D6F-PH

MEMS Differential pressure Sensor

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

Air Digital

- **High accuracy of ±3% RD**
- **Linearized and temperature compensated**
- **Digital output (I2C communication)**
- **High flow impedance to reduce the influence of bypass configuration**

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.)	Model
Air (See note 2.)	0 to 250 Pa (0 to 1 in. H_2O)	**D6F-PH0025AD1**
	-50 to +50 Pa (±0.2 in. H_2O)	**D6F-PH0505AD3**
	-500 to +500 Pa (±2 in. H_2O)	**D6F-PH5050AD3**

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)
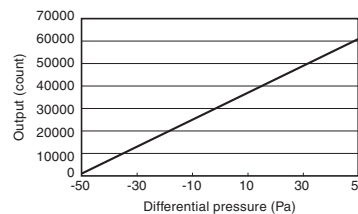
Output Characteristics

D6F-PH0025AD1
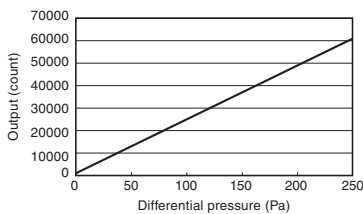
Differential pressure (Pa)	0	50	100	150	200	250
Output (HEX)	1024 (0400)	13024 (32E0)	25024 (61C0)	37024 (90A0)	49024 (BF80)	61024 (EE60)

Measurement conditions: Power supply voltage of 3.3 ±0.1 VDC, ambient temperature of 25±5°C, and ambient humidity of 35% to 75%.
Differential pressure conversion formula: Dp = (Op - 1024) / 60000 × 250
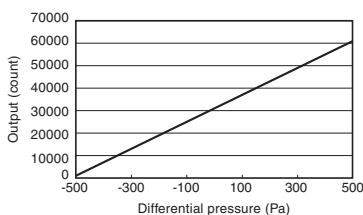Dp = Differential pressure, Op = Output

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 ±0.1 VDC, ambient temperature of 25±5°C, and ambient humidity of 35% to 75%.
Differential pressure conversion formula: Dp = (Op - 1024) / 60000 × 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 ±0.1 VDC, ambient temperature of 25±5°C, and ambient humidity of 35% to 75%.
Differential pressure conversion formula: Dp = (Op - 1024) / 60000 × 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 × (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 4.)	±0.2 Pa		
Span tolerance (See note 4.)	±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 3.)	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 5.)	-20 to +80°C		
Operating humidity (See note 5.)	35 to 85 %RH		
Storage temperature (See note 5.)	-40 to +80°C		
Storage humidity (See note 5.)	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. 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.
Note: 4. The zero point tolerance and span tolerance are independent uncertainties and add according to the principles of error propagation.
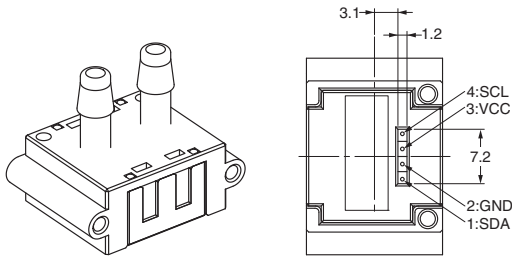Note: 5. With no condensation or icing.
Note: 6. Please call us about functions, such as fault detection, temperature check, Vdd check, threshold value setup.
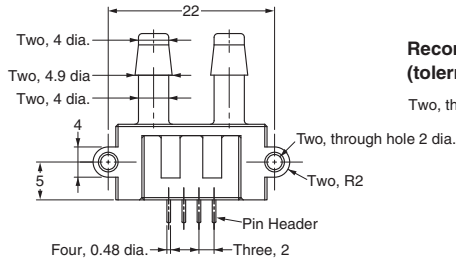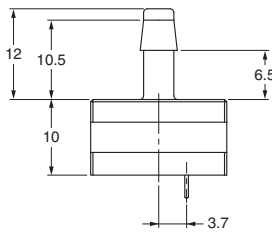
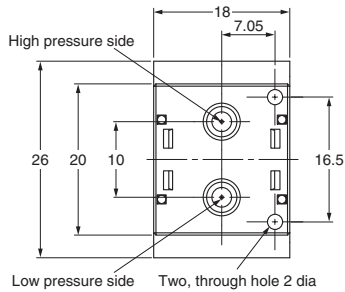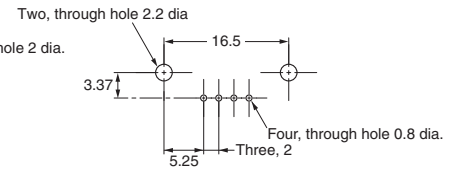Relation between pressure and flow rate

D6F-PH

MEMS Differential pressure Sensor
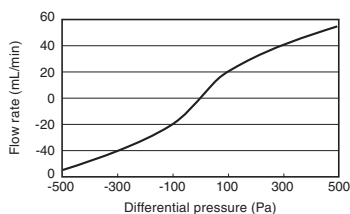
Connections/Dimensions (Unit: mm)

3.1
1.2

4:SCL
3:VCC
7.2
2:GND
1:SDA

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

12 10.5
6.5
10
3.7

22
Two, 4 dia.
Two, 4.9 dia
Two, 4 dia.
4
5
Two, through hole 2 dia.
Two, R2
Pin Header
Four, 0.48 dia.
Three, 2

Recommendation size for pin header installation (tolerrances: ±0.1)

Two, through hole 2.2 dia
16.5
3.37
Four, through hole 0.8 dia.
Three, 2
5.25

18
7.05
High pressure side
26 20 10
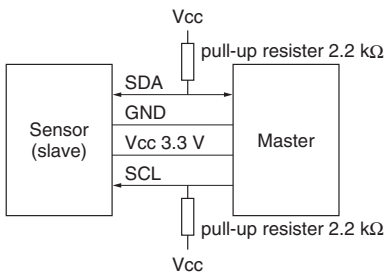16.5
Low pressure side
Two, through hole 2 dia

Tubes
Install tubes made of materials such as rubber or urethane
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

Vcc
pull-up resister 2.2 kΩ
SDA
GND
Vcc 3.3 V
SCL
Sensor (slave)
Master
pull-up resister 2.2 kΩ
Vcc

Communication

Serial Interface		I2C
Master/Slave		Slave / Address: HEX : 0x6C BIN : 110_1100 (7bit)
Speed mode		Fast Mode 400kHz
Signal		
	SCL	Serial Clock
	SDA	Data Signal