MODEL FP5000

Configurable Pressure Transducer

DESCRIPTION
The Honeywell Model FP5000 Series is a media-isolated piezoresistive silicon pressure sensor offering multiple output options (0 V to 5 V, 0 V to 10 V or 4 mA to 20 mA) for reading pressure over the specified full-scale pressure span and temperature range. It is compensated for sensor offset, sensitivity, temperature effects and non-linearity to offer improved thermal stability and accuracy. Hastelloy® C276 and 316L stainless steel wetted parts provide durability with abrasive or corrosive media.

DIFFERENTIATION
- Offers improved accuracy and reliability
- Configurable platform enables a sensor to be built to customer requirements. Simplified nomenclature and order codes makes ordering easier
- Many pressure and operating temperature range options
- Built from stocked components; most configurations are shipped within ten business days
- Extensive history of pressure measurement know-how

FEATURES
- Pressure ranges from 10 in-H₂O (0.36 psi) up to 5000 psi
- Gage, absolute, vacuum, barometric and compound pressure types
- Higher accuracy to 0.1 %FSS BFSL
- Multiple output types: 0 Vdc to 5 Vdc, 0 Vdc to 10 Vdc, 4 mA to 20 mA
- Multiple electrical and pressure connection options
- Zero adjustment through potentiometer
- Operating temperature ranges from -40°C to 125°C [-40°F to 250°F]
- Multiple compensation temperature ranges
- Faster response and higher resolution
- Fully analog reduced-noise signal path provides continuous output resolution
- Stainless steel construction
- Ha C276 and 316L stainless steel wetted parts offer more enhanced durability with abrasive or corrosive media
- CE approved
- Intrinsically Safe: cFMus, ATEX, IEC Ex certified 2AR option (4 mA to 20 mA)

APPLICATIONS
- Test stands (Automotive, Aerospace, Industrial, and Medical)
- R&D test labs
- Hydraulic and pneumatic system monitoring
- Leak detection
- Manufacturing mold pressure control
- Pump and compressor control
- Liquid level measurement
- Oil & gas process control

PORTFOLIO
Model FP5000 pressure transducers are part of a comprehensive line of Honeywell pressure sensors.

VALUE TO CUSTOMERS
- Built on the Honeywell history of higher-quality pressure sensing technologies
- Next-gen design of the popular FP2000 pressure sensor
- Offers more repeatable, reliable, and accurate pressure measurements over time
- Rugged, stainless steel pressure sensors are built and tested to perform and survive in many demanding environments
- Configurable platform creates a wide range of standard configurations
- Stocked components enable shipping within ten business days on most configurations
TABLE 1. PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Measure</th>
</tr>
</thead>
</table>
| Operating pressure ranges      | Gage: 10 in-H₂O [0.36 psi] to 5000 psi  
 Absolute: 5 psi to 5000 psi  
 Vacuum: 10 in-H₂O [0.36 psi] to 15 psi  
 Barometric: 0 to 30 in-Hg,  
 16 to 32 in-Hg, 26 to 32 in-Hg  
 Compound ranges available consult factory  
 Equivalent ranges are available in other pressure units also: kPa, bar, mm-Hg, in-Hg, mbar, torr, in-H₂O |
| Accuracy                       | 0.2 %FSS BFSL (Standard accuracy)  
 0.1 %FSS BFSL (High accuracy)     |
| Output (selectable)            | 0 Vdc to 5 Vdc, 0 Vdc to 10 Vdc, or 4 mA to 20 mA (two wire)           |
| Resolution                     | Continuous (Fully analog signal path)                                   |

TABLE 2. ENVIRONMENTAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>See Table 3 (Electrical connectors)</td>
</tr>
<tr>
<td>Compensated temperature range</td>
<td>See Table 4 (Thermal effects error band)</td>
</tr>
<tr>
<td>Thermal effects error band (TEB)</td>
<td>See Table 4 (Thermal effects error band)</td>
</tr>
<tr>
<td>Sealing</td>
<td>See Table 3 (Electrical connectors)</td>
</tr>
</tbody>
</table>

Notes:
1. Accuracies stated are with respect to best fit straight line (BFSL) for all errors including linearity, hysteresis, and non-repeatability through zero.
2. Thermal Effects Error Band - The maximum deviation in output due to changes in temperature over the entire compensated temperature range, relative to output measured at reference temperature. Includes all errors due to: Thermal Effect on Offset and Thermal Effect on Span.
3. Thermal effects error band (TEB) increases pro-rata for pressure ranges below 5 psi [0.35 bar].
4. True Zero Output: The voltage output versions have onboard circuitry that allows the output signal to swing all the way to ground (True Zero) and even a little below (~0.2 V). This mitigates increased error at lower voltage measurements.
5. Over pressure: 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.
7. All specifications apply at 25°C [77°F] and under operating conditions unless otherwise noted.
8. Full Scale Span (FSS): The algebraic difference between output signal measured at the upper and lower limits of the operating pressure range. Also known as “span”.
9. Offset: The output signal obtained when the reference pressure is applied to all available pressure ports. Also known as “null” or “zero”.
10. Reference pressure: The pressure used as a reference (zero) in measuring performance. Unless otherwise specified, this is vacuum (0 psia) for absolute pressure sensors and local ambient atmospheric pressure (0 psig) for gage/vacuum pressure sensors.
11. Minimum operating pressure: The lower limit of the operating pressure range.
## TABLE 6. ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specifications</th>
<th>2AM, 2AR: 4 mA to 20 mA (2 wire)</th>
<th>2AN: 0 V to 5 V (3 wire)</th>
<th>2AP: 0 V to 10 V (3 wire)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>9 Vdc to 28 Vdc</td>
<td>9 Vdc to 28 Vdc</td>
<td>14 Vdc to 28 Vdc</td>
</tr>
<tr>
<td>Current consumption</td>
<td>4 mA to 24 mA</td>
<td>&lt; 6 mA</td>
<td>&lt; 6 mA</td>
</tr>
<tr>
<td>Output at reference pressure</td>
<td>4 mA ±0.5 %FSS</td>
<td>0 V ±0.5 %FSS</td>
<td>0 V ±0.5 %FSS</td>
</tr>
<tr>
<td>Output at minimum operating pressure</td>
<td>16 mA ±1 %FSS</td>
<td>5 V ±1 %FSS</td>
<td>10 V ±1 %FSS</td>
</tr>
<tr>
<td>Frequency response</td>
<td>3500 Hz</td>
<td>3500 Hz</td>
<td>3500 Hz</td>
</tr>
<tr>
<td>Reverse voltage protection</td>
<td>Yes, 28 V</td>
<td>Yes, 28 V</td>
<td>Yes, 28 V</td>
</tr>
<tr>
<td>Load impedance</td>
<td>&lt; 950 Ohm at 28 V decreasing</td>
<td>&gt; 10K Ohms</td>
<td>&gt; 10K Ohms</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt;500 MOhm to case GND at 33 V</td>
<td>&gt;500 MOhm to case GND at 33 V</td>
<td>&gt;500 MOhm to case GND at 33 V</td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>&gt;32 V</td>
<td>&gt;32 V</td>
<td>&gt;32 V</td>
</tr>
<tr>
<td>Power up time</td>
<td>&lt; 1 sec</td>
<td>&lt; 1 sec</td>
<td>&lt; 1 sec</td>
</tr>
<tr>
<td>Zero adjustment potentiometer</td>
<td>Yes, &gt; ±5 %FS adjustment</td>
<td>Yes, &gt; ±5 %FS adjustment</td>
<td>Yes, &gt; ±5 %FS adjustment</td>
</tr>
</tbody>
</table>

### Notes
- 10 - (absolute, gage, vacuum)
- 11 - (compound, barometric)
- Full scale span (FSS)
# CONFIGURABLE PRESSURE TRANSDUCER, MODEL FP5000

## TABLE 7. DIN FORM A (6M), DIN FORM C (6BO) WIRING

<table>
<thead>
<tr>
<th>PIN</th>
<th>STANDARD</th>
<th>ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 mA to 20 mA (2AM, 2AR)</td>
<td>4 mA to 20 mA (2AN, 2AP)</td>
</tr>
<tr>
<td></td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
</tr>
<tr>
<td>Designation</td>
<td>Designation</td>
<td>Designation</td>
</tr>
<tr>
<td>1</td>
<td>(+) Supply</td>
<td>(+) Supply</td>
</tr>
<tr>
<td>2</td>
<td>No connection</td>
<td>No connection</td>
</tr>
<tr>
<td>3</td>
<td>No connection</td>
<td>No connection</td>
</tr>
<tr>
<td>E</td>
<td>No connection</td>
<td>Case GND</td>
</tr>
</tbody>
</table>

## TABLE 8. PT02A-10-6P, 6-PIN (6A) WIRING

<table>
<thead>
<tr>
<th>PIN</th>
<th>STANDARD</th>
<th>ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 mA to 20 mA (2AM, 2AR)</td>
<td>4 mA to 20 mA (2AN, 2AP)</td>
</tr>
<tr>
<td></td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
</tr>
<tr>
<td>Designation</td>
<td>Designation</td>
<td>Designation</td>
</tr>
<tr>
<td>A</td>
<td>(+) Supply</td>
<td>(+) Supply</td>
</tr>
<tr>
<td>B</td>
<td>No connection</td>
<td>Supply return</td>
</tr>
<tr>
<td>C</td>
<td>No connection</td>
<td>(+) Output</td>
</tr>
<tr>
<td>D</td>
<td>(+) Output</td>
<td>No connection</td>
</tr>
<tr>
<td>E</td>
<td>No connection</td>
<td>No connection</td>
</tr>
<tr>
<td>F</td>
<td>No connection</td>
<td>No connection</td>
</tr>
</tbody>
</table>

## TABLE 9. INTEGRAL CABLE (6Q), CONDUIT FITTING (6R) WIRING

<table>
<thead>
<tr>
<th>PIN</th>
<th>STANDARD</th>
<th>ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 mA to 20 mA (2AM, 2AR)</td>
<td>4 mA to 20 mA (2AN, 2AP)</td>
</tr>
<tr>
<td></td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
</tr>
<tr>
<td>Designation</td>
<td>Designation</td>
<td>Designation</td>
</tr>
<tr>
<td>Red</td>
<td>(+) Supply</td>
<td>(+) Supply</td>
</tr>
<tr>
<td>Black</td>
<td>(+) Output</td>
<td>Supply return</td>
</tr>
<tr>
<td>Green</td>
<td>Not available</td>
<td>Supply return</td>
</tr>
<tr>
<td>White</td>
<td>Not available</td>
<td>Supply return</td>
</tr>
</tbody>
</table>

## TABLE 10. M12 X 1, 4-PIN (6BJ) WIRING

<table>
<thead>
<tr>
<th>PIN</th>
<th>STANDARD</th>
<th>ALTERNATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 mA to 20 mA (2AM, 2AR)</td>
<td>4 mA to 20 mA (2AN, 2AP)</td>
</tr>
<tr>
<td></td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
<td>0 V to 5 V/0 V to 10 V (2AN, 2AP)</td>
</tr>
<tr>
<td>Designation</td>
<td>Designation</td>
<td>Designation</td>
</tr>
<tr>
<td>1</td>
<td>(+) Supply</td>
<td>(+) Supply</td>
</tr>
<tr>
<td>2</td>
<td>No connection</td>
<td>(+) Output</td>
</tr>
<tr>
<td>3</td>
<td>(+) Output</td>
<td>Supply return</td>
</tr>
<tr>
<td>4</td>
<td>Case GND</td>
<td>Case GND</td>
</tr>
</tbody>
</table>

## TABLE 11. INTRINSICALLY SAFE APPROVALS FOR OPTION 2AR (NOT AVAILABLE ON 2AM, 2AN, 2AP)

<table>
<thead>
<tr>
<th>Agency</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>cFMs</td>
<td>Class I, Div 1, Groups A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>Class I, Zone 0, AEx/Ex ia IIC T4/T5 Ga</td>
</tr>
<tr>
<td></td>
<td>Ta= –40°C to 40°C (T5), –40°C to 85°C (T4)</td>
</tr>
</tbody>
</table>

See Honeywell’s website (http://sensing.honeywell.com) for up-to-date information regarding intrinsically safe approvals. Refer to Installation manual #008-0751-00 for installation/wiring instructions, cautions and warnings.
CONFIGURABLE PRESSURE TRANSDUCER, MODEL FP5000

Figure 1. Product Nomenclature

NF  G  1  BR, 1AK, 2AM, 5F, 6M, 7BA

Product Series
NF  FP5000 pressure transducer

Type
G  Gage
A  Absolute
V  Vacuum
B  Barometric (UG, UQ, UR only)
C  Compound (consult factory)

Calibration
5-point calibration at 77°F
9A  9-point calibration at 77°F

Wiring
7BA  Standard
7BB  Alternative

Electrical Connection
6A  PT02A-10-6P, 6-pin
6M  DIN A43650, 4-pin
6BO  DIN C, 4-pin
6Q  Integral cable, 5 feet*
6R  Conduit fitting with 5 feet# cable
6BJ  M12 x 1 (IEC 61076-2-101 style AM), 4-pin
*Consult factory for other cable lengths

Pressure Port
5A  1/4-18 NPT female
5B  1/4-18 NPT male
5D  7/16-20 UNF male
5F  G1/4 B female
5G  G1/4 B male
5P  M12 x 1.5 male
5AE  1/2-14 NPT male
5I  1/8-27 NPT male

Output
2AM  4 mA to 20 mA
2AN  0 Vdc to 5 Vdc
2AP  0 Vdc to 10 Vdc
2AR  4 mA to 20 mA Intrinsically Safe (see Table 11 for certifications)

Temperature Compensation
1AK  0°C to 60°C (40°F to 140°F)
1Y  -20°C to 80°C (0°F to 180°F)
1AP  -40°C to 85°C (-40°F to 185°F)
1BA  -40°C to 125°C (-40°F to 250°F)

Accuracy
1  0.10 %*
2  0.20 %

Not available in ranges 2 psi

Range

<table>
<thead>
<tr>
<th>APa</th>
<th>bar</th>
<th>psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>KD</td>
<td>35 kPa</td>
<td>0.5 psi</td>
</tr>
<tr>
<td>KF</td>
<td>100 kPa</td>
<td>1 psi</td>
</tr>
<tr>
<td>KG</td>
<td>200 kPa</td>
<td>2 psi</td>
</tr>
<tr>
<td>KJ</td>
<td>700 kPa</td>
<td>10 psi</td>
</tr>
<tr>
<td>KL</td>
<td>1000 kPa</td>
<td>15 psi</td>
</tr>
<tr>
<td>KM</td>
<td>1500 kPa</td>
<td>25 psi</td>
</tr>
<tr>
<td>KR</td>
<td>3000 kPa</td>
<td>50 psi</td>
</tr>
<tr>
<td>KS</td>
<td>5000 kPa</td>
<td>75 psi</td>
</tr>
<tr>
<td>KT</td>
<td>10000 kPa</td>
<td>100 psi</td>
</tr>
<tr>
<td>WA</td>
<td>10 in-H2O</td>
<td>26-32 in-Hg</td>
</tr>
<tr>
<td>WC</td>
<td>20 in-H2O</td>
<td>26-32 in-Hg</td>
</tr>
<tr>
<td>WE</td>
<td>30 in-H2O</td>
<td>26-32 in-Hg</td>
</tr>
<tr>
<td>WO</td>
<td>50 in-H2O</td>
<td>26-32 in-Hg</td>
</tr>
<tr>
<td>UA</td>
<td>30 in-Hg</td>
<td>16-32 in-Hg</td>
</tr>
<tr>
<td>UQ</td>
<td>35 in-Hg</td>
<td>16-32 in-Hg</td>
</tr>
<tr>
<td>UR</td>
<td>40 in-Hg</td>
<td>16-32 in-Hg</td>
</tr>
</tbody>
</table>

More ranges are available.
Please consult Honeywell for options.

Ranges with blue highlight (greater than 100 kPa, 15 psi, 1 bar)
are NOT available in Vacuum.

Accuracy
1  0.10 %*
2  0.20 %

Not available in absolute pressure type

* Not available in absolute pressure type

SAMPLE CATALOG Listings

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFA1BM,1AK,2AP,5A,6A,7BA</td>
<td>Model FP5000; 0.10% accuracy; 30 psi absolute; compensated across 0°C to 60°C (40°F to 140°F); 0 Vdc to 10 Vdc output; 1/4-18 NPT female port; PT02A-10-6P 6-pin electrical connector; standard wiring</td>
</tr>
<tr>
<td>NFG2DR,1Y,2AR,5G,6Q,7BB</td>
<td>Model FP5000; 0.20% accuracy; 5000 psi gage; compensated across -20°C to 80°C (0°F to 180°F); Intrinsically Safe 4 mA to 20 mA output; G 1/4 B male port; 5 ft long integral cable; alternative wiring</td>
</tr>
</tbody>
</table>

Ranges with blue highlight (greater than 100 kPa, 15 psi, 1 bar)
are NOT available in Vacuum.

Accuracy
1  0.10 %*
2  0.20 %

Not available in absolute pressure type

* Not available in absolute pressure type

More ranges are available.
Please consult Honeywell for options.

Ranges with blue highlight (greater than 100 kPa, 15 psi, 1 bar)
are NOT available in Vacuum.

Accuracy
1  0.10 %*
2  0.20 %

Not available in absolute pressure type

* Not available in absolute pressure type

More ranges are available.
Please consult Honeywell for options.

Ranges with blue highlight (greater than 100 kPa, 15 psi, 1 bar)
are NOT available in Vacuum.

Accuracy
1  0.10 %*
2  0.20 %

Not available in absolute pressure type

* Not available in absolute pressure type

More ranges are available.
Please consult Honeywell for options.

Ranges with blue highlight (greater than 100 kPa, 15 psi, 1 bar)
are NOT available in Vacuum.
CONFIGURABLE PRESSURE TRANSDUCER, MODEL FP5000

Figure 2. Mounting Dimensions

ELECTRICAL TERMINATION

- Code 6BO: 4-pin, Micro DIN Form C
- Code 6M: 4-pin, Standard DIN 43650 Form A
- Code 6A: 6-pin, Bendix connector
- Code 6Q: 4-conductor, vented, Integral cable
- Code 6R: 4-conductor, vented, 1/2-inch NPT conduit exit with integral cable
- Code 6BJ: 4-pin M12 x 1 (IEC 61076-2-101) style AM

PRESSURE PORTS

- Code 5F: G 1/4 B female
- Code 5A: 1/4-18 NPT female
- Code 5G: G 1/4 B male
- Code 5B: 1/4-18 NPT male
- Code 5D: 7/16-20 UNF male
- Code 5AE: 1/2-14 NPT male
- Code 5P: M12 x 15 male
- Code 5I: 1/8-27 NPT male

Choose from electrical termination code: 6BO, 6M, 6A, 6Q, 6BJ & 6R

Choose from pressure ports: Codes 5F or 5A

Choose from pressure ports: Codes 5AE, 5G, 5B, 5D, or 5I
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 acknowledgment 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.

While Honeywell may provide application assistance personally, through our literature and the Honeywell website, it is buyer’s sole responsibility 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 writing. However, Honeywell assumes no responsibility for its use.

CAUTION
PRODUCT DAMAGE DUE TO MECHANICAL ISSUES
- Ensure torque specifications are determined for the specific application. (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.
- 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.

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

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.

WARNING
MISUSE OF DOCUMENTATION
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FOR MORE INFORMATION
Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing, or the nearest Authorized Distributor, visit sensing.honeywell.com or call:

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