

Installation Instructions for the Heavy Duty Pressure Transducers PX2 Series, 1 bar to 70 bar | 100 kPa to 7 MPa | 15 psi to 700 psi

50052336
Issue I

GENERAL INFORMATION

Honeywell's PX2 Series Heavy Duty Pressure Transducers are 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.

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.

The PX2 Series is not recommended for use with media involving water, saturated air such as steam and vapor, and ammonia.

INSTALLATION

CAUTION PRODUCT DAMAGE DUE TO PARTICULATES

- Ensure that a filter is used upstream of the transducer to keep media flow free of larger particulates and increased humidity. All PX2 Series transducers are dead-ended devices; particulate accumulation and condensing moisture may affect sensor output.
- It is recommended that the transducer be positioned with the port facing downwards; any particulates in the system are less likely to enter and settle within the pressure transducer if it is in this position.
- Ensure that the media does not create a residue when dried. Build-up inside the transducer may affect transducer output; rinsing of a dead-ended transducer is potentially difficult and has limited effectiveness in removing residue.

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

CAUTION PRODUCT DAMAGE DUE TO MECHANICAL ISSUES

- Ensure torque specifications are determined for the specific application. Values provided are for reference only. (Mating materials and thread sealants can result in significantly different torque values from one application to the next.)
- When using mating parts made of stainless steel, 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.
- Ensure that torque is not applied to the electrical connector.
- Ensure that the proper mating electrical connector with a seal is used to connect the transducer. Improper or damaged seals can compromise ingress protection, leading to short circuits.

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.

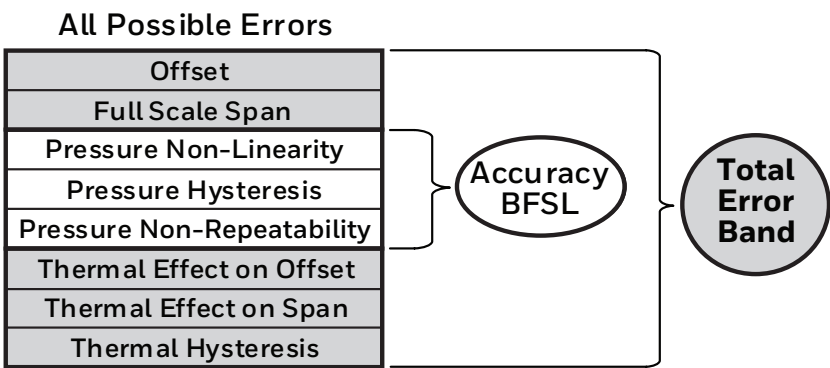
NOTICE

- 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.

WIRING INSTRUCTIONS

The wiring code for electrical connection is shown in Figure 3.

Figure 1. Total Error Band (TEB)



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Table 1. Performance Specifications¹

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

¹ All specifications apply at 25°C and under operating conditions unless otherwise noted.

² 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.

³ 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.

⁴ Compensated Temperature Range: The temperature range (or ranges) over which the product will produce an output proportional to pressure within the specified performance limits.

⁵ 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.

⁶ 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.

⁷ 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.

⁸ 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.

⁹ Full Scale Span (FSS): The algebraic difference between the output signal measured at the maximum (Pmax.) and minimum (Pmin.) limits of the pressure range.

¹⁰ 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.

¹¹ 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.

¹² Turn On Time: Duration from power applied until first valid output.

¹³ 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.

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Table 2. Electrical Specifications

Characteristic	Ratiometric Output				Current Output	Regulated Output			
	Output Transfer Function Order Code ¹								
	AA	AB	AC	AD	CH	BC	BD	BE	BG
Output transfer function ¹ :									
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) ²	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) ²	5 V	5 V	3.3 V	3.3 V	—	—	—	—	—
operating supply voltage, max. (Vs) ²	5.25 V	5.5 V	3.465 V	3.465 V	30 V ⁴	30 V ³	30 V ³	30 V ³	30 V ³
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 ⁴	—			
Absolute voltage ratings ⁵ :									
minimum ⁶	-16 V				-16 V	-16 V			
maximum ⁶	16 V				30 V	30 V			
maximum applied to output pin (short circuit protection) ⁷	Vs				—	12 V			
EMC rating ⁸ :									
CE compliance:									
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								
ISO 11452-2 radiated immunity	100 V/m 200 MHz to 2 GHz					20 V/m 200 MHz to 2 GHz			

¹ Output transfer function options are shown in the Nomenclature and Order Guide. (See Figure 4.)

² Transducer will not produce valid output when supply voltage is outside of operating range.

³ Applies at 25°C. See Figure 2 for Regulated Output Supply Voltage.

⁴ Applies at 25°C. See Figure 3 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 Short circuit protection between output pin and ground, and output pin and supply pin.

⁸ All EMC ratings verified with the Metri-Pack 150 electrical connector type.

Figure 2. Regulated Output Supply Voltage

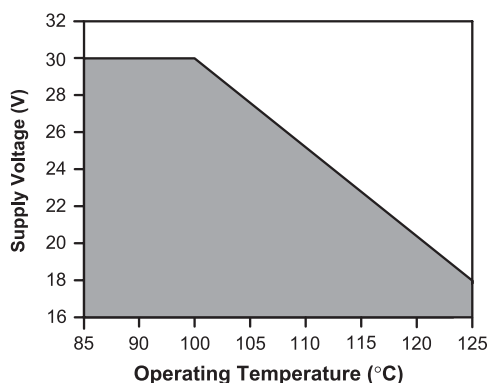
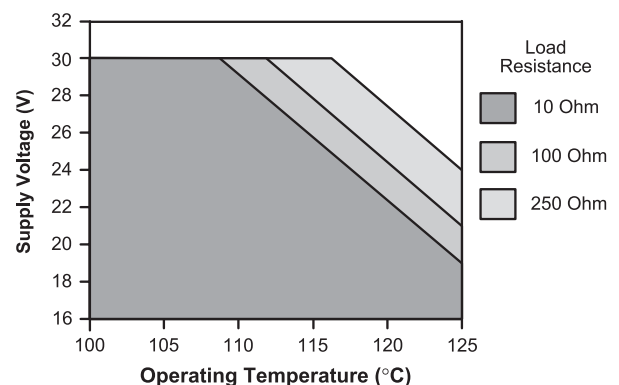


Figure 3. Current Output Supply Voltage



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Table 3. Pressure Ratings

bar			kPa			MPa			psi		
Operating Pressure	Over-pressure	Burst Pressure	Operating Pressure	Over-pressure	Burst Pressure	Operating Pressure	Over-pressure	Burst Pressure	Operating Pressure	Over-pressure	Burst Pressure
1	5	8	100	500	800	1	3.1	5.1	15	70	115
1.6	5	8	160	1000	1700	1.6	5.2	8.6	30	150	250
2	10	17	250	1000	1700	2.5	6.9	10.3	50	250	400
2.5	10	17	400	1700	2700	4	6.9	10.3	100	450	750
4	17	27	600	3100	5100	4.6	6.9	10.3	150	450	750
6	31	51	—	—	—	6	13.8	20.6	200	750	1250
8	31	51	—	—	—	7	13.8	20.6	250	750	1250
10	31	51	—	—	—	—	—	—	300	1000	1500
16	52	86	—	—	—	—	—	—	500	1000	1500
25	69	103	—	—	—	—	—	—	600	1000	1500
34	69	103	—	—	—	—	—	—	667	1000	1500
40	69	103	—	—	—	—	—	—	750	1500	2250
46	69	103	—	—	—	—	—	—	800	1500	2250
60	138	206	—	—	—	—	—	—	850	2000	3000
70	138	206	—	—	—	—	—	—	1000	2000	3000

Table 4. Pressure Reference 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 ¹	Output is proportional to the difference between applied pressure and a built-in fixed reference to 1 atmA, where the minimum operating pressure is set to 14.7 psiA (1 atmA).
Vented gage ²	Sensor measures pressure relative to ambient pressure. Output is proportional to the difference between applied pressure and atmospheric (ambient) pressure, where the minimum operating pressure is set to atmospheric pressure.

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

² Vented gage option only available in pressure ranges between 100 psi and 667 psi.

Table 5. Environmental and 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 type selection (See Figure 5.)
Wetted materials: port substrate adhesives electronics	304 stainless steel alumina ceramic epoxy glass, silicon
External materials: housing connector: UL 94 HB (standard) UL 94 V-O (optional) cable jacket	304 stainless steel PBT 30% GF, black PBT 30% GF, natural (beige) TPE
Installation torque	per pressure port type (See Figure 6.)

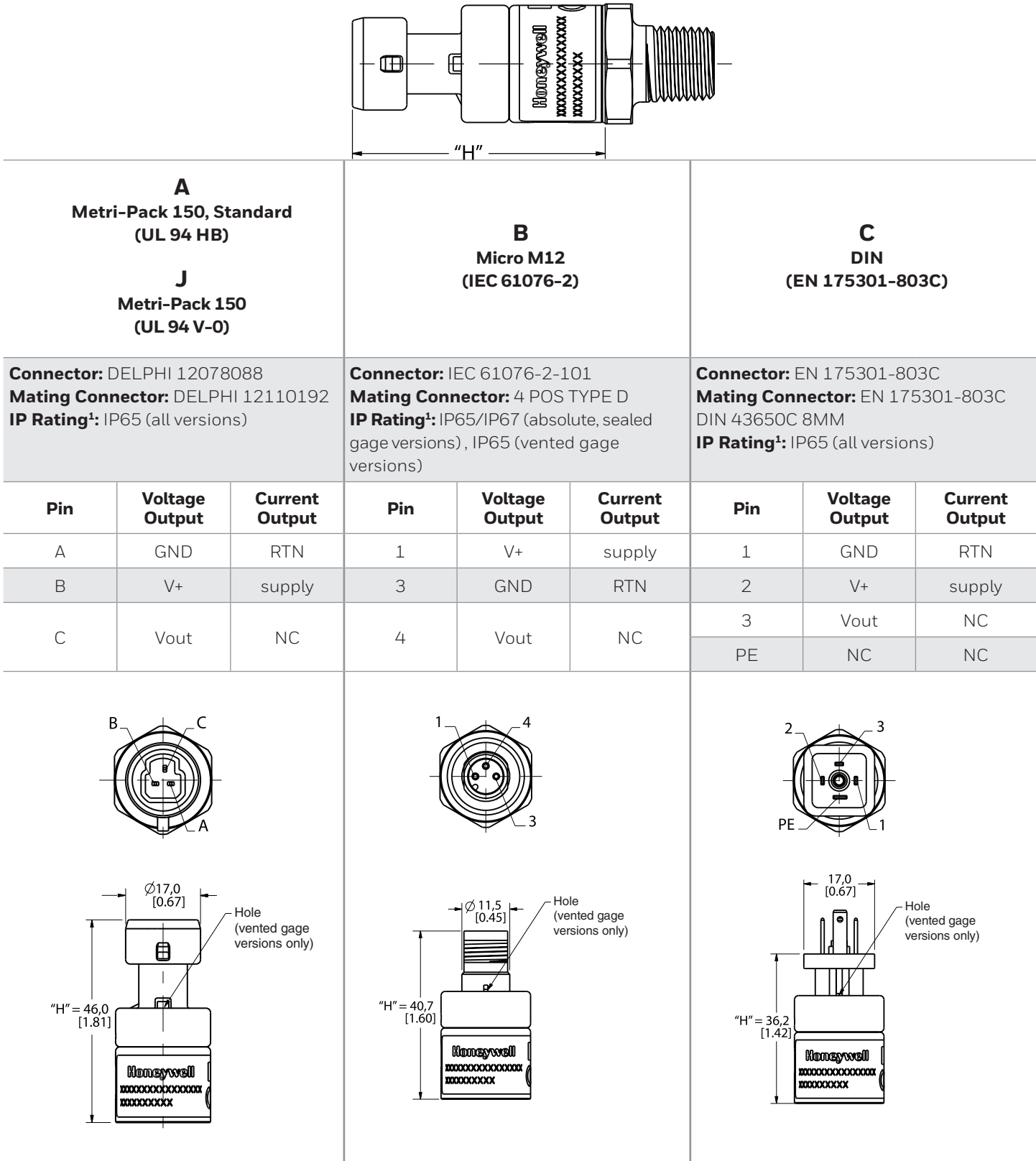
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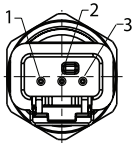
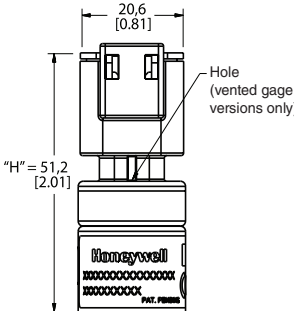
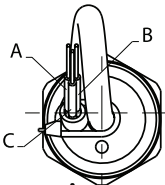
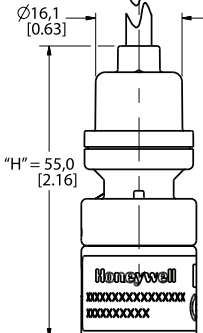
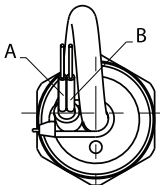
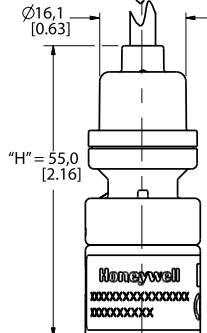
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Figure 4. Electrical Connector Type Dimensions (For reference only: mm/[in].)



¹ IP rating is determined by the electrical connection chosen.

Figure 4. Electrical Connector Type Dimensions (continued)

<div>D</div> <div>Deutsch</div> <div>(DTM04-3P)</div>			<div>E Cable Harness, 1 Meter²</div> <div>F Cable Harness, 2 Meter²</div> <div>G Cable Harness, 3 Meter^{2, 3}</div> <div>H Cable Harness, 5 Meter^{2, 3}</div>					
<div>Connector: Deutsch DTM04-3P</div> <div>Mating Connector: DTM06-3S</div> <div>IP Rating¹: IP65, IP67, IP69K (absolute, sealed gage versions), IP65 (vented gage versions)</div>			<div>Connector: 24 AWG with TPE Jacket</div> <div>Mating Connector: Flying leads</div> <div>IP Rating¹: IP65, IP67, IP69K (absolute, sealed gage versions)</div>					
Pin	Voltage Output	Current Output	Wire Color	Voltage Output	Wire Color	Current Output		
1	GND	RTN	red	V+	red	supply		
2	Vout	NC	black	GND	black	RTN		
3	V+	supply	white	Vout				
<div></div> <div></div>			<div></div> <div></div>				<div></div> <div></div>	

¹ IP rating is determined by the electrical connector type chosen.

² Three-wire cable is required for ratiometric and regulated outputs; two wire cable is required for current output.

³ Three meter and five meter cables are only available with Output Transfer Function **CH** = Current, 4 mA to 20 mA.

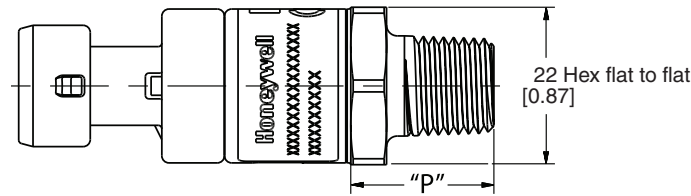
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Figure 5. Pressure Port Type Dimensions (For reference only: mm/[in.])¹

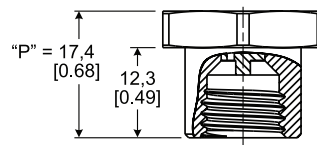


F1 7/16-20 UNF 1/4 in 45° Flare Female Schrader (SAE J512)

Seal: 45° cone

Mating geometry: SAE J512

Installation torque²: 17 N m [12.5 ft-lb]

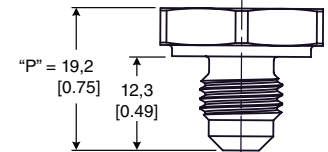


F2 7/16-20 UNF 45° Flare Male (SAE J513)

Seal: 45° cone

Mating geometry: SAE J513

Installation torque²: 1/4 Turn from finger tight

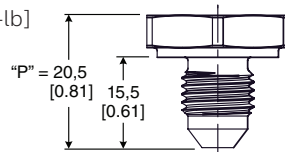


F3 7/16-20 UNF 37° Flare Male (SAE J514)

Seal^{3,4}: 37° cone

Mating Geometry: SAE J514

Installation Torque²: 16 N m [11.8 ft-lb]

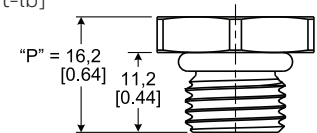


G1 G1/4 (ISO 1179-3)

Seal^{3,4}: O-ring

Mating geometry: ISO 1179-1

Installation torque²: 50 N m [38.9 ft-lb]

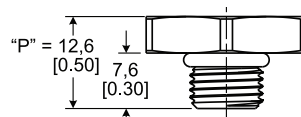


G2 G1/8 (ISO 1179-3)

Seal^{3,4}: O-ring

Mating geometry: ISO 1179-1

Installation torque²: 25 N m [18.4 ft-lb]

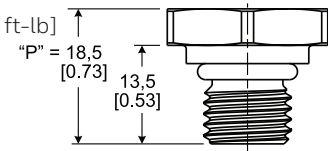


M1 M12 X 1.5 (ISO 6149-3)

Seal^{2,3}: O-ring

Mating geometry: ISO 6149-1

Installation torque²: 25 N m [18.4 ft-lb]

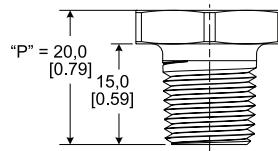


N1 1/4-18 NPT

Seal: pipe thread

Mating geometry: ANSI B1.20.1

Installation torque²: 2 to 3 turns from finger tight

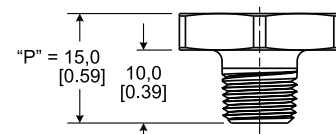


N2 1/8-27 NPT

Seal: pipe thread

Mating geometry: ANSI B1.20.1

Installation torque²: 2 to 3 turns from finger tight

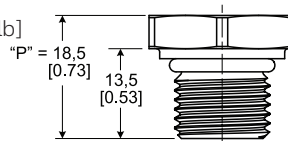


S1 9/16-18 UNF (SAE J1926-3)

Seal^{3,4}: O-ring

Mating geometry: SAE J1926-1

Installation torque²: 30 N m [22.1 ft-lb]

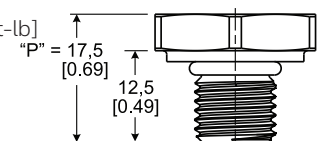


S2 7/16-20 UNF (SAE J1926-3)

Seal^{3,4}: O-ring

Mating geometry: SAE J1926-1

Installation torque²: 18 N m [12.3 ft-lb]



¹ See **CAUTION "PRODUCT DAMAGE DUE TO MECHANICAL ISSUES"** on page 1.

² Straight thread maximum torque is validated to 150% of installation torque.

³ Seals for pressure port type order codes **S1**, **S2**, **M1**, **G1** and **G2** are included and assembled to the sensors.

⁴ O-ring material is nitrile 70 durometer -30°C to 125°C [-22°F to 257°F].

⚠ 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/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. 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 that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other 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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