Honeywell

Installation Instructions for the TruStability® Board Mount Pressure Sensors

Issue 5

50063864

TSC Series, Compensated/Unamplified

±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
Millivolt Analog Output

NSC Series, Uncompensated/Unamplified

±2.5 mbar to ±10 bar | ±250 Pa to ±1 MPa | ±1 inH_2O to ±150 psi
Millivolt Analog Output

Honeywell's TruStability® TSC Series and NSC Series are piezoresistive silicon pressure sensors offering a ratiometric analog output for reading pressure over the specified full scale pressure span and temperature range.

TSC Series:

- Temperature compensated and unamplified.
- Compensation makes it easier to integrate the sensor into a system by eliminating the need to calibrate the system over temperature and also offers reduced part-to-part variation.
- Compensated temperature range is 0 °C to 85 °C [-32 °F to 185 °F].
- Operating temperature range is -40 °C to 85 °C [-40 °F to 185 °F].
- Measures differential or gage pressures

NSC Series:

- Uncompensated and unamplified.
- Allows customers the flexibility of performing their own calibration while still benefiting from the industry-leading stability, accuracy, and repeatability that the Honeywell TruStability® Pressure Sensors provide.
- Operates as specified from -40 °C to 85 °C [-40 °F to 185 °F].
- Measures absolute, differential or gage pressures.

The absolute versions have an internal vacuum reference and an output value proportional to absolute pressure. Differential versions allow measurement of pressure between two pressure ports. Gage versions are referenced to atmospheric pressure and provide an output proportional to pressure variations from atmosphere.

The TSC Series and NSC Series sensors are intended for use with non-corrosive, non-ionic gases, such as air. Port 1 can also be used for non-corrosive, non-ionic liquids on sensors rated above 60 mbar | 6 kPa | 1 psi.

The TSC and NSC Series offer numerous package styles and mounting options, making it easier for device manufacturers to integrate the product into their applications. These sensors offer infinite resolution on the pressure signal. Frequency response is also typically limited only by the end user's system. All products are designed and manufactured according to ISO 9001.

Table 1. Absolute Maximum Ratings[1]

Characteristic	Min.	Max.	Unit
Supply voltage (V_{supply})[2]:			
pressure ranges ≥60 mbar | 6 kPa | 1 psi	-12.0	12.0	Vdc
pressure ranges ≤40 mbar | 4 kPa | 20 inH_2O	0	7	
Storage temperature	-40 [-40]	85 [185]	°C [°F]
Soldering time and temperature:			
lead solder temperature (SIP, DIP)		4 s max. at 250 °C [482 °F]	
peak reflow temperature (SMT)		15 s max. at 250 °C [482 °F]	

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

[2]Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

Table 2. Operating Specifications

Characteristic	Min.	Typ.	Max.	Unit
Supply voltage (V_{supply}):[1, 2] pressure ranges ≥60 mbar | 6 kPa | 1 psi pressure ranges ≤40 mbar | 4 kPa | 20 H_2O	 1.5 2.7	 5.0 5.0	 12.0 6.5	Vdc
Supply current (at 5.0 Vdc supply) TSC Series NSC Series	 — —	 0.6 1.5	 1 2.2	mA
Operating temperature range[3]	-40 [-40]	—	85 [185]	°C [°F]
Compensated temperature range[4]	0 [32]	—	85 [185]	°C [°F]
Startup time	—	—	5	ms
TSC Series output resistance	—	2.5	—	kOhm

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

[2]Incorrect application of supply voltage or ground to the wrong pin may cause electrical failure.

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

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

Table 3. Environmental Specifications

Characteristic	Parameter
Humidity	0% to 95% RH, non-condensing
Vibration	MIL-STD-202F, Method 214A, Condition 1E (15 g, 10 Hz to 2 kHz)
Shock	MIL-STD-202F, Method 213B, Condition F (100 g, 6 ms duration)
Life[1]	1 million pressure cycles minimum
Solder reflow	J-STD-020-D MSL1 (unlimited shelf life when stored at less than 30 °C and 85 %RH)

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

Table 4. Wetted Materials[1]

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, RTV	epoxy, RTV
Electronic components	silicon	silicon, glass, gold

[1]Contact Honeywell Customer Service for detailed material information.

CAUTION
PRODUCT DAMAGE

- 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.

Figure 1. DIP Package Dimensional Drawings (For reference only: mm [in])

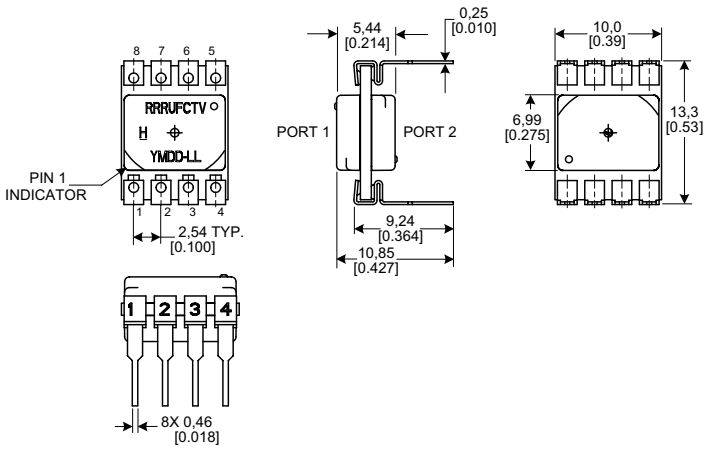
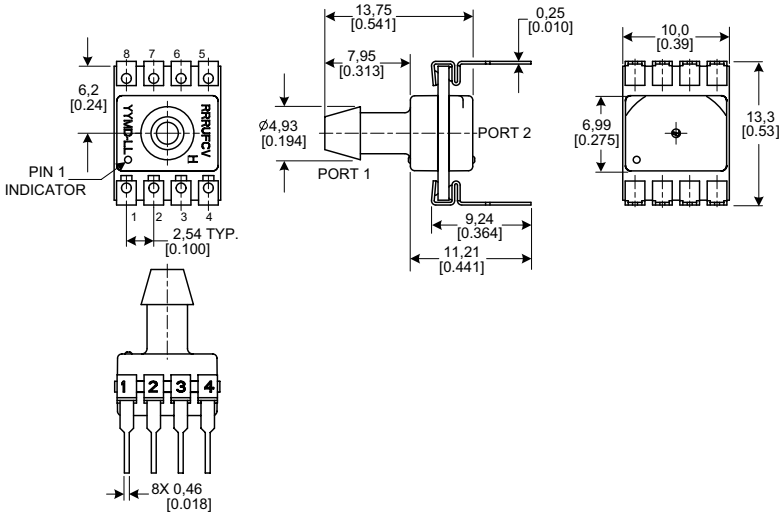
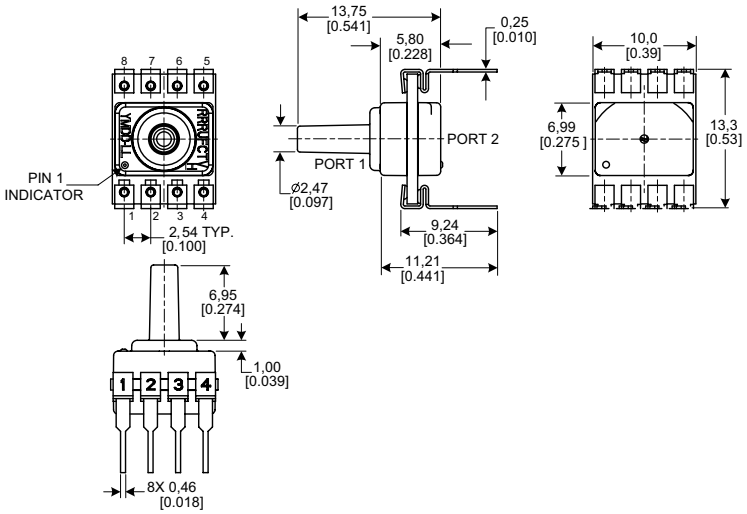
	Dimensions
DIP NN: No ports	 
DIP AN: SIngle axial barbed port	 
DIP LN: Single axial barbless port	 

Figure 1. DIP Package Dimensional Drawings (continued)

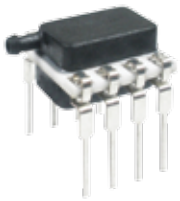
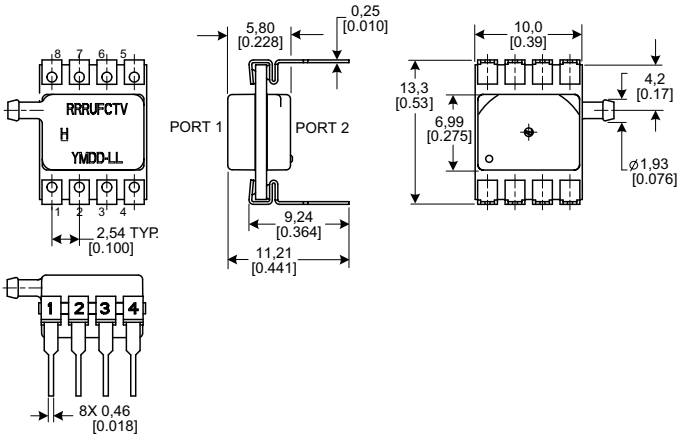
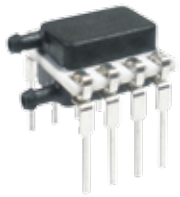
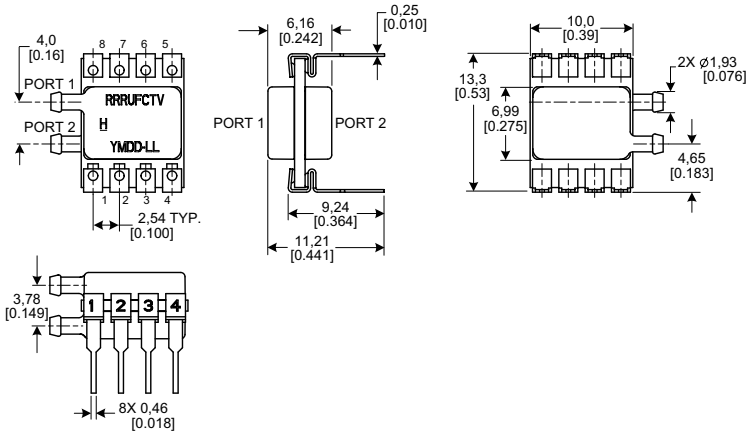
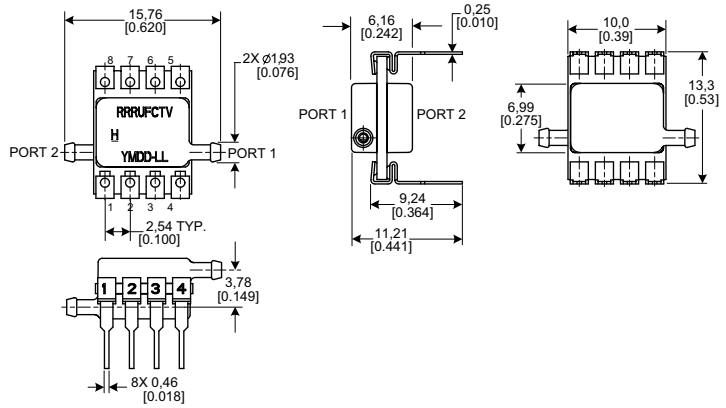
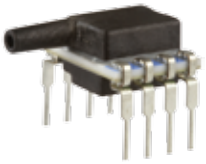
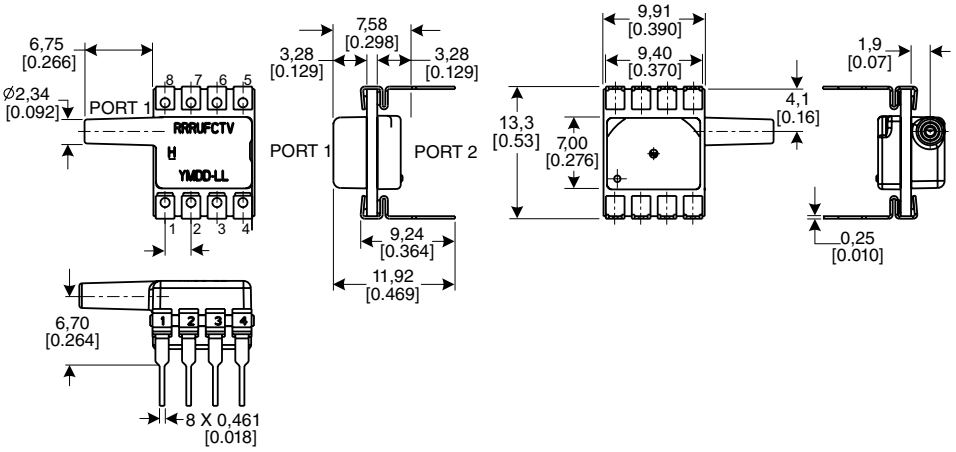
	Dimensions
DIP RN: Single radial barbed port 	
DIP RR: Dual radial barbed ports, same side 	
DIP DR: Dual radial barbed ports, opposite sides 	

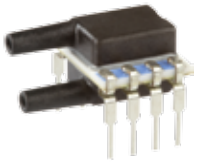
Figure 1. DIP Package Dimensional Drawings (continued)

	Dimensions
DIP JN: Single radial barbless port	





DIP JJ: Dual radial radial barbless ports, same side	



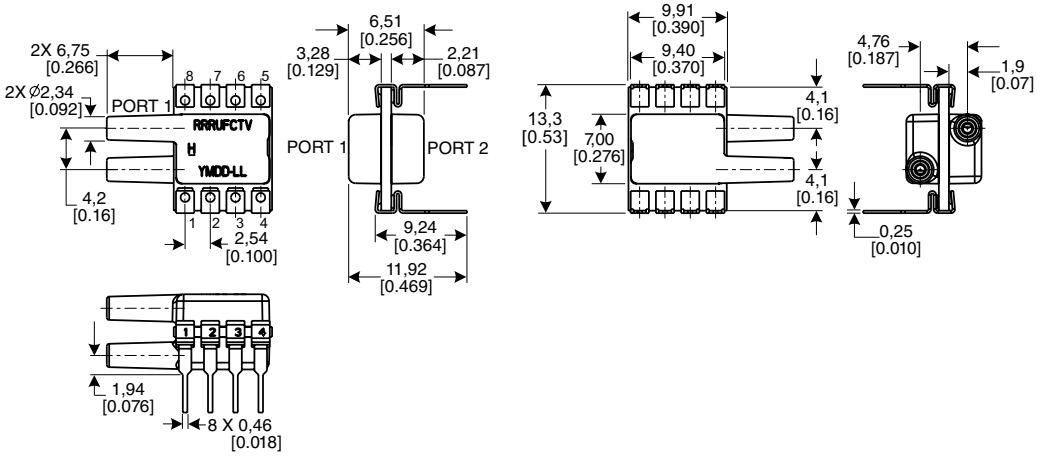


Figure 2. SMT Package Dimensional Drawings (For reference only: mm [in])

	Dimensions
SMT NN: No ports	

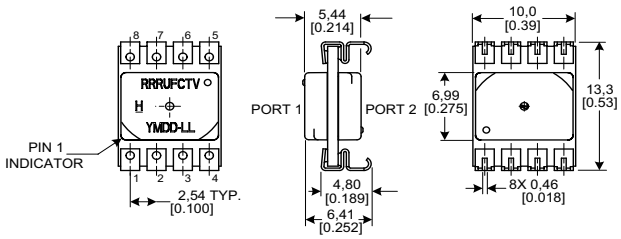
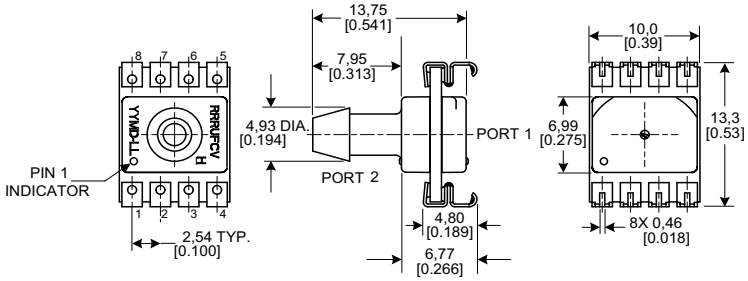
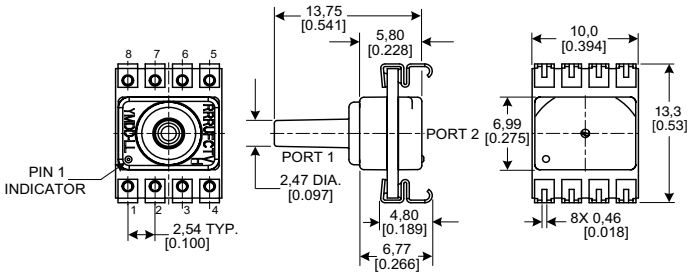


Figure 2. SMT Package Dimensional Drawings (continued)

	Dimensions
SMT AN: Single axial barbless port	



SMT LN: Single axial barbless port	



SMT RN: Single radial barbed port	

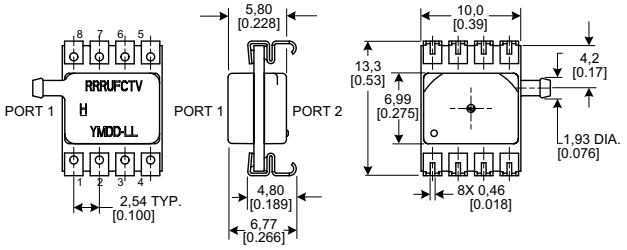


Figure 2. SMT Package Dimensional Drawings (continued)

	Dimensions
SMT RR: Dual radial barbed ports, same side	
SMT DR: Dual radial barbed ports, opposite sides	
SMT JN: Single radial barbless port	

Figure 2. SMT Package Dimensional Drawings (continued)

	Dimensions
SMT JJ: Dual radial barbless ports, same side	

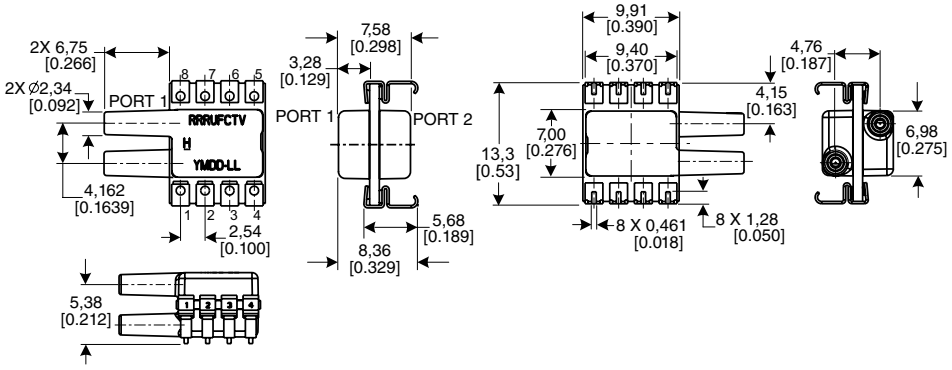
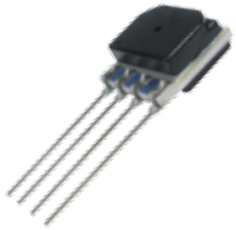
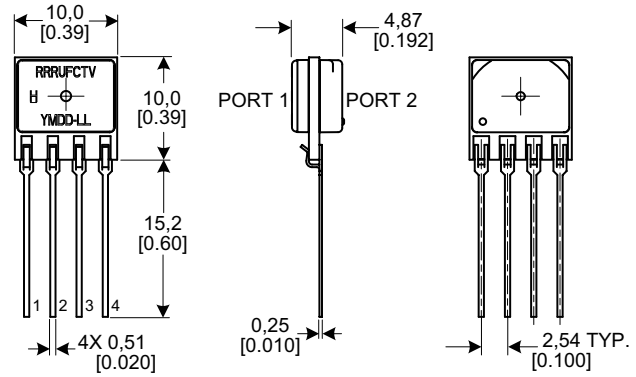


Figure 3. SIP Package Dimensional Drawings (For reference only: mm [in].)

	Dimensions
SIP NN: No ports	





SIP AA: Dual axial barbed ports, opposite sides	

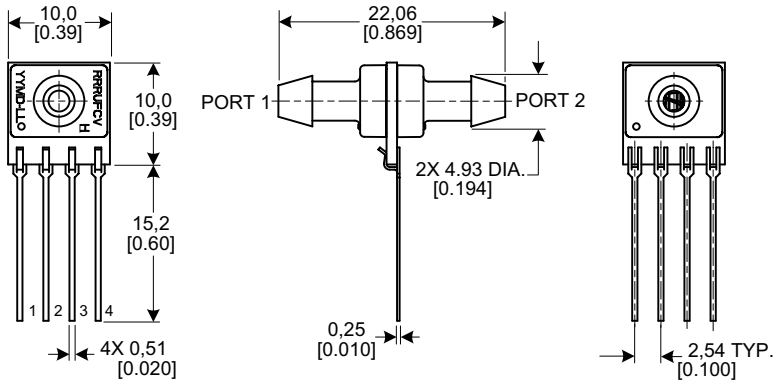
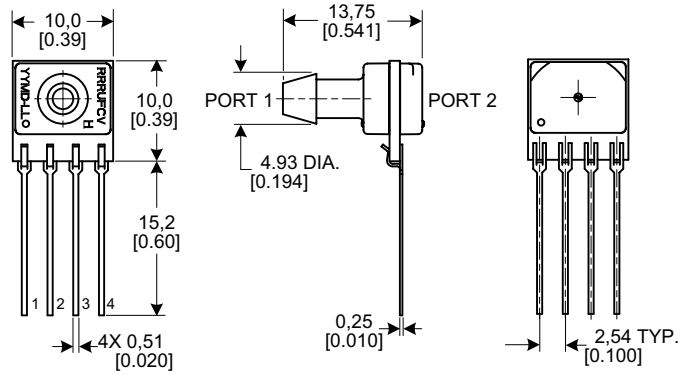
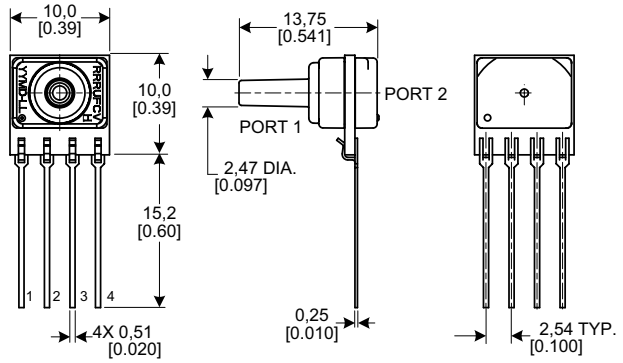


Figure 3. SIP Package Dimensional Drawings (continued)

	Dimensions
SIP AN: Single axial barbed port	



SIP LN: Single axial barbless port	



SIP FF: Fastener mount, dual axial barbed ports, opposite sides	

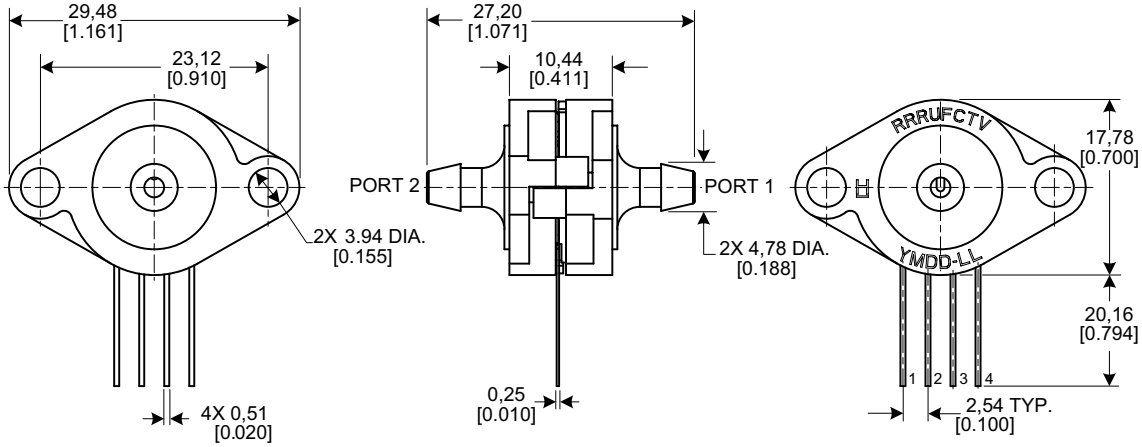


Figure 3. SIP Package Dimensional Drawings (continued)

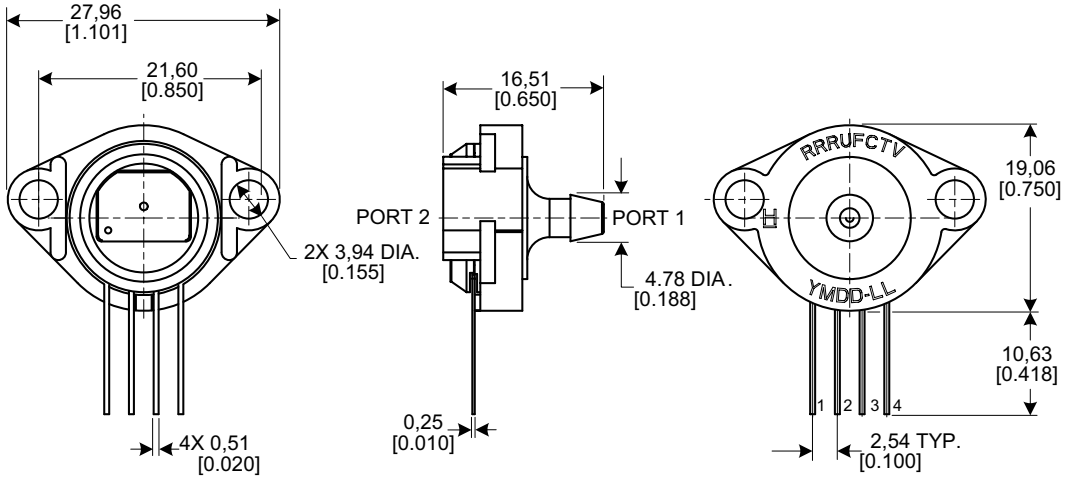
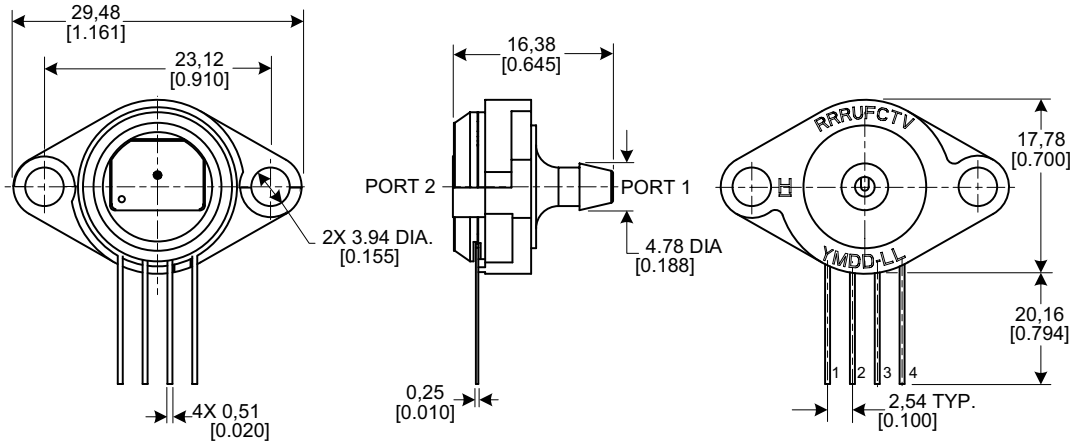
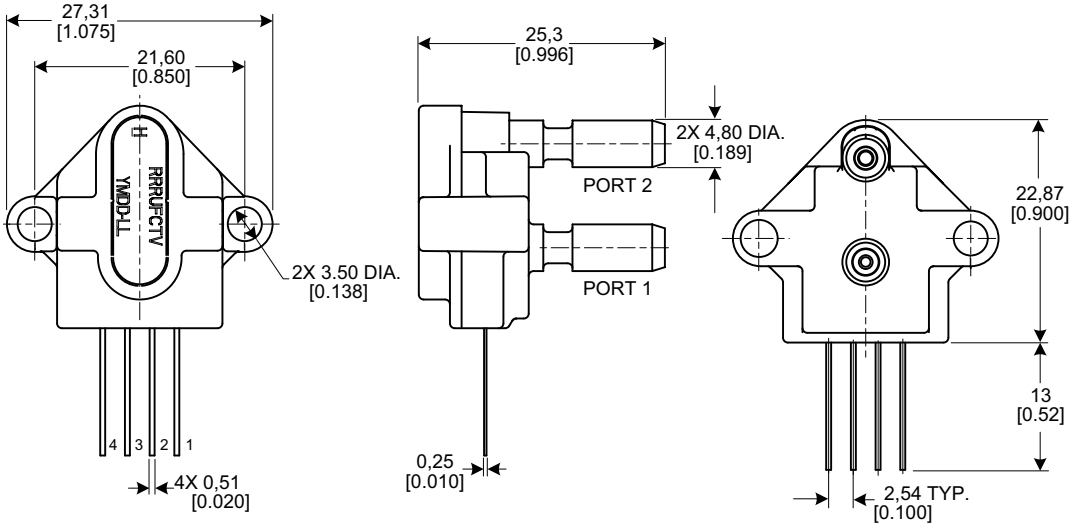
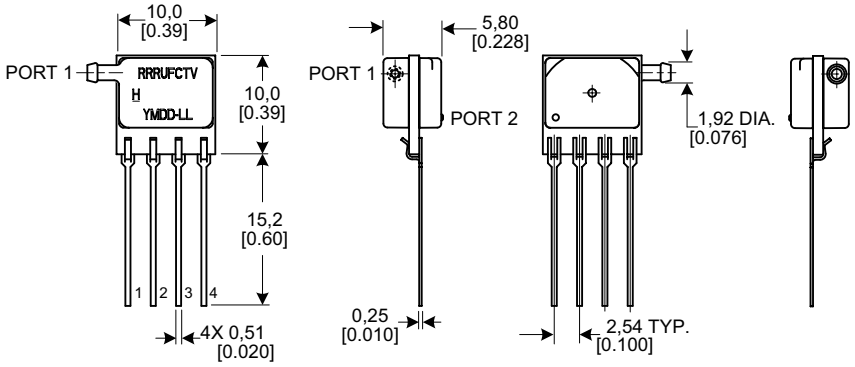
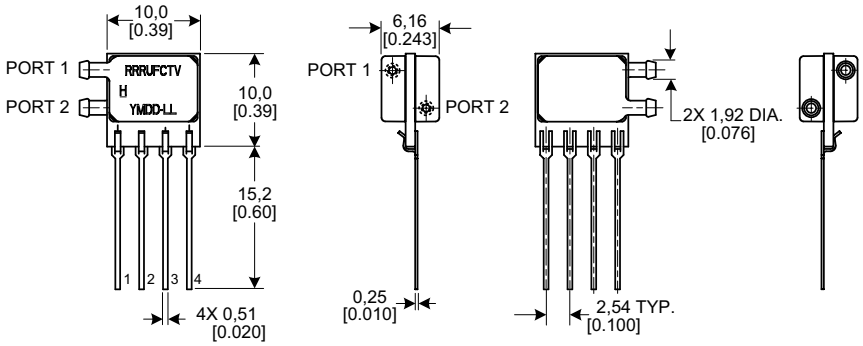
Dimensions	
SIP FN: Fastener mount, single axial barbed port	 
SIP GN: Ribbed fastener mount, single axial barbed port	 
SIP NB: Fastener mount, dual axial ports, same side	 

Figure 3. SIP Package Dimensional Drawings (continued)

	Dimensions
SIP RN: Single radial barbed port	
SIP RR: Dual radial barbed ports, opposite sides	
SIP DR: Dual radial barbed ports, opposite sides	





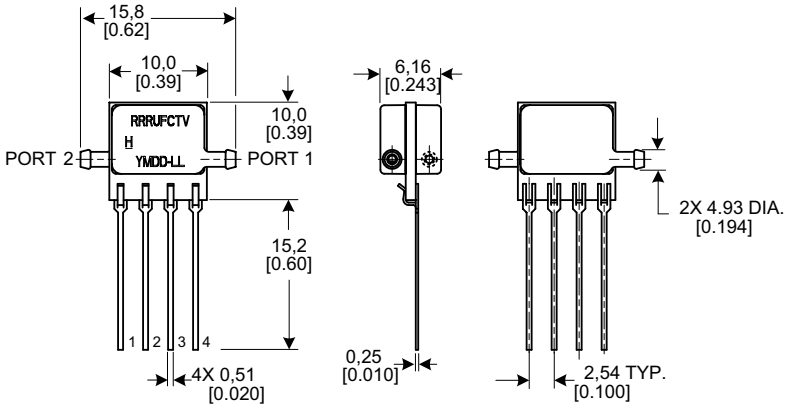
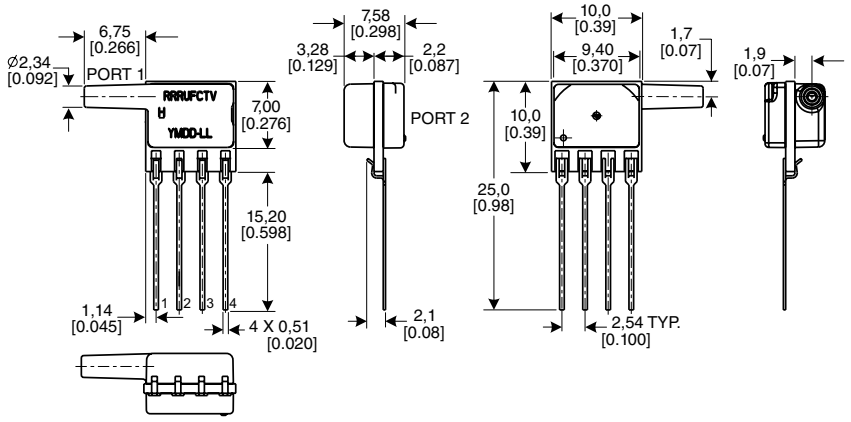
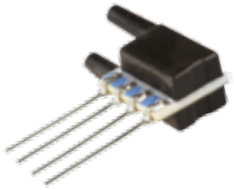


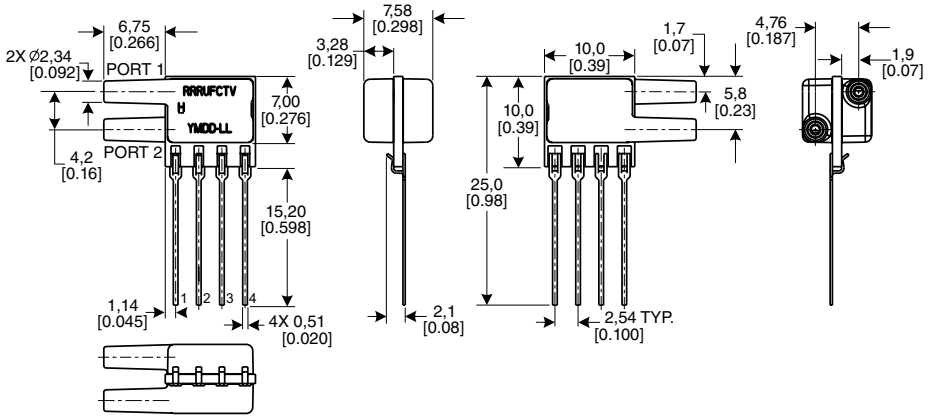
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions
SIP JN: Single radial barbless port



SIP JJ: Dual radial barbless ports, same side





SIP HH: Fastener mount dual radial barbed ports, same side

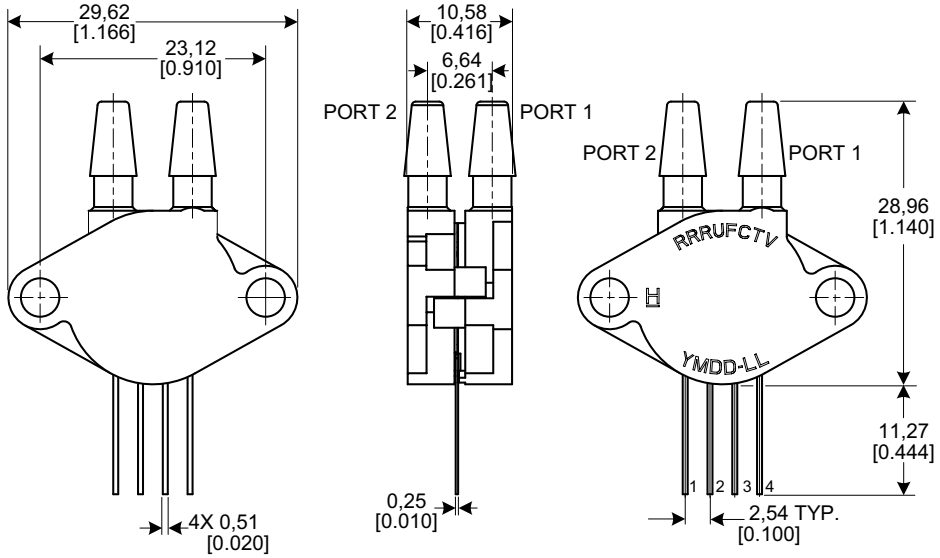


Figure 3. SIP Package Dimensional Drawings (continued)

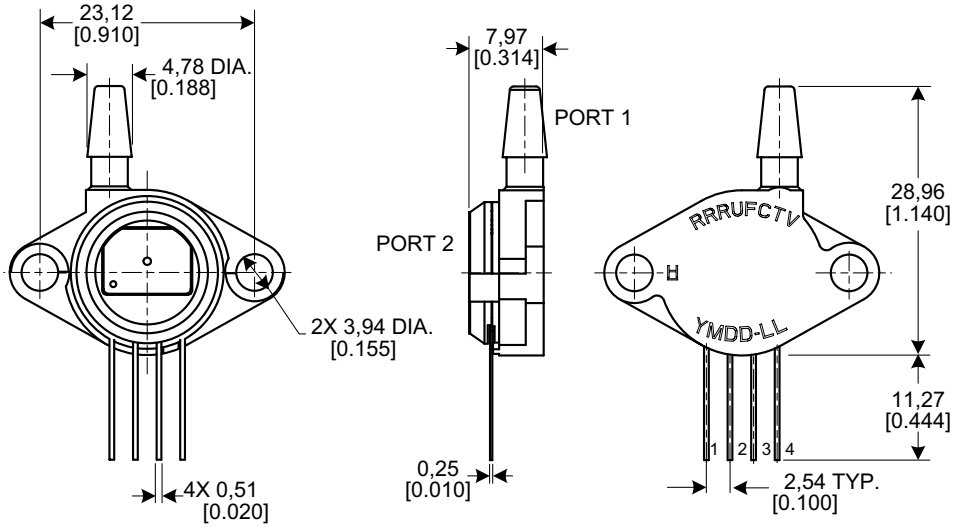
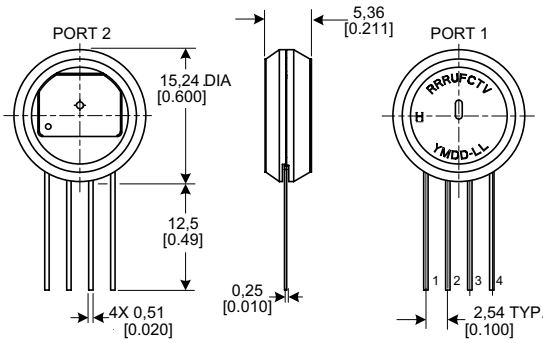
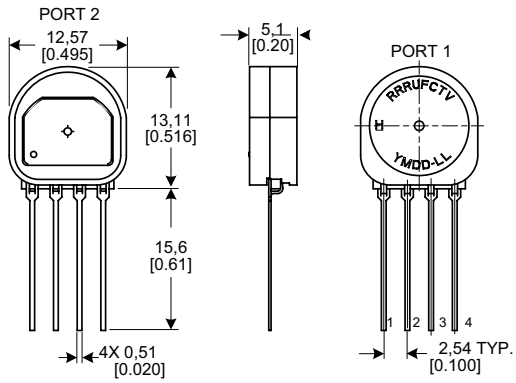
Dimensions	
SIP HN: Fastener mount single radial barbed port	 
SIP MN: Manifold mount, outer diameter seal	 
SIP SN: Manifold mount, inner diameter seal	 

Table 5. Pinout for DIP and SMT Packages

Output Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
analog	GND	Vout+	V_{supply}	Vout-	NC	NC	NC	NC

Table 6. Pinout for SIP Packages

Output Type	Pin 1	Pin 2	Pin 3	Pin 4
analog	GND	Vout+	V_{supply}	Vout-

Figure 4. Recommended PCB Pad Layouts

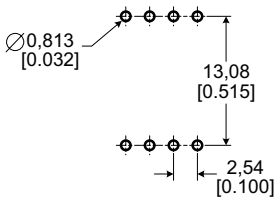
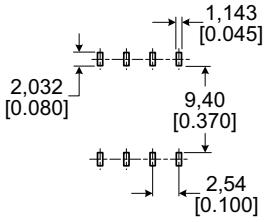
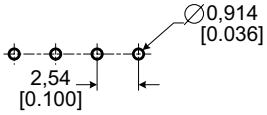
DIP	SMT	SIP
		

Figure 5. Circuit Examples

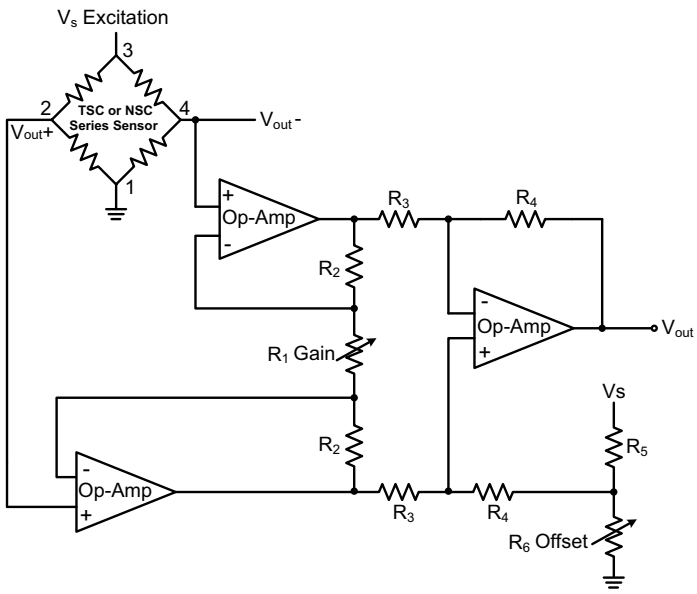
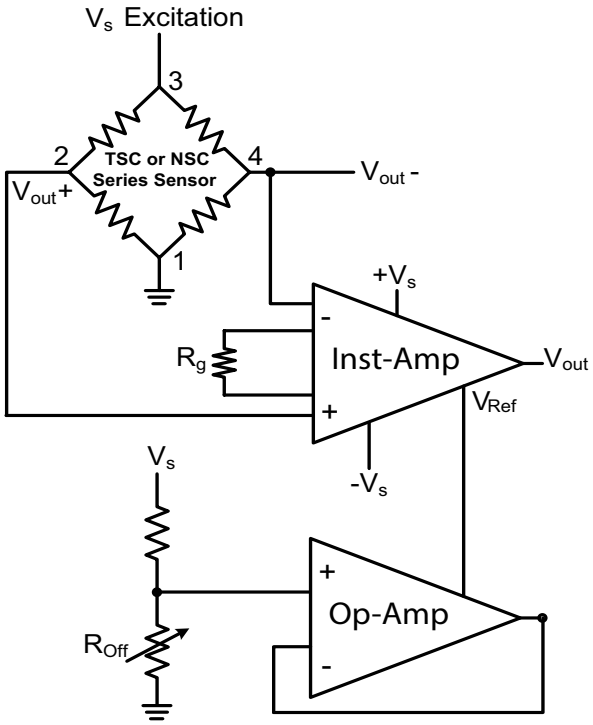
Amplification Circuit Using Discrete Op-Amps	Amplification Circuit Using an Instrumentation Amplifier
	

Figure 6. TSC Series Nomenclature and Order Guide[1]

For example, **TSCDNNN150PGUCV** defines a TSC Series TruStability® Pressure Sensor, DIP package, NN pressure port, no special options,150 psi gage pressure range, unamplified, compensated, constant supply voltage.

T S C D N N N 1 5 0 P G U C V

Series

TSC	Compensated/Unamplified

Package

D	DIP (Dual Inline Pin)
M	SMT (Surface Mount Technology)
S	SIP (Single Inline Pin)

Pressure Port

DIP	SMT	SIP
NN No ports	**NN** No ports	**NN** No ports
–	–	**AA** Dual axial barbed ports, opposite sides
AN Single axial barbed port	**AN** Single axial barbed port	**AN** Single axial barbed port
LN Single axial barbless port	**LN** Single axial barbless port	**LN** Single axial barbless port
–	–	**FF** Fastener mount, dual axial barbed ports, opposite sides
–	–	**FN** Fastener mount, single axial barbed port
–	–	**GN** Ribbed fastener mount, single axial barbed port
–	–	**NB** Fastener mount, dual axial ports, same side
RN Single radial barbed port	**RN** Single radial barbed port	**RN** Single radial barbed port
RR Dual radial barbed ports, same side	**RR** Dual radial barbed ports, same side	**RR** Dual radial barbed ports, same side
DR Dual radial barbed ports, opposite sides	**DR** Dual radial barbed ports, opposite sides	**DR** Dual radial barbed ports, opposite sides
JN Single radial barbless port	**JN** Single radial barbless port	**JN** Single radial barbless port
JJ Dual radial barbless ports, same side	**JJ** Dual radial barbless ports, same side	**JJ** Dual radial barbless ports, same side
–	–	**HH** Fastener mount, dual radial barbed ports, same side
–	–	**HN** Fastener mount, single radial barbed port
–	–	**MN** Manifold mount, outer diameter seal
–	–	**SN** Manifold mount, inner diameter seal

Options

N	No special options

Supply Voltage

V	Constant

Compensation

C	Compensated

Output Type

U	Unamplified

Pressure Range

60 mbar to 10 bar	6 kPa to 1 MPa	1 psi to 150 psi
Differential	*Differential*	*Differential*
060MD ±60 mbar	**006KD** ±6 kPa	**001PD** ±1 psi
100MD ±100 mbar	**010KD** ±10 kPa	**005PD** ±5 psi
160MD ±160 mbar	**016KD** ±16 kPa	**015PD** ±15 psi
250MD ±250 mbar	**025KD** ±25 kPa	**030PD** ±30 psi
400MD ±400 mbar	**040KD** ±40 kPa	**060PD** ±60 psi
600MD ±600 mbar	**060KD** ±60 kPa	**100PD** ±100 psi
001BD ±1 bar	**100KD** ±100 kPa	**150PD** ±150 psi
1.6BD ±1.6 bar	**160KD** ±160 kPa	
2.5BD ±2.5 bar	**250KD** ±250 kPa	
004BD ±4 bar	**400KD** ±400 kPa	
006BD ±6 bar	**600KD** ±600 kPa	
010BD ±10 bar	**001GD** ±1 MPa	
Gage	*Gage*	*Gage*
060MG 0 mbar to 60 mbar	**006KG** 0 kPa to 6 kPa	**001PG** 0 psi to 1 psi
100MG 0 mbar to 100 mbar	**010KG** 0 kPa to 10 kPa	**005PG** 0 psi to 5 psi
160MG 0 mbar to 160 mbar	**016KG** 0 kPa to 16 kPa	**015PG** 0 psi to 15 psi
250MG 0 mbar to 250 mbar	**025KG** 0 kPa to 25 kPa	**030PG** 0 psi to 30 psi
400MG 0 bar to 400 mbar	**040KG** 0 kPa to 40 kPa	**060PG** 0 psi to 60 psi
600MG 0 bar to 600 mbar	**060KG** 0 kPa to 60 kPa	**100PG** 0 psi to 100 psi
001BG 0 bar to 1 bar	**100KG** 0 kPa to 100 kPa	**150PG** 0 psi to 150 psi
1.6BG 0 bar to 1.6 bar	**160KG** 0 kPa to 160 kPa	
2.5BG 0 bar to 2.5 bar	**250KG** 0 kPa to 250 kPa	
004BG 0 bar to 4 bar	**400KG** 0 kPa to 400 kPa	
006BG 0 bar to 6 bar	**600KG** 0 kPa to 600 kPa	
010BG 0 bar to 10 bar	**001GG** 0 kPa to 1 MPa	

Figure 7. NSC Series Nomenclature and Order Guide[1]

For example, **NSCDNNN150PGUNV** defines an NSC Series TruStability® Pressure Sensor, DIP package, NN pressure port, no special options,150 psi gage pressure range, unamplified, uncompensated, constant supply voltage.

N S C D N N N 1 5 0 P G U N V

Series

NSC	Uncompensated/Unamplified

Package

D	DIP (Dual Inline Pin)
M	SMT (Surface Mount Technology)
S	SIP (Single Inline Pin)

Pressure Port

	DIP	SMT	SIP
NN	No ports	No ports	No ports
AA	—	—	Dual axial barbed ports, opposite sides
AN	Single axial barbed port	Single axial barbed port	Single axial barbed port
LN	Single axial barbless port	Single axial barbless port	Single axial barbless port
FF	—	—	Fastener mount, dual axial barbed ports, opposite sides
FN	—	—	Fastener mount, single axial barbed port
GN	—	—	Ribbed fastener mount, single axial barbed port
NB	—	—	Fastener mount, dual axial ports, same side
RN	Single radial barbed port	Single radial barbed port	Single radial barbed port
RR	Dual radial barbed ports, same side	Dual radial barbed ports, same side	Dual radial barbed ports, same side
DR	Dual radial barbed ports, opposite sides	Dual radial barbed ports, opposite sides	Dual radial barbed ports, opposite sides
JN	Single radial barbless port	Single radial barbless port	Single radial barbless port
JJ	Dual radial barbless ports, same side	Dual radial barbless ports, same side	Dual radial barbless ports, same side
HH	—	—	Fastener mount, dual radial barbed ports, same side
HN	—	—	Fastener mount, single radial barbed port
MN	—	—	Manifold mount, outer diameter seal
SN	—	—	Manifold mount, inner diameter seal

Options

N	No special options

Supply Voltage

V	Constant

Compensation

N	Uncompensated

Output Type

U	Unamplified

Pressure Range

2.5 mbar to 10 bar	400 Pa to 1 MPa	1 in H_2O to 150 psi
Absolute	*Absolute*	*Absolute*
001BA 0 bar to 1 bar	**100KA** 0 kPa to 100 kPa	**015PA** 0 psi to 15 psi
1.6BA 0 bar to 1.6 bar	**160KA** 0 kPa to 160 kPa	**030PA** 0 psi to 30 psi
2.5BA 0 bar to 2.5 bar	**250KA** 0 kPa to 250 kPa	**060PA** 0 psi to 60 psi
004BA 0 bar to 4 bar	**400KA** 0 kPa to 400 kPa	**100PA** 0 psi to 100 psi
006BA 0 bar to 6 bar	**600KA** 0 kPa to 600 kPa	**150PA** 0 psi to 150 psi
010BA 0 bar to 10 bar	**001GA** 0 kPa to 1 MPa	
Differential	*Differential*	*Differential*
2.5MD ±2.5 mbar	**250LD** ±250 Pa	**001ND** ±1 inH_2O
004MD ±4 mbar	**400LD** ±400 Pa	**002ND** ±2 inH_2O
006MD ±6 mbar	**600LD** ±600 Pa	**004ND** ±4 inH_2O
010MD ±10 mbar	**001KD** ±1 kPa	**005ND** ±5 inH_2O
016MD ±16 mbar	**1.6KD** ±1.6 kPa	**010ND** ±10 inH_2O
025MD ±25 mbar	**2.5KD** ±2.5 kPa	**020ND** ±20 inH_2O
040MD ±40 mbar	**004KD** ±4 kPa	**030ND** ±30 inH_2O
060MD ±60 mbar	**006KD** ±6 kPa	**001PD** ±1 psi
100MD ±100 mbar	**010KD** ±10 kPa	**005PD** ±5 psi
160MD ±160 mbar	**016KD** ±16 kPa	**015PD** ±15 psi
250MD ±250 mbar	**025KD** ±25 kPa	**030PD** ±30 psi
400MD ±400 mbar	**040KD** ±40 kPa	**060PD** ±60 psi
600MD ±600 mbar	**060KD** ±60 kPa	**100PD** ±100 psi
001BD ±1 bar	**100KD** ±100 kPa	**150PD** ±150 psi
1.6BD ±1.6 bar	**160KD** ±160 kPa	
2.5BD ±2.5 bar	**250KD** ±250 kPa	
004BD ±4 bar	**400KD** ±400 kPa	
006BD ±6 bar	**600KD** ±600 kPa	
010BD ±10 bar	**001GD** ±1 MPa	
Gage	*Gage*	*Gage*
004MG 0 mbar to 4 mbar	**400LG** 0 Pa to 400 Pa	**002NG** 0 inH_2O to 2 inH_2O
006MG 0 mbar to 6 mbar	**600LG** 0 Pa to 600 Pa	**004NG** 0 inH_2O to 4 inH_2O
010MG 0 mbar to 10 mbar	**001KG** 0 kPa to 1 kPa	**005NG** 0 inH_2O to 5 inH_2O
016MG 0 mbar to 16 mbar	**1.6KG** 0 kPa to 1.6 kPa	**010NG** 0 inH_2O to 10 inH_2O
025MG 0 mbar to 25 mbar	**004KG** 0 kPa to 4 kPa	**020NG** 0 inH_2O to 20 inH_2O
040MG 0 mbar to 40 mbar	**006KG** 0 kPa to 6 kPa	**030NG** 0 inH_2O to 30 inH_2O
060MG 0 mbar to 60 mbar	**010KG** 0 kPa to 10 kPa	**001PG** 0 psi to 1 psi
100MG 0 mbar to 100 mbar	**016KG** 0 kPa to 16 kPa	**005PG** 0 psi to 5 psi
160MG 0 mbar to 160 mbar	**025KG** 0 kPa to 25 kPa	**015PG** 0 psi to 15 psi
250MG 0 mbar to 250 mbar	**040KG** 0 kPa to 40 kPa	**030PG** 0 psi to 30 psi
400MG 0 bar to 400 mbar	**060KG** 0 kPa to 60 kPa	**060PG** 0 psi to 60 psi
600MG 0 bar to 600 mbar	**100KG** 0 kPa to 100 kPa	**100PG** 0 psi to 100 psi
001BG 0 bar to 1 bar	**160KG** 0 kPa to 160 kPa	**150PG** 0 psi to 150 psi
1.6BG 0 bar to 1.6 bar	**250KG** 0 kPa to 250 kPa	
2.5BG 0 bar to 2.5 bar	**400KG** 0 kPa to 400 kPa	
004BG 0 bar to 4 bar	**600KG** 0 kPa to 600 kPa	
006BG 0 bar to 6 bar	**001GG** 0 kPa to 1 MPa	
010BG 0 bar to 10 bar		

TSC Series, Compensated/Unamplified
NSC Series, Uncompensated/Unamplified

Issue 4

50063864

⚠ 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.

WARRANTY

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

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

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

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: sensing.honeywell.com
Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

Sensing and Control
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422
honeywell.com

50063864-5-EN
February 2014