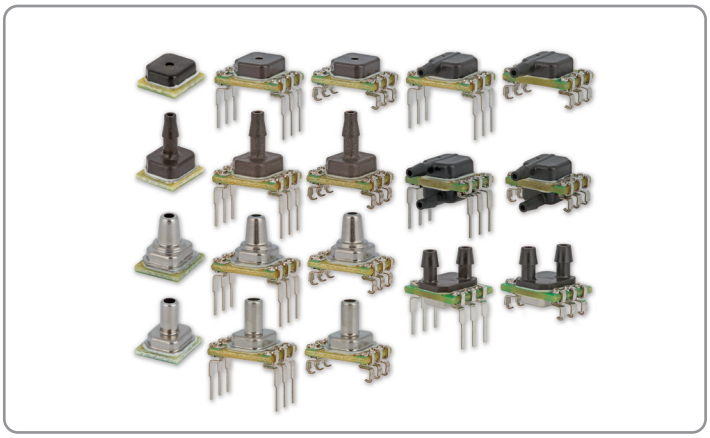
ABP3 Series

3021-9392
Issue A

Board Mount Pressure Sensors

High Accuracy, Compensated/Amplified 2.5 mbar to 10 bar | 1 inH_2O to 150 psi Digital or Analog Output, Liquid Media Capable



Description

The Honeywell Technologies ABP3 Series board mount pressure sensor provides leading performance, configurability, reliability, and value.

ABP3 Series supports an extended pressure range from 2.5 mbar to 10 bar and an extended operating temperature range from -40°C to 110°C. ABP3 sensors are offered with different liquid gel protection options and provide extensive media compatibility. ABP3 sensors are wet-on-wet compatible allowing the sensor to be used with liquids on both ports. This allows the sensor to be used for liquid flow and clogged filter detection with liquids.

Honeywell Technologies ABP3 sensors are temperature compensated from -40°C to 110°C and provide an accuracy as low as 1.5 %TEB. The ABP3 Series provides an effective resolution up to 15 bits, sample rate up to 4 KHz, advanced diagnostics, enhanced EMC immunity, and is available with analog or digital outputs. The ABP3 Series builds on the success of ABP and ABP2 Series and provides an excellent upgrade path for existing customers who need increased accuracy, faster sample rates, greater resolution, advanced diagnostics, and better value. In most instances cases ABP3 will provide ABP and ABP2 customers with a direct drop-in replacement, meaning no hardware or software changes are required.

Honeywell Technologies global technical support and application specialists are available to assist you with any pre-sales or posts sales enquiries. For over 40 years, we have been designing and manufacturing board mount pressure sensors for critical applications, our commitment to quality, reliability and service creates trust from all who rely on our sensors.

Applications

- **Medical** — Ventilators, oxygen concentrators, CPAP, patient monitoring systems, spirometry, blood pressure monitoring, negative wound therapy, breast pumps, hospital beds, dental/surgical equipment
- **Industrial** — HVAC, air filtration, clogged filter detection, hand-held pressure measurement devices, wireless pressure transmitters, pneumatic control, water/gas pumps, emission testing, gas analysers, breathing apparatus
- **Commercial** — Smart water/gas meters, coffee makers, washing machines, liquid level measurement, vacuum cleaners, rice cookers, alcohol breathalysers
- **Other** — Drones, weather balloons, air brakes, emission testing, fuel level measurement

Features

- Total Error Band: As low as 1.5 %FSS
- Wide pressure range: 2.5 mbar to 10 bar
- Effective resolution: Up to 15 bits
- Sample rate: Up to 50KHz (default 1 KHz)
- Analog & digital 16-bit (I^2C/SPI) outputs
- Wide operating temperature range of -40°C to 110°C [-40°F to 230°F]
- Calibrated over wide temperature range of -40°C to 110°C [-40°F to 230°F]
- REACH and RoHS compliant
- Advanced diagnostics (enabled by default)
- Temperature output (enabled by default)
- Meets IPC/JEDEC J-STD-020E Moisture Sensitivity Level 2
- LFGB and BPA compliant materials
- Different operating modes
- Backward compatible with ABP & ABP2

Honeywell Technologies

BPA Free

Basic board-mount pressure sensors
ABP3 Series

Value to customers

- Simplifies design-in
  - Small size saves room on the PC board (PCB), simplifying design in smaller and lower power devices
- Meets IPC/JEDEC J-STD-020E Moisture Sensitivity Level 2 requirements
  - Allows avoidance of thermal and mechanical damage during solder reflow attachment and/or repair that lesser rated sensors may incur
  - Allows for unlimited shelf life when stored inside sealed moisture barrier bag
  - Allows for lean manufacturing due to stability and usability shortly after reflow
- Cost-effective
  - Small size helps engineers reduce design and manufacturing costs while maintaining enhanced performance and reliability of the systems they design
- Accurate
  - Total Error Band (TEB) and wide pressure range enable engineers to optimize system performance by improving resolution and system accuracy
- Flexible
  - Supply voltage range, variety of pressure units, types and ranges, diagnostic mode, operating mode with resolution and sampling frequency, output options, and wide operating temperature range simplify use in the application
- Versatile
  - Wet-media compatibility, low power, and temperature output options make the sensor a versatile choice for Internet of Things applications

Differentiation

- Application
  - Specific design ensures suitability for a wide array of customer requirements
- Digital output
  - Allows the sensor to be directly plugged into the customer's circuitry without requiring major design changes
- Total Error Band (see Figure 1):
  - Provides a more comprehensive measurement of performance over the compensated temperature range, which minimizes testing and calibrating every sensor, thereby potentially reducing manufacturing cost; improves sensor accuracy and offers ease of sensor interchangeability due to minimal part-to-part variation
  - Improves sensor accuracy
  - Offers ease of sensor interchangeability due to minimal part-to-part variation

Total Error Band

Total Error Band (TEB) is a single specification that includes the major sources of sensor error. TEB should not be confused with accuracy, which is actually a component of TEB. TEB is the worst error that the sensor could experience.

Honeywell Technologies uses the TEB specification in its datasheet because it is the most comprehensive measurement of a sensor's true accuracy. Honeywell Technologies also provides the accuracy specification in order to provide a common comparison with competitors' literature that does not use the TEB specification.

Many competitors do not use TEB – they simply specify the accuracy of their device. Their accuracy specification, however, may exclude certain parameters. On their datasheet, the errors are listed individually. When combined, the total error (or what would be TEB) could be significant.

Figure 1. Total error band

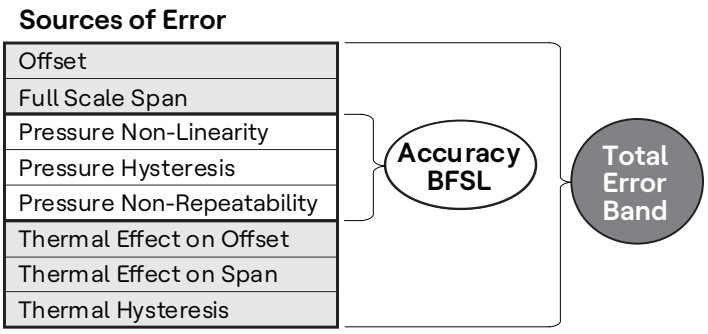


Table 1. Absolute maximum specifications[1]

Characteristic	Minimum	Maximum	Unit
Supply voltage (V_{DD}/V_{supply}): digital output analog output	 -0.3 -0.3	 6.0 6.0	Vdc
Voltage on any pin	-0.3	V_{supply} + 0.3	Vdc
Digital clock frequency: I^2C SPI	 100 –	 400 10	 kHz MHz
ESD susceptibility (human body model)	-2	+2	kV
Storage temperature range	-40 [-40]	125 [257]	°C [°F]
Soldering time and temperature: lead (DIP) peak reflow (SMT, Leadless SMT)	 4 s max. at 250°C [482°F] 15 s max. at 250°C [482°F]		

[1]Absolute maximum ratings are the extreme limits the device will withstand without damage.

Table 2. Operating specifications

Characteristic	Analog			Digital			Unit
	Minimum	Typical	Maximum	Minimum	Typical	Maximum	
Supply voltage (V_{supply})[1] 3.3 Vdc 5.0 Vdc	 3.0 3	 3.3 5.0	 3.6 5.5	 2.7 —	 3.3 —	 5.5 —	Vdc
Current consumption: Digital o/p sleep/ standby mode	 —	 —	 —	 —	 10	 20	µA
Power consumption (5 V)	—	23	27.5	—	9.9	—	mW
Power consumption (3.3 V)	—	15.18	18.15	—	—	—	mW
Operating temperature range[2]	-40 [-40]	—	110 [230]	-40 [-40]	—	110 [230]	°C [°F]
Compensated temperature range[3]	-40 [-40]	—	110 [230]	-40 [-40]	—	110 [230]	°C [°F]
Startup time[4]	—	—	5	—	—	5	ms
Clipping limit for analog version: Upper Lower	 — 5	 — —	 95 —	 — —	 — —	 — —	V_{supply}
Update rate[8]	—	1000	4000	—	1000	4000	Samples/s
SPI/I²C voltage level: Low High	 — —	 — —	 — —	 — 80	 — —	 20 —	$\%V_{supply}$
Pull up on SDA, SCL	—	—	—	1	—	—	kOhm
Accuracy[5] 0 to 16 mBar 16 mBar to 10 Bar	 —	 —	 ±0.4 ±0.25	 —	 —	 ±0.4 ±0.25	% FSS BFSL[6]
Resolution	0.03 —	— —	— —	— —	— 14	— 15	% FSS bits
Temperature output error[7]	—	—	—	—	±5	—	°C

[1] Sensors are not reverse polarity protected. Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

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

[3] Compensated temperature range: The temperature range over which the sensor will produce an output proportional to pressure within the specified performance limits (see Total Error Band).

[4] Startup Time: For analog versions: 5 ms to data ready. For digital versions: 2.5 ms for power up to receive the first measurement command. Refer to Section 3.0, Tables 22, 23 and 26 for further details on communication timing.

[5] 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.

[6] 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 2).

[7] Temperature Output Error: The error in Temperature Output reading relative to a thermal reference standard over a temperature range of -40°C to 125°C.

[8] Update rate: the above listed update rates are for default standard listings but the range of update rates comes with the selection operating mode and sampling frequency , Please contact Honeywell for higher update rate

Table 3. Environmental specifications

Characteristic	Parameter
Humidity: all external surfaces internal surfaces of liquid media options "V" and "F" internal surfaces of dry gases option "D"	 0 %RH to 95 %RH, non-condensing 0 %RH to 100 %RH, condensing 0 %RH to 95 %RH, non-condensing
Vibration	15 g, 10 Hz to 2 kHz
Shock	75 g, 6 ms duration
Life[1]	1 million full scale pressure cycles minimum
Solder reflow	J-STD-020-E, MSL2 (see shelf life/floor life)
Shelf life	Unlimited storage life, inside sealed moisture barrier bag
Floor life[3]	1 year floor life, after removal from sealed moisture bag, <30°C & <60 %RH
Certification (silicone gel coating option, Port 1 only)[2]	BPA Free, LFGB

[1] Life may vary depending on specific application in which the sensor is utilized.
[2] Sensor materials have been tested and certified for the food safety standards noted.
[3] Floor life, the maximum recommended time period after removal from a moisture barrier bag or dry storage prior to solder reflow.
If the maximum recommended floor time is exceeded, parts may require to be baked at 85°C for up to 12 hours prior to solder reflow.

Table 4. Wetted materials[1]

Component	Pressure port 1 (P1)		Pressure port 2 (P2)
	Dry gas option	Liquid media option	
Ports and covers	High temperature polyamide, 304 SST		High temperature polyamide
Substrate	FR4	—	FR4
Adhesives	Epoxy, silicone	Epoxy, silicone gel, fluorosilicone gel	Epoxy, silicone
Electronic components	Silicon, glass, gold, aluminum	—	Silicon

[1] Contact Honeywell Technologies customer service for detailed material information.

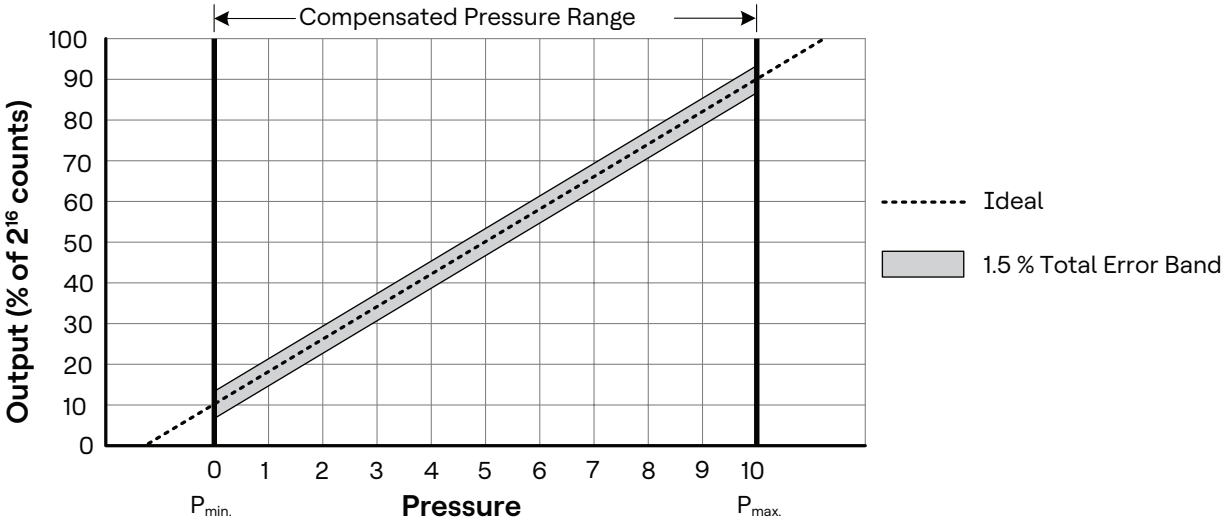
Table 5. Sensor Pressure Types

Pressure Type	Description
Absolute	Output is proportional to the difference between pressure applied and a built-in vacuum reference.
Differential	Output is proportional to the difference between the applied pressure to each port (Port1 - Port2)
Gage	Output is proportional to the difference between applied pressure and atmospheric (ambient) pressure.

Table 6. Sensor output at significant percentages

Output (%)	Digital versions		Analog versions	
	Counts		V_{SUPPLY}	
	Decimal	Hex	3.3 V	5.0 V
0	-25600	O×9C00 (2s complement)	0.330 V	0.500 V
10	-20480	O×B000	0.594 V	0.900 V
30	-10240	O×D800	1.122 V	1.700 V
50	0	O×0000	1.650 V	2.500 V
70	10240	O×2800	2.178 V	3.300 V
90	20480	O×5000	2.706 V	4.100 V
100	25600	O×6400	2.970 V	4.500 V

Figure 2. Transfer function for digital output versions



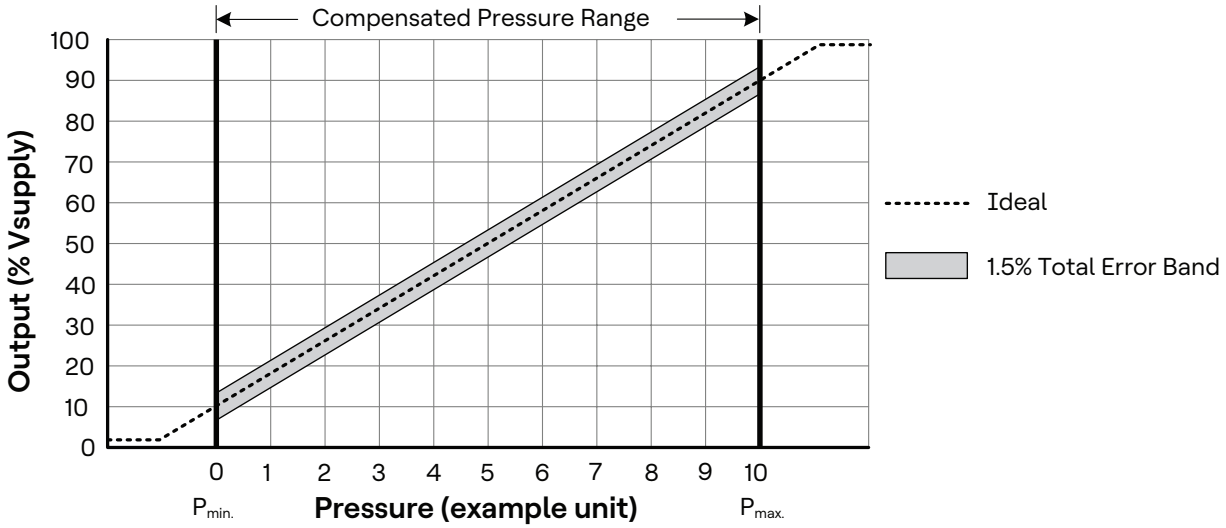
Pressure example 1: Transfer Function A (10 % to 90 %)

$$\text{Output (\% of } 2^{16} \text{ counts)} = \frac{80\ \%}{P_{max.} - P_{min.}} \times (\text{Pressure}_{applied} - P_{min.}) + 10\ \%$$

Pressure example 2: Transfer Function B (30 % to 70 %)

$$\text{Output (\% of } 2^{16} \text{ counts)} = \frac{40\ \%}{P_{max.} - P_{min.}} \times (\text{Pressure}_{applied} - P_{min.}) + 30\ \%$$

Figure 3. Transfer Function for analog output versions



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

Table 7 . Digital output versions average power consumption at 3.3 V_{SUPPLY} (assumes command AA_{HEX})

Sampling rate	Operating mode	Idle (mA)	Current consumption with I^2C (mA)	Current consumption with SPI
2 KS/s	Single shot	1	3.225	3.27
4 KS/s		1	3.26	3.29
6 KS/s		1	3.29	3.37
8 KS/s		1	3.314	3.397
16 KS/s		1	3.399	3.402

Table 8. Analog output versions power consumption

Vsupply (V)	Active power (mW)	Minimum power (mW)	Average power (mW)	Maximum power (mW)
3.3	15.10	13.28	14.18	18.15
5	27.0	21.5	22.94	27.5

Basic board-mount pressure sensors
ABP3 Series

Figure 4. ABP3 Nomenclature and order guide

ABP3 D AN V 001BA 2 A 3 XX

Product series
- **ABP3** Amplified Basic

Package
- **D** DIP (Dual Inline Pin)
- **M** SMT (Surface Mount Technology)
- **L** Leadless SMT

Pressure port[1]

	DIP	SMT	Leadless SMT
Plastic	**NN** No port	**NN** No port	**NN** No port
Plastic	**AN** Single axial barbed port	**AN** Single axial barbed port	**AN** Single axial barbed port
Metal	**VN** Single axial barbless port	**VN** Single axial barbless port	**VN** Single axial barbless port
Metal	**SN** Single axial straight barbless port	**SN** Single axial straight barbless port	**SN** Single axial straight barbless port
Plastic	**RN** Single radial barbed port	**RN** Single radial barbed port	—
Plastic	**RR** Dual radial barbed ports, same side	**RR** Dual radial barbed ports, same side	—
Plastic	**DA** Dual axial barbed ports, same side	**DA** Dual axial barbed ports, same side	—

Product option[2,3]
- **D** Dry gases only, diagnostics on
- **V** Liquid media, food-grade silicone gel, diagnostics on
- **F** Liquid media, fluorosilicone gel, diagnostics on

Pressure range

2.5 mbar to 10 bar		1 inH_2O to 150 psi	
Absolute		**Absolute**	
001BA	1 bar	**015PA**	15 psi
1.6BA	1.6 bar	**030PA**	30 psi
2.5BA	2.5 bar	**060PA**	60 psi
004BA	4 bar	**100PA**	100 psi
006BA	6 bar	**150PA**	150 psi
010BA	10 bar		
Differential		**Differential**	
2.5MD	±2.5 mbar	**001ND**	±1 inH_2O
006MD	±6 mbar	**002ND**	±2 inH_2O
010MD	±10 mbar	**004ND**	±4 inH_2O
016MD	±16 mbar	**005ND**	±5 inH_2O
025MD	±25 mbar	**010ND**	±10 inH_2O
040MD	±40 mbar	**020ND**	±20 inH_2O
060MD	±60 mbar	**030ND**	±30 inH_2O
100MD	±100 mbar	**001PD**	±1 psi
160MD	±160 mbar	**005PD**	±5 psi
250MD	±250 mbar	**015PD**	±15 psi
400MD	±400 mbar	**030PD**	±30 psi
600MD	±600 mbar	**060PD**	±60 psi
001BD	±1 bar		
1.6BD	±1.6 bar		
2.5BD	±2.5 bar		
004BD	±4 bar		
Gage		**Gage**	
006MG	6 mbar	**002NG**	2 in H_2O
010MG	10 mbar	**004NG**	4 inH_2O
016MG	16 mbar	**005NG**	5 inH_2O
025MG	25 mbar	**010NG**	10 inH_2O
040MG	40 mbar	**020NG**	20 inH_2O
060MG	60 mbar	**030NG**	30 inH_2O
100MG	100 mbar	**001PG**	1 psi
160MG	160 mbar	**005PG**	5 psi
250MG	250 mbar	**015PG**	15 psi
400MG	400 mbar	**030PG**	30 psi
600MG	600 mbar	**060PG**	60 psi
001BG	1 bar	**100PG**	100 psi
1.6BG	1.6 bar	**150PG**	150 psi
2.5BG	2.5 bar		
004BG	4 bar		
006BG	6 bar		
008BG	8 bar		
010BG	10 bar		

Output type

A	Analog	**3**	I^2C, Address 0x38
S	SPI	**4**	I^2C, Address 0x48
0	I^2C, Address 0x08	**5**	I^2C, Address 0x58
1	I^2C, Address 0x18	**6**	I^2C, Address 0x68
2	I^2C, Address 0x28	**7**	I^2C, Address 0x78

Transfer function
- **A** 10 % to 90 % of Vsupply (analog), 2^{16} counts (digital)

Supply voltage
- **3** 3.3 Vdc
- **5** 5.0 Vdc

Future
- **XX**

[1] The "DA" pressure port is only available with product option "D". The "DA" pressure port is available in standard listings with pressure ranges up to 400 mbar | ±160 mbar. For higher pressure ranges, please contact the technical support team.

[2] Product option "D" is only available with gage pressure ranges 6 mbar to 40 mbar | 2 $in\text{-}H_2O$ to 20 $in\text{-}H_2O$ and differential pressure ranges ±2.5 mbar to ±25 mbar | ±1 $in\text{-}H_2O$ to ±10 $in\text{-}H_2O$.

[3] Product option "V" is only available with pressure ranges 60 mbar | 1 psi gage and ±40 mbar | 1 psi differential and above.

[4] Ultra low pressure ranges less than 1 psi or 60 mbar are not available as standard listing in leadless package, please contact the technical support team for such requests.

[5] ABP3 Series pressure sensors are piezo-resistive based which are sensitive to change in light intensity. These semiconductor materials when exposed to light, change the output resulting in sensor offset voltage. For applications where direct exposure to light is possible, we recommend Flurosilicone gel listings which are less susceptible to light transmitting to the sense die.

Basic board-mount pressure sensors
ABP3 Series

Table 9. Pressure range specifications: 6 mbar to 10 bar for product options "D" and "V" only

Pressure range	Pressure range		Unit	Overpressure[1]		Burst Pressure[2]		Common mode pressure[3]	Total error band[4] (% FSS)			Typical offset shift with reflow (% FSS)	Long-term stability (1000 HR) (% FSS)	Transfer function for digital versions
	$P_{Min.}$	$P_{Max.}$		Port 1 (P1)	Port 2 (P2)	Port 1 (P1)	Port 2 (P2)		0°C to 50°C	-20°C to 85°C	-40°C to 110°C			
Absolute														
001BA	0	1	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
1.6BA	0	1.6	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
2.5BA	0	2.5	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
Differential														
2.5MD	-2.5	2.5	mbar	340	340	1020	510	—	±2.5	—	—	±1.0	±0.3	A
006MD	-6	6	mbar	340	340	1020	510	—	±2.5	—	—	±1.0	±0.3	A
010MD	-10	10	mbar	340	340	1020	510	—	±2.5	—	—	±1.0	±0.3	A
016MD	-16	16	mbar	700	700	7000	1000	—	±2.0	±3.5	—	±1.0	±0.3	A
025MD	-25	25	mbar	700	700	7000	1000	—	±2.0	±3.5	—	±1.0	±0.3	A
040MD[5]	-40	40	mbar	2000	1000	7000	2000	2000	±1.5	±3.0	±4.5	NA	±0.2	A
060MD[5]	-60	60	mbar	2000	1000	7000	2000	2000	±1.5	±3.0	±4.5	NA	±0.2	A
100MD[5]	-100	100	mbar	2000	1000	7000	2000	2000	±1.5	±3.0	±4.5	NA	±0.2	A
160MD[5]	-160	160	mbar	2000	1000	7000	2000	2000	±1.5	±3.0	±4.5	NA	±0.2	A
250MD	-250	250	mbar	16000	—	25000	—	16000	±1.5	±3.0	±4.5	±1.0	±0.6	A
400MD	-400	400	mbar	16000	—	25000	—	16000	±1.5	±3.0	±4.5	±1.0	±0.6	A
600MD	-600	600	mbar	16000	—	25000	—	16000	±1.5	±3.0	±4.5	±1.0	±0.6	A
001BD	-1	1	bar	16	—	25	—	16	±1.5	±3.0	±4.5	±1.0	±0.2	A
1.6BD	-1.6	1.6	bar	16	—	25	—	16	±1.5	±3.0	±4.5	±1.0	±0.2	A
2.5BD	-2.5	2.5	bar	16	—	25	—	16	±1.5	±3.0	±4.5	±1.0	±0.2	A
004BD	-4	4	bar	16	—	25	—	16	±1.5	±3.0	±4.5	±1.0	±0.2	A
Gage														
006MG	0	6	mbar	340	–	1020	—	—	±2.5	—	—	±1.0	±0.3	A
010MG	0	10	mbar	340	—	1020	—	—	±2.5	—	—	±1.0	±0.3	A
016MG	0	16	mbar	340	—	1020	—	—	±2.5	—	—	±1.0	±0.3	A
025MG	0	25	mbar	700	—	7000	—	—	±2.0	±3.5	—	±1.0	±0.3	A
040MG	0	40	mbar	700	—	7000	—	—	±2.0	±3.5	—	±1.0	±0.3	A
060MG[5]	0	60	mbar	2000	—	7000	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
100MG[5]	0	100	mbar	2000	—	7000	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
160MG[5]	0	160	mbar	2000	—	7000	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
250MG[5]	0	250	mbar	2000	—	7000	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
400MG[5]	0	400	mbar	2000	—	7000	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
600MG	0	600	mbar	16000	—	25000	—	—	±1.5	±3.0	±4.5	±1.0	±0.6	A
001BG	0	1	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.5	A
1.6BG	0	1.6	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.3	A
2.5BG	0	2.5	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
004BG	0	4	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
006BG	0	6	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
008BG	0	8	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
010BG	0	10	bar	16	—	25	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A

[1] 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 within the operating temperature range.

[2] Burst Pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. The product should not be expected to function after exposure to any pressure beyond the burst pressure.

[3] 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.

[4] Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range without causing changes in specified performance.

[5] Total Error Band specified for these pressure ranges are after offset auto-zero correction post sensor reflow.

Table 10. Pressure range specifications: 250 mbar to 10 bar for product options "V" and "F" only

Pressure range	Pressure range		Unit	Overpressure[1]		Burst Pressure[2]		Common mode pressure[3]	Total error band[4] (% FSS)			Typical offset shift with reflow (% FSS)	Long-term stability (1000 HR) (% FSS)	Transfer function for digital versions
	$P_{Min.}$	$P_{Max.}$		Port 1 (P1)	Port 2 (P2)	Port 1 (P1)	Port 2 (P2)		0°C to 50°C	-20°C to 85°C	-40°C to 110°C			
Absolute														
001BA	0	1	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
1.6BA	0	1.6	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
2.5BA	0	2.5	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
004BA	0	4	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
006BA	0	6	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
008BA	0	8	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
010BA	0	10	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
Differential														
250MD	-250	250	mbar	16000	—	25000	—	16000	±2.0	±3.0	±4.5	±1.0	±0.5	A
400MD	-400	400	mbar	16000	—	25000	—	16000	±2.0	±3.0	±4.5	±1.0	±0.5	A
600MD	-600	600	mbar	16000	—	25000	—	16000	±2.0	±3.0	±4.5	±1.0	±0.5	A
001BD	-1	1	bar	16	—	25	—	16	±2.0	±3.0	±4.5	±1.0	±0.5	A
1.6BD	-1.6	1.6	bar	16	—	25	—	16	±2.0	±3.0	±4.5	±1.0	±0.5	A
2.5BD	-2.5	2.5	bar	16	—	25	—	16	±2.0	±3.0	±4.5	±1.0	±0.5	A
004BD	-4	4	bar	16	—	25	—	16	±2.0	±3.0	±4.5	±1.0	±0.5	A
Gage														
600MG	0	600	mbar	16000	—	25000	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
001BG	0	1	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
1.5BG	0	1.6	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
2.5BG	0	2.5	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
004BG	0	4	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
006BG	0	6	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
008BG	0	8	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
010BG	0	10	bar	16	—	25	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A

[1] 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 within the operating temperature range.

[2] Burst Pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. The product should not be expected to function after exposure to any pressure beyond the burst pressure.

[3] 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.

[4] Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range without causing changes in specified performance.

Basic board-mount pressure sensors
ABP3 Series

Table 11. Pressure range specifications: 1 psi to 175 psi for product options "D" and "V" only
Pressure range specification: 2 inH₂0 to 1 psi for product option "D" only

Pressure range	Pressure range		Unit	Overpressure[1]		Burst pressure[2]		Common mode pressure[3]	Total error band[4] (% FSS)			Typical offset shift with reflow (% FSS)	Long-term stability (1000 HR) (% FSS)	Transfer function for digital versions
	$P_{Min.}$	$P_{Max.}$		Port 1 (P1)	Port 2 (P2)	Port 1 (P1)	Port 2 (P2)		0°C to 50°C	-20°C to 85°C	-40°C to 110°C			
Absolute														
015PA	0	15	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
030PA	0	30	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
Differential														
001ND	-1	1	inH_20	135	135	410	205	–	±2.5	—	—	±1.0	±0.3	A
002ND	-2	2	inH_20	135	135	410	205	—	±2.5	—	—	±1.0	±0.3	A
004ND	-4	4	inH_20	135	135	410	205	—	±2.5	—	—	±1.0	±0.3	A
005ND	-5	5	inH_20	270	270	2800	415	—	±2.0	±3.5	—	±1.0	±0.3	A
010ND	-10	10	inH_20	270	270	2800	415	—	±2.0	±3.5	—	±1.0	±0.3	A
020ND[5]	-20	20	inH_20	830	415	2800	830	830	±1.5	±3.0	±4.5	NA	±0.2	A
030ND[5]	-30	30	inH_20	830	415	2800	830	830	±1.5	±3.0	±4.5	NA	±0.2	A
001PD[5]	-1	1	psi	30	15	100	30	30	±1.5	±3.0	±4.5	NA	±0.2	A
005PD	-5	5	psi	240	—	375	—	240	±1.5	±3.0	±4.5	±1.0	±0.6	A
015PD	-15	15	psi	240	—	375	—	240	±1.5	±3.0	±4.5	±1.0	±0.2	A
030PD	-30	30	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.2	A
060PD	-60	60	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.2	A
Gage														
002NG	0	2	inH_20	135	—	410	—	—	±2.5	—	—	±1.0	±0.3	A
004NG	0	4	inH_20	135	—	410	—	—	±2.5	—	—	±1.0	±0.3	A
005NG	0	5	inH_20	135	—	410	—	—	±2.5	—	—	±1.0	±0.3	A
010NG	0	10	inH_20	270	—	2800	—	—	±2.0	±3.5	—	±1.0	±0.3	A
020NG	0	20	inH_20	270	—	2800	—	—	±2.0	±3.5	—	±1.0	±0.3	A
030NG[5]	0	30	inH_20	830	—	2800	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
001PG[5]	0	1	psi	30	—	100	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
005PG[5]	0	5	psi	30	—	100	—	—	±1.5	±3.0	±4.5	NA	±0.2	A
015PG	0	15	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.5	A
030PG	0	30	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
060PG	0	60	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
100PG	0	100	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A
150PG	0	150	psi	240	—	375	—	—	±1.5	±3.0	±4.5	±1.0	±0.2	A

[1] 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 within the operating temperature range.

[2] Burst Pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. The product should not be expected to function after exposure to any pressure beyond the burst pressure.

[3] 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.

[4] Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range without causing changes in specified performance.

[5] Total Error Band specified for these pressure ranges are after offset auto-zero correction post sensor reflow.

Table 12. Pressure range specifications: 5 PSI to 175 PSI for product option "F" only

Pressure range	Pressure range		Unit	Overpressure[1]		Burst Pressure[2]		Common mode pressure[3]	Total error band[4] (% FSS)			Typical offset shift with reflow (% FSS)	Long-term stability (1000 HR) (% FSS)	Transfer function for digital versions
	$P_{Min.}$	$P_{Max.}$		Port 1 (P1)	Port 2 (P2)	Port 1 (P1)	Port 2 (P2)		0°C to 50°C	-20°C to 85°C	-40°C to 110°C			
Absolute														
015PA	0	15	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
030PA	0	30	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
060PA	0	60	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
100PA	0	100	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
150PA	0	150	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
Differential														
005PD	-5	5	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.5	A
015PD	-15	15	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.5	A
030PD	-30	30	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.5	A
060PD	-60	60	psi	240	—	375	—	240	±2.0	±3.0	±4.5	±1.0	±0.5	A
Gage														
015PG	0	15	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
030PG	0	30	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
060PG	0	60	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
100PG	0	100	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A
150PG	0	150	psi	240	—	375	—	—	±2.0	±3.0	±4.5	±1.0	±0.5	A

[1] 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 within the operating temperature range.

[2] Burst Pressure: The maximum pressure that may be applied to any port of the product without causing escape of pressure media. The product should not be expected to function after exposure to any pressure beyond the burst pressure.

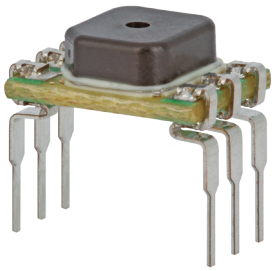
[3] Common Mode Pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

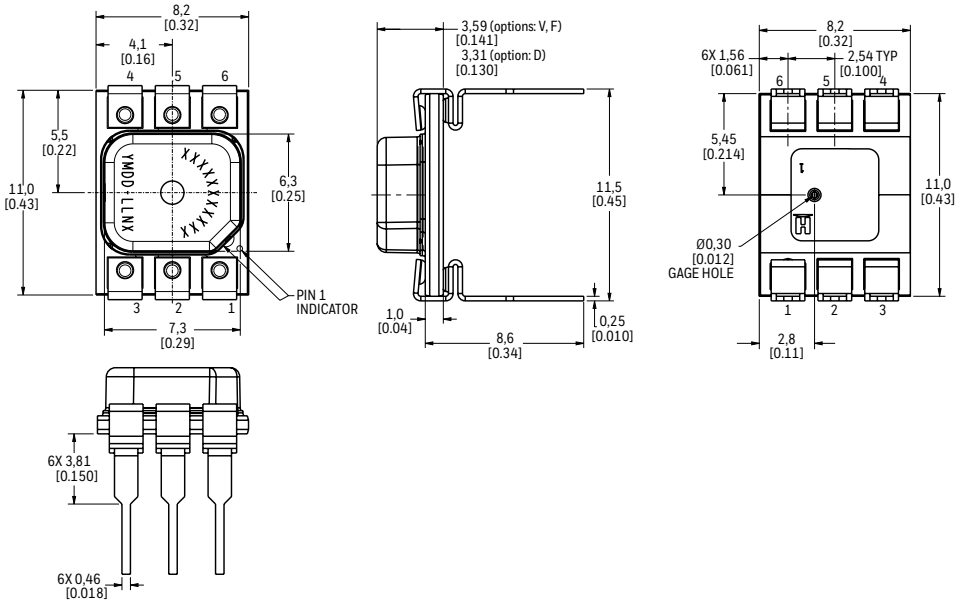
[4] Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range without causing changes in specified performance.

Dimensional drawings

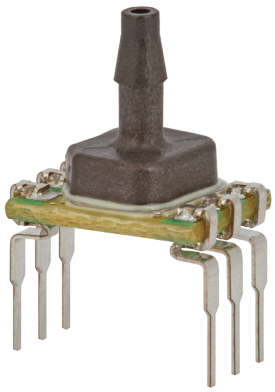
Figure 5. DIP Package dimensional drawings (For reference only: mm [in].)

DIP NN: Plastic no port





DIP AN: Plastic single axial barbed port



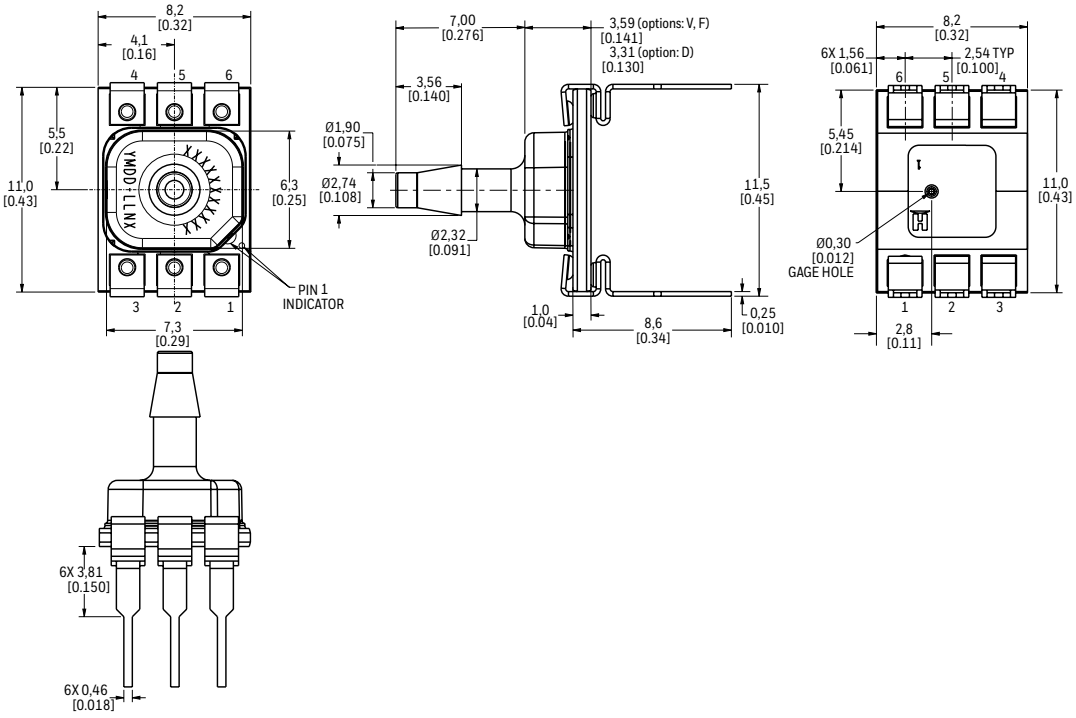
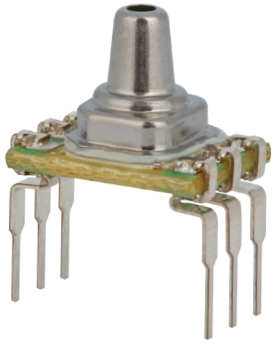
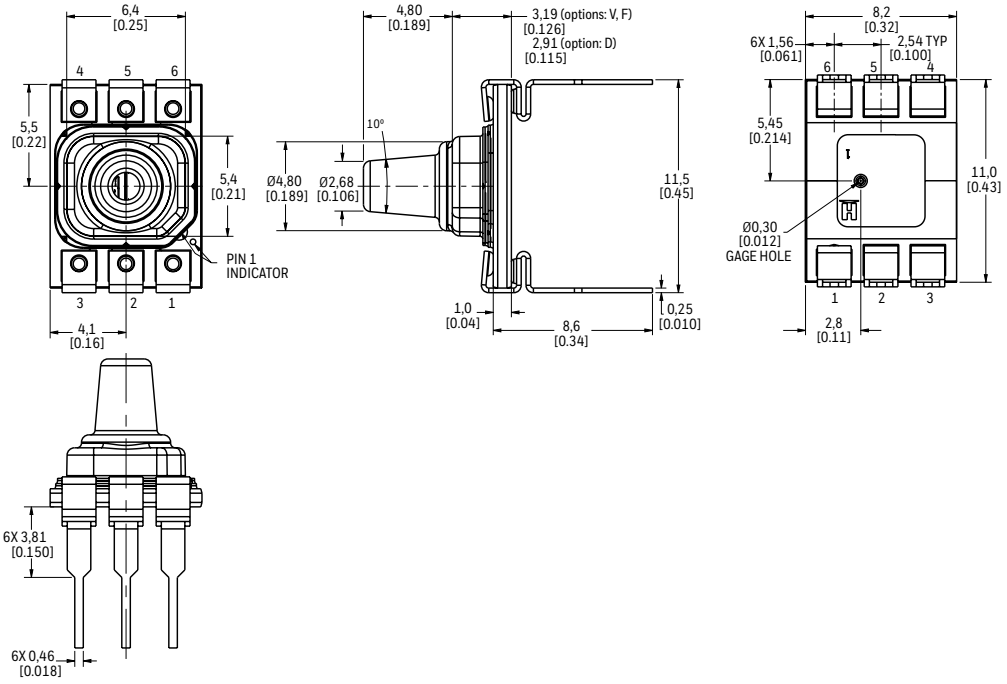


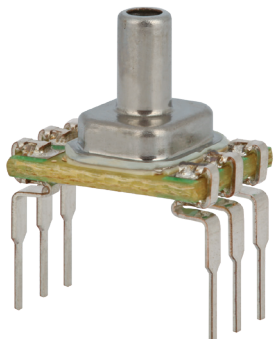
Figure 6. DIP Package dimensional drawings (continued)

DIP VN: Metal single axial barbless port[xvi][xvii]





DIP SN: Metal single axial straight barbless port[xvi][xvii]



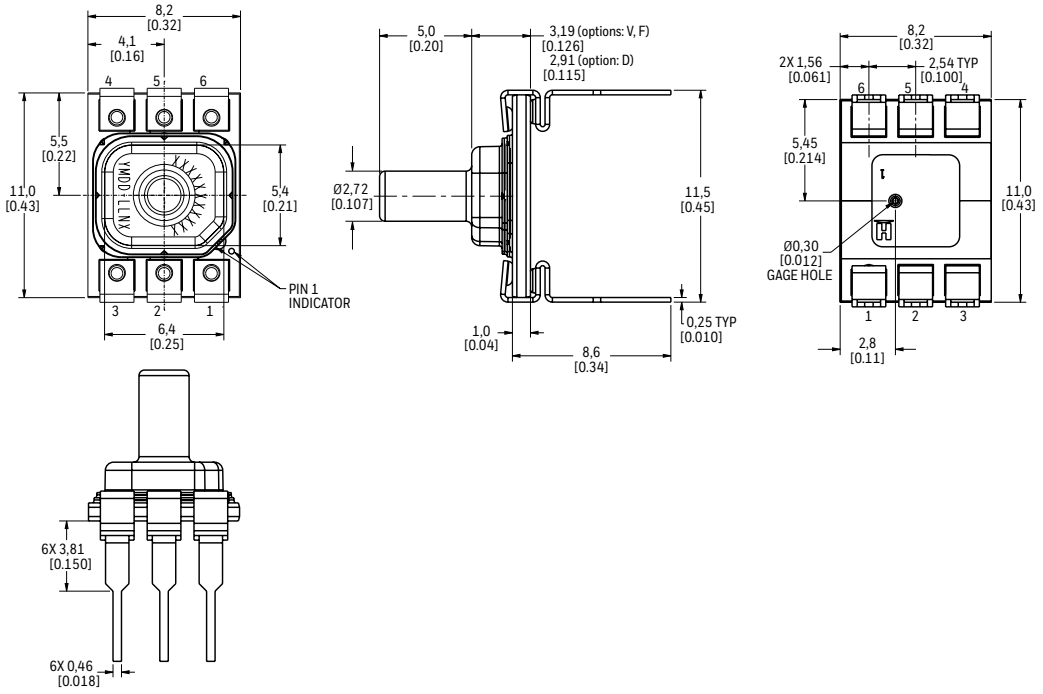
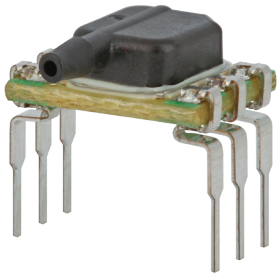
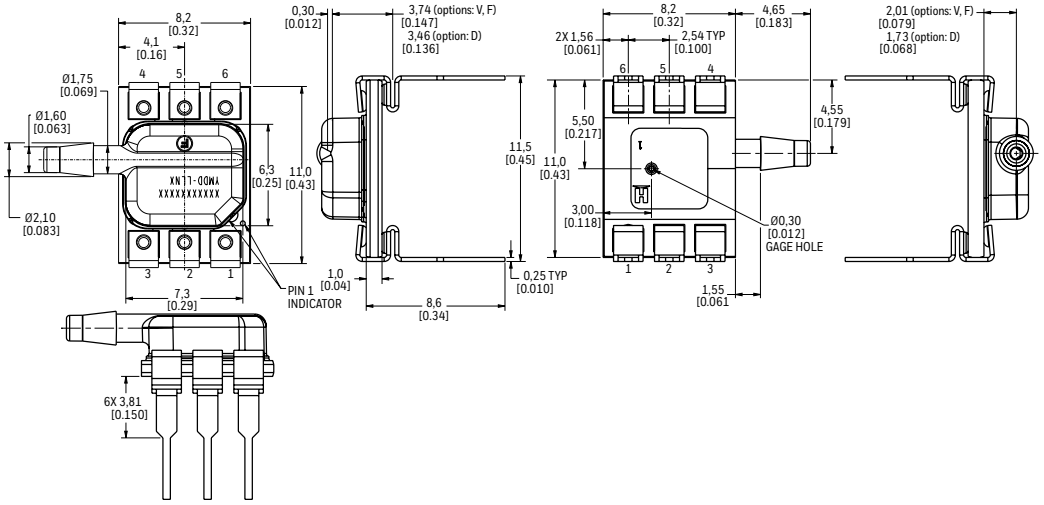


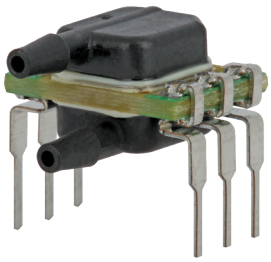
Figure 7. DIP Package dimensional drawings (continued)

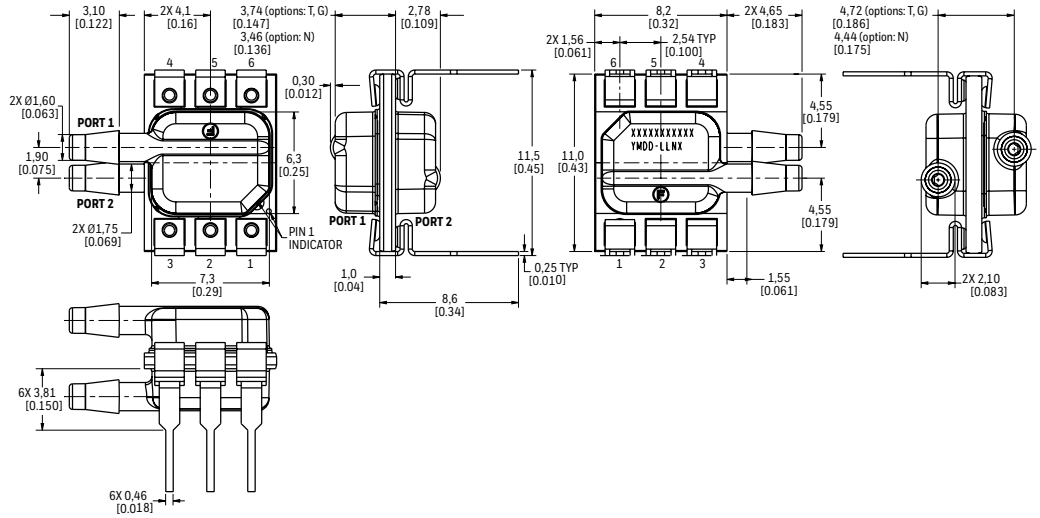
DIP RN: Plastic single radial barbed port



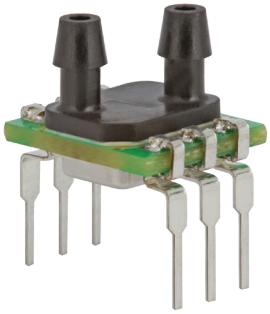


DIP RR: Plastic dual radial barbed ports, same side





DIP DA: Plastic dual axial barbed ports, same side



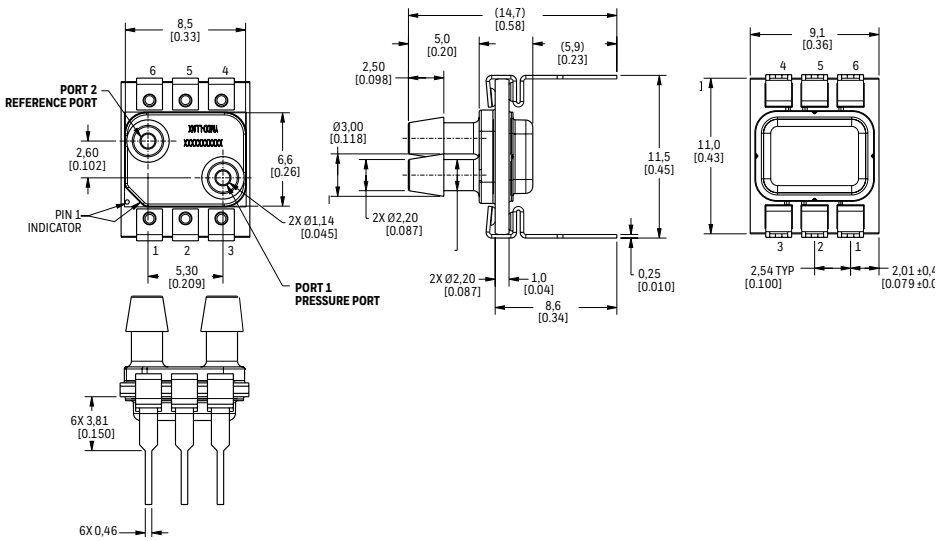
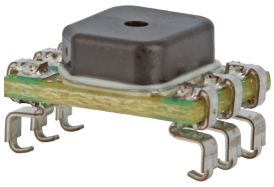
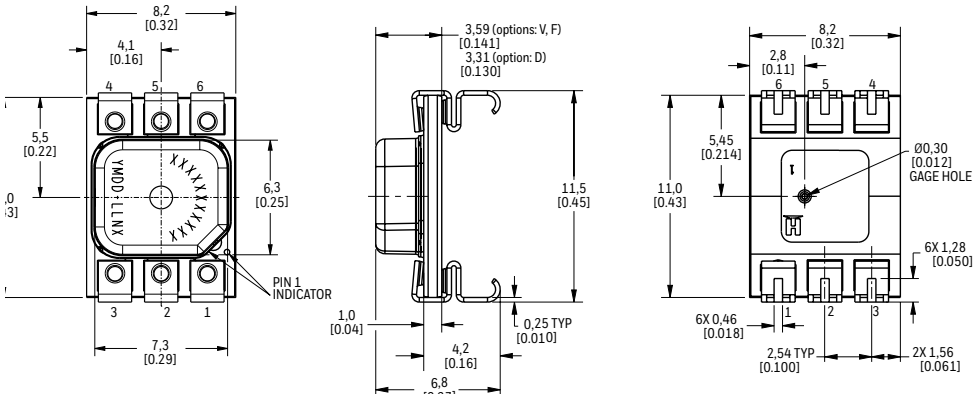


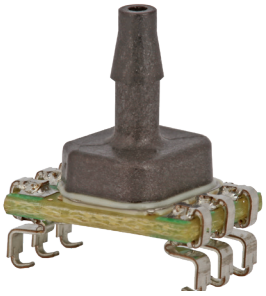
Figure8. SMT Package dimensional drawings (For reference only: mm [in].)

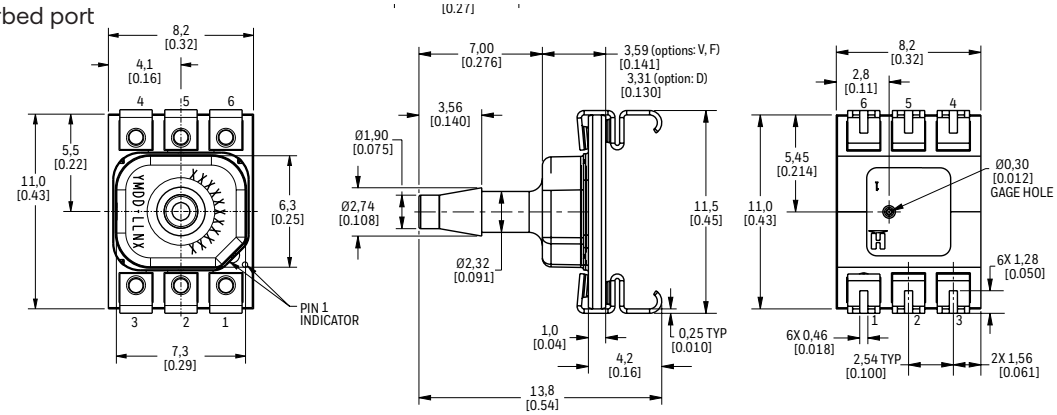
SMT NN: Plastic no port



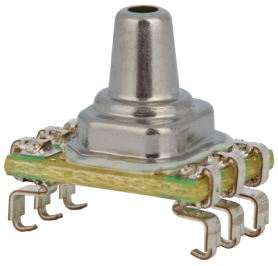


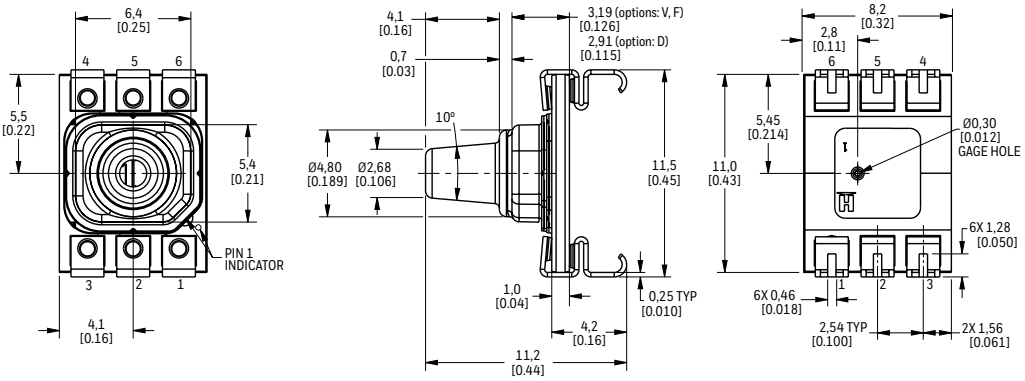
SMT AN: Plastic single axial barbed port



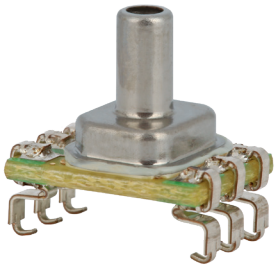


SMT VN: Metal single axial barbless port





SMT SN: Metal single axial straight barbless port



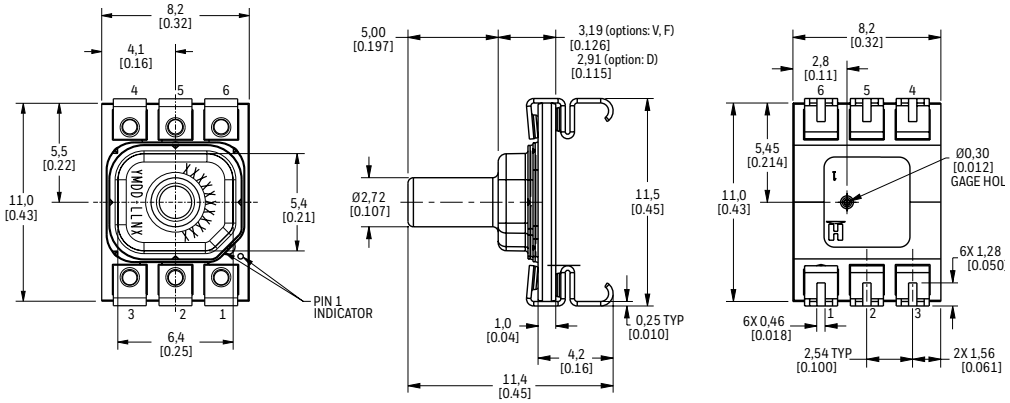
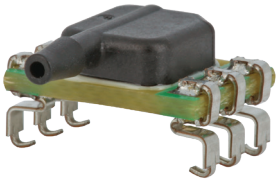
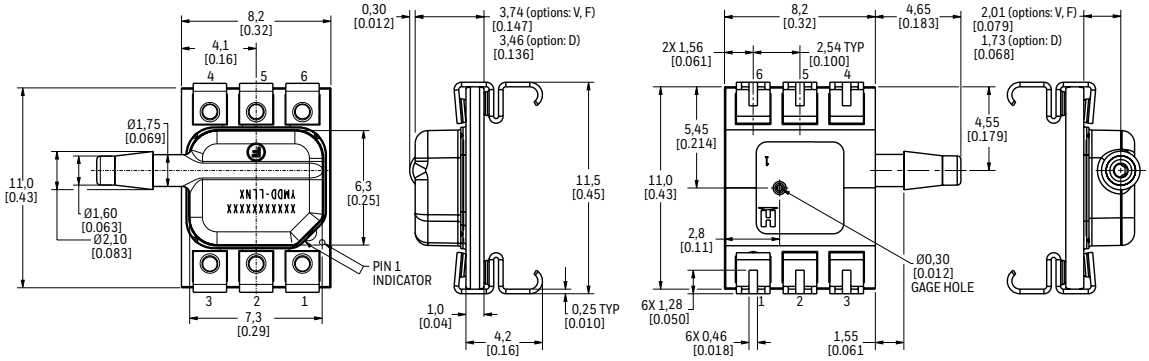


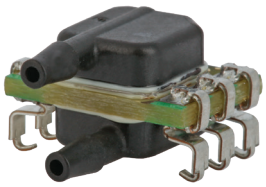
Figure 8. SMT Package dimensional drawings (continued)

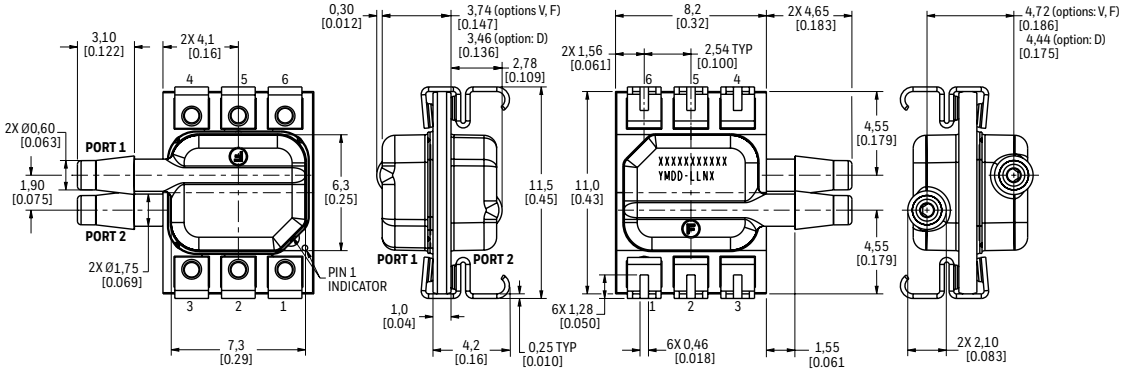
SMT RN: Plastic single radial barbed port



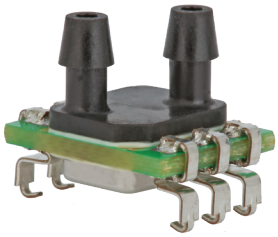


SMT RR: Plastic dual radial barbed ports, same side





SMT DA: Plastic dual axial barbed ports, same side



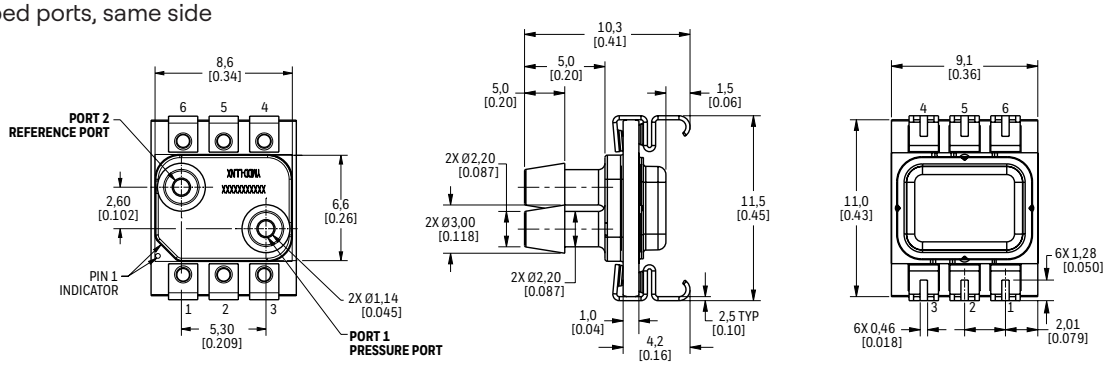
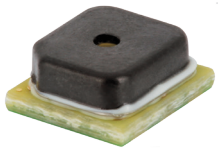
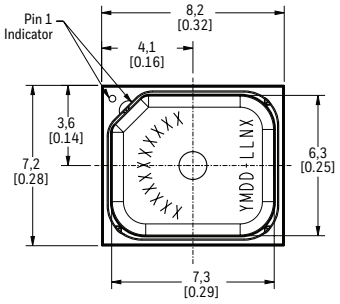
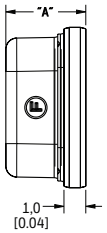


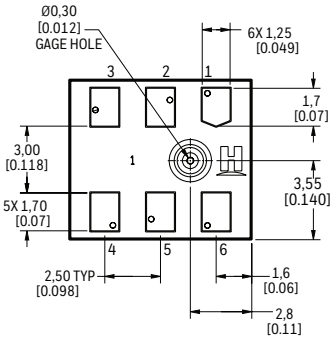
Figure 9. Leadless SMT Package dimensional drawings (For reference only: mm [in].)

Leadless SMT NN: Plastic no port



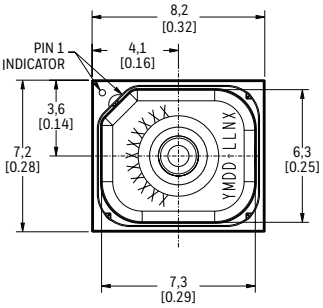


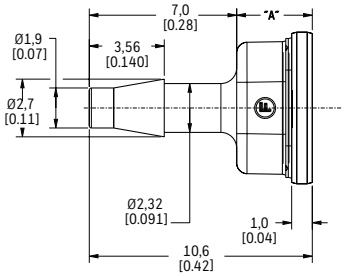


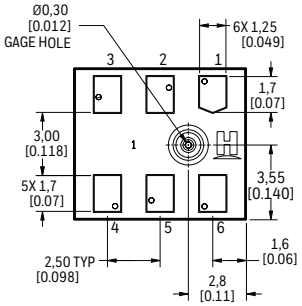


Leadless SMT AN: Plastic single axial barbed port



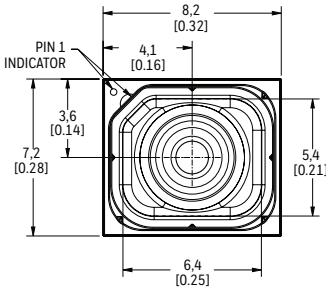


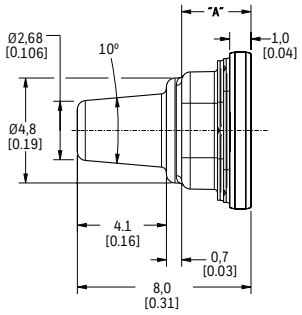


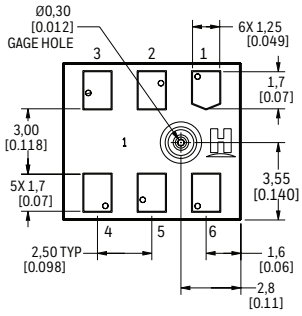


Leadless SMT VN: Metal single axial barbless port



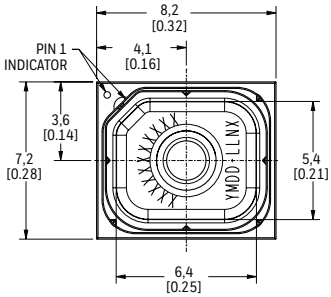


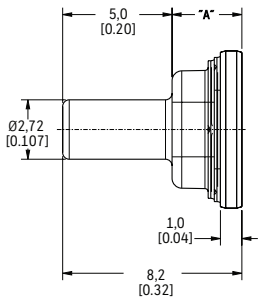




Leadless SMT SN: Metal single axial straight port







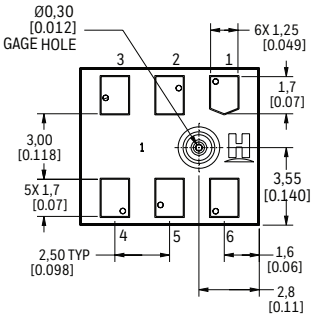
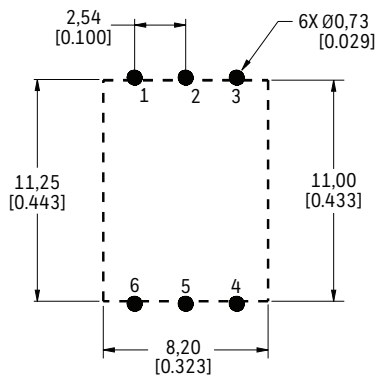


Table 13. Pinout

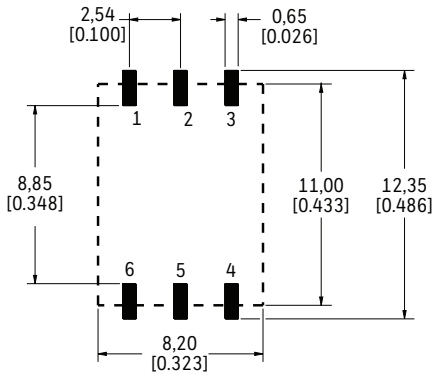
Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
I^2C	GND	V_{DD}	EOC	NC	SDA	SCL
SPI	GND	V_{DD}	MOSI	SS	MISO	SCLK
Analog	GND	NC	V_{OUT}	NC	NC	V_{DD}

Figure 13. Recommended PCB layout and part marketing details

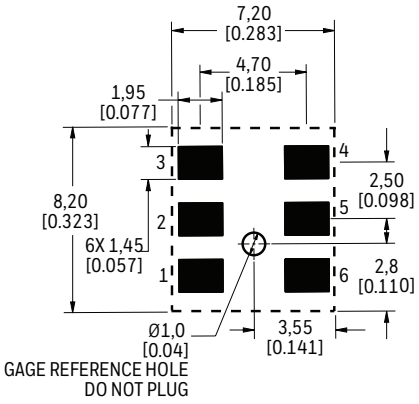
DIP Packages
All pressure port styles except DA



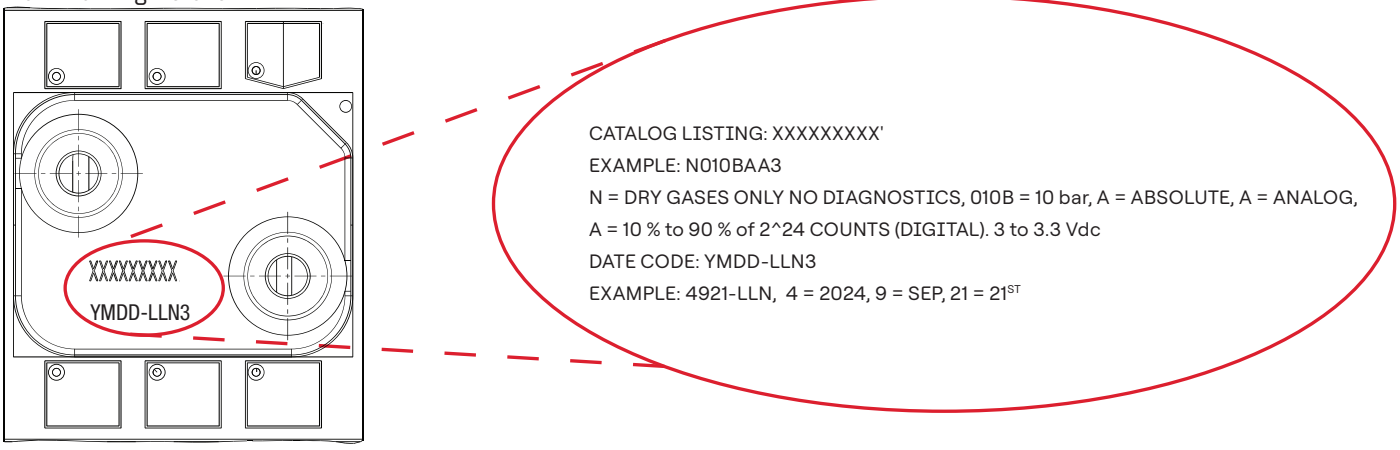
SMT Packages
All pressure port styles except DA



Leadless SMT Packages
All pressure port styles



Part Marking Details



1.0 General information

Please see Figures 7, 8, and 9 for product dimensions and pinout details.

2.0 Pinout and functionality

Table 14. Pinout and functionality

Pad number	I²C Sensor		SPI sensor	
	Name	Description	Name	Description
1	GND	Ground reference voltage signal	GND	Ground reference voltage signal
2	V_{DD}	Positive supply voltage	V_{DD}	Positive supply voltage
3	EOC[1]	End-of-conversion indicator: This pin is set high when a measurement and calculation have been completed and the data is ready to be clocked out	MOSI	Master Out/Sensor In: Data in
4	NC	No connection	SS	Sensor Select: Chip select
5	SDA	Data in/out	MISO	Master In/Sensor Out: Data output
6	SCL	Clock input	SCLK	Clock input

[1] For more details on EOC functionality, please refer to the technical note.

3.0 Start-up timing

On power-up, the ABP3 Series digital sensor is able to receive the first command after 2.5 ms from when the V_{DD} supply is within operating specifications.

4.0 Power supply requirement

Verify that system power to the sensor meets the V_{DD} rising slope requirement (minimum V_{DD} rising slope is at least 10 V/ms).

5.0 Reference circuit designs

5.1 Digital output versions

Figure 10. I²C circuit diagram

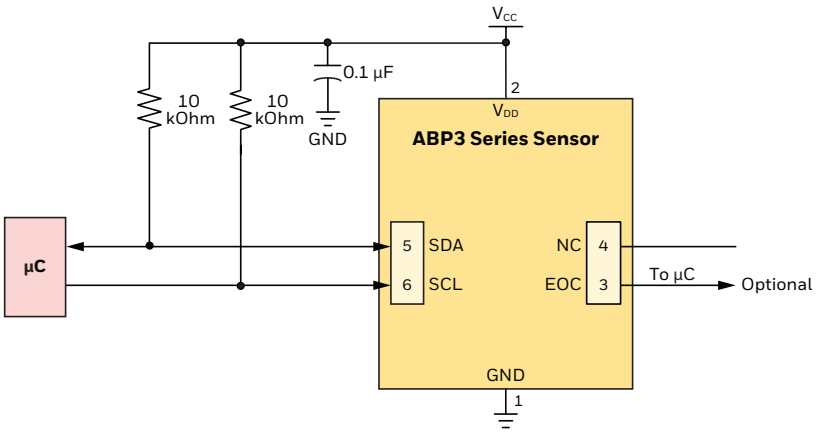
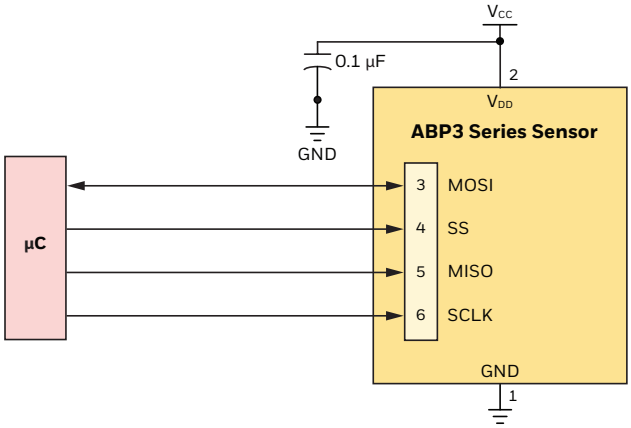
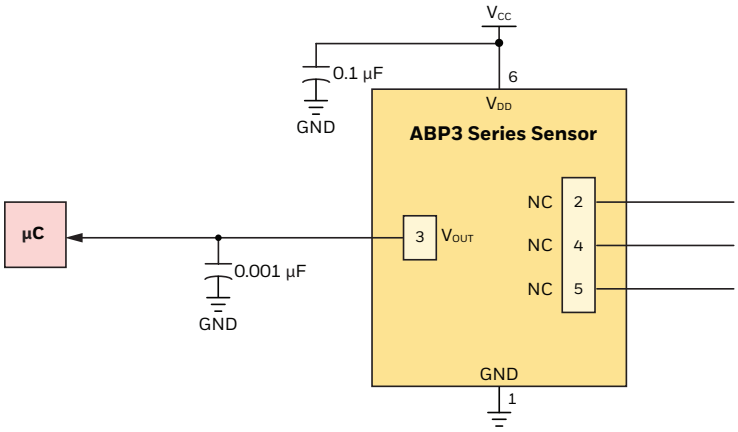


Figure 11. SPI circuit diagram



5.2 Analog output versions

Figure 12. Analog circuit diagram



5.3 Bypass capacitor use

NOTICE

To ensure output noise suppression, place an external bypass capacitor of 0.1 µF very close to the sensor power supply pin (see Figures 14 and 15) in the end-user design.

6.0 ABP3 Series calculations

The above-mentioned pressure and temperature counts transmitted over the I^2C are in unsigned 16-bit format. After the two bytes are combined, the resulting word shall be interpreted as a singed 16-bit two's compliment value.

The signed 16-bit numerical range is:

-32768 to +32767

The value **2^{15}=32768** represents the scaling magnitude of the signed Q0.15 output format. It shall not be interpreted as a -bit ADC resolution.

The user needs to convert the counts to a 16-bit signed format for proper interpretation of the output as per datasheet specifications.

Equation 1: Unsigned counts to signed counts
Please follow the following steps to suitably convert the data into signed format.

1) 1If the received 16-bit unsigned data is greater than 32767 (i.e., 2^{15} - 1), this must be converted to a 16-bit signed value using Equation 1(a) below.
2) If the received 16-bit unsigned data is less than or equal to 32767 (i.e., 2^{15} - 1), then the corresponding 16-bit signed counts are equal to the received unsigned count as in Equation 1(b).

Equation 1(a):
If Unsigned counts > 32767:
Signed Counts = ((Unsigned Counts + 2^{15}) % 2^{16}) - 2^{15}

Equation 1(b):
If Unsigned counts ≤ 32767:
Signed Counts = Unsigned Counts

Pressure_Counts output range and digital headroom
Although the complete signed 16-bit register range is -32768 to +32767, the nominal calibrated pressure transfer function uses:

-32000 counts at 0 %FSS

and:

+32000 counts at 100 %FSS

The calibration defines the expected compensated pressure output as:

$$\textbf{Pressure_output} = 640 \times P_{\%FSS} - 32000$$

where $P_{\%FSS}$ is the applied pressure expressed from 0% to 100% of the calibrated pressure range.
The use of **±32000,** rather than the absolute signed limits, intentionally keeps the nominal calibrated output away from the numerical saturation limits of the signed 16-bit register

Example: Calculate the pressure for an -1 psi to 1 psi differential sensor with a 10 %FSS to 90 %FSS calibration when the recorded pressure count from the sensor is 65500 (in decimal):
Signed Counts = ((65500 + 2^{15}) % 2^{16}) - 2^{15}
Signed Counts = -36
Output(%FSS) = (-36+32000)/640
Output(%FSS) = 49.94

Equation2: Pressure sensor transfer function
Output(%FSS) = (Signed Counts + 32000)/640

Equation3: Temperature output transfer function
Output(%FSS) = (Signed Counts + 16485)/387.88

Pressure output
The ABP3 Series sensor pressure output may be expressed by the transfer function of the device as shown in Equation 2:

$$\text{Pressure} = \frac{(\text{Output} - \text{Output}_{\text{min.}}) * (P_{\text{max.}} - P_{\text{min.}})}{\text{Output}_{\text{max.}} - \text{Output}_{\text{min.}}} + P_{\text{min.}}$$

Where, $\text{Output}_{\text{min}}$ = output at minimum pressure [counts]
$\text{Output}_{\text{max}}$ = output at maximum pressure [counts]
Output = digital pressure reading [counts]
P_{max} = Maximum pressure range
P_{min} = Minimum pressure range
Pressure = pressure reading [mBar, Bar, psi, kPa, etc.]

Example
Calculate the pressure for a -2.5 mBar to 2.5 mBar Differential sensor with a 10 % to 90 % calibration, and a pressure output of 12750 Counts

The maximum counts +32000(2^{15}) and minimum counts is =-32000(-2^{15}) and the span to be considered (90-10) % = 80%
$\text{Output}_{\text{max}}$ = +25600 counts (90% of 2^{15} counts or 0×6400)
$\text{Output}_{\text{min}}$ =-25600 counts (10% of 2^{15} counts or 0×9C00)
Output = 12750 counts
Pressure = pressure in mBar

$$\text{Pressure} = \frac{(12750 - (-25600)) \times (2.5 - (-2.5)) + (-2.5)}{25600 - (-25600)}$$

$$\text{Pressure} = \frac{191750 - 2.5}{51200}$$

$$\text{Pressure} = 1.24 \text{ mBar}$$

Temperature output

The ABP3 Series temperature output may be expressed by the transfer function as shown in Equation 3:

$$\text{Temperature} = \frac{T_{OUT} + 16485}{387.88}$$

Equation 3: Temperature output transfer function

Where,

Temperature = calculated temperature output in °C

T_{OUT} = digital temperature output in counts (decimal)

Example

Calculate the temperature for a temperature output of -6783 (decimal) counts:

Temperature = temperature in °C T_{OUT} = -6783 counts

$$\text{Temperature} = \frac{-6783+16485}{387.88}$$

$$\text{Temperature} = \frac{9702}{387.88}$$

$$\text{Temperature} = 25.01°C$$

7.0 Recommended pneumatic sensor connections

7.1 Tubing

Tubing is a common method of pneumatically connecting to the sensors and needs to be matched to the sensor's application to provide the required operating temperature range and working pressure. Depending on the working pressure range and operating temperature, the corresponding type of tubing can be selected (i.e., Superthane®, silicone, and vinyl). Silicone tubing, for instance, tends to be the easiest to which to connect; however, its working pressure is not as high as that of the other materials.

The lower the shore rating for the tubing, the easier it is to insert the tubing onto the sensor's pressure port; however, the lower shore rated tubing also has lower working pressures. For working pressures of 20 psi and below, silicone or vinyl tubing tends to be used. For pressures above 20 psi, Superthane® or low-density polyethylene tubing may be considered. Table 29 shows recommended tubing for use with the Honeywell Technologies Basic Board Mount Pressure Sensors.

Generally, when the working pressure is 15 psi or less, clamps are typically not required. However, because each application is different, the end use must be taken into account before determining whether clamps are necessary to ensure that the tubing remains in place and doesn't leak. Considerations include vibration, pressure spikes, and the type of tubing being used. A common clamping method is to use a plastic cable tie, available in a variety of sizes and found in most hardware stores. They are relatively easy to install and stay in place over time.

NOTICE

Instead of using a clamp, a small drop of epoxy may be applied to either pressure port prior to the tubing being placed onto the port or applied at the end of the tubing once the tubing is in place. This method holds the tubing in place and can further act as a sealing agent to help ensure a leak-tight connection between the pressure port and the tubing. A room temperature sealant is generally used for this purpose. Ensure that the epoxy doesn't block the hole in the port as it needs to remain open.

NOTICE

To apply a more rigid tubing-to-port connection, a low-power heat gun may be used to slightly heat the tubing. Once cooled, the tubing tends to grip the pressure port better.

Table 15. Recommended tubing

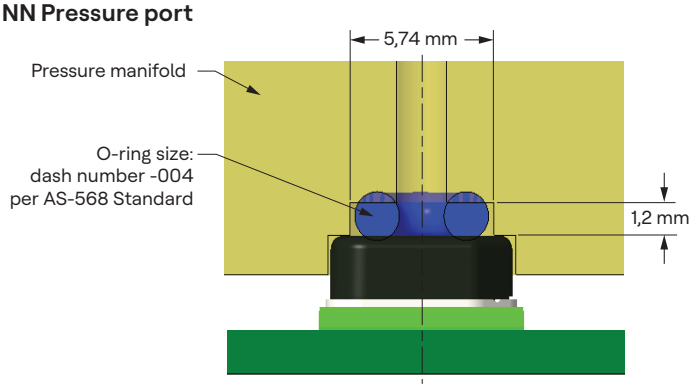
Pressure Port	Manufacturer	Type	Part Number	ID	OD	Pressure at 25°C (psi)
AN	Frelin-Wade	Fre-Thane® (polyurethane)	1A-156-11	0.093 in	0.156 in	210
AN	Frelin-Wade	nylon	1A-200-01	0.093 in	0.125 in	270
AN	NewAge Industries	PVC	1100225	0.094 in	0.156 in	42
AN	NewAge Industries	silicone	2800315	0.094 in	0.156 in	20
AN	McMaster	silicone	5041K512	2,0 mm	6,0 mm	60
AN	McMaster	silicone	5041K601	2,0 mm	6,0 mm	115
RN, RR	Frelin-Wade	Fre-Thane	95a-157	0.066 in	0.125 in	225
RN, RR	NewAge Industries	Superthane® (ether)	2110535	0.066 in	0.125 in	135
RN	NewAge Industries	silicone	2800161	0.063 in	0,188 in	20
RN, RR	Du-Bro	silicone	196 1/16 ID	0.063 in	0.125 in	20
RN, RR	US Plastics	Excelthane polyurethane	77901710	0.063 in	0.125 in	70
RN, RR	McMaster	silicone	5041K603	1,0 mm	3.00 in	15
DA	McMaster	silicone	5041K512	2,0 mm	6,0 mm	60

7.2 O-ring manifold designs

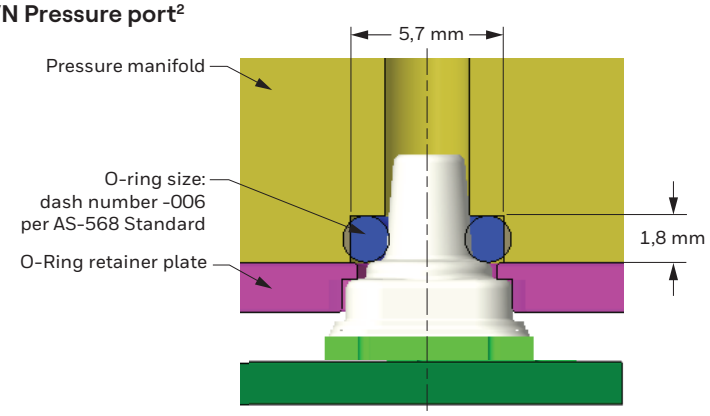
O-rings may also be used to connect pneumatically to the sensor. Most O-ring manufacturers recommend a compression of 20 % to 25 % to provide the proper O-ring compression over the temperature range. Silicone or fluorosilicone O-rings are commonly used as they tend to take less of a set over temperature verses other O-ring materials. System operating temperatures and sealant media compatibility are the two most important parameters which must be considered when selecting an O-ring base polymer. See Figures 22 and 23 and Table 30 for more information.

Figure 13. Guidelines for O-ring manifold designs[1]

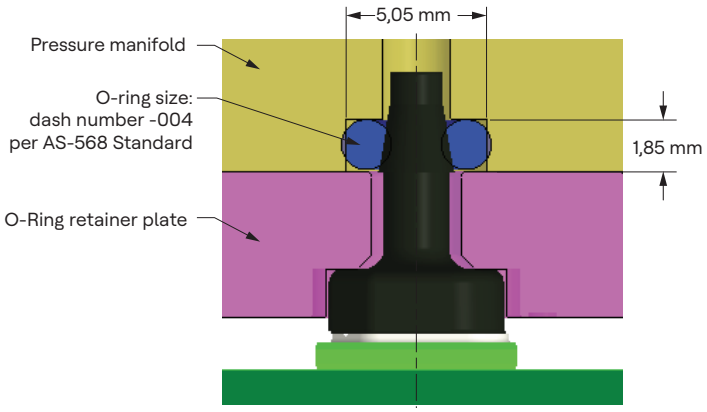
NN Pressure port



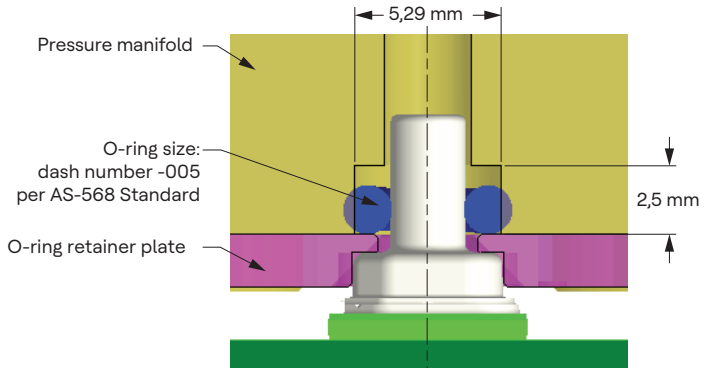
VN Pressure port[2]



AN Pressure port

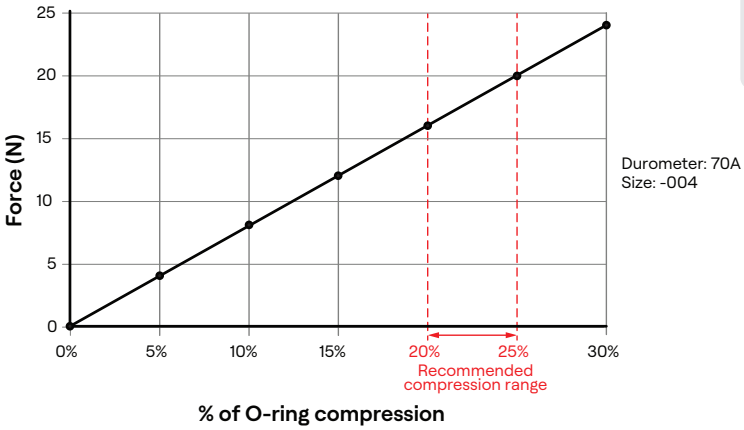


SN Pressure port[2]



[1] The recommended design has been validated for operating conditions ranging from -40°C to 110°C and up to 16 bar gage pressure.
[2] For more demanding applications, a second O-ring can be used with a gland height of 3,6 mm (VN pressure port) and 4,55 mm (SN pressure port).

Figure 14. Force vs. % of O-ring compression for N port type



NOTICE
It is the buyer's sole responsibility to determine the suitability of the product in the application.

Table 16. Recommended O-rings

Pressure port	O-ring size AS-568 uniform dash numbers	O-ring ID (mm)	O-ring C/S (mm)	Material	Supplier	Part number	Shore hardness
NN	-004	1,78	1,78	Fluoroelastomer	McMaster	8333T114	Durometer 70A
NN	-004	1,78	1,78	Silicone	McMaster	1283N14	Durometer 70A
AN	-004	1,78	1,78	Fluoroelastomer	McMaster	8333T114	Durometer 70A
AN	-004	1,78	1,78	Silicone	McMaster	1283N14	Durometer 70A
SN	-005	2,57	1,78	Fluoroelastomer	McMaster	8333T115	Durometer 70A
SN	-005	2,57	1,78	Silicone	McMaster	1283N15	Durometer 70A
VN	-006	2,90	1,78	Fluoroelastomer	McMaster	8333T116	Durometer 70A
VN	-006	2,90	1,78	Silicone	McMaster	1283N16	Durometer 70A

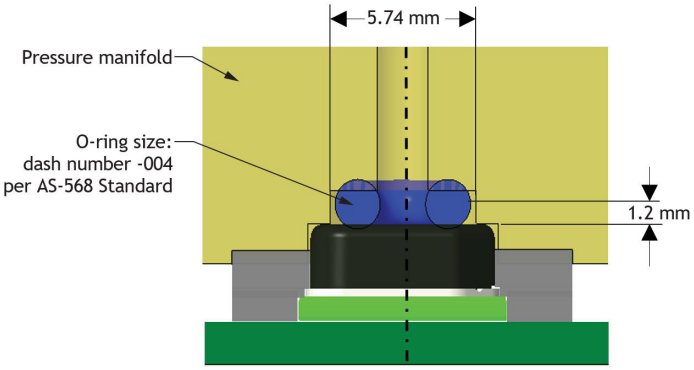
O-rings may also be used to connect pneumatically to the sensor. Most O-ring manufacturers recommend a compression of 20 % to 25 % to provide the proper O-ring compression over the temperature range. Silicone or fluorosilicone O-rings are commonly used as they tend to take less of a set over temperature verses other O-ring materials. System operating temperatures and sealant media compatibility are the two most important parameters which must be considered when selecting an O-ring base polymer. See Figures 24 and 25, and Table 31 for more information.

NOTICE

It is the buyer's sole responsibility to determine the suitability of the product in the application.

Figure 15. Guidelines for O-ring manifold designs

NX Pressure port



VX Pressure port[1]

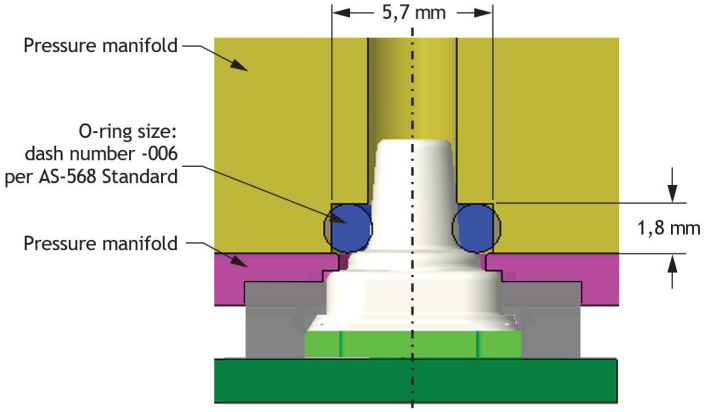
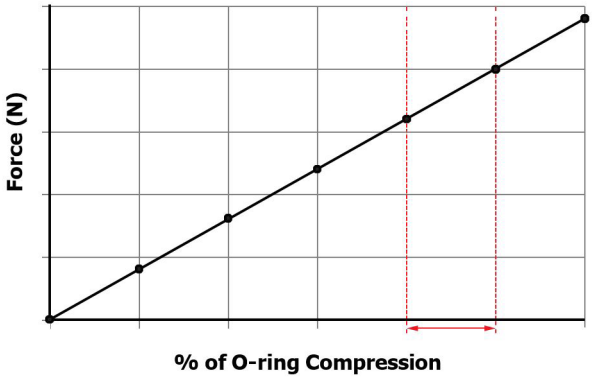
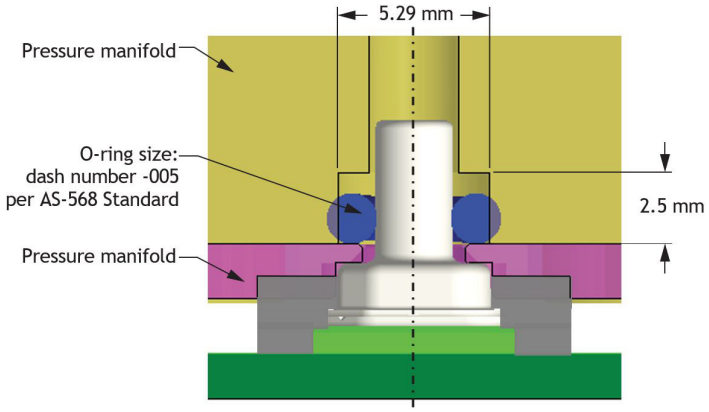


Figure 16. Force v. % of O-ring compression for N port type



SX Pressure port[2]



[1] The recommended design has been validated for operating conditions ranging from -40 °C to 110 °C and up to 16 bar guage pressure.

[2] For more demanding applications, a second O-ring can be used with a gland height of 3,6 mm (VN pressure port) and 4,55 mm (SN pressure port).

Table 17. Recommended O-rings

Pressure port	O-ring size AS-568 uniform dash numbers	O-ring ID (mm)	O-ring C/S (mm)	Material	Supplier	Part number	Shore hardness
NN	-004	1,78	1,78	Fluoroelastomer	McMaster	8333T114	Durometer 70A
NN	-004	1,78	1,78	Silicone	McMaster	1283N14	Durometer 70A
SN	-005	2,57	1,78	Fluoroelastomer	McMaster	8333T115	Durometer 70A
SN	-005	2,57	1,78	Silicone	McMaster	1283N15	Durometer 70A
VN	-006	2,90	1,78	Fluoroelastomer	McMaster	8333T116	Durometer 70A
VN	-006	2,90	1,78	Silicone	McMaster	1283N16	Durometer 70A

⚠ 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 Technologies warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. The Honeywell Technologies standard product warranty applies unless agreed to otherwise by Honeywell Technologies in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell Technologies during the period of coverage, Honeywell Technologies will repair or replace, at its option, without charge those items that Honeywell Technologies, in its sole discretion, 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 Technologies be liable for consequential, special, or indirect damages.

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For more information
Honeywell Technologies services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing, or the nearest Authorized Distributor, visit our website or call:

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