

Installation Instructions for the

TruStability® Board Mount Pressure Sensors

Issue 4 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.

Table 1. Absolute Maximum Ratings¹

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.

| 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. | Тур. | 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 $^\circ \! C$ 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.

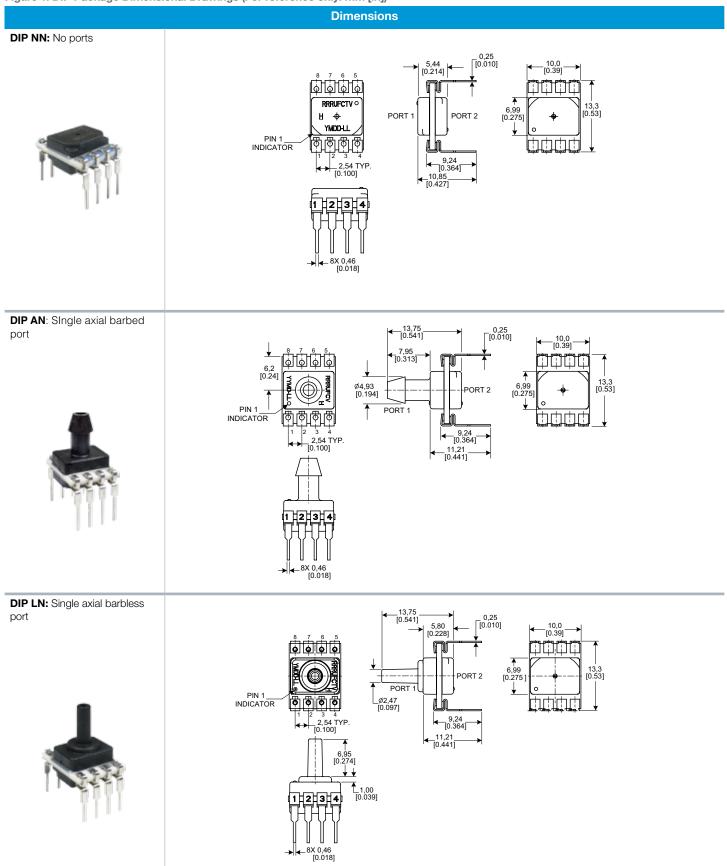
CAUTION PRODUCT DAMAGE

- 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.

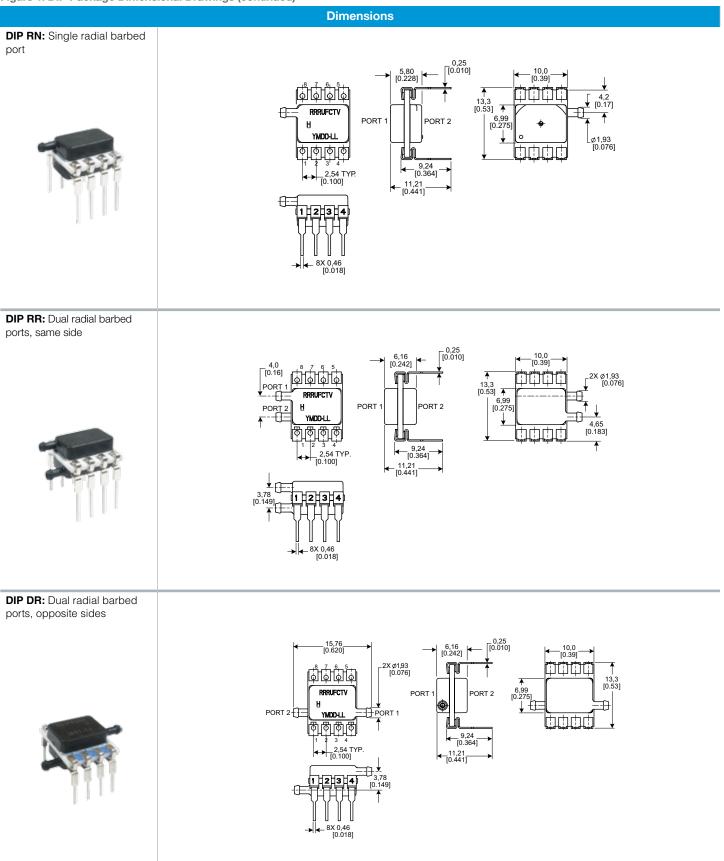
Failure to comply with these instructions may result in product damage.

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



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Figure 1. DIP Package Dimensional Drawings (continued)

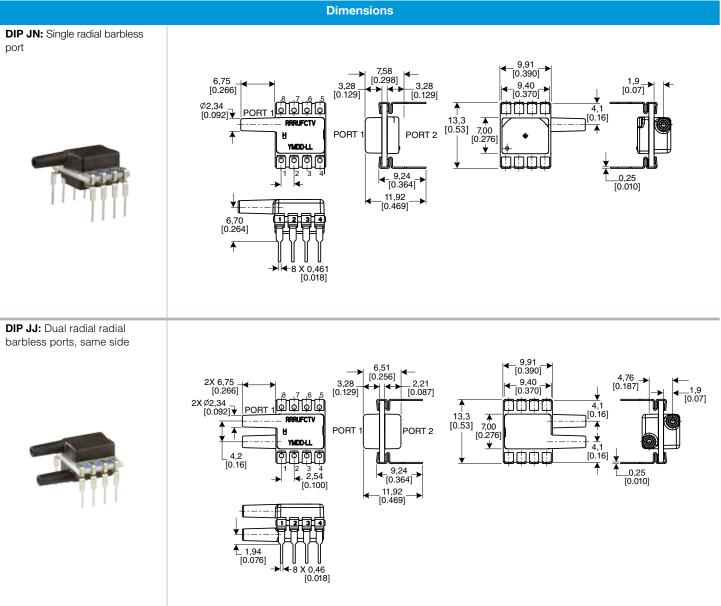
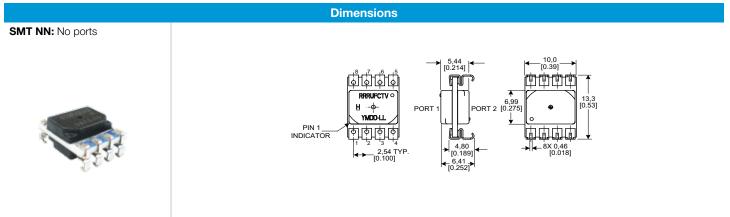


Figure 2. SMT Package Dimensional Drawings (For reference only: mm [in])



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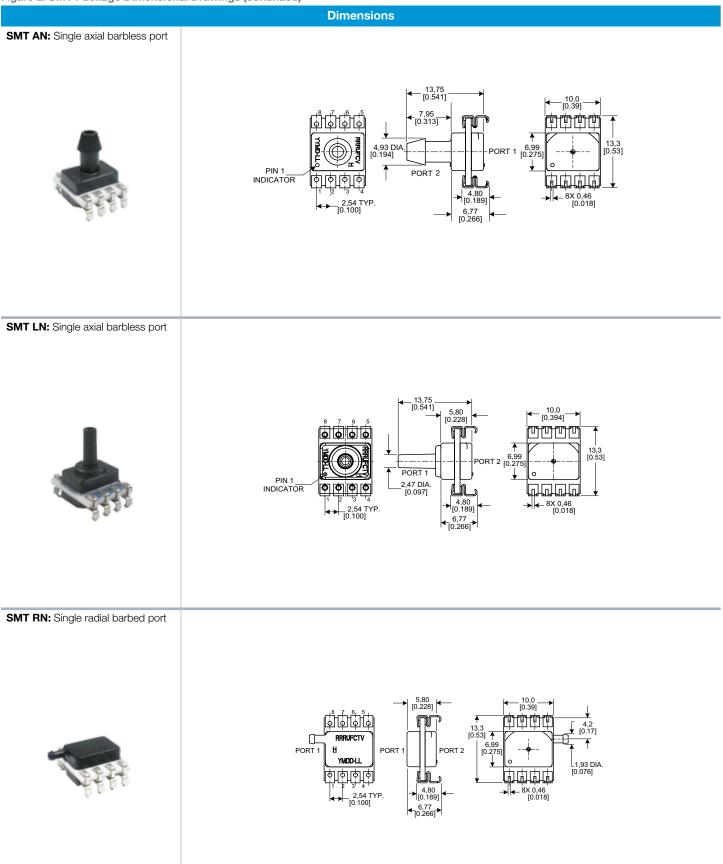
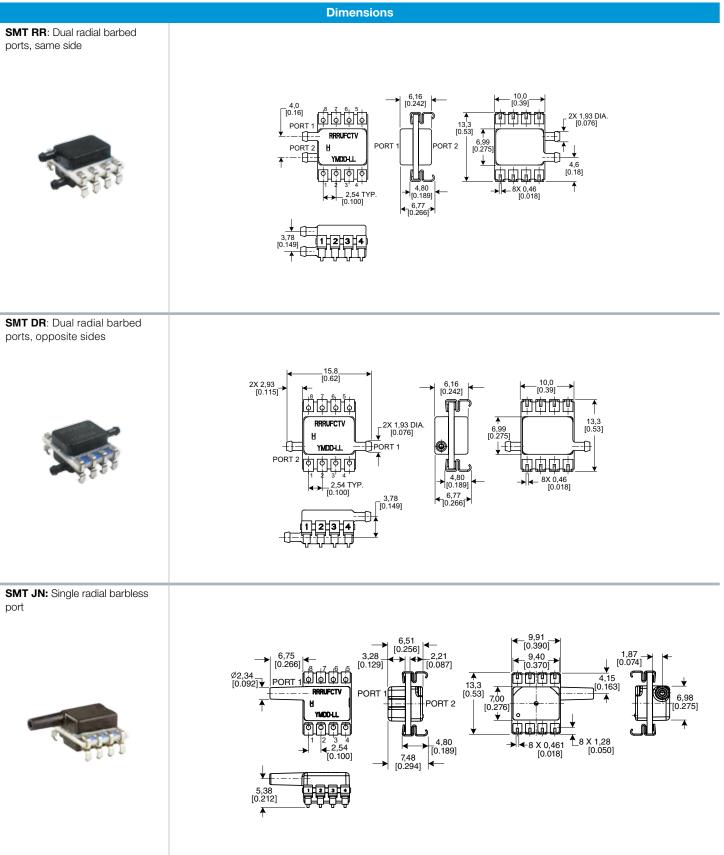


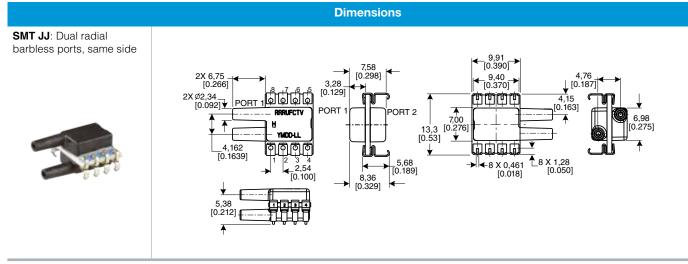
Figure 2. SMT Package Dimensional Drawings (continued)



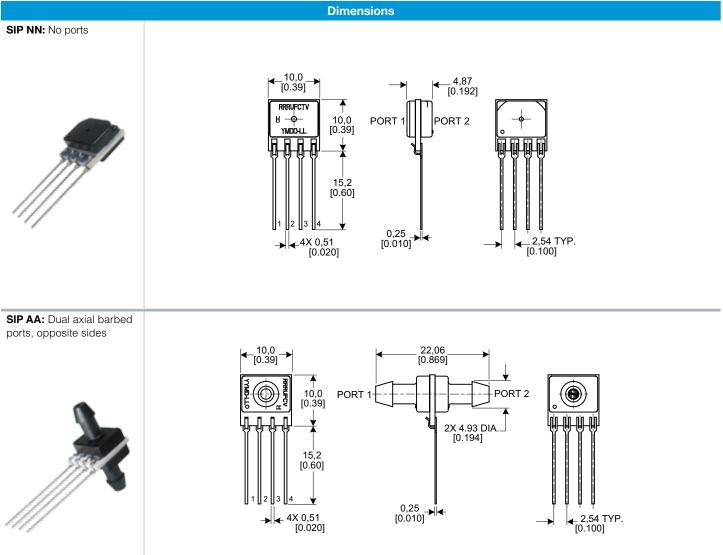
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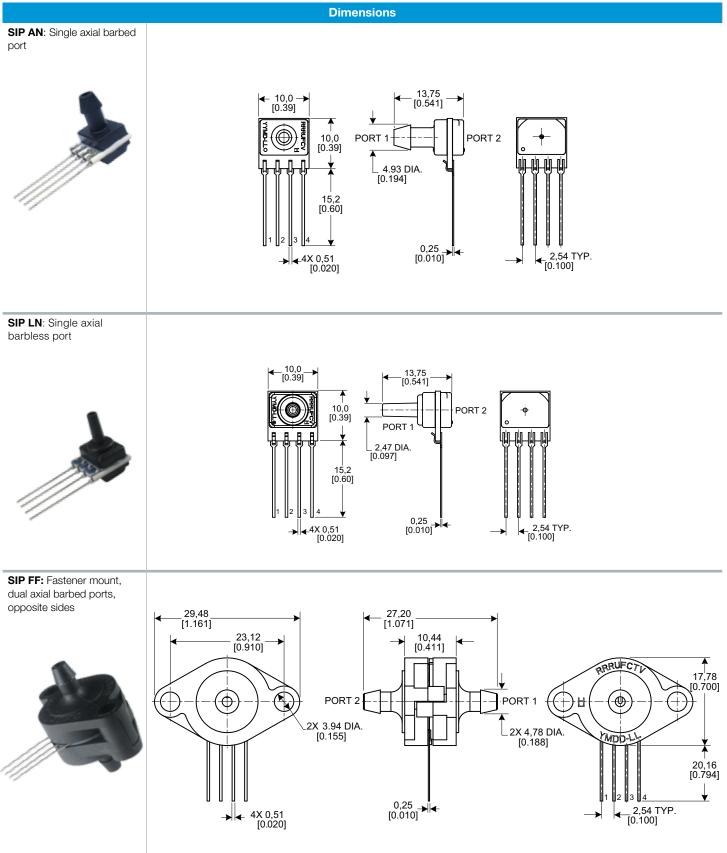
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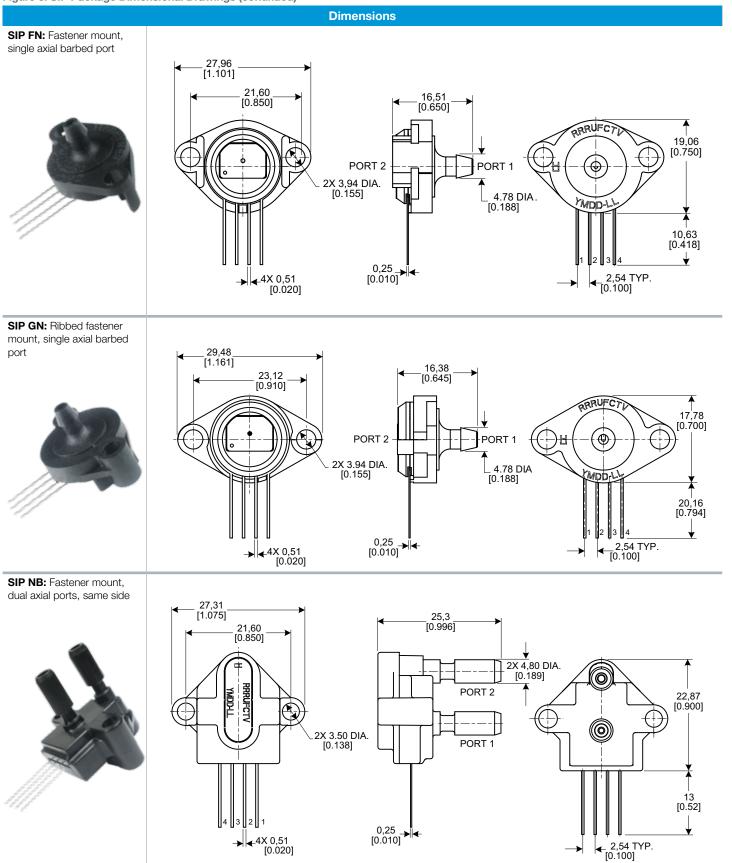
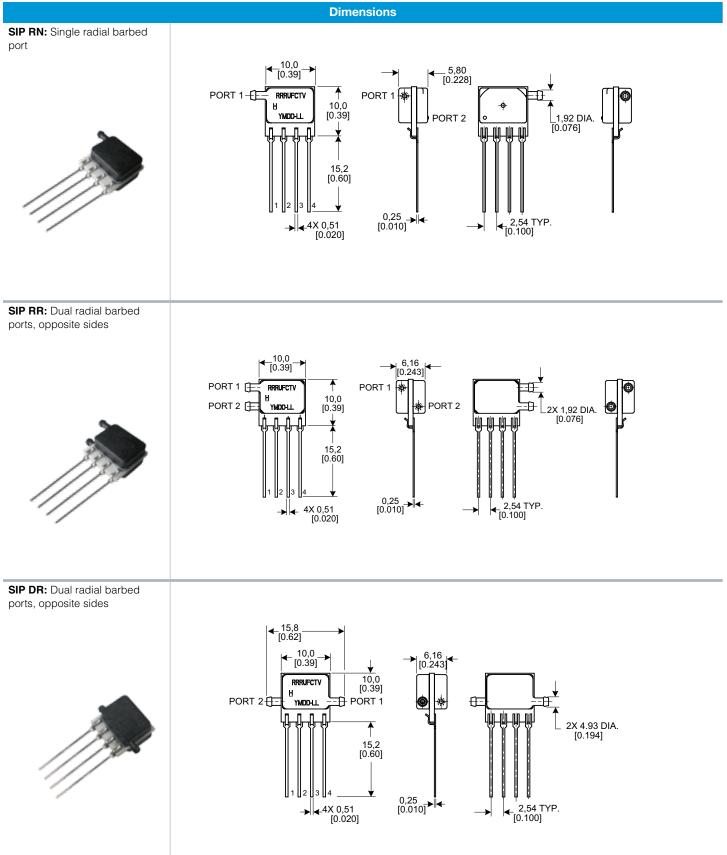
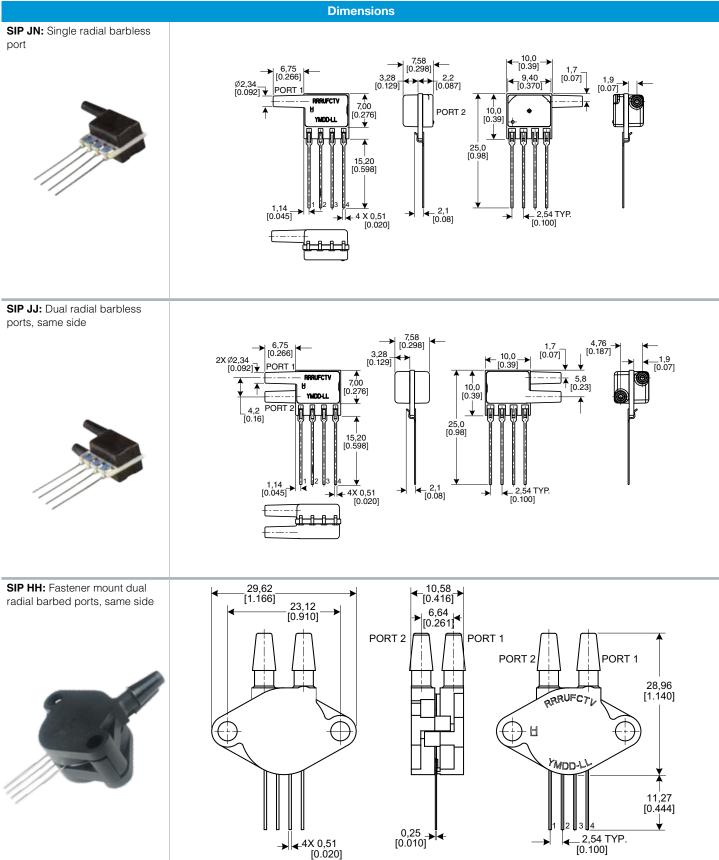


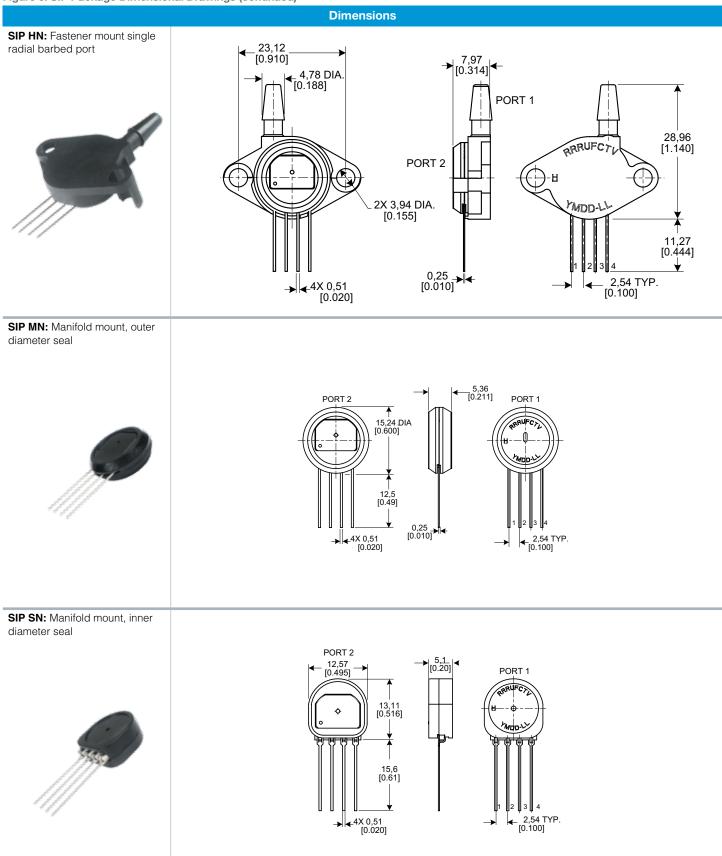
Figure 3. SIP Package Dimensional Drawings (continued)



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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

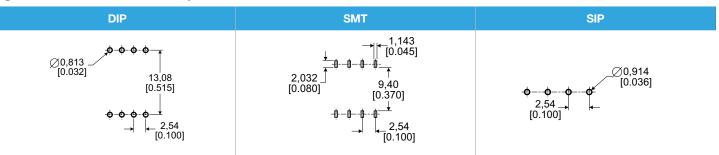
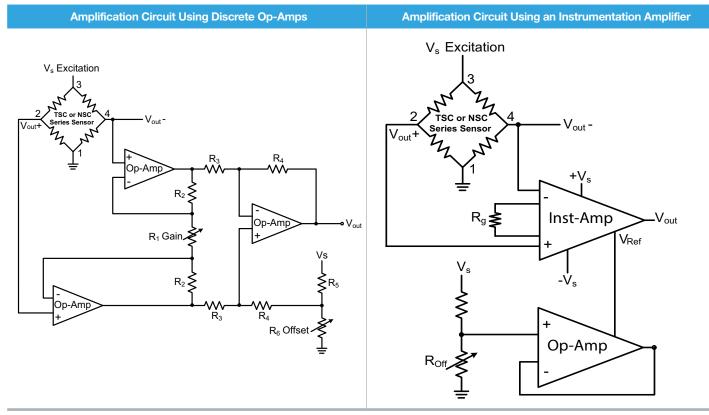


Figure 5. Circuit Examples



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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.

| | тѕс | DNN N 1 | 50PG U C V | | |
|---|---|--|---|-------------------------------|--|
| Series | | | | | Cumply Voltono |
| | | | | | Supply Voltage |
| TSC Compensated/Unamp | blified | | | | V Constant |
| Package | | | | | Compensation |
| DIP (Dual Inline Pin) | | | קן <u>ו</u> ∟ | | C Compensated |
| M SMT (Surface Mount Techr | nology) | | | | |
| S SIP (Single Inline Pin) | | | | | Output Type |
| | | | | | Unamplified |
| Pressure Port DIP | SMT | SIP | Pressure Range | | |
| | 5 | | 60 mbar to 10 bar | 6 kPa to 1 MPa | 1 psi to 150 psi |
| NN No ports | NN No ports | NN No ports | Differential | Differential | Differential |
| | | | OGOMD ±60 mbar | 006KD ±6 kPa | 001PD ±1 psi |
| | _ | Dual axial barbed ports, | 100MD ±100 mbar | 010KD ±10 kPa | 005PD ±5 psi |
| | | opposite sides | 160MD ±160 mbar | 016KD ±16 kPa | 015PD ±15 psi |
| Single axial | <u>^</u> | | 250MD ±250 mbar | 025KD ±25 kPa | 030PD ±30 psi |
| AN Single axial barbed port | AN Single axial barbed port | AN Single axial barbed port | 400MD ±400 mbar | 040KD ±40 kPa | 060PD ±60 psi |
| | | | 600MD ±600 mbar | 060KD ±60 kPa | 100PD ±100 psi |
| 🛛 🔊 Single axial | LN Single axial | LN Single axial | 001BD ±1 bar | 100KD ±100 kPa | 150PD ±150 psi |
| LN Single axial barbless port | LN barbless port | barbless port | 1.6BD ±1.6 bar | 160KD ±160 kPa | |
| | | Fastener - | 2.5BD ±2.5 bar | 250KD ±250 kPa | |
| _ | - | FF Fastener mount, dual axial barbed sides | 004BD ±4 bar | 400KD ±400 kPa | |
| | | PP axial barbed ports, opposite | 006BD ±6 bar 010BD ±10 bar | 600KD ±600 kPa | |
| | | Fastener | | 001GD ±1 MPa | |
| - | - | FN mount, single axial barbed | Gage | Gage | Gage |
| | | | 060MG 0 mbar to 60 mbar | | 001PG 0 psi to 1 psi |
| _ | _ | GN Ribbed fastener mount, single axial barbed port | 100MG 0 mbar to 100 mbar | | 005PG 0 psi to 5 psi |
| | | single axial barbed port | 160MG 0 mbar to 160 mbar | | 015PG 0 psi to 15 psi |
| | | Fastener 0 | 250MG 0 mbar to 250 mbar 400MG 0 bar to 400 mbar | | 030PG 0 psi to 30 psi 060PG 0 psi to 60 psi |
| - | - | NB mount, dual axial ports, | 600MG 0 bar to 600 mbar | | 100PG 0 psi to 100 psi |
| | | same side | 001BG 0 bar to 1 bar | | 150PG 0 psi to 150 psi |
| BN Single radial | RN Single radial | RN Single radial | 1.6BG 0 bar to 1.6 bar | 160KG 0 kPa to 160 kPa | |
| RN Single radial barbed port | RN barbed port | barbed port | 2.5BG 0 bar to 2.5 bar | 250KG 0 kPa to 250 kPa | |
| Dual madial 177 | Dual radial | Dual radial | 004BG 0 bar to 4 bar | 400KG 0 kPa to 400 kPa | |
| RR barbed ports, | RR barbed ports, same side | RR barbed ports, | 006BG 0 bar to 6 bar | 600KG 0 kPa to 600 kPa | |
| same side | Same side | same side | 010BG 0 bar to 10 bar | 001GG 0 kPa to 1 MPa | |
| DR Dual radial barbed ports, opposite sides | DR Dual radial barbed ports, opposite sides | 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 port | | | |
| _ | - | Manifold mount, outer diameter seal | | | |
| - | - | SN Manifold mount, inner diameter seal | | | |
| Options | | | | | |

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Figure 7. NSC Series Nomenclature and Order Guide¹

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.

| eries | | | | | Supply Voltage |
|--|------------------------------------|--|--|--|--|
| SC Uncompensated/ | Inamplified | | | | V Constant |
| Checompensated/ | onampinieu | | | | 0 |
| ackage | | | | | Compensation |
| _ | | | | | N Uncompensated |
| DIP (Dual Inline Pin) | Tashnalagu) | | | | |
| SMT (Surface Mount S SIP (Single Inline Pin | | | | | Output Type |
| SIP (Single Inline Pin |) | | LT - | | U Unamplified |
| ressure Port | | | Pressure Range | | |
| DIP | SMT | SIP | 2.5 mbar to 10 bar | 400 Pa to 1 MPa | 1 in H₂O to 150 psi |
| No porto | | | | | • |
| No ports | NN No ports | NN No ports | Absolute 001BA 0 bar to 1 bar | Absolute 100KA 0 kPa to 100 kPa | Absolute 015PA 0 psi to 15 psi |
| | | | 1.6BA 0 bar to 1.6 bar | 160KA 0 kPa to 160 kPa | |
| _ | - | AA Dual axial barbed ports, | 2.5BA 0 bar to 2.5 bar | 250KA 0 kPa to 250 kPa | · · · · · · · · · · · · · · · · · · · |
| | | AA barbed ports, opposite sides | 004BA 0 bar to 4 bar | 400KA 0 kPa to 400 kPa | |
| N Single axial barbed port | AN Single axial | AN Single axial | 006BA 0 bar to 6 bar | 600KA 0 kPa to 600 kPa | 150PA 0 psi to 150 psi |
| barbed port | AN Single axial barbed port | AN barbed port | 010BA 0 bar to 10 bar | 001GA 0 kPa to 1 MPa | |
| [| Single ovial | | Differential | Differential | Differential |
| N Single axial barbless port | LN Single axial barbless port | LN Single axial barbless port | 2.5MD ±2.5 mbar | 250LD ±250 Pa | 001ND ±1 inH ₂ O |
| · YYY | | | 004MD ±4 mbar | 400LD ±400 Pa | 002ND ±2 inH ₂ O |
| | _ | FF Fastener mount, dual axial barbed | 006MD ±6 mbar | 600LD ±600 Pa | 004ND ±4 inH ₂ O |
| — | | ports, opposite | 010MD ±10 mbar 016MD ±16 mbar | 001KD ±1 kPa 1.6KD ±1.6 kPa | 005ND ±5 inH ₂ O 010ND ±10 inH ₂ O |
| | | Eastener - | 025MD ±25 mbar | 2.5KD ±2.5 kPa | 020ND ±20 inH ₂ O |
| - | - | FN mount, single axial barbed | 040MD ±40 mbar | 004KD ±4 kPa | 030ND ±30 inH ₂ O |
| | | port | 060MD ±60 mbar | 006KD ±6 kPa | 001PD ±1 psi |
| _ | _ | GN Ribbed fastener mount, single axial barbed port | 100MD ±100 mbar | 010KD ±10 kPa | 005PD ±5 psi |
| | | single axial barbed port | 160MD ±160 mbar | 016KD ±16 kPa | 015PD ±15 psi |
| | | Fastener | 250MD ±250 mbar | 025KD ±25 kPa | 030PD ±30 psi |
| - | - | NB mount, dual axial ports, | 400MD ±400 mbar | 040KD ±40 kPa | 060PD ±60 psi |
| | | same side | 600MD ±600 mbar | 060KD ±60 kPa | 100PD ±100 psi |
| N Single radial | RN Single radial barbed port | RN Single radial barbed port | 001BD ±1 bar 1.6BD ±1.6 bar | 100KD ±100 kPa 160KD ±160 kPa | 150PD ±150 psi |
| barbed port | Balbed port | | 2.5BD ±2.5 bar | 250KD ±250 kPa | |
| Dual radial | Dual radial | Dual radial | 004BD ±4 bar | 400KD ±400 kPa | |
| R barbed ports, same side | RR barbed ports, same side | RR barbed ports, same side | 006BD ±6 bar | 600KD ±600 kPa | |
| Dual radial | Dual radial | Dual radial | 010BD ±10 bar | 001GD ±1 MPa | |
| R barbed ports, opposite sides | DR barbed ports, opposite sides | DR barbed ports, opposite sides | Gage | Gage | Gage |
| | | | 004MG 0 mbar to 4 mbar | 400LG 0 Pa to 400 Pa | 002NG 0 inH ₂ O to 2 inH |
| N Single radial barbless port | JN Single radial | JN Single radial barbless port | 006MG 0 mbar to 6 mbar | 600LG 0 Pa to 600 Pa | 004NG 0 inH ₂ O to 4 inH ₂ |
| barbless port | UN barbless port | barbless port | 010MG 0 mbar to 10 mbar | 001KG 0 kPa to 1 kPa | 005NG 0 inH ₂ O to 5 inH ₂ |
| Dual radial | Dual radial | Dual radial | 016MG 0 mbar to 16 mbar 025MG 0 mbar to 25 mbar | 1.6KG 0 kPa to 1.6 kPa 004KG 0 kPa to 4 kPa | 010NG 0 inH ₂ O to 10 inH 020NG 0 inH ₂ O to 20 inH |
| barbless ports, same side | JJ barbless ports, same side | JJ barbless ports, same side | 040MG 0 mbar to 40 mbar | 006KG 0 kPa to 6 kPa | 030NG 0 inH ₂ O to 30 inH |
| TY. | 11 0000 | | 060MG 0 mbar to 60 mbar | 010KG 0 kPa to 10 kPa | 001PG 0 psi to 1 psi |
| _ | _ | mount, dual radial barbed | 100MG 0 mbar to 100 mbar | | 005PG 0 psi to 5 psi |
| | | HH Fastener mount, dual radial barbed ports, same side | 160MG 0 mbar to 160 mbar | | 015PG 0 psi to 15 psi |
| | | Fastener | 250MG 0 mbar to 250 mbar | 040KG 0 kPa to 40 kPa | O30PG 0 psi to 30 psi |
| — | - | HN mount, single radial barbed | 400MG 0 bar to 400 mbar | 060KG 0 kPa to 60 kPa | 060PG 0 psi to 60 psi |
| | | port "" | 600MG 0 bar to 600 mbar | 100KG 0 kPa to 100 kPa | 100PG 0 psi to 100 psi |
| | | Manifold | 001BG 0 bar to 1 bar | 160KG 0 kPa to 160 kPa | 150PG 0 psi to 150 psi |
| | | diameter seal | 1.6BG 0 bar to 1.6 bar 2.5BG 0 bar to 2.5 bar | 250KG 0 kPa to 250 kPa | |
| | | Manifold | 004BG 0 bar to 4 bar | 400KG 0 kPa to 400 kPa 600KG 0 kPa to 600 kPa | |
| — | - | SN mount, inner diameter seal | 006BG 0 bar to 6 bar | 001GG 0 kPa to 1 MPa | |
| | | | 010BG 0 bar to 10 bar | | 1 |

No special options

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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.

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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.

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