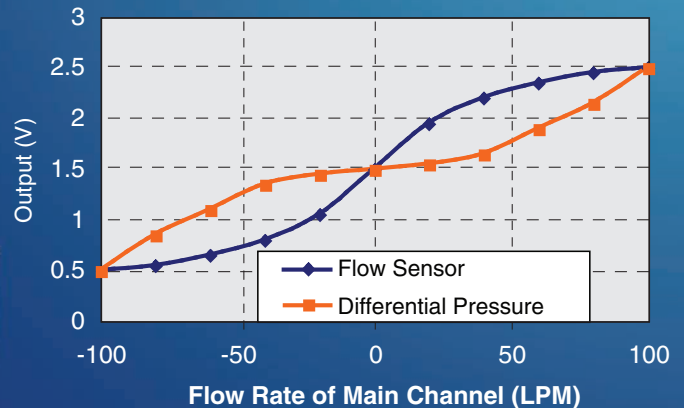
**Omron has been a leading manufacturer of MEMS based components and modules for measurement and control applications since 1970 and has shipped more than 20 million products.**

## Bypass Setup

When used in a bypass setup, as illustrated below, Omron mass flow sensors can measure flow rates far beyond their in-line rating. The pressure differential required to pull airflow through the sensor can be accomplished by installing a flow restrictor between the two ports or through the use of a flow cross in large ducts, as shown in the HVAC application.



## Difference Between Flow & Differential Pressure Sensors



\* Contact Omron for other calibration gases. Omron mass flow sensors are compatible with a wide variety of noncorrosive gases including Nitrogen, Oxygen, Carbon Dioxide, Argon, Heliox, and Nitrogen Oxides among others.

# D6F-P

## Flow Sensor with Unique Dust Segregation System

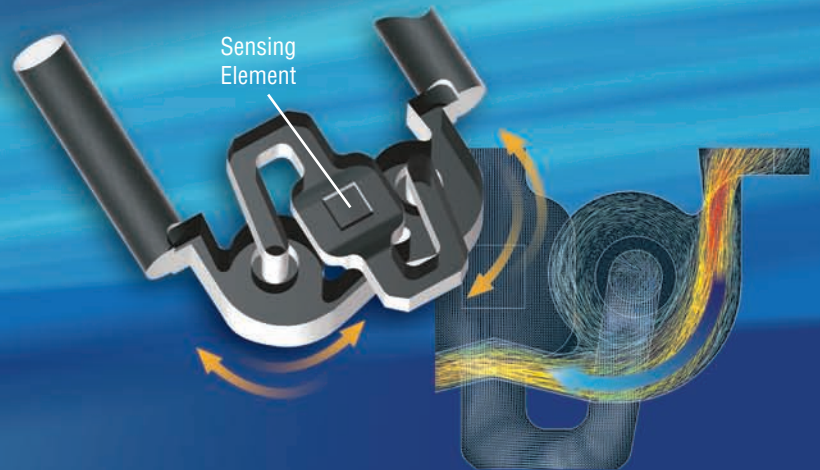
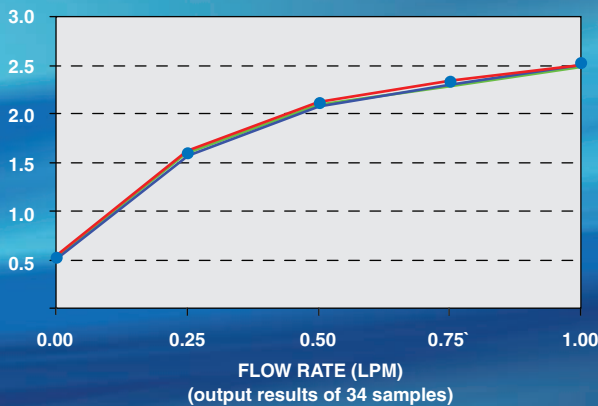
Flow Range	D6F-P0001A 0-0.1 LPM inline, >200 LPM bypass set-up D6F-P0010A 0-1 LPM inline, >200 LPM bypass set-up
Compact Size	35(L) x 17.2(W) x 27.2(H) mm
Supply Voltage	5 to 10 VDC
Analog Output	0.5 to 2.5 VDC amplified and temperature compensated
Accuracy	+/- 5% FS max (+/- 2% FS typical)
Temp. Characteristic	+/- 5% FS max
Temperature Range	-10 to 60°C
Gas Type	Air (contact Omron for other gases)
Connection Type	PCB (D6F-P0001A1, D6F-P0010A1) Connector (D6F-P0010A2) Manifold (D6F-P0010AM2)



### Bidirectional Dust Segregation System

The flow path incorporates dual centrifugal chambers, through which particulate matter follows the outer path, away from the MEMS sensor chip regardless of flow direction. Standard products are calibrated for unidirectional flow. Contact Omron for bidirectional calibration options.

### Output Characteristics, Supreme Repeatability



# D6F-PS Differential Pressure Type

## High Impedance flow sensor not sensitive to tube length variation in bypass designs

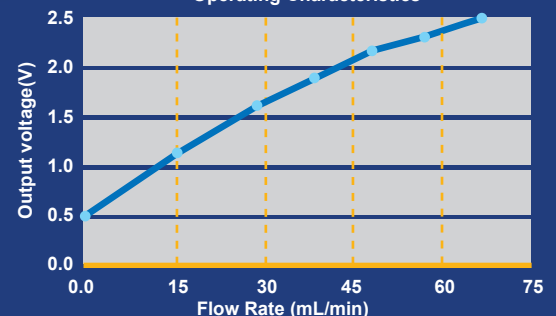
Flow Range	0-70 mL/min inline, >200 LPM in bypass
Pressure Drop	250 Pa
Compact Size	35(L) x 17.2(W) x 27.2(H) mm
Supply Voltage	5 to 10 VDC
Analog Output	0.5 to 2.5 VDC amplified and temperature compensated
Accuracy	+/- 5% FS max (+/- 2% FS typical)
Temp. Characteristic	+/- 5% FS max
Temperature Range	-10 to 60°C
Gas Type	Air (contact Omron for other gases)
Connection Type	PCB



**COMING SOON**

### D6F-PS

#### Operating Characteristics



All flow rates stated are at standard conditions of 0° C and 1 atm.

# Mass Flow Sensors

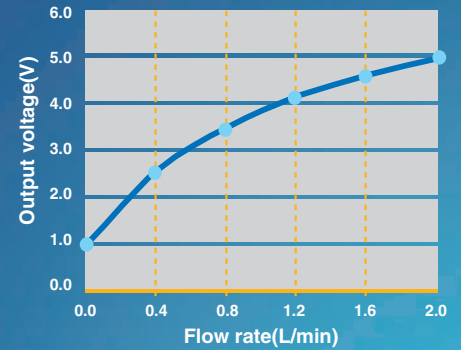
## D6F-01A1 / 02A1

### High accuracy mass flow sensor

Flow range	1 LPM (D6F-01A1-110) 2 LPM (D6F-02A1-110)
Compact Size	66(L) x 36(W) x 15.1(H) mm
Supply Voltage	10.8 - 26.4 VDC
Analog Output	1 - 5 VDC (amplified and temperature compensated)
Accuracy	+/- 3% FS max
Temp Range	-10 to +60°C
Calibration Gas*	Air

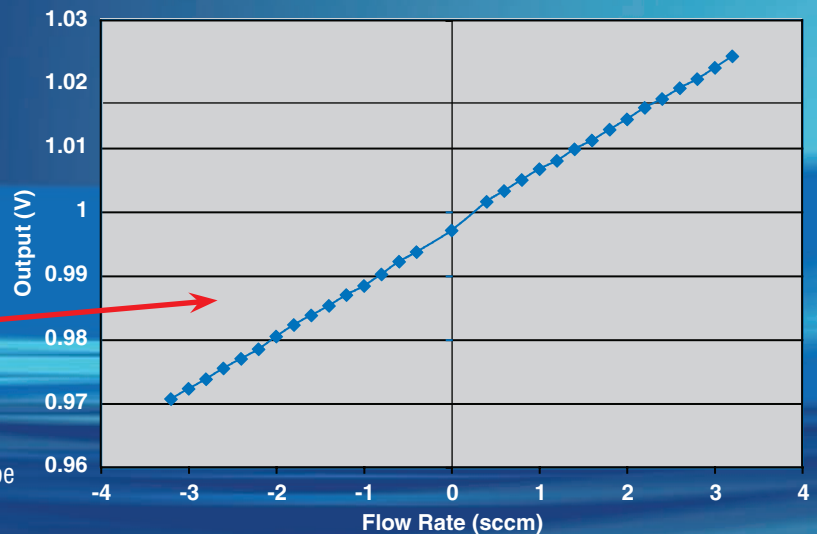
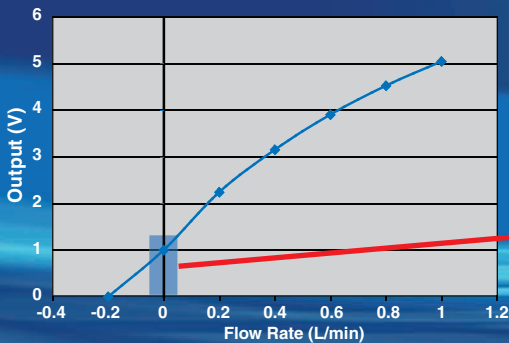


**D6F-02A1-110**  
Operating Characteristics



## Excellent Low Flow Sensitivity

### D6F-01A1 Resolution



With Omron's MEMS Flow Chips, extremely low flows can be detected, down to 0.1% of full scale sensor range.

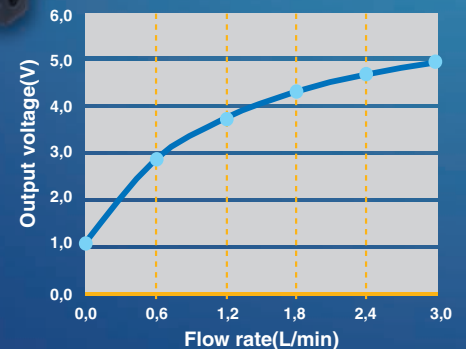
## D6F-03A3

### High accuracy mass flow sensor with fast response time (<5 msec typical, for reference only) in small package

Flow range	3 LPM (D6F-03A3-000)
Ultra-Compact Size	36.6(L) x 8(W) x 16.8(H) mm
Supply Voltage	10.8 - 26.4 VDC
Analog Output	1 - 5 VDC (amplified and temperature compensated)
Accuracy	+/-5% FS max
Temp Range	0 to 50°C
Calibration Gas*	Air



**D6F-03A3-000**  
Operating Characteristics



\* Contact Omron for other calibration gases. Omron mass flow sensors are compatible with a wide variety of noncorrosive gases including Nitrogen, Oxygen, Carbon Dioxide, Argon, Heliox, and Nitrogen Oxides among others.

# D6F-01N2 / 02L2 / 05N2

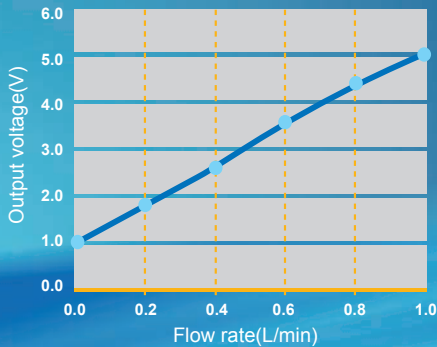
High accuracy mass flow sensor, suitable for natural gas and propane applications

Flow range +	1 LPM (D6F-01N2-000) Natural Gas
Calibration Gases	2 LPM (D6F-02L2-000) Propane
	5 LPM (D6F-05N2-000) Natural Gas
Compact Size	62(L) x 21.6(W) x 22.1(H) mm
Supply Voltage	10.8 - 26.4 VDC
Analog Output	1 - 5 VDC (amplified and temperature compensated)
Accuracy	+/-3% FS max
Temp Range	-10 to 60°C



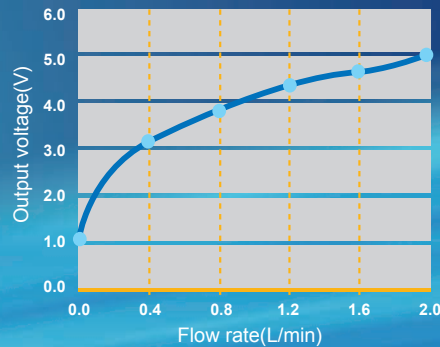
**D6F-01N2-000**

Operating Characteristics



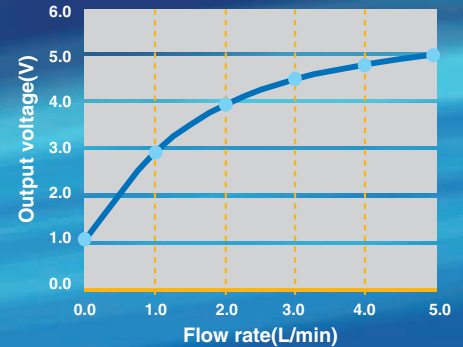
**D6F-02L2-000**

Operating Characteristics



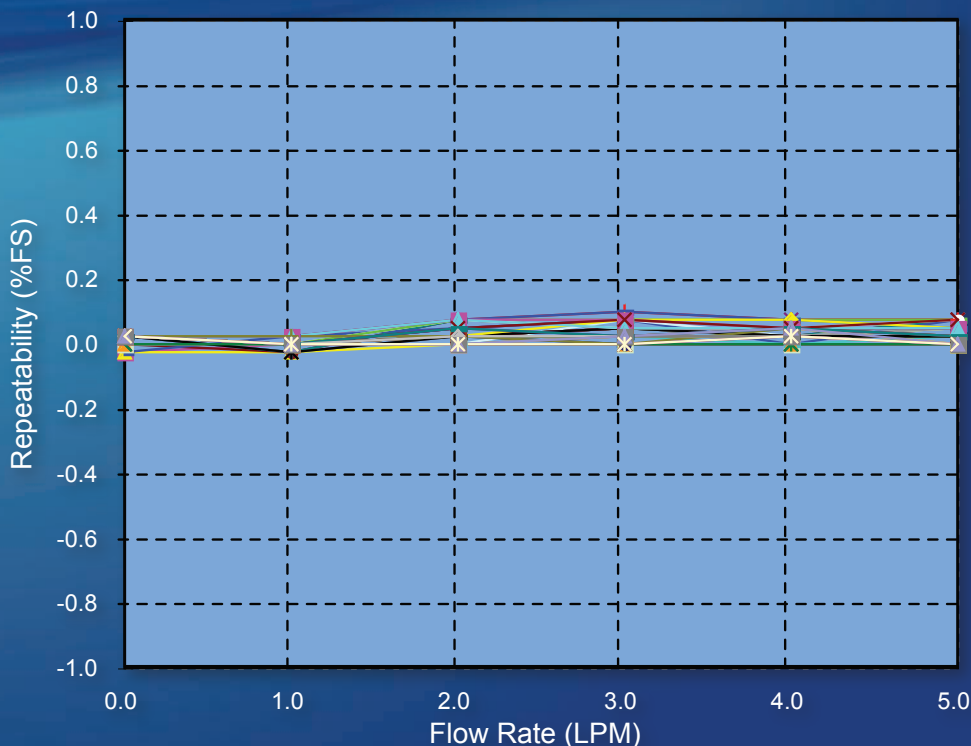
**D6F-05N2-000**

Operating Characteristics



## Repeatability Test Results

D6F-05N2-000 (5 samples, repeated 10 times each)

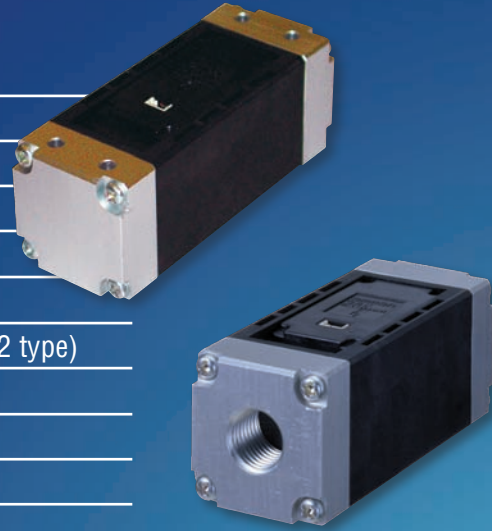


Omron's manufacturing expertise produces superb repeatability, resulting in consistent product yields, eliminating costly field calibration.

# D6F-10/20/50

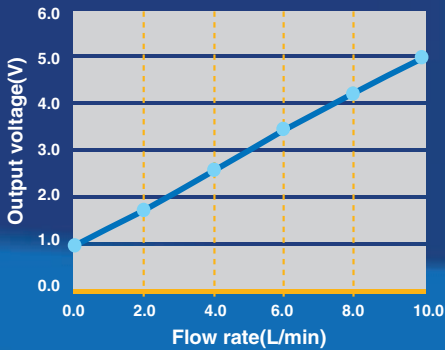
## High accuracy mass flow sensor

A5 = right angle flange mount ports (D6F- 10/20/50 A5-000)	
A6 = straight thru Rc 1/4 taper pipe threads (D6F-10/20/50 A6-000)	
A61 = 1/8-27 NPT pipe threads (D6F- 10/20/50 A61-000)	
A62 = 1/2 NPT pipe threads (D6F- 10/20/50 A62-000)	
Flow range	10 LPM, 20 LPM, 50 LPM
Compact Size	78(L) x 30(W) x 30 (H) mm (L = 92 mm for A62 type)
Supply Voltage	10.8 to 26.4 VDC
Accuracy	+/- 3% FS max
Temp Range	-10 to +60°C
Calibration Gas*	Air



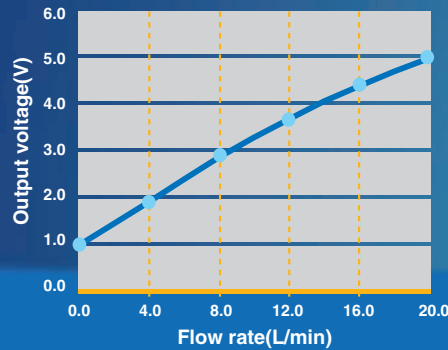
**D6F-10A5-000**

Operating Characteristics



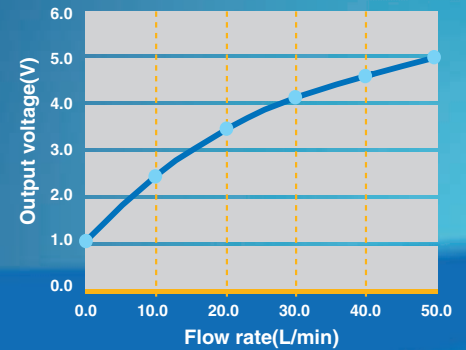
**D6F-20A5-000**

Operating Characteristics



**D6F-50A5-000**

Operating Characteristics



# High Flow D6F-70AB/200AB

70 to 200 LPM sensor utilizes internal bypass structure to reduce effects of diaphragm pump pulsation

### Tentative Specifications:

A5 = right angle flange mount ports (D6F-70/200 AB5-000)	
A62 = 1/2 NPT pipe threads (D6F-70/200 AB62-000)	
Flow range	-70 to +70 LPM, and -200 to +200 LPM
Compact Size	92 (L) x 30 (W) x 32 (H)mm for AB6 type endcaps
Supply Voltage	10.8 to 26.4 VDC
Accuracy	+/- 3% FS max
Temp Range	-10 to +60°C
Calibration Gas*	Air



\* Contact Omron for other calibration gases. Omron mass flow sensors are compatible with a wide variety of noncorrosive gases including Nitrogen, Oxygen, Carbon Dioxide, Argon, Heliox, and Nitrogen Oxides among others.

# Air Velocity Sensors - Ideal for clogged filter sensing

## D6F-W, D6F-V

with Dust Segregation System

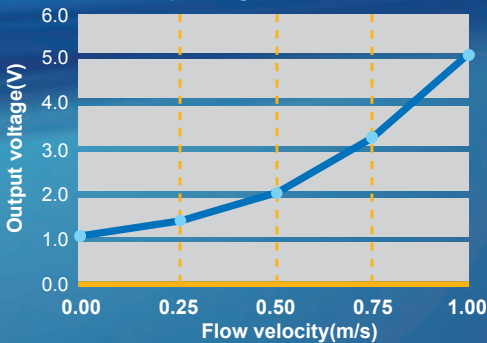
	D6F-W01A1	D6F-W04A1	D6F-W10A1
Flow Range	1 m/sec	4 m/sec	10 m/sec
Ultra-Compact Size	39(L) x 20(W) x 9(H) mm		
Supply Voltage	10.8 to 24.6 VDC		
Analog Output	1 to 5 VDC amplified temperature compensated		
Accuracy	+/-5% FS max		
Temperature Range	-10 to 60°C		
Gas Type	Air (contact Omron for other gases)		

<b>Economical</b>	<b>D6F-V03A1</b>
Flow Range	3 m/sec
Ultra-Compact Size	24(L) x 13(W) x 8(H) mm
Supply Voltage	3.15 to 3.45 VDC
Analog Output	0.5 to 2 VDC amplified (not temperature compensated)
Accuracy	+/- 10% FS max
Temperature Range	-10 to 60°C
Gas Type	Air (contact Omron for other gases)

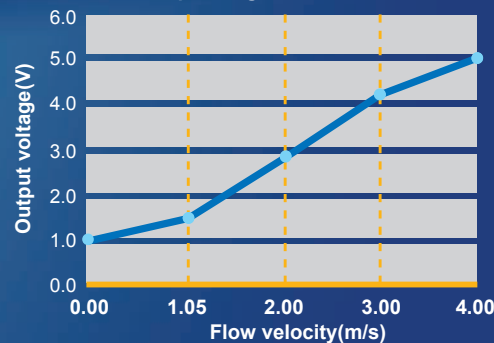


The housing design is based on a centrifugal principle to segregate particulates from the air.

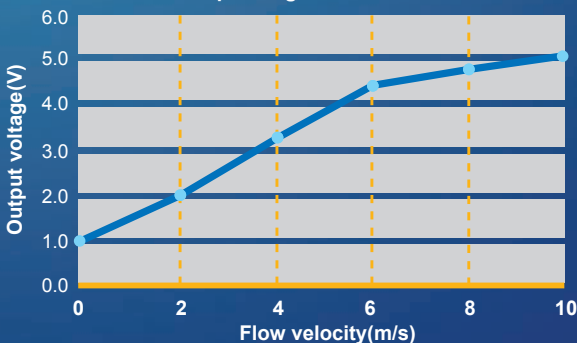
**D6F-W01A1**  
Operating Characteristics



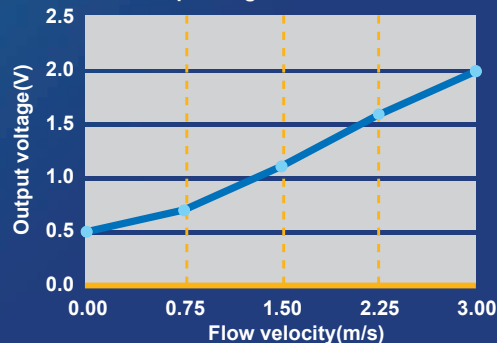
**D6F-W04A1**  
Operating Characteristics



**D6F-W10A1**  
Operating Characteristics



**D6F-V03A1**  
Operating Characteristics





**2SMPP-02  
MEMS Gauge Pressure Sensor**

- Pressure range of 0-37 kPa
- Small package 6.1 x 4.7 x 8.2 mm
- Low power consumption 0.2 mW
- Low offset and span output variation
- Low temperature influence
- Economical solution for vast applications from medical to home appliances to instrumentation.



**MEMS Absolute Pressure Sensor**

- Tentative Specifications*
- Pressure Range 50 to 110 kPa
  - Small size 3.8 x 3.8 x 1.25 mm
  - Vertical movement detection can be used to enhance GPS and health monitoring devices as well as fall detection for hard drives and other electronic devices.



**MEMS Thermal IR Sensor**

- Tentative Specifications*
- 1 x 8 array of sensors
  - 6 meter sensing distance
  - 7deg field of view per element
  - 30 x 17 x 18 mm package
  - Room occupancy detection without motion.
  - Detects number of people and general comfort level.

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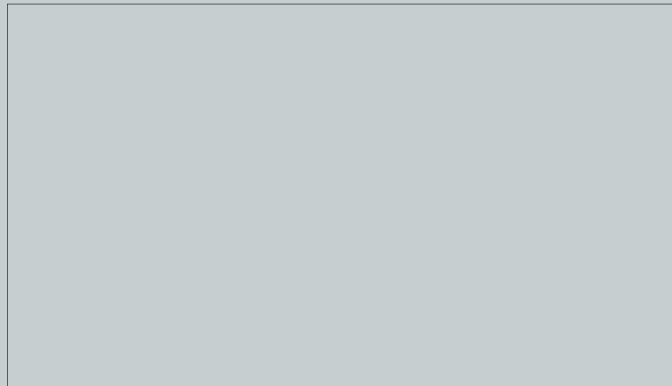
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It is the buyer's sole responsibility to ensure that any Omron product is fit and sufficient for use in a motorized vehicle application. Buyer shall be solely responsible for determining appropriateness of the particular product with respect to the buyer's application, end product, or system. Buyer shall take the application responsibility in all cases, but the following is a non-exhaustive list of applications for which particular attention must be given:

- (I) Outdoor use; uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
  - (II) Use in consumer products or any use in significant quantities.
  - (III) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
  - (IV) Systems, machines, and equipment that could present a risk to life or property.
- Never use the product for an application involving serious risk to life or property or in large quantities without ensuring that the end product as a whole has been designed to address relevant risks, and that the Omron product is properly rated and installed for its intended use.

**OMRON ELECTRONIC COMPONENTS LLC**

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