

# Installation Instructions for the PX2 Series Heavy Duty Transducers

Issue 6

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## GENERAL INFORMATION

Honeywell's PX2 Series Heavy Duty Pressure Transducer is a portfolio of highly configurable pressure sensors that use piezoresistive sensing technology with ASIC (Application Specific Integrated Circuit) signal conditioning in a stainless steel housing. The PX2 Series is fully calibrated and compensated for offset, sensitivity, temperature effects and non-linearity using the on-board ASIC.

## OVERPRESSURE

### CAUTION PRODUCT DAMAGE

- Do not exceed the overpressure.
- Failure to comply with these instructions may result in product damage.**

If the overpressure rating is exceeded, the life of the PX2 Series may be reduced and electrical failure may occur. Both static and dynamic overpressure must be considered, particularly in hydraulic system applications. Hydraulic pressure fluctuations can have very high and very fast peak pressures, as in a water hammer effect.

An oscilloscope is recommended for determining if high-pressure transients exist in a system. If system pressure pulses are expected, choose a transducer with a pressure rating high enough to allow continuous operation at the highest expected pressure spikes.

A pressure 'snubber' may be used to reduce the peak pressure applied to the transducer.

## MEDIA COMPATIBILITY

### CAUTION PRODUCT DAMAGE

- Use non-abrasive, chemically compatible media to prevent damage to diaphragm or port materials.
- Failure to comply with these instructions may result in product damage.**

The PX2 Series fluid path is an assembly of 304 stainless steel, epoxy, alumina, glass, and silicon.

**Table 1. Compatible Media**

Refrigerants	Other
R410A	engine oil 10W30
R134A	brake fluid DOT3
R123ZE	hydraulic fluid
mixture of R245Fa and transdichloroethylene	tap water
	compressed air

## CAUTION

### PRODUCT DAMAGE

- Ensure torque specifications are determined for the specific application. Values provided are for reference only. NPT ports are not specified with torque values. Correct installation is based on the number of Turns From Finger Tight (TFFT). (Mating materials and thread sealants can result in significantly different torque values from one application to the next.)
  - When using NPT ports in stainless steel manifolds, use a thread sealant with anti-seize properties to prevent thread galling. Ensure the sealant is rated for the application.
  - Use appropriate tools (such as an open ended wrench or deep well socket) to install transducers.
  - Always hand-start transducers into the hole to prevent cross threading and damage.
  - Do not subject the transducer to high temperatures from soldering, brazing, or welding of the system plumbing
- Failure to comply with these instructions may result in product damage.**

Ratiometric voltage devices require either a regulated 3.3 Vdc (AA and AB) or a regulated 5.0 Vdc supply (AC and AD), (see Table 2). All other versions can use an unregulated supply within the ranges noted under the excitation specifications. Ensure the power supply is off while wiring.

## ELECTROMAGNETIC ENERGY/NOISE

### CAUTION

#### PRODUCT DAMAGE/ERRATIC OPERATION

- Do not use in areas where electromagnetic energy may affect transducer operation.
- Failure to comply with these instructions may result in product damage.**

The PX2 Series has been rated for high immunity to electrical noise; however, care should be taken when used around high voltage sources that emit high levels of radiated electromagnetic energy like variable frequency motor drives, solenoids, radio transmitters and engine ignition systems. The use of shielded cable and grounding of pressure port is also recommended.

## FUNCTIONAL TEST

- Connect the transducer to a dc voltage supply (off). The supply voltage should be set within the range specified for the model.
- Based on the transducer's specified output, connect the output lead(s) to a digital dc or mA meter.
- With no pressure on the transducer, turn on the power supply and read the output signal on the voltmeter. The reading should correspond to the specification indicated for null offset. If not, check the connections, wire color code and the setting of the power supply.

## WIRING INSTRUCTIONS

The wiring code for electrical connection is shown in Figure 4.

### NOTICE

- To ensure proper environmental sealing and electrical connections when using a connector, follow the connector manufacturer's installation guidelines.
- All terminal cavities must be sealed using the correct wire gauge and seal combination.
- If only two leads are used, any additional terminal cavities should be sealed per the connector manufacturer's installation guide.
- Honeywell recommends using a crimping tool for crimping wires to the connector terminals.
- Contact the individual connector manufacturer for connector wiring.

**Table 2. Electrical Specifications**

Characteristic	Ratiometric Output				Current Output	Regulated Output			
	Output Transfer Function Order Code								
	AA	AB	AC	AD	CH	BC	BD	BE	BG
Output transfer function <sup>1</sup> :									
null output value	10% of Vs	5% of Vs	10% of Vs	5% of Vs	4 mA	1 V	0.25 V	0.5 V	1 V
full scale output value	90% of Vs	95% of Vs	90% of Vs	95% of Vs	4 mA	6 V	10.25 V	4.5 V	5 V
full scale span (FSS)	80% of Vs	90% of Vs	80% of Vs	90% of Vs	16 mA	5 V	10 V	4 V	4 V
operating supply voltage, min.(Vs) <sup>2</sup>	4.75 V	4.5 V	3.135 V	3.135 V	8 V	9 V	13 V	8 V	8 V
operating supply voltage, typ. (Vs) <sup>2</sup>	5 V	5 V	3.3 V	3.3 V	—	—	—	—	—
operating supply voltage, max. (Vs) <sup>2</sup>	5.25 V	5.5 V	3.465 V	3.465 V	30 V <sup>4</sup>	30 V <sup>3</sup>	30 V <sup>3</sup>	30 V <sup>3</sup>	30 V <sup>3</sup>
Supply current (typ.)	5 mA		4 mA		—	5.5 mA			
Output load (pull up or down)									
minimum	2 kOhm				—	2 kOhm			
maximum	—				(Vs - 8) x 50 Ohm <sup>4</sup>	—			
Absolute voltage ratings <sup>5</sup> :									
minimum <sup>6</sup>	-16 V				-16 V	-16 V			
maximum <sup>6</sup>	16 V				30 V	30 V			
maximum applied to output pin	Vs				—	12 V			
EMC rating — CE compliance <sup>7</sup> :									
electrostatic discharge	±4 kV contact, ±8 kV air per IEC 61000-4-2								
radiated immunity	10 V/m (80 MHz to 1000 MHz) per IEC 61000-4-3								
fast transient burst	±1 kV per IEC61000-4-4								
immunity to conducted disturbances	3 V per IEC61000-4-6								
radiated emissions	40 dB 30 MHz to 230 MHz; 47 dB 230 MHz to 1000 MHz per CISPR 11								
EMC Rating – ISO 11452-2 <sup>7</sup> :									
radiated immunity	100 V/m 200 MHz to 2 GHz					20 V/m 200 MHz to 2 GHz			

### Notes:

1. The Output Transfer Function order code in the catalog listing appears as the last two digits before the final "X". For example, the "AA" in the following catalog listing is the transfer function code: PX2BN1XX100PSAAX.
2. Transducer will not produce valid output when supply voltage is outside of operating range.
3. Applies at 25 °C. See Figure 1 for Regulated Output Supply Voltage.
4. Applies at 25 °C. See Figure 2 for Current Output Supply Voltage.
5. Absolute maximum ratings are the extreme limits the device can withstand without damage to the product. Voltages above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability.
6. Absolute voltage applies to potential across power and ground terminals.
7. All EMC ratings verified with the Dephi Metri-Pack 150 connector type.

Figure 1. Regulated Output Supply Voltage

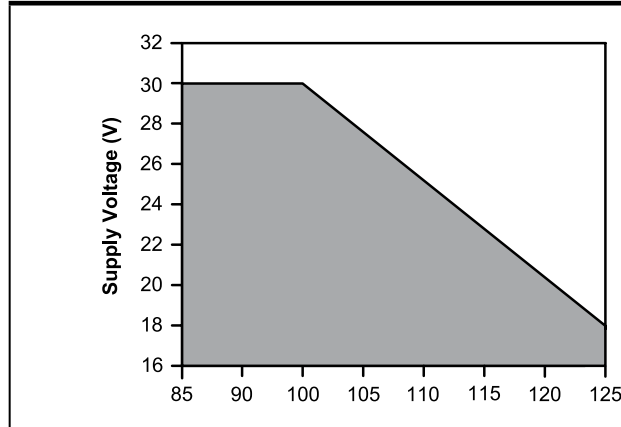


Figure 2. Current Output Supply Voltage

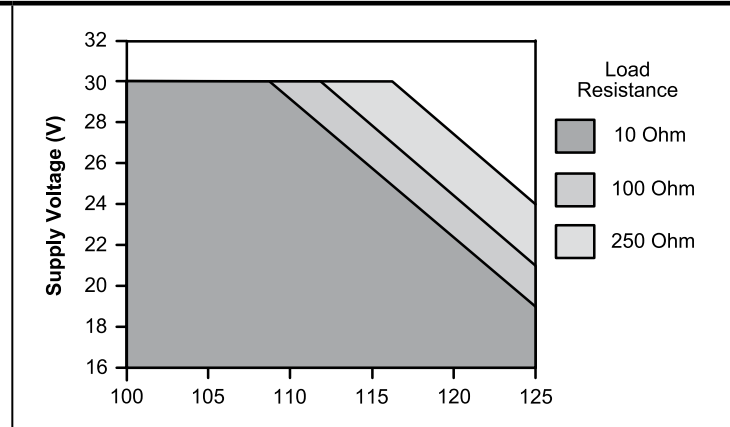


Table 3. Performance Specifications<sup>1</sup>

Characteristic	Parameter
Operating temperature range <sup>2</sup>	-40 °C to 125 °C [-40 °F to 257 °F]
Storage temperature range <sup>3</sup>	-40 °C to 125 °C [-40 °F to 257 °F]
Compensated temperature range <sup>4</sup>	-40 °C to 125 °C [-40 °F to 257 °F]
Overpressure minimum rating <sup>5</sup>	(See Figure 3.)
Burst pressure minimum rating <sup>6</sup>	(See Figure 3.)
Long term stability	±0.5 %FSS <sup>9</sup> (1000 hr at 25 °C [77 °F])
Accuracy <sup>7</sup>	±0.25 %FSS <sup>9</sup>
Offset error <sup>8</sup>	±1 %FSS <sup>9</sup>
Total Error Band <sup>10</sup>	±2 %FSS <sup>9</sup> (-40 °C to 125 °C [-40°F to 257 °F])
Response time <sup>11</sup>	<2 ms
Turn on time <sup>12</sup>	<7 ms
Life <sup>13</sup>	min. of 10 million cycles to operating pressure

**Notes:**

- All specifications apply at 25 °C and under operating conditions unless otherwise noted.
- Operating Temperature Range: The temperature range over which the product will produce an output proportional to pressure but may not remain within the specified performance limits.
- Storage Temperature Range: The temperature range over which the product may safely be exposed without excitation or pressure applied. Under these conditions the product will remain in specification after excursion to any temperatures within this range. Exposure to temperatures outside this range may cause permanent damage to the product.
- Compensated Temperature Range: The temperature range (or ranges) over which the product will produce an output proportional to pressure within the specified performance limits.
- Overpressure: The absolute maximum rating for pressure which may be safely applied to the product for it to remain in specification once pressure is returned to the operating pressure range. Exposure to higher pressure may cause permanent damage to the product.
- Burst Pressure: The maximum pressure that may be applied to the product without causing escape of the pressure media. The product should not be expected to function after exposure to any pressure beyond the rated burst pressure. This rating is also the case burst rating of the product.
- Accuracy: The maximum deviation in output from a Best Fit Straight Line (BFSL) fitted to the output measured over the pressure range at 25 °C. Includes all errors due to pressure non-linearity, pressure hysteresis, and non-repeatability.
- Offset Error: the maximum deviation in the output signal obtained when the reference pressure is applied at 25 °C relative to the ideal transfer function.
- Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range.
- Total Error Band: The maximum deviation from the ideal transfer function over the entire compensated temperature and pressure range. Includes all errors due to offset, full scale span, pressure non-linearity, pressure hysteresis, repeatability, thermal effect on offset, thermal effect on span, and thermal hysteresis.
- Response Time: The response time of the transducer is the maximum amount of time that the transducer will take for the transducer to output a change from 10% to 90% of full scale in response to a 0% to 100% full scale step input pressure range.
- Turn On Time: Duration from power applied until first valid output.
- Life may vary depending on the application in which transducer is used. Contact Honeywell Sales and Service for Mean Time to Failure (MTTF) data based on customer-specific usage profile.

Figure 3. Pressure Rating Curve

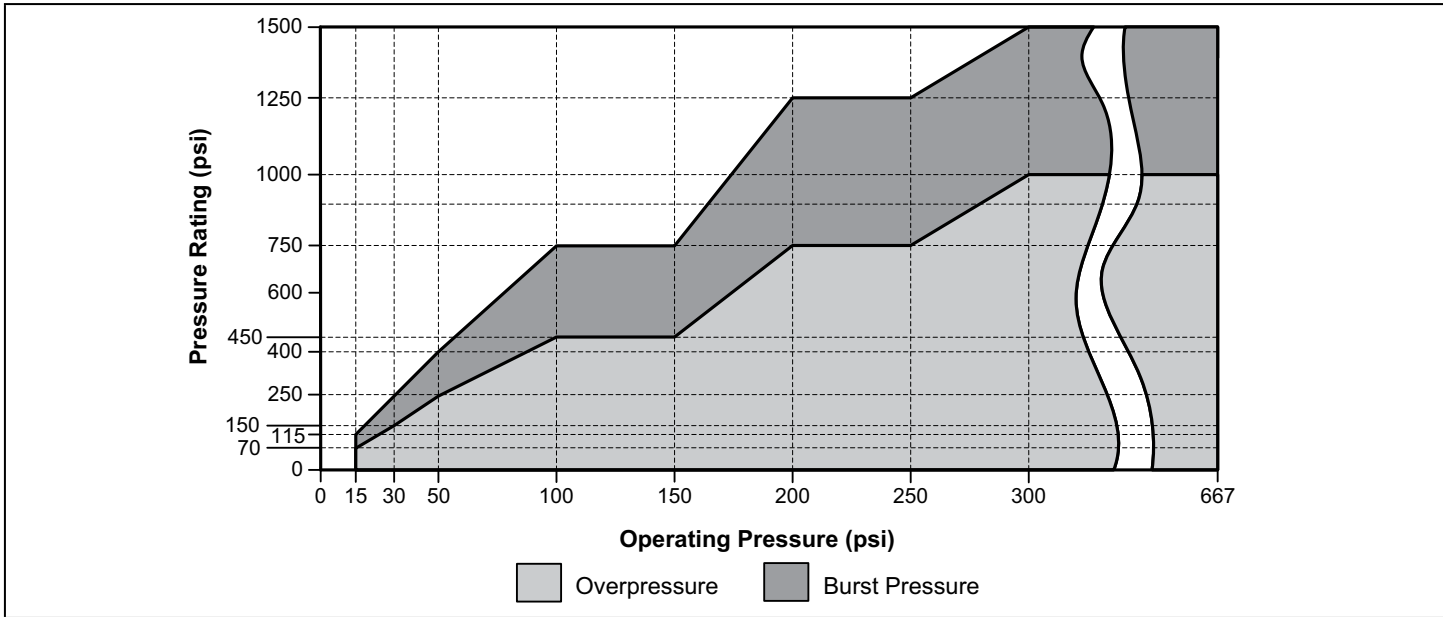


Table 4. Pressure Types

Pressure Reference	Description
Absolute	Output is proportional to the difference between applied pressure and a built-in fixed reference to vacuum (zero pressure), where the minimum operating pressure is set to absolute zero pressure (perfect vacuum)
Sealed Gage <sup>1</sup>	Output is proportional to the difference between applied pressure and a built-in fixed reference to 1 atmsA, where the minimum operating pressure is set to 14.7 psiA (1 atmsA)

Note:

1. Sealed gage option only available in pressure ranges at or above 100 psi.

Table 5. Mechanical Characteristics

Characteristic	Parameter
Mechanical shock	100 G per MIL-STD-202F, Method 213B, Cond. F (at 25 °C]
Vibration	20 G sweep, 10 Hz to 2000 Hz (at 25 °C]
Enclosure rating	per electrical connector selection (See Figure 4.)
Wetted materials: port substrate adhesives electronics	304 stainless steel alumina ceramic epoxy glass, silicon
External materials: housing connector cable jacket	304 stainless steel PBT 30% GF TPE
Installation torque	per port type (See Figure 5.)

Figure 4. Connector Dimensions (For reference only: mm/[in].)

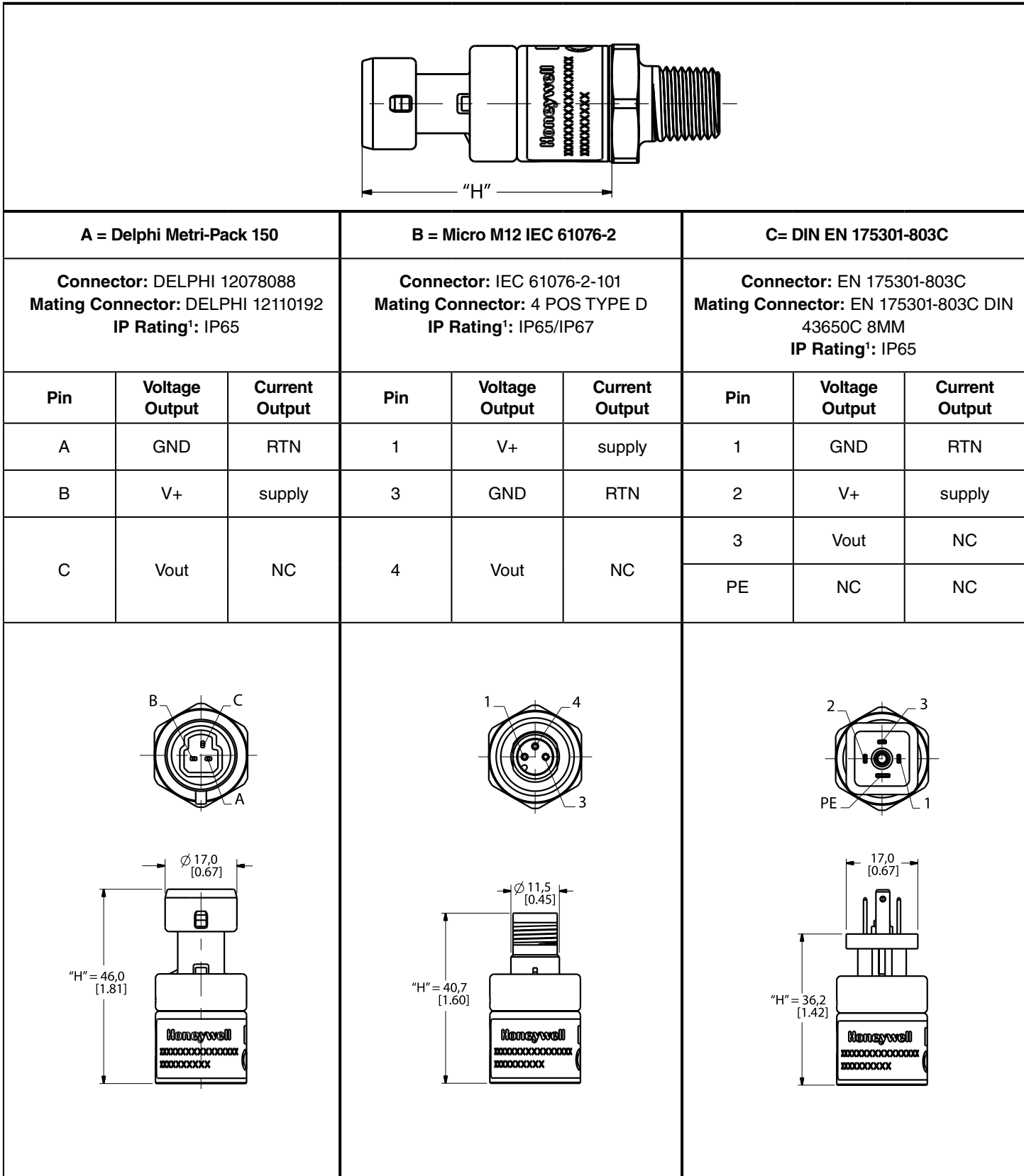
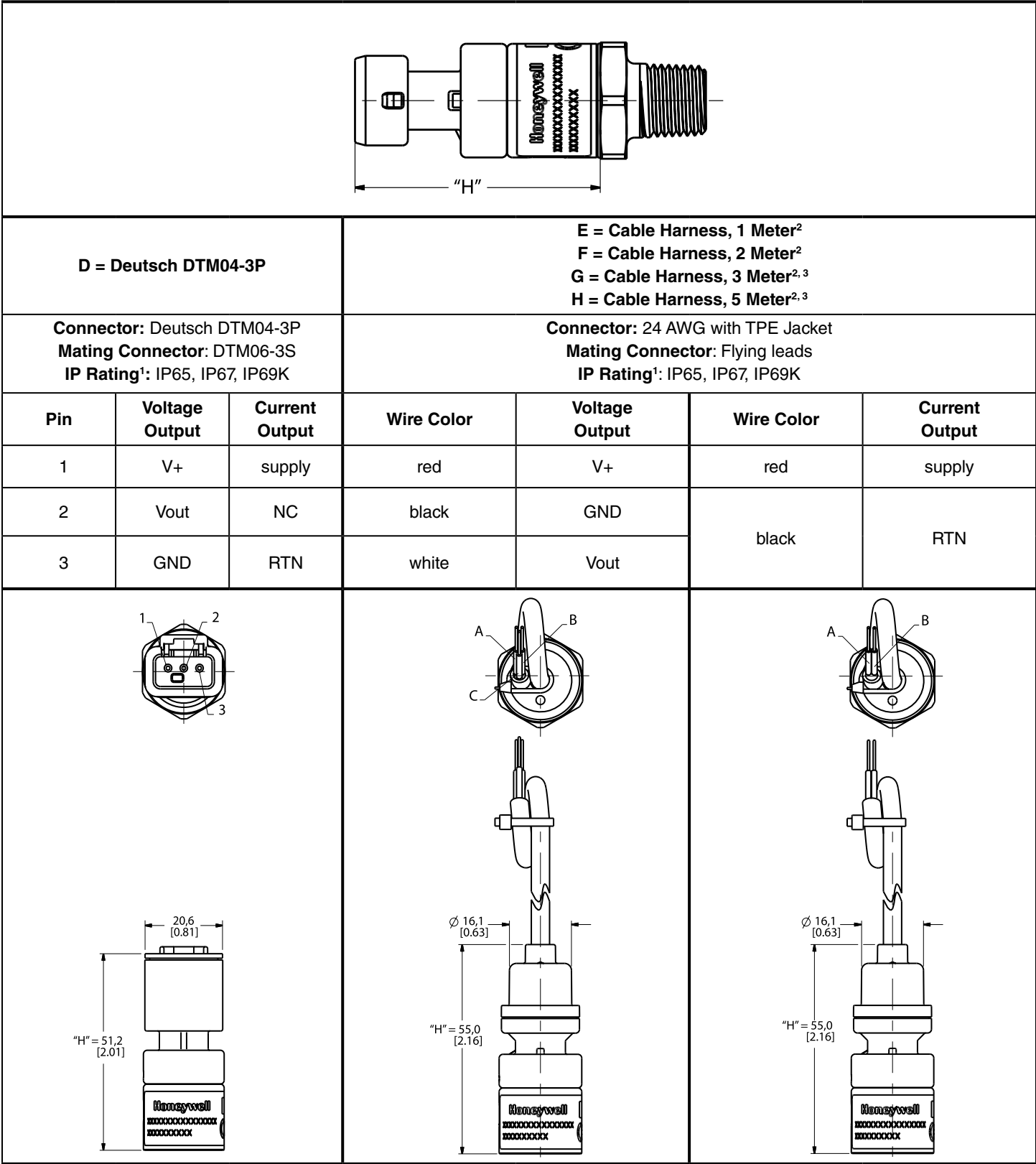


Figure 4. Connector Dimensions (For reference only: mm/[in], continued.)

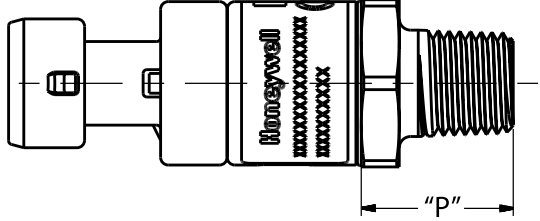
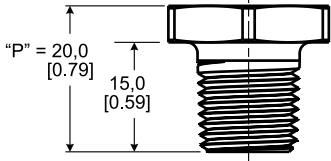
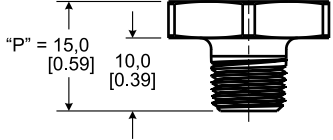
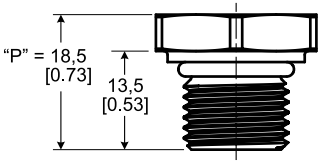
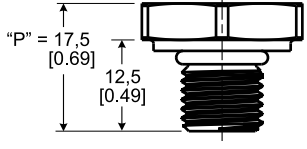
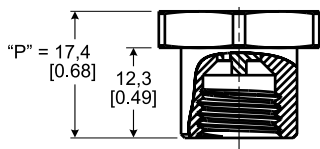
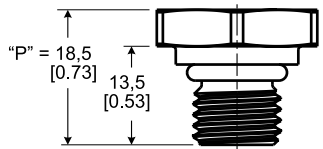
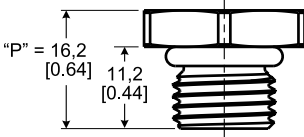
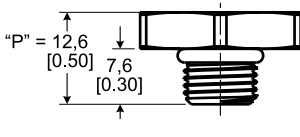


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Figure 5. Port Dimensions (For reference only: mm/[in].)

	
<p><b>N1 = 1/4–18 NPT</b>  <b>Seal:</b> pipe thread  <b>Mating Geometry:</b> ANSI B1.20.1  <b>Installation Torque<sup>1</sup>:</b> 2 to 3 Turns From Finger Tight</p> 	<p><b>N2 = 1/8–27 NPT</b>  <b>Seal:</b> pipe thread  <b>Mating Geometry:</b> ANSI B1.20.1  <b>Installation Torque<sup>1</sup>:</b> 2 to 3 Turns From Finger Tight</p> 
<p><b>S1 = 9/16–18 UNF SAE J1926-3</b>  <b>Seal<sup>2,3</sup>:</b> O-ring  <b>Mating Geometry:</b> SAE J1926-1  <b>Installation Torque<sup>1</sup>:</b> 30 N m [22.1 ft lb]</p> 	<p><b>S2 = 7/16–20 UNF SAE J1926-3</b>  <b>Seal<sup>2,3</sup>:</b> O-ring  <b>Mating Geometry:</b> SAE J1926-1  <b>Installation Torque<sup>1</sup>:</b> 18 N m [12.3 ft lb]</p> 
<p><b>F1 = 1/4 in 45° Flare Female Schrader (7/16–20 SAE J512)</b>  <b>Seal:</b> 45° cone seal  <b>Mating Geometry:</b> SAE J512  <b>Installation Torque<sup>1</sup>:</b> 17 N m [12.5 ft lb]</p> 	<p><b>M1 = M12 X 1.5 ISO 6149-3</b>  <b>Seal<sup>2,3</sup>:</b> O-ring  <b>Mating Geometry:</b> ISO 6149-1  <b>Installation Torque<sup>1</sup>:</b> 25 N m [18.4 ft lb]</p> 
<p><b>G1 = G1/4 ISO 1179-3</b>  <b>Seal<sup>2,3</sup>:</b> O-ring  <b>Mating Geometry:</b> ISO 1179-1  <b>Installation Torque<sup>1</sup>:</b> 50 N m [38.9 ft lb]</p> 	<p><b>G2 = G1/8 ISO 1179-3</b>  <b>Seal<sup>2,3</sup>:</b> O-ring  <b>Mating Geometry:</b> ISO 1179-1  <b>Installation Torque<sup>1</sup>:</b> 25 N m [18.4 ft lb]</p> 

## Notes:

1. Straight thread maximum torque is validated to 150% of installation torque.
2. Seals for port order codes **S1**, **S2**, **M1**, **G1** and **G2** are included and assembled to the sensor.
3. O-ring material is nitrile 70 durometer -30 °C to 125 °C [-22 °F to 257 °F].

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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:

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