

## Pressure Sensors

Low-cost, Stainless Steel, Isolated Sensors

*13 mm Series*

### FEATURES

- Rugged, isolated stainless steel package
- Reliable semiconductor technology
- Calibrated and temperature compensated
- Voltage or current supply options
- Absolute and sealed gage pressures
- Low-cost cell package
- Absolute pressure
- 0 psi to 500 psi, 1000 psi, 2000 psi, 3000 psi, and 5000 psi

### TYPICAL APPLICATIONS

- Industrial controls
- Hydraulic controls
- Tank pressure
- Pressure transmitters
- Process control systems



Honeywell's 13 mm Series stainless steel pressure sensors are designed for high pressure applications that involve measurement of hostile media in harsh environments. This series uses Honeywell's proven piezoresistive semiconductor sensor chip in an oil-isolated housing with or without an integral ceramic for temperature compensation and calibration. This design has proven to be highly reliable, stable and accurate.

These sensors feature a weld-ring collar and special back support ring for high cycle life capability as they are designed for further package integration in OEM (Original Equipment Manufacturer) applications. Products are available with pressure ranges from 500 psi through 5000 psi and can be used with voltage or current supplies.

### EQUIVALENT CIRCUIT

#### 13 mm compensated series



#### 13 mm uncompensated series



### **⚠ 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.**

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## PRESSURE SENSOR CHARACTERISTICS (all devices)

Environmental specifications	
Compensated temperature range	0 °C to 82 °C [32 °F to 180 °F]
Operating temperature range	-40 °C to 125 °C [-40 °F to 257 °F]
Storage temperature range	-40 °C to 125 °C [-40 °F to 257 °F]
Vibration	10 G at 20 Hz to 2000 Hz
Shock	100 G for 11 ms
Life	1 million cycles min.
Insulation resistance	100 mΩ at 50 Vdc
Maximum ratings	
Voltage version "K"	Supply voltage $V_s = +15$ Vdc
Voltage version "L"	Supply current $I_s = +2.0$ mA

## PERFORMANCE CHARACTERISTICS – COMPENSATED SERIES <sup>(1)</sup>

Characteristic	Minimum	Typical	Maximum	Units
Zero pressure offset	-2	0	+2	mV
Pressure non-linearity <sup>(3)</sup>	–	±0.1	±0.25	%FSS
Pressure hysteresis <sup>(3)</sup>	–	±0.015	±0.030	%FSS
Repeatability	–	±0.010	±0.030	%FSS
Temp. effect on span <sup>(4)</sup>	–	±0.5	±1.0	%FSS
Temp. effect on offset <sup>(4)</sup>	–	±0.5	±1.0	%FSS
Thermal hysteresis (0 °C to 82 °C [32 °F to 180 °F])	–	±0.1	±0.3	%FSS
Long-term stability of offset and span <sup>(5)</sup>	–	±0.1	±0.3	%FSS
Response time <sup>(6)</sup>	–	0.1	–	ms
Common mode voltage (voltage version "K") <sup>(9)</sup>	0.50	1.25	2.0	Vdc
Input resistance (current version "L")	2.0	4.5	8.0	kΩ
Input resistance (voltage version "K")	8.0	25	50	kΩ
Output resistance	3.0	4.5	6.0	kΩ

## PRESSURE RANGE SPECIFICATIONS – COMPENSATED SERIES

Catalog Listing	Pressure range	Full scale span <sup>(2)</sup>	Proof pressure <sup>(7)</sup>	Burst pressure <sup>(8)</sup>
13C 0500P (A,S) (1,4,5,6) (K,L)	0 psi to 500 psi	98 mV to 102 mV	1500 psi	2500 psi
13C 1000P (A,S) (1,4,5,6) (K,L)	0 psi to 1000 psi	98 mV to 102 mV	3000 psi	5000 psi
13C 2000P (A,S) (1,4,5,6) (K,L)	0 psi to 2000 psi	98 mV to 102 mV	6000 psi	10,000 psi
13C 3000P (A,S) (1,4,5,6) (K,L)	0 psi to 3000 psi	98 mV to 102 mV	9000 psi	10,000 psi
13C 5000P (A,S) (1,4,5,6) (K,L)	0 psi to 5000 psi	148 mV to 152 mV	10,000 psi	10,000 psi

## NOTES

- Reference conditions (unless otherwise noted):  $T_A = 25$  °C [77 °F]; Supply  $V_s = 10$  Vdc ±0.01 Vdc or  $I_s = 1.5$  mA ±0.0015 mA.
- Full-scale span (FSS) is the algebraic difference between the output voltage at full-scale pressure and the output at zero pressure. FSS is ratiometric to supply voltage.
- Pressure non-linearity is based on best-fit straight line from zero to the full-scale pressure. Pressure hysteresis is the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure.
- Maximum error band of the offset voltage or span over the compensated temperature range, relative to the 25 °C [77 °F] reading.
- Long-term stability over a six-month period.
- Response time for a 0 psi to FSS pressure step change, 10 % to 90 % rise time.
- The maximum pressure that can be applied without changing the transducer's performance or accuracy.
- The maximum pressure that can be applied to a transducer without rupture of either the sensing element or transducer case.
- Common mode voltage as measure from output to ground.

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## PERFORMANCE CHARACTERISTICS – UNCOMPENSATED SERIES <sup>(1)</sup>

Characteristic	Minimum	Typical	Maximum	Unit
Zero pressure offset	-7.5	0	+7.5	mV/V
Pressure non-linearity <sup>(3)</sup>	–	±0.1	±0.25	%FSS
Pressure hysteresis <sup>(3)</sup>	–	±0.015	±0.030	%FSS
Repeatability	–	±0.010	±0.030	%FSS
Temp. coefficient of span <sup>(4)</sup> (0 °C to 82 °C [32 °F to 180 °F])	360	720	1260	ppm/°C
Temp. coefficient of resistance <sup>(4)</sup> (0 °C to 82 °C [32 °F to 180 °F])	2700	3420	4500	ppm/°C
Temp. coefficient of offset <sup>(4)</sup> (0 °C to 82 °C [32 °F to 180 °F])	–	30	–	µV/V/°C
Thermal hysteresis (0 °C to 82 °C [32 °F to 180 °F])	–	±0.1	±0.3	%FSS
Long-term stability of offset and span <sup>(5)</sup>	–	±0.1	±0.3	%FSS
Response time <sup>(6)</sup>	–	0.1	–	ms
Input resistance	4.0	4.75	6.0	kΩ
Output resistance	4.0	4.75	6.0	kΩ

## PRESSURE RANGE SPECIFICATIONS – UNCOMPENSATED SERIES

Catalog Listing	Pressure range	Full scale span <sup>(2)</sup>	Proof pressure <sup>(7)</sup>	Burst pressure <sup>(8)</sup>
13U 0500P A 0 K	0 psi to 500 psi	175 mV to 300 mV	1200 psi	2400 psi
13U 1000P A 0 K	0 psi to 1000 psi	175 mV to 300 mV	3000 psi	5000 psi
13U 2000P A 0 K	0 psi to 2000 psi	175 mV to 300 mV	6000 psi	10,000 psi
13U 3000P A 0 K	0 psi to 3000 psi	175 mV to 300 mV	9000 psi	10,000 psi
13U 5000P A 0 K	0 psi to 5000 psi	290 mV to 500 mV	10,000 psi	10,000 psi

### NOTES

- Reference conditions (unless otherwise noted):  $T_A = 25\text{ °C}$  [77 °F]; Supply  $V_s = 10\text{ Vdc} \pm 0.01\text{ Vdc}$  or  $I_s = 1.5\text{ mA} \pm 0.0015\text{ mA}$ .
- Full-scale span (FSS) is the algebraic difference between the output voltage at full-scale pressure and the output at zero pressure. FSS is ratiometric to supply voltage.
- Pressure non-linearity is based on best-fit straight line from zero to the full-scale pressure. Pressure hysteresis is the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure.
- The error band resulting from maximum deviation of a transducer's output parameter (offset, span, or resistance) as temperature is varied from 25 °C [77 °F] to any other temperature within the specified range 0 °C to 82 °C [32 °F to 180 °F]. This parameter is not 100 % tested and is guaranteed by process design and tested on a sample basis only. Temperature coefficient of span is evaluated using a constant current source.
- Long-term stability over a six-month period.
- Response time for a 0 psi to FSS pressure step change, 10 % to 90 % rise time.
- The maximum pressure that can be applied without changing the transducer's performance or accuracy.
- The maximum pressure that can be applied to a transducer without rupture of either the sensing element or transducer case.

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**PHYSICAL DIMENSIONS** for reference only, in (mm)

## Package 1 (see note): Ring with back support



**Note:** Non-concentricity effects at the diaphragm weld area may cause runout of up to  $\pm 0.006$  in between the upper and lower portions of the sensor body. (It is recommended to use a counter bore to mate with this device to allow for this non-concentricity).

## Package 4: 1/8-27 NPT



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## Package 5: 1/4-18 NPT



## Package 6: 7/16-20 UNF



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**Package 0 (see note): Ring and cell**



**Note:** Non-concentricity effects at the diaphragm weld area may cause runout of up to  $\pm 0.006$  in between the upper and lower portions of the sensor body. (It is recommended to use a counter bore to mate with this device to allow for this non-concentricity).

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## ORDERING INFORMATION

### 13 mm Compensated Series



For example: **Part #13C3000PS4K** = 13 mm Cell, Compensated, 3000 psi, Sealed Gauge, 1/8NPT Port with 10 Vdc excitation.

### 13 mm Uncompensated Series



For example: **Part #13U 3000PA0K** = 13 mm Cell, Uncompensated, 3000 psi, Absolute, Ring pressure connection with 5 Vdc excitation.