Honeywell



TruStability[®] Board Mount Pressure Sensors

HSC Series—High Accuracy, Compensated/Amplified

 \pm 1.6 mbar to \pm 10 bar | \pm 160 Pa to \pm 1 MPa | \pm 0.5 inH₂O to \pm 150 psi Digital or Analog Output



TruStability® Board Mount Pressure Sensors

The TruStability[®] High Accuracy Silicon Ceramic (HSC) 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 HSC Series is fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects, and nonlinearity 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 HSC 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 absolute, gage, or differential pressures. The absolute versions have an internal vacuum reference and an output value proportional to absolute pressure. Gage versions are referenced to atmospheric pressure and provide an output proportional to pressure variations from atmosphere. Differential versions allow measurement of pressure between the two pressure ports.

The TruStability[®] pressure sensors are intended for use with non-corrosive, non-ionic gases, such as air and other dry gases. Available options extend the performance of these sensors to non-corrosive, non-ionic liquids for pressure ranges above 40 mbar | 4 kPa | 20 inH₂O.

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

Table of Contents

Features and Benefits 3-5
Potential Applications6
General Specifications
Analog Operating Specifications9
Digital Operating Specifications 10
Transfer Function Limits
Total Error Band Values12
Nomenclature and Order Guide
Pressure Range Specifications
±1.6 mbar to ±10 bar 14
±160 Pa to ±1 MPa 15
$\pm 0.5 \text{ inH}_2 \text{O to } \pm 150 \text{ psi} \dots 16$
Available Standard Configurations17-18
Dimensional Drawings
DIP Packages
SMT Packages 21-24
SIP Packages 24-29
Pinouts, PCB Layouts
TruStability [®] Board Mount Pressure Sensors
Portfolio Overview
Additional Information

What makes our sensors better?

- Stability and reliability
- Industry-leading accuracy of ±0.25 %FSS BFSL
- Port and housing options simplify integration
- Wide pressure range, from ±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH₂O to ±150 psi
- Small package size
- Extremely low power consumption

Features and Benefits

PROPRIETARY HONEYWELL TECHNOLOGY

Combines high sensitivity with high overpressure and burst pressure while providing industry leading stability—performance factors that are difficult to achieve in the same product; this gives the customer more flexibility in sensor implementation and reduces the customer design requirements for protecting the sensor without sacrificing the ability to sense very small changes in pressure.

PROTECTED BY MULTIPLE GLOBAL PATENTS

INDUSTRY-LEADING LONG-TERM STABILITY

Even after long-term use and thermal extremes, the sensor's stability remains best in class:

- Minimizes system calibration needs.
- Improves system performance.
- Helps support system uptime by minimizing the need to service or replace the sensor during its application life.

TOTAL ERROR BAND (TEB)

Honeywell specifies TEB—the most comprehensive, clear, and meaningful measurement—that provides the sensor's true performance over a compensated range of 0 °C to 50 °C [32 °F to 122 °F] (see Figure 1):

- Minimizes individually testing and calibrating every sensor, decreasing manufacturing time and process costs.
- Improves system accuracy.
- Provides enhanced sensor interchangeability—there is minimal part-to-part variation in accuracy.

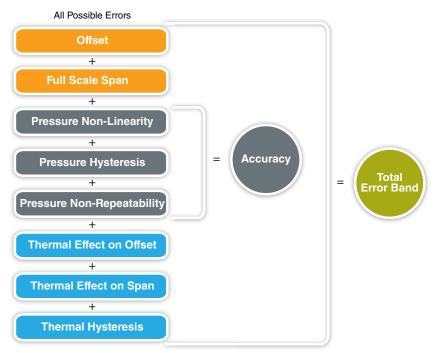


Figure 1. TEB Components for TruStability® Board Mount Pressure Sensors

Features and Benefits

INDUSTRY-LEADING ACCURACY

Extremely tight accuracy of ± 0.25 %FSS BFSL (Full Scale Span Best Fit Straight Line) reduces software needed to correct system inaccuracies, minimizing system design time:

- Avoids additional customer calibration.
- Helps to improve system efficiency.
- Often simplifies software development.

HIGH BURST PRESSURES

- Promotes system reliability and reduces potential system downtime.
- Can simplify the design process.

HIGH WORKING PRESSURE RANGES

Allows ultra-low pressure sensors to be used continuously well above the calibrated pressure range.

INDUSTRY-LEADING FLEXIBILITY

Modular, flexible design with many package styles (with the same industryleading stability), pressure ports, and options simplify integration into the device manufacturer's application.

WIDE VARIETY OF PRESSURE RANGES

From ±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH₂O to 150 psi provide support for many unique applications.

MEETS IPC/JEDEC J-STD-020D.1 MOISTURE SENSITIVITY LEVEL 1 REQUIREMENTS

- Allows the customer to avoid the thermal and mechanical damage during solder reflow attachment and/or repair that lesser rated products would incur.
- Allows unlimited floor life when stored as specified (≤30 °C/85 %RH), simplifying storage and reducing scrap.
- Never requires lengthy bakes prior to reflow.
- Stable and usable shortly after reflow process allows for lean manufacturing.

OPTIONAL INTERNAL DIAGNOSTIC FUNCTIONS

- May reduce the need for redundant sensors in the system.
- Detects most internal failures including burst sensors.

ENERGY EFFICIENT

Extremely low power consumption (less than 10 mW, typ.):

- Reduces system power requirements.
- Enables extended battery life.
- Optional sleep mode available upon special request.

Features and Benefits

OUTPUT: RATIOMETRIC ANALOG; I²C- OR SPI-COMPATIBLE 14-BIT DIGITAL OUTPUT (MIN. 12-BIT SENSOR RESOLUTION)

Accelerates performance through reduced conversion requirements and the convenience of direct interface to microprocessors.

SMALL SIZE

Miniature 10 mm x 10 mm [0.39 in x 0.39 in] package is very small when compared to many board mount pressure sensors:

- Occupies less area on the PCB.
- Typically allows for easy placement on crowded PCBs or in small devices.

REACH AND ROHS COMPLIANT

LIQUID MEDIA OPTION

- Provides robustness in environments with condensing humidity.
- Compatible with a variety of non-ionic fluids.
- Available for pressure ranges above 40 mbar | 4 kPa | 20 inH₂0.

Potential Applications



MEDICAL

- AIRFLOW MONITORS
- ANESTHESIA MACHINES
- BLOOD ANALYSIS MACHINES
- GAS CHROMATOGRAPHY
- GAS FLOW INSTRUMENTATION
- KIDNEY DIALYSIS MACHINES
- OXYGEN CONCENTRATORS
- PNEUMATIC CONTROLS
- **RESPIRATORY MACHINES**
- SLEEP APNEA EQUIPMENT
- VENTILATORS
- SPIROMETERS
- NEBULIZERS
- HOSPITAL ROOM AIR PRESSURE

INDUSTRIAL

- BAROMETRY
- FLOW CALIBRATORS
- GAS CHROMATOGRAPHY
- GAS FLOW INSTRUMENTATION
- HVAC
- LIFE SCIENCES
- PNEUMATIC CONTROL
- VAV (VARIABLE AIR VOLUME) CONTROL
- CLOGGED HVAC FILTER DETECTION
- HVAC TRANSMITTERS
- INDOOR AIR QUALITY

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 _{supply} + 0.3	V
Digital interface clock frequency: I ² C SPI	100 50	400 800	kHz
ESD susceptibility (human body model)	3	-	kV
Storage temperature	-40 [-40]	85 [185]	°C [°F]
Soldering time and temperature: lead solder temperature (SIP, DIP) peak reflow temperature (SMT)		4 s max. at 250 °C [482 °F] 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 4.) liquid media (See "Options T and V" in Figure 4.)	0% to 95% RH, non-condensing 100% condensing or direct liquid media on Port 1
Vibration	MIL-STD-202G, Method 204D, Condition B (15 g, 10 Hz to 2 Hz)
Shock	MIL-STD-202G, Method 213B, Condition C (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 \leq 30 °C/85 % RH)

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

General Specifications

Table 3. Wetted Materials¹

Component	Port 1 (Pressure Port)	Port 2 (Reference Port)		
Ports and covers	high temperature polyamide	high temperature polyamide		
Substrate	alumina ceramic	alumina ceramic		
Adhesives	epoxy, silicone	epoxy, silicone		
Electronic components	ceramic, silicon, glass, solder	silicon, glass, gold		

¹Contact Honeywell Customer Service for detailed material information.

CAUTION PRODUCT DAMAGE FOR SENSORS WITH LIQUID MEDIA OPTION (ONLY AVAILABLE 60 MBAR | 6 KPA | 1 PSI AND ABOVE)

- Ensure liquid media is applied to Port 1 only; Port 2 is not compatible with liquids.
- Ensure liquid media contains no particulates. All TruStability® sensors are dead-ended devices. Particulates can accumulate inside the sensor, causing damage or affecting sensor output.
- Recommend that the sensor be positioned with Port 1 facing downwards; any particulates in the system are less likely to enter and settle within the pressure sensor if it is in this position.
- Ensure liquid media does not create a residue when dried; build-up inside the sensor may affect sensor output. Rinsing of a dead-ended sensor is difficult and has limited effectiveness for removing residue.
- Ensure liquid media are compatible with wetted materials. Non-compatible liquid media will degrade sensor performance and may lead to sensor failure.

Failure to comply with these instructions may result in product damage.

Table 4. Sensor Pressure Types

Pressure Type	Description
Absolute	Output is proportional to the difference between applied pressure and a built-in vacuum reference.
Differential	Output is proportional to the difference between the pressures applied to each port (Port 1 – Port 2).
Gage	Output is proportional to the difference between applied pressure and atmospheric (ambient) pressure.

Analog Operating Specifications

Table 5. Analog Operating Specifications

Characteristic	Min.	Тур.	Max.	Unit
Supply voltage (V _{suppl}) ^{,1,2,3} pressure ranges ≥60 mbar 6 kPa 1 psi: 3.3 Vdc 5.0 Vdc pressure ranges ≤40 mbar 4 kPa 20 inH ₂ O: 3.3 Vdc 5.0 Vdc	3.0 4.75 3.27 4.95	3.3 5.0 3.3 5.0	3.6 5.25 3.33 5.05	Vdc
Supply current: 3.3 Vdc 5.0 Vdc		2.1 2.7	2.8 3.5	mA
Operating temperature range ⁴	-20 [-4]	_	85 [185]	°C [°F]
Compensated temperature range⁵	0 [-32]	_	50 [122]	°C [°F]
Startup time (power up to data ready)	—	—	5	ms
Response time	_	1	_	ms
Clipping limit: upper lower	2.5		97.5 —	%Vsupply
Accuracy ⁶	-	-	±0.25	%FSS BFSL ⁸
Output resolution	0.03	_	_	%FSS
Orientation sensitivity (±1 g): ^{7,9} pressure ranges \leq 40 mbar 4 kPa 20 inH ₂ O pressure ranges \leq 2.5 mbar 250 Pa 1 inH ₂ O		±0.1 ±0.2		%FSS ⁸

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.

⁶Accuracy: 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.

⁷Orientation sensitivity: The maximum change in offset of the sensor due to a change in position or orientation relative to Earth's gravitational field.

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 4 for ranges.)

⁹Insignificant for pressure ranges above 40 mbar | 4 kPa | 20 inH₂O.

Digital Operating Specifications

Table 6. Digital Operating Specifications

Characteristic	Min.	Тур.	Max.	Unit
Supply voltage (V _{suppl}); ^{1,2,3} pressure ranges ≥60 mbar 6 kPa 1 psi: 3.3 Vdc 5.0 Vdc pressure ranges ≤40 mbar 4 kPa 20 inH ₂ O: 3.3 Vdc 5.0 Vdc	3.0 4.75 3.27 4.95	3.3 5.0 3.3 5.0	3.6 5.25 3.33 5.05	Vdc
Supply current: 3.3 Vdc 5.0 Vdc		3.1 3.7	3.9 4.6	mA
Operating temperature range ⁴	-20 [-4]	_	85 [185]	°C [°F]
Compensated temperature range ⁵	0 [-32]	-	50 [122]	°C [°F]
Startup time (power up to data ready)	—	_	3	ms
Response time	_	0.46	_	ms
SPI/I²C voltage level: low high	— 80		20	%Vsupply
Pull up on SDA/MISO, SCL/SCLK, SS	1	_	-	kOhm
Accuracy ⁶	_	_	±0.25	%FSS BFSL ⁸
Output resolution	12	-	-	bits
Orientation sensitivity (±1 g) ^{.7, 9} pressure ranges \leq 40 mbar 4 kPa 20 inH ₂ O pressure ranges \leq 2.5 mbar 250 Pa 1 inH ₂ O		±0.1 ±0.2		%FSS ⁸

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.

⁶Accuracy: 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.

⁷Orientation sensitivity: The maximum change in offset of the sensor due to a change in position or orientation relative to Earth's gravitational field.

^aFull 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 4 for ranges.)

 9 Insignificant for pressure ranges above 40 mbar | 4 kPa | 20 inH $_{2}$ O.

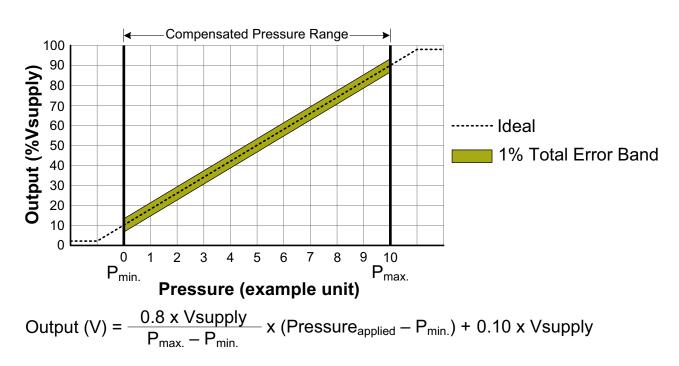
Table 7. Sensor Output at Significant Percentages (Digital Versions Only)

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

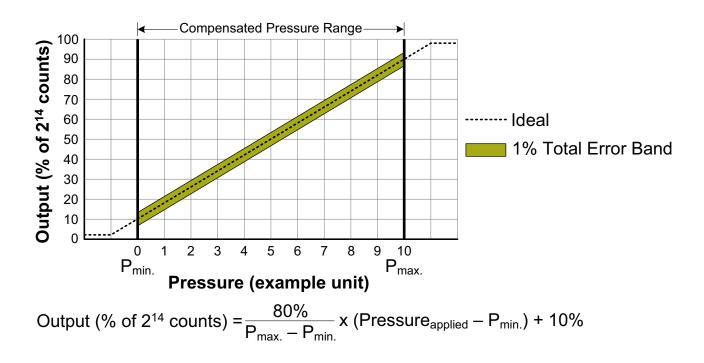
Transfer Function Limits

Figure 2. Transfer Function Limits¹

Analog Versions



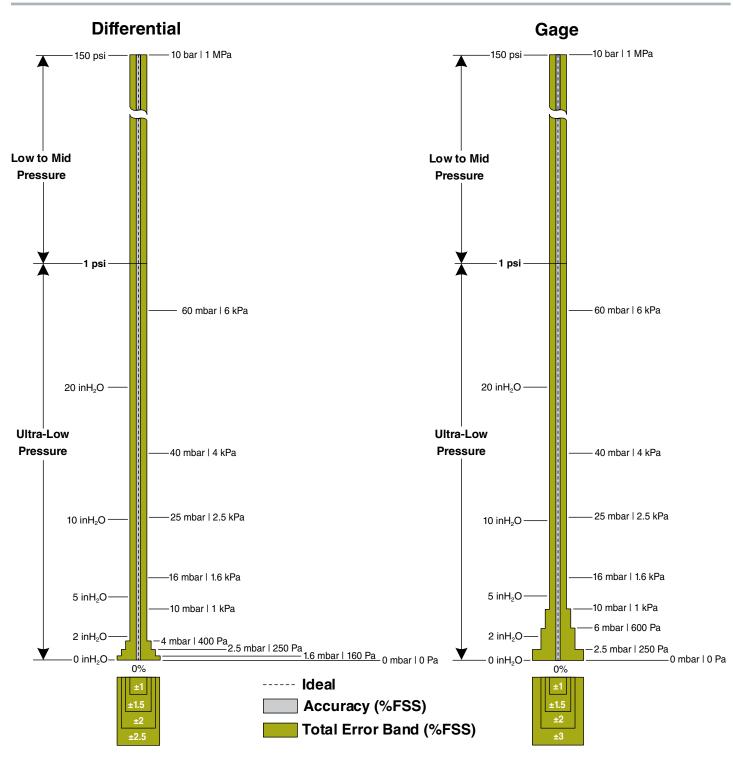
Digital Versions



¹Transfer Function "A" is shown. See Figure 4 for other available transfer function options.

Total Error Band Values





Nomenclature and Order Guide

Figure 4. Nomenclature and Order Guide

For example, HSCDNNN150PGAA3 defines an HSC Series TruStability® Pressure Sensor, DIP package, NN pressure port, no special options, 150 psi gage pressure range, analog output type, 10% to 90% of Vsupply transfer function, 3.3 Vdc supply voltage.

Dred	luat Carica		HSO) D		NN	N	13) (DPG /	а А 1 1	3	Supply Voltage
	luct Series												3 3.3 Vdc
HS	C High Accuracy, Comp	ensated/	Amplified										5 5.0 Vdc
Pacl	kage											Transfer Functio	n¹
_	-											A 10% to 90% of Vsup	ply (analog), 214 counts (digital
	DIP (Dual Inline Pin)										IL	5% to 95% of Vsupp	ly (analog), 214 counts (digital)
-	SMT (Surface Mount Tech	nology)									7	C 5% to 85% of Vsupp	ly (analog), 214 counts (digital)
S	SIP (Single Inline Pin)											F 4% to 94% of Vsupp	ly (analog), 214 counts (digital)
Droc	sure Port											Outward Tree	-2
ries	DIP		SMT			SIP						Output Typ	
			OWIT			011	-					A Analog	4 I ² C, Address 0x
NN	No ports	NN	No ports	NN	No	ports	, A A A A A A A A A A A A A A A A A A A	P				S SPI	5 I ² C, Address 0>
	YYYY .		00 00				////					2 I ² C, Addre	
					Du	al axial	A			Pressure R	ange ^{3, 4}	I 3 I ² C, Addre	ess 0x38 7 I ² C, Address 0
	-		-	AA	bai op	rbed port	ies			±1.6 mbar to) ±10 bar	±160 Pa to ±1 MPa	±0.5 inH ₂ O to ±150 ps
	<u>A</u>	_		-						Absol		Absolute	Absolute
AN	Single axial barbed port	AN	Single axial	ΔΝ	Sin	igle axial	de la			001BA 0 bar t	o 1 bar	100KA 0 kPa to 100 kPa	015PA 0 psi to 15 psi
	barbed port		barbed port		bar	rbed port	m	,		1.6BA 0 bar t	o 1.6 bar	160KA 0 kPa to 160 kPa	O30PA 0 psi to 30 psi
	<u> </u>			_	Cim	ala avial	1			2.5BA 0 bar t	o 2.5 bar	250KA 0 kPa to 250 kPa	OGOPA 0 psi to 60 psi
LN	Single axial barbless port	LN	Single axial barbless port	LN		igle axial rbless po				004BA 0 bar t		400KA 0 kPa to 400 kPa	
	YYYY''	_	2000	_						006BA 0 bar t		600KA 0 kPa to 600 kPa	150PA 0 psi to 150 psi
				EF	Fas mo	stener unt, dual		5		010BA 0 bar t	o 10 bar	001GA 0 kPa to 1 MPa	
	-		_	1.55	por	al barbec rts, oppos	site	3		Differe	ntial	Differential	Differential
		_				stener	-			1.6MD ±1.6 m	ıbar	160LD ±160 Pa	0.5ND ±0.5 inH ₂ O
	-		_	FN	mo	al barbed		9		2.5MD ±2.5 m	nbar	250LD ±250 Pa	001ND ±1 inH ₂ O
					por			8		004MD ±4 mb	ar	400LD ±400 Pa	002ND ±2 inH ₂ O
					- 60.01	bed				006MD ±6 mb	ar	600LD ±600 Pa	004ND ±4 inH2O
	-		-	GN	sin	tener moi gle axial	-	<u>ן</u>		010MD ±10 m	bar	001KD ±1 kPa	005ND ±5 inH2O
		_		_		rbed port				016MD ±16 m	bar	1.6KD ±1.6 kPa	010ND ±10 inH ₂ O
	_		_	NE	mo	stener ount, dual				025MD ±25 m	bar	2.5KD ±2.5 kPa	020ND ±20 inH ₂ O
					axi	al ports, ne side				040MD ±40 m	bar	004KD ±4 kPa	030ND ±30 inH ₂ O
	~~~						. 4			060MD ±60 m	bar	006KD ±6 kPa	001PD ±1 psi
RN	Single radial barbed port	RN	Single radial barbed port	RN		igle radia				100MD ±100 r		010KD ±10 kPa	005PD ±5 psi
	1111	_	. 0000	_			////			160MD ±160 r		016KD ±16 kPa	015PD ±15 psi
-	Dual radial	-	Dual radial barbed ports,		Du	al radial	E Contraction de la contractio			250MD ±250 r		025KD ±25 kPa	030PD ±30 psi
RR	barbed ports, same side	RR	same side	RR	sar	rbed port ne side	s, <b>1117</b>			400MD ±400 r		040KD ±40 kPa	060PD ±60 psi
		_	Dual radial		-					600MD ±600 r		060KD ±60 kPa	-
DR	Dual radial barbed ports, opposite sides	DD	Dual radial barbed ports,	DR	🕻 bar	al radial bed port	s, 🖬	Þ		001BD ±1 bar 1.6BD ±1.6 ba		100KD ±100 kPa 160KD ±160 kPa	
	opposité sides		opposite sides a		opp	oositė sid			Ч	2.5BD ±2.5 b		250KD ±250 kPa	
	Single radial		Single radial		Cim	ale redie				<b>004BD</b> ±4 bar		400KD ±400 kPa	
JN	Single radial barbless port	JN	barbless port	JN	bar	igle radia rbless po	rt III						- 
	זויי	_	9992	_	_	_				Gag		Gage	Gage
J.J	Dual radial barbless ports,		Dual radial barbless ports,			al radial bless po	rts,			2.5MG 0 mbar			001NG 0 inH ₂ O to 1 inH ₂
	same side		same side		sar	ne side	III			004MG 0 mbar			002NG 0 inH ₂ O to 2 inH ₂
					Fas	stener	- AL	7		006MG 0 mbar			004NG 0 inH ₂ O to 4 inH ₂
	-		-	HH	1 rac	stener ount, dual dial barbe	d S			010MG 0 mbar			005NG 0 inH ₂ O to 5 inH ₂
				_		rts, same e				016MG 0 mbar			010NG 0 inH ₂ O to 10 inH 020NG 0 inH ₂ O to 20 inH
					Fas	stener ount, sing lial barbe rt		2		025MG 0 mbar 040MG 0 mbar			020NG 0 inH ₂ O to 20 inH 030NG 0 inH ₂ O to 30 inH
	-			HN	rac	lial barbe	ad man	1		060MG 0 mbar			001PG 0 psi to 1 psi
-		_		_						100MG 0 mbar			005PG 0 psi to 5 psi
				M	Ma mo	nifold ount, oute meter se	er O			160MG 0 mbar			015PG 0 psi to 15 psi
					dia	meter se	al <b>Contract</b>			250MG 0 mbar			030PG 0 psi to 30 psi
					Ma	nifold	-			400MG 0 bar to			060PG 0 psi to 60 psi
	-		-	SN	mo dia	ount, inne	er eal			600MG 0 bar to			<b>100PG</b> 0 psi to 100 psi
					uid		····			001BG 0 bar to		100KG 0 kPa to 100 kPa	150PG 0 psi to 150 psi
)nti	ons ^{5, 6}									1.6BG 0 bar to		160KG 0 kPa to 160 kPa	
÷										2.5BG 0 bar to		250KG 0 kPa to 250 kPa	1
	ry gases only, no diagnosti									004BG 0 bar to		400KG 0 kPa to 400 kPa	
	bry gases only, diagnostics		_							006BG 0 bar to		600KG 0 kPa to 600 kPa	1
T 11	iquid media on Port 1, no c	diagnostic	s							010BG 0 bar to		001GG 0 kPa to 1 MPa	1

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. For other available transfer functions contact Honeywell Customer Service. ²SPI output function is not available in SIP package.

³Custom pressure ranges are available. Contact Honeywell Customer Service for more information.

⁴See the explanation of sensor pressure types in Table 4.

5See the CAUTION in this document.

⁶Options T and V are only available on pressure ranges ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi.

# Pressure Range Specifications ±1.6 mbar to ±10 bar

Table 8. Pressure Range Specifications for ±1.6 mbar to ±10 bar

Pressure Range	Pres Rai			Working	Over	Burst	Common	Total Error	Total Error Band after	Long-term Stability
(see Figure 4)	Pmin.	Pmax.	Unit	Pressure ¹	Pressure ²	Pressure ³	Mode Pressure⁴	Band⁵ (%FSS)	Auto-Zero ⁶ (%FSS)	1000 hr, 25 °C (%FSS)
						Absolute	ļ		,	1
001BA	0	1	bar	-	2	4	-	±1%	-	±0.25%
1.6BA	0	1.6	bar	-	4	8	-	±1%	-	±0.25%
2.5BA	0	2.5	bar	-	6	8	-	±1%	-	±0.25%
004BA	0	4	bar	-	8	16	-	±1%	-	±0.25%
006BA	0	6	bar	-	17	17	-	±1%	-	±0.25%
010BA	0	10	bar	-	17	17	-	±1%	-	±0.25%
						Differential				
1.6MD	-1.6	1.6	mbar	335	675	1000	3450	±2.5%	±1.75%	±0.5%
2.5MD	-2.5	2.5	mbar	335	675	1000	3450	±2%	±1.25%	±0.35%
004MD	-4	4	mbar	335	675	1000	3450	±1.5%	±0.75%	±0.35%
006MD	-6	6	mbar	335	675	1000	3450	±1%	±0.75%	±0.35%
010MD	-10	10	mbar	375	750	1250	5450	±1%	±0.5%	±0.25%
016MD	-16	16	mbar	375	750	1250	5450	±1%	±0.5%	±0.25%
025MD	-25	25	mbar	435	850	1350	10450	±1%	±0.5%	±0.25%
040MD	-40	40	mbar	435	850	1350	10450	±1%	±0.5%	±0.25%
060MD	-60	60	mbar	-	850	1000	10000	±1%	-	±0.25%
100MD	-100	100	mbar	-	1400	2500	10000	±1%	-	±0.25%
160MD	-160	160	mbar	-	1400	2500	10000	±1%	-	±0.25%
250MD	-250	250	mbar	-	1400	2500	10000	±1%	-	±0.25%
400MD	-400	400	mbar	-	2000	4000	10000	±1%	-	±0.25%
600MD	-600	600	mbar	-	2000	4000	10000	±1%	-	±0.25%
001BD	-1	1	bar	-	4	8	10	±1%	-	±0.25%
1.6BD	-1.6	1.6	bar	-	8	16	10	±1%	-	±0.25%
2.5BD	-2.5	2.5	bar	-	8	16	10	±1%	-	±0.25%
004BD	-4.0	4.0	bar	-	16	17	10	±1%	-	±0.25%
00.22					10	Gage			1	
2.5MG	0	2.5	mbar	335	675	1000	3450	±3%	±2%	±0.5%
2.5MG	0	2.5	mbar	335	675	1000	3450	±3%	±1.25%	±0.5%
004MG	0	6	mbar	335	675	1000	3450	±2%	±1%	±0.35%
010MG	0	10	mbar	335	675	1000	3450	±1.5%	±0.75%	±0.35%
016MG	0	16	mbar	335	675	1000	3450	±1%	±0.75%	±0.25%
025MG	0	25	mbar	375	750	1250	5450	±1%	±0.75%	±0.25%
040MG	0	40	mbar	375	750	1250	5450	±1%	±0.5%	±0.25%
060MG	0	60	mbar	-	850	1000	5450	±1%	±0.5%	±0.25%
100MG	0	100	mbar	-	850	1000	10000	±1%	-	±0.25%
160MG	0	160	mbar	-	850	1000	10000	±1%	-	±0.25%
250MG	0	250	mbar	-	1400	2500	10000	±1%	-	±0.25%
400MG	0	400	mbar	-	2000	4000	10000	±1%	-	±0.25%
600MG	0	600	mbar	-	2000	4000	10000	±1%	-	±0.25%
001BG	0	1	bar	-	2	4	10	±1%	-	±0.25%
1.6BG	0	1.6	bar	-	4	8	10	±1%	-	±0.25%
2.5BG	0	2.5	bar	-	8	16	10	±1%	-	±0.25%
004BG	0	4	bar	-	8	16	16	±1%	-	±0.25%
006BG	0	6	bar	-	17	17	17	±1%	-	±0.25%
010BG	0	10	bar	-	17	17	17	±1%	-	±0.25%

Working pressure: The maximum pressure that may be applied to any port of the sensor in continuous use. This pressure may be outside the operating pressure range limits (Pmin. to Pmax.) in which case the sensor may not provide a valid output until pressure is returned to within the operating pressure range. Tested to 1 million cycles, minimum.

²Overpressure: 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.

³Burst 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.

⁴Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

⁶Total 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 (see Figure 1).

^eTotal Error Band after Auto-Zero: The maximum deviation from the ideal transfer function over the entire compensated pressure range at a constant temperature and supply voltage for a minimum of 24 hours after an auto-zero operation. Includes all errors due to full scale span, pressure non-linearity, pressure hysteresis, and thermal effect on span.

### Pressure Range Specifications ±160 Pa to ±1 MPa

Table 9. Pressure Range Specifications for ±160 Pa to ±1 MPa

Pressure Range		sure nge		Working	Over	Burst	Common	Total Error	Total Error Band after	Long-term Stability
(see Figure 4)	Pmin.	Pmax.	Unit	Pressure ¹	Pressure ²	Pressure ³	Mode Pressure⁴	Band⁵ (%FSS)	Auto-Zero ⁶ (%FSS)	1000 hr, 25 °C (%FSS)
		_				Absolute			1	
100KA	0	100	kPa	-	200	400	-	±1%	-	±0.25%
160KA	0	160	kPa	-	400	800	-	±1%	-	±0.25%
250KA	0	250	kPa	-	600	800	-	±1%	-	±0.25%
400KA	0	400	kPa	-	800	1600	-	±1%	-	±0.25%
600KA	0	600	kPa	-	1700	1700	-	±1%	-	±0.25%
001GA	0	1	MPa	-	1700	1700	-	±1%	-	±0.25%
						Differential				
160LD	-160	160	Pa	33500	67500	100000	345000	±2.5%	±1.75%	±0.5%
250LD	-250	250	Pa	33500	67500	100000	345000	±2%	±1.25%	±0.35%
400LD	-400	400	Pa	33500	67500	100000	345000	±1.5%	±0.75%	±0.35%
600LD	-600	600	Pa	33500	67500	100000	345000	±1%	±0.75%	±0.35%
001KD	-1	1	kPa	37.5	75	125	545	±1%	±0.5%	±0.25%
1.6KD	-1.6	1.6	kPa	37.5	75	125	545	±1%	±0.5%	±0.25%
2.5KD	-2.5	2.5	kPa	43.5	85	135	1045	±1%	±0.5%	±0.25%
004KD	-4	4	kPa	43.5	85	135	1045	±1%	±0.5%	±0.25%
006KD	-6	6	kPa	-	85	100	1000	±1%	-	±0.25%
010KD	-10	10	kPa	-	140	250	1000	±1%	-	±0.25%
016KD	-16	16	kPa	-	140	250	1000	±1%	-	±0.25%
025KD	-25	25	kPa	-	140	250	1000	±1%	-	±0.25%
040KD	-40	40	kPa	-	200	400	1000	±1%	-	±0.25%
060KD	-60	60	kPa	-	200	400	1000	±1%	-	±0.25%
100KD	-100	100	kPa	-	400	800	1000	±1%	-	±0.25%
160KD	-160	160	kPa	-	800	1600	1000	±1%	-	±0.25%
250KD	-250	250	kPa	-	800	1600	1000	±1%	-	±0.25%
400KD	-400	400	kPa	-	1600	1700	1000	±1%	-	±0.25%
						Gage				
250LG	0	250	Pa	33500	67500	100000	345000	±3%	±2%	±0.5%
400LG	0	400	Pa	33500	67500	100000	345000	±2%	±1.25%	±0.5%
600LG	0	600	Pa	33500	67500	100000	345000	±2%	±1%	±0.35%
001KG	0	1	kPa	33.5	67.5	100	345	±1.5%	±0.75%	±0.35%
1.6KG	0	1.6	kPa	33.5	67.5	100	345	±1%	±0.75%	±0.25%
2.5KG	0	2.5	kPa	37.5	75	125	545	±1%	±0.5%	±0.25%
004KG	0	4	kPa	37.5	75	125	545	±1%	±0.5%	±0.25%
006KG	0	6	kPa	-	85	100	545	±1%	±0.5%	±0.25%
010KG	0	10	kPa	-	85	100	1000	±1%	-	±0.25%
016KG	0	16	kPa	-	85	100	1000	±1%	-	±0.25%
025KG	0	25	kPa	-	140	250	1000	±1%	-	±0.25%
040KG	0	40	kPa	-	200	400	1000	±1%	-	±0.25%
060KG	0	60	kPa	-	200	400	1000	±1%	-	±0.25%
100KG	0	100	kPa	-	200	400	1000	±1%	-	±0.25%
160KG	0	160	kPa	-	400	800	1000	±1%	-	±0.25%
250KG	0	250	kPa	-	800	1600	1000	±1%	-	±0.25%
400KG	0	400	kPa	-	800	1600	1600	±1%	_	±0.25%
600KG	0	600	kPa	-	1700	1700	1700	±1%	-	±0.25%
001GG	0	1	MPa	-	1.7	1.7	1.7	±1%	-	±0.25%

¹Working pressure: The maximum pressure that may be applied to any port of the sensor in continuous use. This pressure may be outside the operating pressure range limits (Pmin. to Pmax.) in which case the sensor may not provide a valid output until pressure is returned to within the operating pressure range. Tested to 1 million cycles, minimum.

²Overpressure: 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.

³Burst 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.

⁴Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

⁵Total 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 (see Figure 1).

^eTotal Error Band after Auto-Zero: The maximum deviation from the ideal transfer function over the entire compensated pressure range at a constant temperature and supply voltage for a minimum of 24 hours after an auto-zero operation. Includes all errors due to full scale span, pressure non-linearity, pressure hysteresis, and thermal effect on span.

# Specifications $\pm 0.5 \text{ inH}_2\text{O}$ to $\pm 150 \text{ psi}$

Table 10. Pressure Range Specifications for 0.5 inH₂O to 150 psi

Pressure Range		sure nge		Working	Over	Burst	Common Mode	Total Error	Total Error Band after	Long-term Stability
(see Figure 4)	Pmin.	Pmax.	Unit	Pressure ¹	Pressure ²	Pressure ³	Pressure ^₄	Band⁵ (%FSS)	Auto-Zero ⁶ (%FSS)	1000 hr, 25 °C (%FSS)
						Absolute				
015PA	0	15	psi	-	30	60	-	±1%	-	±0.25%
030PA	0	30	psi	-	60	120	-	±1%	-	±0.25%
060PA	0	60	psi	-	120	240	-	±1%	-	±0.25%
100PA	0	100	psi	-	250	250	-	±1%	-	±0.25%
150PA	0	150	psi	-	250	250	-	±1%	-	±0.25%
						Differential				
0.5ND	-0.5	0.5	inH ₂ O	135	270	415	1400	±3%	±2%	±0.5%
001ND	-1	1	inH ₂ O	135	270	415	1400	±2%	±1.25%	±0.35%
002ND	-2	2	inH ₂ O	135	270	415	1400	±1%	±0.75%	±0.35%
004ND	-4	4	inH ₂ O	150	300	500	2200	±1%	±0.5%	±0.25%
005ND	-5	5	inH ₂ O	150	300	500	2200	±1%	±0.5%	±0.25%
010ND	-10	10	inH ₂ O	175	350	550	4200	±1%	±0.5%	±0.25%
020ND	-20	20	inH ₂ O	175	350	550	4200	±1%	±0.5%	±0.25%
030ND	-30	30	inH ₂ O	175	350	550	4200	±1%	±0.5%	±0.25%
001PD	-1	1	psi	-	10	15	150	±1%	-	±0.25%
005PD	-5	5	psi	-	30	40	150	±1%	-	±0.25%
015PD	-15	15	psi	-	60	120	150	±1%	-	±0.25%
030PD	-30	30	psi	-	120	240	150	±1%	-	±0.25%
060PD	-60	60	psi	-	250	250	250	±1%	-	±0.25%
						Gage				
001NG	0	1	inH ₂ O	135	270	415	1400	±3%	±2%	±0.5%
002NG	0	2	inH ₂ O	135	270	415	1400	±2%	±1.25%	±0.35%
004NG	0	4	inH ₂ O	135	270	415	1400	±1.5%	±0.75%	±0.35%
005NG	0	5	inH ₂ O	135	270	415	1400	±1%	±0.75%	±0.25%
010NG	0	10	inH ₂ O	150	300	500	2200	±1%	±0.5%	±0.25%
020NG	0	20	inH ₂ O	175	350	550	4200	±1%	±0.5%	±0.25%
030NG	0	30	inH ₂ O	175	350	550	4200	±1%	±0.5%	±0.25%
001PG	0	1	psi	-	10	15	150	±1%	-	±0.25%
005PG	0	5	psi	-	30	40	150	±1%	-	±0.25%
015PG	0	15	psi	-	30	60	150	±1%	-	±0.25%
030PG	0	30	psi	-	60	120	150	±1%	-	±0.25%
060PG	0	60	psi	-	120	240	250	±1%	-	±0.25%
100PG	0	100	psi	-	250	250	250	±1%	-	±0.25%
150PG	0	150	psi	-	250	250	250	±1%	-	±0.25%

Working pressure: The maximum pressure that may be applied to any port of the sensor in continuous use. This pressure may be outside the operating pressure range limits (Pmin. to Pmax.) in which case the sensor may not provide a valid output until pressure is returned to within the operating pressure range. Tested to 1 million cycles, minimum.

²Overpressure: 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.

³Burst 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.

⁴Common mode pressure: The maximum pressure that can be applied simultaneously to both ports of a differential pressure sensor without causing changes in specified performance.

⁵Total 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

⁶Total Error Band after Auto-Zero: The maximum deviation from the ideal transfer function over the entire compensated pressure range at a constant temperature and supply voltage for a minimum of 24 hours after an auto-zero operation. Includes all errors due to full scale span, pressure non-linearity, pressure hysteresis, and thermal effect on span.

### Available Standard Configurations

	Available Standard Configurations (Dimensional drawings on pages noted below.) Pressure Port				
Package Code	DIP	SMT	SIP		
NN	page 19	page 21	page 24		
AA	_	_	page 24		
AN	page 19	page 22	page 25		
LN	page 19	page 22	page 25		
FF	_	_	page 25		
FN	_	_	page 26		
GN	_	_	page 26		
NB	_	_	page 26		
RN	page 20	page 22	page 27		

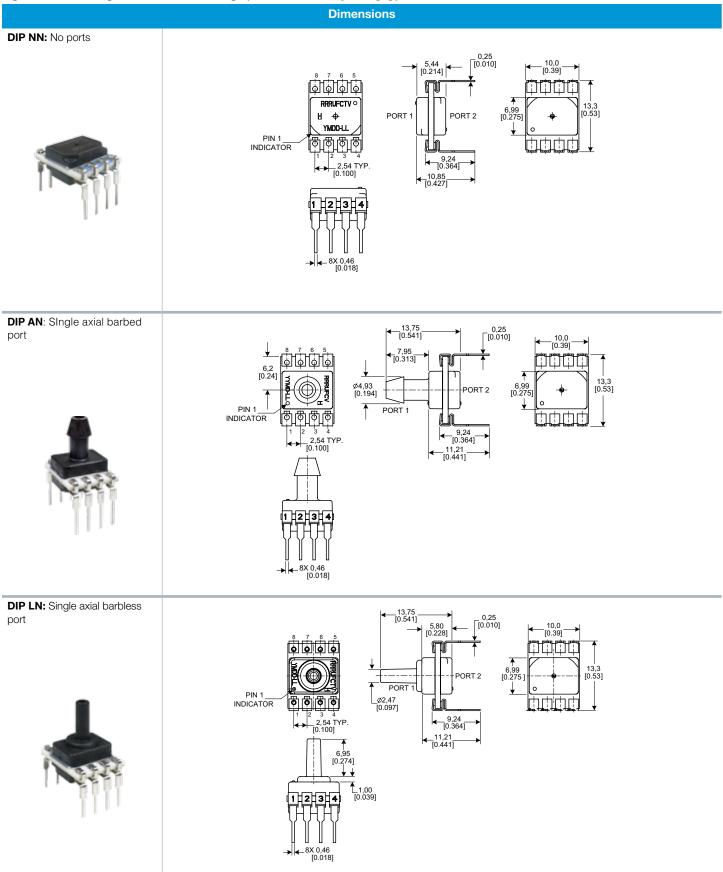
Figure 5. All Available Standard Configurations (Dimensional drawings on pages noted below.)

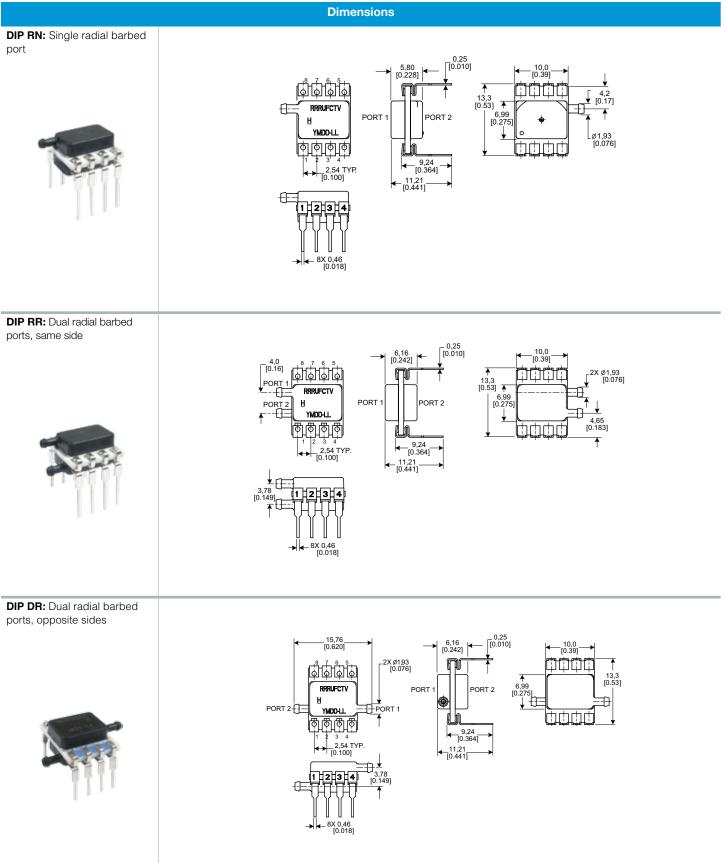
### Available Standard Configurations

	Pressure Port				
Package Code	DIP	SMT	SIP		
RR	page 20	page 23	page 27		
DR	page 20	page 23	page 27		
JN	page 21	page 23	page 28		
JJ	page 21	page 24	page 28		
нн	_	_	page 28		
HN	_	_	page 29		
MN	_	_	page 29		
SN	_	_	page 29		

Figure 5. All Available Standard Configurations (Continued; dimensional drawings on pages noted below.)

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





### Dimensional Drawings DIP and SMT Packages

Figure 6. DIP Package Dimensional Drawings (continued)

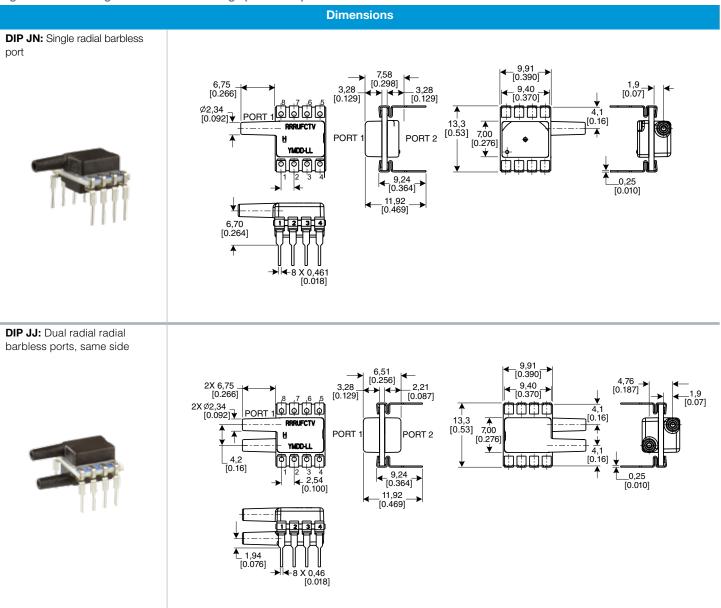
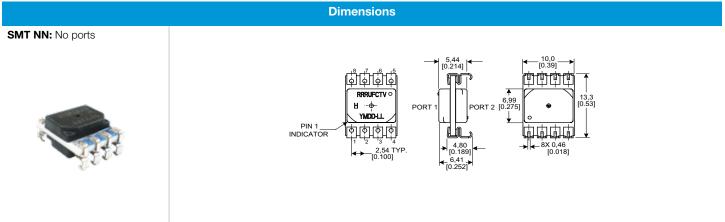
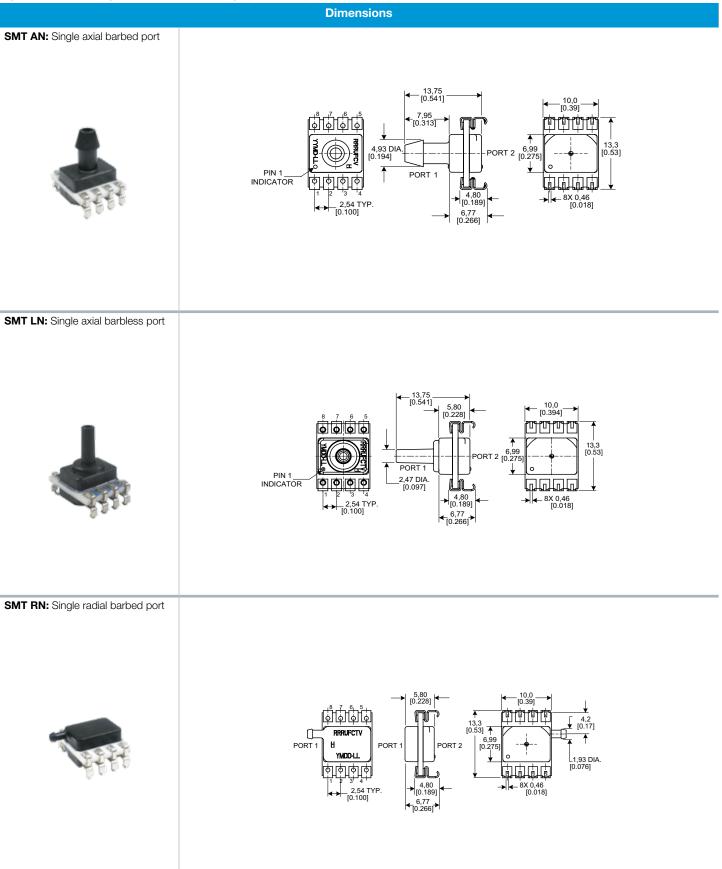
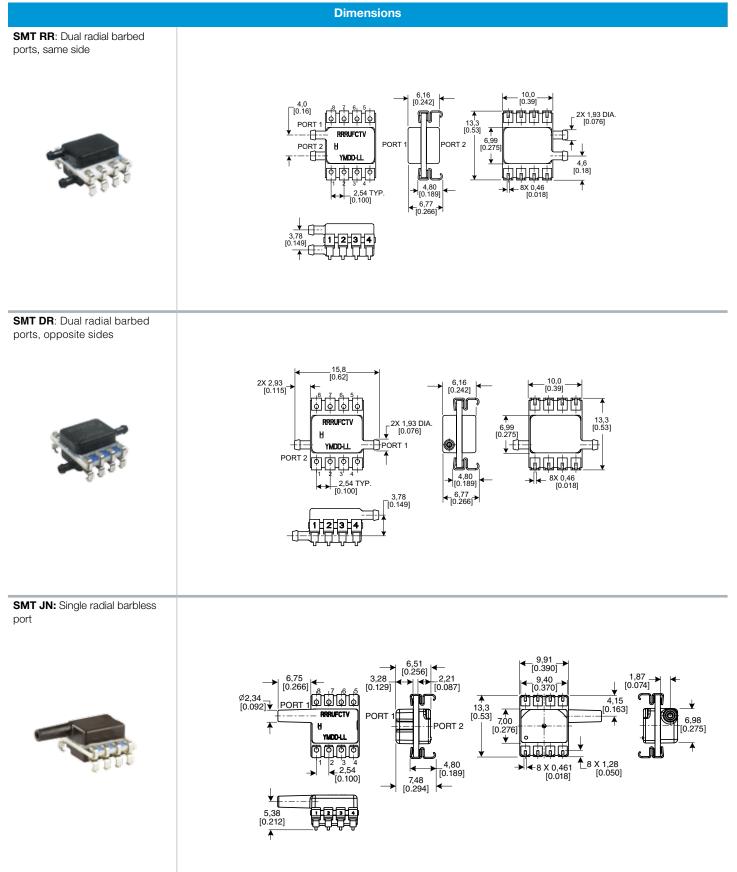


Figure 7. SMT Package Dimensional Drawings (For reference only: mm [in].)







### Dimensional Drawings SMT and SIP Packages

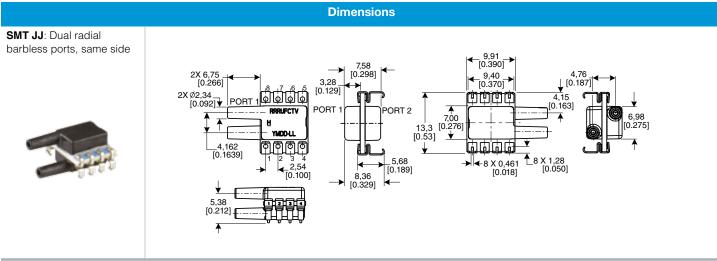
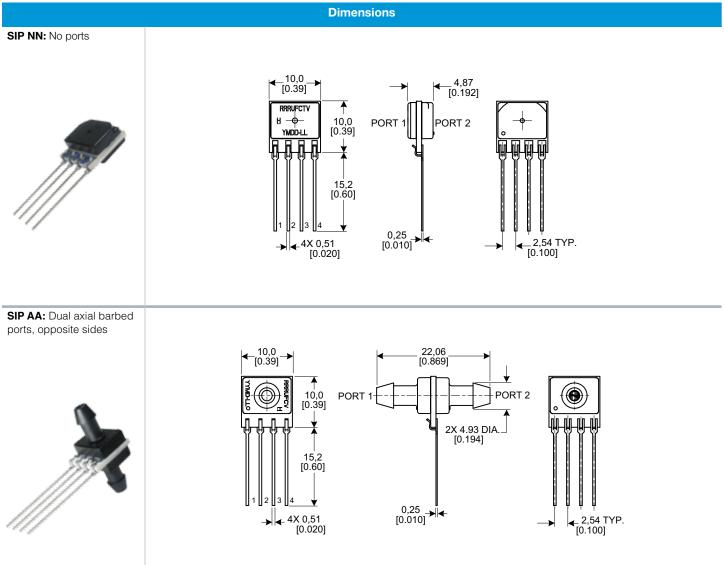
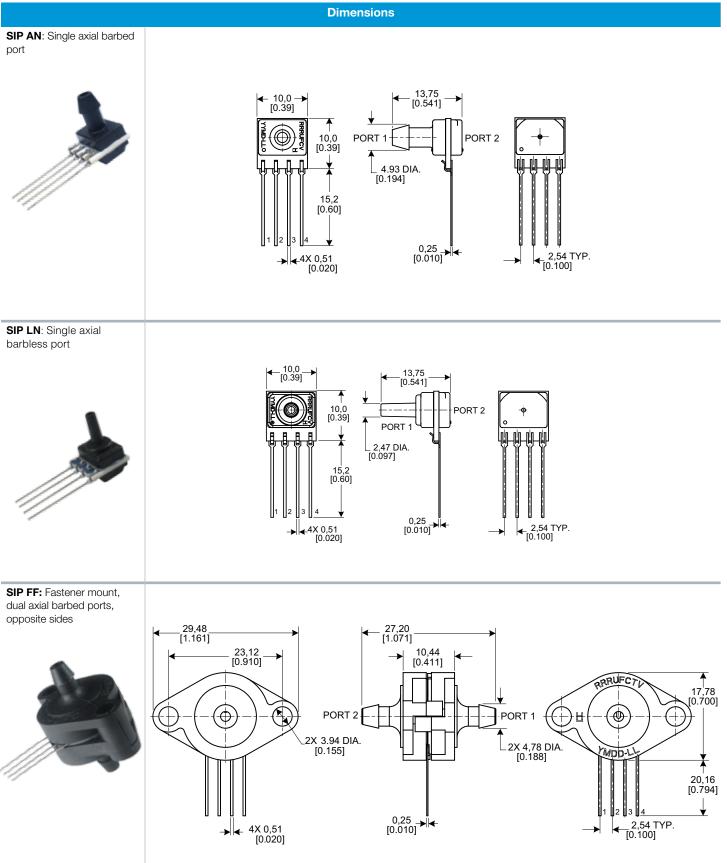
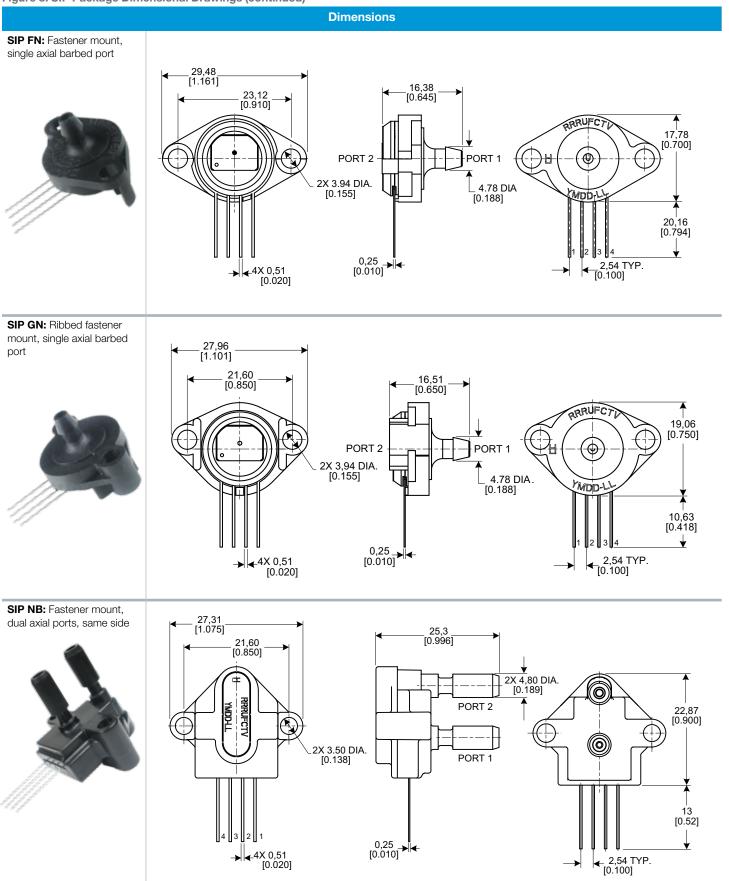
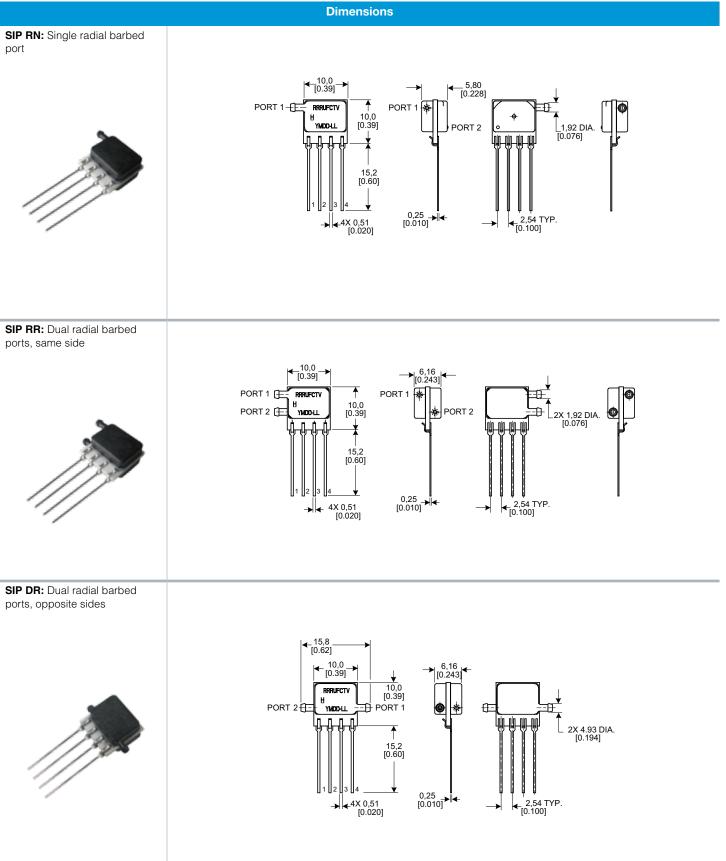


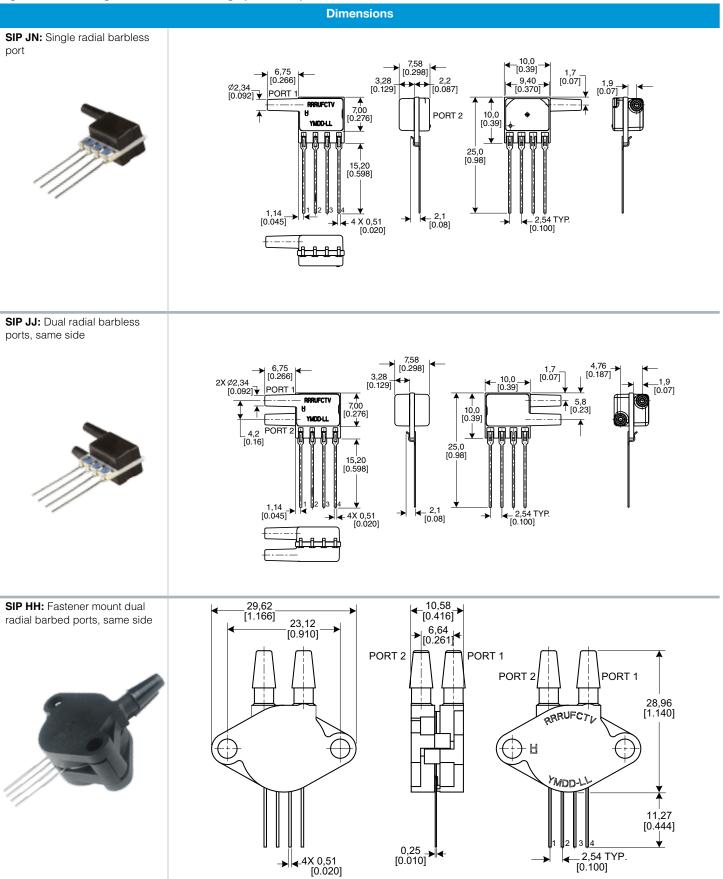
Figure 8. SIP Package Dimensional Drawings (For reference only: mm [in].)

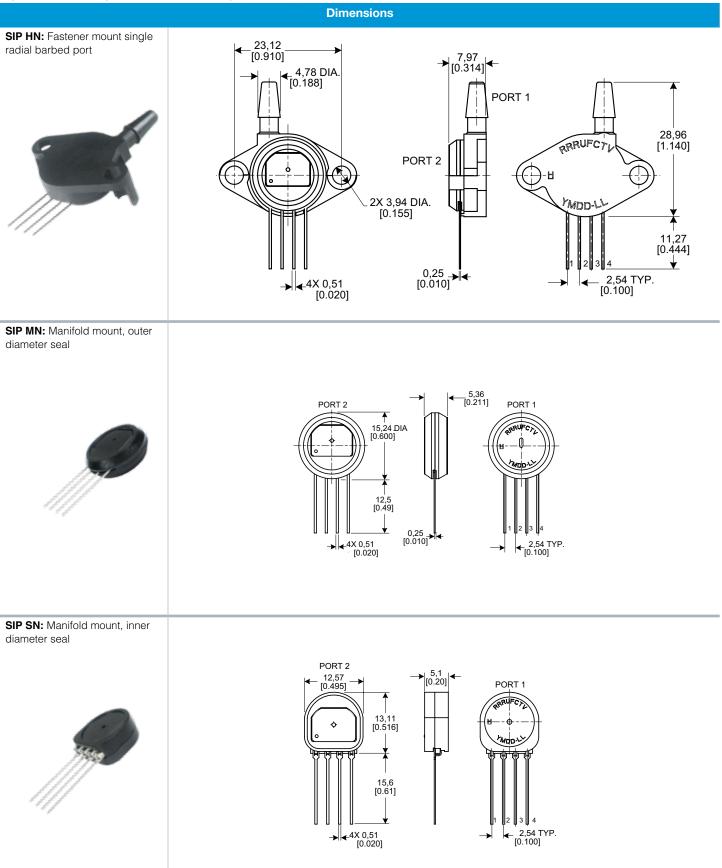












### Pinouts, PCB Pad Layout

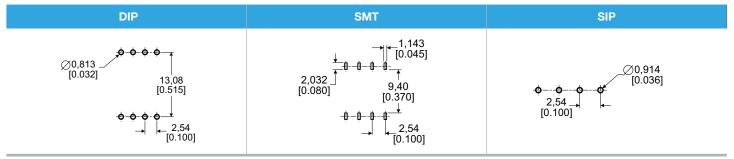
Table 11. Pinouts for DIP and SMT Packages

Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
l ² C	GND	$V_{\text{supply}}$	SDA	SCL	NC	NC	NC	NC
SPI	GND	$V_{supply}$	MISO	SCLK	SS	NC	NC	NC
Analog	NC	V _{supply}	V _{out}	GND	NC	NC	NC	NC

Table 12. Pinouts for SIP Packages

Output Type	Pin 1	Pin 2	Pin 3	Pin 4
l ² C	GND	V _{supply}	SDA	SCL
Analog	NC	V _{supply}	V _{out}	GND

#### Figure 9. Recommended PCB Pad Layouts



### TruStability® Board Mount Pressure Sensors Portfolio Overview

Table 13. TruStability® Board Mount Pressure Sensors Portfolio Overview

Chowseteristic		Series				
Characteristic	HSC	SSC	TSC	NSC		
Package: DIP (Dual In-Line Pin) SMT (Surface Mount Technology) SIP (Single In-Line Pin)	✓ ✓ ✓	* * *	* * *	✓ ✓ ✓		
<b>Option:</b> dry gases only, no diagnostics (all pressure ranges) dry gases only, diagnostics on (all pressure ranges) liquid media on port 1, no diagnostics (±60 mbar to ±10 bar   ±6 kPa to ±1 MPa   ±1 psi to ±150 psi) liquid media on port 1, diagnostics on (±60 mbar to ±10 bar   ±6 kPa to ±1 MPa   ±1 psi to ±150 psi)	$\checkmark$	$\checkmark$	✓ - ✓ -	✓ - ✓ -		
Pressure range:         Absolute:         1 bar to 10 bar   100 kPa to 1 MPa   15 psi to 150 psi         Differential:         ±60 mbar to ±10 bar   ±6 kPa to ±1 MPa   ±1 psi to ±150 psi         ±1.6 mbar to ±40 mbar   ±160 Pa to ±4 kPa   ±0.5 inH ₂ O to ±30 inH ₂ O         Gage:         60 mbar to 10 bar   6 kPa to 1 MPa   1 psi to 150 psi         2.5 mbar to 40 mbar   250 Pa to 4 kPa   1 inH ₂ O to 30 inH ₂ O	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	- - - -	✓ ✓ ✓ ✓		
Temperature compensated	$\checkmark$	$\checkmark$	$\checkmark$	-		
Amplified	$\checkmark$	$\checkmark$	-	-		
Output type: analog digital (SPI and I ² C)	√ √	√ √	✓ _	✓ _		
Transfer function:10% to 90% of Vsupply (analog), 214 counts (digital)5% to 95% of Vsupply (analog), 214 counts (digital)5% to 85% of Vsupply (analog), 214 counts (digital)4% to 94% of Vsupply (analog), 214 counts (digital)	$\checkmark$	$\checkmark$				
Supply voltage: 3.3 Vdc 5.0 Vdc 1.5 Vdc to 12.0 Vdc (for pressure ranges ≥60 mbar   6 kPa   1 psi) 2.7 Vdc to 6.5 Vdc (for pressure ranges ≤40 mbar   4 kPa   20 inH ₂ O)	✓ ✓ -	✓ ✓ -	- - •	- - •		
Accuracy ≤0.25 %FSS BFSL	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		
<b>Compensated temperature range:</b> -20 °C to 85 °C [-4 °F to 185 °F] 0 °C to 85 °C [32 °F to 185 °F] 0 °C to 50 °C [32 °F to 122 °F]	- - •	✓ - -	- •			
Operating temperature range: -20 °C to 85 °C [-4 °F to 185 °F] -40 °C to 85 °C [-40 °F to 185 °F]	✓ _	- ✓	- ✓	- ✓		
<b>Total Error Band:</b> down to ±1% Full Scale Span max. down to ±2% Full Scale Span max.	✓ -	- ✓	_	_		

#### **ADDITIONAL INFORMATION**

The following associated literature is available at sensing.honeywell.com:

- 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

# 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.

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 80541-B00000150-01
 80541-B00000200-05
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