

Installation Instructions for the TruStability® Board Mount Pressure Sensors

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 inH₂O 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 Ratings¹

Characteristic	Min.	Max.	Unit
Supply voltage (V_{supply}) ² : pressure ranges ≥ 60 mbar 6 kPa 1 psi pressure ranges ≤ 40 mbar 4 kPa 20 inH ₂ O	-12.0 0	12.0 7	Vdc
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.

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

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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 ₂ O	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

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

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

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

⁴Compensated 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)

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

Table 4. 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, RTV	epoxy, RTV
Electronic components	silicon	silicon, glass, gold

¹Contact 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.

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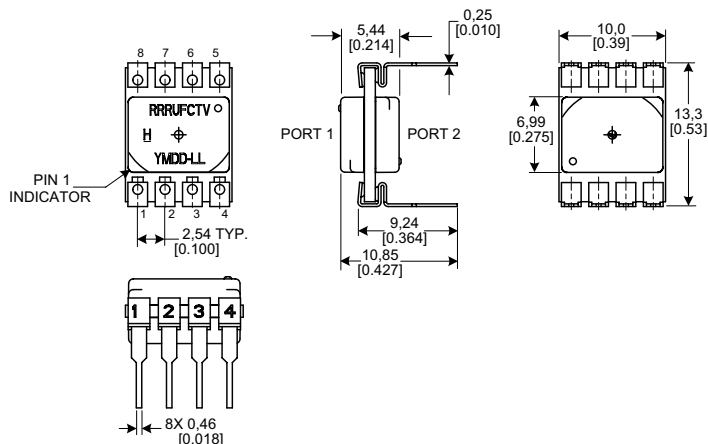
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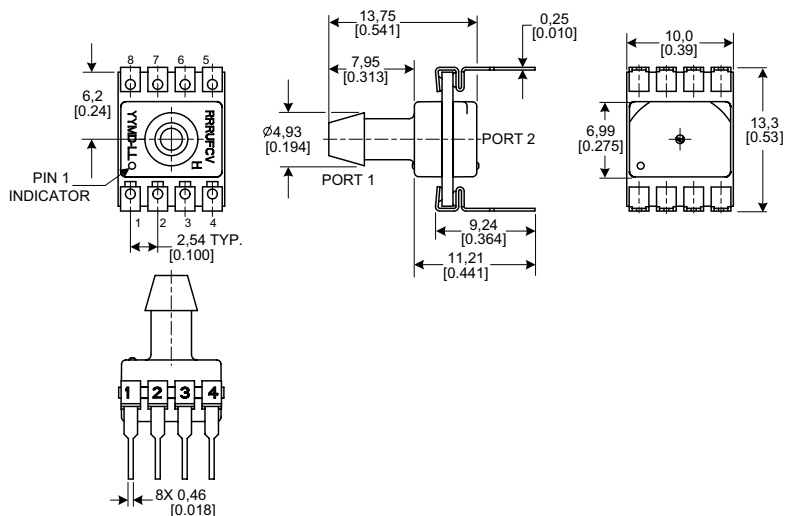
Figure 1. DIP Package Dimensional Drawings (For reference only: mm [in])

Dimensions

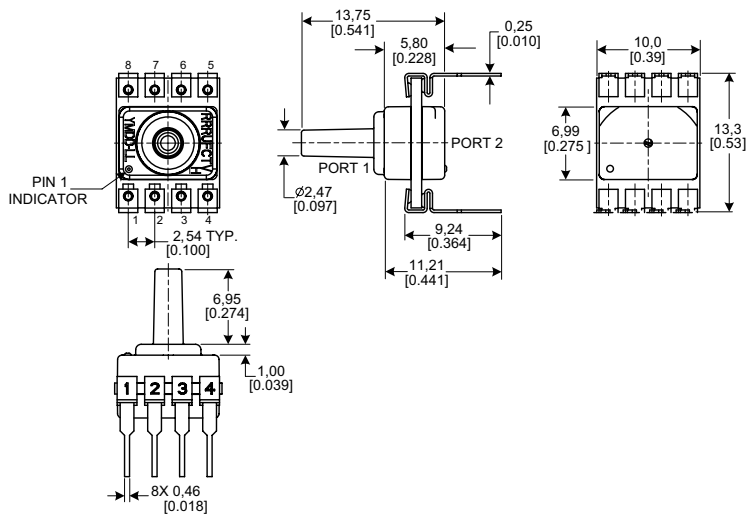
DIP NN: No ports



DIP AN: Single axial barbed port



DIP LN: Single axial barbless port



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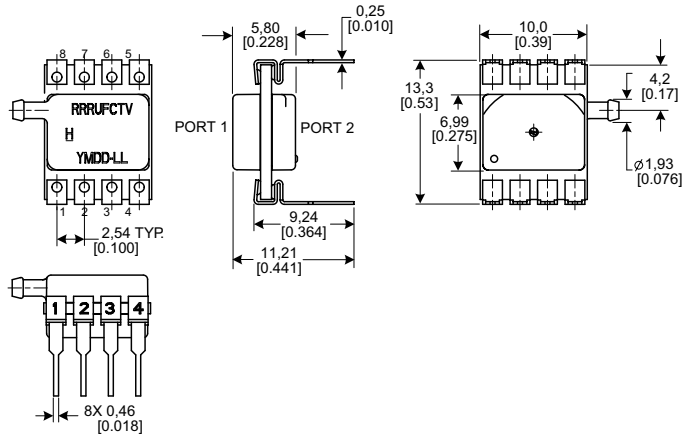
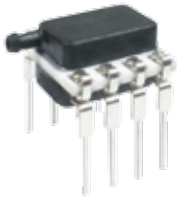
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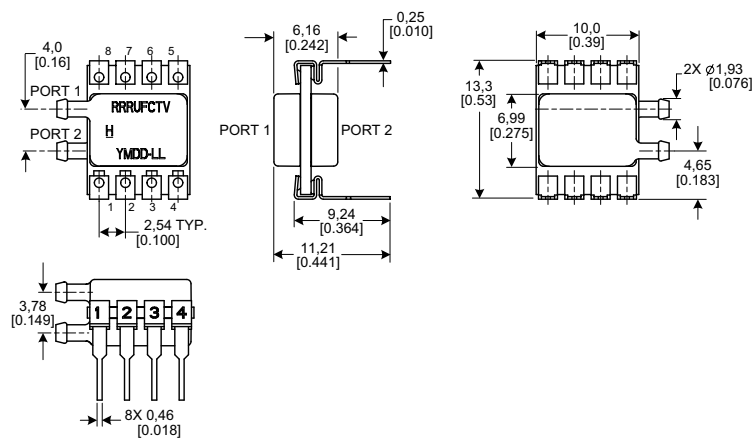
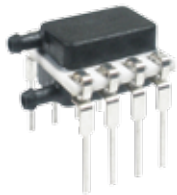
Figure 1. DIP Package Dimensional Drawings (continued)

Dimensions

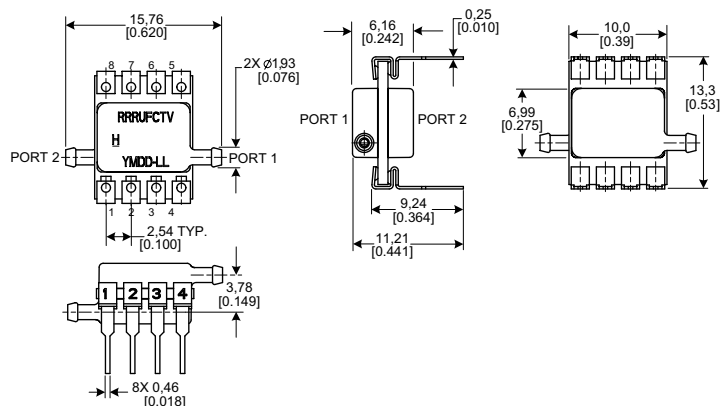
DIP RN: Single radial barbed port



DIP RR: Dual radial barbed ports, same side



DIP DR: Dual radial barbed ports, opposite sides



TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

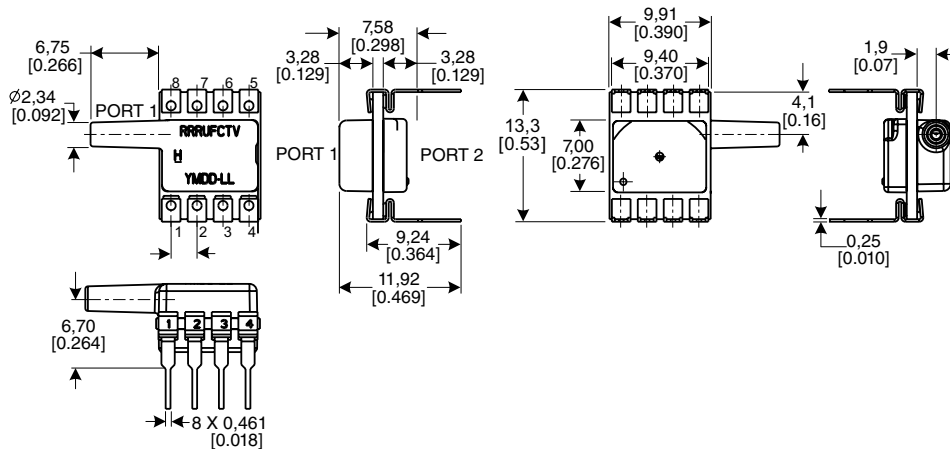
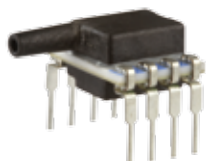
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Figure 1. DIP Package Dimensional Drawings (continued)

Dimensions

DIP JN: Single radial barbless port



DIP JJ: Dual radial radial barbless ports, same side

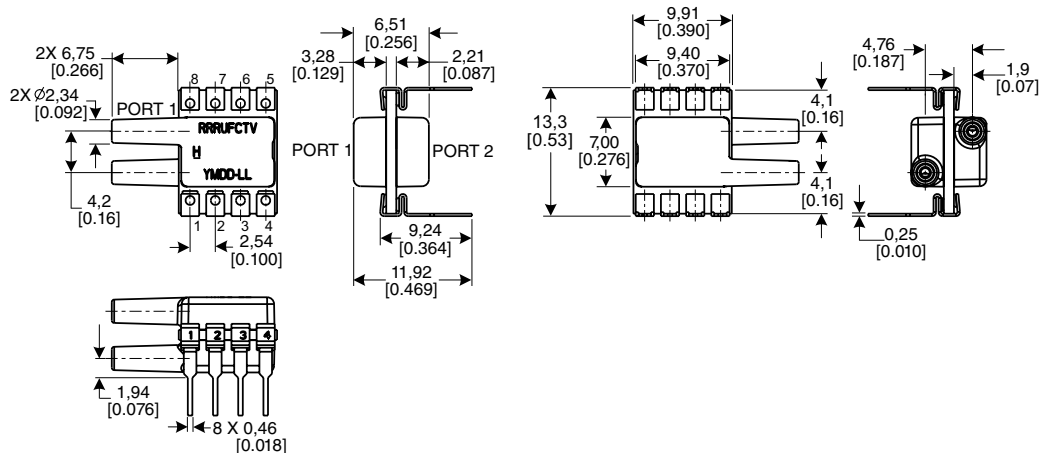
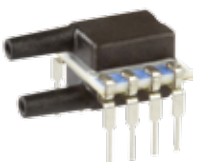
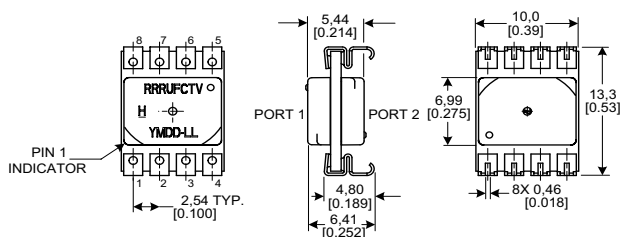


Figure 2. SMT Package Dimensional Drawings (For reference only: mm [in])

Dimensions

SMT NN: No ports



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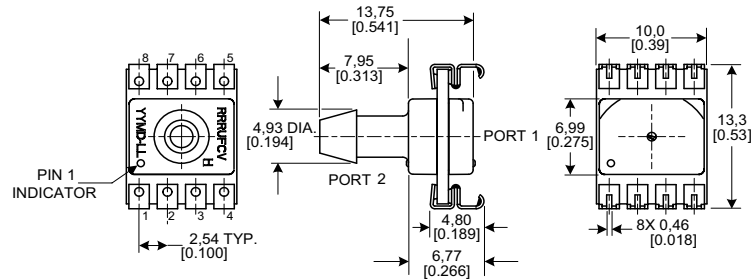
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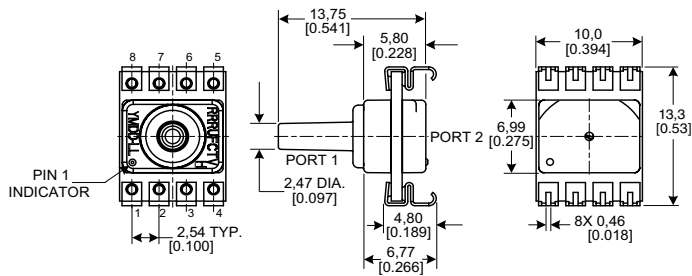
Figure 2. SMT Package Dimensional Drawings (continued)

Dimensions

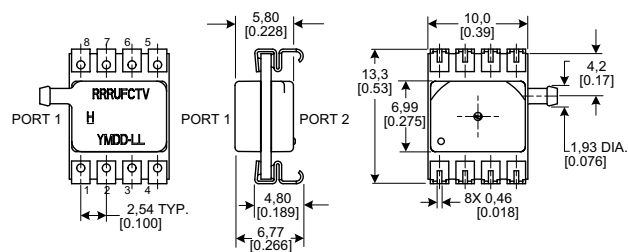
SMT AN: Single axial barbless port



SMT LN: Single axial barbless port



SMT RN: Single radial barbed port



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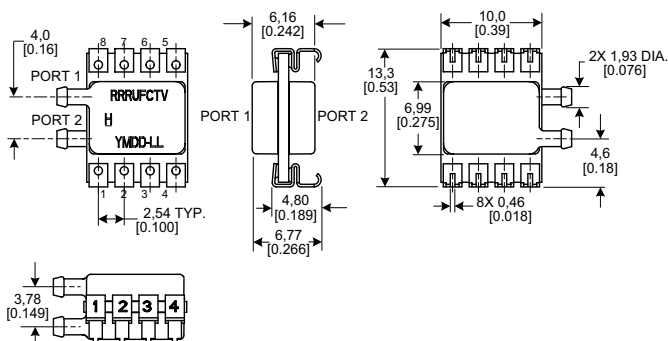
NSC Series, Uncompensated/Unamplified

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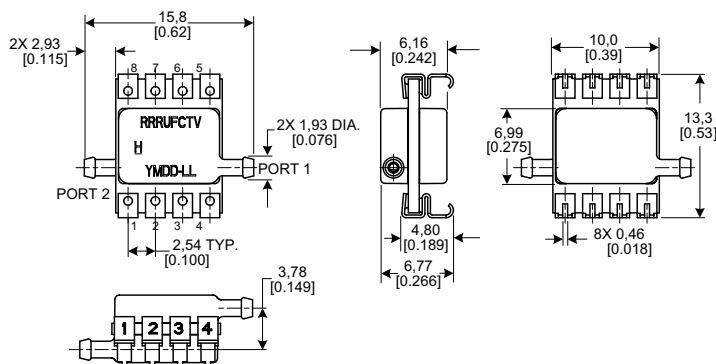
Figure 2. SMT Package Dimensional Drawings (continued)

Dimensions

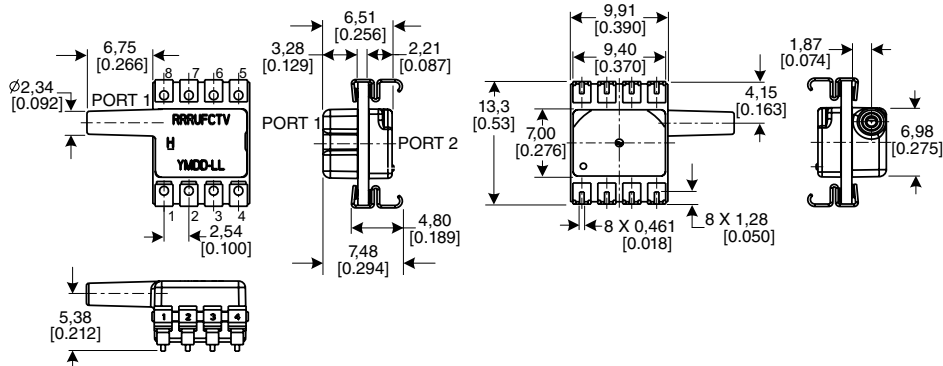
SMT RR: Dual radial barbed ports, same side



SMT DR: Dual radial barbed ports, opposite sides



SMT JN: Single radial barbless port



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Figure 2. SMT Package Dimensional Drawings (continued)

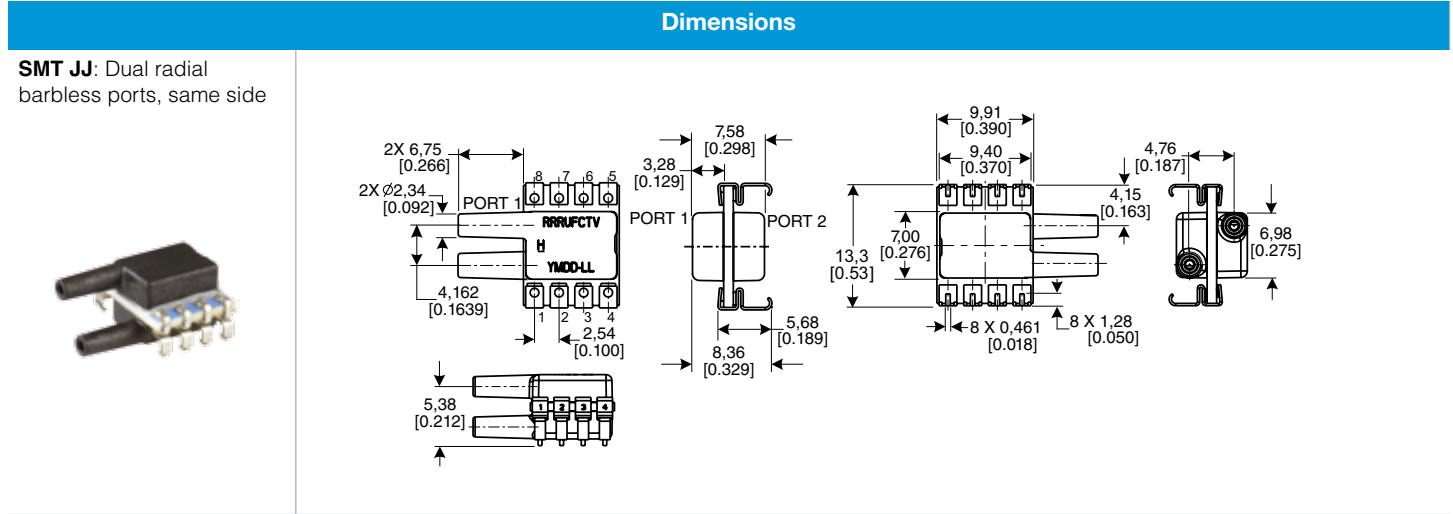
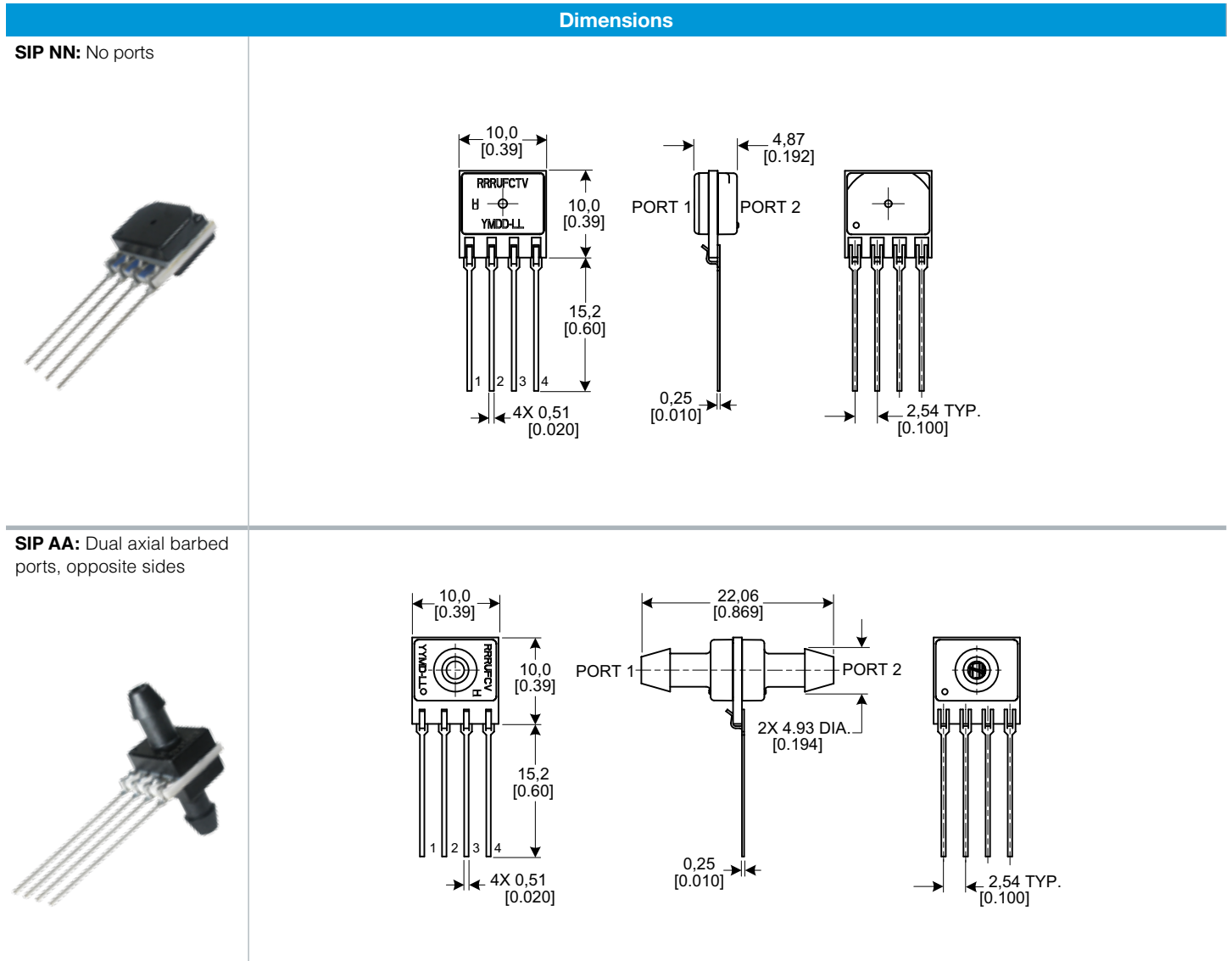


Figure 3. SIP Package Dimensional Drawings (For reference only: mm [in].)



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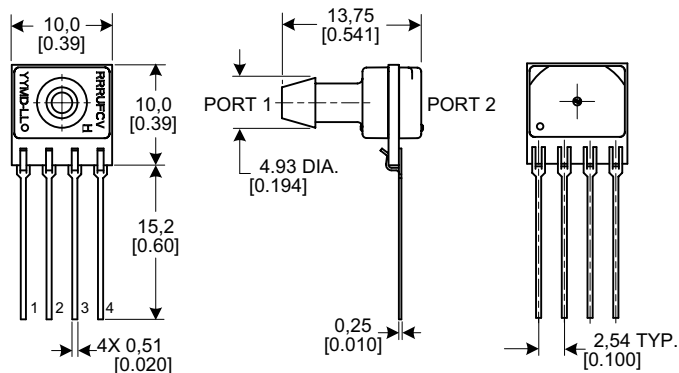
NSC Series, Uncompensated/Unamplified

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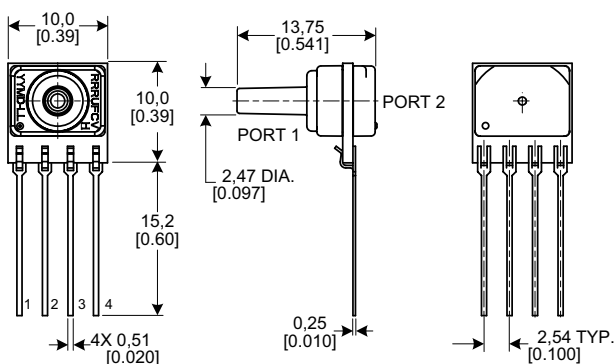
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

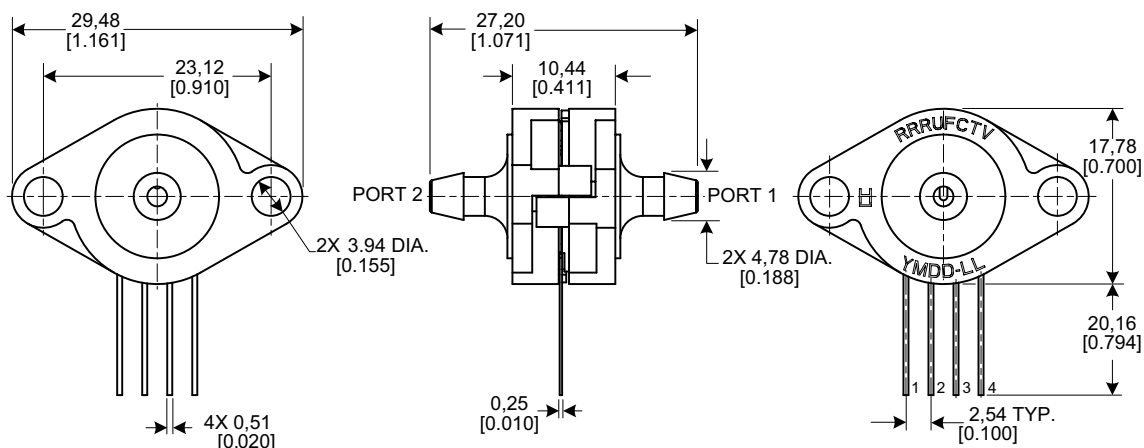
SIP AN: Single axial barbed port



SIP LN: Single axial barbless port



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



TSC Series, Compensated/Unamplified

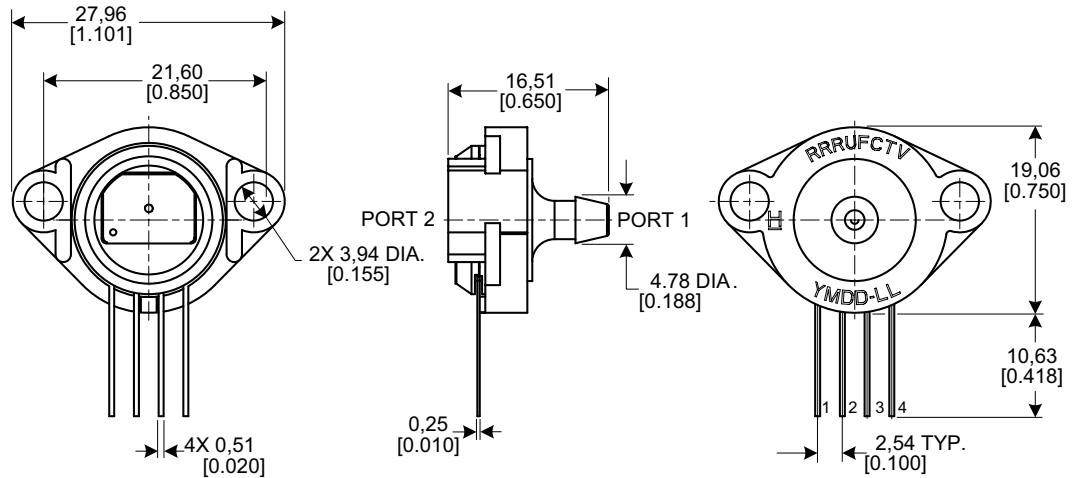
NSC Series, Uncompensated/Unamplified

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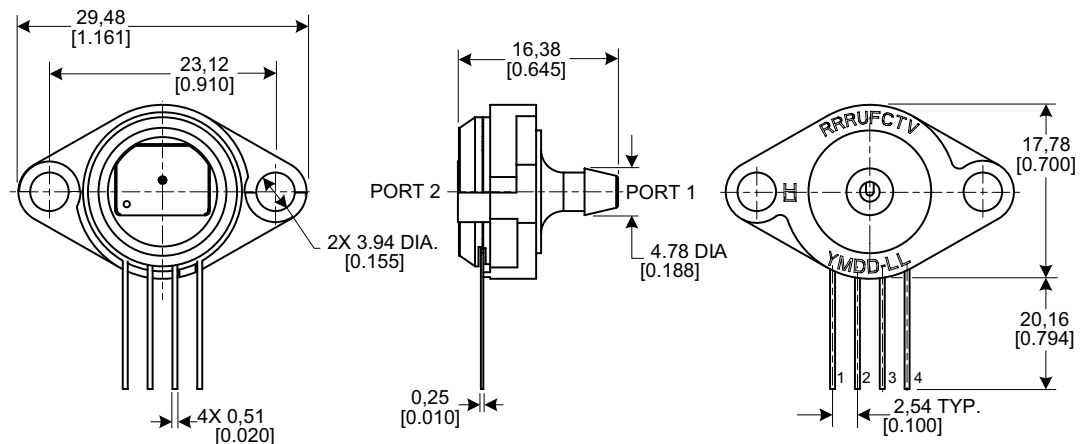
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

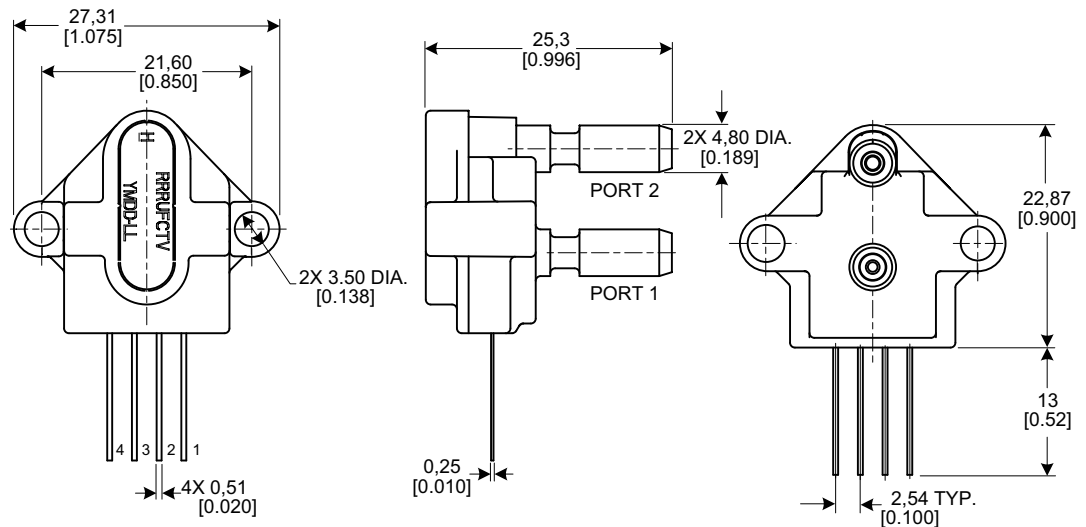
SIP FN: Fastener mount, single axial barbed port



SIP GN: Ribbed fastener mount, single axial barbed port



SIP NB: Fastener mount, dual axial ports, same side



TSC Series, Compensated/Unamplified

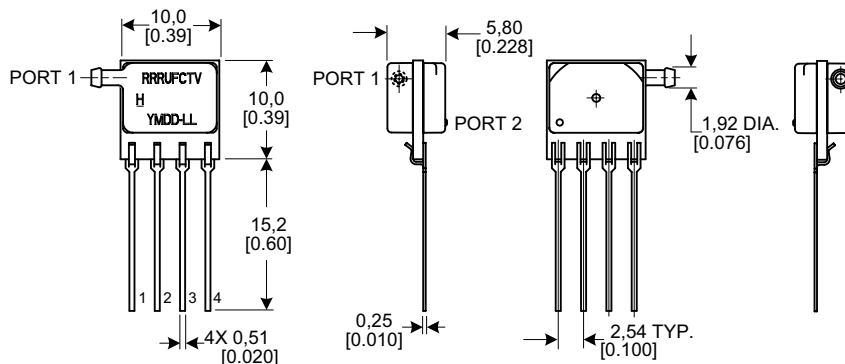
NSC Series, Uncompensated/Unamplified

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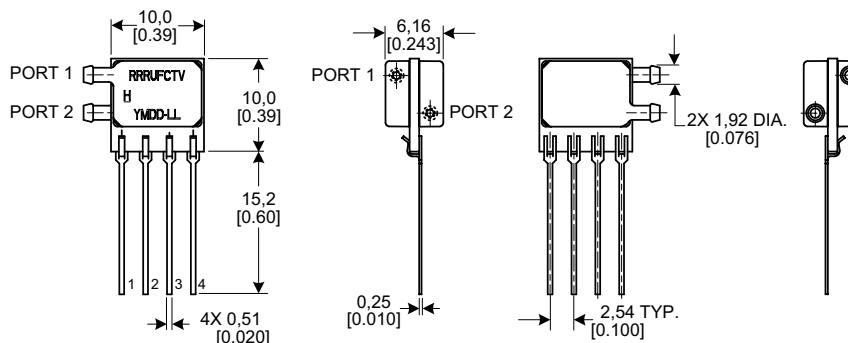
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

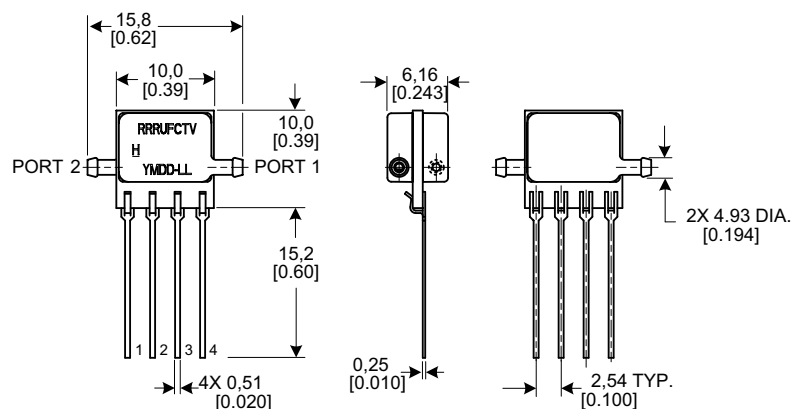
SIP RN: Single radial barbed port



SIP RR: Dual radial barbed ports, opposite sides



SIP DR: Dual radial barbed ports, opposite sides



TSC Series, Compensated/Unamplified

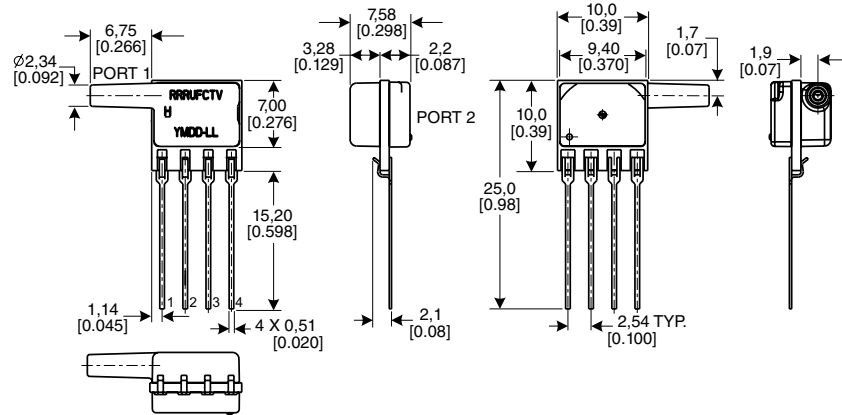
NSC Series, Uncompensated/Unamplified

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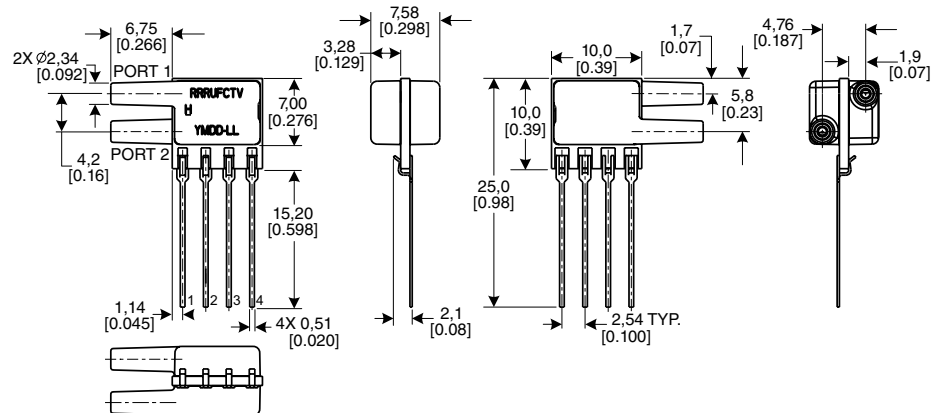
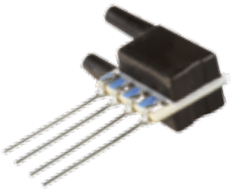
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

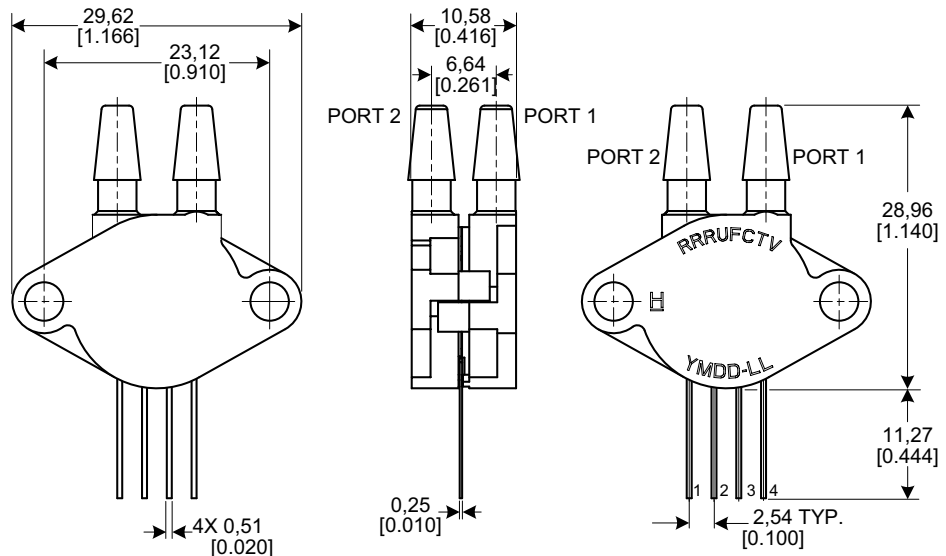
SIP JN: Single radial barbless port



SIP JJ: Dual radial barbless ports, same side



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



TSC Series, Compensated/Unamplified

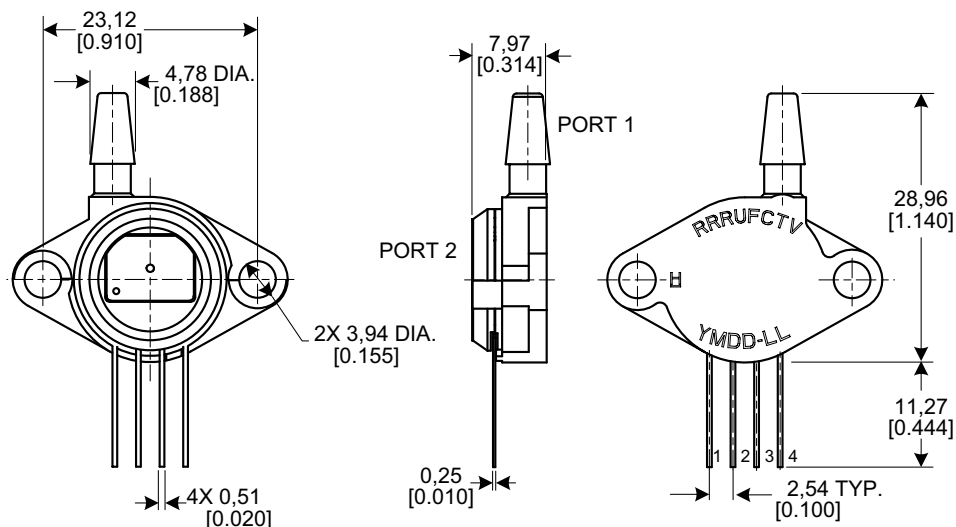
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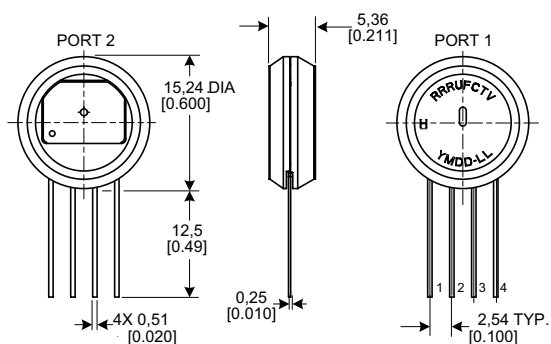
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

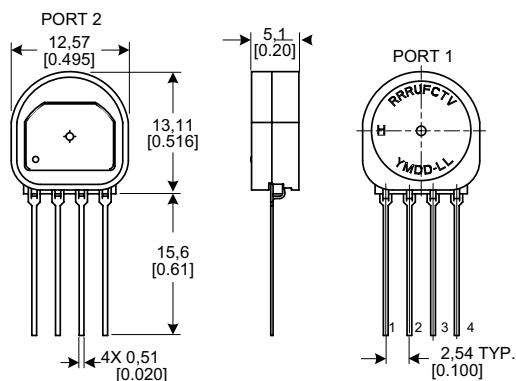
SIP HN: Fastener mount single radial barbed port



SIP MN: Manifold mount, outer diameter seal



SIP SN: Manifold mount, inner diameter seal



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

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

DIP	SMT	SIP
 Diagram showing dimensions for a DIP package. The width is 13,08 [0.515]. The distance between pins is 2,54 [0.100]. The pin diameter is Ø0,813 [0.032].	 Diagram showing dimensions for an SMT package. The width is 1,143 [0.045]. The distance between pins is 2,032 [0.080]. The pin diameter is Ø0,813 [0.032].	 Diagram showing dimensions for an SIP package. The width is 2,54 [0.100]. The pin diameter is Ø0,914 [0.036].

The figure compares two instrumentation amplifier topologies. The left circuit, titled 'Amplification Circuit Using Discrete Op-Amps', shows a three-stage design. It starts with a Wheatstone bridge containing a TSC or NSC Series Sensor. The bridge output is connected to a first Op-Amp configured as a voltage follower. The output of this stage is then connected to a second Op-Amp configured as a differential amplifier. The final output is connected to a third Op-Amp configured as a voltage follower. The right circuit, titled 'Amplification Circuit Using an Instrumentation Amplifier', shows a single-stage design. It uses a similar Wheatstone bridge. The bridge output is connected to an Instrumentation Amplifier (Inst-Amp). The Inst-Amp is powered by a supply voltage V_s and has a reference input V_{Ref} . The output of the Inst-Amp is connected to a third Op-Amp configured as a voltage follower.

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Figure 6. TSC Series Nomenclature and Order Guide¹

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
AN Single axial barbed port	AN Single axial barbed port	AN Single axial barbed port
LN Single axial barless port	LN Single axial barless port	LN Single axial barless port
—	—	AA Dual axial barbed ports, opposite sides
—	—	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 barless port	JN Single radial barless port	JN Single radial barless port
JJ Dual radial barless ports, same side	JJ Dual radial barless ports, same side	JJ Dual radial barless 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
<i>Differential</i>	<i>Differential</i>	<i>Differential</i>
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	
<i>Gage</i>	<i>Gage</i>	<i>Gage</i>
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	

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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.



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NSC Series, Uncompensated/Unamplified

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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