

PFLOW Series

Mass Airflow Sensors

Description

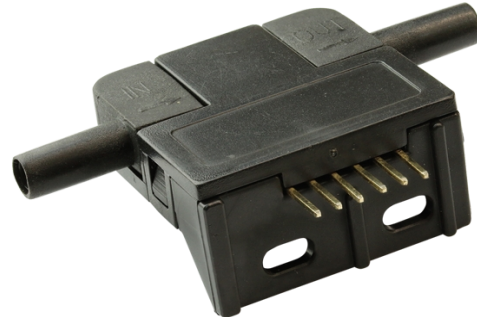
The PFLOW series of mass airflow sensors incorporate the latest MEMS and microelectronics innovations. The sensor die uses a pair of thermopiles to detect changes in temperature gradient caused by mass flow, delivering ultra-low noise-to-signal, and unsurpassed repeatability. The “solid state” thermal isolation on the sensor die eliminates the need for surface cavities or fragile membranes, used in competing solutions, making the sensor resistant to clogging and pressure shock. The sensor’s internal signal conditioning circuitry leverages an off-the-shelf microcontroller, providing proven reliability and low cost.

The PFLOW series of mass airflow sensors covers the ranges from 10 sccm to 2000 sccm. The sensors are fully calibrated and compensated over the temperature range of 0 to 50 °C (32 to 122 °F). The linearized analog output (1 to 5 V) provides customers with maximum flexibility and ease-of-use.

Bidirectional air flow versions are available upon request. Consult PEWATRON

Applications

- Medical respirators and ventilators
- Patient monitoring systems
- Anesthesia delivery machines
- Nebulizers
- Oxygen concentrators
- Sleep apnea machines
- Ventricular assistance devices
- Environmental monitoring
- Analytical instrumentation
- Gas leak detection
- Filter monitoring and VAV systems in HVAC
- Process Control



Features

- Unsurpassed performance in a robust and cost effective package
- High accuracy and repeatability (2% F.S. Max)
- Linear output and temperature compensation
- Long-term stability with minimal null drift
- “Solid state” sensing core (no surface cavity or fragile membrane), resistant to clogging and pressure shock
- Analog output (1 to 5 V)
- High sensitivity at very low flows
- Fast response time (1 ms)

Absolute Maximum Ratings

- Operating Temperature: -25 °C to 85 °C
- Storage Temperature: -40 °C to 90 °C
- Humidity: 0 to 100% RH*
- Shock 100 g peak (5 drops, 6 axis)
- Common Mode Pressure 25 psi**

*Sensor is resistant to water condensation

**Packaging with higher common model pressure rating is available

PFLOW Series

| ELECTRICAL CHARACTERISTICS | | | | | |
|---|---|------|------|----------|-------------------|
| Test Conditions: Vin=10±0.01VDC, Ta=25°C. Relative Humidity: 40%<RH<60% | | | | | |
| Maximum Operating Temperature Range -25°C to +85°C | | | | | |
| PARAMETERS | PFLOW10U-2210 Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Flow Range ¹ (Full Scale) | 0 | | 10 | SCCM | |
| Max Output Voltage | 4.94 | 5.00 | 5.02 | VDC | @10 sccm |
| PARAMETERS | PFLOW301U-2210 Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Flow Range ¹ (Full Scale) | 0 | | 30 | SCCM | |
| Max Output Voltage | 4.94 | 5.00 | 5.02 | VDC | @30 sccm |
| PARAMETERS | PFLOW202U-2210 Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Flow Range ¹ (Full Scale) | 0 | | 200 | SCCM | |
| Max Output Voltage | 4.94 | 5.00 | 5.02 | VDC | @200 sccm |
| PARAMETERS | PFLOW113U-2210 Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Flow Range ¹ (Full Scale) | 0 | | 1000 | SCCM | |
| Max Output Voltage | 4.94 | 5.00 | 5.02 | VDC | @1000 sccm |
| PARAMETERS | PFLOW213U-2210 Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Flow Range ¹ (Full Scale) | 0 | | 2000 | SCCM | |
| Max Output Voltage | 4.94 | 5.00 | 5.02 | VDC | @2000 sccm |
| PARAMETERS | PFLOW Series | | | | CONDITIONS |
| | MIN | TYP | MAX | UNIT | |
| Analog Voltage Output ² | 1 | | 5 | VDC | |
| Null Voltage ³ | .95 | 1 | 1.05 | VDC | |
| Null Drift | | 0.2 | | % / Year | Full Scale |
| Temperature Drift | | | 4 | % | 0°C to +50°C |
| Repeatability | | 0.1 | | % | Full Scale |
| Load | | 100 | | KΩ | |
| Accuracy ⁴ (Full Scale) | | 1.5 | 2 | % | |
| Response Time | | 1 | 3 | mSec | |
| Supply Voltage | 8 | 10 | 14 | VDC | |
| Supply Current | 22 | | 23 | mA | |
| Inrush Current ⁵ | | | 550 | mA | Duration: 3 ms |
| Wetted Materials | Silicon carbide, Epoxy, PPS, FR4, Silicone as static seal | | | | |

1. Custom ranges available between 10 and 2000 sccm

2. See Linear Output Flow Rate Calculation on Page 3

3. Null tolerance for PFLOW10U-2210 is ± 0.1V

4. Accuracy for PFLOW301U-2210 and PFLOW10U-2210 is 2.5% F.S. Max

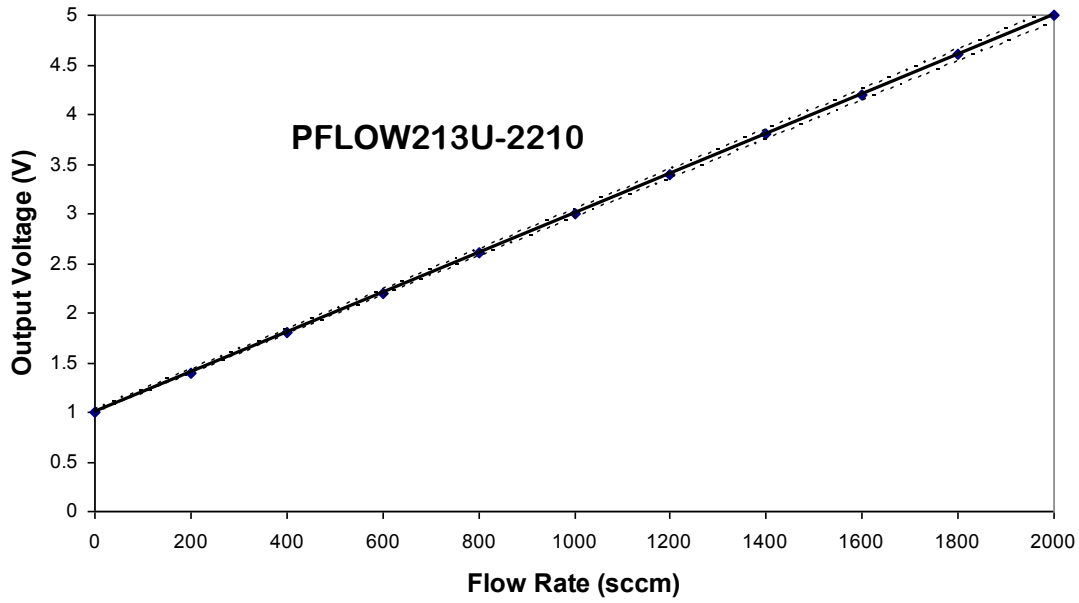
5. A series resistance of 5 ohms on the source supply will reduce inrush current to under 250 mA (duration: 8 ms)

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Linear Output

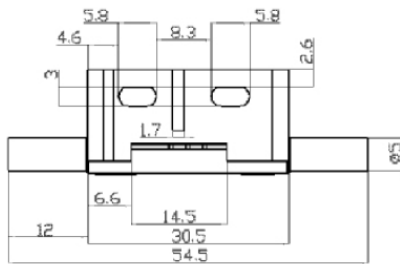
$$\text{Flow Rate} = [(V_{out} - 1 \text{ V}) / 4 \text{ V}] \times \text{Full Scale Flow Rate}$$

For example, using the PFLOW213U-2210 below, the device has a Full Scale Flow Rate of 2000 sccm. When the Output Voltage reads 2.5V, the Flow Rate will be: $[(2.5\text{V}-1\text{V})/4\text{V} \times 2000 \text{ sccm}] = 750 \text{ sccm}$



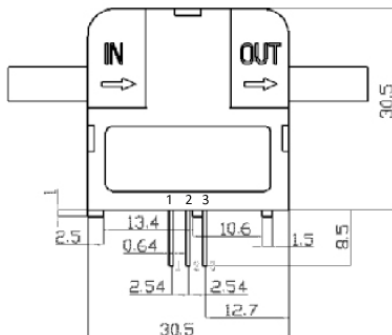
PFLOW Series

Package Dimensions



Pin-out

- 1 Vout
- 2 Vcc
- 3 GND



Ordering Information

| Part Number | Specifications |
|----------------|----------------------------------|
| PFLOW10U-2210 | 1 to 5 V, linear; 0 to 10 SCCM |
| PFLOW301U-2210 | 1 to 5 V, linear; 0 to 30 SCCM |
| PFLOW202U-2210 | 1 to 5 V, linear; 0 to 200 SCCM |
| PFLOW113U-2210 | 1 to 5 V, linear; 0 to 1000 SCCM |
| PFLOW213U-2210 | 1 to 5 V, linear; 0 to 2000 SCCM |

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