

# D6F-PH

MEMS Differential pressure Sensor

## A Compact, High-accuracy Differential Pressure Sensor with Superior Resistance to Environments.

 Digital

- High accuracy of  $\pm 3\%$  RD
- Linearized and temperature compensated
- Digital output (I2C communication)
- High flow impedance to reduce the influence of bypass configuration
- Lineup of 4 types of slave address models



RoHS Compliant



Refer to the *Common Precautions for the D6F Series* on page 40.

### Ordering Information

Applicable fluid (See note 1.)	Measurement range (See note 3.)	slave address (7 bit)	Model
Air (See note 2.)	0 to 250 Pa	0b110_1100, 0x6C	D6F-PH0025AD1
		0b110_1101, 0x6D	D6F-PH0025AD1-1
		0b110_1110, 0x6E	D6F-PH0025AD1-2
		0b110_1111, 0x6F	D6F-PH0025AD1-3
	-50 to 50 Pa	0b110_1100, 0x6C	D6F-PH0505AD3
		0b110_1101, 0x6D	D6F-PH0505AD3-1
		0b110_1110, 0x6E	D6F-PH0505AD3-2
		0b110_1111, 0x6F	D6F-PH0505AD3-3
	-500 to 500 Pa	0b110_1100, 0x6C	D6F-PH5050AD3
		0b110_1101, 0x6D	D6F-PH5050AD3-1
		0b110_1110, 0x6E	D6F-PH5050AD3-2
		0b110_1111, 0x6F	D6F-PH5050AD3-3

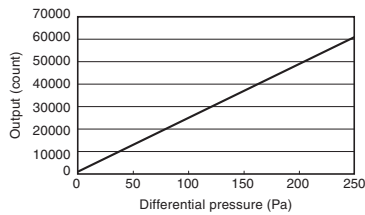
Note: 1. The Sensor be calibrated for different gas types. Consult your Omron representative.

Note: 2. Dry gas must not contain large particles, e.g., dust, oil, or mist.

Note: 3. At standard atmospheric pressure (1013.25 hPa)

### Output Characteristics

#### D6F-PH0025AD1-□



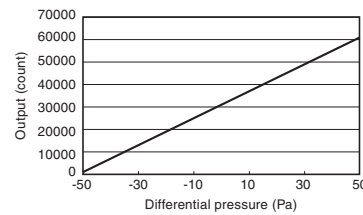
Differential pressure (Pa)	0	50	100	150	200	250
Output (HEX)	1024 (0400)	13024 (32E0)	25024 (61C0)	37024 (90A0)	49024 (BF80)	61024 (EE60)

Measurement conditions: Power supply voltage of  $3.3 \pm 0.1$  VDC, ambient temperature of  $25 \pm 5^\circ\text{C}$ , and ambient humidity of 35% to 75%.

Differential pressure conversion formula:  $Dp = (Op - 1024) / 60000 \times 250$

$Dp$  = Differential pressure,  $Op$  = Output

#### D6F-PH0505AD3-□



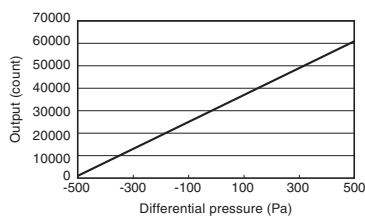
Differential pressure (Pa)	-50	-30	-10	0	10	30	50
Output (HEX)	1024 (0400)	13024 (32E0)	25024 (61C0)	31024 (7930)	37024 (90A0)	49024 (BF80)	61024 (EE60)

Measurement conditions: Power supply voltage of  $3.3 \pm 0.1$  VDC, ambient temperature of  $25 \pm 5^\circ\text{C}$ , and ambient humidity of 35% to 75%.

Differential pressure conversion formula:  $Dp = (Op - 1024) / 60000 \times 100 - 50$

$Dp$  = Differential pressure,  $Op$  = Output

#### D6F-PH5050AD3-□



Differential pressure (Pa)	-500	-300	-100	0	100	300	500
Output (HEX)	1024 (0400)	13024 (32E0)	25024 (61C0)	31024 (7930)	37024 (90A0)	49024 (BF80)	61024 (EE60)

Measurement conditions: Power supply voltage of  $3.3 \pm 0.1$  VDC, ambient temperature of  $25 \pm 5^\circ\text{C}$ , and ambient humidity of 35% to 75%.

Differential pressure conversion formula:  $Dp = (Op - 1024) / 60000 \times 1000 - 500$

$Dp$  = Differential pressure,  $Op$  = Output

Note. Change of gas density affects the sensor output.  
Change of atmospheric pressure is compensated by the following formula.  
 $Dpeff = Dp \times (Pstd / Pamb)$   
 $Dpeff$ : Effective differential pressure  
 $Dp$ : Differential pressure of the sensor output  
 $Pstd$ : Standard atmospheric pressure (1013.25 hPa)  
 $Pamb$ : Actual ambient atmospheric pressure (hPa)

## Characteristics/Performance

Model	D6F-PH0025AD1-□	D6F-PH0505AD3-□	D6F-PH5050AD3-□
Differential pressure range (See note 1)	0 to 250 Pa	±50 Pa	±500 Pa
Calibration Gas (See note 2.)	Air		
Port Type	Bamboo joint, Maximum outside diameter: 4.9 mm, minimum outside diameter: 4.0 mm		
Power Supply	2.3 to 3.6 VDC		
Current Consumption	6 mA max. with no load and Vcc of 3.3 VDC, GND = 0 VDC, 25°C		
Resolution	12 bit		
Zero point tolerance (See note 3.)	±0.2 Pa		
Span tolerance (See note 3.)	±3% RD		
Span shift due to temperature variation	< 0.5% RD per 10°C		
Response time	33 ms typical at 12 bit resolution (50 ms max.) The processing time is 6 ms typical at 12 bit resolution.		
Gas flow through sensor (See note 5.)	63 mL/min	23 mL/min	100 mL/min
Interface	I2C		
Case material	PPS		
Degree of Protection	IEC IP40 (Excluding tubing sections.)		
Withstand Pressure	10 kPa		
Operating temperature (See note 4.)	-20 to +80°C		
Operating humidity (See note 4.)	35 to 85 %RH		
Storage temperature (See note 4.)	-40 to +80°C		
Storage humidity (See note 4.)	35 to 85 %RH		
Insulation Resistance	Between Sensor outer cover and lead terminals: 20 MΩ min. (at 500 VDC)		
Dielectric Strength	Between Sensor outer cover and lead terminals: 500 VAC, 50/60 Hz min. for 1 min (leakage current: 1 mA max.)		
Weight	5.2 g		

Note: 1. At standard atmospheric pressure (1013.25 hPa)

Note: 2. Dry gas must not contain large particles, e.g., dust, oil, or mist.

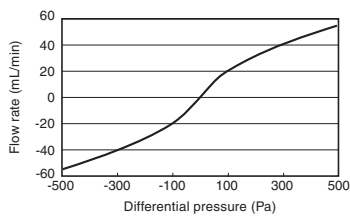
Note: 3. The zero point tolerance and span tolerance are independent uncertainties and add according to the principles of error propagation.

Note: 4. With no condensation or icing.

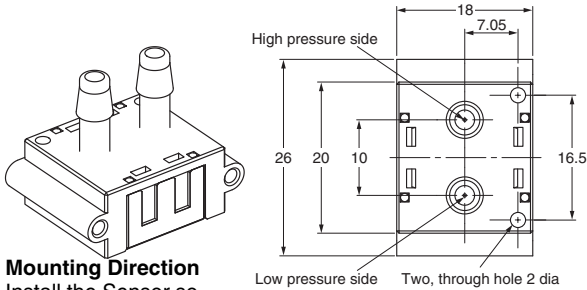
Note: 5. Type D6F-PH is based on thermal flow principle. Air flow is needed to measure the differential pressure.

Typical characteristic of air flow by differential pressure is below.

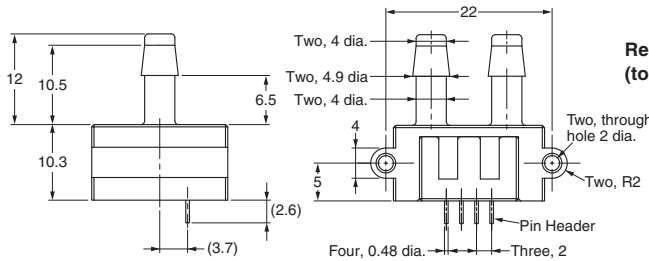
### Relation between pressure and flow rate



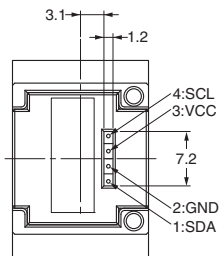
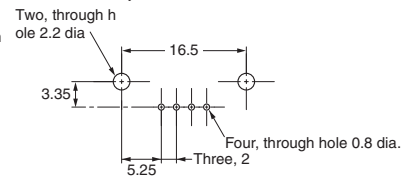
## Connections/Dimensions (Unit: mm)



**Mounting Direction**  
Install the Sensor so that the joints are facing upward.



**Recommendation size for pin header installation (tolerances:  $\pm 0.1$ )**



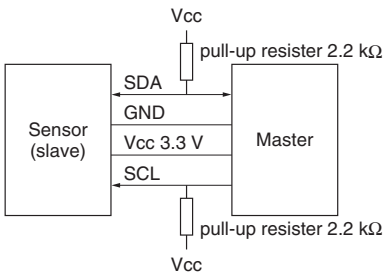
### Tubes

Install tubes made of materials such as rubber, urethane or nylon so that they will not come out. For urethane tubes, tubes with an outer diameter of 6 mm and an inner diameter of 4 mm are recommended.

### Soldering Conditions

Use a soldering iron for 5 s at 350°C with a pressure of 100 gf max.

## Electrical connection



## Communication

		D6F-PH0025AD1 D6F-PH0505AD3 D6F-PH5050AD3	D6F-PH0025AD1-1 D6F-PH0505AD3-1 D6F-PH5050AD3-1	D6F-PH0025AD1-2 D6F-PH0505AD3-2 D6F-PH5050AD3-2	D6F-PH0025AD1-3 D6F-PH0505AD3-3 D6F-PH5050AD3-3
Serial Interface		I2C			
Master/Slave	HEX	0x6C	0x6D	0x6E	0x6F
	BIN (7bit)	0b110_1100	0b110_1101	0b110_1110	0b110_1111
Speed mode		Max. 400kHz (Fast Mode)			
Signal	SCL	Serial Clock			
	SDA	Data Signal			