

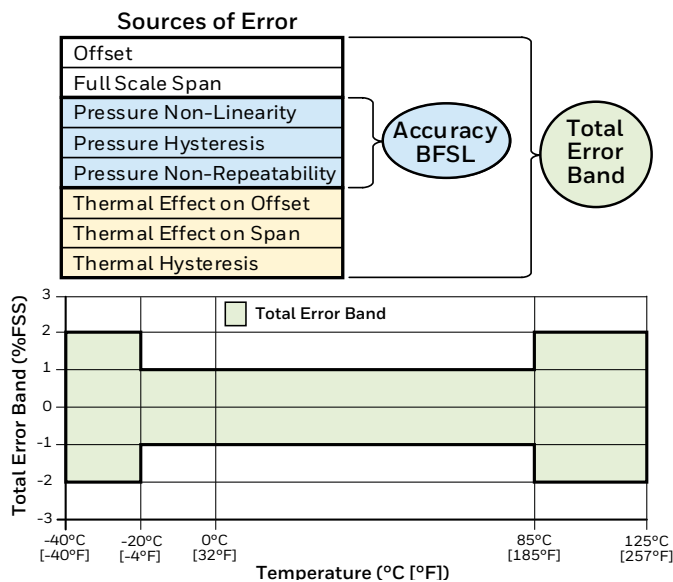
## Heavy Duty Pressure Sensors, PX2 Series and PX3 Series

### An Application Note

#### Background

Honeywell's PX2 Series and PX3 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 metal housing. These products are calibrated and compensated for offset, sensitivity, temperature effects and non-linearity using the on-board ASIC. The Total Error Band, which provides indication of the of the sensor's true measurement performance over a specified temperature range, is  $\pm 2\%$  FSS (40°C to 125°C [-40°F to 257°F]) for the PX2 Series and  $\pm 1\%$  FSS (-20°C to 85°C [-4°F to 185°F]) for the PX3 Series. (See Figure 1.)

Figure 1. TEB Definition and Temperature Performance



Pressure ranges are 1 to 70 bar | 100 kPa to 7 MPa | 15 psi to 1000 psi for the PX2 Series and 1 bar to 50 bar | 15 psi to 700 psi for the PX3 Series. All products are designed and manufactured according to ISO 9001 standards and are RoHS and CE compliant.

#### Solutions

With thousands of possible configurations, the PX2 Series and PX3 Series allow Honeywell to meet customer requirements and quickly provide the preferred options for the application. They are compatible with a variety of harsh media including brake fluid, common hydrofluorocarbon refrigerants, next generation low global warming potential (GWP) refrigerants, engine oil, hydraulic fluids, and dry compressed air. The wide operating temperature range, ingress protection, and radiated immunity allow for reliable performance in tough environments.

These transducers measure absolute, sealed gage, or vented gage pressure (PX2 only for vented gage). The absolute versions have an internal vacuum reference and an output value proportional to absolute pressure, the sealed gage versions have the offset calibrated at 14.7 psiA, and the vented gage versions measure pressure with respect to ambient pressure. (See Table 1.)

#### Potential Applications

##### Industrial

**HVAC/R:** May be used (with driers) to monitor system performance for proper environmental control of:

- Compressors:
  - Inlet and outlet pressure
  - Oil pressure
  - Rack rooms
- Refrigerant recovery systems
- Rooftop chillers

**Air compressors:** When used with dehumidifiers upstream, may be used to monitor compressor performance and efficiency, specifically:

- Filter pressure drop
- Inlet and outlet pressure
- Oil pressure
- Pumps

**General:** May be used to monitor dry air and fluid pressure in:

- Factory automation
- Flow and level
- Fluid power
- Injection molding knock-out valves
- Lasers
- Pneumatics
- Solar energy
- Sprayers
- Valves

##### Transportation

- Air system monitoring
- Air brakes
- Cooling systems
- Engine oil
- Hydraulic oil pressure monitoring
- Manifold absolute pressure (MAP)

**Table 1: PX2 Series and PX3 Series General Comparison**

CHARACTERISTIC	PX2 SERIES	PX3 SERIES	COMMENTS
OPERATING, COMPENSATED, AND STORAGE TEMPERATURE RANGE	-40°C to 125°C [-40°F to 257°F]	<ul style="list-style-type: none"> <li>• Metri-Pack 150: -40°C to 125°C [-40°F to 257°F]</li> <li>• PVC cable harness: -40°C to 100°C [-40°F to 212°F]</li> <li>• XLPE cable harness: -40°C to 125°C [-40°F to 257°F]</li> <li>• DIN male (EN 175301-803): -40°C to 125°C [-40 °F to 257°F]</li> </ul>	PX2 and PX3 have the same broad temperature range
TOTAL ERROR BAND	±2 %FSS from -40°C to 125°C [-40°F to 257°F]	<ul style="list-style-type: none"> <li>• ±1 %FSS: -20°C to 85°C [-4°F to 185°F] (optimal)</li> <li>• ±2 %FSS: below -20°C [-4°F] and above 85°C [185°F]</li> </ul>	PX3's smaller error permits systems to run more efficiently; energy efficiency minimizes energy costs
PRESSURE RANGE	<ul style="list-style-type: none"> <li>• 1 bar to 70 bar</li> <li>• 15 psi to 1000 psi</li> <li>• 100 kPa to 7 MPa</li> </ul>	<ul style="list-style-type: none"> <li>• 1 bar to 50 bar</li> <li>• 15 psi to 700 psi</li> </ul>	PX2's wide pressure range and more pressure reference options accommodate diverse applications
PRESSURE REFERENCE	<ul style="list-style-type: none"> <li>• Absolute</li> <li>• Sealed gage</li> <li>• Vented gage</li> </ul>	<ul style="list-style-type: none"> <li>• Absolute</li> <li>• Sealed gage</li> </ul>	
PRESSURE PORT MATERIAL	stainless steel 304	<ul style="list-style-type: none"> <li>• Threaded ports: brass C36000 (lead (Pb) content: 3.7% max.)</li> <li>• Tube port: copper (per ASTM B 280, lead (Pb) free) and brazing alloy</li> </ul>	PX3 has a brass pressure port for cost-sensitive applications; PX2's many common pressure port and electrical connector types provide flexibility to accommodate application and regional diversity  (See product datasheet for latest pressure port and electrical connector offerings.)
PRESSURE PORT TYPE	<ul style="list-style-type: none"> <li>• 7/16-20 UNF 1/4 in 45° Flare Female Schrader</li> <li>• 7/16-20 UNF 45° Flare Male</li> <li>• 7/16-20 UNF 37° Flare Male</li> <li>• G1/4</li> <li>• G1/8</li> <li>• M12 x 1.5</li> <li>• 1/4-18 NPT</li> <li>• 1/8-27 NPT</li> <li>• 9/16-18 UNF</li> <li>• 7/16-20 UNF</li> </ul>	<ul style="list-style-type: none"> <li>• Threaded ports:                             <ul style="list-style-type: none"> <li>- 7/16-20 UNF 1/4 in 45° Flare Female Schrader</li> <li>- G1/4 A-G</li> <li>- G1/4 A-L</li> <li>- M12 x 1.5</li> <li>- 1/4-18 NPT</li> <li>- 1/8-27 NPT</li> </ul> </li> <li>• Tube port</li> </ul>	
ELECTRICAL CONNECTOR TYPE	<ul style="list-style-type: none"> <li>• Metri-Pack 150 (UL 94 HB or V-0)</li> <li>• Micro M12</li> <li>• DIN</li> <li>• Deutsch</li> <li>• Cable harness (1 m, 2 m, 3 m, or 5 m)</li> </ul>	<ul style="list-style-type: none"> <li>• Metri-Pack 150 male, 3-pin</li> <li>• DIN male (EN 175301-803C)</li> <li>• PVC/XLPE cable harness (0,5 m, 1 m, 2 m, 3 m, or 5 m)</li> </ul>	

CHARACTER-ISTIC	PX2 SERIES	PX3 SERIES	COMMENTS
OUTPUT TRANSFER FUNCTION	<ul style="list-style-type: none"> <li>• Ratiometric: <ul style="list-style-type: none"> <li>- 5.0 V: 10 %Vs to 90 %Vs</li> <li>- 5.0 V: 5 %Vs to 95 %Vs</li> <li>- 3.3 V: 10 %Vs to 90 %Vs</li> <li>- 3.3 V: 5 %Vs to 95 %Vs</li> </ul> </li> <li>• Regulated: <ul style="list-style-type: none"> <li>- 1 Vdc to 6 Vdc</li> <li>- Regulated: 0.25 Vdc to 10.25 Vdc</li> <li>- Regulated: 0.5 Vdc to 4.5 Vdc</li> <li>- Regulated: 1 Vdc to 5 Vdc</li> </ul> </li> <li>• Current: 4 mA to 20 mA</li> </ul>	<ul style="list-style-type: none"> <li>• Ratiometric to 5 Vdc supply: 0.5 Vdc to 4.5 Vdc</li> <li>• Ratiometric to 3.3 Vdc supply: 0.33 Vdc to 2.97 Vdc</li> <li>• Current: 4 mA to 20 mA</li> </ul>	PX2's wide range of output transfer functions facilitates system integration; 3.3 Vdc low power option
EMC (RADIATED IMMUNITY) <sup>1</sup>	100 V/m per ISO 11452-2	<ul style="list-style-type: none"> <li>• Ratiometric output: 200 V/m per ISO 11452-2</li> <li>• Current output: 140 V/m per ISO 11452-2</li> </ul>	PX3's high radiated immunity provides durable signal output near wireless signals and antennas
INSULATION RESISTANCE <sup>2</sup>	not specified	<ul style="list-style-type: none"> <li>• Ratiometric output: &gt;100 MOhm at 1500 Vdc</li> <li>• Current output: &gt;100 MOhm at 1000 Vdc</li> </ul>	PX3's high insulation resistance helps protect operator and sensor from hazardous current
DIELECTRIC STRENGTH <sup>2</sup>	not specified	<1 mA at 1500 Vac for 1 min or 1800 Vac for 1 s	PX3's high dielectric strength helps protect operator and sensor from hazardous current
INGRESS PROTECTION	IP65, IP67, IP69K (depends on the electrical connector type)	<ul style="list-style-type: none"> <li>• Metri-Pack 150: IP67</li> <li>• DIN male (EN 175301-803C): IP65</li> <li>• PVC Cable harness: IP65, IP67, IP69K</li> </ul>	PX2 and PX3's high ingress protection allows sensor to perform reliably in wet or moist environments
EXTERNAL FREEZE/THAW RESISTANCE	not specified	>6 cycles from -30°C to 50°C [-22°F to 122°F]	PX3's resistance against external frost prevents operation down time and minimizes maintenance costs
MEDIA COMPATIBILITY	<ul style="list-style-type: none"> <li>• Common HFC refrigerants (e.g. R410A)</li> <li>• Low GWP refrigerants (e.g. R32, R1234ZE)</li> <li>• Engine oil, brake fluid, hydraulic fluid</li> </ul>	<ul style="list-style-type: none"> <li>• Common HFC (hydrofluorocarbon) refrigerants (R410A and R134A)</li> <li>• Low global warming potential (GWP) refrigerants (R448A/Solstice® N40, R32 and R1234ZE)</li> <li>• Engine oil</li> <li>• Petroleum-based hydraulic fluids (Mobil DTE 25)</li> <li>• Brake fluids (DOT3)</li> <li>• Dry air</li> </ul>	PX2 and PX3 support wide variety of applications such as HVAC/R, air compressor, MAP, and pneumatic systems

<sup>1</sup> Cable length = 1,5 m.

<sup>2</sup> Tested in dry, non-ionized air.

## Warranty/Remedy

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