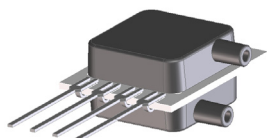


# MINIATURE AMPLIFIED LOW PRESSURE SENSORS

Low Pressure (1" H<sub>2</sub>O to 30 " H<sub>2</sub>O) Sensors  
PRIME GRADE



## Features

- 0 to 1" H<sub>2</sub>O to 0 to 30" H<sub>2</sub>O Pressure Ranges
- Matched pressure port volumes
- Temperature Compensated (-25 to 85° C)
- Calibrated Zero and Span

## Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

## General Description

The Miniature Amplified Output pressure sensors is based upon a proprietary technology to reduce all output offset or common mode errors. This model provides a calibrated amplified output with superior output offset characteristics. Output offset errors due to change in temperature, stability to warm-up, stability to long time period, and position sensitivity are all significantly reduced when compared to conventional compensation methods. In addition the sensor utilizes a silicon, micromachined, stress concentration enhanced structure to provide a very linear output to measured pressure.

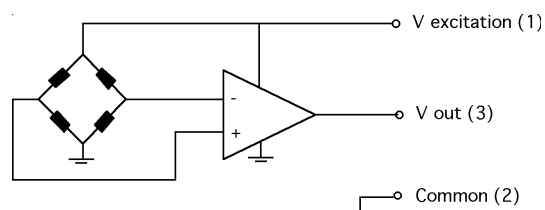
These calibrated and temperature compensated sensors give an accurate and stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like.

The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage between 4.5 and 5.5 volts.

## Physical Dimensions



## Equivalent Circuit



## Pressure Sensor Characteristics Maximum Ratings

|                                                 |                  |
|-------------------------------------------------|------------------|
| <b>Supply Voltage VS</b>                        | +4.5 to +5.5     |
| <b>Common-mode pressure</b>                     | Vdc              |
| <b>Lead Temperature</b><br>(soldering 2-4 sec.) | 10 psig<br>250°C |

## Environmental Specifications

|                           |                                 |
|---------------------------|---------------------------------|
| <b>Temperature Ranges</b> |                                 |
| <b>Compensated</b>        | -25 to 85° C                    |
| <b>Operating</b>          | -40 to 125° C                   |
| <b>Storage</b>            | -40 to 125° C                   |
| <b>Humidity Limits</b>    | 0 to 95% RH<br>(non condensing) |

## Standard Pressure Ranges

| Part Number         | Operating Pressure | Nominal Span | Proof Pressure | Burst Pressure |
|---------------------|--------------------|--------------|----------------|----------------|
| 1 INCH-Dx-P4V-MINI  | ±1 ln H2O          | 4 V          | 100 ln H2O     | 200 ln H2O     |
| 1 INCH-G-P4V-MINI   | 0 - 1 ln H2O       | 4 V          | 300 ln H2O     | 200 ln H2O     |
| 5 INCH-Dx-P4V-MINI  | ±5 ln H2O          | 4 V          | 200 ln H2O     | 300 ln H2O     |
| 5 INCH-G-P4V-MINI   | 0 - 5 ln H2O       | 4 V          | 200 ln H2O     | 300 ln H2O     |
| 10 INCH-Dx-P4V-MINI | ±10 ln H2O         | 4 V          | 200 ln H2O     | 300 ln H2O     |
| 10 INCH-G-P4V-MINI  | 0 - 10 ln H2O      | 4 V          | 200 ln H2O     | 300 ln H2O     |
| 20 INCH-Dx-P4V-MINI | ±20 ln H2O         | 4 V          | 300 ln H2O     | 500 ln H2O     |
| 20 INCH-G-P4V-MINI  | 0 - 20 ln H2O      | 4 V          | 300 ln H2O     | 500 ln H2O     |
| 30 INCH-Dx-P4V-MINI | ±30 ln H2O         | 4 V          | 500 ln H2O     | 800 ln H2O     |
| 30 INCH-G-P4V-MINI  | 0 - 30 ln H2O      | 4 V          | 500 ln H2O     | 800 ln H2O     |
| 60 INCH-Dx-P4V-MINI | ±60 ln H2O         | 4V           | 500 ln H2O     | 800 ln H2O     |

For differential pressure D1 is the package with two pressure ports the same side, D2 has two ports the opposite sides.

## Equivalent Circuit



## Performance Characteristics for 1 INCH-Dx-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, differential pressure        |         | ±1.0    |         | "H <sub>2</sub> O |
| Output Span, note 5                           | ±1.90   | ±2.0    | ±2.10   | volt              |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±60     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±10     |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±10     |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±2      | %span             |

## Performance Characteristics for 1 INCH-G-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, gage pressure                |         | 1.0     |         | "H <sub>2</sub> O |
| Output Span, note 5                           | 3.90    | 4.0     | 4.10    | volt              |
| Offset Voltage @ zero pressure                | 0.15    | 0.25    | 0.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±60     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±10     |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±15     |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±10     |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (5°C-50°C), note 2                 |         |         | ±2      | %span             |

## Performance Characteristics for 5 INCH-Dx-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, differential pressure        |         | ±5.0    |         | "H <sub>2</sub> O |
| Output Span, note 5                           | ±1.90   | ±2.0    | ±2.10   | volt              |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±40     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±1      | %span             |



## Performance Characteristics for: 5 INCH-G-P4V-MINI

| Parameter, NOTE 1                             | Minimum | Nominal | Maximum | Units |
|-----------------------------------------------|---------|---------|---------|-------|
| Operating Range, gage pressure                |         | 5.0     |         | mbar  |
| Output Span, NOTE 5                           | 3.90    | 4.0     | 4.10    | volt  |
| Offset Voltage @ zero pressure                | 0.15    | 0.25    | 0.35    | volt  |
| Offset Temperature Shift (-25°C-85°C), NOTE 2 |         |         | ±40     | mvolt |
| Offset Warm-up Shift, NOTE 3                  |         | ±5      |         | mvolt |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt |
| Linearity, hysteresis error, NOTE 4           |         | 0.05    | 0.25    | %fs   |
| Span Shift (-25°C-85°C), NOTE 2               |         |         | ±1      | %span |

## Performance Characteristics for: 10 INCH-Dx-P4V-MINI

| Parameter, NOTE 1                             | Minimum | Nominal | Maximum | Units |
|-----------------------------------------------|---------|---------|---------|-------|
| Operating Range, differential pressure        |         | ±10.0   |         | mbar  |
| Output Span, NOTE 5                           | ±1.90   | ±2.0    | ±2.10   | volt  |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt  |
| Offset Temperature Shift (-25°C-85°C), NOTE 2 |         |         | ±20     | mvolt |
| Offset Warm-up Shift, NOTE 3                  |         | ±5      |         | mvolt |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt |
| Linearity, hysteresis error, NOTE 4           |         | 0.05    | 0.25    | %fs   |
| Span Shift (-25°C-85°C), NOTE 2               |         |         | ±1      | %span |

## Performance Characteristics for: 10 INCH-G-P4V-MINI

| Parameter, NOTE 1                             | Minimum | Nominal | Maximum | Units |
|-----------------------------------------------|---------|---------|---------|-------|
| Operating Range, gage pressure                |         | 10.0    |         | mbar  |
| Output Span, NOTE 5                           | 3.90    | 4.0     | 4.10    | volt  |
| Offset Voltage @ zero pressure                | 0.15    | 0.25    | 0.35    | volt  |
| Offset Temperature Shift (-25°C-85°C), NOTE 2 |         |         | ±20     | mvolt |
| Offset Warm-up Shift, NOTE 3                  |         | ±5      |         | mvolt |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt |
| Linearity, hysteresis error, NOTE 4           |         | 0.05    | 0.25    | %fs   |
| Span Shift (-25°C-85°C), NOTE 2               |         |         | ±1      | %span |

## Performance Characteristics for 20 INCH-Dx-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, differential pressure        |         | ±20.0   |         | "H <sub>2</sub> O |
| Output Span, note 5                           | ±1.90   | ±2.0    | ±2.10   | volt              |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±20     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±1      | %span             |

## Performance Characteristics for 20 INCH-G-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, gage pressure                |         | 20.0    |         | "H <sub>2</sub> O |
| Output Span, note 5                           | 3.90    | 4.0     | 4.1     | volt              |
| Offset Voltage @ zero pressure                | 0.15    | 0.25    | 0.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±20     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±1      | %span             |

## Performance Characteristics for 30 INCH-Dx-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, differential pressure        |         | ±30.0   |         | "H <sub>2</sub> O |
| Output Span, note 5                           | ±1.90   | ±2.0    | ±2.10   | volt              |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±20     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±1      | %span             |



## Performance Characteristics for 30 INCH-G-P4V-MINI

| Parameter, NOTE 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, gage pressure                |         | 30.0    |         | "H <sub>2</sub> O |
| Output Span, NOTE 5                           | 3.9     | 4.0     | 4.1     | volt              |
| Offset Voltage @ zero pressure                | 0.15    | 0.25    | 0.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), NOTE 2 |         |         | ±20     | mvolt             |
| Offset Warm-up Shift, NOTE 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, NOTE 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), NOTE 2               |         |         | ±1      | %span             |

## Performance Characteristics for 60 INCH-Dx-P4V-MINI

| Parameter, note 1                             | Minimum | Nominal | Maximum | Units             |
|-----------------------------------------------|---------|---------|---------|-------------------|
| Operating Range, differential pressure        |         | ±60.0   |         | "H <sub>2</sub> O |
| Output Span, note 5                           | ±1.90   | ±2.0    | ±2.10   | volt              |
| Offset Voltage @ zero differential pressure   | 2.15    | 2.25    | 2.35    | volt              |
| Offset Temperature Shift (-25°C-85°C), note 2 |         |         | ±20     | mvolt             |
| Offset Warm-up Shift, note 3                  |         | ±5      |         | mvolt             |
| Offset Position Sensitivity (±1g)             |         | ±5      |         | mvolt             |
| Offset Long Term Drift (one year)             |         | ±5      |         | mvolt             |
| Linearity, hysteresis error, note 4           |         | 0.05    | 0.25    | %fs               |
| Span Shift (-25°C-85°C), note 2               |         |         | ±1      | %span             |

**Pressure Response: for any pressure applied the response time to get to 90% of pressure applied is typically less than 100 useconds.**

### Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 5.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO THE FRONT PORT.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

NOTE 3: SHIFT IS WITHIN THE FIRST HOUR OF EXCITATION APPLIED TO THE DEVICE.

NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

NOTE 5: THE VOLTAGE ADDED TO THE OFFSET VOLTAGE AT FULL SCALE PRESSURE. NOMINALLY THE OUTPUT VOLTAGE RANGE IS 0.25 TO 4.25 VOLTS FOR MINUS TO PLUS FULL SCALE PRESSURE.

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