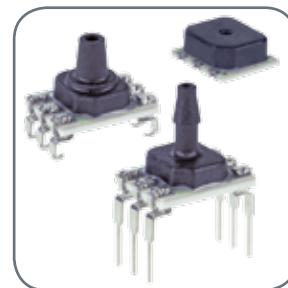




Basic Board Mount  
Pressure Sensors  
**ABP Series—High Accuracy**  
**Digital or Analog Output**  
**Compensated/Amplified**



60 mbar to 10 bar | 6 kPa to 1 MPa | 1 psi to 150 psi

# Basic Amplified Board Mount Pressure Sensors

The Basic Amplified ABP Series is a piezoresistive silicon pressure sensor offering a ratiometric analog or digital output for reading pressure over the specified full scale pressure span and temperature range.

The ABP Series is fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects and accuracy errors (which include non-linearity, repeatability and hysteresis) using an on-board Application Specific Integrated Circuit (ASIC). Calibrated output values for pressure are updated at approximately 1 kHz for analog and 2 kHz for digital.

The ABP Series is calibrated over the temperature range of 0 °C to 50 °C [32 °F to 122 °F]. The sensor is characterized for operation from a single power supply of either 3.3 Vdc or 5.0 Vdc. These sensors measure gage and differential pressures.

The Basic Amplified pressure sensors are intended for use with non-corrosive, non-ionic gases, such as air and other dry gases. The following options extend the performance of these sensors to non-corrosive liquids.

- No silicone gel coating: The input port is limited to non-corrosive, non-ionic media such as dry air and gases and should not be exposed to condensation. The gases are limited to media that are compatible with high temperature polyamide, silicone, alumina ceramic, silicon, gold, and glass.
- Silicone gel coating: Uses the same materials in the wetted media path but is protected from condensation by a silicone-based gel coating; allows use in applications where condensation may occur.

All products are designed and manufactured according to ISO 9001 standards.

## Features

- Proprietary Honeywell technology
- Protected by multiple global patents
- Industry-leading long-term stability:  $\pm 0.25$  %FSS
- Total Error Band (TEB):  $\pm 1.5$  %FSS
- Industry-leading accuracy:  $\pm 0.25$  %FSS BFSL
- High burst pressures
- Industry-leading flexibility
- Wide pressure range: 60 mbar to 10 bar | 6 kPa to 1 MPa | 1 psi to 150 psi
- Meets IPC/JEDEC J-STD-020D.1 Moisture Sensitivity Level 1 requirements
- Optional internal diagnostic functions
- Energy efficient
- Output: ratiometric analog; I<sup>2</sup>C- or SPI-compatible 14-bit digital output (min. 12-bit sensor resolution)
- Small size: As small as 8 mm x 7 mm
- REACH and RoHS compliant
- Sleep mode option (see [Technical Note](#))
- Temperature output option
- Liquid media option

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## Potential Applications

### MEDICAL

- CPAP
- Blood analysis
- Blood pressure monitoring
- Breast pumps
- Drug dosing
- Hospital beds
- Massage machines
- Oxygen concentrators
- Patient monitoring
- Sleep apnea equipment
- Urine analyzers
- Ventilators/portable ventilators
- Wound therapy

### INDUSTRIAL

- Air brakes
- HVAC/transmitters
- Life sciences
- Material handling
- Pneumatic control
- Pneumatic regulator
- Process gas monitoring
- Valve positioning and positioners

### COMMERCIAL

- Air beds
- Coffee makers
- Washing machines

STABILITY • ACCURACY • FLEXIBILITY • SMALL SIZE

# General Specifications

**Table 1. Absolute Maximum Ratings<sup>1</sup>**

Characteristic	Min.	Max.	Unit
Supply voltage ( $V_{supply}$ )	-0.3	6.0	Vdc
Voltage on any pin	-0.3	$V_{supply} + 0.3$	V
Digital interface clock frequency:			
I <sup>2</sup> C	100	400	kHz
SPI	50	800	
ESD susceptibility (human body model)	2	—	kV
Storage temperature	-40 [-40]	85 [185]	°C [°F]
Soldering time and temperature:			
lead solder temperature (DIP)		4 s max. at 250 °C [482 °F]	
peak reflow temperature (Leadless SMT, SMT)		15 s max. at 250 °C [482 °F]	

<sup>1</sup>Absolute maximum ratings are the extreme limits the device will withstand without damage.

**Table 2. Environmental Specifications**

Characteristic	Parameter
Humidity (Gases only; see “Options N and D” in Figure 2.)	0% to 95% RH, non-condensing
Vibration	15 g, 10 Hz to 2 kHz
Shock	100 g, 6 ms duration
Life <sup>1</sup>	1 million pressure cycles minimum
Solder reflow	J-STD-020-D.1 Moisture Sensitivity Level 1 (unlimited shelf life when stored at ≤30 °C/85 % RH)

<sup>1</sup>Life may vary depending on specific application in which the sensor is used.

**Table 3. Wetted Materials<sup>1</sup>**

Component	Pressure Port	
	No Silicone Gel Coating Option	Silicone Gel Coating Option
Ports and covers	high temperature polyamide	
Substrate	alumina ceramic	not exposed; protected by silicone gel
Adhesives	epoxy, silicone	epoxy
Electronic components	ceramic, silicon, glass, solder, gold	not exposed; protected by silicone gel

<sup>1</sup>Contact Honeywell Customer Service for detailed material information.

**Table 4. Sensor Pressure Types**

Pressure Type	Description
Gage	Output is proportional to the difference between applied pressure and atmospheric (ambient) pressure.
Differential	Output is proportional to the difference between the pressures applied to each port (Port 1 – Port 2).

# Operating Specifications

**Table 5. Operating Specifications**

Characteristic	Analog			Digital			Unit
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Supply voltage ( $V_{\text{supply}}$ ) <sup>1, 2, 3</sup>							
3.3 Vdc	3.0	3.3	3.6	3.0	3.3	3.6	Vdc
5.0 Vdc	4.75	5.0	5.25	4.75	5.0	5.25	
Supply current:							
3.3 Vdc	—	2.1	2.8	—	3.1	3.9	mA
5.0 Vdc	—	2.7	3.8	—	3.7	4.6	mA
sleep mode option	—	—	—	—	1	10	μA
Operating temperature range <sup>4</sup>	-40 [-40]	—	85 [185]	-40 [-40]	—	85 [185]	°C [°F]
Compensated temperature range <sup>5</sup>	0 [-32]	—	50 [122]	0 [-32]	—	50 [122]	°C [°F]
Temperature output option <sup>6</sup>	—	—	—	—	1.5	—	°C
Startup time (power up to data ready)	—	—	5	—	—	3	ms
Response time	—	1	—	—	0.46	—	ms
Clipping limit:							
upper	—	—	97.5	—	—	—	%Vsupply
lower	2.5	—	—	—	—	—	
SPI/I <sup>2</sup> C voltage level:							
low	—	—	—	—	—	20	%Vsupply
high	—	—	—	80	—	—	
Pull up on SDA/MISO, SCL/SCLK, SS	—	—	—	1	—	—	kOhm
Accuracy <sup>7</sup>	—	—	±0.25	—	—	±0.25	%FSS BFSL <sup>8</sup>
Output resolution	0.03	—	—	—	—	—	%FSS bits
	—	—	—	12	—	—	

<sup>1</sup>Sensors are either 3.3 Vdc or 5.0 Vdc based on the catalog listing selected.

<sup>2</sup>Ratiometricity of the sensor (the ability of the device output to scale to the supply voltage) is achieved within the specified operating voltage.

<sup>3</sup>The sensor is not reverse polarity protected. Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

<sup>4</sup>Operating temperature range: The temperature range over which the sensor will produce an output proportional to pressure.

<sup>5</sup>Compensated temperature range: The temperature range over which the sensor will produce an output proportional to pressure within the specified performance limits.

<sup>6</sup>Temperature Output Option: Continuous operation in Sleep Mode only may provide different results.

<sup>7</sup>Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C [77 °F]. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.

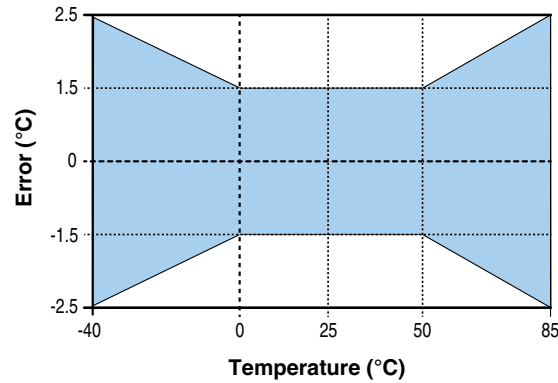
<sup>8</sup>Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range. (See Figure 3 for ranges.)

**Table 6. Sensor Output at Significant Percentages (Digital Versions Only)**

% Output	Digital Counts	
	decimal	hex
0	0	0x0000
10	1638	0x0666
50	8192	0x2000
90	14746	0x399A
100	16383	0x3FFF

# Transfer Function Limits

Figure 1. Temperature Output Option Temperature Error<sup>1,2</sup>

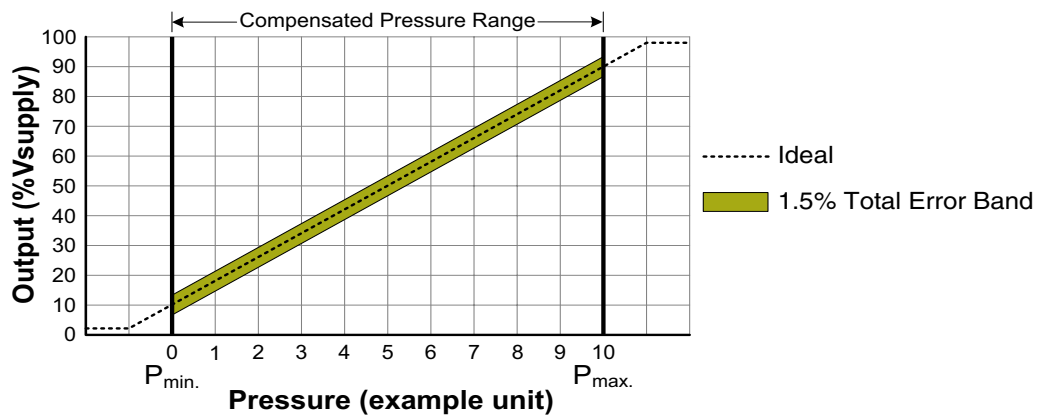


<sup>1</sup>Operating temperature range: The temperature range over which the sensor will produce an output proportional to pressure.

<sup>2</sup>Compensated temperature range: The temperature range over which the sensor will produce an output proportional to pressure within the specified performance limits.

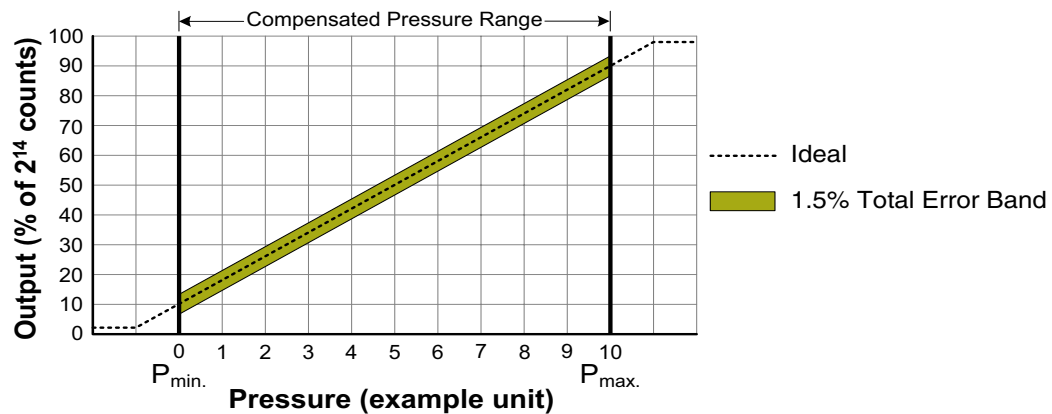
Figure 2. Transfer Function Limits<sup>1</sup>

## Analog Versions



$$\text{Output (V)} = \frac{0.8 \times V_{\text{supply}}}{P_{\text{max.}} - P_{\text{min.}}} \times (\text{Pressure}_{\text{applied}} - P_{\text{min.}}) + 0.10 \times V_{\text{supply}}$$

## Digital Versions



$$\text{Output (\% of } 2^{14} \text{ counts)} = \frac{80\%}{P_{\text{max.}} - P_{\text{min.}}} \times (\text{Pressure}_{\text{applied}} - P_{\text{min.}}) + 10\%$$

<sup>1</sup>Transfer Function "A" is shown. See Figure 3 for other available transfer function options.

# Nomenclature and Order Guide

Figure 3. Nomenclature and Order Guide

For example, **ABPDNNN150PGAA3** defines an ABP Series Amplified Basic Pressure Sensor, DIP package, NN pressure port, dry gases only, no diagnostics, 150 psi gage pressure range, analog output type, 10% to 90% of Vsupply (analog), 2<sup>14</sup> counts (digital) transfer function, no temperature output, no sleep mode, 3.3 Vdc supply voltage.

Product Series			Package			Pressure Port			Option			Supply Voltage		Transfer Function <sup>1</sup>			Output Type			Pressure Range <sup>2,3</sup>																																																																																											
<b>ABP</b> Amplified Basic			<b>D</b> DIP (Dual Inline Pin) <b>M</b> SMT (Surface Mount Technology) <b>L</b> Leadless SMT			<table border="1"> <thead> <tr> <th>DIP</th> <th>SMT</th> <th>Leadless SMT</th> </tr> </thead> <tbody> <tr> <td><b>NN</b> No port </td> <td><b>NN</b> No port </td> <td><b>NN</b> No port </td> </tr> <tr> <td><b>AN</b> Single axial barbed port </td> <td><b>AN</b> Single axial barbed port </td> <td><b>AN</b> Single axial barbed port </td> </tr> <tr> <td><b>LN</b> Single axial barbless port </td> <td><b>LN</b> Single axial barbless port </td> <td><b>LN</b> Single axial barbless port </td> </tr> <tr> <td><b>JN</b> Single radial barbless port </td> <td><b>JN</b> Single radial barbless port </td> <td>—</td> </tr> <tr> <td><b>JJ</b> Dual radial barbless ports, same side </td> <td><b>JJ</b> Dual radial barbless ports, same side </td> <td>—</td> </tr> <tr> <td><b>RN</b> Single radial barbed port </td> <td><b>RN</b> Single radial barbed port </td> <td>—</td> </tr> <tr> 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<sup>1</sup> The transfer function limits define the output of the sensor at a given pressure input. By specifying Pmin. and Pmax., the output at Pmin. and Pmax., the complete transfer function of the sensor is defined. See the graphical representations of the transfer function in Figure 2 of the product datasheet.

<sup>2</sup> Custom pressure ranges are available. Contact Honeywell Customer Service for more information.

<sup>3</sup> See the explanation of sensor pressure types in Table 4 of the product datasheet.

## COMMON CATALOG LISTINGS

ABPLLND060MGAA3	ABPMAND001PG2A3
ABPLLNN600MGAA3	ABPLANN001PG2A5
ABPMANN005PGAA3	ABPDANT005PGAA5
ABPMANN004BGAA5	ABPDANT015PGAA5
ABPMLNN001PGAA3	ABPLLNT010BGAA5
ABPMANN030PG2A3	ABPDJTT001PGAA5
ABPDLNN100MG2A3	ABPDRRT005PG2A5
ABPDANN005PG2A3	ABPMJTT015PGAA5

# Pressure Range Specifications

Table 7. Pressure Range Specifications

Pressure Range (see Figure 3)	Pressure Range		Unit	Overpressure <sup>1</sup>	Burst Pressure <sup>2</sup>	Common Mode Pressure <sup>3</sup>	Total Error Band <sup>4</sup> (%FSS)	Long-term Stability 1000 hr, 25 °C (%FSS)
	Pmin.	Pmax.						
<b>60 mbar to 10 bar</b>								
<b>Differential</b>								
060MD	-60	60	mbar	850	1000	10000	±1.5	±0.25
100MD	-100	100	mbar	1400	2500	10000	±1.5	±0.25
160MD	-160	160	mbar	1400	2500	10000	±1.5	±0.25
250MD	-250	250	mbar	1400	2500	10000	±1.5	±0.25
400MD	-400	400	mbar	2000	4000	10000	±1.5	±0.25
600MD	-600	600	mbar	2000	4000	10000	±1.5	±0.25
001BD	-1	1	bar	4	8	10	±1.5	±0.25
1.6BD	-1.6	1.6	bar	8	16	10	±1.5	±0.25
2.5BD	-2.5	2.5	bar	8	16	10	±1.5	±0.25
004BD	-4.0	4.0	bar	16	17	10	±1.5	±0.25
<b>Gage</b>								
060MG	0	60	mbar	850	1000	5450	±1.5	±0.25
100MG	0	100	mbar	850	1000	10000	±1.5	±0.25
160MG	0	160	mbar	850	1000	10000	±1.5	±0.25
250MG	0	250	mbar	1400	2500	10000	±1.5	±0.25
400MG	0	400	mbar	2000	4000	10000	±1.5	±0.25
600MG	0	600	mbar	2000	4000	10000	±1.5	±0.25
001BG	0	1	bar	2	4	10	±1.5	±0.25
1.6BG	0	1.6	bar	4	8	10	±1.5	±0.25
2.5BG	0	2.5	bar	8	16	10	±1.5	±0.25
004BG	0	4	bar	8	16	16	±1.5	±0.25
006BG	0	6	bar	17	17	17	±1.5	±0.25
010BG	0	10	bar	17	17	17	±1.5	±0.25
<b>6 kPa to 1 MPa</b>								
<b>Differential</b>								
006KD	-6	6	kPa	85	100	1000	±1.5	±0.25
010KD	-10	10	kPa	140	250	1000	±1.5	±0.25
016KD	-16	16	kPa	140	250	1000	±1.5	±0.25
025KD	-25	25	kPa	140	250	1000	±1.5	±0.25
040KD	-40	40	kPa	200	400	1000	±1.5	±0.25
060KD	-60	60	kPa	200	400	1000	±1.5	±0.25
100KD	-100	100	kPa	400	800	1000	±1.5	±0.25
160KD	-160	160	kPa	800	1600	1000	±1.5	±0.25
250KD	-250	250	kPa	800	1600	1000	±1.5	±0.25
400KD	-400	400	kPa	1600	1700	1000	±1.5	±0.25
<b>Gage</b>								
006KG	0	6	kPa	85	100	545	±1.5	±0.25
010KG	0	10	kPa	85	100	1000	±1.5	±0.25
016KG	0	16	kPa	85	100	1000	±1.5	±0.25
025KG	0	25	kPa	140	250	1000	±1.5	±0.25
040KG	0	40	kPa	200	400	1000	±1.5	±0.25
060KG	0	60	kPa	200	400	1000	±1.5	±0.25
100KG	0	100	kPa	200	400	1000	±1.5	±0.25
160KG	0	160	kPa	400	800	1000	±1.5	±0.25
250KG	0	250	kPa	800	1600	1000	±1.5	±0.25
400KG	0	400	kPa	800	1600	1600	±1.5	±0.25
600KG	0	600	kPa	1700	1700	1700	±1.5	±0.25
001GG	0	1	MPa	1.7	1.7	1.7	±1.5	±0.25

<sup>1</sup>Overpressure: The maximum pressure which may safely be applied to the product for it to remain in specification once pressure is returned to the operating pressure range. Exposure to higher pressures may cause permanent damage to the product. Unless otherwise specified this applies to all available pressure ports at any temperature with the operating temperature range.

<sup>2</sup>Burst pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. Product should not be expected to function after exposure to any pressure beyond the burst pressure.

<sup>3</sup>Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

<sup>4</sup>Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range. Includes all errors due to offset, full scale span, pressure non-linearity, pressure hysteresis, repeatability, thermal effect on offset, thermal effect on span, and thermal hysteresis.

# Pressure Range Specifications

## PCB Pad Layouts

Table 7. Pressure Range Specifications (continued)

Pressure Range (see Figure 3)	Pressure Range		Unit	Overpressure <sup>1</sup>	Burst Pressure <sup>2</sup>	Common Mode Pressure <sup>3</sup>	Total Error Band <sup>4</sup> (%FSS)	Long-term Stability 1000 hr, 25 °C (%FSS)
	Pmin.	Pmax.						
<b>1 psi to 150 psi</b>								
<b>Differential</b>								
001PD	-1	1	psi	10	15	150	±1.5%	±0.25%
005PD	-5	5	psi	30	40	150	±1.5%	±0.25%
015PD	-15	15	psi	60	120	150	±1.5%	±0.25%
030PD	-30	30	psi	120	240	150	±1.5%	±0.25%
060PD	-60	60	psi	250	250	250	±1.5%	±0.25%
<b>Gage</b>								
001PG	0	1	psi	10	15	150	±1.5%	±0.25%
005PG	0	5	psi	30	40	150	±1.5%	±0.25%
015PG	0	15	psi	30	60	150	±1.5%	±0.25%
030PG	0	30	psi	60	120	150	±1.5%	±0.25%
060PG	0	60	psi	120	240	250	±1.5%	±0.25%
100PG	0	100	psi	250	250	250	±1.5%	±0.25%
150PG	0	150	psi	250	250	250	±1.5%	±0.25%

<sup>1</sup>Overpressure: The maximum pressure which may safely be applied to the product for it to remain in specification once pressure is returned to the operating pressure range. Exposure to higher pressures may cause permanent damage to the product. Unless otherwise specified this applies to all available pressure ports at any temperature with the operating temperature range.

<sup>2</sup>Burst pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. Product should not be expected to function after exposure to any pressure beyond the burst pressure.

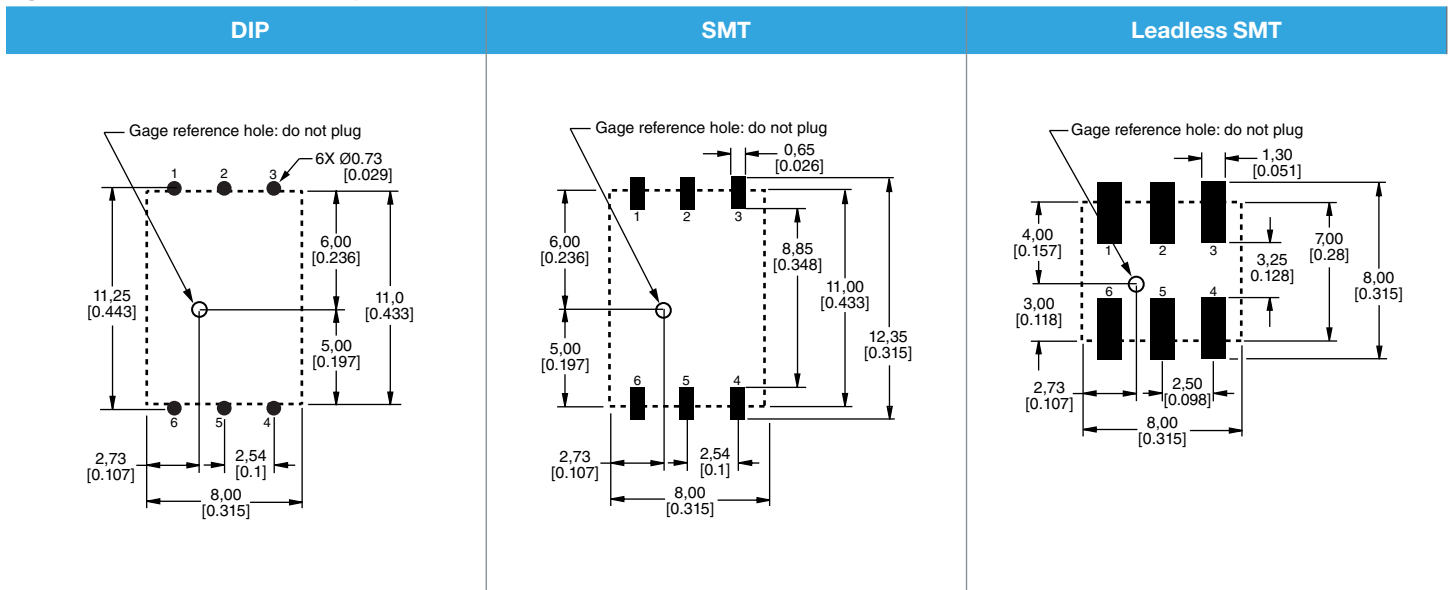
<sup>3</sup>Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

<sup>4</sup>Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range. Includes all errors due to offset, full scale span, pressure non-linearity, pressure hysteresis, repeatability, thermal effect on offset, thermal effect on span, and thermal hysteresis.

Table 8. Pinouts

Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Digital (I <sup>2</sup> C, SPI)	GND	V <sub>DD</sub>	SS/INT	NC	SDA	SCL
Analog	GND	NC	V <sub>out</sub>	NC	NC	V <sub>DD</sub>

Figure 4. Recommended PCB Layouts

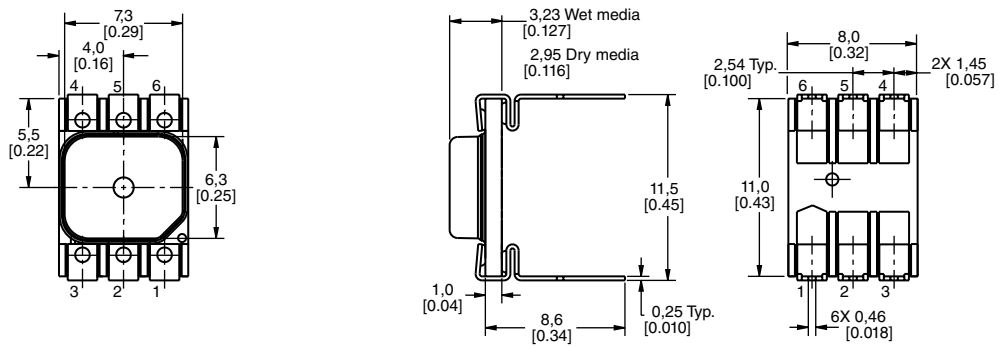


# Dimensional Drawings

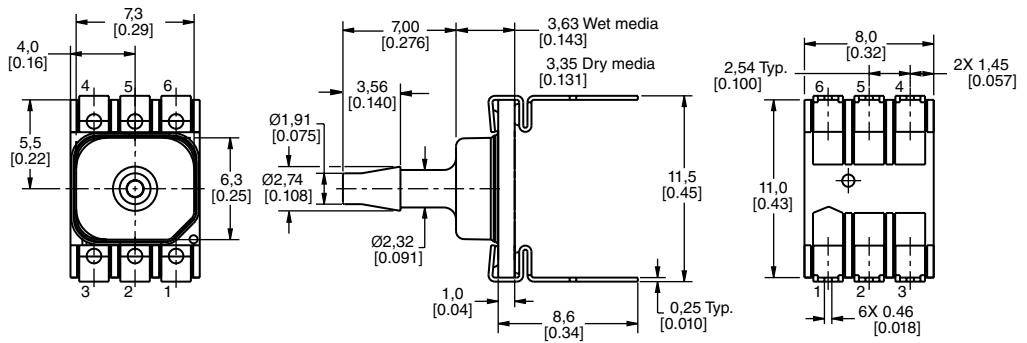
## DIP Packages

Figure 5. DIP Package Dimensional Drawings (For reference only: mm [in.] )

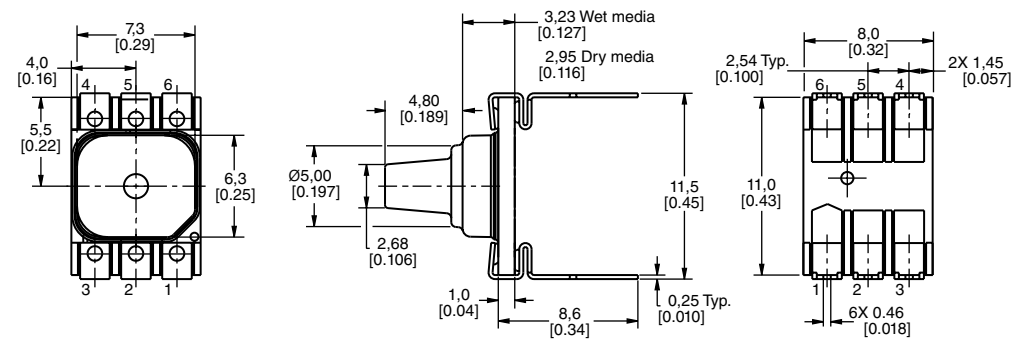
**DIP NN:** No port



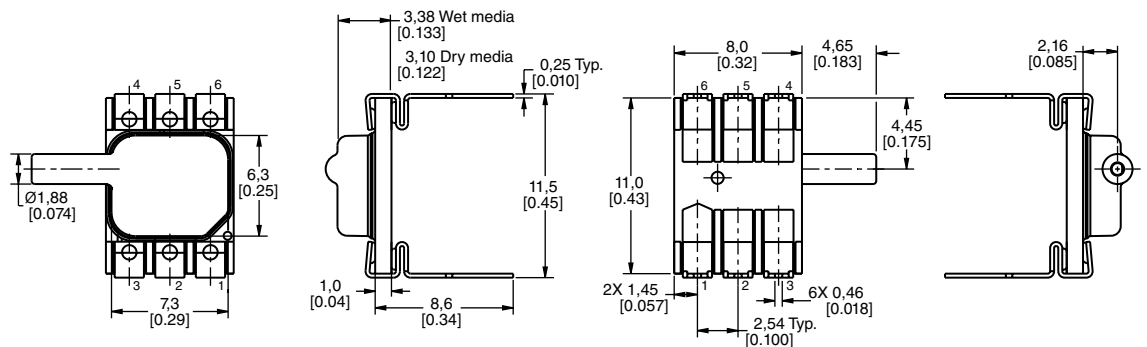
**DIP AN:** Single axial barbed port



**DIP LN:** Single axial barbless port



**DIP JN:** Single radial barbless port

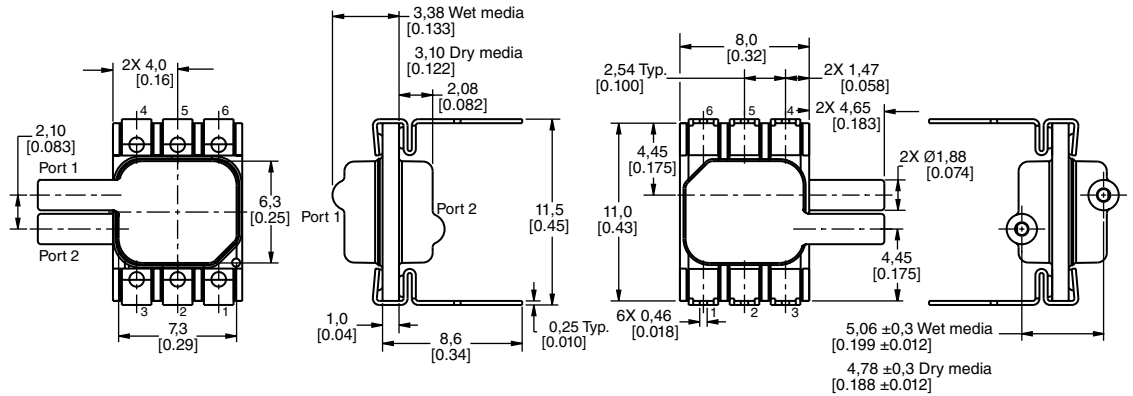


# Dimensional Drawings

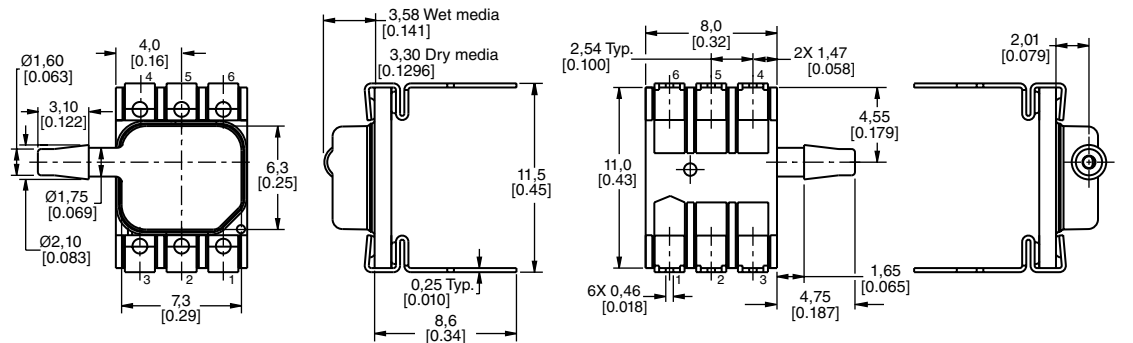
## DIP Packages

Figure 5. DIP Package Dimensional Drawings (continued)

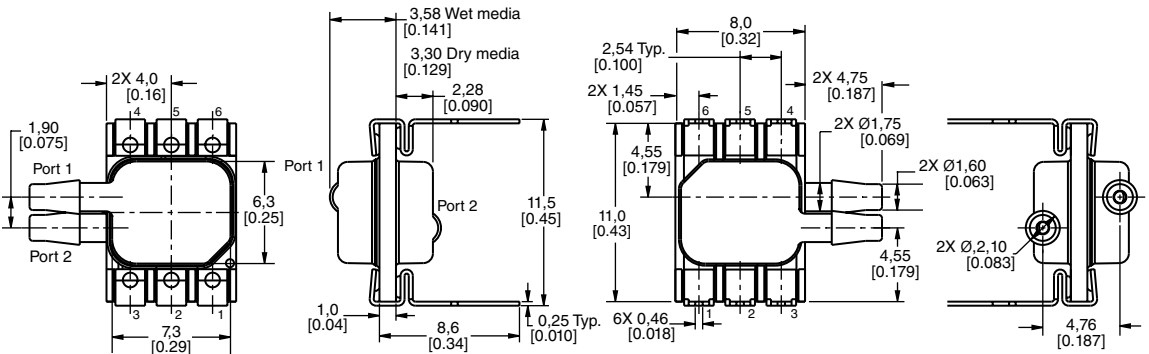
**DIP JJ:** Dual radial barbless ports, same side



**DIP RN:** Single radial barbed port



**DIP RR:** Dual radial barbed ports, same side

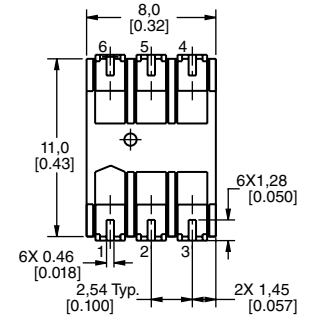
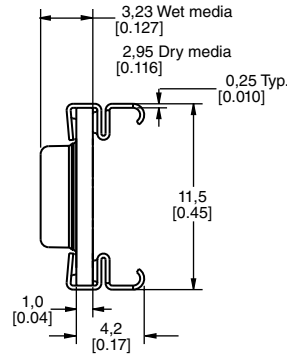
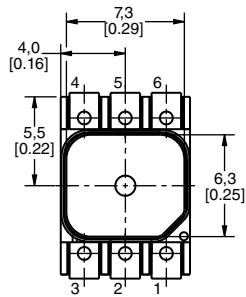


# Dimensional Drawings

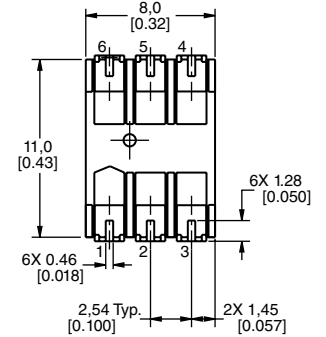
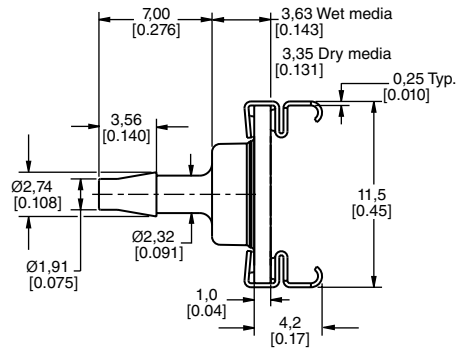
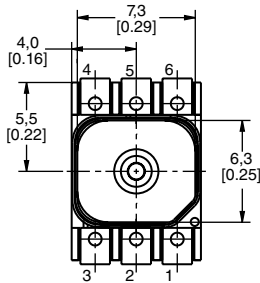
## SMT Packages

Figure 6. SMT Package Dimensional Drawings (For reference only: mm [in.] )

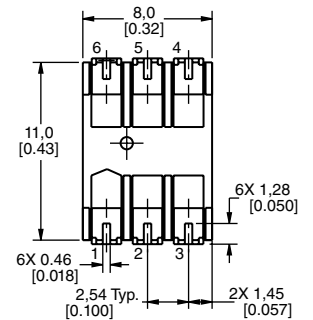
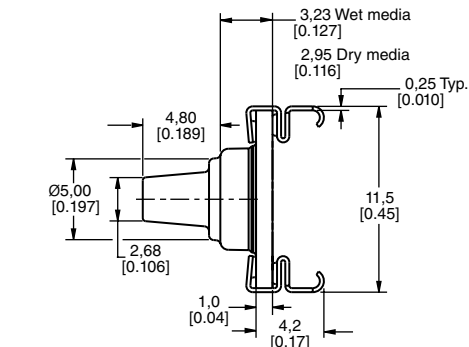
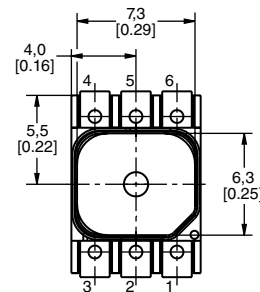
**SMT NN:** No port



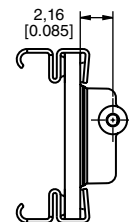
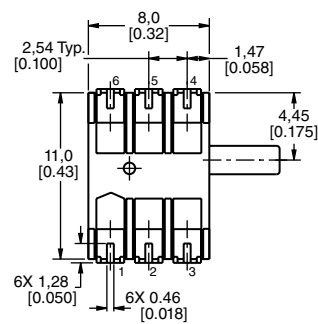
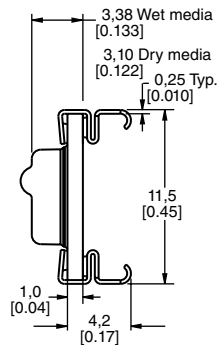
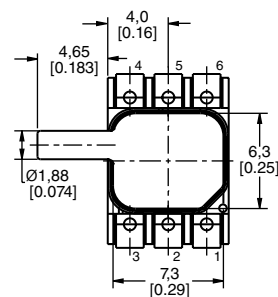
**SMT AN:** Single axial barbed port



**SMT LN:** Single axial barbless port



**SMT JN:** Single radial barbless port

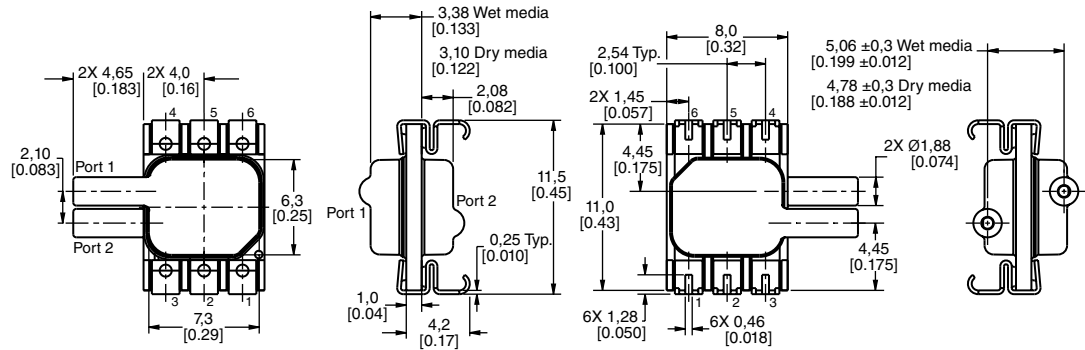


# Dimensional Drawings

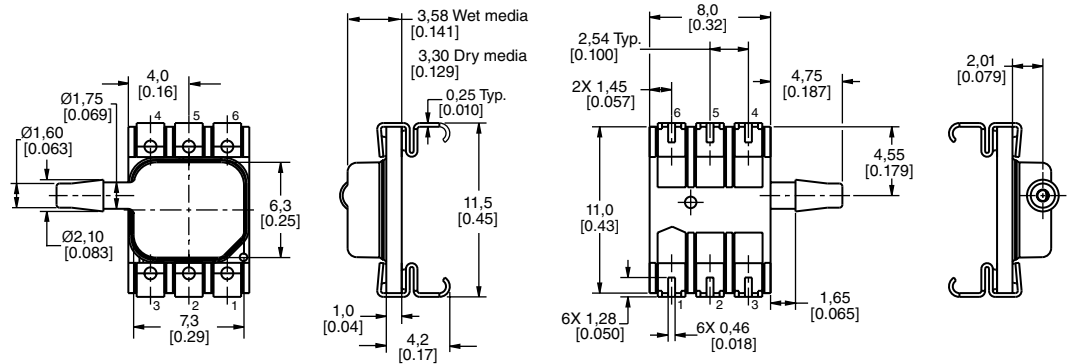
## SMT Packages

Figure 6. SMT Package Dimensional Drawings (continued)

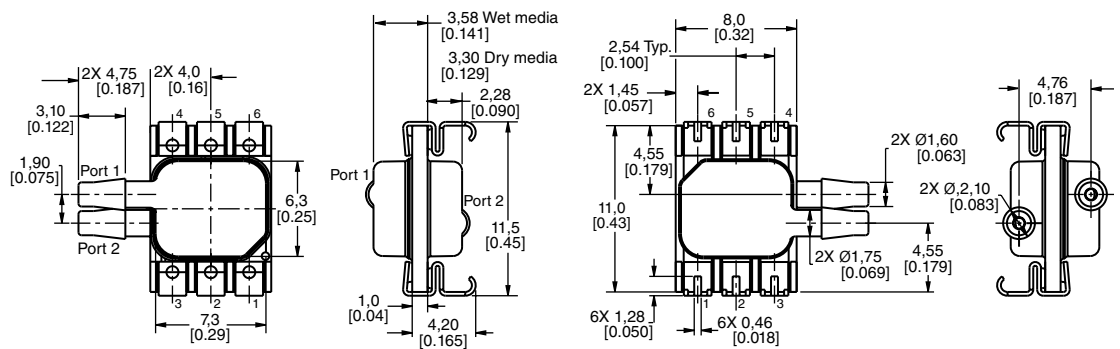
**SMT JJ:** Dual radial barless ports, same side



**SMT RN:** Single radial barbed port



**SMT RR:** Dual radial barbed ports, both sides

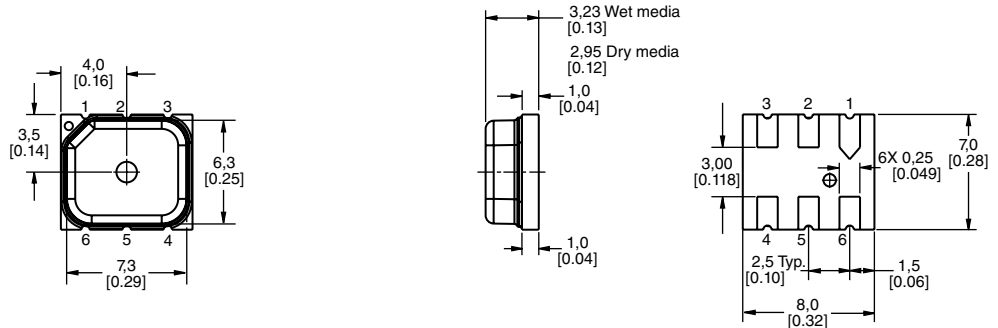


# Dimensional Drawings

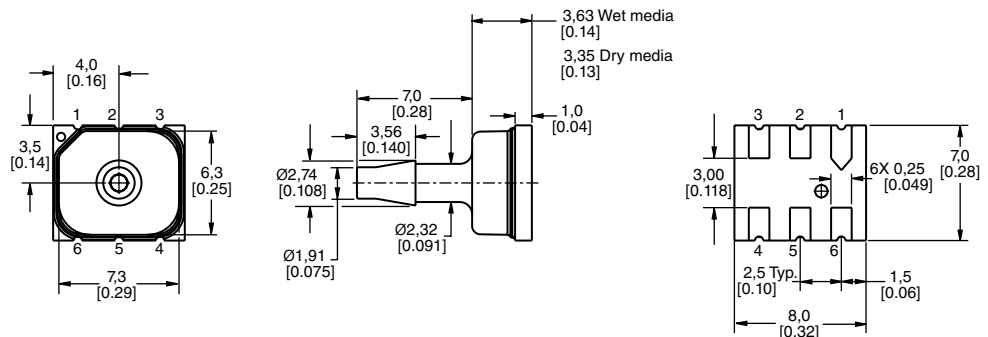
## Leadless SMT Packages

Figure 7. Leadless SMT Package Dimensional Drawings (For reference only: mm [in.] )

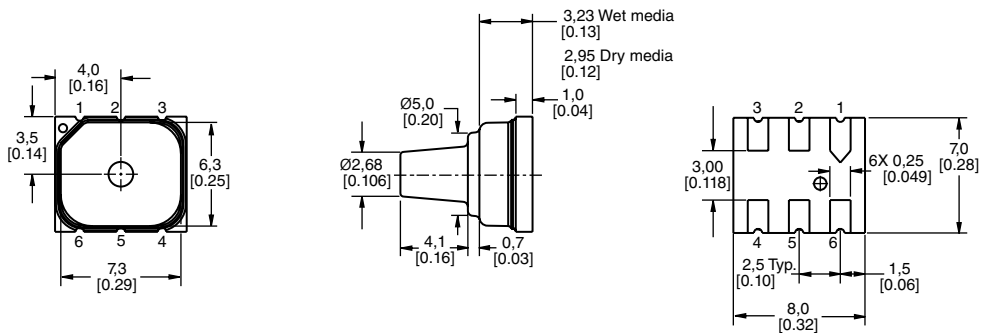
**Leadless SMT AN: No port**



**Leadless SMT AN: Single axial barbed port**



**Leadless SMT AN: Single axial barbless port**



## ADDITIONAL INFORMATION

The following associated literature is available at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product Line Guide
- Product Range Guide
- Product Nomenclature Tree
- Installation Instructions
- Application Information
- Technical Notes:
  - I<sup>2</sup>C Communications with Honeywell Digital Output Pressure Sensors
  - SPI Communications with Honeywell Digital Output Pressure Sensors
  - Sleep Mode with Honeywell Digital Output Pressure Sensors

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