

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 | -12.0 | 12.0 | Vdc |
| pressure ranges ≤40 mbar 4 kPa 20 inH ₂ O | 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] | |

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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NSC Series, Uncompensated/Unamplified

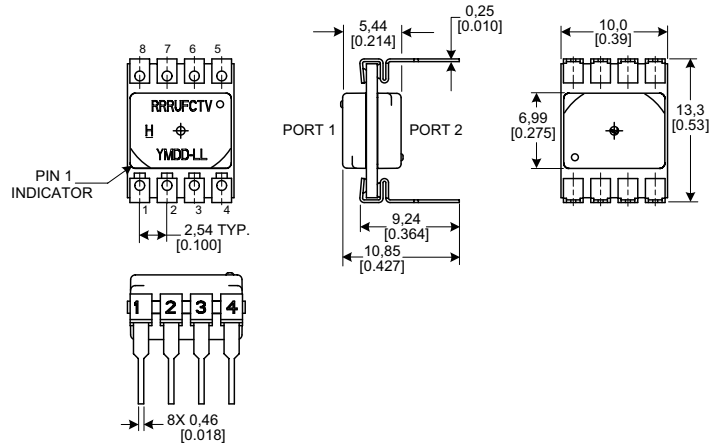
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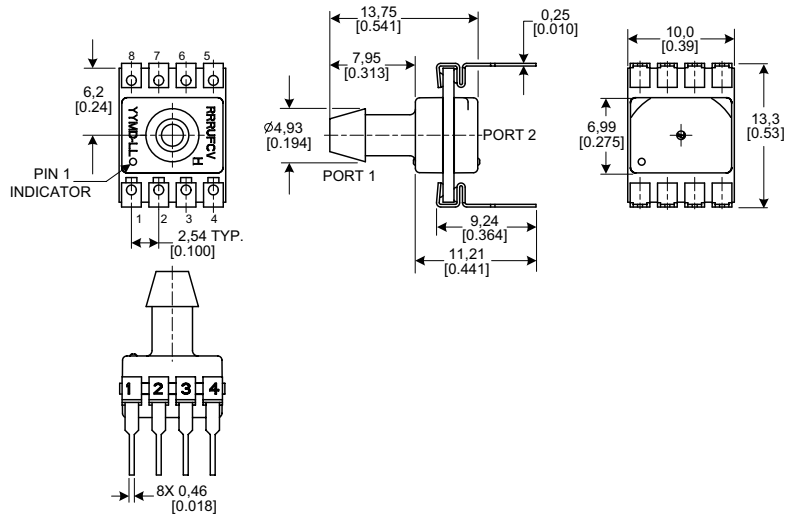
Figure 1. DIP Package Dimensional Drawings (For reference only: mm [in])

Dimensions

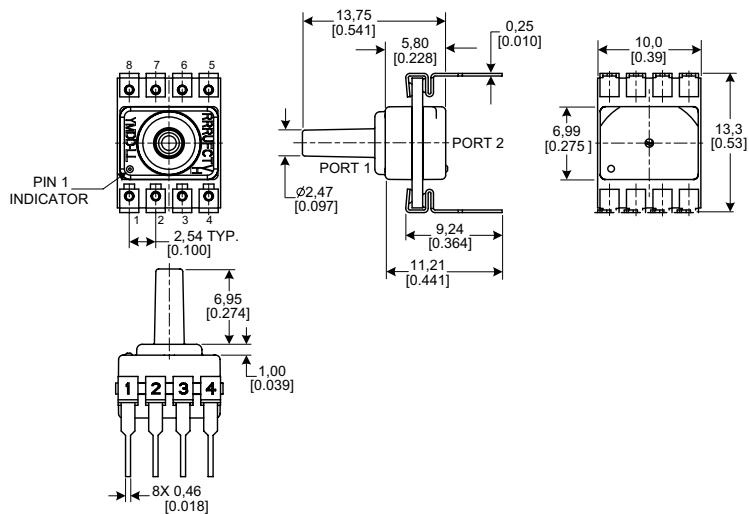
DIP NN: No ports



DIP AN: Single axial barbed port



DIP LN: Single axial barbless port



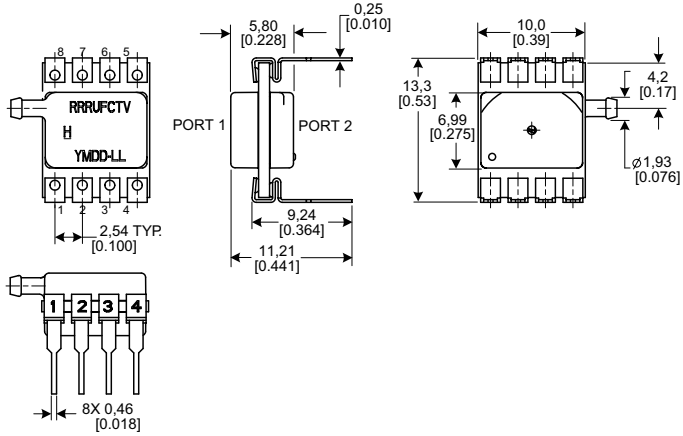
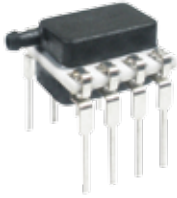
TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

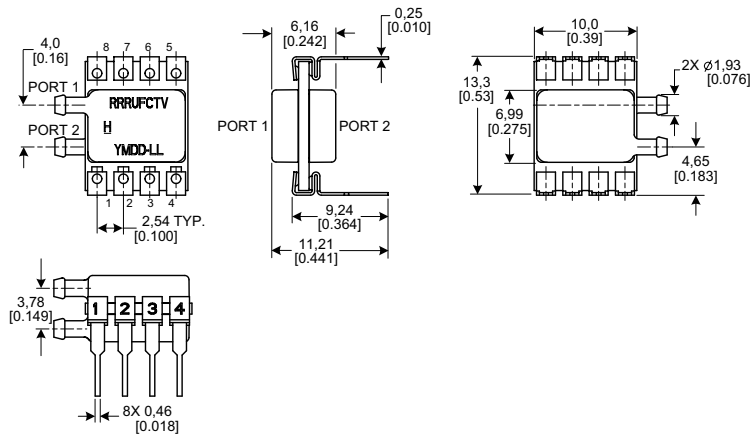
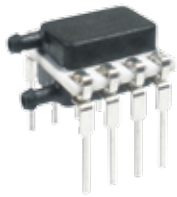
Figure 1. DIP Package Dimensional Drawings (continued)

Dimensions

DIP RN: Single radial barbed port



DIP RR: Dual radial barbed ports, same side



DIP DR: Dual radial barbed ports, opposite sides

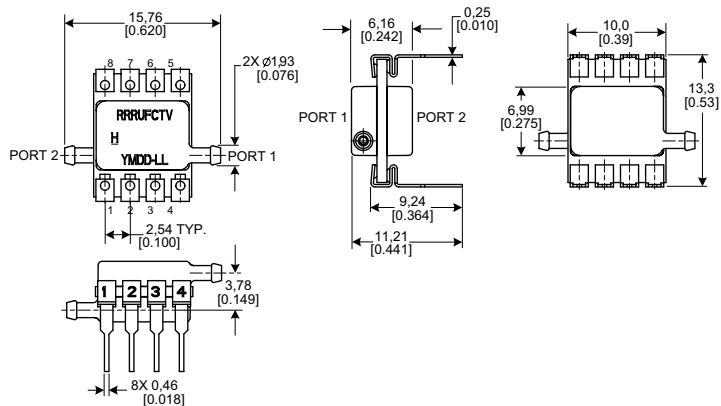


Figure 1. DIP Package Dimensional Drawings (continued)

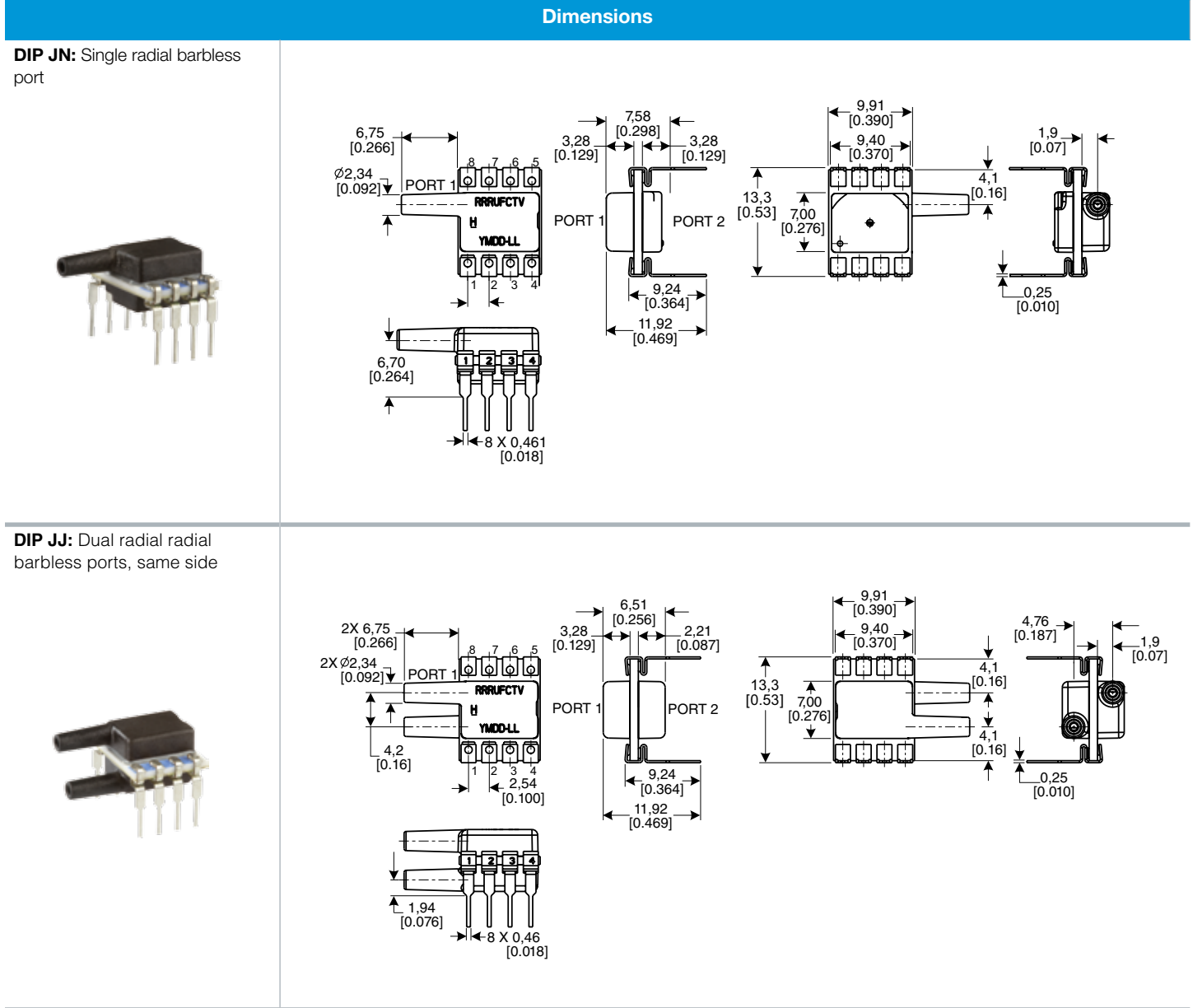


Figure 2. SMT Package Dimensional Drawings (For reference only: mm [in])

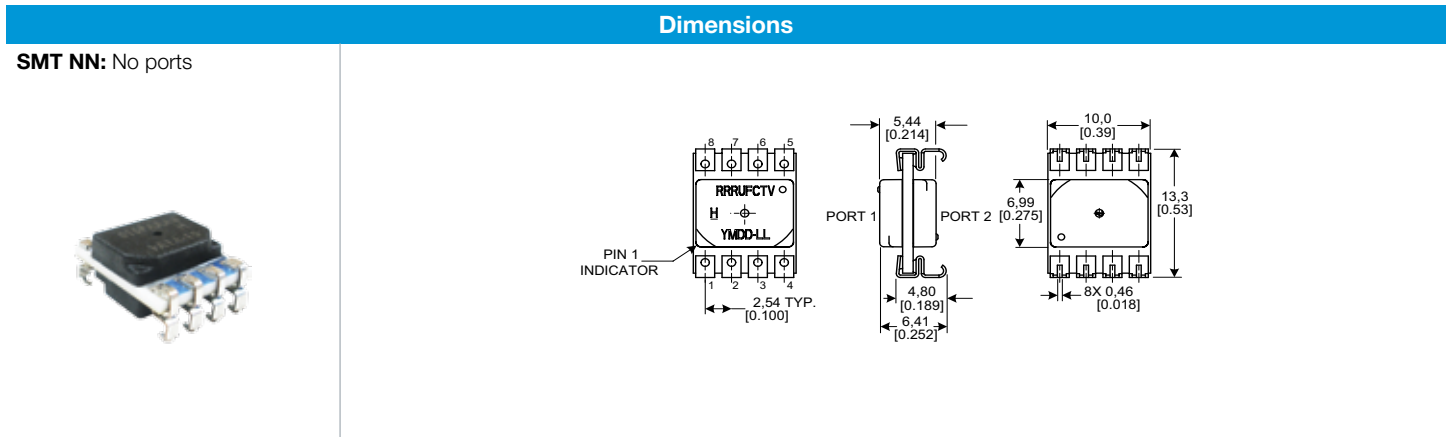
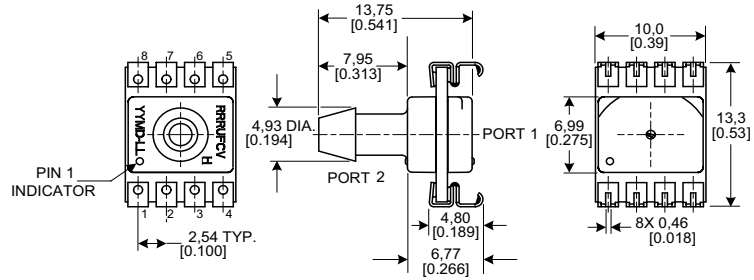


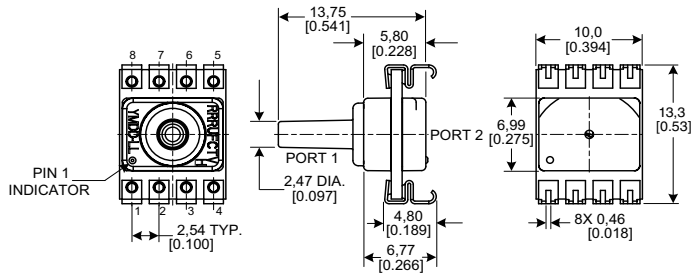
Figure 2. SMT Package Dimensional Drawings (continued)

Dimensions

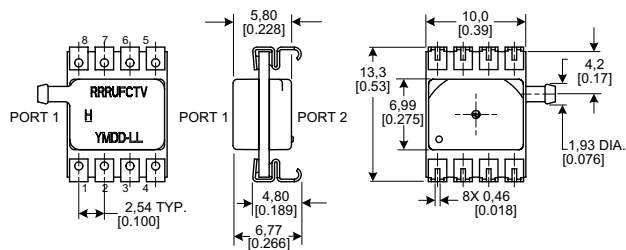
SMT AN: Single axial barbless port



SMT LN: Single axial barbless port



SMT RN: Single radial barbed port



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NSC Series, Uncompensated/Unamplified

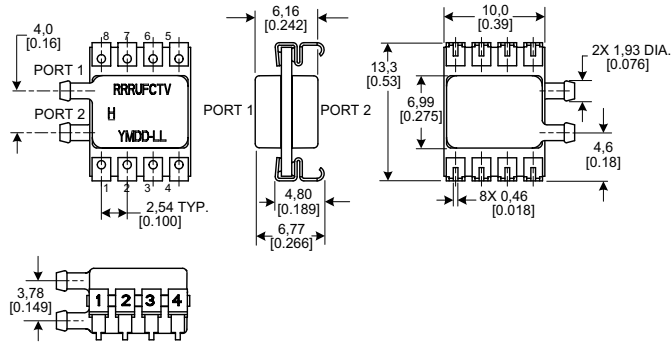
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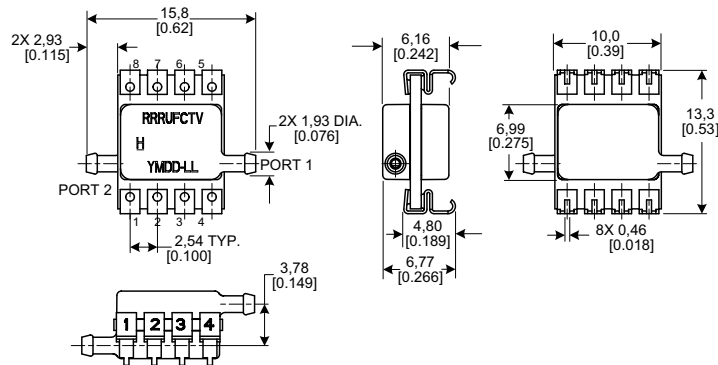
Figure 2. SMT Package Dimensional Drawings (continued)

Dimensions

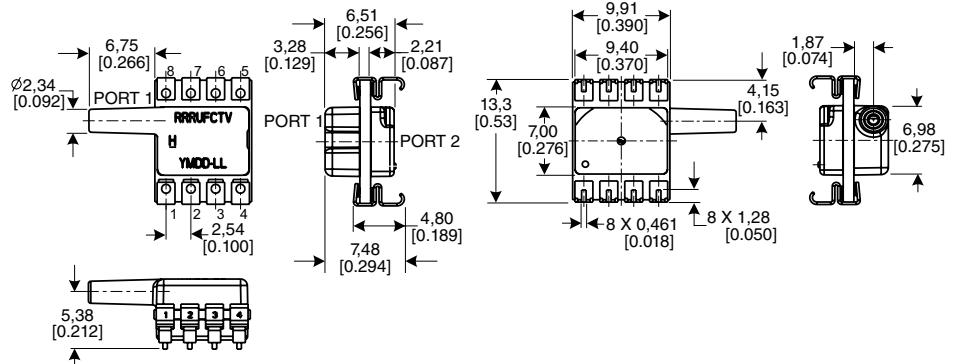
SMT RR: Dual radial barbed ports, same side



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)

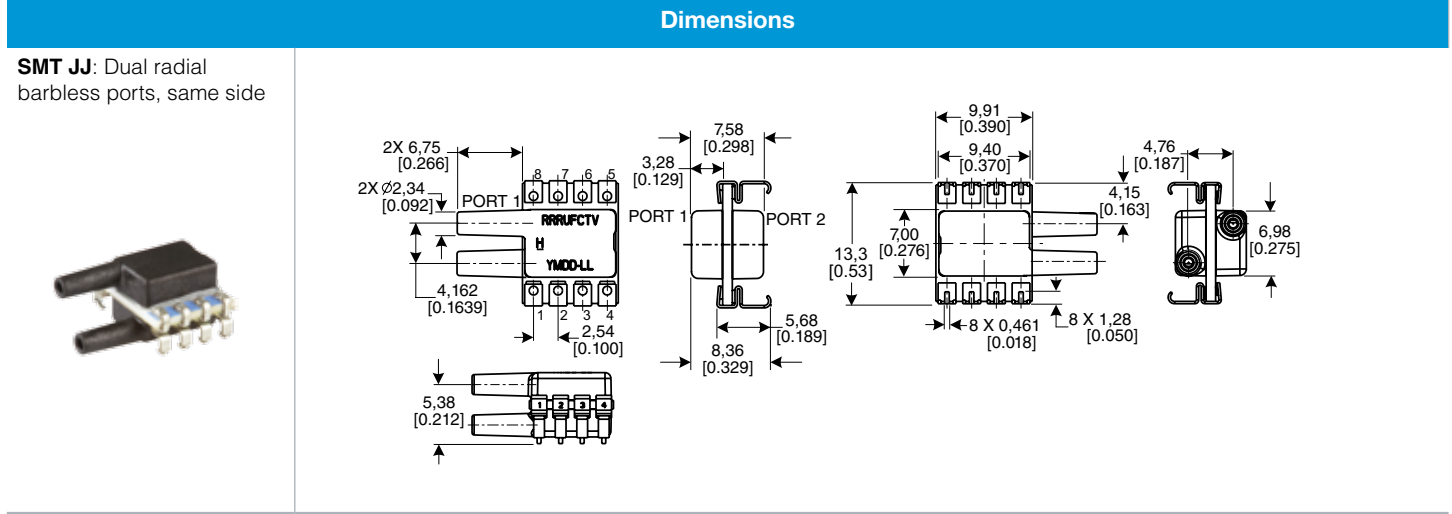
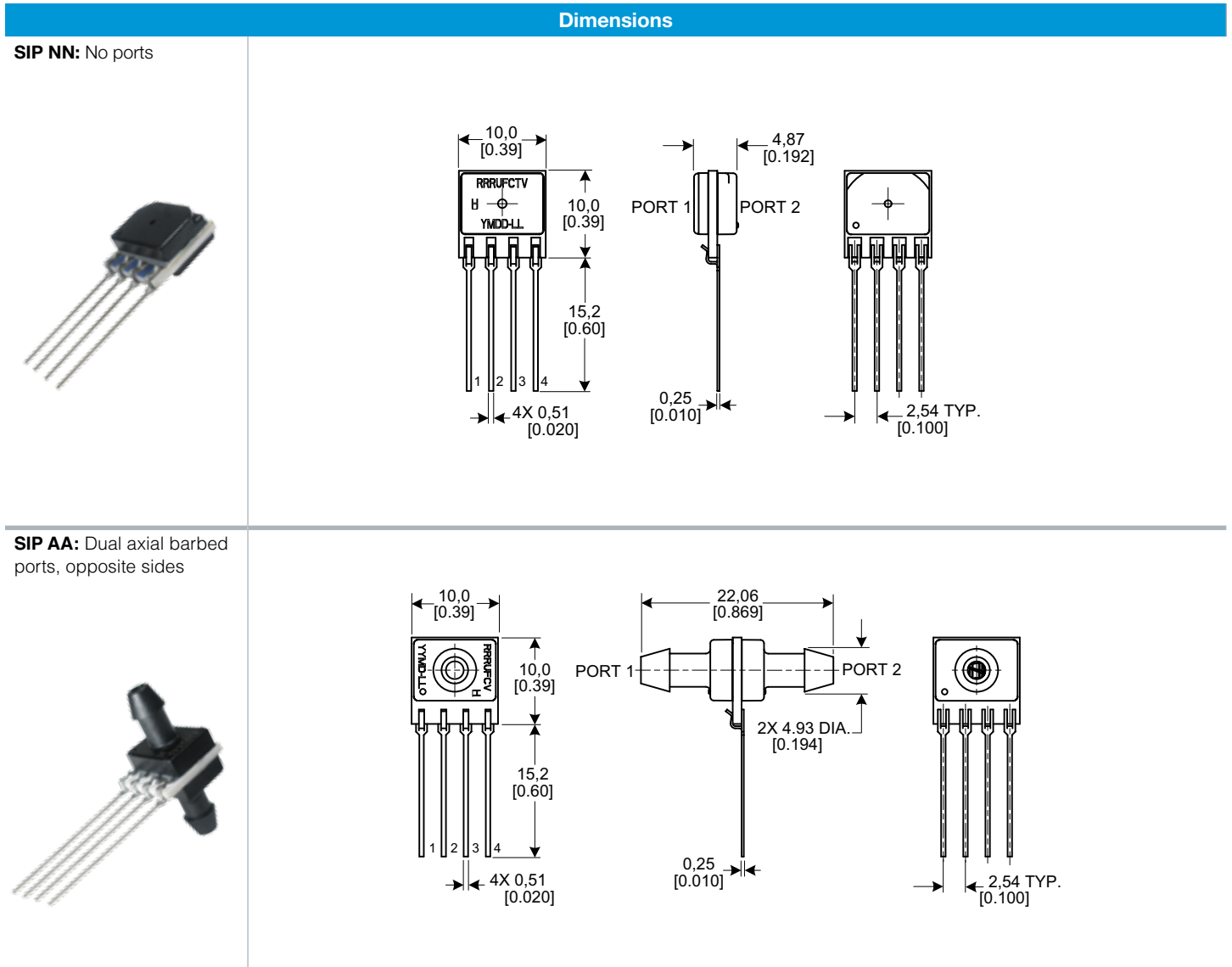


Figure 3. SIP Package Dimensional Drawings (For reference only: mm [in].)



TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

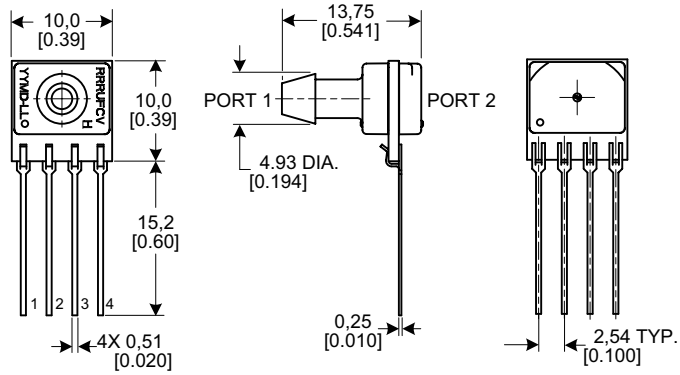
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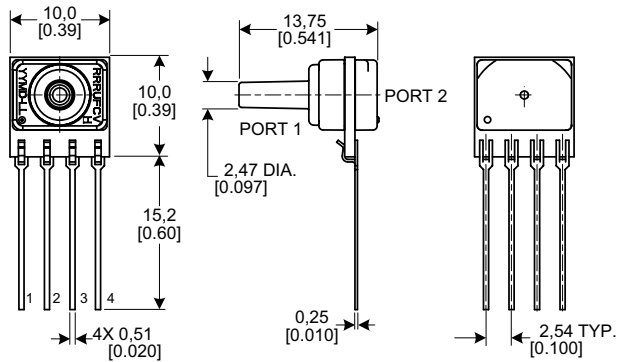
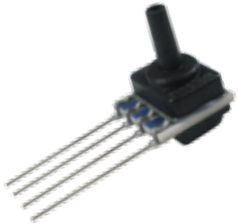
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

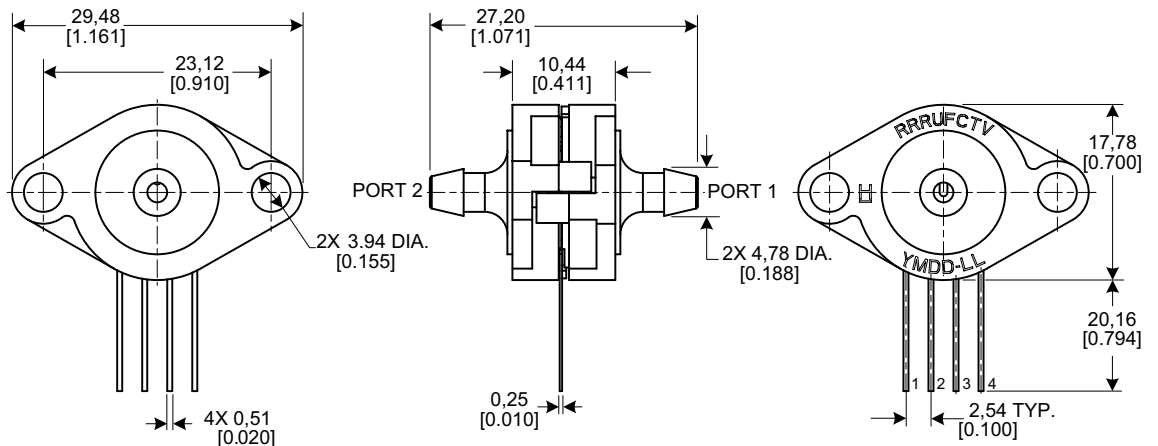
SIP AN: Single axial barbed port



SIP LN: Single axial barbless port



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



TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

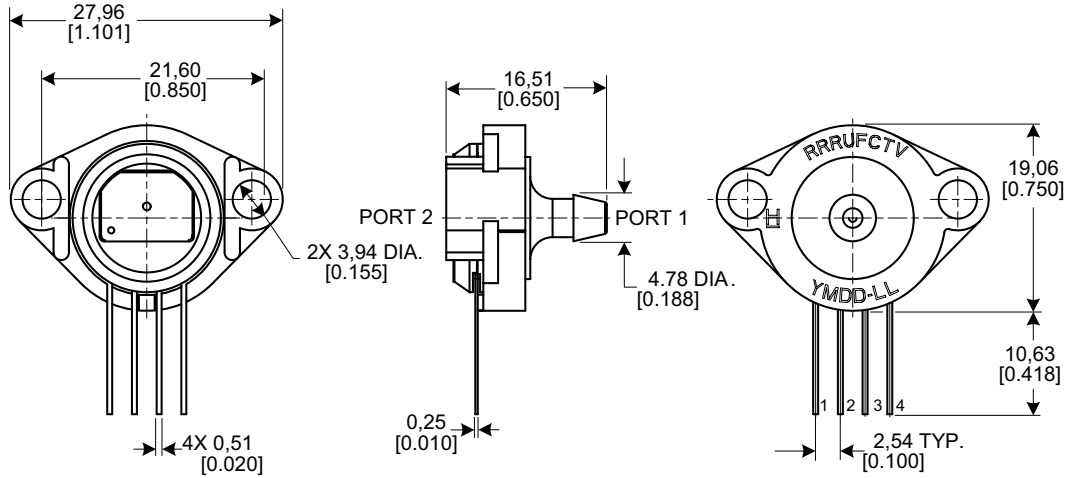
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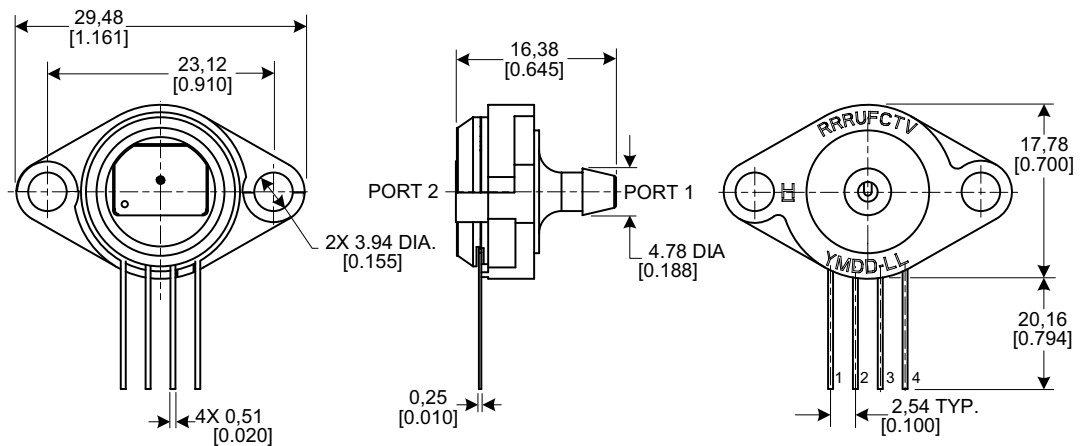
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

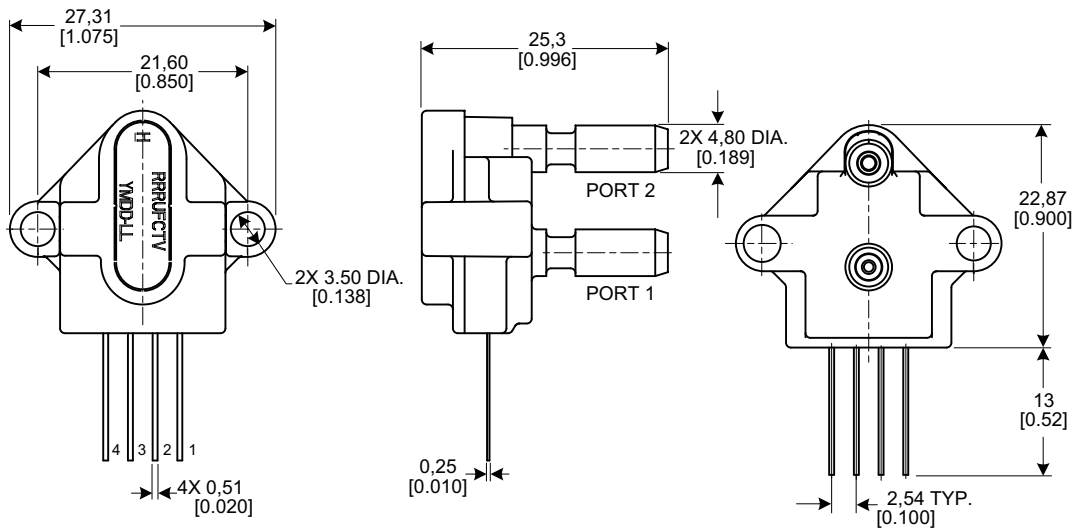
SIP FN: Fastener mount, single axial barbed port



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

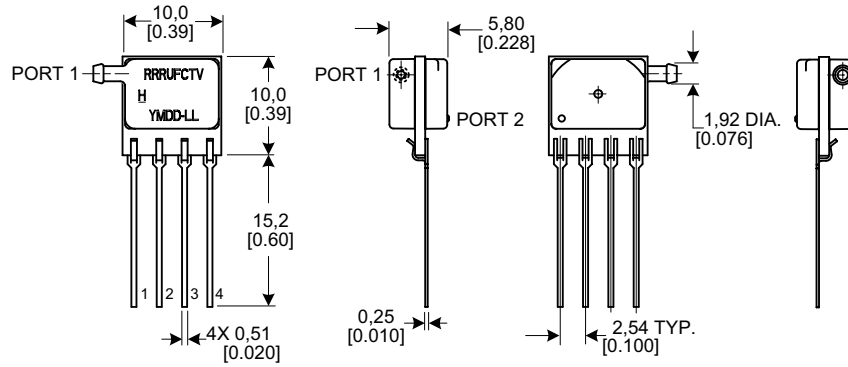
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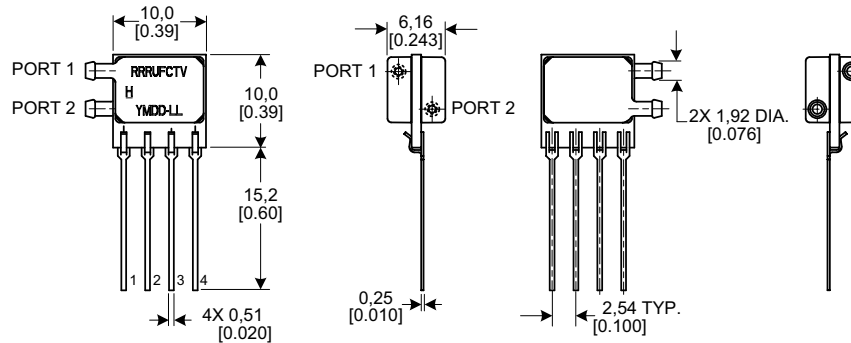
Figure 3. SIP Package Dimensional Drawings (continued)

Dimensions

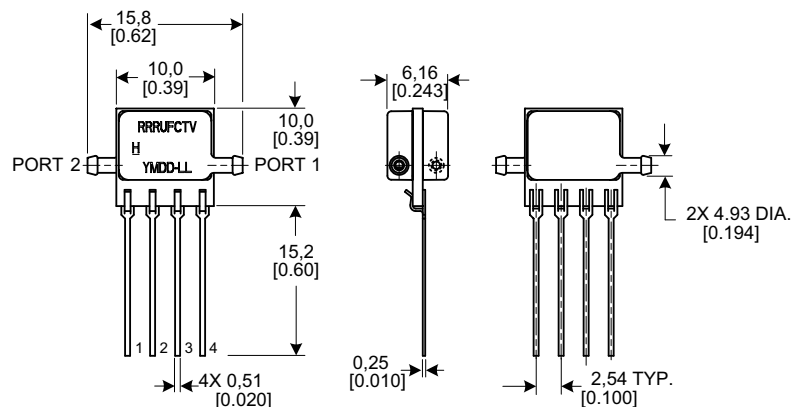
SIP RN: Single radial barbed port



SIP RR: Dual radial barbed ports, opposite sides



SIP DR: Dual radial barbed ports, opposite sides



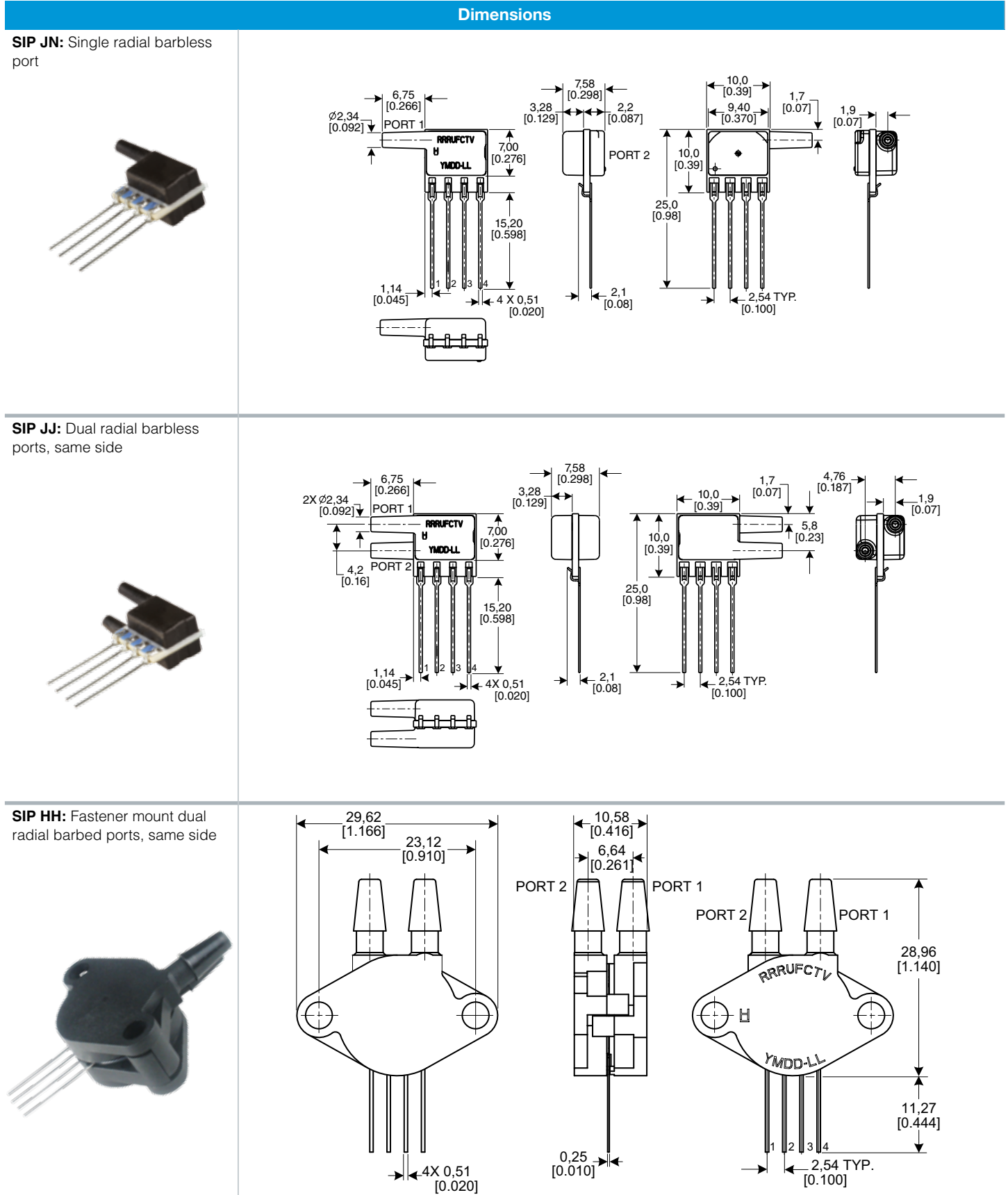
TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

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Figure 3. SIP Package Dimensional Drawings (continued)



TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

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Figure 3. SIP Package Dimensional Drawings (continued)


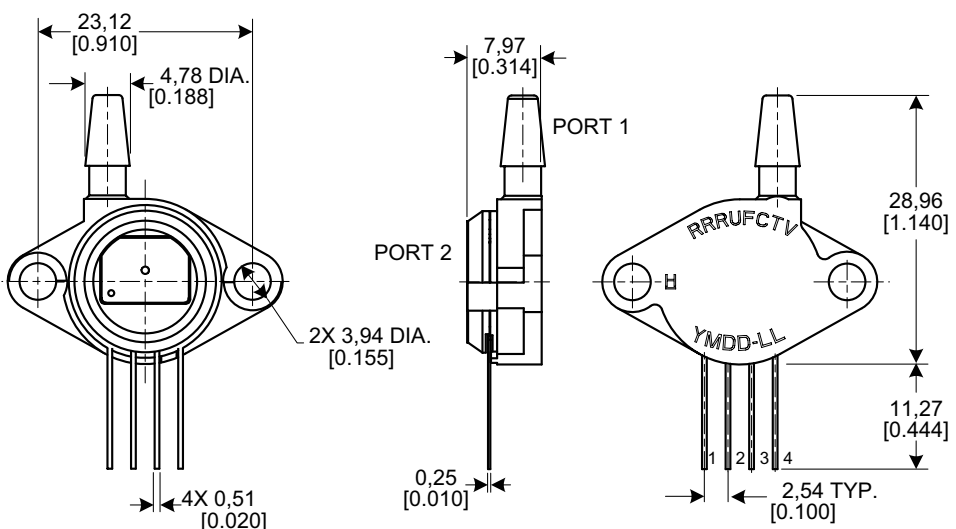

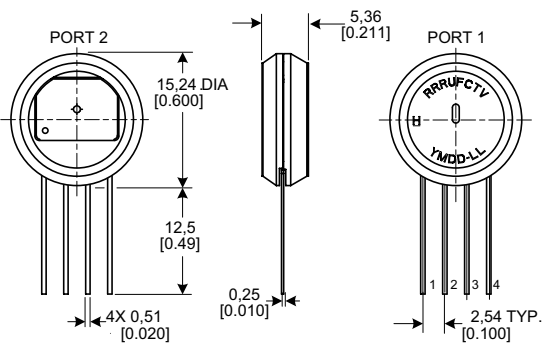

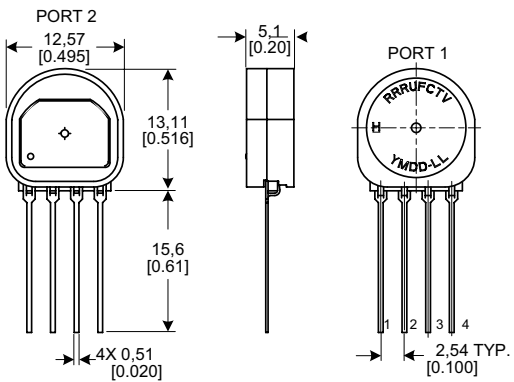
| Dimensions | |
|--|--|
| <p>SIP HN: Fastener mount single radial barbed port</p>  |  <p>23,12 [0.910] 4,78 DIA. [0.188] 7,97 [0.314] PORT 1 PORT 2 2X 3,94 DIA. [0.155] 28,96 [1.140] 11,27 [0.444] 4X 0,51 [0.020] 0,25 [0.010] 2,54 TYP. [0.100]</p> |
| <p>SIP MN: Manifold mount, outer diameter seal</p>  |  <p>5,36 [0.211] PORT 2 15,24 DIA. [0.600] 12,5 [0.49] 4X 0,51 [0.020] 0,25 [0.010] PORT 1 2,54 TYP. [0.100]</p> |
| <p>SIP SN: Manifold mount, inner diameter seal</p>  |  <p>5,1 [0.20] PORT 2 12,57 [0.495] 13,11 [0.516] 15,6 [0.61] 4X 0,51 [0.020] PORT 1 2,54 TYP. [0.100]</p> |

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

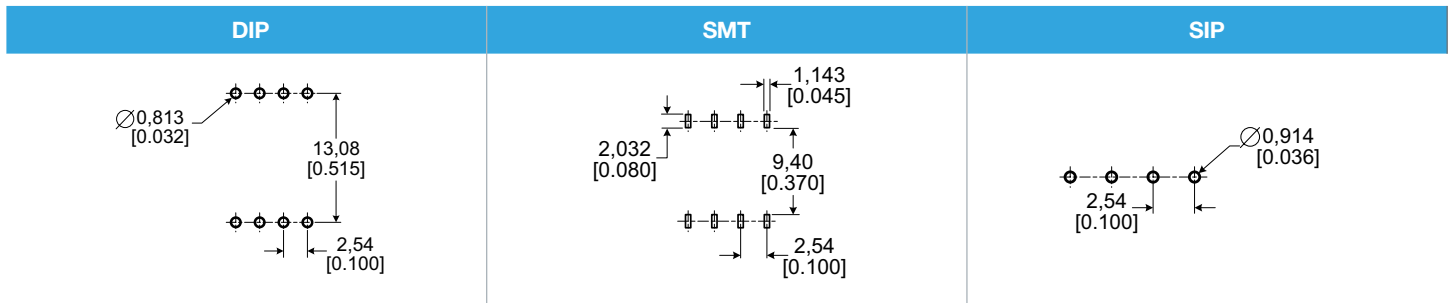
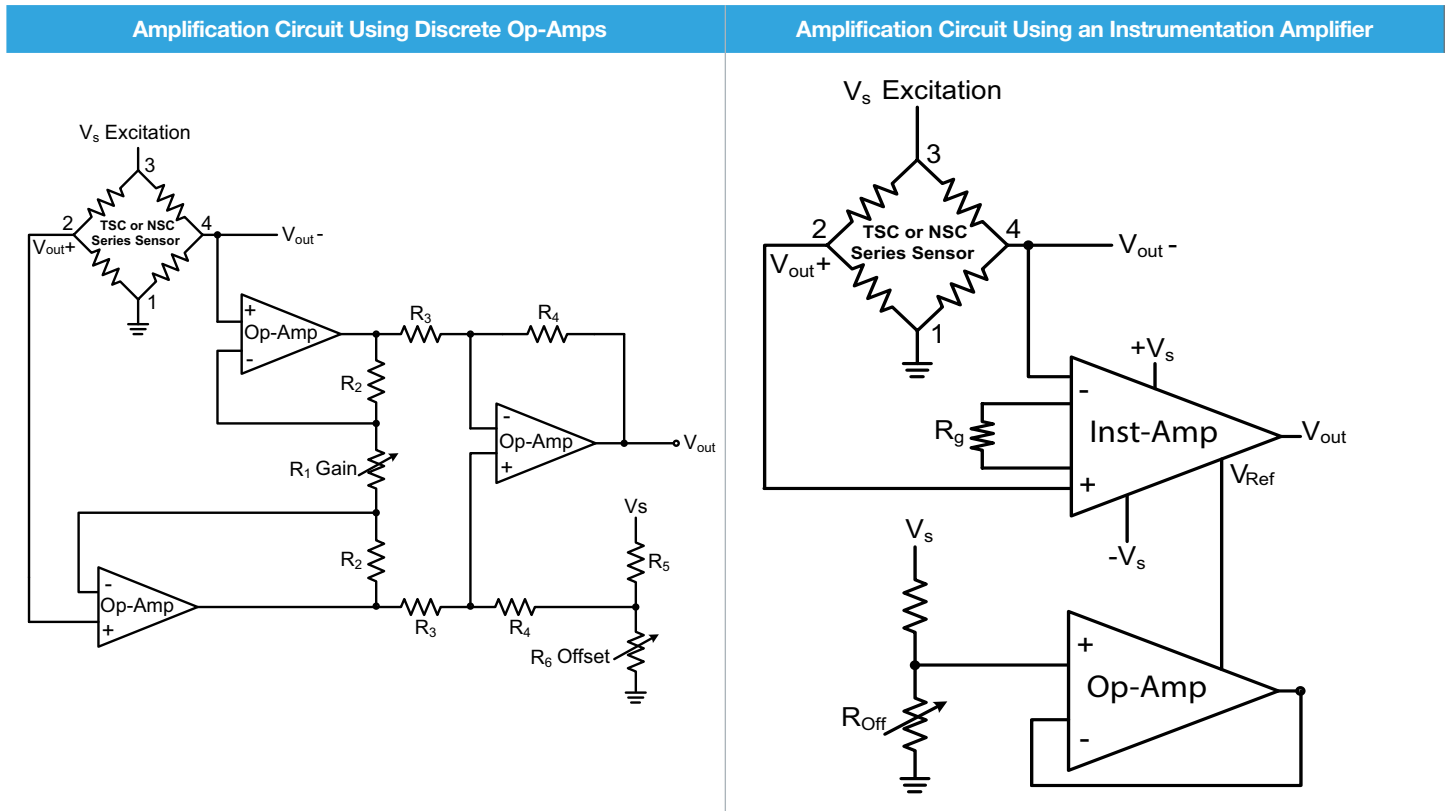


Figure 5. Circuit Examples



TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

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 | |
| — | — | — | — | 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 |
|---------------------------------|-------------------------------|-------------------------------|
| <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> | | |
| 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 | |

TSC Series, Compensated/Unamplified

NSC Series, Uncompensated/Unamplified

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.

NSC D N N N 150 P G U N V

Supply Voltage
V Constant

Compensation
N Uncompensated

Output Type
U Unamplified

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 | | 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

Pressure Range

| 2.5 mbar to 10 bar | | 400 Pa to 1 MPa | | 1 in H ₂ O to 150 psi | |
|---------------------------------|-------------------------------|--|--|----------------------------------|--|
| <i>Absolute</i> | | <i>Absolute</i> | | <i>Absolute</i> | |
| 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 | | | | |
| <i>Differential</i> | | <i>Differential</i> | | <i>Differential</i> | |
| 2.5MD ±2.5 mbar | 250LD ±250 Pa | 001ND ±1 inH ₂ O | | | |
| 004MD ±4 mbar | 400LD ±400 Pa | 002ND ±2 inH ₂ O | | | |
| 006MD ±6 mbar | 600LD ±600 Pa | 004ND ±4 inH ₂ O | | | |
| 010MD ±10 mbar | 001KD ±1 kPa | 005ND ±5 inH ₂ O | | | |
| 016MD ±16 mbar | 1.6KD ±1.6 kPa | 010ND ±10 inH ₂ O | | | |
| 025MD ±25 mbar | 2.5KD ±2.5 kPa | 020ND ±20 inH ₂ O | | | |
| 040MD ±40 mbar | 004KD ±4 kPa | 030ND ±30 inH ₂ O | | | |
| 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> | |
| 004MG 0 mbar to 4 mbar | 400LG 0 Pa to 400 Pa | 002NG 0 inH ₂ O to 2 inH ₂ O | | | |
| 006MG 0 mbar to 6 mbar | 600LG 0 Pa to 600 Pa | 004NG 0 inH ₂ O to 4 inH ₂ O | | | |
| 010MG 0 mbar to 10 mbar | 001KG 0 kPa to 1 kPa | 005NG 0 inH ₂ O to 5 inH ₂ O | | | |
| 016MG 0 mbar to 16 mbar | 1.6KG 0 kPa to 1.6 kPa | 010NG 0 inH ₂ O to 10 inH ₂ O | | | |
| 025MG 0 mbar to 25 mbar | 004KG 0 kPa to 4 kPa | 020NG 0 inH ₂ O to 20 inH ₂ O | | | |
| 040MG 0 mbar to 40 mbar | 006KG 0 kPa to 6 kPa | 030NG 0 inH ₂ O to 30 inH ₂ O | | | |
| 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

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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.

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