PC-0002 Rev C

Piezoresistive Medium Pressure Sensors

PDF Catalog

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Amplified Middle Pressure Sensors

±0.3 psi to 100 psi Pressure Sensors

Features

- 0 to ±0.3 to 0 to 150 psi Pressure Ranges
- Ratiometric 4V Output
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Instrumentation
- HVAC Instrumentation

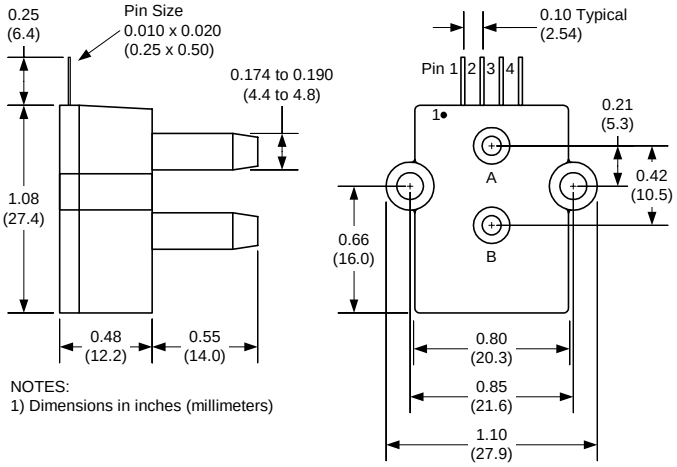
General Description

The Amplified line of middle pressure sensors is based upon a proprietary package technology to reduce errors. This model provides a ratiometric 4-volt output with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. 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. Each sensor is internally compensated using an ASIC compensation technique. 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 over a supply voltage range of 4.5 to 5.5 volts.

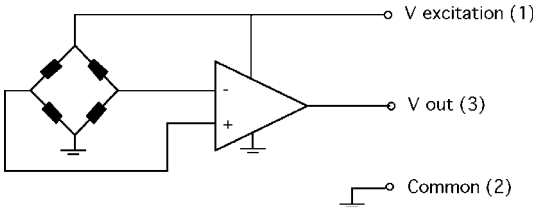
Physical Dimensions



NOTES:
1) Dimensions in inches (millimeters)

pin 1: Vsupply
pin 2: Common
pin 3: Voutput
pin 4: do not connect

Equivalent Circuit



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Pressure Sensor Ratings

Supply Voltage, Vs	+4.5 to +5.5 Vdc
Common-mode pressure	-10 to +10 psig
Lead Temperature, max (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	5 to 50° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D-4V	±0.3 PSI	4 V	5 PSI	10 PSI
0.3 PSI-G-4V	0 - 0.3 PSI	4 V	5 PSI	10 PSI
1 PSI-D-4V	±1 PSI	4 V	5 PSI	10 PSI
1 PSI-G-4V	0 - 1 PSI	4 V	5 PSI	10 PSI
5 PSI-D-4V	± 5 PSI	4 V	15 PSI	30 PSI
5 PSI-G-4V	0 - 5 PSI	4 V	15 PSI	30 PSI
15 PSI-A-4V	0 - 15 PSIA	4 V	45 PSI	60 PSI
15 PSI-D-4V	±15 PSI	4 V	45 PSI	60 PSI
15 PSI-G-4V	0 - 15 PSI	4V	45 PSI	60 PSI
30 PSI-A-4V	0 - 30 PSIA	4V	60 PSI	60 PSI
30 PSI-D-4V	±30 PSI	4V	60 PSI	60 PSI
30 PSI-G-4V	0 - 30 PSI	4V	60 PSI	100 PSI
100 PSI-G-4V	0 - 100 PSI	4V	150 PSI	150 PSI
150 PSI-G-4V	0 - 150 PSI	4V	200 PSI	200 PSI
BARO-A-4V	600 - 1100 mbar	4V	45 PSI	60 PSI

Performance Characteristics for 0.3 PSI-D-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure			±0.3	PSI
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 (5°C-50°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C-50°C), note 2			±2	%span

Performance Characteristics for 0.3 PSI-G-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	0		0.3	PSI
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 (5°C-50°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C-50°C), note 2			±2	%span

Performance Characteristics for 1 PSI-D-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure			±1.0	PSI
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 (5°C to 50°C), note 2			±40	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for: 1 PSI-G-4V

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	0		1.0	PSI
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 (5°C to 50°C), note 2			±40	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for: 5 PSI-D-4V

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure			±5.0	PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for: 5 PSI-G-4V

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	0		5.0	PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

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Performance Characteristics for 15 PSI-A-4V & 15 PSI-G-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute or gage pressure	0		15	psi
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 15 PSI-D-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure			±15.0	PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for BARO-A-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 30 PSI-A-4V & 30 PSI-G-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute or gage pressure	0		30	PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 30 PSI-D-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±30.0		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 100 PSI-G-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		100		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 150 PSI-G-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		150		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

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 PORT B.

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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Amplified Middle Pressure Sensors

0.3 psi to 15 psi Pressure Sensors

Military Temperature Grade

Features

- 0 to 0.3 psi to 0 to 15 psi Pressure Ranges
- Ratiometric 4V Output
- Temperature Compensated **(-40C to 125C)**
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

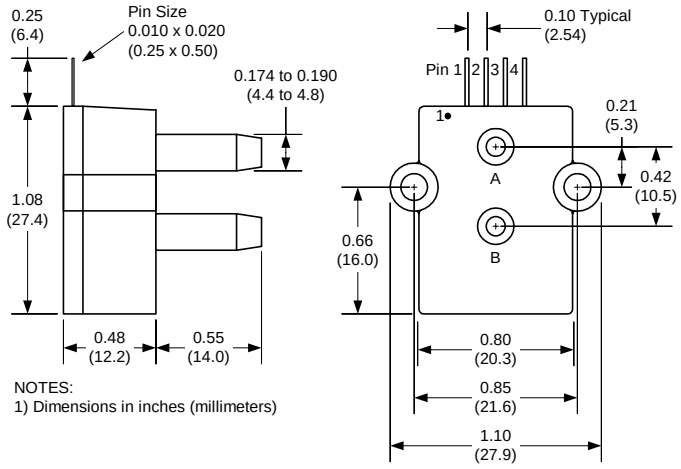
General Description

The Amplified line of middle pressure sensors is based upon a proprietary package technology to reduce errors. This model provides a ratiometric 4-volt output with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. 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. Each sensor is internally compensated using an ASIC compensation technique. 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 over a supply voltage range of 4.5 to 5.5 volts.

Physical Dimensions



pin 1: Vsupply

pin 2: Common

pin 3: Voutput

pin 4: do not connect

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Pressure Sensor Ratings

Supply Supply Voltage VS	+4.5 to +5.5 Vdc
Common-mode pressure	-10 to +10 psig
Lead Temperature, max (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	-40 to 125° C
Operating	-40 to 125° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D-4V-MIL	±0.3 PSI	4 V	5 PSI	10 PSI
0.3 PSI-G-4V-MIL	0 - 0.3 PSI	4 V	5 PSI	10 PSI
1 PSI-D-4V-MIL	±1 PSI	4 V	5 PSI	10 PSI
1 PSI-G-4V-MIL	0 - 1 PSI	4 V	5 PSI	10 PSI
5 PSI-D-4V-MIL	± 5 PSI	4 V	15 PSI	30 PSI
5 PSI-G-4V-MIL	0 - 5 PSI	4 V	15 PSI	30 PSI
15 PSI-A-4V-MIL	0 - 15 PSIA	4 V	45 PSI	60 PSI
15 PSI-D-4V-MIL	±15 PSI	4 V	45 PSI	60 PSI
15 PSI-G-4V-MIL	0 - 15 PSIG	4 V	45 PSI	60 PSI

Performance Characteristics for 0.3 PSI-D-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±0.3		PSI
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 (-40°C to 125°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±2	%span

Performance Characteristics for 0.3 PSI-G-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		0.3		PSI
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 (-40°C to 125°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±2	%span

Performance Characteristics for 1 PSI-D-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±1.0		PSI
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 (-40°C to 125°C), note 2			±40	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

Performance Characteristics for: 1 PSI-G-4V-MIL

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		1.0		PSI
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 (-40°C to 125°C), note 2			±40	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

Performance Characteristics for: 5 PSI-D-4V-MIL

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±5.0		PSI
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 (-40°C to 125°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

Performance Characteristics for: 5 PSI-G-4V-MIL

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		5.0		PSI
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 (-40°C to 125°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

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Performance Characteristics for 15 PSI-A-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		15.0		PSI
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 (-40°C to 125°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

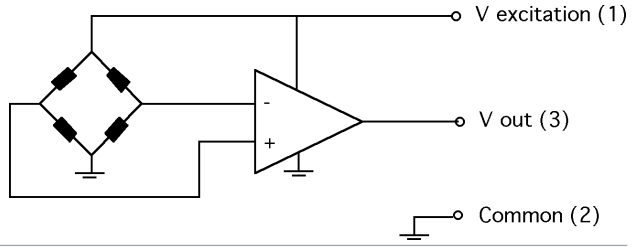
Performance Characteristics for 15 PSI-D-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±15.0		PSI
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 (-40°C to 125°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

Performance Characteristics for 15 PSI-G-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		15.0		PSI
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 (-40°C to 125°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

Equivalent Circuit



Pressure Response: for any pressure applied the response time to get to 90% of pressure applied is typically less than 500 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 PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

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

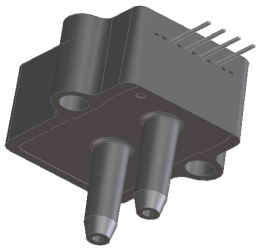
NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

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.

Amplified Middle Pressure Sensors

0.3 psi to 30 psi Pressure Sensors

Industrial Temperature Grade



Features

- 0 to 0.3 psi to 0 to 30 psi Pressure Ranges
- Ratiometric 4V Output
- Temperature Compensated **(-25C to 85C)**
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

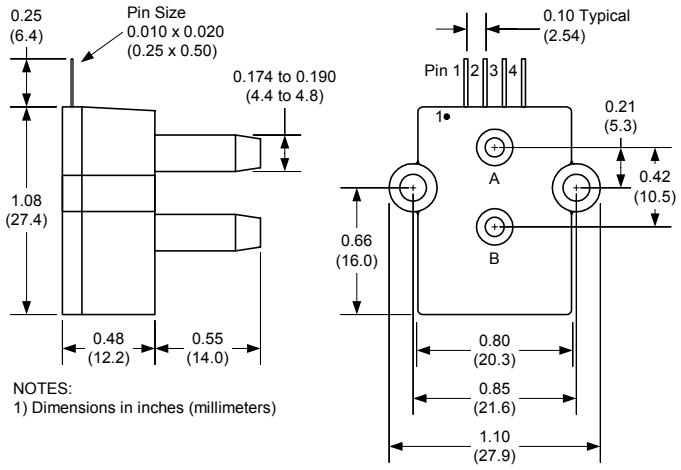
General Description

The Amplified line of middle pressure sensors is based upon a proprietary package technology to reduce errors. This model provides a ratiometric 4-volt output with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. 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. Each sensor is internally compensated using an ASIC compensation technique. 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 over a supply voltage range of 4.5 to 5.5 volts.

Physical Dimensions



pin 1: Vsupply

pin 2: Common

pin 3: Voutput

pin 4: do not connect

Approvals

MKT DATE	MFG DATE	ENG DATE	QA DATE
☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change

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Pressure Sensor Ratings

Supply Supply Voltage VS	+4.5 to +5.5 Vdc
Common-mode pressure	-10 to +10 psig
Lead Temperature, max (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	-25 to 85° C
Operating	-40 to 125° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D-4V-PRIME	±0.3 PSI	4 V	5 PSI	10 PSI
0.3 PSI-G-4V-PRIME	0 - 0.3 PSI	4 V	5 PSI	10 PSI
1 PSI-D-4V-PRIME	±1 PSI	4 V	5 PSI	10 PSI
1 PSI-G-4V-PRIME	0 - 1 PSI	4 V	5 PSI	10 PSI
5 PSI-D-4V-PRIME	± 5 PSI	4 V	15 PSI	30 PSI
5 PSI-G-4V-PRIME	0 - 5 PSI	4 V	15 PSI	30 PSI
15 PSI-A-4V-PRIME	0 - 15 PSIA	4 V	45 PSI	60 PSI
15 PSI-D-4V-PRIME	±15 PSI	4 V	45 PSI	60 PSI
15 PSI-G-4V-PRIME	0 - 15 PSIG	4 V	45 PSI	60 PSI
30 PSI-D-4V-PRIME	±30 PSI	4 V	60 PSI	60 PSI
30 PSI-G-4V-PRIME	0 - 30 PSIG	4 V	60 PSI	60 PSI
100 PSI-D-4V-PRIME	±100 PSI	4V	150 PSI	150 PSI
100 PSI-G-4V-PRIME	0 - 100 PSIG	4V	150 PSI	150 PSI

Performance Characteristics for 0.3 PSI-D-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	±0.3	--	PSI
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 to 85°C), note 2	--	--	±40	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±2	%span

Performance Characteristics for 0.3 PSI-G-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	0.3	--	PSI
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 to 85°C), note 2	--	--	±40	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±2	%span

Performance Characteristics for 1 PSI-D-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	±1.0	--	PSI
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 to 85°C), note 2	--	--	±40	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for: 1 PSI-G-4V-PRIME

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	1.0	--	PSI
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 to 85°C), note 2	--	--	±40	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for: 5 PSI-D-4V-PRIME

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	±5.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

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Performance Characteristics for: 5 PSI-G-4V-PRIME

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	5.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 15 PSI-A-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	15.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 15 PSI-D-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	±15.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 15 PSI-G-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	15.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 30 PSI-D-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	±30.0	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 30 PSI-G-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	30.0	--	PSI
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 to 85°C, note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 100 PSI-D-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	100	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

Performance Characteristics for 100 PSI-G-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	100	--	PSI
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 to 85°C), note 2	--	--	±20	mvolt
Linearity, hysteresis error, note 4	--	--	±0.5	%fs
Span Shift (-25°C to 85°C), note 2	--	--	±1	%span

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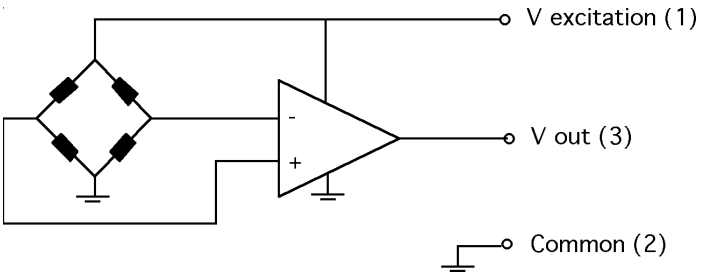
Equivalent Circuit



Pressure Response: for any pressure applied the response time to get to 90% of pressure applied is typically less than 500 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 PORT B. ABSOLUTE DEVICES REQUIRE PRESSURE TO BE APPLIED TO PORT A.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

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

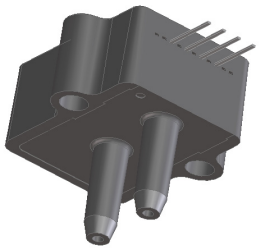
NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

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.

BAROMETRIC PRESSURE SENSORS

Barometrici Pressure Sensors

600 to 1,100 mbar Barometric Pressure



Options:

- Ratiometric Output
- Fixed 4V Output with internal Voltage Reference
- Temperature Compensated **(-25C to 85C, -40C to 125C, 5 C to 50C)**
- Calibrated Zero and Span

Applications

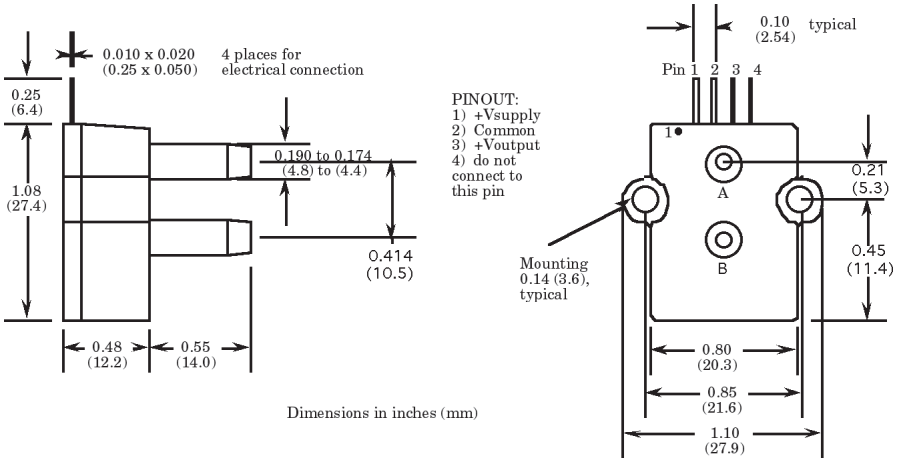
- Medical Instrumentation
- Environmental Controls
- Chemical Analysis

General Description

These Barometric pressure sensors are based upon a proprietary package technology to reduce errors. This model provides a fixed 4-volt output with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. In addition the sensor utilizes a silicon, micromachined (MEMS) structure to provide a very linear output to measured pressure. The sensor embodies a vacuum reference.

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

Physical Dimensions



Dimensions in inches (mm)

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ALL SENSORS

Pressure Sensor Ratings

Lead Temperature, max (soldering 2-4 sec.)	250°C
Burst Pressure	60 psi

Environmental Specifications

Temperature Ranges	
Compensated	see below
Operating	-40 to 125° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Supply Voltage	Compensated Temperature Range
BARO-A-4V	600 - 1100 mbar	4.5 to 5.5 V	5C to 50C
BARO-A-4V-PRIME	600 - 1100 mbar	4.5 to 5.5 V	-25C to 85C
BARO-A-4V-MIL	600 - 1100 mbar	4.5 to 5.5 V	-40C to 125C
BARO-A-4V-PRIME-REF	600 - 1100 mbar	5.5 to 16 V	-25C to 85C

Performance Characteristics for BARO-A-4V

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @1,100 mbar	4.20	4.25	4.30	volt
Output Voltage @ 600 mbar	0.20	0.25	0.30	volt
Offset Temperature Shift (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.25	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for BARO-A-4V-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @ 1,100 mbar	4.20	4.25	4.30	volt
Output Voltage @ 600 mbar	0.20	0.25	0.30	volt
Offset Temperature Shift (-25°C to 85°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.25	%fs
Span Shift (-25°C to 85°C), note 2			±1	%span

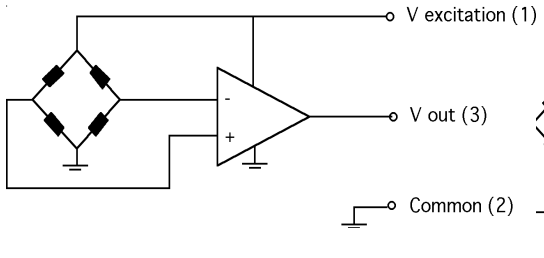
Performance Characteristics for BARO-A-4V-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @ 1,100 mbar	4.20	4.25	4.30	volt
Output Voltage @ 600 mbar	0.20	0.25	0.30	volt
Offset Temperature Shift (-40°C to 125°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.25	%fs
Span Shift (-40°C to 125°C), note 2			±1	%span

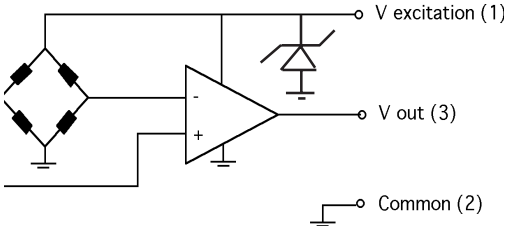
Performance Characteristics for BARO-A-4V-PRIME-REF

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @ 1,100 mbar	4.20	4.25	4.30	volt
Output Voltage @ 600 mbar	0.20	0.25	0.30	volt
Offset Temperature Shift (-25°C to 85°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.25	%fs
Span Shift (-25°C to 85°C), note 2			±1	%span

Equivalent Circuit



Equivalent Circuit with Internal Voltage Reference



Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 5.0 VOLT EXCITATION FOR RATIOMETRIC PARTS AND 12.0 FOR PARTS WITH INTERNAL REFERENCE, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED.

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.

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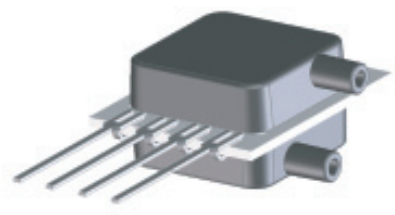
BAROMETRIC AMPLIFIED PRESSURE SENSORS

600 to 1,100 mbar Barometric Pressure Sensor



Features

- Barometric Pressure Range
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Monitoring
- Altimeters
- Chemical Analysis

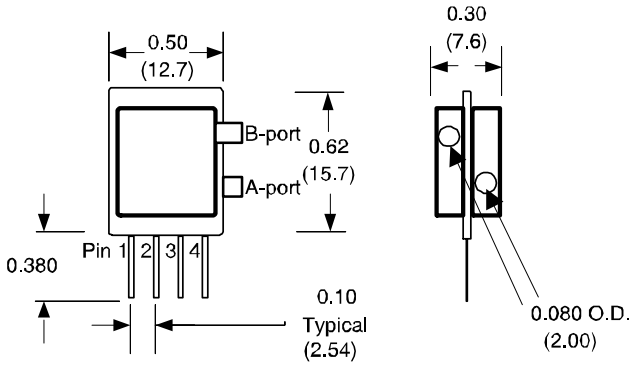
General Description

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



Approvals

MKT	DATE	MFG	DATE	ENG	DATE	QA	DATE
☐ As Is ☐ With Change		☐ As Is ☐ With Change		☐ As Is ☐ With Change		☐ As Is ☐ With Change	

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	+4.5 to +5.5Vdc
Lead Temperature (soldering 2-4 sec.)	250°C

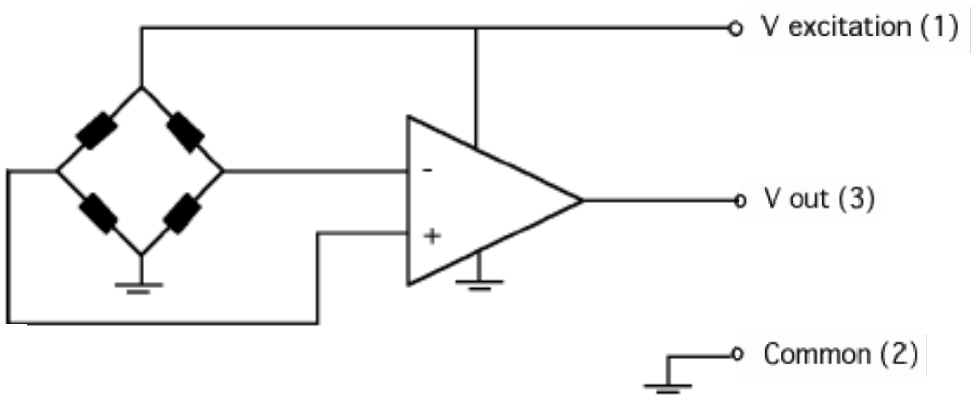
Environmental Specifications

Temperature Ranges	
Compensated	see specification
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Compensated Range
BARO-A-4V-MINI	600 to 1,100 mbar	5 to 50° C
BARO-A-4V--MINI-PRIME	600 to 1,100 mbar	-25 to 85° C
BARO-A-4V-MINI-MIL	600 to 1,100 mbar	-40 to 125° C

Equivalent Circuit



Performance Characteristics for BARO-A-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @1,100 mbar	4.15	4.25	4.35	volt
Output Voltage @ 600 mbar	0.15	0.25	0.35	volt
Offset Temperature Shift (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.50	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for BARO-A-4V-MINI-PRIME

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @1,100 mbar	4.15	4.25	4.35	volt
Output Voltage @ 600 mbar	0.15	0.25	0.35	volt
Offset Temperature Shift (-25°C to 85°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.50	%fs
Span Shift (-25°C to 85°C), note 2			±1	%span

Performance Characteristics for BARO-A-4V-MINI-MIL

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	mBar
Output Voltage @1,100 mbar	4.15	4.25	4.35	volt
Output Voltage @ 600 mbar	0.15	0.25	0.35	volt
Offset Temperature Shift (-40°C to 125°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4		0.05	0.50	%fs
Span Shift (-40°C to 125°C), note			±1	%span

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 B-PORT.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

NOTE 3: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

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ASCX Series Compatible Pressure Sensors

COMPATIBLE TO SENSYM ASCX SERIES

Features

- 5 Vdc Supply
- High Level Voltage Output
- Ratiometric 4.5 V Span
- Temperature Compensated
- Calibrated Zero and Span
- MULTIPLE Pressure Ranges

Applications

- Medical Instrumentation
- Environmental Instrumentation
- HVAC Instrumentation
- Pneumatic Controls

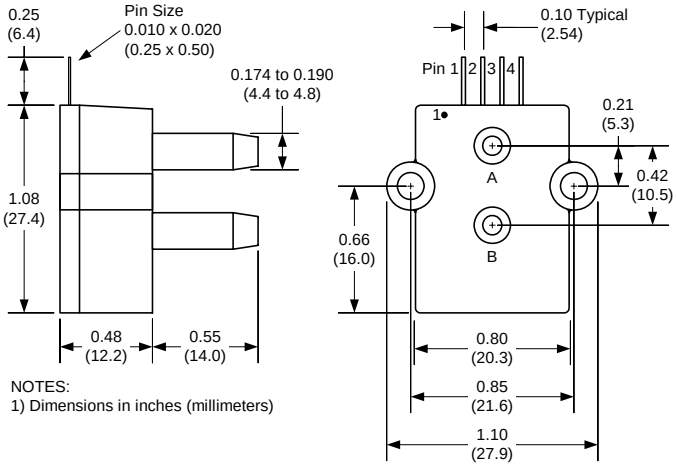
General Description

The Amplified line of middle pressure sensors is based upon a proprietary package technology to reduce errors. This model provides a ratiometric 4.5-volt output span with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. 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. Each sensor is internally compensated using an ASIC compensation technique. This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like.

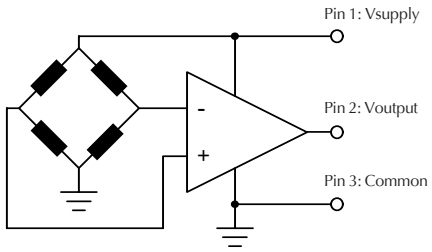
The output of the device is ratiometric to the supply voltage over a supply voltage range of 4.5 to 5.5 volts.

Physical Dimensions



NOTES:
1) Dimensions in inches (millimeters)

Equivalent Circuit



Pin 1: Vsupply
Pin 2: Voutput
Pin 3: Common
Pin 4: Do not connect

Maximum Ratings

Supply Voltage, Vs	+4.5 to +5.5 Vdc
Lead Soldering Temperature (2-4 sec.)	250 °C
Quiescent Current (6)	7.5 mA

Environmental Specifications

Compensated Temperature	0 to 70°C
Operating Temperature	-25 to 105°C
Storage Temperature	-55 to 125°C
Humidity Limits (non condensing)	0 to 95% RH

Pressure Ranges

Part Number	Operating Pressure	Proof Pressure	Burst Pressure
1 PSI-D-4V-ASCX	0 - 1 PSID	5 PSI	10 PSI
5 PSI-D-4V-ASCX	0 - 5 PSID	15 PSI	30 PSI
15 PSI-D-4V-ASCX	0 - 15 PSID	45 PSI	75 PSI
15 PSI-A-4V-ASCX	0 - 15 PSIA	45 PSI	75 PSI
30 PSI-D-4V-ASCX	0 - 30 PSID	100 PSI	150 PSI
30 PSI-A-4V-ASCX	0 - 30 PSIA	100 PSI	150 PSI
100 PSI-D-4V-ASCX	0 - 100 PSID	150 PSI	150 PSI
100 PSI-A-4V-ASCX	0 - 100 PSIA	150 PSI	150 PSI

Performance Characteristics for 1/5 PSI-D-4V-ASCX

Parameter (1)	Minimum	Nominal	Maximum	Units
Output Span (5)	4.43	4.50	4.57	Volt
Span Shift (0 °C to 70 °C)	-	±0.2	±1.5	%Span
Offset Voltage @ zero pressure	0.18	0.25	0.32	Volt
Offset Shift (0 °C to 70 °C) (2)	-	±0.5	±1.5	%Span
Combined Linearity and Hysteresis Error (4)	-	±0.1	±0.5	%Span
Repeatability (7)	-	±0.2	±0.5	% Span
Response Time (8)	-	100	-	uSec

Performance Characteristics for 15/30/100 PSI-x-4V-ASCX

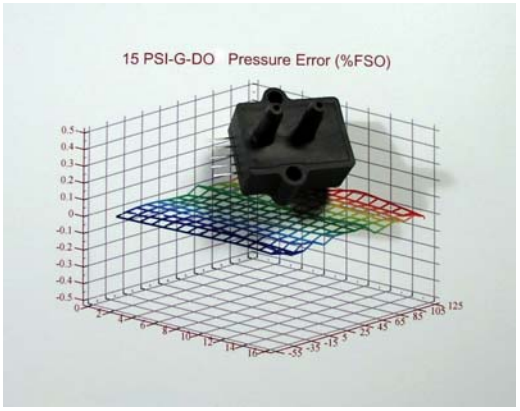
Parameter (1)	Minimum	Nominal	Maximum	Units
Output Span (5)	4.45	4.50	4.55	Volt
Span Shift (0 °C to 70 °C)	-	±0.2	±1.0	%Span
Offset Voltage @ zero pressure	0.20	0.25	0.30	Volt
Offset Shift (0 °C to 70 °C) (2)	-	±0.5	±1.0	%Span
Combined Linearity and Hysteresis Error (4)	-	±0.1	±0.5	%Span
Repeatability (7)	-	±0.2	±0.5	% Span
Response Time (8)	-	100	-	uSec

Specification Notes

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 Port B. Absolute devices are with pressure applied to Port A.
2) Shift is relative to 25°C.
4) Measured at one-half full scale rated pressure using best straight line curve fit for the span indicated.
5) The voltage added to the offset voltage at full scale pressure. Nominally the output voltage range is 0.25 to 4.75 volts for minus to plus full scale pressure.
6) Parameter is computed as maximum for design reference and is not tested.
7) Maximum diference in output at any pressure within the operating pressure range and compensated temperature range after: A) 1000 temperature cycles and B) 1.0 million pressure cycles.
8) Response time for a zero to Full Scale pressure step change, 10% to 90% rise time.

DIGITAL OUTPUT PRESSURE SENSORS

Enhanced Digital Output Sensors MILITARY GRADE



Features

- 5″ H_2O to 100psi Pressure Ranges
- All Combined Errors Over Temperature Less Than 0.1%, Typical
- Wide -40 to 125°C Compensated Temperature Range
- Electrically Compatible to All Sensors GA142 Series
- Enhanced Dual Serial Interface Mode

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC
- Meteorology

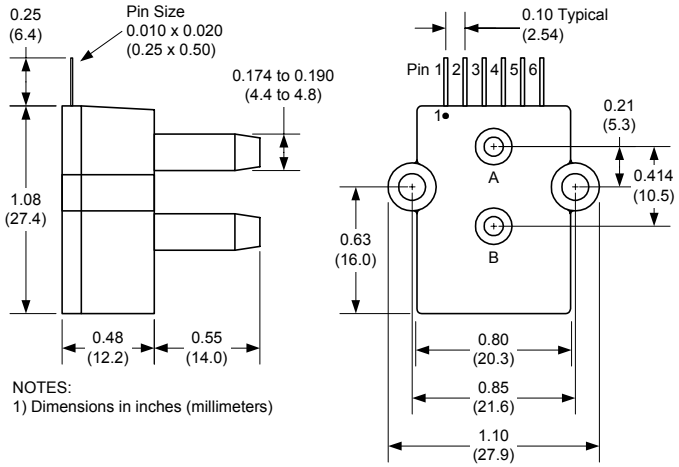
General Description

The Digital Output pressure sensors are based upon a proprietary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. This series provides a 12 bit digital serial output (14 bit in High Resolution Mode) with superior offset, span and linearity characteristics. The output is SPI and MICROWIRE/PLUS® compatible as well as fully compatible with the All Sensors GA142 Series sensors.

In addition to synchronous communications, the Digital Output pressure sensors incorporates a bi-directional, TTL level, asynchronous serial interfaces mode (hardware selectable 9,600 or 19,200 baud). This mode includes a command set that allows the host to interrogate the sensor for model information, pressure range, serial number, pressure units and conversion factor. The command set also allows the host to select a high resolution output mode, make minor adjustments to offset and has an addressable feature that alows multiple sensors to be tied to the same interface buss.

This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. All signals are 5V TTL/CMOS compatible.

Physical Dimensions



NOTES:
1) Dimensions in inches (millimeters)

Pin Descriptions

Pin	Label	Description
1	Vcc	+5V power supply input
2	Data/SI	Data output for synchronous mode. Serial in for asynchronous mode.
3	Clock/SO	Clock output for synchronous mode. Serial out for asynchronous mode.
4	Ready/Mode	Ready output for synchronous mode. Selects asynchronous mode when held low during reset.
5	Convert/BR	Convert input for synchronous mode. Selects one of two baud rates for asynchronous mode (low=9,600, high=19,200).
6	Ground	Ground for power and signals

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Absolute Maximum Ratings

Supply Voltage (Vcc)	7Vdc
Voltage on Any Pin with Respect to Gnd	-0.6 to Vcc+0.6V
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Operating Voltage	+4.75Vdc to +5.25Vdc
Compensated Temperature	-40° C to +125° C
Operating Temperature	-40 to +125° C
Storage Temperature	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Units	FSO [2]	Digital Span [4]	Proof Pressure	Burst Pressure
5 INCH-D-DO-MIL	-5 to 5	inH2O	5	1	200 inH2O	300inH2O
10 INCH-D-DO-MIL	-10 to 10	inH2O	10	1	200inH2O	300inH2O
1 PSI-D-DO-MIL	-1 to 1	PSI	1	1	200inH2O	800inH2O
5 PSI-D-DO-MIL	-5 to 5	PSI	5	1	10 PSI	30 PSI
15 PSI-D-DO-MIL	-15 to 15	PSI	15	1	60 PSI	120 PSI
15 PSI-A-DO-MIL	0 to 15	PSIA	15	2	60 PSI	120 PSI
BARO-DO-MIL	600 to 1100	mBar	1100	3	60 PSI	120 PSI
30 PSI-D-DO-MIL	-30 to 30	PSI	30	2	90 PSI	150 PSI
30 PSI-A-DO-MIL	0 to 30	PSIA	30	2	90 PSI	150 PSI
100 PSI-D-DO-MIL	-100 to 100	PSI	100	2	200 PSI	250 PSI
100 PSI-A-DO-MIL	0 to 100	PSIA	100	2	200 PSI	250 PSI

General Performance Characteristics (All Models)

Parameter [1]	Minimum	Nominal	Maximum	Units
Resolution	12	--	--	Bit
Conversion Speed	--	8	16	mS
Supply Current	--	8	12	mA

Performance Characteristics for 5 INCH-D-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.5	1.0	%FSO
Long Term Drift (one year)	--	--	0.5	%FSO
Offset Position Sensitivity (1g)	--	--	0.05	%FSO
Offset Warm-up Shift [3]	--	--	0.25	%FSO

Performance Characteristics for 10 INCH-D-DO and 1 PSI-D-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.5	1.0	%FSO
Long Term Drift (one year)	--	--	0.5	%FSO
Offset Position Sensitivity (1g)	--	--	0.03	%FSO
Offset Warm-up Shift [3]	--	--	0.25	%FSO

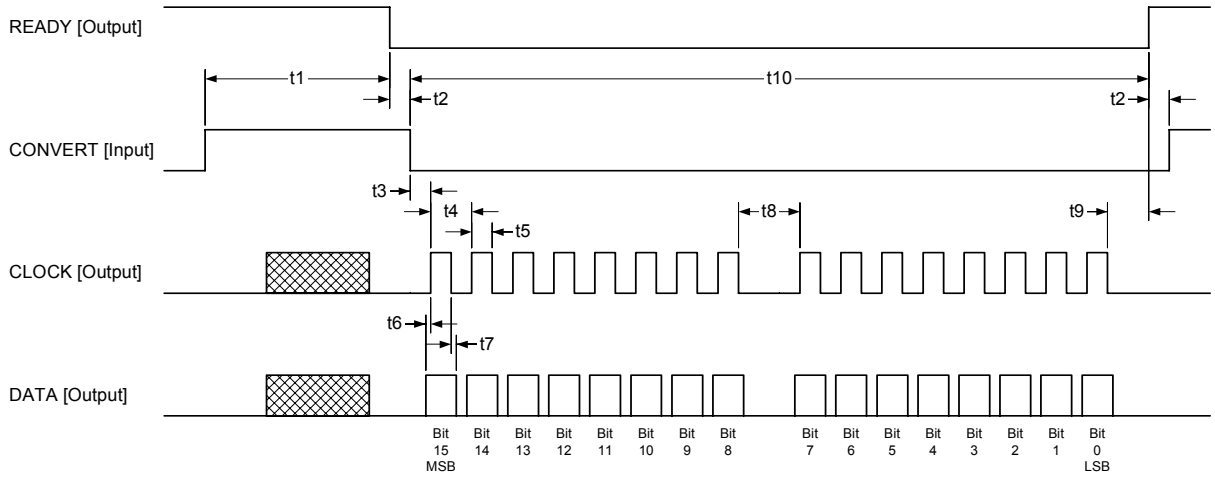
Performance Characteristics for BARO-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	1.0	2.5	mBar
Long Term Drift (one year)	--	--	2.0	mBar

Performance Characteristics for 5 PSI-D-DO through 100 PSI-x-DO (except BARO-DO)

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.25	0.5	%FSO
Long Term Drift (one year)	--	–	0.25	%FSO

Synchronous Timing Diagram (Note: Asynchronous mode timing is per RS-232. To use RS-232 requires the Maxim MA232 interface circuit for proper voltage level compatibility.)



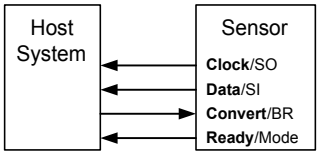
Ref	Parameter	Min	Typ	Max	Units
t1	Conversion Time	--	8	16	msec
t2	Ready to Convert	0	--	--	usec
t3	Convert to Clock	24	32	39	usec
t4	Clock Period	--	24	--	usec
t5	Clock High Time	--	12	--	usec

Ref	Parameter	Min	Typ	Max	Units
t6	Data Setup Time	--	3	--	usec
t7	Data Hold Time	--	3	--	usec
t8	Interbyte Delay	--	70	--	usec
t9	Clock to Ready	--	14	--	usec
t10	Data Transmission	--	476	--	usec

Typical Configurations

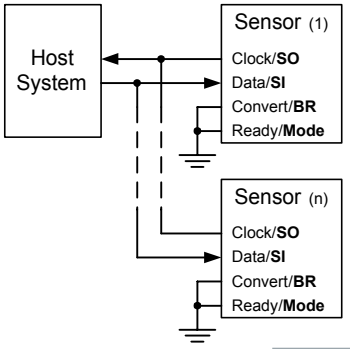
Synchronous Communications

Typical synchronous communications configuration (compatible with All Sensors GA142 Series Digital Output Sensors).



Asynchronous Communications

Typical asynchronous communications configuration. The Mode pin is interrogated at power up and if tied low, will cause the sensor to enter asynchronous communications mode. This mode supports multiple sensors by addressable commands. The Convert/BR pin then serves to select one of two available baud rates.



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Command Summary Table:

Command	Description	Response
RA<cr>	Read Accuracy String	RA=[Accuracy String]<cr>
RC<cr>	Read Captured Pressure	RC=[hhhh]<sp>[eeee]<cr>
RH<cr>	Read High Resolution Pressure	RH=[hhhh]<sp>[eeee]<cr>
RL<cr>	Read Low Resolution Pressure	RL[llll]<sp>[eeee]<cr>
RM<cr>	Read Model	RM=[Model String]<cr>
RR<cr>	Read Pressure Range	RR=[pressure Range String]<cr>
RS<cr>	Read Serial Number	RS=[S/N String]<cr>
RT<cr>	Read Temperature	RT=[Temperature Range String]<cr>
U[S/N String][Command]<cr>	Unique Command	For Matching S/N U[S/N String],sp>[Response String] For Non-matching S/N {null}
WC<cr>	Capture Pressure	{null}

Notations:

<> indicates a single ascii character

[] indicates an ascii string

{} text within the braces describes the response (this is essentially a comment)

"" text within quotes represents a literal ascii text string

Definitions:

Term	Name	Description
<cr>	Carriage Return	ascii Carrage Return. This is a command/response delimiter
<sp>	Space	ascii Space Character
[Accuracy String]	Accuracy String	Part accuracy string. Given in % full scale output. Example: 0.250%FSO Notes: 1.) There is a space between the numeric accuracy "0.250" and units "%FSO." 2.) FSO stands for Full Scale Output (full scale output is determined by the Pressure Range String.)
[hhhh]	High Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 3F7C Represents an output count of 16,252 Note: the output is forced to "8000" upon an error. except error bit 8, see error bit codes.
[llll]	Low Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 1D58 Represents an output count of 7,512 Note: the output is forced to "8000" upon an error. except error bit 8, see error bit codes.
[Model String]	Model String	Part Model as given in the data sheet (also order number.) The general model syntax is [Full Scale Pressure]<sp>[Pressure Units]-[Pressure Model]-DO Example: 100PSI-D-DO Where: Full Scale Pressure=100 Pressure Units=PSI (inH2O, mbar or mmHg available) DO represents Digital Output Notes: 1.) Exception to this syntax is the Barometer. 2.) Custom models may be different.

Definitions:

Term	Name	Description
[Pressure Range String]	Pressure Range String	This is the compensated pressure range of the part. Syntax: [low limit]<sp>"to"<sp>[high limit]<sp>[units}[mode] Esample: 20 to 32 mmHgA Where: Low limit = 20 High limit = 32 Units = mmHg Mode = A (absolute pressure) (D differential and G gage pressure also available.)
[Response String]	A Fully Formed Response String	Example: "RL=1E43<sp>0000<cr>
[S/N String]	Serial Number String	YMDD-NN-BSPP (12 character String) Where: Y : Year (0~9) M : Month (A~M, excluding I) DD: Day of Month NN: Lot (lot sequence for a given day) B : Lot Batch# (A~Z) S : Test Oven Slot# (1~5) P : Position on Slot (1~15) Example: 3D23-03-A103 April 23, 2003 3rd lot of the day Batch A, Slot 1, Position 03 This allows traceability to original test data
[Temperature Range String]	Temperature Range String	This is the compensated temperature range of the part. Syntax: [low limit]<sp>[high limit]<sp>"C" Example: -20 to 85 C -40 to 125 C and custom ranges also available.
[eeee]	Error Codes	The error codes are bits packed within a double byte. The four character string is an ascii hex expression. The error code bits are: Bit 0 : Part not factory compensated Bit 1 : Tdex Overflow Bit 2 : Tdex Over-range Bit 3 : Pdex Overflow Bit 4 : Pdex Over-range Bit 5 : PWL Overflow Bit 6 : Scale Overflow Bit 7 : High Resolution Overflow Bit 8 : Pressure Output Limited to Specific Value Bits 9 through 15 : Reserved Example: 0100 Represents error bit 8 set and the Pressure Output Limited Notes: Bit 0 : This should not appear if the part has been calibrated Bits 1 thru 7 : indicate computational error when compensated Bit 8: indicates that the pressure applied to the part exceeds the range of the part and is limit to either the high or low limit
{null}	Null Response	No response from the part. In the event of a serial number mismatch the part will not respond (to avoid buss contention.)

Month Codes

January	: A
February	: B
March	: C
April	: D
May	: E
June	: F
July	: G
August	: H
September	: J
October	: K
November	: L
December	: M

Specification Notes

NOTE 1: Unless otherwise specified, all parameters are measured at 5.0 volt supply, positive pressure applied to Port B.

NOTE 2: The digital output is a 16 bit signed binary output in a two's compliment format. The applied pressure is computed using the Pressure Conversion Table (below). The Mode column identifies the resolution operating mode of the device (A = Standard resolution, B = High resolution). FSO and Units are shown for each model.

NOTE 3: Shift is within the first hour of excitation applied to the device.

NOTE 4: Digital Span is dependent on the resolution operating mode. Refer to the Digital Span Table (below) to identify the digital span of the specific model. In the event of an over-pressure or under-pressure condition, the digital output will one count higher or one count lower (respectively) to the listed Digital Span to indicate the condition.

NOTE 5: Overall accuracy includes the combined effects of offset and span shifts over temperature, linearity, hysteresis, and offset and span calibration.

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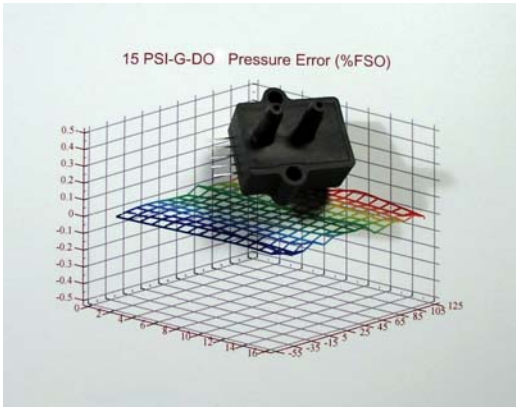
DIGITAL OUTPUT PRESSURE SENSORS

Enhanced Digital Output Sensors



Features

- 5" H_2O to 100psi Pressure Ranges
- All Combined Errors Over Temperature Less Than 0.1%, Typical
- Wide -20 to 85°C Compensated Temperature Range
- Electrically Compatible to All Sensors GA142 Series
- Enhanced Dual Serial Interface Mode

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC
- Meteorology

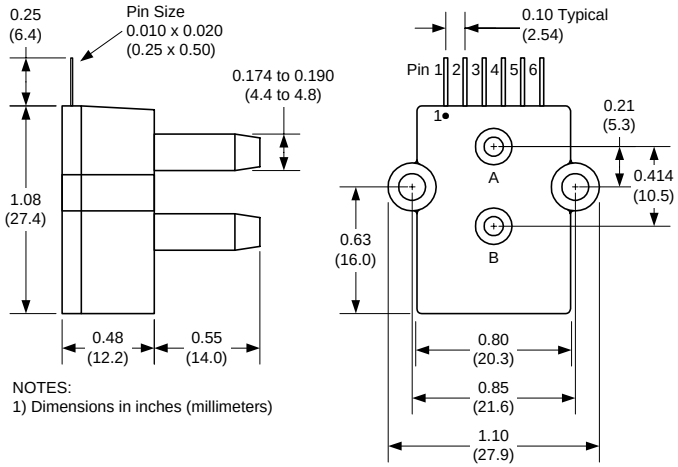
General Description

The Digital Output pressure sensors are based upon a proprietary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. This series provides a 12 bit digital serial output (14 bit in High Resolution Mode) with superior offset, span and linearity characteristics. The output is SPI and MICROWIRE/PLUS® compatible as well as fully compatible with the All Sensors GA142 Series sensors.

In addition to synchronous communications, the Digital Output pressure sensors incorporates a bi-directional, TTL level, asynchronous serial interfaces mode (hardware selectable 9,600 or 19,200 baud). This mode includes a command set that allows the host to interrogate the sensor for model information, pressure range, serial number, pressure units and conversion factor. The command set also allows the host to select a high resolution output mode, make minor adjustments to offset and has an addressable feature that alows multiple sensors to be tied to the same interface buss.

This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. All signals are 5V TTL/CMOS compatible.

Physical Dimensions



NOTES:
1) Dimensions in inches (millimeters)

Pin Descriptions

Pin	Label	Description
1	Vcc	+5V power supply input
2	Data/SI	Data output for synchronous mode. Serial in for asynchronous mode.
3	Clock/SO	Clock output for synchronous mode. Serial out for asynchronous mode.
4	Ready/Mode	Ready output for synchronous mode. Selects asynchronous mode when held low during reset.
5	Convert/BR	Convert input for synchronous mode. Selects one of two baud rates for asynchronous mode (low=9,600, high=19,200).
6	Ground	Ground for power and signals

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Absolute Maximum Ratings

Supply Voltage (Vcc)	7Vdc
Voltage on Any Pin with Respect to Gnd	-0.6 to Vcc+0.6V
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Operating Voltage	+4.75Vdc to +5.25Vdc
Compensated Temperature	-20° C to +85° C
Operating Temperature	-25 to +90° C
Storage Temperature	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Units	FSO [2]	Digital Span [4]	Proof Pressure	Burst Pressure
5 INCH-D-DO	-5 to 5	inH2O	5	1	200 inH2O	300 inH2O
10 INCH-D-DO	-10 to 10	inH2O	10	1	200 inH2O	300 inH2O
1 PSI-D-DO	-1 to 1	PSI	1	1	200 inH2O	300 inH2O
5 PSI-D-DO	-5 to 5	PSI	5	1	10 PSI	30 PSI
15 PSI-D-DO	-15 to 15	PSI	15	1	60 PSI	120 PSI
15 PSI-A-DO	0 to 15	PSIA	15	2	60 PSI	120 PSI
30 PSI-D-DO	-30 to 30	PSI	30	2	90 PSI	150 PSI
30 PSI-A-DO	0 to 30	PSIA	30	2	90 PSI	150 PSI
100 PSI-D-DO	-100 to 100	PSI	100	2	200 PSI	250 PSI
100 PSI-A-DO	0 to 100	PSIA	100	2	200 PSI	250 PSI

General Performance Characteristics (All Models)

Parameter [1]	Minimum	Nominal	Maximum	Units
Resolution	12	--	--	Bit
Conversion Speed	--	8	16	mS
Supply Current	--	8	12	mA

Performance Characteristics for 5 INCH-D-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.25	0.5	%FSO
Long Term Drift (one year)	--	--	0.5	%FSO
Offset Position Sensitivity (1g)	--	--	0.05	%FSO
Offset Warm-up Shift [3]	--	--	0.25	%FSO

Performance Characteristics for 10 INCH-D-DO and 1 PSI-D-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.25	0.5	%FSO
Long Term Drift (one year)	--	--	0.5	%FSO
Offset Position Sensitivity (1g)	--	--	0.03	%FSO
Offset Warm-up Shift [3]	--	--	0.25	%FSO

Performance Characteristics for 5 PSI-D-DO through 100 PSI-x-DO

Parameter [1]	Minimum	Nominal	Maximum	Units
Overall Accuracy [5]	--	0.10	0.25	%FSO
Long Term Drift (one year)	--	--	0.25	%FSO

Specification Notes

NOTE 1: Unless otherwise specified, all parameters are measured at 5.0 volt supply, positive pressure applied to Port B.

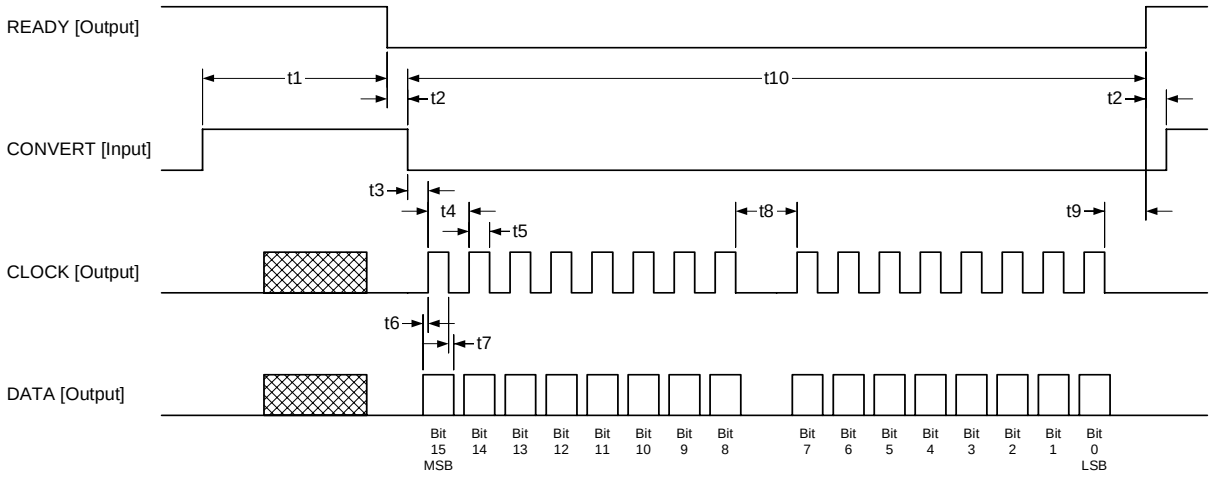
NOTE 2: The digital output is a 16 bit signed binary output in a two's compliment format. The applied pressure is computed using the Pressure Conversion Table (below). The Mode column identifies the resolution operating mode of the device (A = Standard resolution, B = High resolution). FSO and Units are shown for each model.

NOTE 3: Shift is within the first hour of excitation applied to the device.

NOTE 4: Digital Span is dependent on the resolution operating mode. Refer to the Digital Span Table (below) to identify the digital span of the specific model. In the event of an over-pressure or under-pressure condition, the digital output will one count higher or one count lower (respectively) to the listed Digital Span to indicate the condition.

NOTE 5: Overall accuracy includes the combined effects of offset and span shifts over temperature, linearity, hysteresis, and offset and span calibration.

Synchronous Timing Diagram (Note: Asynchronous mode timing is per RS-232. To use RS-232 requires the Maxim MA232 interface circuit for proper voltage level compatibility.)



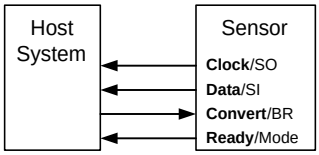
Ref	Parameter	Min	Typ	Max	Units
t1	Conversion Time	--	8	16	msec
t2	Ready to Convert	0	--	--	usec
t3	Convert to Clock	24	32	39	usec
t4	Clock Period	--	24	--	usec
t5	Clock High Time	--	12	--	usec

Ref	Parameter	Min	Typ	Max	Units
t6	Data Setup Time	--	3	--	usec
t7	Data Hold Time	--	3	--	usec
t8	Interbyte Delay	--	70	--	usec
t9	Clock to Ready	--	14	--	usec
t10	Data Transmission	--	476	--	usec

Typical Configurations

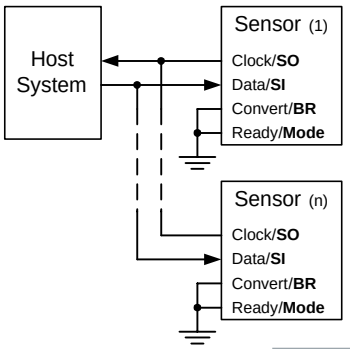
Synchronous Communications

Typical synchronous communications configuration (compatible with All Sensors GA142 Series Digital Output Sensors).



Asynchronous Communications

Typical asynchronous communications configuration. The Mode pin is interrogated at power up and if tied low, will cause the sensor to enter asynchronous communications mode. This mode supports multiple sensors by addressable commands. The Convert/BR pin then serves to select one of two available baud rates.



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Command Summary Table:

Command	Description	Response
RA<cr>	Read Accuracy String	RA=[Accuracy String]<cr>
RC<cr>	Read Captured Pressure	RC=[hhhh]<sp>[eeee]<cr>
RH<cr>	Read High Resolution Pressure	RH=[hhhh]<sp>[eeee]<cr>
RL<cr>	Read Low Resolution Pressure	RL[llll]<sp>[eeee]<cr>
RM<cr>	Read Model	RM=[Model String]<cr>
RR<cr>	Read Pressure Range	RR=[pressure Range String]<cr>
RS<cr>	Read Serial Number	RS=[S/N String]<cr>
RT<cr>	Read Temperature	RT=[Temperature Range String]<cr>
U[S/N String][Command]<cr>	Unique Command	For Matching S/N U[S/N String],sp>[Response String] For Non-matching S/N {null}
WC<cr>	Capture Pressure	{null}

Notations:

<> indicates a single ascii character

[] indicates an ascii string

{} text within the braces describes the response (this is essentially a comment)

“” text within quotes represents a literal ascii text string

Definitions:

Term	Name	Description
<cr>	Carriage Return	ascii Carrage Return. This is a command/response delimiter
<sp>	Space	ascii Space Character
[Accuracy String]	Accuracy String	Part accuracy string. Given in % full scale output. Example: 0.250 %FSO Notes: 1.) There is a space between the numeric accuracy “0.250” and units “%FSO.” 2.) FSO stands for Full Scale Output (full scale output is determined by the Pressure Range String.)
[hhhh]	High Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 3F7C Represents an output count of 16,252 Note: the output is forced to “8000” upon an error. except error bit 8, see error bit codes.
[llll]	Low Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 1D58 Represents an output count of 7,512 Note: the output is forced to “8000” upon an error. except error bit 8, see error bit codes.
[Model String]	Model String	Part Model as given in the data sheet (also order number.) The general model syntax is [Full Scale Pressure]<sp>[Pressure Units]-[Pressure Model]-DO Example: 100 PSI-D-DO Where: Full Scale Pressure=100 Pressure Units=PSI (inH2O, mbar or mmHg available) DO represents Digital Output Notes: 1.) Exception to this syntax is the Barometer. 2.) Custom models may be different.

Definitions:

Term	Name	Description
[Pressure Range String]	Pressure Range String	This is the compensated pressure range of the part. Syntax: [low limit]<sp>"to"<sp>[high limit]<sp>[units}[mode] Esample: 20 to 32 mmHgA Where: Low limit = 20 High limit = 32 Units = mmHg Mode = A (absolute pressure) (D differential and G gage pressure also available.)
[Response String]	A Fully Formed Response String	Example: "RL=1E43<sp>0000<cr>
[S/N String]	Serial Number String	YMDD-NN-BSPP (12 character String) Where: Y : Year (0~9) M : Month (A~M, excluding I) DD: Day of Month NN: Lot (lot sequence for a given day) B : Lot Batch# (A~Z) S : Test Oven Slot# (1~5) P : Position on Slot (1~15) Example: 3D23-03-A103 April 23, 2003 3rd lot of the day Batch A, Slot 1, Position 03 This allows traceability to original test data **Month Codes** January : A February : B March : C April : D May : E June : F July : G August : H September : J October : K November : L December : M
[Temperature Range String]	Temperature Range String	This is the compensated temperature range of the part. Syntax: [low limit]<sp>[high limit]<sp>"C" Example: -20 to 85 C -40 to 125 C and custom ranges also available.
[eeee]	Error Codes	The error codes are bits packed within a double byte. The four character string is an ascii hex expression. The error code bits are: Bit 0 : Part not factory compensated Bit 1 : Tdex Overflow Bit 2 : Tdex Over-range Bit 3 : Pdex Overflow Bit 4 : Pdex Over-range Bit 5 : PWL Overflow Bit 6 : Scale Overflow Bit 7 : High Resolution Overflow Bit 8 : Pressure Output Limited to Specific Value Bits 9 through 15 : Reserved Example: 0100 Represents erro bit 8 set and the Pressure Output Limited Notes: Bit 0 : This should not appear if the part has been calibrated Bits 1 thru 7 : indicate computational error when compensated Bit 8: indicates that the pressure applied to the part exceeds the range of the part and is limit to either the high or low limit
{null}	Null Response	No response from the part. In the event of a serial number mismatch the part will not respond (to avoid buss contention.)

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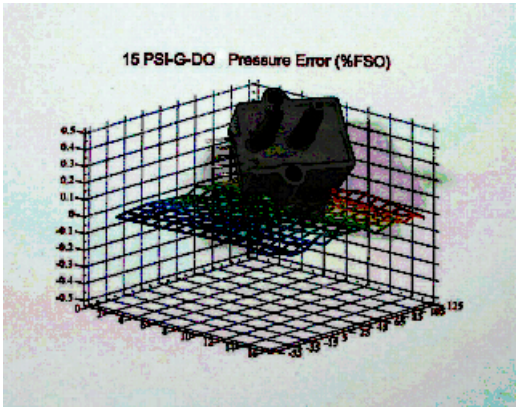
DIGITAL OUTPUT BAROMETER SENSORS

Enhanced Digital Output Sensors: Industrial temperature range



Features

- All Combined Errors Over Temperature Less Than 0.1%, Typical
- Wide -20 to 85°C Compensated Temperature Range
- Electrically Compatible to All Sensors GA142 Series
- Enhanced Dual Serial Interface Mode

Applications

- Medical Instrumentation
- Environmental Controls
- Meteorology

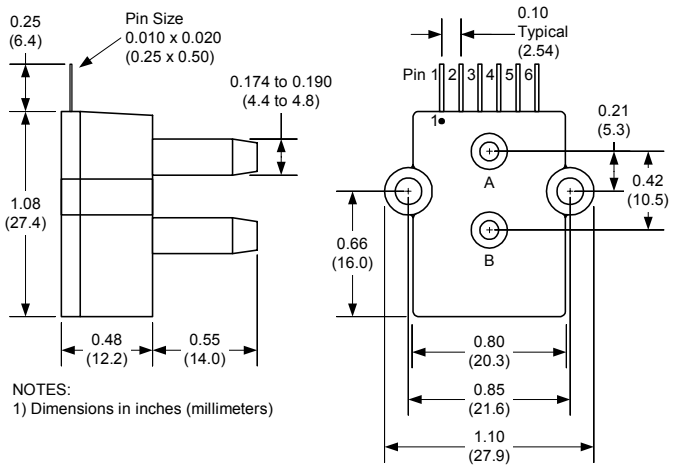
General Description

The Digital Output pressure sensors are based upon a proprietary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. This series provides a 12 bit digital serial output (14 bit in High Resolution Mode) with superior offset, span and linearity characteristics. The output is SPI and MICROWIRE/PLUS® compatible as well as fully compatible with the All Sensors GA142 Series sensors.

In addition to synchronous communications, the Digital Output pressure sensors incorporates a bi-directional, TTL level, asynchronous serial interfaces mode (hardware selectable 9,600 or 19,200 baud). This mode includes a command set that allows the host to interrogate the sensor for model information, pressure range, serial number, pressure units and conversion factor. The command set also allows the host to select a high resolution output mode, make minor adjustments to offset and has an addressable feature that alows multiple sensors to be tied to the same interface buss.

This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. All signals are 5V TTL/CMOS compatible.

Physical Dimensions



Pressure Applied to Port B

Pin Descriptions

Pin	Label	Description
1	Vcc	+5V power supply input
2	Data/SI	Data output for synchronous mode. Serial in for asynchronous mode.
3	Clock/SO	Clock output for synchronous mode. Serial out for asynchronous mode.
4	Ready/Mode	Ready output for synchronous mode. Selects asynchronous mode when held low during reset.
5	Convert/BR	Convert input for synchronous mode. Selects one of two baud rates for asynchronous mode (low=9,600, high=19,200).
6	Ground	Ground for power and signals

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Absolute Maximum Ratings

Supply Voltage (Vcc)	7Vdc
Voltage on Any Pin with Respect to Gnd	-0.6 to Vcc+0.6V
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Operating Voltage	+4.75Vdc to +5.25Vdc
Compensated Temperature	-20°C to +85° C
Operating Temperature	-20 to +105° C
Storage Temperature	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Units	Digital Span [4]	Proof Pressure	Burst Pressure
BARO-DO	600 to 1100	mBar	3	60 PSI	120 PSI
BARO-INHG-DO	20 to 32	inches Hg	3	60 PSI	120 PSI

General Performance Characteristics

Parameter [1]	Minimum	Nominal	Maximum	Units
Resolution	12	--	--	Bit
Conversion Speed	–	8	16	mS
Supply Current	–	8	12	mA
Overall Accuracy [5]	–	1.0	2.5	mBar
Long Term Drift (one year)	–	0.025	2.0	mBar

Specification Notes

NOTE 1: Unless otherwise specified, all parameters are measured at 5.0 volt supply, positive pressure applied to Port B.

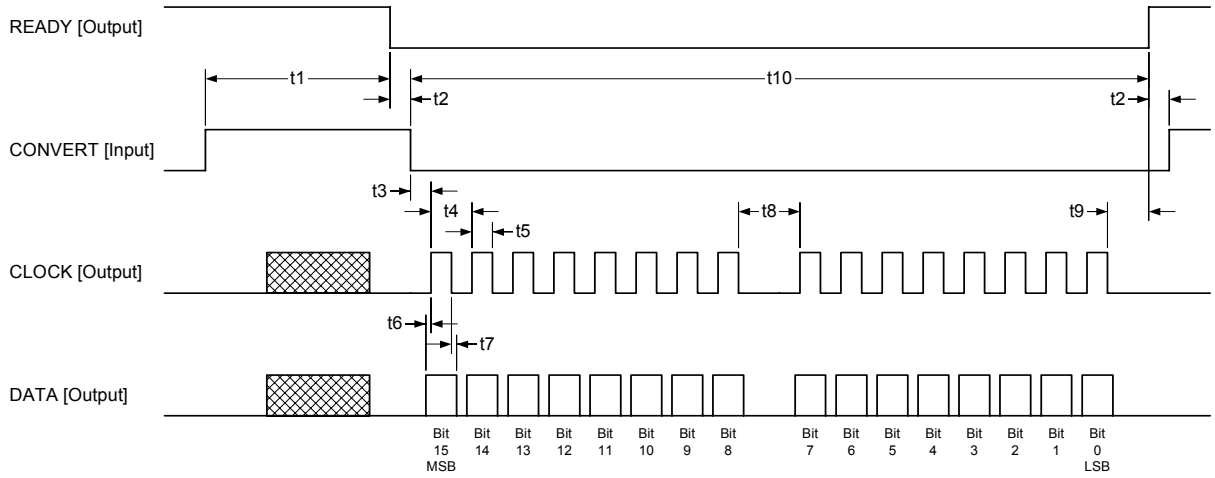
NOTE 2: The digital output is a 16 bit signed binary output in a two's compliment format. The applied pressure is computed using the Pressure Conversion Table (below). The Mode column identifies the resolution operating mode of the device (A = Standard resolution, B = High resolution). FSO and Units are shown for each model.

NOTE 3: Shift is within the first hour of excitation applied to the device.

NOTE 4: Digital Span is dependent on the resolution operating mode. Refer to the Digital Span Table (below) to identify the digital span of the specific model. In the event of an over-pressure or under-pressure condition, the digital output will one count higher or one count lower (respectively) to the listed Digital Span to indicate the condition.

NOTE 5: Overall accuracy includes the combined effects of offset and span shifts over temperature, linearity, hysteresis, and offset and span calibration.

Synchronous Timing Diagram (Note: Asynchronous mode timing is per RS-232. To use RS-232 requires the Maxim MA232 interface circuit for proper voltage level compatibility.)



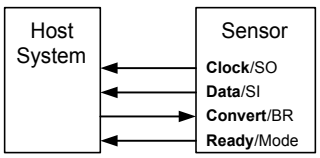
Ref	Parameter	Min	Typ	Max	Units
t1	Conversion Time	--	8	16	msec
t2	Ready to Convert	0	--	--	usec
t3	Convert to Clock	24	32	39	usec
t4	Clock Period	--	24	--	usec
t5	Clock High Time	--	12	--	usec

Ref	Parameter	Min	Typ	Max	Units
t6	Data Setup Time	--	3	--	usec
t7	Data Hold Time	--	3	--	usec
t8	Interbyte Delay	--	70	--	usec
t9	Clock to Ready	--	14	--	usec
t10	Data Transmission	--	476	--	usec

Typical Configurations

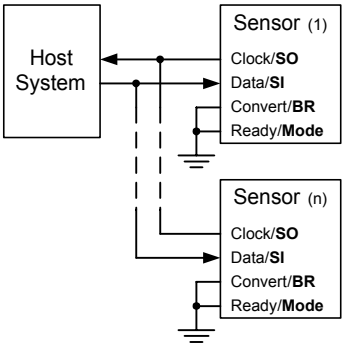
Synchronous Communications

Typical synchronous communications configuration (compatible with All Sensors GA142 Series Digital Output Sensors).



Asynchronous Communications

Typical asynchronous communications configuration. The Mode pin is interrogated at power up and if tied low, will cause the sensor to enter asynchronous communications mode. This mode supports multiple sensors by addressable commands. The Convert/BR pin then serves to select one of two available baud rates.



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Command Summary Table:

Command	Description	Response
RA<cr>	Read Accuracy String	RA=[Accuracy String]<cr>
RC<cr>	Read Captured Pressure	RC=[hhhh]<sp>[eeee]<cr>
RH<cr>	Read High Resolution Pressure	RH=[hhhh]<sp>[eeee]<cr>
RL<cr>	Read Low Resolution Pressure	RL[llll]<sp>[eeee]<cr>
RM<cr>	Read Model	RM=[Model String]<cr>
RR<cr>	Read Pressure Range	RR=[pressure Range String]<cr>
RS<cr>	Read Serial Number	RS=[S/N String]<cr>
RT<cr>	Read Temperature	RT=[Temperature Range String]<cr>
U[S/N String][Command]<cr>	Unique Command	For Matching S/N U[S/N String],sp>[Response String] For Non-matching S/N {null}
WC<cr>	Capture Pressure	{null}

Notations:

<> indicates a single ascii character

[] indicates an ascii string

{} text within the braces describes the response (this is essentially a comment)

"" text within quotes represents a literal ascii text string

Definitions:

Term	Name	Description
<cr>	Carriage Return	ascii Carrage Return. This is a command/response delimiter
<sp>	Space	ascii Space Character
[Accuracy String]	Accuracy String	Part accuracy string. Given in % full scale output. Example: 0.250 %FSO Notes: 1.) There is a space between the numeric accuracy "0.250" and units "%FSO." 2.) FSO stands for Full Scale Output (full scale output is determined by the Pressure Range String.)
[hhhh]	High Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 3F7C Represents an output count of 16,252 Note: the output is forced to "8000" upon an error. except error bit 8, see error bit codes.
[llll]	Low Resolution Output	This is a four character ascii string representing a hexidecimal value. Example: 1D58 Represents an output count of 7,512 Note: the output is forced to "8000" upon an error. except error bit 8, see error bit codes.
[Model String]	Model String	Part Model as given in the data sheet (also order number.) The general model syntax is [Full Scale Pressure]<sp>[Pressure Units]-[Pressure Model]-DO Example: 100 PSI-D-DO Where: Full Scale Pressure=100 Pressure Units=PSI (inH2O, mbar or mmHg available) DO represents Digital Output Notes: 1.) Exception to this syntax is the Barometer. 2.) Custom models may be different.

Definitions:

Term	Name	Description
[Pressure Range String]	Pressure Range String	This is the compensated pressure range of the part. Syntax: [low limit]<sp>"to"<sp>[high limit]<sp>[units][mode] Esample: 20 to 32 mmHgA Where: Low limit = 20 High limit = 32 Units = mmHg Mode = A (absolute pressure) (D differential and G gage pressure also available.)
[Response String]	A Fully Formed Response String	Example: "RL=1E43<sp>0000<cr>
[S/N String]	Serial Number String	YMDD-NN-BSPP (12 character String) Where: Y : Year (0~9) M : Month (A~M, excluding I) DD: Day of Month NN: Lot (lot sequence for a given day) B : Lot Batch# (A~Z) S : Test Oven Slot# (1~5) P : Position on Slot (1~15) Example: 3D23-03-A103 April 23, 2003 3rd lot of the day Batch A, Slot 1, Position 03 This allows traceability to original test data **Month Codes** January : A February : B March : C April : D May : E June : F July : G August : H September : J October : K November : L December : M
[Temperature Range String]	Temperature Range String	This is the compensated temperature range of the part. Syntax: [low limit]<sp>[high limit]<sp>"C" Example: -20 to 85 C -40 to 125 C and custom ranges also available.
[eeee]	Error Codes	The error codes are bits packed within a double byte. The four character string is an ascii hex expression. The error code bits are: Bit 0 : Part not factory compensated Bit 1 : Tdex Overflow Bit 2 : Tdex Over-range Bit 3 : Pdex Overflow Bit 4 : Pdex Over-range Bit 5 : PWL Overflow Bit 6 : Scale Overflow Bit 7 : High Resolution Overflow Bit 8 : Pressure Output Limited to Specific Value Bits 9 through 15 : Reserved Example: 0100 Represents erro bit 8 set and the Pressure Output Limited Notes: Bit 0 : This should not appear if the part has been calibrated Bits 1 thru 7 : indicate computational error when compensated Bit 8: indicates that the pressure applied to the part exceeds the range of the part and is limit to either the high or low limit
{null}	Null Response	No response from the part. In the event of a serial number mismatch the part will not respond (to avoid buss contention.)

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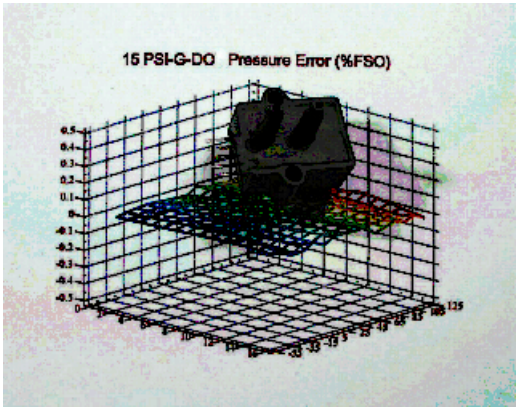
DIGITAL OUTPUT BAROMETER SENSORS

Enhanced Digital Output Sensors: Extended temperature range



Features

- All Combined Errors Over Temperature Less Than 0.1%, Typical
- Wide -40 to 125°C Compensated Temperature Range
- Electrically Compatible to All Sensors GA142 Series
- Enhanced Dual Serial Interface Mode

Applications

- Medical Instrumentation
- Environmental Controls
- Meteorology

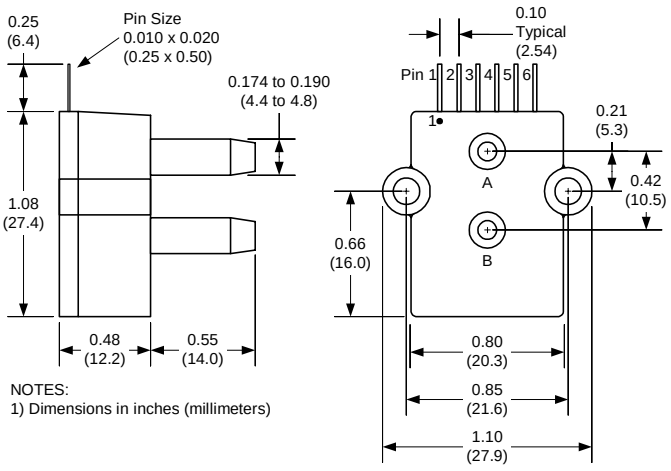
General Description

The Digital Output pressure sensors are based upon a proprietary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. This series provides a 12 bit digital serial output (14 bit in High Resolution Mode) with superior offset, span and linearity characteristics. The output is SPI and MICROWIRE/PLUS® compatible as well as fully compatible with the All Sensors GA142 Series sensors.

In addition to synchronous communications, the Digital Output pressure sensors incorporates a bi-directional, TTL level, asynchronous serial interfaces mode (hardware selectable 9,600 or 19,200 baud). This mode includes a command set that allows the host to interrogate the sensor for model information, pressure range, serial number, pressure units and conversion factor. The command set also allows the host to select a high resolution output mode, make minor adjustments to offset and has an addressable feature that alows multiple sensors to be tied to the same interface buss.

This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. All signals are 5V TTL/CMOS compatible.

Physical Dimensions



NOTES:
1) Dimensions in inches (millimeters)

Pressure Applied to Port B

Pin Descriptions

Pin	Label	Description
1	Vcc	+5V power supply input
2	Data/SI	Data output for synchronous mode. Serial in for asynchronous mode.
3	Clock/SO	Clock output for synchronous mode. Serial out for asynchronous mode.
4	Ready/Mode	Ready output for synchronous mode. Selects asynchronous mode when held low during reset.
5	Convert/BR	Convert input for synchronous mode. Selects one of two baud rates for asynchronous mode (low=9,600, high=19,200).
6	Ground	Ground for power and signals

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Absolute Maximum Ratings

Supply Voltage (Vcc)	7Vdc
Voltage on Any Pin with Respect to Gnd	-0.6 to Vcc+0.6V
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Operating Voltage	+4.75Vdc to +5.25Vdc
Compensated Temperature	-40°C to +125° C
Operating Temperature	-40 to +125° C
Storage Temperature	-40 to 150° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Units	Digital Span (4)	Proof Pressure	Burst Pressure
BARO-DO-MIL	600 to 1100	mBar	3	60 PSI	120 PSI
BARO-INHG-DO-MIL	20 to 32	inches Hg	3	60 PSI	120 PSI
BARO-DO-MIL-PCB	600 to 1100	mBar	3	60 PSI	120 PSI
BARO-INHG-DO-MIL-PCB	20 to 32	inches Hg	3	60 PSI	120 PSI

General Performance Characteristics

Parameter (1)	Minimum	Nominal	Maximum	Units
Resolution	12	--	--	Bit
Conversion Speed	--	8	16	mS
Supply Current	--	8	12	mA
Overall Accuracy (5)	--	1.0	2.5	mBar
Long Term Drift (one year)	--	--	2.0	mBar

Specification Notes

NOTE 1: Unless otherwise specified, all parameters are measured at 5.0 volt supply, positive pressure applied to Port B.

NOTE 2: The digital output is a 16 bit signed binary output in a two's compliment format. The applied pressure is computed using the Pressure Conversion Table (below). The Mode column identifies the resolution operating mode of the device (A = Standard resolution, B = High resolution). FSO and Units are shown for each model.

NOTE 3: Shift is within the first hour of excitation applied to the device.

NOTE 4: Digital Span is dependent on the resolution operating mode. Refer to the Digital Span Table (below) to identify the digital span of the specific model. In the event of an over-pressure or under-pressure condition, the digital output will one count higher or one count lower (respectively) to the listed Digital Span to indicate the condition.

NOTE 5: Overall accuracy includes the combined effects of offset and span shifts over temperature, linearity, hysteresis, and offset and span calibration.

Error Code Table (Asynchronous mode)

Bit 0 : Part not compensated
Bit 1 : Tdex Overflow
Bit 2 : Tdex Over-range
Bit 3 : Pdex Overflow
Bit 4 : Pdex Over-range
Bit 5 : PWL Overflow
Bit 6 : Scaling Overflow
Bit 7 : High resolution overflow
Bit 8 : Pressure Output Limited to Specified Value
Bit 9 through Bit 15 : Reserved

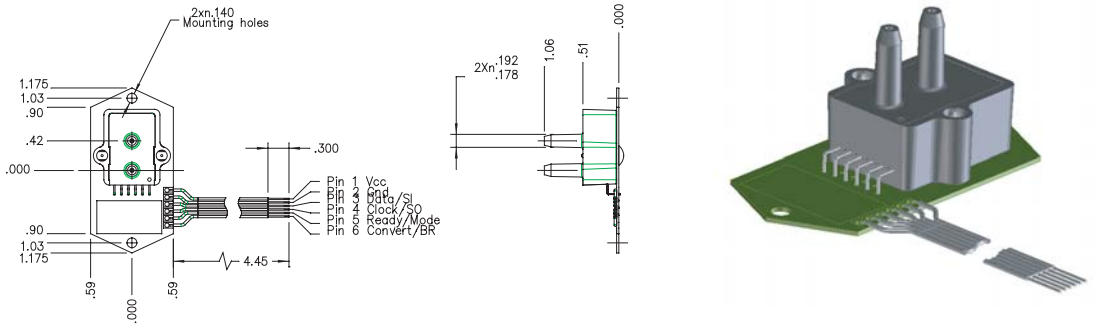
Pressure Conversion Table

Mode	Pressure Output Equation
S	$\text{Pout} = \text{Digital Output} \times \frac{\text{FSO} \times \text{Units}}{10{,}000}$
H	$\text{Pout} = \text{Digital Output} \times \frac{\text{FSO} \times \text{Units}}{32{,}767}$

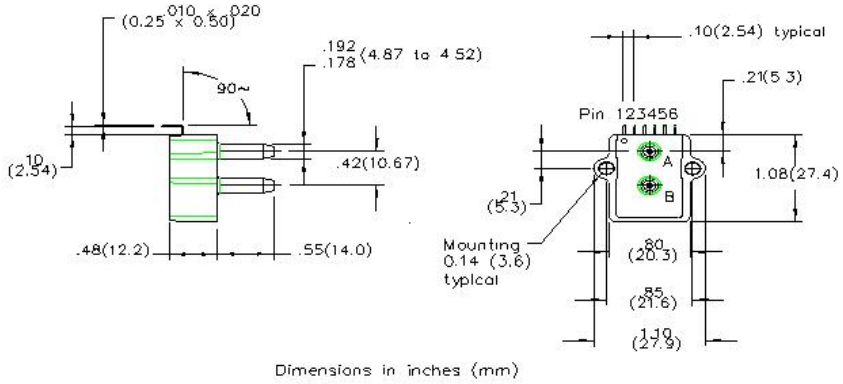
Digital Span Table

Span	Mode S (Standard)	Mode H (High Res)
1	-10,399 to 10,399	-32,767 to 32,766
2	-399 to 10,399	-999 to 32,766
3	5,054 to 10,399	17,501 to 32,766

Option: PCB mounted compatible to GA-series and SMRT series



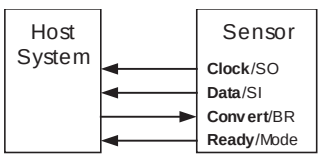
Optional 90 degree lead bend



Typical Configurations

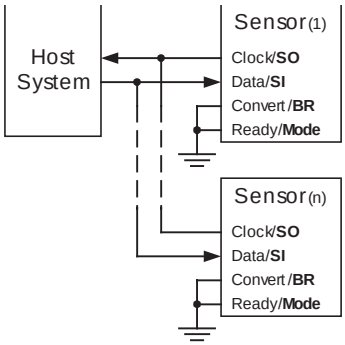
Synchronous Communications

Typical synchronous communications configuration (compatible with All Sensors GA142 Series Digital Output Sensors).



Asynchronous Communications

Typical asynchronous communications configuration. The Mode pin is interrogated at power up and if tied low, will cause the sensor to enter asynchronous communications mode. This mode supports multiple sensors by addressable commands. The Convert/BR pin then serves to select one of two available baud rates.



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Asynchronous Command Summary (1,2)

Command	Description	Response
RD	Read Mode Setting	RD=<Mode>
RM	Read Model Information	RM=<Model String>
RO	Read User Offset Setting	RO=<hhhh>
RP	Read Pressure	RP=<hhhh>
RR	Read Device Pressure Range	RR=<Range String>
RS	Read Serial Number	RS=<Serial Number String>
WD<Mode>	Write Mode Setting (“S” = Standard, “H” = High Resolution)	WD=<Mode>
WO<Offset>	Write User Offset Setting	WO=<hhhh>
U<S/N><Cmd>	Select Unique Part for following command (for multidrop configurations).	U<S/N><Cmd>

Asynchronous Command Notes

NOTE 1: All commands and responses are in ASCII character format and are terminated by a Carriage Return (Carriage Returns are not shown in command and response table). Example: The Read High Resolution Pressure command (represented by: RH<CR>) is given by the following three byte sequence: 0x52 0x48 0x0D

NOTE 2: <hhhh> is a four byte ASCII string representing a 16-bit signed value. Example: RH=2B7D represents the response of an RH command with the pressure output of 0x2B7D (11,133 decimal) value.

NOTE 3: <llll> is a four byte ASCII string representing the low resolution output (similar to the high resolution response of Note 2)

NOTE 4: <eeee> is a 16-bit error code. The representation is four byte ASCII string (expressing a double-byte or 16-bits). A “no error” condition is expressed as “0000’ where an error is expressed by setting an individual bit of the error word and presenting it in ASCII hex format.

NOTE 5: {null} is a null response (no response). The intent utility of the command is to apply this command in a multidrop configuration (bussed configuration) and simulaneously capture the pressure of all of the devices on the buss. The captured readings can subsequently be read using the U command (Select Unique Part) inconjunction with the RC command. Example: U<S/N>RC<CR>

Millivolt Output Pressure Sensors

C-Grade
Pressure Sensors

Features

- 0 to 0.3 PSI to 0 to 100 PSI Pressure Ranges
- 1 % linearity version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

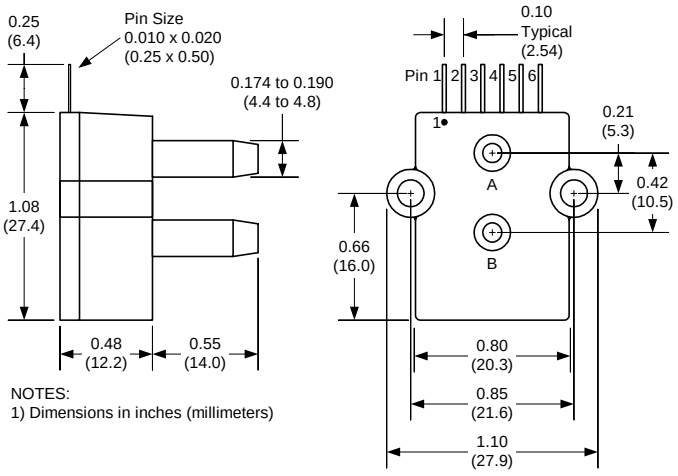
General Description

The Millivolt Output pressure sensors is based upon a proprietary packaging technology to reduce output offset or common mode errors. This model provides a calibrated millivolt output with good output offset characteristics. 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 C-GRADE is a lowest cost version of the millivolt output pressure sensors.

The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +16 V is acceptable.

Physical Dimensions



pin 1: N/C
pin 2: +V supply
pin 3: +Voutput
pin 4: -Vsupply
pin 5: -Voutput
pin 6: N/C

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Pressure Sensor Characteristics Maximum Ratings

Supply Voltage ,Vs	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
4 INCH-D-CGRADE-MV	0 - 4 "H2O	40 mV	1 PSI	5 PSI
0.3 PSI-D-CGRADE-MV	0 - O.3 PSI	20 mV	5 PSI	5 PSI
1 PSI-D-CGRADE-MV	0 - 1 PSI	18 mV	5 PSI	15 PSI
5 PSI-D-CGRADE-MV	0 - 5 PSI	60 mV	10 PSI	30 PSI
15 PSI-D-CGRADE-MV	0 - 15 PSI	90 mV	60 PSI	120 PSI
30 PSI-D-CGRADE-MV	0 - 30 PSI	90 mV	90 PSI	150 PSI
100 PSI-D-CGRADE-MV	0 - 100 PSI	100mV	200 PSI	250 PSI
150 PSI-D-CGRADE-MV	0 - 150 PSI	90mV	200 PSI	250 PSI
15 PSI-A-CGRADE-MV	0 - 15 PSIA	60mV	60 PSIA	120 PSI

Performance Characteristics for 4 INCH-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		4.0		"H2O
Output Span, note 5	38	40.0	42	mV
Offset Voltage @ zero differential pressure			±1.5	mV
Offset Temperature Shift (0°C-50°C), note 2			±1.5	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-50°C), note 2			±2	%fs

Performance Characteristics for 0.3 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		0.3		PSI
Output Span, note 5	18	20.0	22	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 1 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		1.0		PSI
Output Span, note 5	16	18	20	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 5 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		5.0		PSI
Output Span, note 5	57	60	63	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 15 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		15.0		PSI
Output Span, note 5	86	90.0	94	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 30 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		30.0		PSI
Output Span, note 5	86	90	94	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

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Performance Characteristics for 100 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		100.0		PSI
Output Span, note 5	96	100	104	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 150 PSI-D-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		150.0		PSI
Output Span, note 5	86	90	95	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 15 PSI-A-CGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		15.0		PSIA
Output Span, note 5	86	90.0	94	mV
Offset Voltage @ zero absolute pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

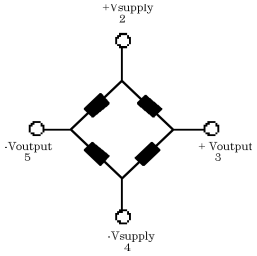
NOTE 2: SHIFT IS RELATIVE TO 25°C.

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.

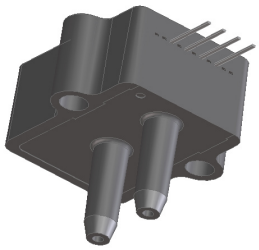
Input Resittance	5.0 k ohm
Output Resistance	3.0 k ohm



Equivalent Circuit

Millivolt Output Pressure Sensors

H-Grade
Pressure Sensors



Features

- 0 to 4" H2O to 0 to 100 PSI Pressure Ranges
- 0.5 % linearity...high accuracy version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

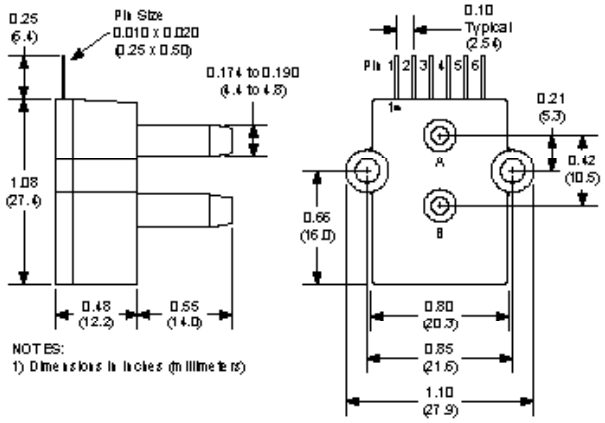
General Description

The Millivolt Output pressure sensors is based upon a proprietary packaging technology to reduce output offset or common mode errors. This model provides a calibrated millivolt output with excellent output offset characteristics. 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 H-GRADE is a high accuracy version of the millivolt output pressure sensors.

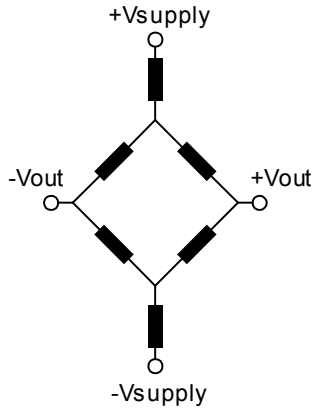
The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +16 V is acceptable.

Physical Dimensions



pin 1: N/C
pin 2: +V supply
pin 3: +Voutput
pin 4: -Vsupply
pin 5: -Voutput
pin 6: N/C

Equivalent Circuit



Input Resittance	20 k ohm
Output Resistance	3.0 k ohm

Approvals

MKT DATE	MFG DATE	ENG DATE	QA DATE
☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change

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Pressure Sensor Characteristics Maximum Ratings

Supply Voltage, Vs	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
4 INCH-D-HGRADE-MV	0 - 4" H2O	40 mV	3 PSI	15 PSI
0.3 PSI-D-HGRADE-MV	0 - 0.3 PSI	20 mV	5 PSI	15 PSI
1 PSI-D-HGRADE-MV	0 - 1 PSI	18 mV	5 PSI	15 PSI
5 PSI-D-HGRADE-MV	0 - 5 PSI	60 mV	10 PSI	30 PSI
15 PSI-D-HGRADE-MV	0 - 15 PSI	90 mV	60 PSI	120 PSI
30 PSI-D-HGRADE-MV	0 - 30 PSI	90 mV	90 PSI	150 PSI
100 PSI-D-HGRADE-MV	0 - 100 PSI	100 mV	200 PSI	250 PSI
150 PSI-D-HGRADE-MV	0 - 150 PSI	90 mV	200 PSI	250 PSI
15 PSI-A-HGRADE-MV	0 - 15 PSIA	90 mV	60 PSIA	120 PSIA
30 PSI-A-HGRADE-MV	0 - 30 PSIA	90 mV	90 PSIA	150 PSIA
100 PSI-A-HGRADE-MV	0 - 100 PSIA	100 mV	200 PSIA	250 PSIA

Performance Characteristics for 4 INCH-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	4	--	"H2O
Output Span, note 5	39.5	40.0	40.5	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 0.3 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	0.3	--	PSI
Output Span, note 5	19.8	20.0	20.2	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 1 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	1.0	--	PSI
Output Span, note 5	17.82	18.0	18.18	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 5 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	5.0	--	PSI
Output Span, note 5	59.4	60.0	60.6	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 15 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	15.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 30 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	30.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

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Performance Characteristics for 100 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	100.0	--	PSI
Output Span, note 5	99	100	101	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 150 PSI-D-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	150.0	--	PSI
Output Span, note 5	89	90	91	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 15 PSI-A-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	15.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero absolute pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 30 PSI-A-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	30.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero absolute pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 100 PSI-A-HGRADE-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	100.0	--	PSIA
Output Span, note 5	99.0	100.0	101.0	mV
Offset Voltage @ zero absolute pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±500	uV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B. FOR ABSOLUTE PRESSURE PRESSURE IS APPLIED TO PORT A.

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.

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Millivolt Output Pressure Sensors

Prime Grade
Pressure Sensors

Features

- 0 to 0.3 PSI to 0 to 100 PSI Pressure Ranges
- 0.25 % linearity...highest accuracy version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

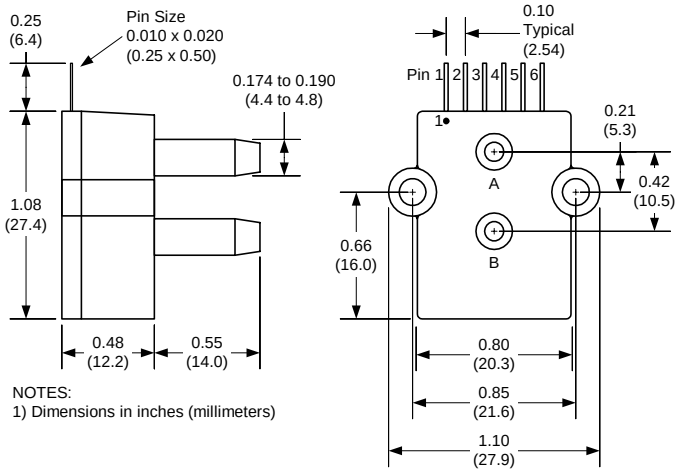
General Description

The Millivolt Output pressure sensors is based upon a proprietary packaging technology to reduce output offset or common mode errors. This model provides a calibrated millivolt output with excellent output offset characteristics. 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 PRIME GRADE is the highest accuracy version of the millivolt output pressure sensors.

The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +16 V is acceptable.

Physical Dimensions



pin 1: N/C
pin 2: +V supply
pin 3: +Voutput
pin 4: -Vsupply
pin 5: -Voutput
pin 6: N/C

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D-PRIME-MV	0 - 0.3 PSI	20 mV	5 PSI	15 PSI
1 PSI-D-PRIME-MV	0 - 1 PSI	18 mV	5 PSI	15 PSI
5 PSI-D-PRIME-MV	0 - 5 PSI	60 mV	10 PSI	30 PSI
15 PSI-D-PRIME-MV	0 - 15 PSI	90 mV	60 PSI	120 PSI
30 PSI-D-PRIME-MV	0 - 30 PSI	90 mV	90 PSI	150 PSI
100 PSI-D-PRIME-MV	0 - 100 PSI	100 mV	200 PSI	250 PSI
15 PSI-A-PRIME-MV	0 - 15 PSIA	60 mV	60 PSIA	120 PSI

Performance Characteristics for 0.3 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		0.3		PSI
Output Span, note 5	19.8	20.0	20.2	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 1 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		1.0		PSI
Output Span, note 5	17.82	18.0	18.18	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 5 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		5.0		PSI
Output Span, note 5	59.4	60.0	60.6	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 15 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		15.0		PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 30 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		30.0		PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 100 PSI-D-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		100.0		PSI
Output Span, note 5	99	100	101	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

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Performance Characteristics for 15 PSI-A-PRIME-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		15.0		PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero absolute pressure			±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2			±250	uV
Linearity, hysteresis error, note 4		0.1	0.25	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

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

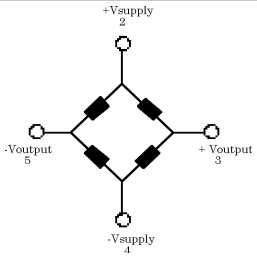
NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

NOTE 5: THE VOLTAGE ADDED TO THE OFFSET VOLTAGE AT FULL SCALE PRESSURE.

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

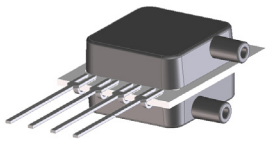
Equivalent Circuit

Input Resittance	5.0 k ohm
Output Resistance	3.0 k ohm



MILLIVOLT OUTPUT MINIATURE PRESSURE SENSORS

C-Grade
Pressure Sensors



Features

- 0 to 0.3 PSI to 0 to 30 PSI Pressure Ranges
- 1 % linearity version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

General Description

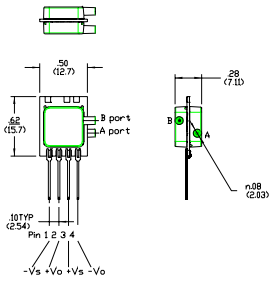
The Millivolt Output pressure sensors is based upon a proprietary packaging technology to reduce output offset or common mode errors. This model provides a calibrated millivolt output with good output offset characteristics. In addition the sensor utilizes a silicon, micromachined, stress concentration 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 C-GRADE is a lowest cost version of the millivolt output pressure sensors.

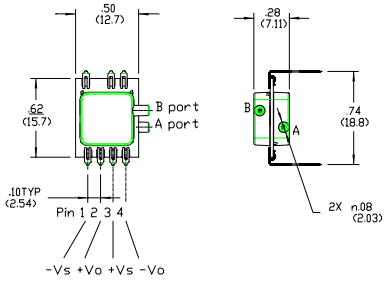
The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +16 V is acceptable.

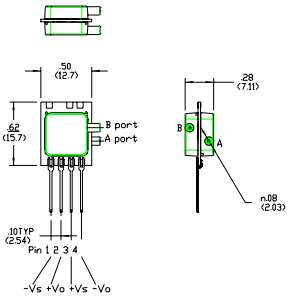
Physical Dimensions

Two Pressure Port Same Side



Dual in Line (DIP)





Two Pressure Port Same Side

Gage Version single port on top

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Pressure Sensor Characteristics Maximum Ratings

Supply Voltage, Vs	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number-Side Port Top Only	Part Number-DIP	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-G-CGRADE-MV-SMINI	0.3 PSI-DDIP-CGRADE-MV-SMINI	0 - 0.3 PSI	20mV	5 PSI	15 PSI
1 PSI-G-CGRADE-MV-SMINI	1 PSI-DDIP-CGRADE-MV-SMINI	0 - 1 PSI	18mV	5 PSI	15 PSI
5 PSI-G-CGRADE-MV-SMINI	5 PSI-DDIP-CGRADE-MV-SMINI	0 - 5 PSI	60mV	10 PSI	30 PSI
15 PSI-G-CGRADE-MV-SMINI	15 PSI-DDIP-CGRADE-MV-SMINI	0 - 15 PSI	90mV	60 PSI	120 PSI
30 PSI-G-CGRADE-MV-SMINI	30 PSI-DDIP-CGRADE-MV-SMINI	0 - 30 PSI	90mV	90 PSI	150 PSI
15 PSI-A-CGRADE-MV-SMINI	15 PSI-ADIP-CGRADE-MV-SMINI	0 - 15 PSIA	60mV	60 PSIA	120 PSI

Part Number-2 Side Ports- same side	Part Number-SDXL Interface board	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D1-CGRADE-MV-SMINI	0.3 PSI-DSDXL-CGRADE-MV-SMINI	0 - 0.3 PSI	20mV	5 PSI	15 PSI
1 PSI-D1-CGRADE-MV-SMINI	1 PSI-DSDXL-CGRADE-MV-SMINI	0 - 1 PSI	18mV	5 PSI	15 PSI
5 PSI-D1-CGRADE-MV-SMINI	5 PSI-DSDXL-CGRADE-MV-SMINI	0 - 5 PSI	60mV	10 PSI	30 PSI
15 PSI-D1-CGRADE-MV-SMINI	15 PSI-DSDXL-CGRADE-MV-SMINI	0 - 15 PSI	90mV	60 PSI	120 PSI
30 PSI-D1-CGRADE-MV-SMINI	30 PSI-DSDXL-CGRADE-MV-SMINI	0 - 30 PSI	90mV	90 PSI	150 PSI
	15 PSI-ASDXL-CGRADE-MV-SMINI	0 - 15 PSIA	60mV	60 PSIA	120 PSI

Performance Characteristics for 0.3 PSI-D-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		0.3		PSI
Output Span, note 5	18	20.0	22	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 1 PSI-D-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		1.0		PSI
Output Span, note 5	16	18	20	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 5 PSI-D-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		5.0		PSI
Output Span, note 5	57	60	63	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 15 PSI-D-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		15.0		PSI
Output Span, note 5	86	90.0	94	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

Performance Characteristics for 30 PSI-D-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		30.0		PSI
Output Span, note 5	86	90	94	mV
Offset Voltage @ zero differential pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs

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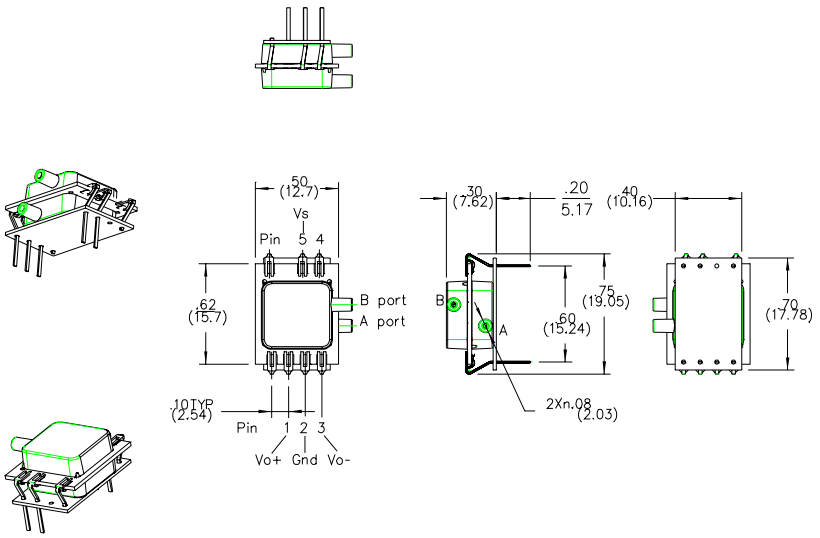
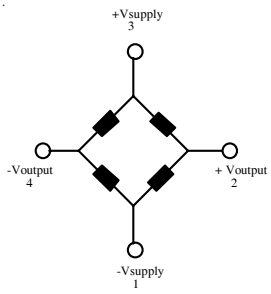
Performance Characteristics for 15 PSI-A-CGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		15.0		PSIA
Output Span, note 5	86	90.0	94	mV
Offset Voltage @ zero absolute pressure			±1	mV
Offset Temperature Shift (0°C-70°C), note 2			±1	mV
Linearity, hysteresis error, note 4		0.5	1.0	%fs
Span Shift (0°C-70°C), note 2			±2	%fs



Dual in Line (SDXL)



Input Resittance	5.0 k ohm
Output Resistance	3.0 k ohm

Equivalent Circuit

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 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

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.

Millivolt Output Miniature Pressure Sensors

H-Grade
Pressure Sensors

Features

- 0 to 0.3 PSI to 0 to 30 PSI Pressure Ranges
- 1 % linearity version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

General Description

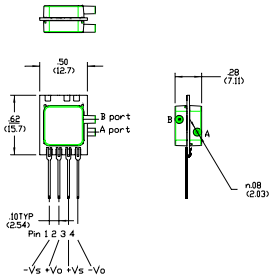
The Millivolt Output pressure sensors is based upon a proprietary packaging technology to reduce output offset or common mode errors. This model provides a calibrated millivolt output with good output offset characteristics. In addition the sensor utilizes a silicon, micromachined, stress concentration 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 C-GRADE is a lowest cost version of the millivolt output pressure sensors.

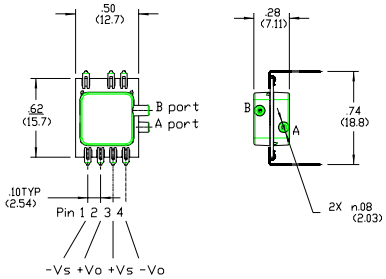
The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage up to +16 V is acceptable.

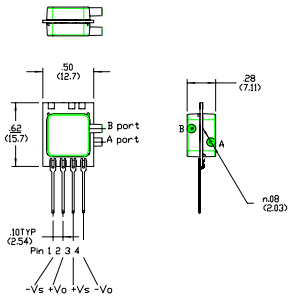
Physical Dimensions

Two Pressure Port Same Side



Dual in Line (DIP)





Two Pressure Port Same Side

Gage Version single port on top

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Pressure Sensor Characteristics Maximum Ratings

Supply Voltage, Vs	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number-Side Port Top Only	Part Number-DIP	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-G-HGRADE-MV-SMINI	0.3 PSI-DDIP-HGRADE-MV-SMINI	0 - 0.3 PSI	20mV	5 PSI	15 PSI
1 PSI-G-HGRADE-MV-SMINI	1 PSI-DDIP-HGRADE-MV-SMINI	0 - 1 PSI	18mV	5 PSI	15 PSI
5 PSI-G-HGRADE-MV-SMINI	5 PSI-DDIP-HGRADE-MV-SMINI	0 - 5 PSI	60mV	10 PSI	30 PSI
15 PSI-G-HGRADE-MV-SMINI	15 PSI-DDIP-HGRADE-MV-SMINI	0 - 15 PSI	90mV	60 PSI	120 PSI
30 PSI-G-HGRADE-MV-SMINI	30 PSI-DDIP-HGRADE-MV-SMINI	0 - 30 PSI	90mV	90 PSI	150 PSI
15 PSI-A-HGRADE-MV-SMINI	15 PSI-ADIP-HGRADE-MV-SMINI	0 - 15 PSIA	60mV	60 PSIA	120 PSI

Part Number-2 Side Ports- same side	Part Number-SDXL Interface board	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-D1-HGRADE-MV-SMINI	0.3 PSI-DSDXL-HGRADE-MV-SMINI	0 - 0.3 PSI	20mV	5 PSI	15 PSI
1 PSI-D1-HGRADE-MV-SMINI	1 PSI-DSDXL-HGRADE-MV-SMINI	0 - 1 PSI	18mV	5 PSI	15 PSI
5 PSI-D1-HGRADE-MV-SMINI	5 PSI-DSDXL-HGRADE-MV-SMINI	0 - 5 PSI	60mV	10 PSI	30 PSI
15 PSI-D1-HGRADE-MV-SMINI	15 PSI-DSDXL-HGRADE-MV-SMINI	0 - 15 PSI	90mV	60 PSI	120 PSI
30 PSI-D1-HGRADE-MV-SMINI	30 PSI-DSDXL-HGRADE-MV-SMINI	0 - 30 PSI	90mV	90 PSI	150 PSI
	15 PSI-ASDXL-HGRADE-MV-SMINI	0 - 15 PSIA	60mV	60 PSIA	120 PSI

Performance Characteristics for 0.3 PSI-D-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		0.3		PSI
Output Span, note 5	19.8	20.0	20.2	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 1 PSI-D-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		1.0		PSI
Output Span, note 5	17.82	18	18.18	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 5 PSI-D-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		5.0		PSI
Output Span, note 5	59.4	60	60.6	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 15 PSI-D-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		15.0		PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

Performance Characteristics for 30 PSI-D-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		30.0		PSI
Output Span, note 5	89.1	90	90.9	mV
Offset Voltage @ zero differential pressure			±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs

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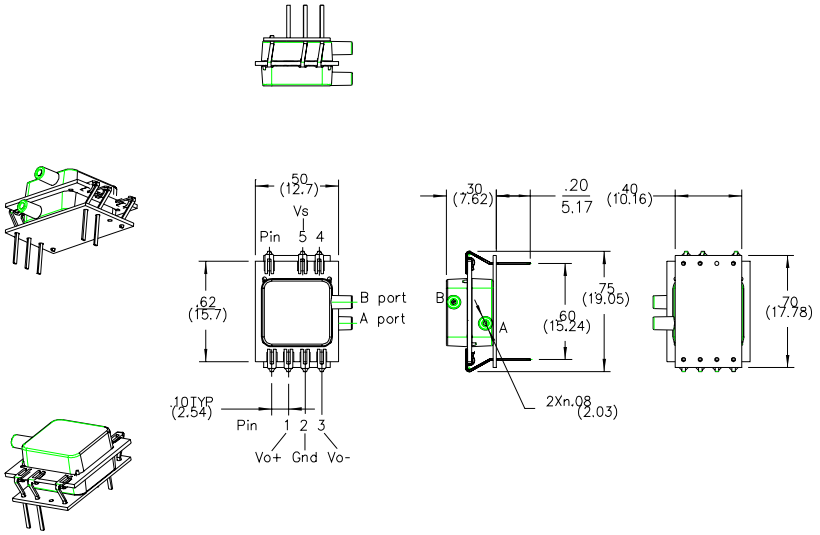
Performance Characteristics for 15 PSI-A-HGRADE-MV-SMINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		15.0		PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero absolute pressure			±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2			±0.5	mV
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (0°C-70°C), note 2			±1	%fs



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 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

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.

Baromtric Pressure Sensors Prime Grade

Features

- 600 to 1,100 mbar Pressure Range
- 0.10 % linearity...highest accuracy version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- Weather Station
- Altimeters

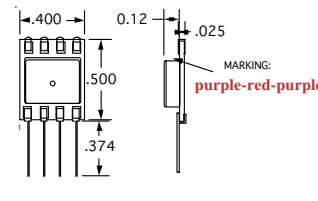
General Description

The Miniature series pressure sensors are based upon a proprietary technology to reduce the size of the sensor and yet maintain a high level of performance. This model provides a calibrated millivolt output with superior output characteristics. In addition the sensor utilizes a silicon, micromachined (MEMS) 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 PRIME GRADE is the highest accuracy version of the millivolt output pressure sensors.

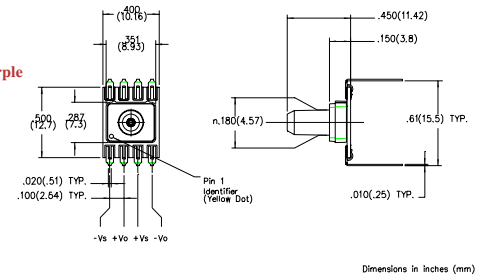
The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage to 16 volts.

Physical Dimensions



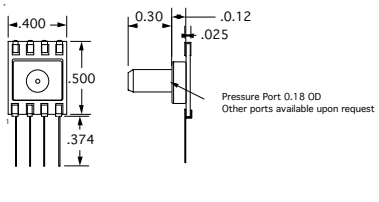
No Pressure Port

BARO-A-PRIME-MINI



Single Pressure Port Dual in Line

BARO-AF-PRIME-DIP



Single Pressure Port

BARO-AF-PRIME-MINI

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	16 Vdc
Lead Temperature (soldering 2-4 sec.)	250°C
Proof Pressure	60 psi

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Performance Characteristics

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600	850	1100	mbar
Output Span, @ 1,100 mbar	94.7	95.7	96.7	mV
Output Voltage @ 600 mbar	51.2	52.2	53.2.	mV
Output Voltage 0 to 600 mbar		0.087		mV/mbar
Linearity, hysteresis error, note 4		0.05	0.25	%fs
Output Shift (0°C-70°C), note 2			±1	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

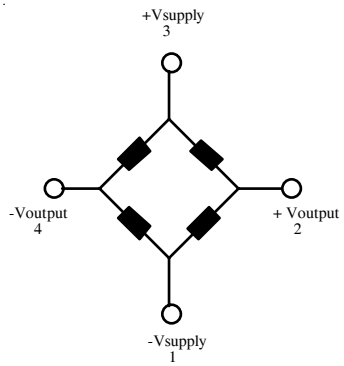
NOTE 2: SHIFT IS RELATIVE TO 25°C.

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.

Equivalent Circuit

Input Resittance	15.0 kohm
Output Resistance	3.0 kohm



Millivolt Output Pressure Sensors

Package A

Package M

Features

- Temperature Compensated
- Calibrated Zero and Span

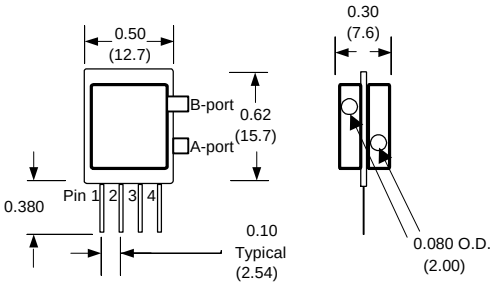
Applications

- Non Invasive Blood Pressure

General Description

This data sheet describes two package configuration of pressure sensors for use in non invasive blood pressure maeasurement.

The output voltager is ratiometric to the supply voltage and is offered in either millivolt or amplified output configuration.

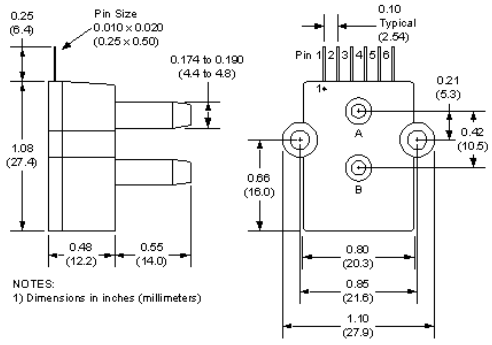


pin 1: +V supply

pin 2: Ground

pin 3: +Voutput

pin 4: -N/C



pin 1: N/C

pin 2: +V supply

pin 3: +Voutput

pin 4: -Vsupply

pin 5: -Voutput

pin 6: N/C

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	see below
Proof Pressure	1500 mmHg
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	10 to 50° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Package Types

Part Number-Side Port	Package Type	Nominal Span	Supply Voltage
BP01-D-MV	A	15 mV	5 volts
BP01-G-4V-MINI	M	4.2 volts	5 volts

Performance Characteristics for BP01-D-MV

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		300		mmHg
Output Span, note 4	14.85	15.0	15.15	mV
Offset Voltage @ zero pressure		0	0±5	mmHg
Offset Temperature Shift (10°C-50°C), note 2			±0.2	mmHg/°C
Linearity, hysteresis error 0 - 200 mmHg, note 3			±0.1	%fs
Linearity, hysteresis error 0 - 300 mmHg, note 3			±0.2	%fs
Span Shift (10°C-50°C), note 2			±0.5	%fs

Performance Characteristics for BP01-G-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		300		mmHg
Output Span, note 4	4.1	4.2	4.3	V
Offset Voltage @ zero pressure	0.18	0.25	0.32	V
Offset Temperature Shift (10°C-50°C), note 2			±0.2	mmHg/°C
Linearity, hysteresis error 0 - 200 mmHg, note 3			±0.1	%fs
Linearity, hysteresis error 0 - 300 mmHg, note 3			±0.2	%fs
Span Shift (10°C-50°C), note 2			±0.5	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C READINGS TAKEN AT 10°C AND 50°C.

NOTE 3: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

NOTE 4: THE VOLTAGE ADDED TO THE OFFSET VOLTAGE AT FULL SCALE PRESSURE.

Miniature Amplified Pressure Sensors

±0.3 psi to 100 psi Pressure Sensors

Features

- 0 to ±0.3 to 0 to 30 psi Pressure Ranges
- Ratiometric 4V Output
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Instrumentation
- HVAC Instrumentation

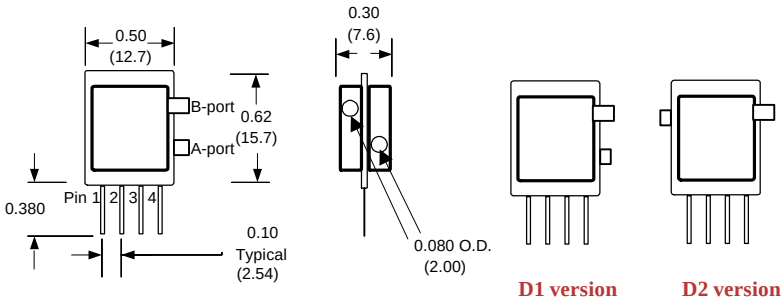
General Description

The Miniature Amplified line of pressure sensors is based upon technology developed over years of development in the pressure sensor industry. This model provides a ratiometric 4-volt output with superior output characteristics. The sensor housing has been designed specifically to reduce package induced parasitic stress and strain. 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. Each sensor is internally compensated using an ASIC compensation technique. 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 over a supply voltage range of 4.5 to 5.5 volts.

Physical Dimensions

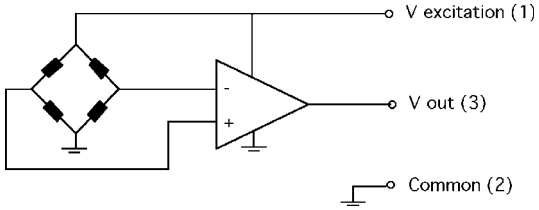


D1 version

D2 version

or G verison

Equivalent Circuit



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Pressure Sensor Ratings

Supply Voltage, Vs	+4.5 to +5.5 Vdc
Common-mode pressure	-10 to +10 psig
Lead Temperature, max (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	5 to 50° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Part Number	Operating Pressure	Nominal Span	Proof Pressure	Burst Pressure
0.3 PSI-Dx-4V-MINI	±0.3 PSI	4 V	5 PSI	10 PSI
0.3 PSI-G-4V-MINI	0 - 0.3 PSI	4 V	5 PSI	10 PSI
1 PSI-Dx-4V-MINI	±1 PSI	4 V	5 PSI	10 PSI
1 PSI-G-4V-MINI	0 - 1 PSI	4 V	5 PSI	10 PSI
5 PSI-Dx-4V-MINI	± 5 PSI	4 V	15 PSI	30 PSI
5 PSI-G-4V-MINI	0 - 5 PSI	4 V	15 PSI	30 PSI
15 PSI-A-4V-MINI	0 - 15 PSIA	4 V	45 PSI	60 PSI
15 PSI-Dx-4V-MINI	±15 PSI	4 V	45 PSI	60 PSI
15 PSI-G-4V-MINI	0 - 15 PSI	4V	45 PSI	60 PSI
30 PSI-A-4V-MINI	0 - 30 PSIA	4V	60 PSI	60 PSI
30 PSI-Dx-4V-MINI	±30 PSI	4V	60 PSI	60 PSI
30 PSI-G-4V-MINI	0 - 30 PSI	4V	60 PSI	100 PSI
BARO-A-4V-MINI	600 - 1100 mbar	4V	45 PSI	60 PSI

Performance Characteristics for 0.3 PSI-Dx-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±0.3		PSI
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 (5°C-50°C), note 2			±40	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C-50°C), note 2			±2	%span

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 PORT B.

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.

Performance Characteristics for 0.3 PSI-G-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		0.3		PSI
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 (5°C-50°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C-50°C), note 2			±2	%span

Performance Characteristics for 1 PSI-D-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±1.0		PSI
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 (5°C to 50°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for: 1 PSI-G-4V-MINI

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		1.0		PSI
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 (5°C to 50°C), note 2			±4.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for: 5 PSI-D-4V-MINI

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±5.0		PSI
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 (5°C to 50°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

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Performance Characteristics for: 5 PSI-G-4V-MINI

Parameter, NOTE 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		5.0		PSI
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 (5°C to 50°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 15 PSI-A-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	0		15	psia
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 (5°C to 50°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 15 PSI-Dx-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±15.0		PSI
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 (5°C to 50°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for BARO-A-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	600		1100	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 (5°C to 50°C), note 2			±2.0	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°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.

Performance Characteristics for 15 PSI-G-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		15.0		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 30 PSI-Dx-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure		±30.0		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 30 PSI-G-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure		30.0		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

Performance Characteristics for 30 PSI-A-4V-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure		30.0		PSI
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 (5°C to 50°C), note 2			±20	mvolt
Linearity, hysteresis error, note 4			±0.5	%fs
Span Shift (5°C to 50°C), note 2			±1	%span

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 PORT B.

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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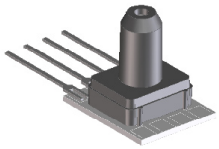
Miniature Pressure Sensors

Prime Grade
Pressure Sensors



Features

- 0 to 0.3 PSI to 0 to 100 PSI Pressure Ranges
- 0.25 % linearity...highest accuracy version
- Temperature Compensated
- Calibrated Zero and Span

Applications

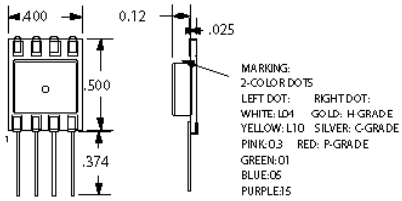
- Medical Instrumentation
- Environmental Controls
- HVAC

General Description

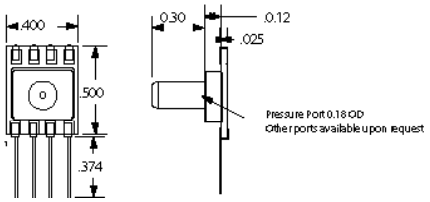
The Miniature series pressure sensors are based upon a proprietary technology to reduce the size of the sensor and yet maintain a high level of performance. This model provides a calibrated millivolt output with superior output characteristics. In addition the sensor utilizes a silicon, micromachined, 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 PRIME GRADE is the highest accuracy version of the millivolt output pressure sensors.

Physical Dimensions

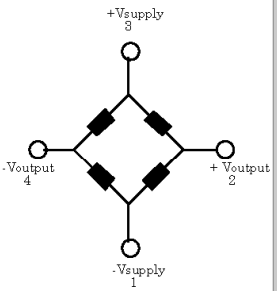


No Pressure Port



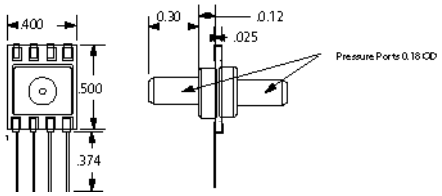
Single Pressure Port

Equivalent Circuit



Input Resittance	5.0 k ohm
Output Resistance	3.0 k ohm

Marking:
right dot: Red: Prime Grade
left dot:
L10: yellow
0.3: pink
1.0: green
05: blue
15: purple
30: orange
100: brown



Dual Pressure Port

Approvals

MKT DATE	MFG DATE	ENG DATE	QA DATE
☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change

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Pressure Sensor Characteristics Maximum Ratings

Supply Voltage, Vs	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

No Prssure Port		Single Pressure Port	Dual Pressure Port	
Part Number	Operating Pressure	Part Number	Part Number	Proof Pressure
0.3 PSI-G-PRIME-MINI	0 - 0.3 PSI	0.3 PSI-GF-PRIME-MINI	0.3 PSI-D-PRIME-MINI	3 PSI
10 INCH-G-PRIME-MINI	0 - 10 "H2O	10 INCH-GF-PRIME-MINI	10 INCH-D-PRIME-MINI	5 PSI
1 PSI-G-PRIME-MINI	0 - 1 PSI	1 PSI-GF-PRIME-MINI	1 PSI-D-PRIME-MINI	10 PSI
5 PSI-G-PRIME-MINI	0 - 5 PSI	5 PSI-GF-PRIME-MINI	5 PSI-D-PRIME-MINI	20 PSI
15 PSI-A-PRIME-MINI	0 - 15 PSIA	15 PSI-AF-PRIME-MINI		60 PSI
15 PSI-G-PRIME-MINI	0-15 PSI	15 PSI-GF-PRIME-MINI	15 PSI-D-PRIME-MINI	60 PSI
30 PSI-A-PRIME-MINI	0-30 PSIA	30 PSI-AF-PRIME-MINI		60 PSI
30 PSI-G-PRIME-MINI	0-30 PSI	30 PSI-GF-PRIME-MINI	30 PSI-D-PRIME-MINI	60 PSI
100 PSI-G-PRIME-MINI	0-100 PSI	100 PSI-GF-PRIME-MINI		150 PSI

Performance Characteristics for 0.3 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	0.3	--	PSI
Output Span, note 5	19	20	21	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 10 INCH-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	10.0	--	"H2O
Output Span, note 5	19	20	21	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 1 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	1.0	--	PSI
Output Span, note 5	17.82	18.0	18.18	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 5 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	5.0	--	PSI
Output Span, note 5	59.4	60.0	60.6	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 15 PSI-A-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	15.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 15 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	15.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero gage pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

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Performance Characteristics for 30 PSI-A-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	30.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 30 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	30.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero gage pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 100 PSI-G-PRIME-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	100.0	--	PSI
Output Span, note 5	99.0	100.0	101.0	mV
Offset Voltage @ zero gage pressure	--	--	±0.3	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±250	uV
Linearity, hysteresis error, note 4	--	0.1	0.25	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

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

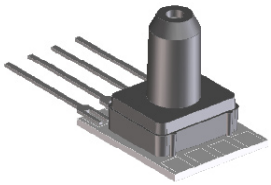
NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

NOTE 5: THE VOLTAGE ADDED TO THE OFFSET VOLTAGE AT FULL SCALE PRESSURE.

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

Miniature Pressure Sensors

C-Grade
Pressure Sensors



Features

- 0 to 4" H2O to 0 to 100 PSI Pressure Ranges
- 1 % linearity version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

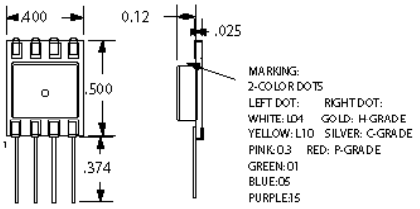
General Description

The Miniature series pressure sensors are based upon a proprietary technology to reduce the size of the sensor and yet maintain a high level of performance. This model provides a calibrated millivolt 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.

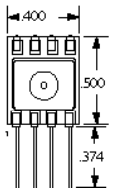
These calibrated and temperature compensated sensors give an accurate and stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. The C-GRADE is a lowest cost version of the millivolt output pressure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

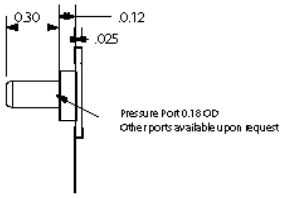
The output of the device is ratiometric to the supply voltage and operation from any D.C. supply voltage.

Physical Dimensions



No Pressure Port

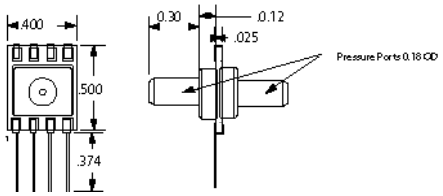




Single Pressure Port

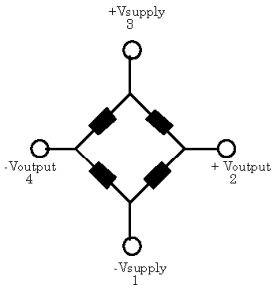
all dimensions in inches

Marking:
right dot: Silver C-Grade
left dot:
L04: white
L10: yellow
0.3: pink
1.0: green
05: blue
15: purple
30: orange
100: brown



Dual Pressure Port

Equivalent Circuit



Input Resittance 5.0 k ohm

Output Resistance 3.0 k ohm

Approvals

MKT	DATE	MFG	DATE	ENG	DATE	QA	DATE
☐ As Is ☐ With Change		☐ As Is ☐ With Change		☐ As Is ☐ With Change		☐ As Is ☐ With Change	

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to 70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

No Prssure Port		Single Pressure Port	Dual Pressure Port	
Part Number	Operating Pressure	Part Number	Part Number	Proof Pressure
4 INCH-G-CGRADE-MINI	0 - 4 "H2O	4 INCH-GF-CGRADE-MINI	4 INCH-D-CGRADE-MINI	3 PSI
0.3 PSI-G-CGRADE-MINI	0 - O.3 PSI	0.3 PSI-GF-CGRADE-MINI	0.3 PSI-D-CGRADE-MINI	3 PSI
10 INCH-G-CGRADE-MINI	0 - 10 "H2O	10 INCH-GF-CGRADE-MINI	10 INCH-D-CGRADE-MINI	5 PSI
1 PSI-G-CGRADE-MINI	0 - 1 PSI	1 PSI-GF-CGRADE-MINI	1 PSI-D-CGRADE-MINI	10 PSI
5 PSI-G-CGRADE-MINI	0 - 5 PSI	5 PSI-GF-CGRADE-MINI	5 PSI-D-CGRADE-MINI	20 PSI
15 PSI-A-CGRADE-MINI	0 - 15 PSIA	15 PSI-AF-CGRADE-MINI		60 PSI
15 PSI-G-CGRADE-MINI	0-15 PSI	15 PSI-GF-CGRADE-MINI	15 PSI-D-CGRADE-MINI	60 PSI
30 PSI-A-CGRADE-MINI	0-30 PSIA	30 PSI-AF-CGRADE-MINI		60 PSI
30 PSI-G-CGRADE-MINI	0-30 PSI	30 PSI-GF-CGRADE-MINI	30 PSI-D-CGRADE-MINI	60 PSI
100 PSI-G-CGRADE-MINI	0-100 PSI	100 PSI-GF-CGRADE-MINI		150 PSI

Performance Characteristics for 4 INCH-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	4.0	--	"H2O
Output Span, note 5	23	25	27	mV
Offset Voltage @ zero differential pressure	--	--	±1.5	mV
Offset Temperature Shift (0°C-50°C), note 2	--	--	±1.5	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-50°C), note 2	--	--	±2	%fs

Performance Characteristics for 10 INCH-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	10.0	--	"H2O
Output Span, note 5	18	20	22	mV
Offset Voltage @ zero differential pressure	--	--	±1.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1.5	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 0.3 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	0.3	--	PSI
Output Span, note 5	18	20.0	22	mV
Offset Voltage @ zero differential pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 1 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	1.0	--	PSI
Output Span, note 5	16	18	20	mV
Offset Voltage @ zero differential pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 5 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	5.0	--	PSI
Output Span, note 5	57	60	63	mV
Offset Voltage @ zero differential pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 15 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	15.0	--	PSI
Output Span, note 5	85	90.0	95	mV
Offset Voltage @ zero gage pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

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Performance Characteristics for 15 PSI-A-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	15.0	--	PSIA
Output Span, note 5	85	90.0	95	mV
Offset Voltage @ zero absolute pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 30 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	30.0	--	PSI
Output Span, note 5	85	90.0	95	mV
Offset Voltage @ zero pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 30 PSI-A-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	30.0	--	PSIA
Output Span, note 5	85	90.0	95	mV
Offset Voltage @ zero absolute pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Performance Characteristics for 100 PSI-G-CGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	100.0	--	PSI
Output Span, note 5	95	100.0	105	mV
Offset Voltage @ zero pressure	--	--	±1	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±1	mV
Linearity, hysteresis error, note 4	--	0.5	1.0	%fs
Span Shift (0°C-70°C), note 2	--	--	±2	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

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

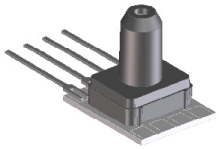
NOTE 4: MEASURED AT ONE-HALF FULL SCALE RATED PRESSURE USING BEST STRAIGHT LINE CURVE FIT.

NOTE 5: THE VOLTAGE ADDED TO THE OFFSET VOLTAGE AT FULL SCALE PRESSURE.

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

Miniature Pressure Sensors

H-Grade
Pressure Sensors



Features

- 0 to 4" H2O to 0 to 100 PSI Pressure Ranges
- 0.5 % linearity...high accuracy version
- Temperature Compensated
- Calibrated Zero and Span

Applications

- Medical Instrumentation
- Environmental Controls
- HVAC

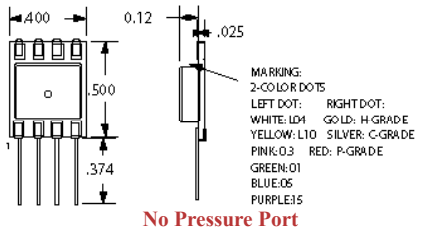
General Description

The Miniature series pressure sensors are based upon a proprietary technology to reduce the size of the sensor and yet maintain a high level of performance. This model provides a calibrated millivolt 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.

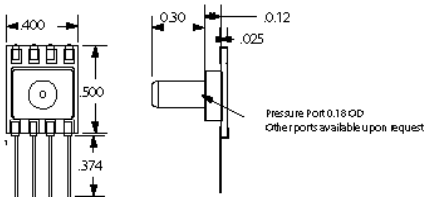
These calibrated and temperature compensated sensors give an accurate and stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. The H-GRADE is a high accuracy version of the millivolt output pressure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

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

Physical Dimensions

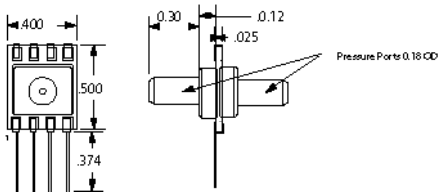


No Pressure Port



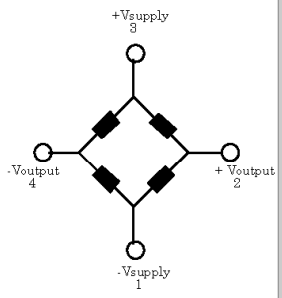
Single Pressure Port

Marking:
right dot: gold: H-Grade
left dot:
L04: white
L10: yellow
0.3: pink
1.0: green
05: blue
15: purple
30: orange
100: brown



Dual Pressure Port

Equivalent Circuit



Input Resittance	5.0 k ohm
Output Resistance	3.0 k ohm

Approvals

MKT DATE	MFG DATE	ENG DATE	QA DATE
☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change

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Pressure Sensor Characteristics Maximum Ratings

Supply Supply Voltage VS	16 Vdc
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Temperature Ranges	
Compensated	0 to (50)70° C
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

No Prssure Port		Single Pressure Port	Dual Pressure Port	
Part Number	Operating Pressure	Part Number	Part Number	Proof Pressure
4 INCH-G-HGRADE-MINI	0 - 4 "H2O	4 INCH-GF-HGRADE-MINI	4 INCH-D-HGRADE-MINI	3 PSI
0.3 PSI-G-HGRADE-MINI	0 - 0.3 PSI	0.3 PSI-GF-HGRADE-MINI	0.3 PSI-D-HGRADE-MINI	3 PSI
10 INCH-G-HGRADE-MINI	0 - 10 "H2O	10 INCH-GF-HGRADE-MINI	10 INCH-D-HGRADE-MINI	5 PSI
1 PSI-G-HGRADE-MINI	0 - 1 PSI	1 PSI-GF-HGRADE-MINI	1 PSI-D-HGRADE-MINI	10 PSI
5 PSI-G-HGRADE-MINI	0 - 5 PSI	5 PSI-GF-HGRADE-MINI	5 PSI-D-HGRADE-MINI	20 PSI
15 PSI-A-HGRADE-MINI	0 - 15 PSIA	15 PSI-AF-HGRADE-MINI		60 PSI
15 PSI-G-HGRADE-MINI	0-15 PSI	15 PSI-GF-HGRADE-MINI	15 PSI-D-HGRADE-MINI	60 PSI
30 PSI-A-HGRADE-MINI	0 -30 PSIA	30 PSI-AF-HGRADE-MINI		60 PSI
30 PSI-G-HGRADE-MINI	0-30 PSI	30 PSI-GF-HGRADE-MINI	30 PSI-D-HGRADE-MINI	60 PSI
100 PSI-G-HGRADE-MINI	0-100 PSI	100 PSI-GF-HGRADE-MINI		150 PSI

Performance Characteristics for 4 INCH-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	4.0	--	"H2O
Output Span, note 5	24	25	26	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-50°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-50°C), note 2	--	--	±1	%fs

Performance Characteristics for 10 INCH-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	10.0	--	"H2O
Output Span, note 5	19	20	21	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 0.3 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	0.3	--	PSI
Output Span, note 5	19	20	21	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 1 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	1.0	--	PSI
Output Span, note 5	17.82	18.00	18.18	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 5 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, differential pressure	--	5.0	--	PSI
Output Span, note 5	59.4	60.0	60.6	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 15 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	15.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero gage pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

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Performance Characteristics for 15 PSI-A-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	15.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 30 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	30.0	--	PSI
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero gage pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 30 PSI-A-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, absolute pressure	--	30.0	--	PSIA
Output Span, note 5	89.1	90.0	90.9	mV
Offset Voltage @ zero differential pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Performance Characteristics for 100 PSI-G-HGRADE-MINI

Parameter, note 1	Minimum	Nominal	Maximum	Units
Operating Range, gage pressure	--	100.0	--	PSI
Output Span, note 5	99.0	100.0	101.0	mV
Offset Voltage @ zero gage pressure	--	--	±0.5	mV
Offset Temperature Shift (0°C-70°C), note 2	--	--	±0.5	mV
Linearity, hysteresis error, note 4	--	0.25	0.5	%fs
Span Shift (0°C-70°C), note 2	--	--	±1	%fs

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 12.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE APPLIED TO PORT B.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

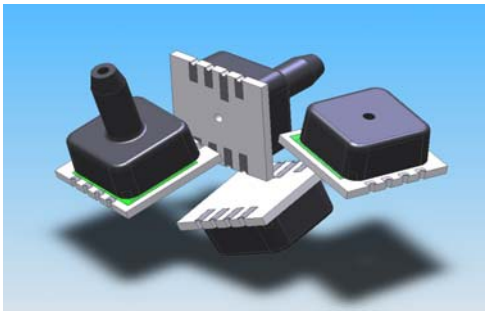
NOTE 3: SHIFT IS WITHIN THE FIRST HOUR OF EXCITATION APPLIED TO THE DEVICE.

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.

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

Surface Mount Basic Pressure Sensors



Features

- 10 inH2O Full Sacale to 100 psi Full ScalePressures
- 0.5 % linearity
- Small LCC Footprint
- ROHS Compliant

Applications

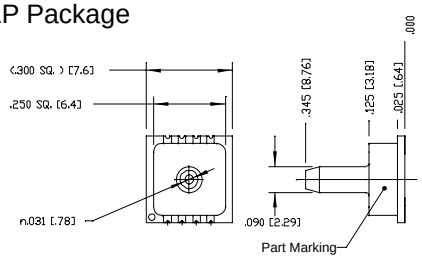
- Medical Instrumentation
- Environmental Controls
- HVAC

General Description

The BASIC Serices of pressure sensors use a silicon micromachined (MEMS) pressure sensor in the most basic configuration. The package is a ceramic surface mount configuration to provide the smallest footprint possible.
Best temperature compensation is realized when the sensor has a constant current excitation.
This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like.
Specifications are written for constant voltage of 3.0 volts.
The output of the device is ratiometric to the supply voltage.

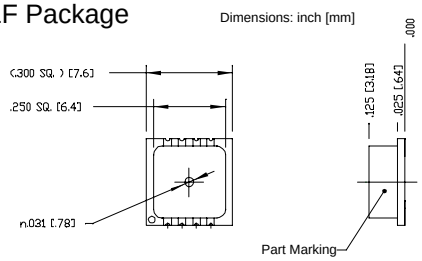
Physical Dimensions

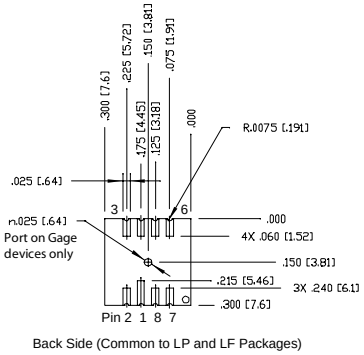
LP Package



LF Package

Dimensions: inch [mm]



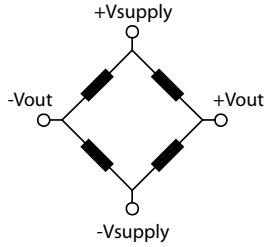


Back Side (Common to LP and LF Packages)

PART MARKING

L10G - 10 inH2O
001G - 1 PSIG
005G - 5 PSIG
015G - 15 PSIG
015A - 15 PSIA
030G - 30 PSIG
060G - 60 PSIG
100G - 100 PSIG

Equivalent Circuit



PINOUT

Pin 1: +Vsupply
Pin 2: +Vout
Pin 3: N.C. Reserved
Pin 4: N.C. Reserved
Pin 5: N.C. Reserved
Pin 6: N.C. Reserved
Pin 7: -Vout
Pin 8: -Vsupply

Approvals

MKT DATE	MFG DATE	ENG DATE	QA DATE
☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change	☐ As Is ☐ With Change

Pressure Sensor Characteristics Maximum Ratings

Supply Voltage VS	6 Vdc
Lead Temperature (soldering 2-4 sec.)	270°C

Environmental Specifications

Temperature Ranges	
Operating	-25 to 85° C
Storage	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Standard Pressure Ranges

Ported Part Number	Non-ported Part Number	Operating Pressure	Sensitivity (1) Nominal	Sensitivity (1) Std Dev.	Sensitivity (1) Units	Proof Pressure
BST-L10G-LP	BST-L10G-LF	0 - 10 inH2O	2.0	±0.24	mV/inH2O	3 PSI
BSM-001G-LP	BSM-001G-LF	0 - 1 PSI	21.0	±2.50	mV/PSI	5 PSI
BSM-005G-LP	BSM-005G-LF	0 - 5 PSI	10.5	±1.30	mV/PSI	15 PSI
BSM-015G-LP	BSM-015G-LF	0 - 15 PSI	5.3	±0.64	mV/PSI	45 PSI
BSM-015A-LP	BSM-015A-LF	0 - 15 PSIA	5.3	±0.64	mV/PSI	30 PSI
BSM-030G-LP	BSM-030G-LF	0 - 30 PSI	2.6	±0.30	mV/PSI	100 PSI
BSM-100G-LP	BSM-100G-LF	0 - 100 PSI	1.1	±0.13	mV/PSI	200 PSI

Common Performance Characteristic

Parameter (1)	Minimum	Nominal	Maximum	Units
Offset Voltage	--	±5	±25	mv
Temperature Effect on Offset (2)	--	±3	--	uV/V/°C
Temperature Effect on Resistance (2,6)	2300	2600	3300	ppm/°C
Temperature Effect on Span (2,6)	-1700	-2200	-2700	ppm/°C
Linearity error (4,6)	--	±0.2	±0.5	% FSS
Hysteresis error (6)	--	±0.01	±0.05	% FSS
Position Sensitivity (BST-L10G-xx) (6)	--	±0.01	±0.03	% FSS
Input Resistance (6)	2.7	3.3	4.0	kohms
Output Resistance (6)	2.7	3.3	4.0	kohms
Long term stability of span (3)	--	0.1	--	% FSS

Specification Notes

NOTE 1: ALL PARAMETERS ARE MEASURED AT 3.0 VOLT EXCITATION, FOR THE NOMINAL FULL SCALE PRESSURE AND ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED. PRESSURE MEASUREMENTS ARE WITH POSITIVE PRESSURE TO THE SINGLE PORT CONFIGURATION.

NOTE 2: SHIFT IS RELATIVE TO 25°C.

NOTE 3: SHIFT IS WITHIN THE FIRST YEAR OF OPERATION.

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.

NOTE 6: PARAMETER IS CHARACTERIZED AND NOT 100% TESTED. MINIMUM AND MAXIMUM VALUES INDICATED AS A DESIGN REFERENCE.

Definition of Terms

Absolute Pressure: Pressure measured relative to a vacuum. Usually expressed in pounds per square inch absolute (psia).

Altimetric Pressure Transducer: A barometric pressure transducer used to determine altitude from the pressure altitude profile.

Auto-Referencing: A technique for eliminating errors by sampling one or more reference pressures, then correcting the output signal function.

Barometric Pressure Transducer: An absolute pressure transducer measuring the local ambient pressure.

Best Straight Line (BSL): The best straight line chosen such that the true transducer response curve contains three points of equal maximum deviation.

Burst Pressure: The maximum pressure that may be applied to the sensor without causing the sensor catastrophic failure.

Common-Mode Error: An error that is independent of the major input variable (input pressure). For All Sensors transducers, all offset errors are common-mode errors.

Common Mode Pressure: The maximum pressure that may be applied to both sides of the diaphragm simultaneously with causing changes in performance to the specifications. Patent US 6,023,978 (Dauenhauer et al.): some of the products manufactured by All Sensors Corporation are licensed for use of the Honeywell US patent.6.023.978. This patent describes a technique for compensating piezo resistive pressure sensors using dual die compensation with electrical cross coupling and pneumatic cross coupling.

Differential Pressure: The pressure difference measured between two pressure sources. Usually expressed in pounds per square inch differential (psid). When one source is a perfect vacuum, the pressure difference is called absolute pressure. When one source is the local ambient, the pressure is called gage pressure.

Differential Pressure Transducer: A device that measures the differential pressure between two pressure sources piped to its inputs.

Error Band: The deviation of transducer response from its BSL, defined by lines on either side of its BSL and including the maximum deviation measured for a given normal mode or common mode error.

Full-Scale: The algebraic difference between endpoints. Where one endpoint is actual offset voltage and the other endpoint is the upper limit of the range.

Full Scale Shift: The shift in sensor output voltage sensitivity to pressure over the temperature range specified. This is equivalent to temperature coefficient of sensitivity. The characteristic of this transfer curve is very close to a second order equation for the basic piezo resistive sensing element. For the millivolt output devices, this is compensated with passive resistors; and for amplified output device, it is ASIC compensated with a second order curve fit to the data taken for each part over the pressure and temperature ranges specified. The characteristic of this transfer curve does not change with any other conditions.

Gage Pressure: Pressure measured relative to ambient pressure (psig).

Hysteresis of Pressure: Pressure hysteresis is measured as the maximum difference between the output at reference conditions before and after a pressure cycle.

Interchangeability: The error band defined by the maximum signal deviation obtained when a transducer is replaced by any other transducer of the same type with equivalent pressure inputs and temperature ranges.

Linearity: The maximum deviation of measured output at constant temperature (25°C) from "best straight line" determined by three points (offset pressure, full-scale pressure, and one-half full-scale pressure) where Y= measured value for each device

Linearity, Hysteresis Error: The error in the output voltage response to pressure over the full operating pressure range relative to the ideal output voltage response; the deviation from a first order transfer curve response of output signal to pressure. This error is a function of pressure and not a function of temperature. This error is computed by measuring pressure at three pressure points; zero pressure. Full scale pressure and one half full scale pressure and computed on the basis of a "best straight line" curve fit to the measured data.

Minimum/Maximum: Are the guaranteed limits for the specification. These limits are generally one hundred percent tested with a guard band between the test limits and the specification limits.

Most Probable Error: The error band obtained by computing the square root of the sum of the squares of all applicable errors specified for the transducer.

Nominal: A useless piece of information that will only get designers into trouble if used for anything. It is the average value for a specification from product manufactured during the first production run. It may, or may not be indicative of product built at any other time. DESIGNERS BEWARE: USE AT YOUR OWN RISK. However, All Sensors will generally provide product tested, or guaranteed, to a limit other than specified upon customer request.

Normal Mode Error: An error that is a function of (and usually assumed to be proportional to) the major input variable (input pressure). For All Sensors transducers, all span errors are normal mode errors.

Offset Calibration: The error band defined by the maximum error in calibrating the offset voltage.

Offset Error: The common-mode error band defined by the maximum deviation of offset voltage from its specified value. It may include calibration, temperature, repeatability and stability errors.

Offset Long Term Drift: The change in offset voltage that may occur over the time specified. Possible causes to this characteristic for piezo resistive pressure sensors have been studied for decades. There is, to date, no conclusive single cause or main causes to the error. Because most of All Sensors low pressure sensors use dual die electrical cross coupling compensation, there is inherent offset long term drift compensation. Products All Sensors tests for warm-up shift will generally identify any offset long term drift problems and would be rejected.

Offset Position Sensitivity: The change in offset voltage due to a change in position of the sensor. Sensors for measuring pressure exceeding 15 psi have virtually no position sensitivity. Because the diaphragm of the sensor has mass, and because the mass to diaphragm thickness ratio increases as the pressure range decreases, the sensitivity to position increases as the pressure range decreases. Because most of All Sensors low pressure sensors use dual die electrical cross coupling compensation there is inherent offset position sensitivity compensation in even the most basic sensors.

Offset Repeatability: The error band expressing the ability of the transducer to reproduce the offset voltage, measured at 25°C, after exposure to any other temperature and pressure within the specified range.

Offset Stability: The error band expressing the ability of the transducer to maintain the offset voltage with constant pressure and temperature.

Offset Temperature Coefficient: The error band defined by the maximum deviation in offset voltage as the temperature is varied from 25°C to any other temperature within the specified range.

Offset Temperature Shift: The change in output offset voltage over the specified temperature range. For non amplified sensors the specification limits are tested at three temperature points; 25°C, temperature maximum, temperature minimum, and back to 25°C. For amplified pressure sensors there are many more data points measured and the compensation is mathematically fit to the data points. There is generally no consistent equation to describe the offset temperature shift characteristic. Because most of All Sensors low pressure sensors use dual die electrical cross coupling compensation there is inherent offset temperature shift compensation in even the most basic sensor.

Offset Voltage: The output voltage when the sensor has zero differential pressure across the diaphragm. For absolute pressure sensors there is zero differential pressure across the diaphragm when the sensor is at absolute pressure of zero. For gage or differential pressure sensors there is zero differential pressure when both sides of the diaphragm are subject to the same pressure.

Offset Warm-up Shift: The change in output offset voltage that may occur when power is applied to the sensor during the first hour of operation. All Sensors tests all low pressure sensors

for this parameter. Because most of the companies low pressure sensors use dual die electrical cross coupling compensation there is inherent offset warm-up shift compensation in even the most basic sensors.

Operating Range: The pressure range over which the sensor has been tested. For sensors with millivolt output this range can generally be extended to at least twice the range specified with only minor degradation to specifications. For amplified output sensors the range can be extended only ten percent before the output is "railed" to the output voltage limit.

Output Span: Is the output voltage for the specified operating pressure range. For sensors without internal voltage reference the span is ratiometric to the supply voltage of the sensor. Changes in the supply voltage to the sensor with result in a change in output span for the pressure applied. The span is the difference in output voltage at full scale pressure from the offset voltage.

Over-Pressure – Maximum: The maximum normal mode (measured) pressure that can be applied without changing the transducer's performance or accuracy beyond the specified limits. This would be applied to either port of a differential transducer. This is also called "proof pressure".

Overall Accuracy – Calibrated: The combined error band relative to the BSL with forced reference unique to one specific transducer. It excludes offset and sensitivity calibration errors. It includes all other offset and span errors: temperature, repeatability, stability, linearity and hysteresis.

Overall Accuracy – Interchangeable: The combined error band relative to an ideal transducer response characteristic. It excludes stability errors because stability error is already included in specified calibration error. It includes all other offset and span errors: calibration, temperature, repeatability, linearity and hysteresis.

Proof Pressure: is the maximum pressure that may be applied to the sensor without causing any changes in performance to the specifications.

Reference Pressure: The pressure used as a reference in measuring transducer errors.

Reference Temperature: The temperature used as reference in measuring transducer errors.

Repeatability: The error band expressing the ability of the transducer to reproduce an output signal parameter (such as offset or span), at specified pressures and temperature, after exposure to any other pressure and temperature within the specified range.

Sensitivity: The ratio of output signal voltage change to the corresponding input pressure change. Sensitivity is determined by computing the ratio of span to the specified input pressure range.

Sensitivity Calibration: The error band defined by the maximum error in calibrating sensitivity.

Span: The arithmetic difference in transducer output signal measured at the specified minimum and maximum operating pressures.

Span Error: The normal mode error band defined by the maximum deviation of span from its specified value. It may include sensitivity calibration temperature, linearity, hysteresis, repeatability and stability deviations.

Span Repeatability: The error band expressing the ability of a transducer to reproduce its span, measured at 25°C, after exposure to any other pressure and temperature within the specified range.

Span Temperature Coefficient: The error band defined by the maximum deviation of the span as the temperature is varied from 25°C to any other temperature within the specified range.

Span Stability: The error band expressing the ability of the transducer to maintain the span voltage at any pressure within the specified range with temperature held constant.

Stability: The error band expressing the ability of a transducer to maintain the value of an output parameter (such as offset or span) with constant temperature and pressure inputs.

Temperature Coefficient (TC): The error band resulting from maximum deviation of a transducer output parameter (such as offset or span) as temperature is varied from 25°C to any other temperature within the specified range. It is usually measured in (ppm/°C or μV/V/°C).

Vacuum: A perfect vacuum is the absence of gaseous fluid.

Vacuum Range: The range of absolute pressures between a perfect vacuum (0 psia) and one standard atmosphere (14.697 psia).

Vacuum Transducer: A transducer scaled for pressure measurement in the vacuum range. This is usually an absolute transducer, but sometimes a gage transducer.

Worst-Case Error: The error band obtained by simple addition of all applicable errors specified for the transducer.

TECHNICAL NOTE: ACCURACY VERSUS RESOLUTION

PURPOSE: To describe the difference between “accuracy” and “resolution” for silicon based pressure sensors.

APPLICATION: Any application .

DISCUSSION AS REPORTED:
Silicon based pressure sensor inherently have infinite resolution. The limit to the practical use of this limitless resolution is based upon many factors associated with the compensation and amplification of the output signal and the accuracy demanded by the application.

All the figures show an output signal where the output of the sensor is displayed as a signal quantized (stepped) by an analog to digital converter after some amplification of the pressure sensor signal. For ease of display the steps are relative to each other and not representative of a typical system. For instance a relatively low accuracy system would be an 8-bit system resulting in quantization of the signal into 256 steps (2^8**).** As a practical matter for today’s sensors and added electronics the limit to the resolution with accuracy acceptable to most applications is roughly one part in sixty thousand, or a 16-bit system (2^{16}). For such a system the analog to digital converter would be somewhere between 18-bits to 24-bits.

Figure 1: Provides an example of a sensor signal with both a large offset error and a sensitivity error but having high resolution. It’s difficult to imagine an application where such a signal would be of practical use.

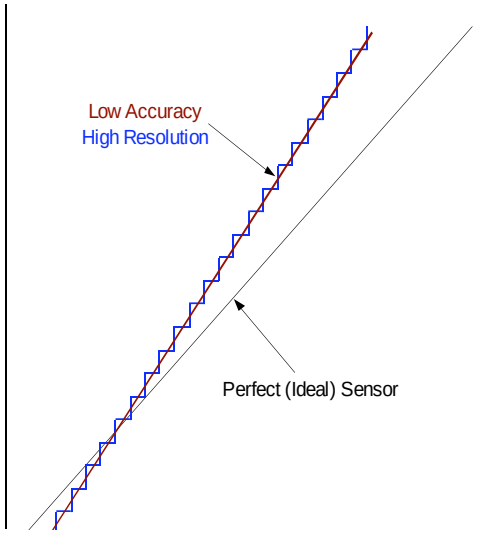


Figure 1

Figure 2: Displays the same output signal as figure 1 but with low resolution.

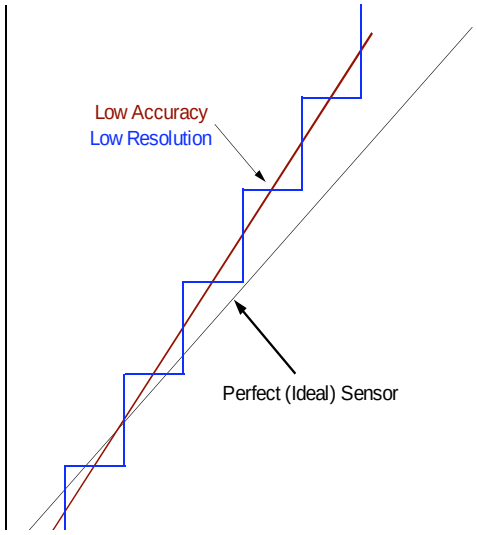


Figure 2

Figure 3: Displays a low resolution output but having high accuracy.

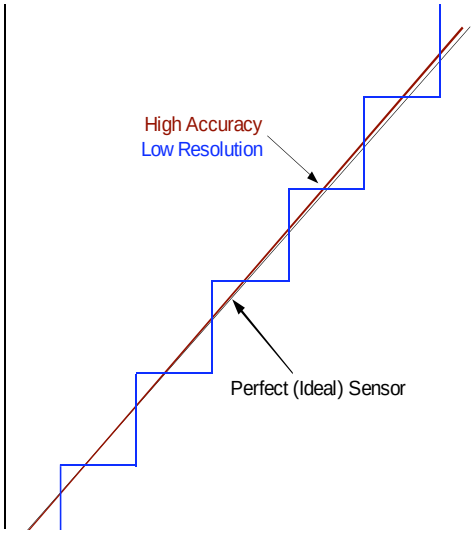


Figure 3

Figure 4: Displays a high resolution output signal having high accuracy.

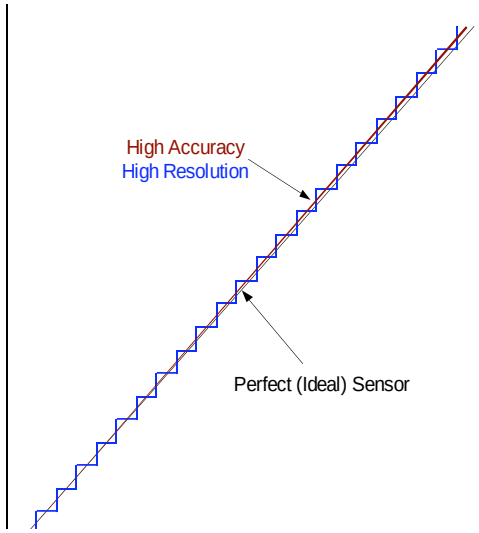
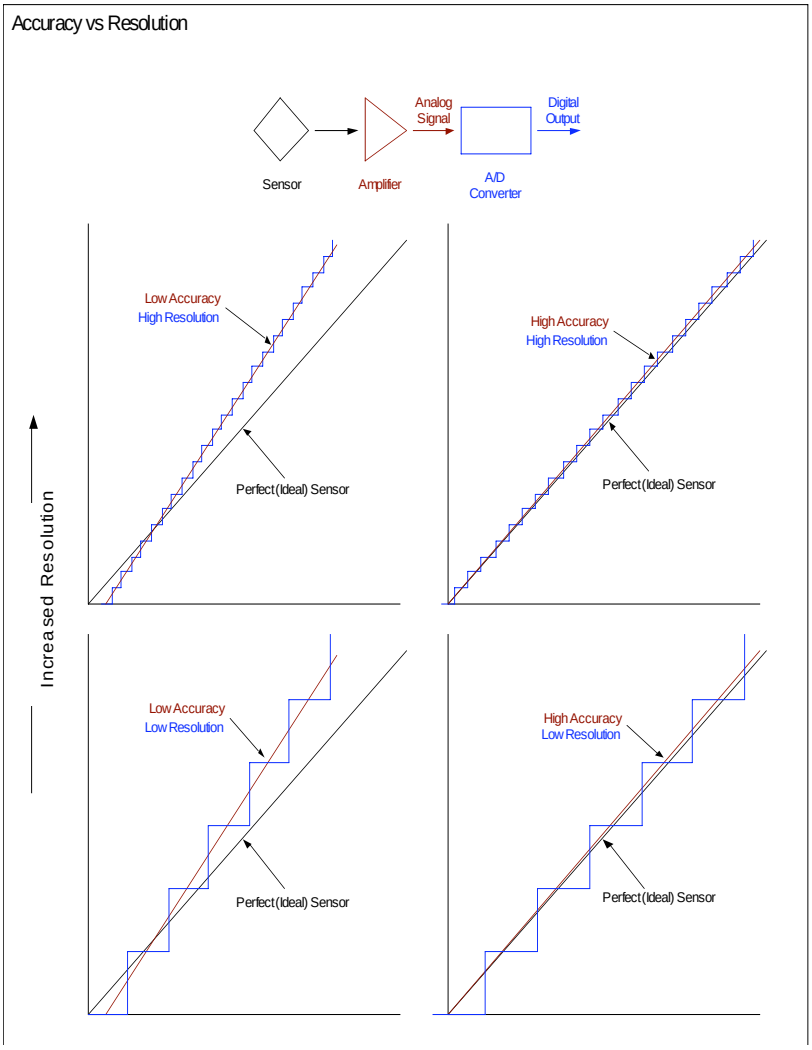


Figure 4


Accuracy vs Resolution
Analog Signal
Digital Output
Sensor
Amplifier
A/D Converter
Low Accuracy
High Resolution
Perfect (Ideal) Sensor
High Accuracy
High Resolution
Perfect (Ideal) Sensor
Increased Resolution
Low Accuracy
Low Resolution
Perfect (Ideal) Sensor
High Accuracy
Low Resolution
Perfect (Ideal) Sensor

TECHNICAL NOTE: NOISE DISCUSSION

PURPOSE: To determine the limitation to sensor resolution with regard to electrical noise present in the sensor. This test was done on an experimental 10 INCH TE device but is representative of other sensors manufactured by All Sensors.

APPLICATION: Breathing monitor where resolution of 1 in 60,000 is desired.

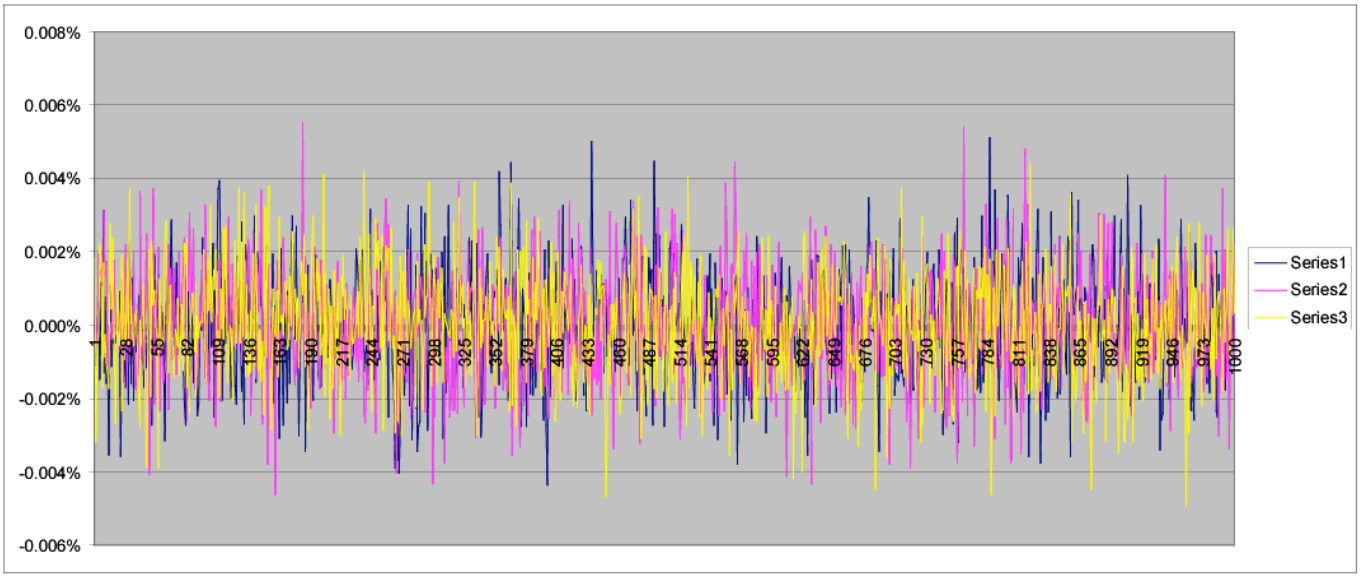
DISCUSSION AS REPORTED:
I decided to go back in the production area and take a look at a basic device with our manufacturing Kiethley DMM (and Kiethley software). It turns out we can get data with that program over an IEEE bus at a rate of 41Hz (24mS per sample)....not the data rate of your target system but faster than the over-sampled digital device...

I used coax lead clips (coax cable with about 2" and 4" lead clips (not really so good but available) for measuring.

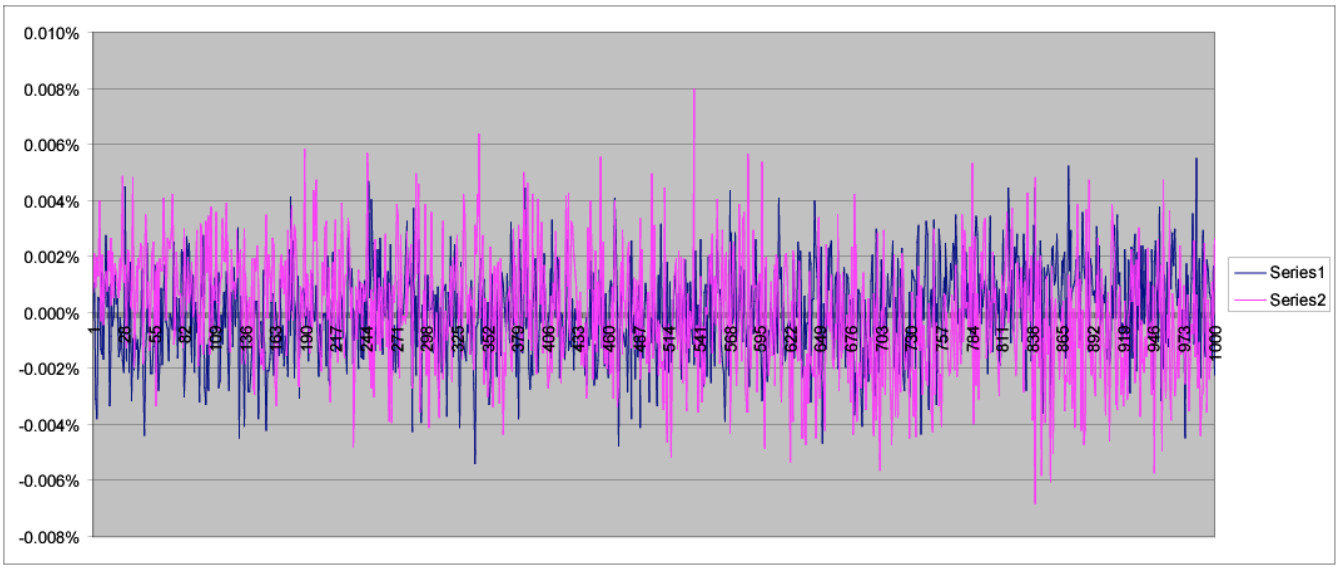
The background noise was measured with the clip leads connected together.

Here are some graphs...normalized to the sensor FS sensitivity...the sensor was a 10 INCH TE device, single die.

1) Background noise levels (three runs of 1000 data points)...

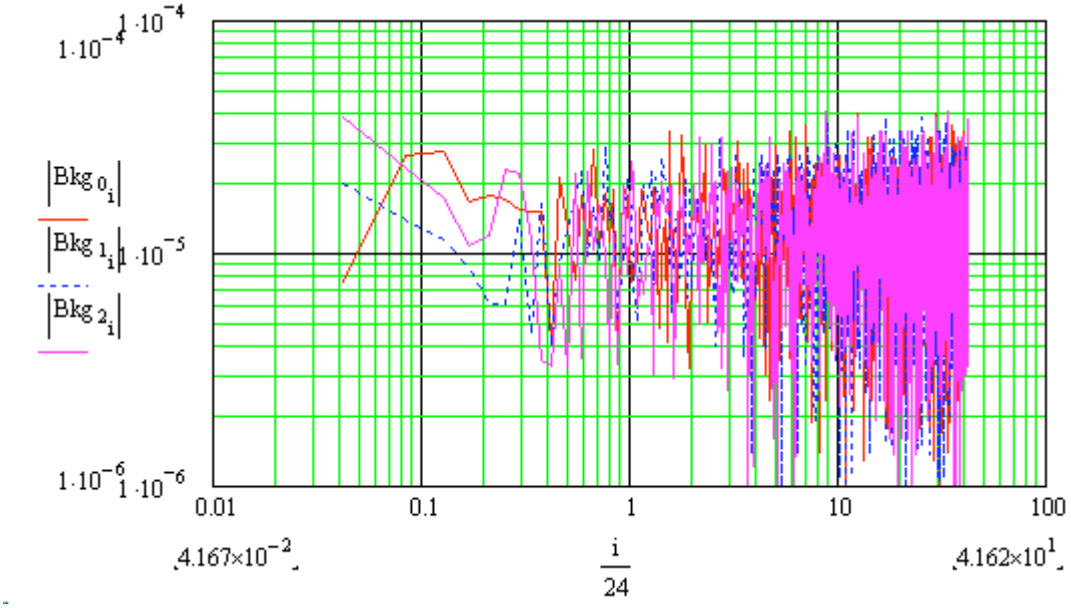


2) Sensor output (2 runs of 1000 points)...

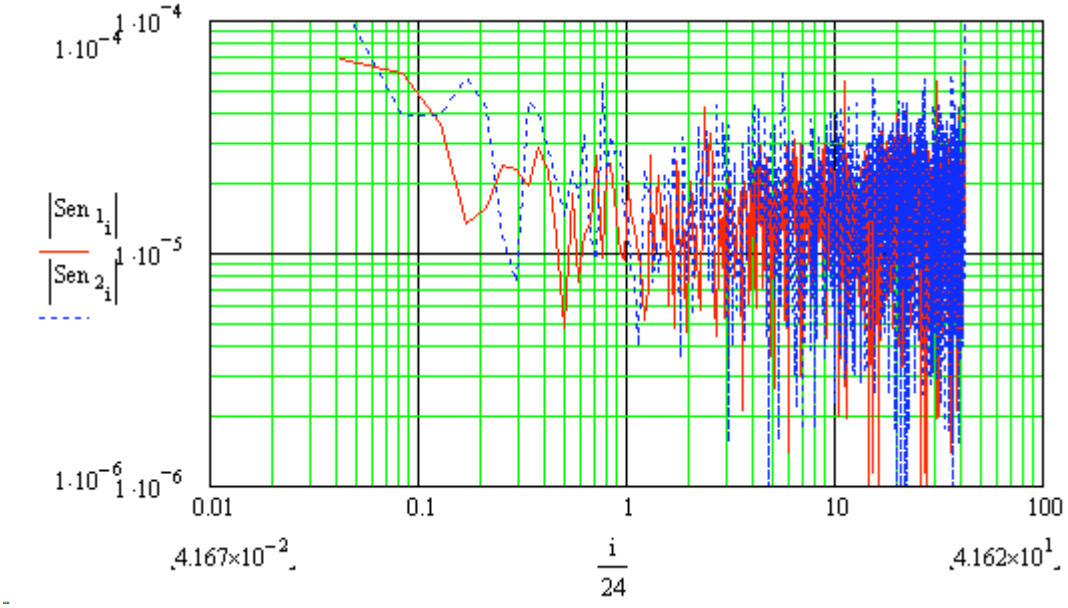


The background level is pretty close to the sensor noise level so here's some FFT info....X-axis is frequency (Hz), Y-axis is noise level relative to full scale (like percentage but MathCAD doesn't have axis format display options)...

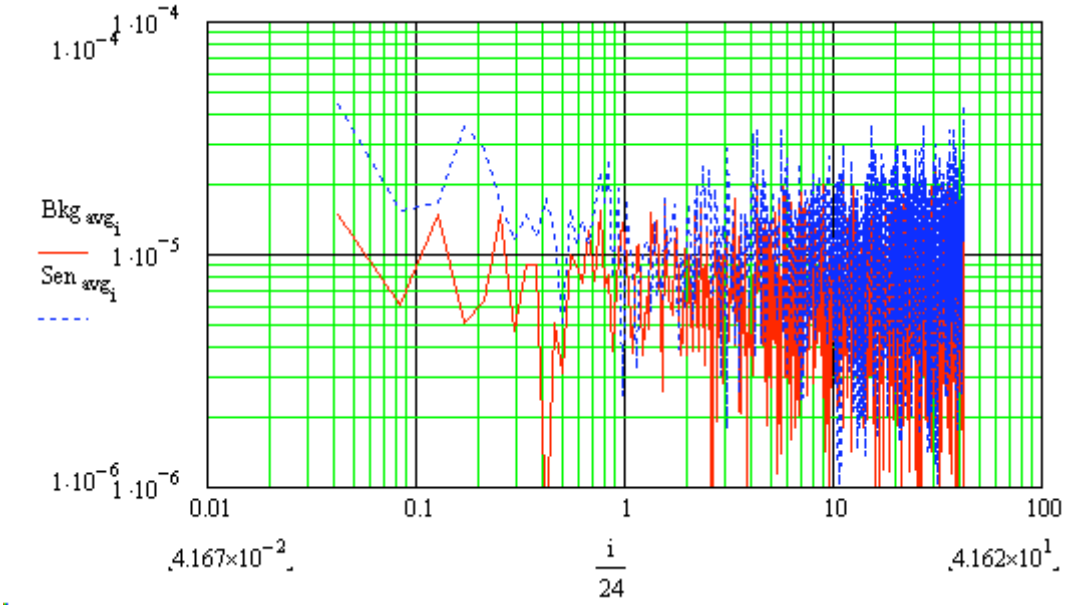
3) Background level (using CFFT function in MathCAD)



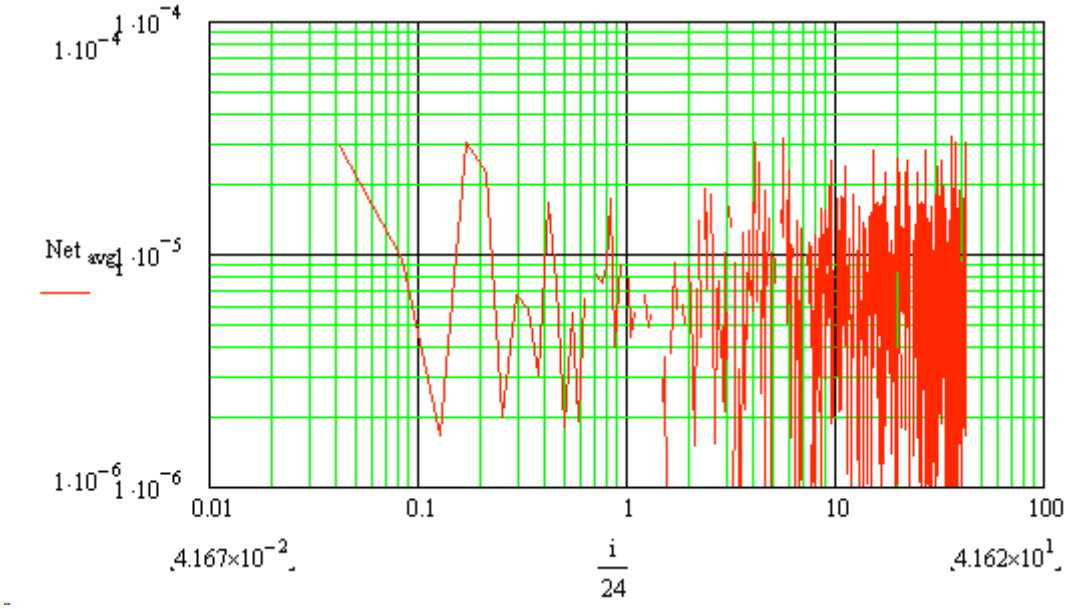
4) Sensor runs (CFFT)



5) Averages of the three background runs compared to average of both sensor runs...



6) Difference between average sensor and average background...



For the last graph above (#6), note the magnitude in the 0.1 Hz~0.02 Hz can be construed with noise where it may actually be small temperature shift or warm-up shift. I let the sensor stabilize for about 10 minutes before running the data but regardless, there is no temperature compensation done on the device.

The only conclusion that I can come up with is that the sensor noise is not significantly greater than the Kiethley background noise. I guess this is good news in itself.

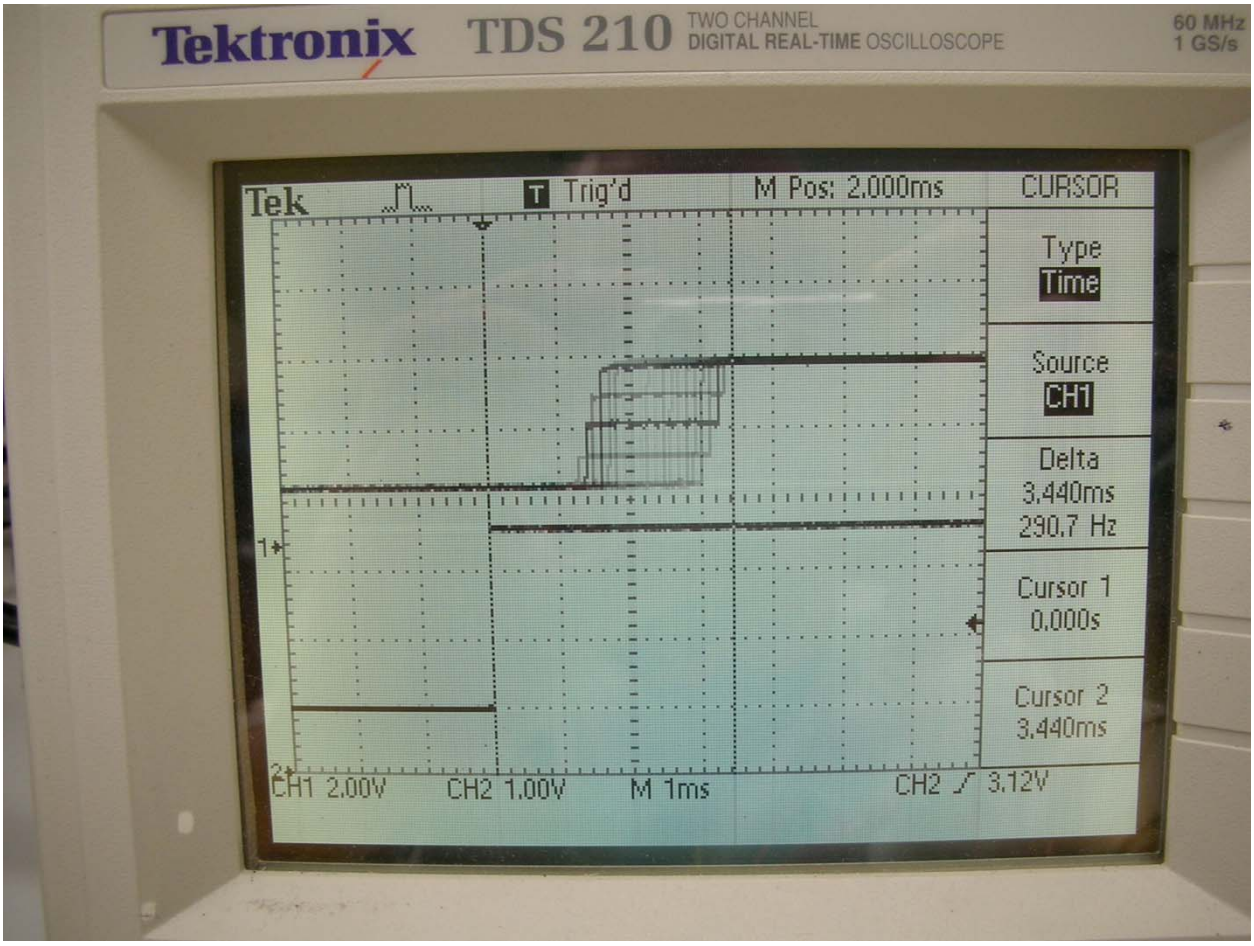
TECHNICAL NOTE: ZMD ASIC COMPENSATED COMPARED TO ALL SENSORS COMPENSATION

PURPOSE: To compare competitor pressure sensors amplified and compensated using the ZMD ASIC to All Sensors pressure sensors using another approach for amplification and compensation.

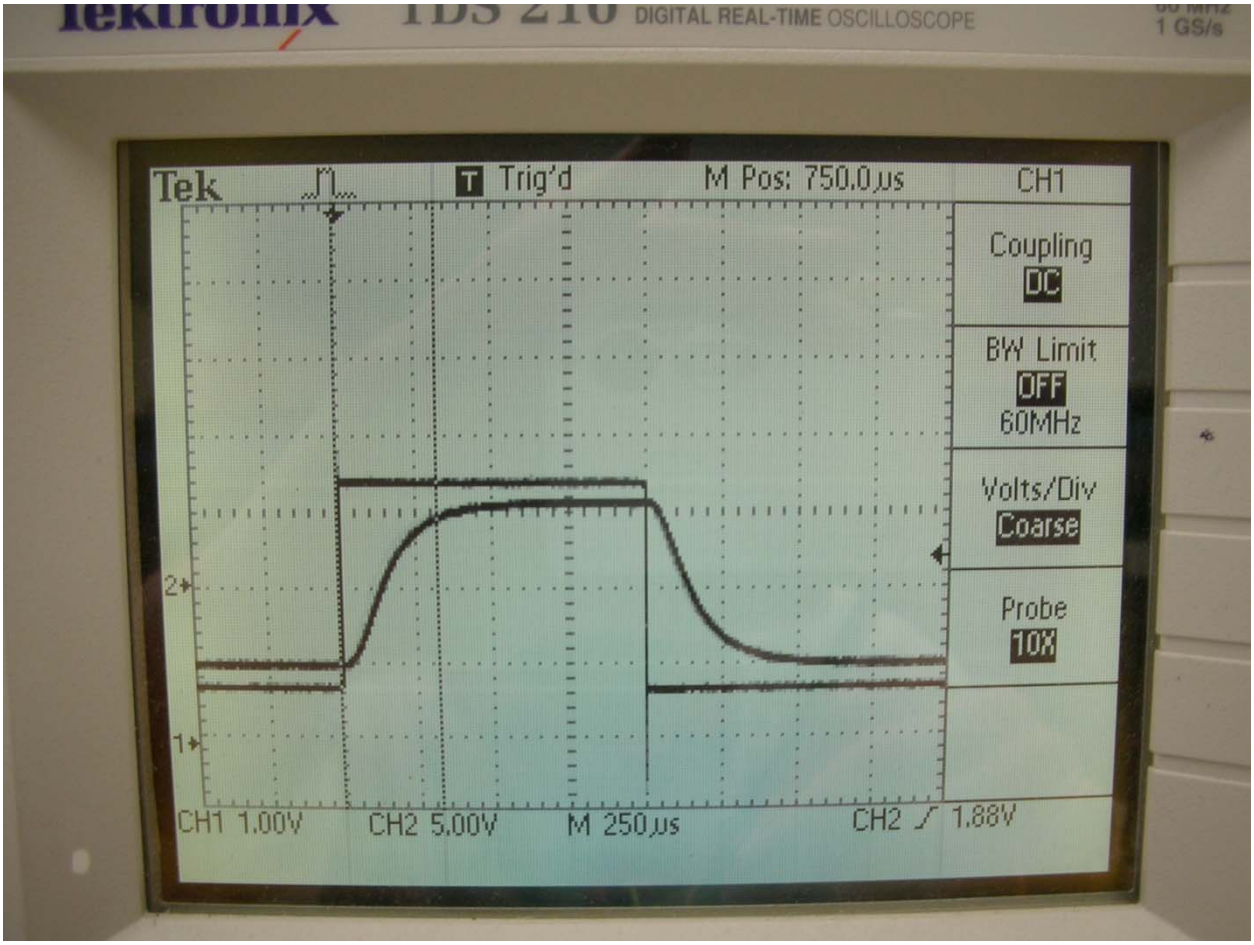
APPLICATION: Any application where a true pressure signal capture is necessary without distortion by the pressure sensor.

DISCUSSION AS REPORTED:
In each of the pictures below of waveforms captured on a Tektronix oscilloscope the lower waveform is the signal to reproduced by the sensor. The top waveform is the output of the pressure sensor. It is important to note the time scale of each picture to get the true measure of the comparisons.

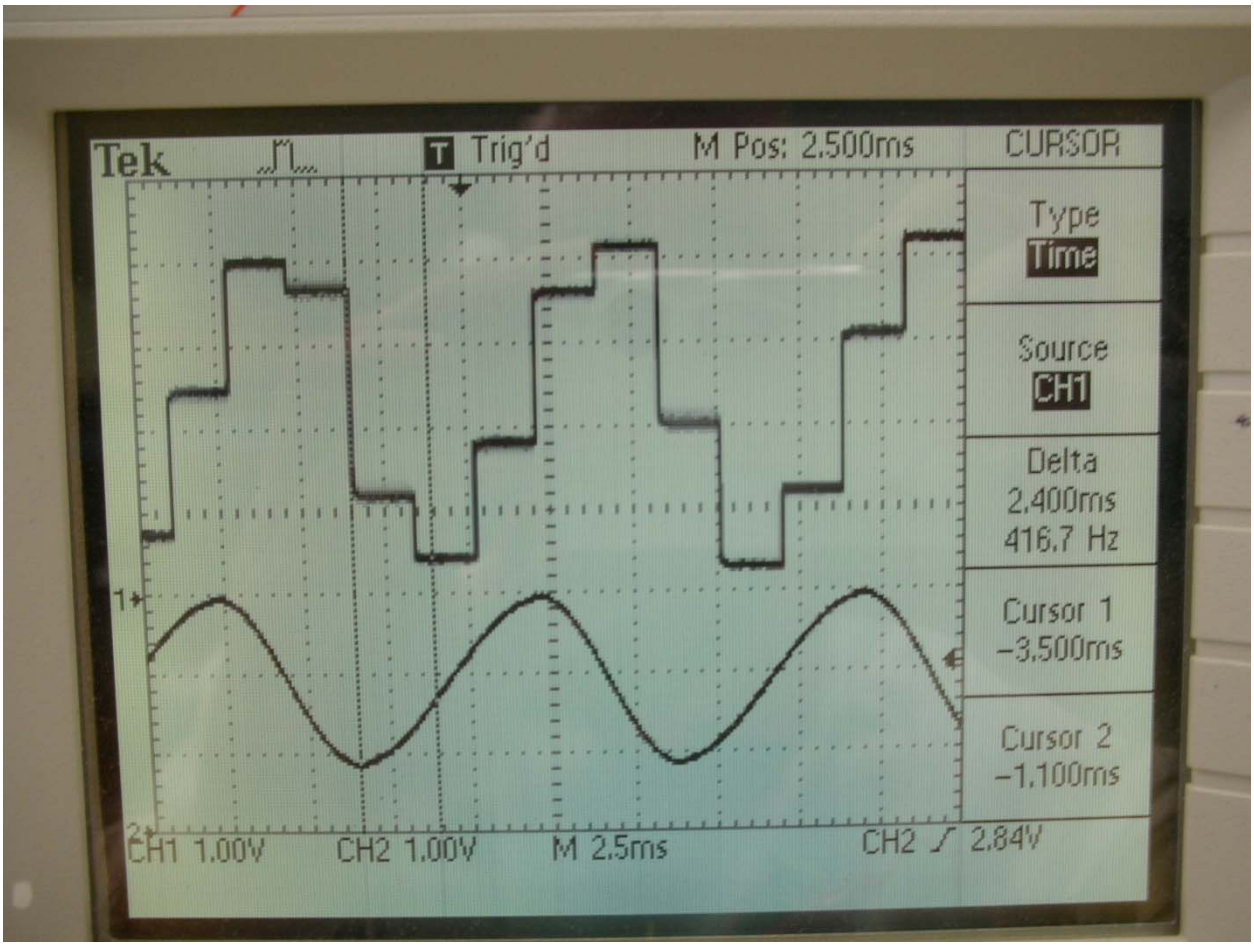
PICTURE 1: DISPLAY: STEP RESPONSE OF A COMPETITORS PRESSURE SENSOR WITH INTERNAL ZMD ASIC COMPENSTATION. TIME SCALE 1 msec/division.



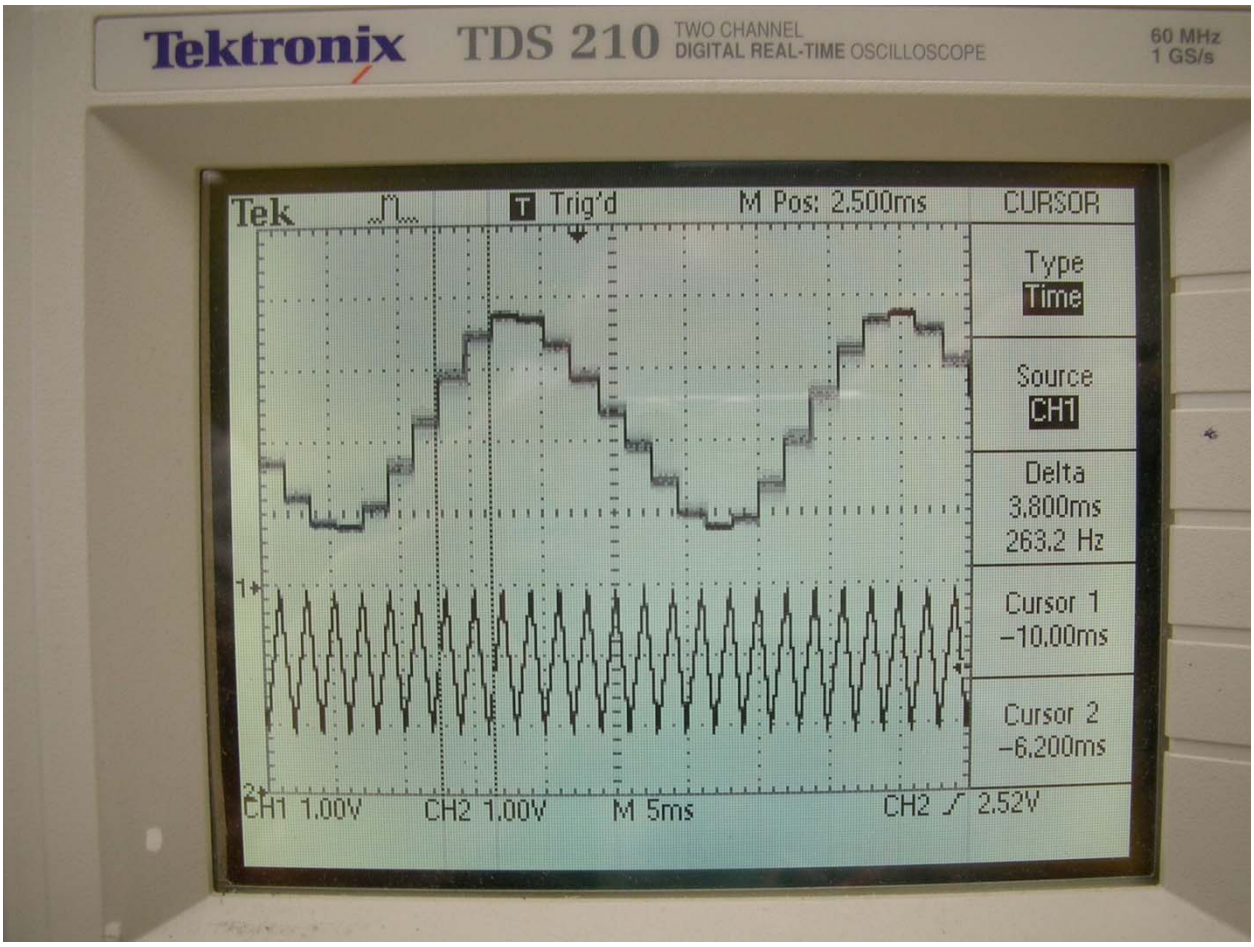
PICTURE 2: STEP RESPONSE OF AN ALL SENSORS 5 INCH-D1-4V-MINI.
TIME SCALE: 250 usec/division…
CONCLUSION: ALL SENSORS RESPONSE IS ABOUT TEN TIMES FASTER THAN COMPETITORS.



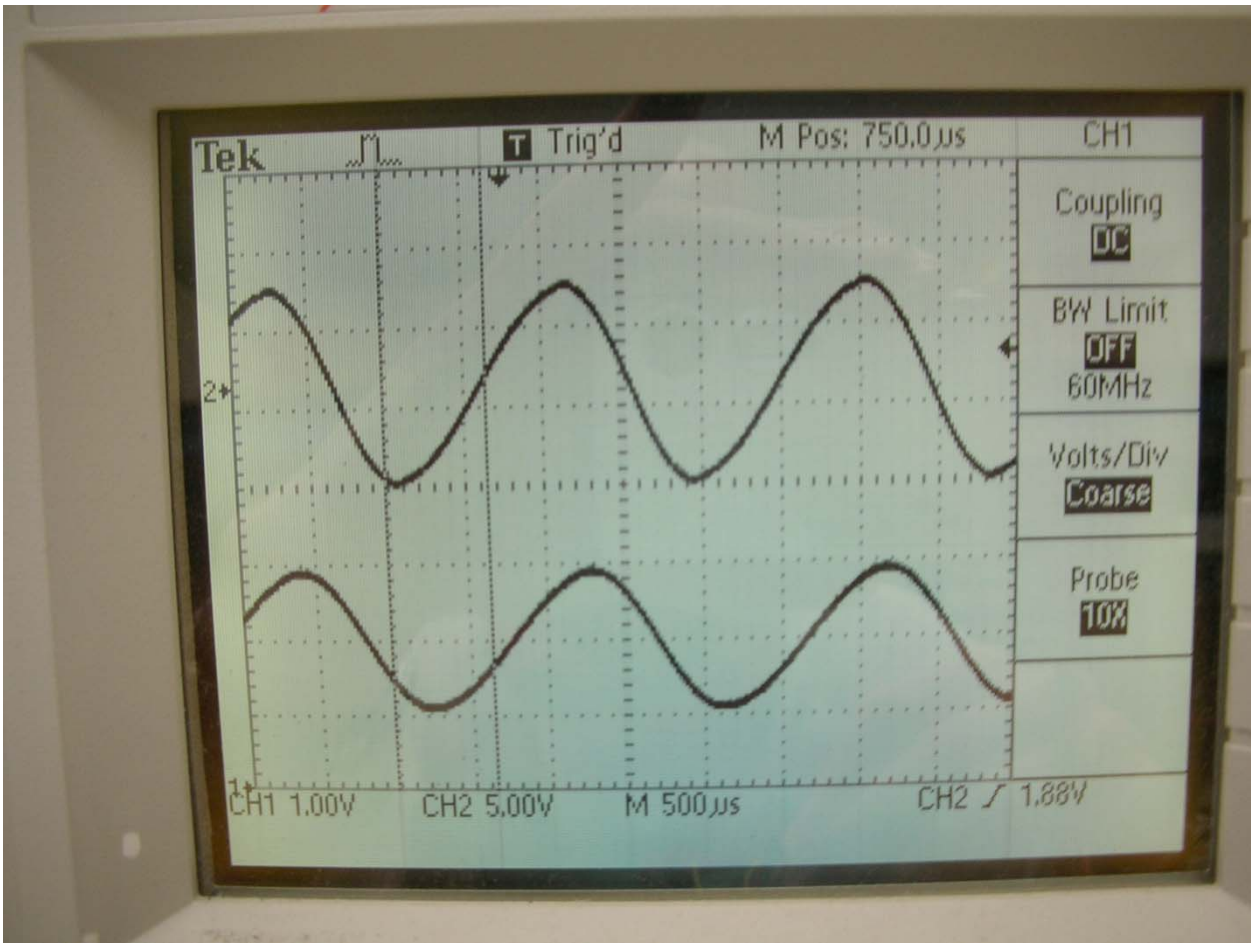
PICTURE 3: COMPETITOR SENSOR 100 HZ RESPONSE.
NOTE: SIGNIFICANT QUANTIZATION DISTORTION AND A GROUP DELAY OF 3 msec.



PICTURE 4: COMPETITOR SENSOR 500 HZ RESPONSE.
NOTE: 37 HZ OUTPUT OF THE SENSOR DUE TO ALIASING OF THE INPUT SIGNAL AS A RESULT OF THE ASIC SAMPLING RATE. AGAIN A SIGNIFICANT DISTORTION OF THE SIGNAL.



PICTURE 5: 500 HZ RESPONSE OF ALL SENSORS PRESSURE SENSOR 5 INCH-D1-4V-MINI.
NOTE: NEGLIGIBLE ATTENTUATION AND A GROUP DELAY OF 200 usec.
CONCLUSION: FOR APPLICATIONS REQUIRING A PRESSURE SENSOR TO PROVIDE A TRUE SIGNAL REPRESENTATION OF THE MEASURED SIGNAL PRESSURE SENSORS WITH ZMD ASIC COMPENSATION WOULD BE UNACCEPTABLE.



Purpose: To demonstrate how pressure measurements can be made using All Sensors Digital Pressure Sensor with All Sensors Evaluation Board. For this Discussion Hyperterminal is used to acquire data from the EV Board to a PC

Application: Ideal for engineers to collect data in lab evaluation

Discussion as Reported:

Overview of Digital Output Sensors

All Sensors Digital Output Sensors use propritary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. These sensors provide 12 bit serial output (14 bit in High resolution mode) with a nominal accuracy of 0.5% which includes the combined effects of offset and span shifts over temperature, linearity, hysteresis, offset and span calibration (for some digital sensors nominal accuracy is 0.25%). Typically, all combined errors over temperature are less than 0.1%. In addition to synchronous communications, the digital output pressure sensors incorporates a bi-directional, TTL level, asynchronous serial interface mode (hardware selectable 9,600 or 19,200). This mode includes a command set that allows the host to select resolution mode and make minor adjustments to offset.

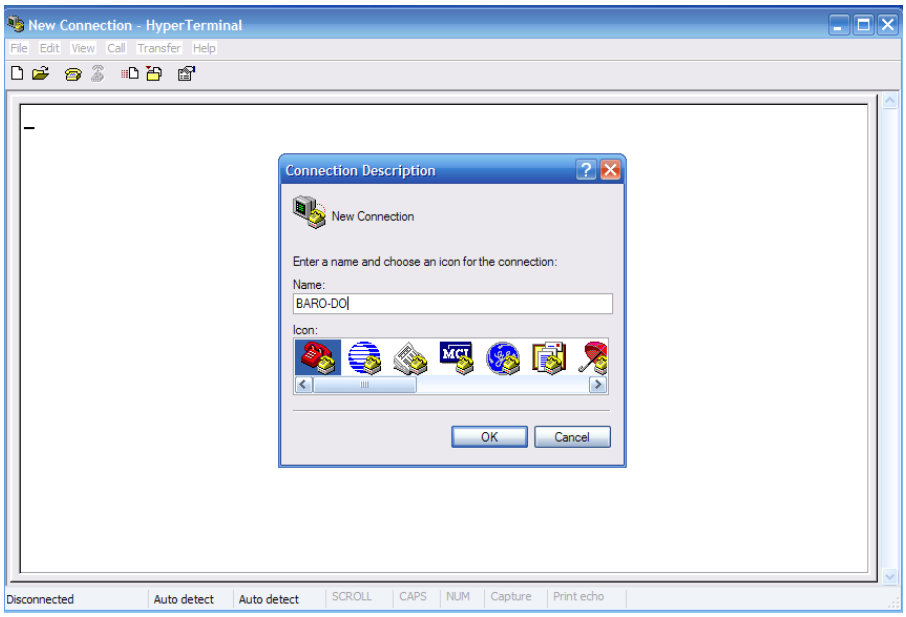
These sensors are available in -40 to 125C (Military Grade) and -20 to 85C (Industrial Grade) temperature compensated range. For detailed sensor performance and command set refer to sensor datasheet.

Overview of Digital Evaluation Board

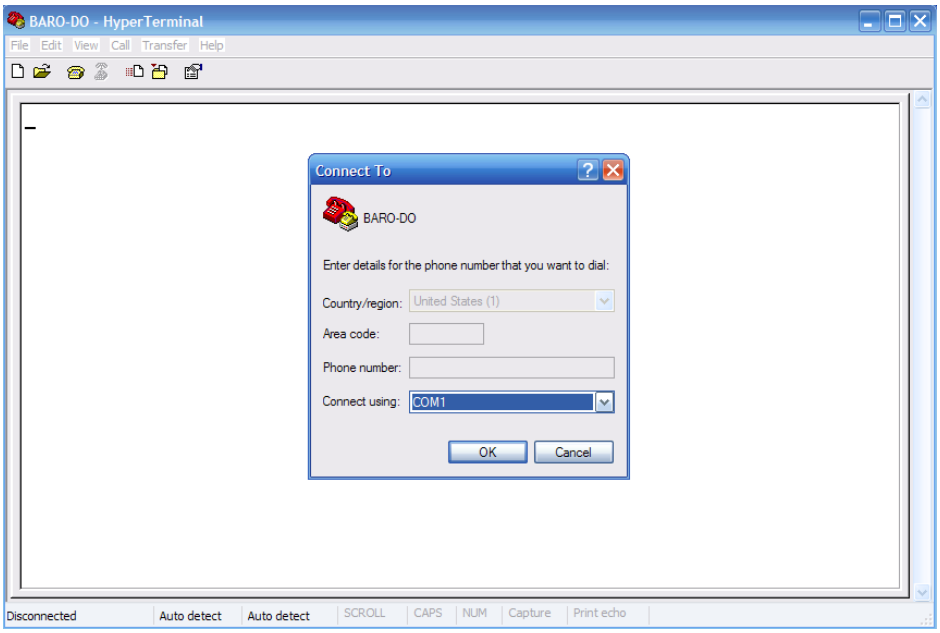
All Sensors Digital Evaluation Board converts CMOS/TTL compatible sensor signals to RS232 levels for serial computer interfacing. This unit is packaged in a sturdy housing from which the sensor pressure ports are easily accessable. The DB-9 connector brings ease of mobility and reduces hastle of connecting wires. EV Board used in conjunction with a digital sensor is an ideal way for engineers to collect data before completing the prototype process by specifying the necessary sensor and collecting data using their PC or Laptop . All Sensors is currently developing software which can be used with the EV Board to collect data in desired pressure units, sampling controls, operating mode controls and the ability to store, track and chart data.

Taking Measurements using Hyperterminal

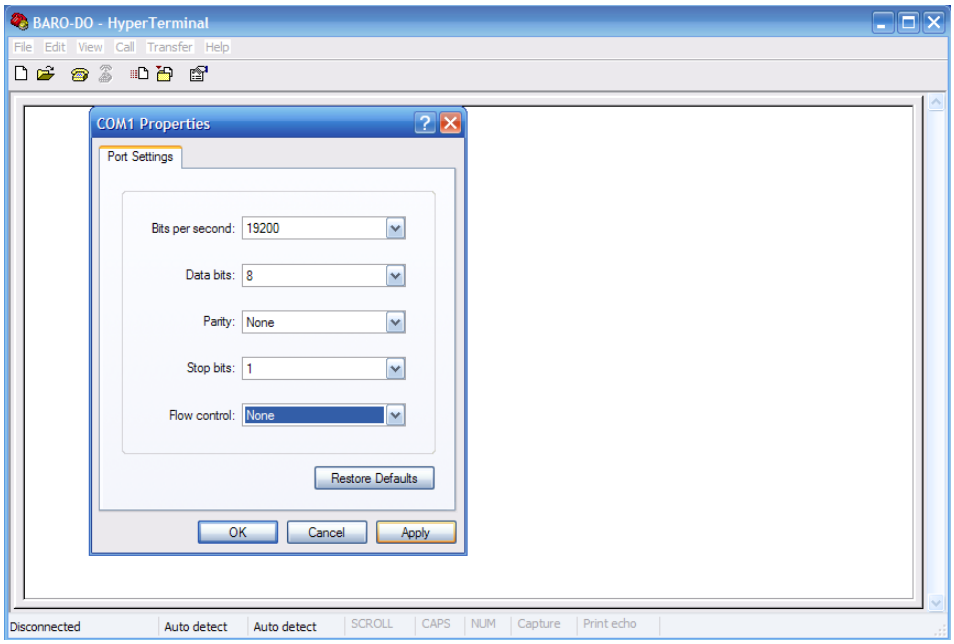
Connect the EV Board to a windows based machine via RS232 Serial cable. Run "**Hyperterminal**" application and create a new connection



1) From the drop down list under "**Connect using**" select COM port EV Board is connected to

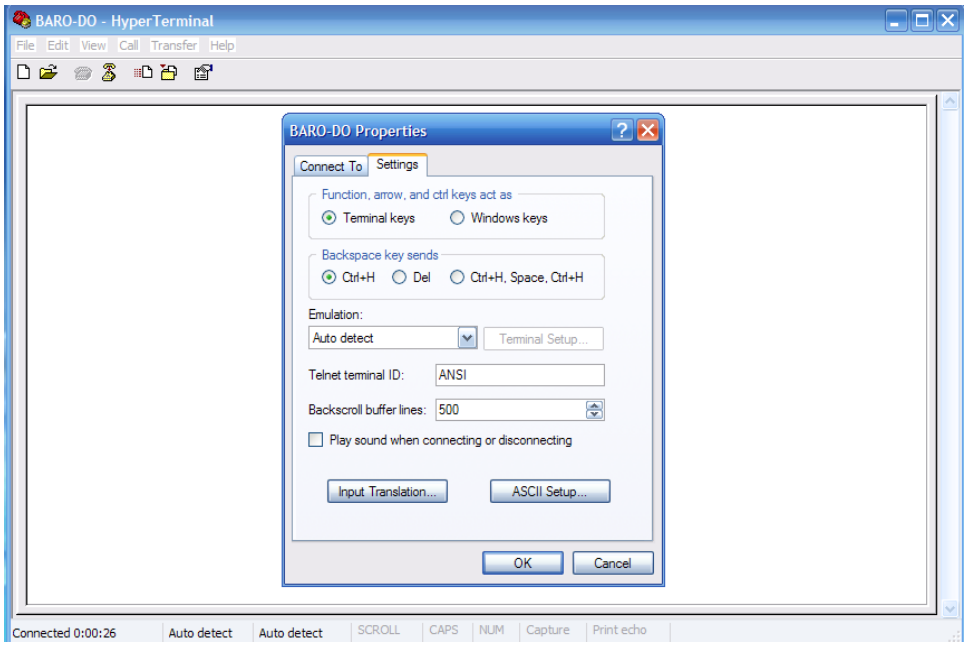


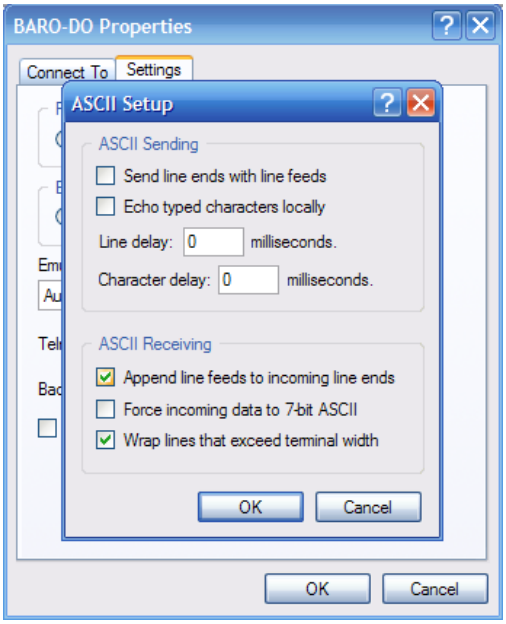
2) **"Configure"** COM port and as necessary modify **"Bits per second"** to 19200 and **"Flow control"** to None. *If JP2 on EV Board is selected for 9,600 modify "Bits per second" to 9600*



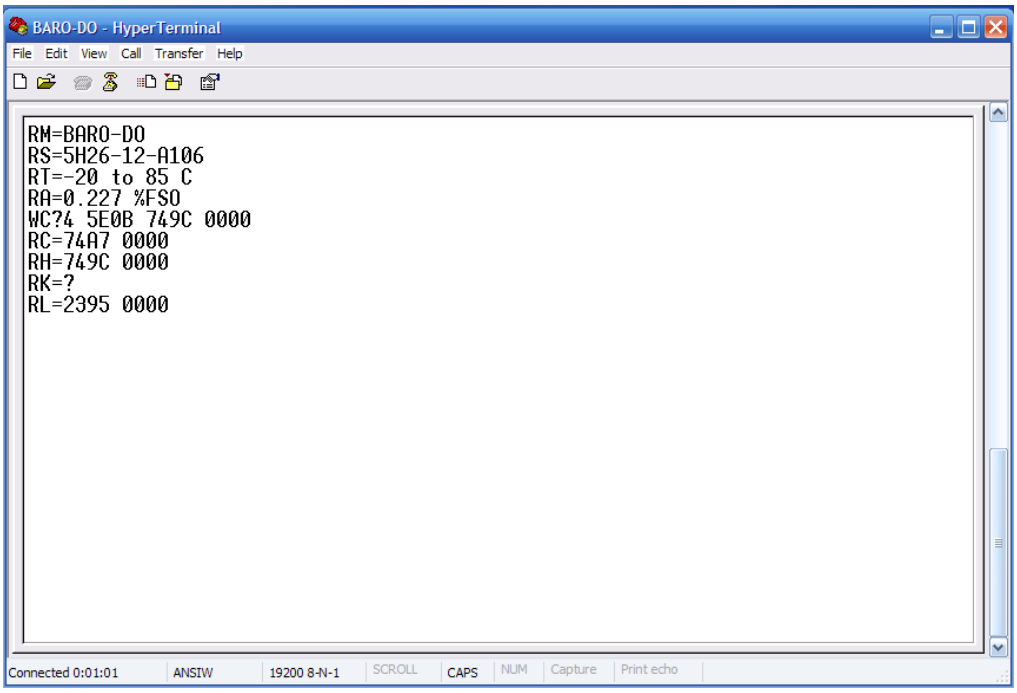
3) Select File -> Properties-> Settings-> **"ASCII Setup"**. Check **"Append Line feeds to incomming line ends"**

Not required , but will help preserve each command entered. This can be useful when saving a log of telnet session





4) On the main screen, type any of the commands listed under **"Command Summary Table in part Datasheet"**



If the sensor does not respond to commands listed in the part datasheet verify the following:

- Sensor is mounted in the correct orientation on the EV Board.
- Baud Rate selected for COM Port and EV Board is the same. By default Baud Rate on EV Board is set to 19,200bps.

- EV Board is connected to COM port as selected in HyperTerminal.

Converting Digital Output to Pressure Units:

The output acquired using HyperTerminal is an 8 character ASCII string which represents a hexadecimal value. The first 4 characters encode a pressure reading while the remaining is reserved for error codes. To get a reading in pressure units, the acquired data must be converted into decimal format (Digital Output) and scaled by Digital Span (depends on operating resolution) using the following formulas:

$$\text{Pout} = \text{Digital Output} \times \left[\frac{\text{FSO} \times \text{Units}}{10{,}000}\right] \quad (\textit{Low Resolution Mode})$$

$$\text{Pout} = \text{Digital Output} \times \left[\frac{\text{FSO} \times \text{Units}}{32{,}767}\right] \quad (\textit{High Resolution Mode})$$

Consult to part datasheet for FSO and units. If FSO is not listed in the datasheet, as a rule of thumb FSO will be the higher limit of the operating pressure. For example, in case of BARO-D-DO sensor (DS-0010) FSO will be 1100 and units will be mBar.

Written by:
Usman Bhatti
Application Engineer

ALL SENSORS®

How to minimize warm-up drift in pressure sensors

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allsensors.com

Edited by Leslie Gordon, *Medical Design*

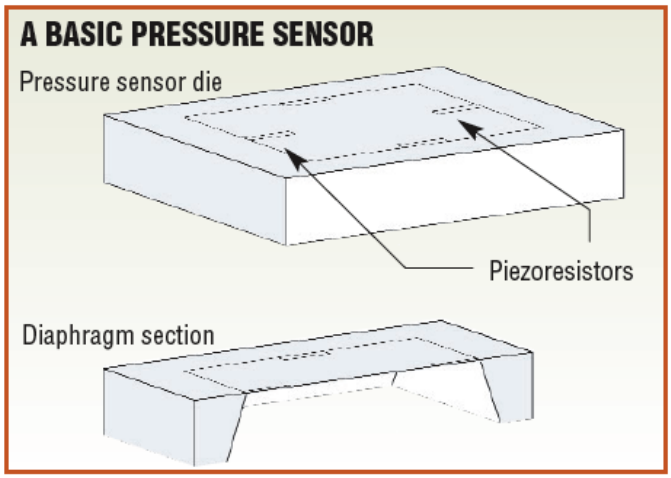
An assortment of sensors features the 0.025-in. H20 Full Scale A-package (top) and a range of mini packages. The A-package accurately reads exceedingly low pressures. The devices are for drug delivery, respiratory, and similar applications where physical size is not a constraint. Mini packages target devices requiring a smaller sensor such as for measuring oxygen in a medical device.

Warm-up drift in pressure sensors makes their readings vary until systems reach operating temperature. It's usually of little concern. However, such drift is unacceptable in hospital respirators, spirometry equipment, neonatal monitors, and similar devices requiring high accuracy at all times. Examining a basic piezoresistive pressure sensor helps to understand the effect of warm-up drift.

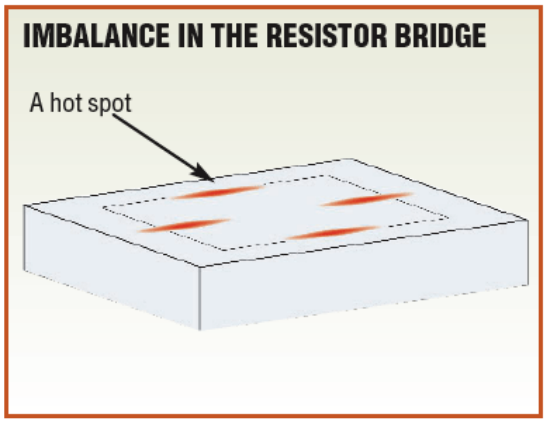
The sensor is made of a body, or "die," and a thin silicon diaphragm with four piezoresistors on the surface. The piezoresistors change resistance in response to stress. They are generally arranged in a bridge configuration and are precisely located on the diaphragm surface to maximize the response to diaphragm deflection. This in turn maximizes the response to a pressure differential across the diaphragm.

Warm-up shift

There are two primary sources of warm-up drift in a basic pressure sensor. One is the warm-up shift of the sensing element. While the system is reaching operating tempera-



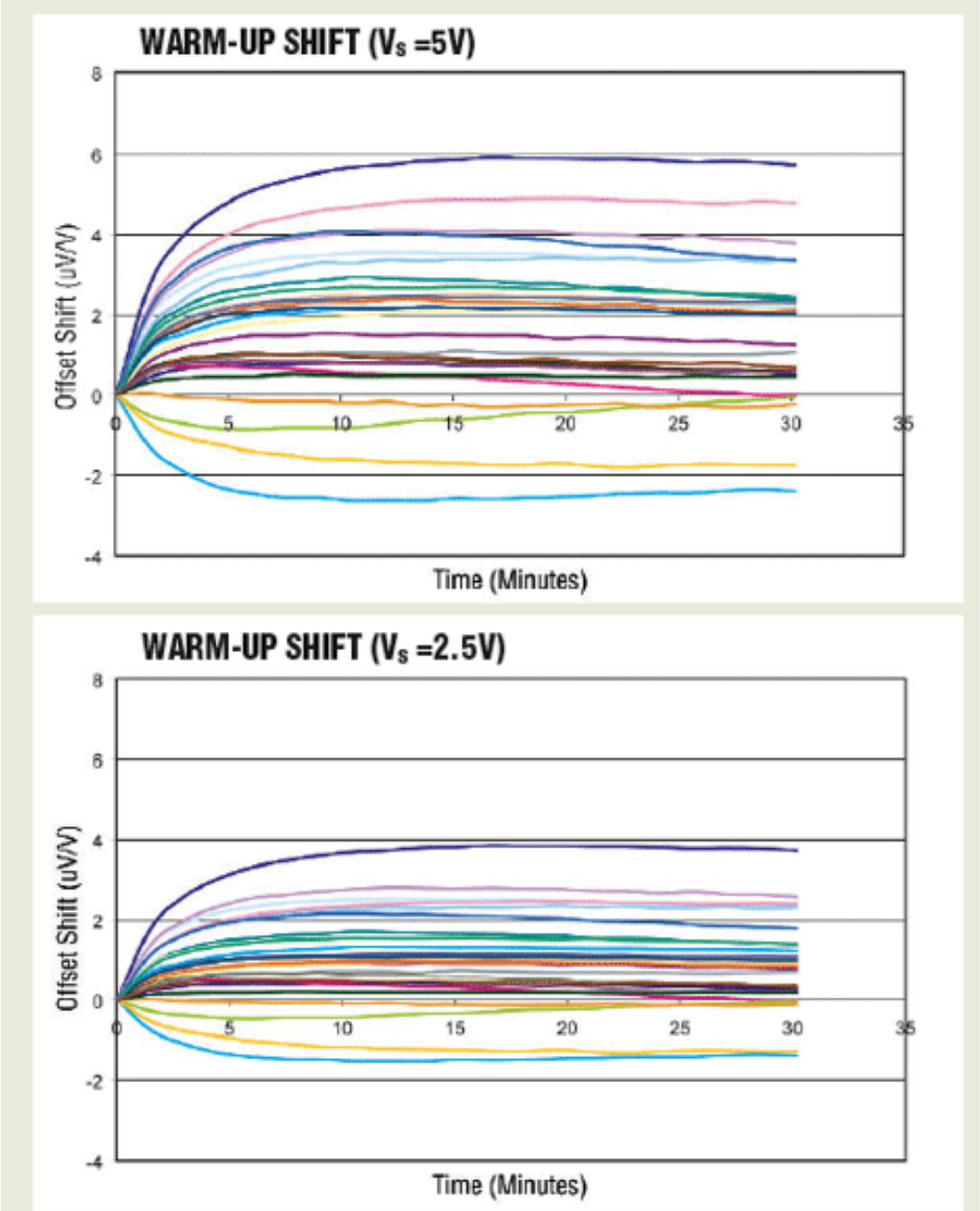
A basic pressure sensor is made of a die and a diaphragm with four piezoresistors on the surface.



Thermal hot spots on the die and diaphragm surface (orange lines) cause an imbalance in the resistor bridge.

ture, surface temperature and resultant thermal hot spots (surface contribution) on the die and diaphragm surface cause an imbalance in the resistor bridge. The temperature rise of the resistor-sensing element is proportional to the dissipated power and therefore proportional to the square of the excitation voltage of the sensor ($\Delta T \alpha V^2$).

Thus, reducing the excitation voltage by a factor of two reduces the sensing element temperature rise by a factor or four and, consequently, the warm-up surface condition is reduced by a factor of four. Since the signal level of the sensor is also reduced by a factor



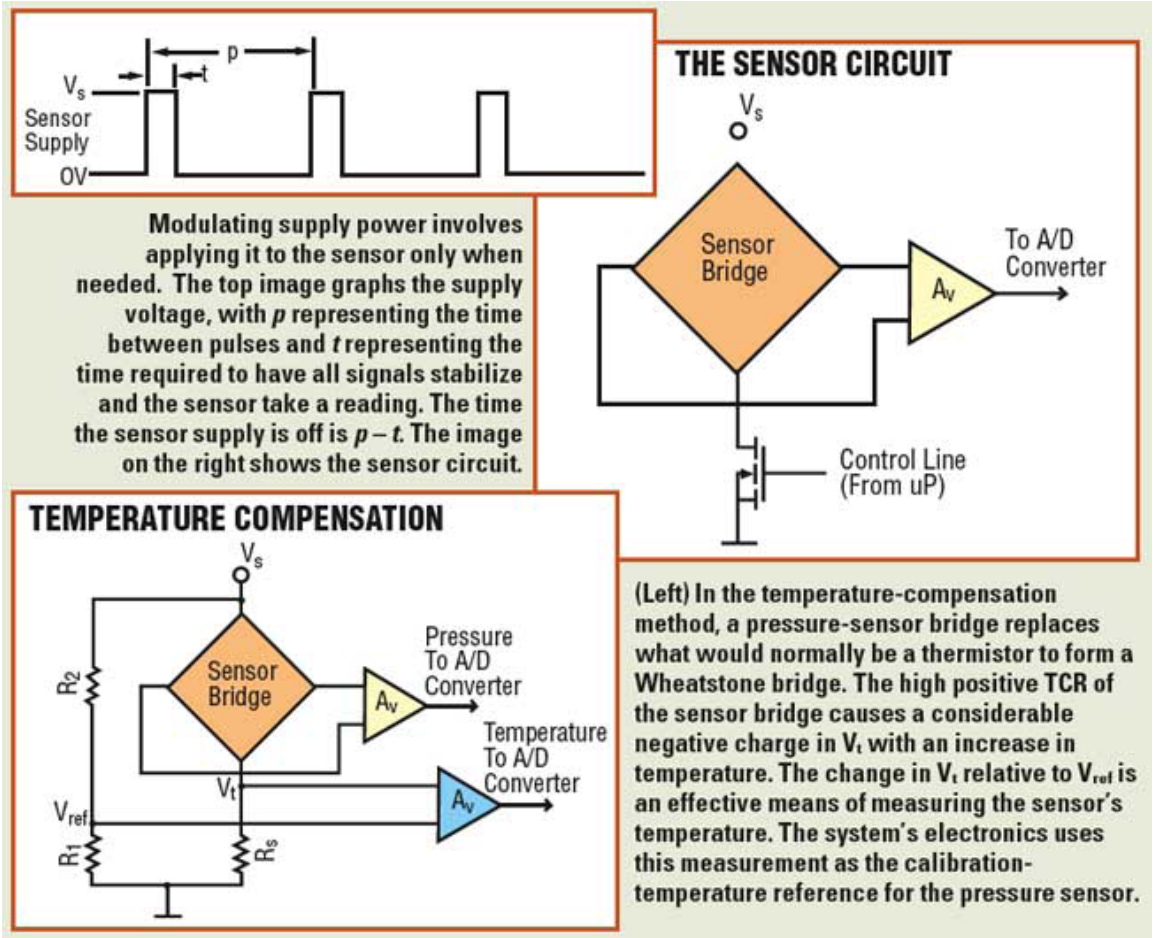
The top graph is a sampling of sensors with a 5 V supply voltage. The bottom graph is the same sampling with a 2.5 V supply voltage. The difference between the two graphs shows how much reducing the supply voltage reduces the surface contribution of warm-up drift. The different colored lines represent different sensors.

of two (with the reduced supply voltage), the overall effect is a reduction in surface contribution warm-up error by a factor of two. However, reducing the sensor power supply adversely affects the system electronic noise level.

An alternate and preferred approach to reducing supply voltage modulates the sensor supply as required by the system bandwidth. In other words, apply power to the sensor only when needed. This reduces power to the sensor to the time average (duty-cycle) applied and, hence, reduces warm-up drift. The method is slightly more sophisticated but can provide excellent results and without affecting system noise level.

Here the period, *p*, between power pulses for an application is the time the power is off plus the time the power is on. This is the time required to have all signals stabilize and the sensor to take a reading.

For example, consider a device that requires readings every 500 ms, has a settling time of 4 ms, and has a signal-acquisition time of 1 ms. The average power to the sensor is only about 1% ([1 ms + 4 ms]/500 ms) of the power applied as compared to a non-modulated system.



Modulating supply power involves applying it to the sensor only when needed. The top image graphs the supply voltage, with *p* representing the time between pulses and *t* representing the time required to have all signals stabilize and the sensor take a reading. The time the sensor supply is off is *p* – *t*. The image on the right shows the sensor circuit.

(Left) In the temperature-compensation method, a pressure-sensor bridge replaces what would normally be a thermistor to form a Wheatstone bridge. The high positive TCR of the sensor bridge causes a considerable negative charge in V_t with an increase in temperature. The change in V_t relative to V_{ref} is an effective means of measuring the sensor's temperature. The system's electronics uses this measurement as the calibration-temperature reference for the pressure sensor.

Of course, the period depends on an application's sampling requirements. It's important that p and on time t remain constant because of subtle surface charges. However, this is a minor constraint considering the benefits of modulating the sensor supply.

Temperature-compensation technique

Another source of warm-up drift is actually more a perceived characteristic and is related to the system's temperature-compensation technique. Systems often have an external temperature sensor for use in calibrating the pressure sensor for the effects of temperature. Such dual-sensor systems have a temperature gradient between the external device and the surface temperature of the diaphragm. The time it takes for a temperature gradient to stabilize is perceived as warm-up drift.

Minimizing this effect is accomplished by using the sensor resistance (bridge resistance-change with temperature) as the temperature-sensing element. Here the pressure-sensor bridge replaces what would normally be a thermistor (a type of resistor used to measure temperature changes) in a circuit that effectively becomes a Wheatstone bridge.

The sensor bridge has a high positive temperature coefficient of resistance (TCR) so an increase in temperature causes an increasingly negative charge in the signal output voltage (V_t) of the temperature-monitoring portion of the circuit. The change in V_t relative to the reference voltage (V_{ref}) is an effective measurement of the sensor temperature itself. The system electronics uses this measurement as the calibration-temperature reference for the pressure sensor. This eliminates the perceived warm-up drift because an external temperature sensor is not involved, so there is no thermal gradient. The good news is that modulating supply and temperature-compensation methods can be used together to almost eliminate the effect of warm-up drift.

Pressure Unit Conversion Constants

(Most commonly used - per international conventions; * = exact conversion factor)

ALL SENSORS®

TO OBTAIN ▶ / ▶ MULTIPLY ▶	Pounds Per Square Inch	in. H_2O (at 39.2°F)	in. Hg (at 32°F)	Kilopascal (Pa = N/m²)	Millibar	cm H_2O (at 4°C)	mm Hg (at 0°C) (Torr)	kgf/cm²	Atmosphere (standard)
Pounds Per Square Inch	1.000	27.681	2.036	6.8948	68.948	70.309	51.715	7.0307×10^{-2}	6.805×10^{-2}
in. H_2O (at 39.2°F)	3.6126×10^{-2}	1.000	7.3554×10^{-2}	0.2491	2.491	2.5400*	1.8683	2.54×10^{-3} *	2.458×10^{-3}
in. Hg (at 32°F)	0.4912	13.595	1.000	3.3864	33.864	34.532	25.400*	3.4531×10^{-2}	3.342×10^{-2}
Kilopascal (Pa = N/m²)	0.14504	4.0147	0.2953	1.000	10.000*	10.1973	7.5006	1.0197×10^{-2}	9.8692×10^{-3}
Millibar	0.01450	0.40147	0.02953	0.100*	1.000	1.01973	0.75006	1.0197×10^{-3}	9.8692×10^{-4}
cm H_2O (at 4°C)	1.4223×10^{-2}	0.3937	2.8958×10^{-2}	0.09806	0.9806	1.000	0.7355	1.0×10^{-3}	9.678×10^{-4}
mm Hg (at 0°C) (Torr)	1.9337×10^{-2}	0.53525	3.9370×10^{-2}	0.13332	1.3332	1.3595	1.000	1.3595×10^{-3}	1.3158×10^{-3}
kgf/cm²	14.223	393.71	28.959	98.0665	9.8067×10^{2}	1.000×10^{3}	7.3556×10^{2}	1.000	0.9678
Atmosphere (standard)	14.696	406.79	29.921	1.0133×10^{2}	1.0133×10^{3}	1.033×10^{3}	7.600×10^{2}	1.0332	1.000

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