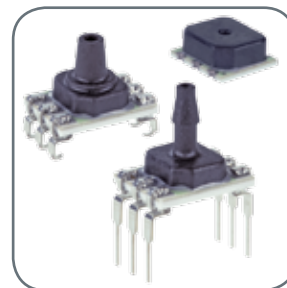




Basic Board Mount
Pressure Sensors
ABP Series—High Accuracy
Digital or Analog Output
Compensated/Amplified



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



Elblinger Elektronik GmbH
Lange Wanne 25
38259 Salzgitter

Telefon 05341/8212-1
Fax 05341/821299

e-mail mail@elblinger-elektronik.de
Internet www.elblinger-elektronik.de

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: ± 0.25 %FSS
- Total Error Band (TEB): ± 1.5 %FSS
- Industry-leading accuracy: ± 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; I²C- 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

Table of Contents

General Specifications	3
Operating Specifications	4
Transfer Function Limits	5
Nomenclature and Order Guide	6
Pressure Range Specifications	7-8
PCB Layouts	8
Dimensional Drawings:	
DIP Packages	9-10
SMT Packages	11-12
Leadless SMT Packages	13
Additional Information	back page

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 Ratings¹

Characteristic	Min.	Max.	Unit
Supply voltage (V_{supply})	-0.3	6.0	Vdc
Voltage on any pin	-0.3	$V_{\text{supply}} + 0.3$	V
Digital interface clock frequency:			
I ² 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]		

¹Absolute 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 ¹	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)

¹Life may vary depending on specific application in which the sensor is used.

Table 3. Wetted Materials¹

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

¹Contact 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_{supply}) ^{1, 2, 3}							Vdc
3.3 Vdc	3.0	3.3	3.6	3.0	3.3	3.6	
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 ⁴	-40 [-40]	—	85 [185]	-40 [-40]	—	85 [185]	°C [°F]
Compensated temperature range ⁵	0 [-32]	—	50 [122]	0 [-32]	—	50 [122]	°C [°F]
Temperature output option ⁶	—	—	—	—	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 ² C voltage level:							
low	—	—	—	—	—	20	%Vsupply
high	—	—	—	80	—	—	
Pull up on SDA/MISO, SCL/SCLK, SS	—	—	—	1	—	—	kOhm
Accuracy ⁷	—	—	±0.25	—	—	±0.25	%FSS BFSL ⁸
Output resolution	0.03	—	—	—	—	—	%FSS
	—	—	—	12	—	—	bits

¹Sensors are either 3.3 Vdc or 5.0 Vdc based on the catalog listing selected.

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

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

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

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

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

⁷Accuracy: 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.

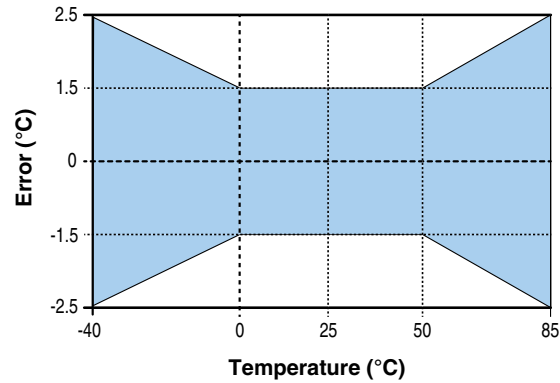
⁸Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range. (See Figure 3 for ranges.)

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^{1,2}

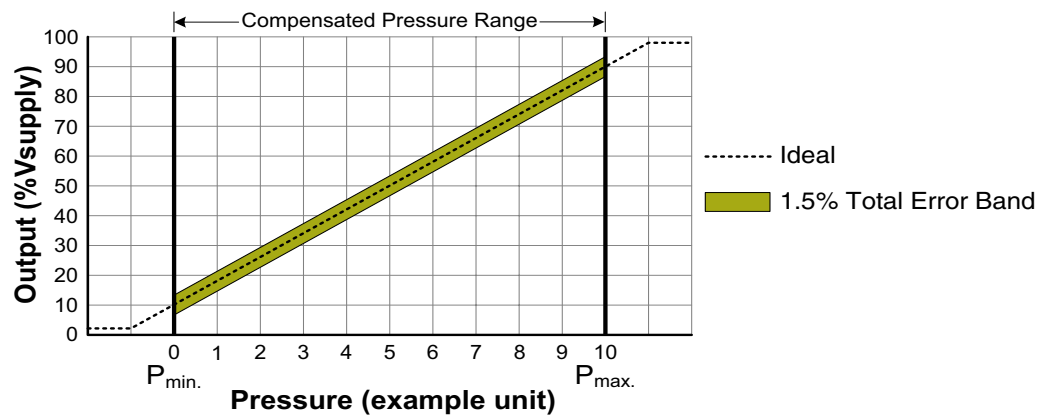


¹Operating temperature range: The temperature range over which the sensor will produce an output proportional to pressure.

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

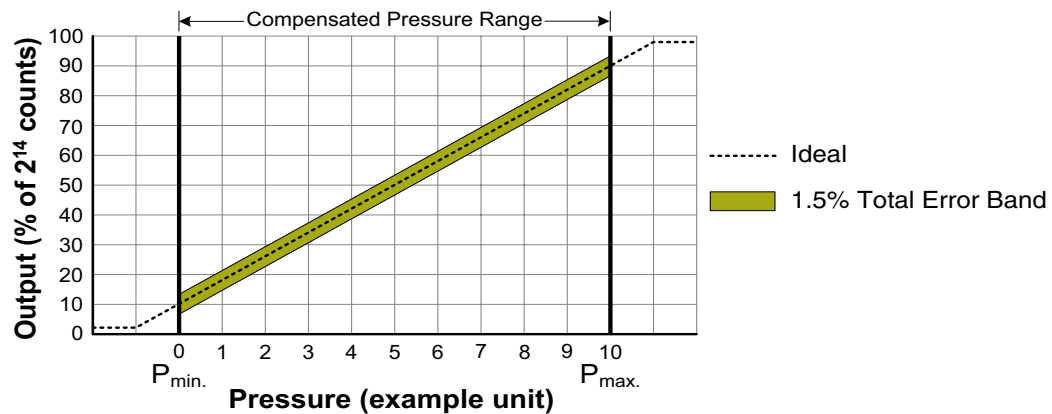
Figure 2. Transfer Function Limits¹

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



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

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

Pressure Range Specifications

Table 7. Pressure Range Specifications

Pressure Range (see Figure 3)	Pressure Range		Unit	Overpressure ¹	Burst Pressure ²	Common Mode Pressure ³	Total Error Band ⁴ (%FSS)	Long-term Stability 1000 hr, 25 °C (%FSS)
	Pmin.	Pmax.						
60 mbar to 10 bar								
Differential								
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
Gage								
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
6 kPa to 1 MPa								
Differential								
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
Gage								
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

¹Overpressure: 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.

²Burst 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.

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

⁴Total 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 ¹	Burst Pressure ²	Common Mode Pressure ³	Total Error Band ⁴ (%FSS)	Long-term Stability 1000 hr, 25 °C (%FSS)
	Pmin.	Pmax.						
1 psi to 150 psi								
Differential								
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%
Gage								
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%

¹Overpressure: 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.

²Burst 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.

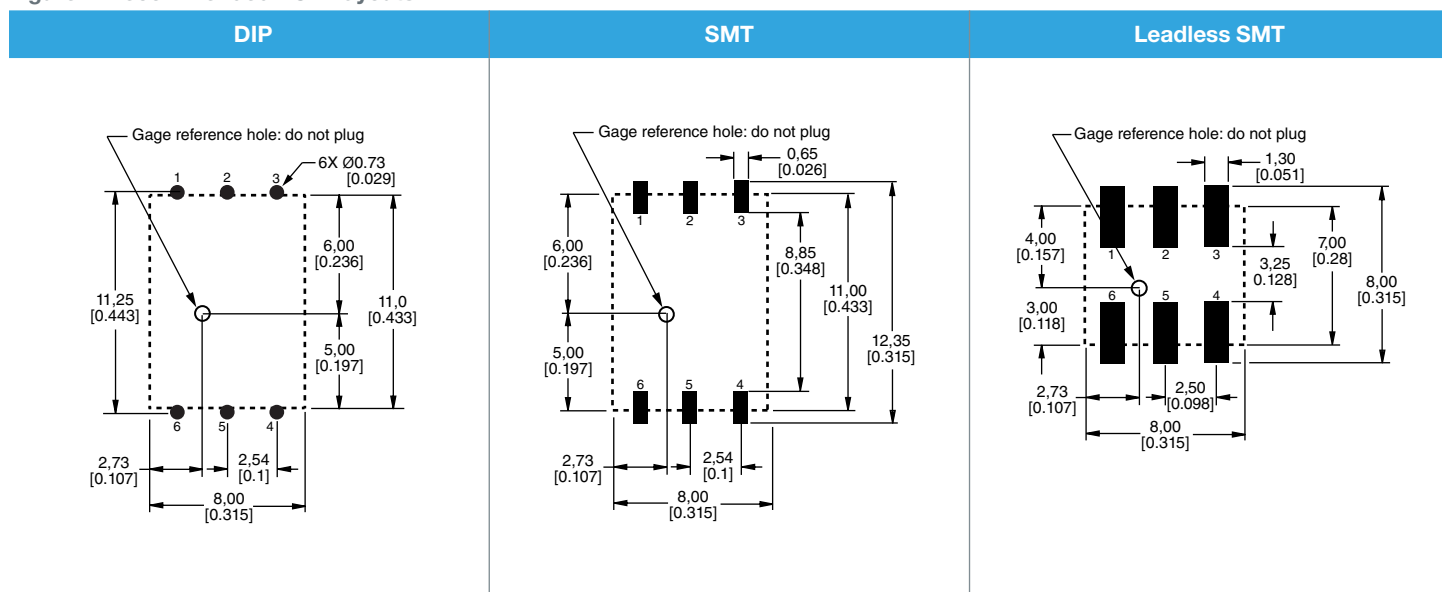
³Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

⁴Total 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 ² C, SPI)	GND	V _{DD}	SS/INT	NC	SDA	SCL
Analog	GND	NC	V _{out}	NC	NC	V _{DD}

Figure 4. Recommended PCB Layouts

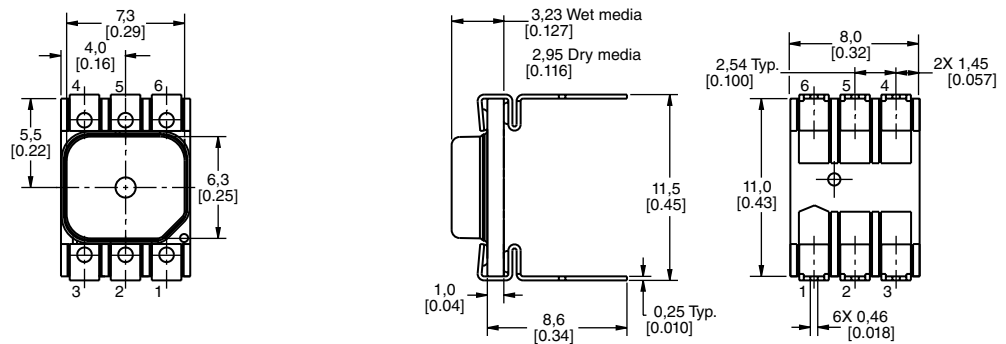


Dimensional Drawings

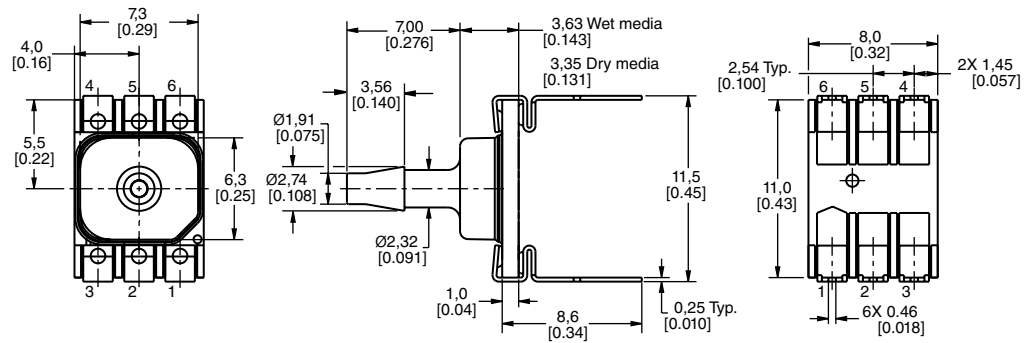
DIP Packages

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

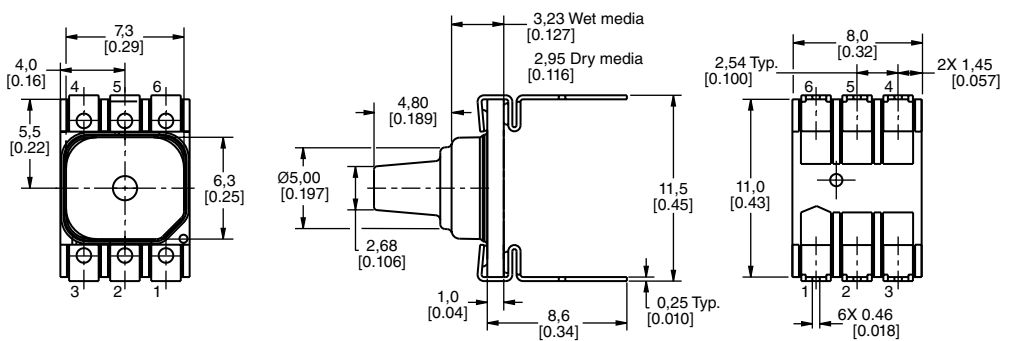
DIP NN: No port



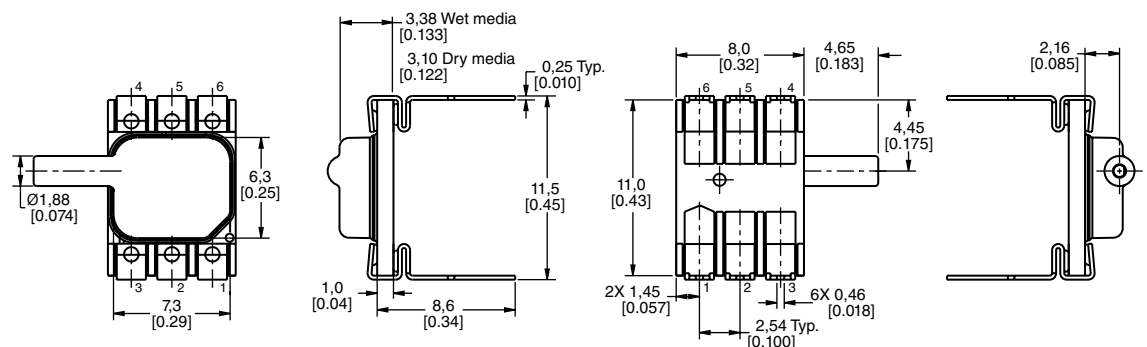
DIP AN: Single axial barbed port



DIP LN: Single axial barbless port



DIP JN: Single radial barbless port

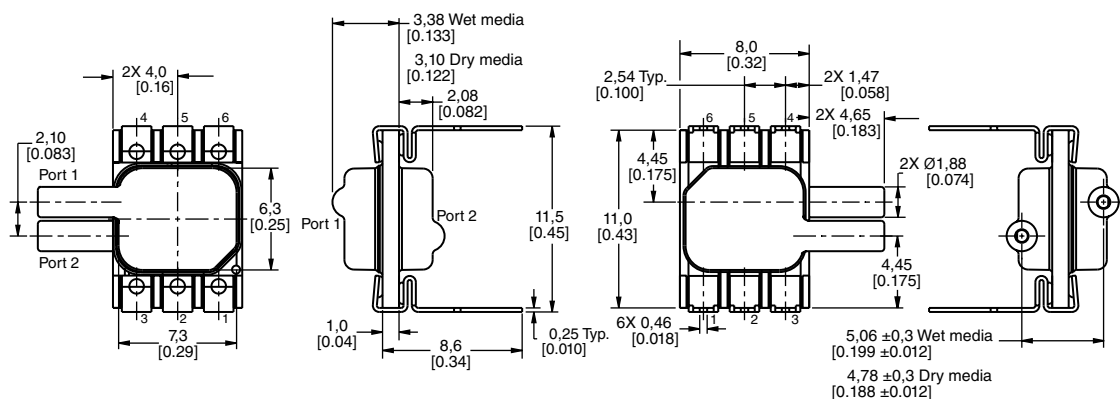


Dimensional Drawings

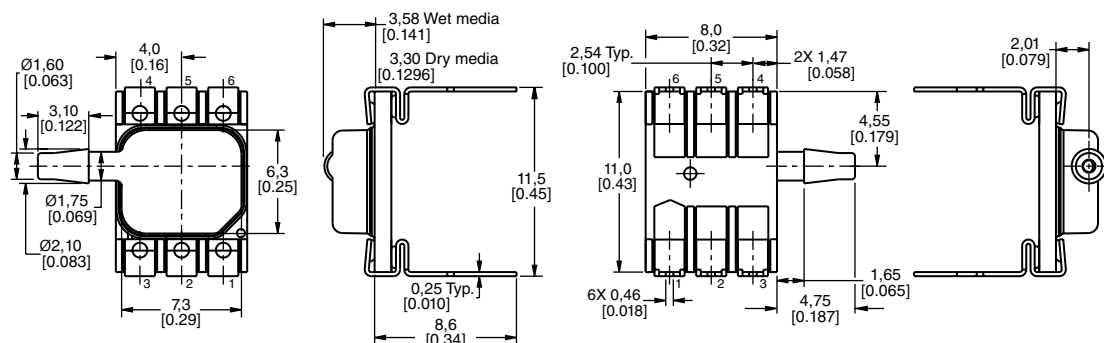
DIP Packages

Figure 5. DIP Package Dimensional Drawings (continued)

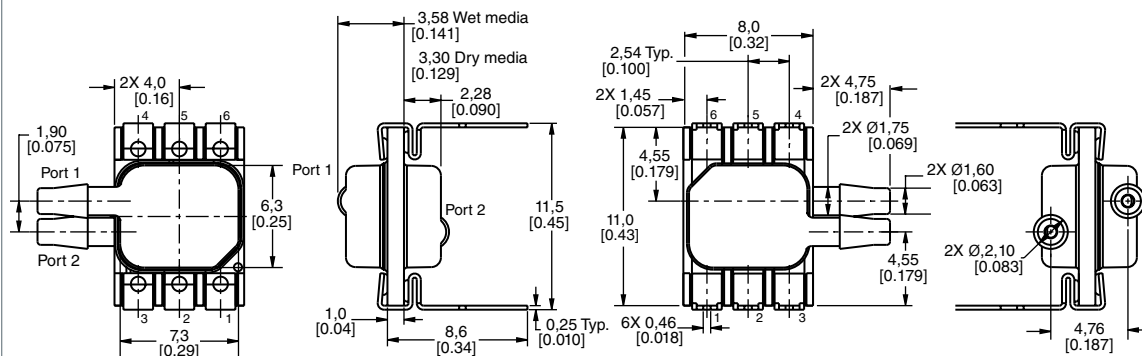
DIP JJ: Dual radial
barbless ports, same side



DIP RN: Single radial
barbed port



DIP RR: Dual radial barbed
ports, same side

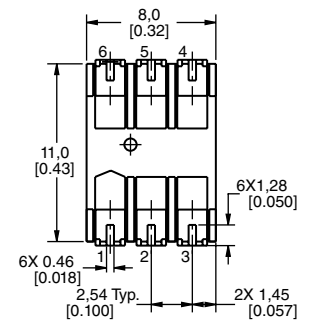
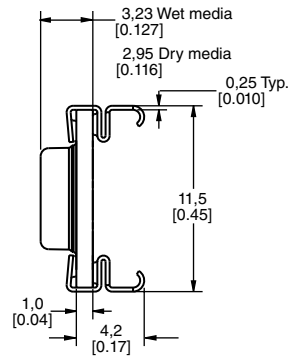
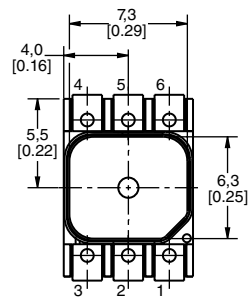


Dimensional Drawings

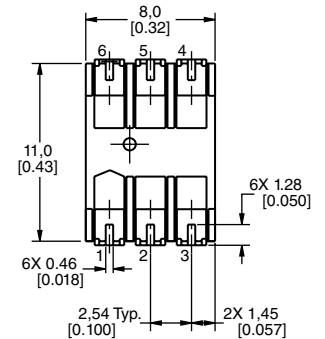
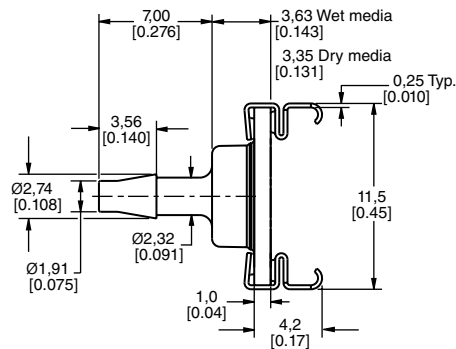
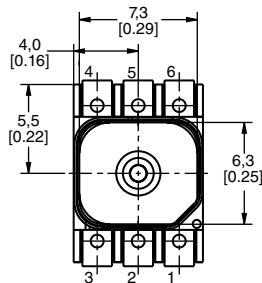
SMT Packages

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

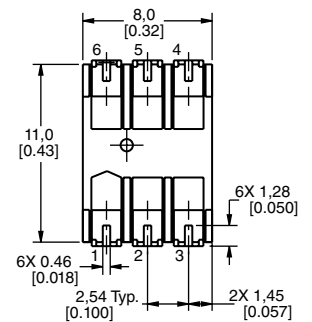
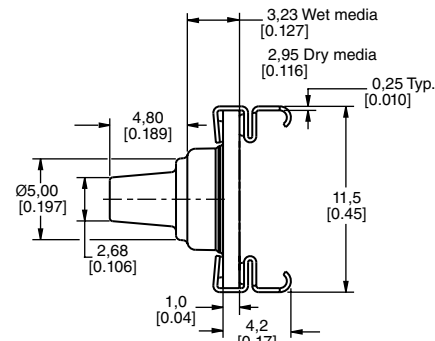
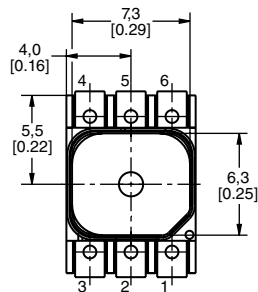
SMT NN: No port



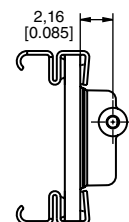
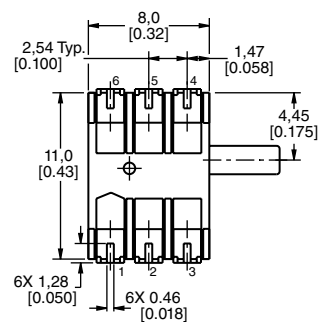
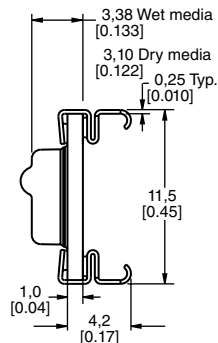
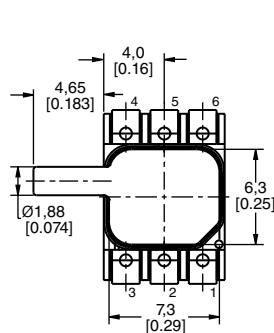
SMT AN: Single axial barbed port



SMT LN: Single axial barless port



SMT JN: Single radial barless port

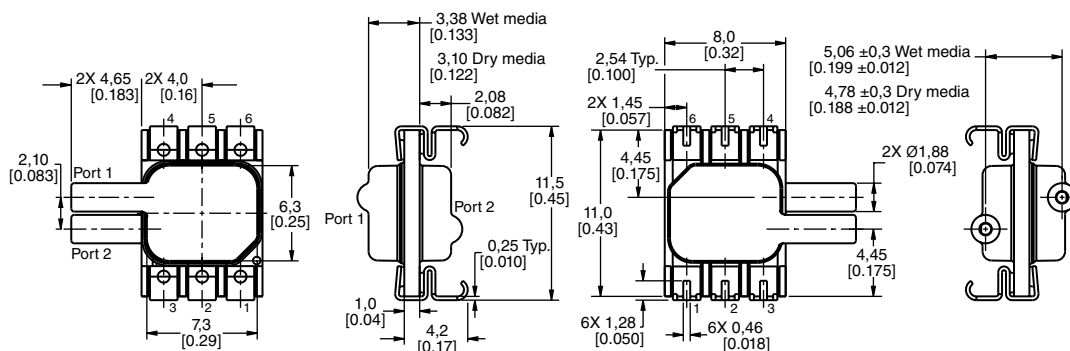


Dimensional Drawings

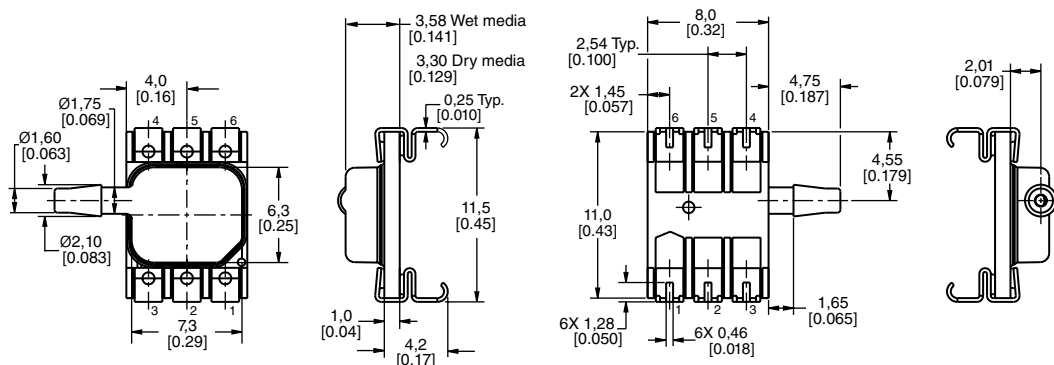
SMT Packages

Figure 6. SMT Package Dimensional Drawings (continued)

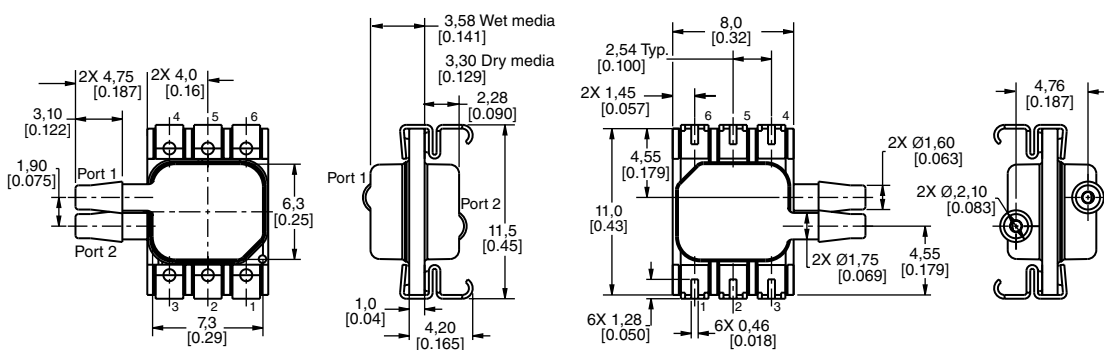
SMT JJ: Dual radial
barbless ports, same side



SMT RN: Single radial
barbed port




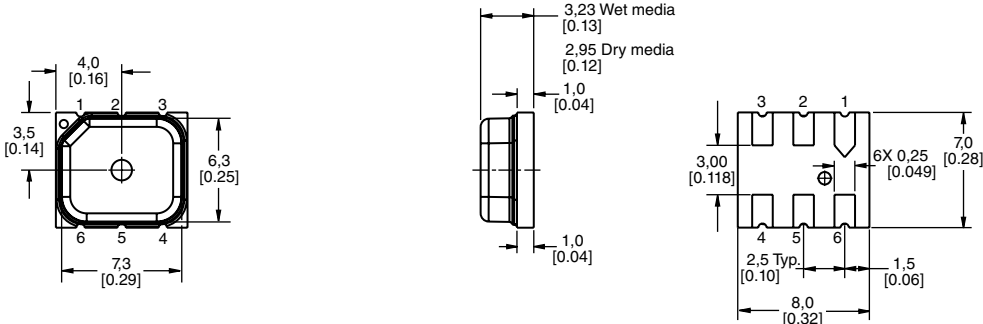

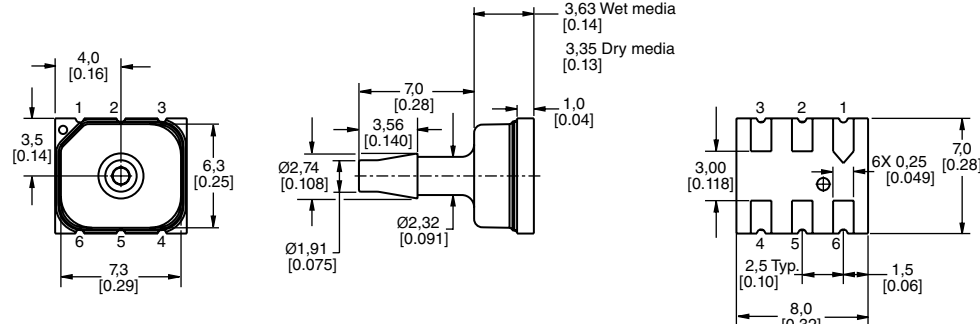

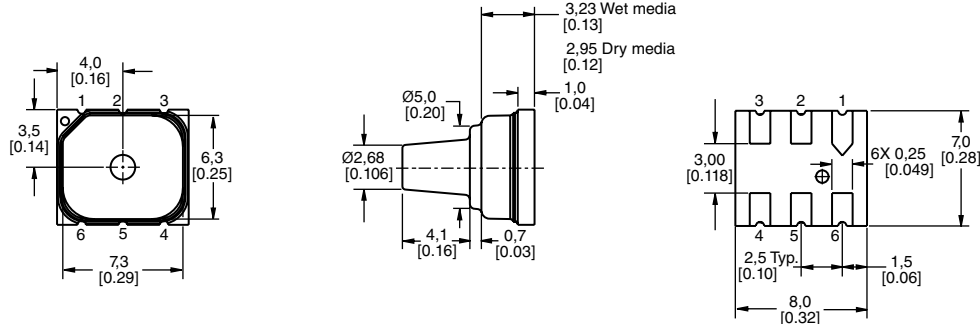
SMT RR: Dual radial
barbed ports, both sides



Dimensional Drawings

Leadless SMT Packages

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

<p>Leadless SMT AN: No port</p> 	
<p>Leadless SMT AN: Single axial barbed port</p> 	
<p>Leadless SMT AN: Single axial barbless port</p> 	

- Product Line Guide
- Product Range Guide
- Product Nomenclature Tree
- Installation Instructions
- Application Information
- Technical Notes:
 - I²C Communications with Honeywell Digital Output Pressure Sensors
 - SPI Communications with Honeywell Digital Output Pressure Sensors
 - Sleep Mode with Honeywell Digital Output Pressure Sensors

⚠ WARNING **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING **MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Honeywell



Elblinger Elektronik GmbH
Lange Wanne 25
38259 Salzgitter

Telefon 05341/8212-1
Fax 05341/821299

e-mail mail@elblinger-elektronik.de
Internet www.elblinger-elektronik.de