

## Pressure Sensors

Low-Cost, Stainless Steel, Isolated Sensors

*19 mm Series*

### FEATURES

- Low cost
- Rugged, isolated stainless steel package
- Small size
- Reliable semiconductor technology
- Calibrated and temperature compensated
- Absolute and gage pressures
- Vacuum compatible, isolated sensors
- 0 psi to 3 psi to, 0 psi to 500 psi

### TYPICAL APPLICATIONS

- Industrial controls
- Process control systems
- Industrial automation and flow control
- Pressure calibrators



Honeywell's stainless steel 19C, 19U, and 19 Vacuum Gage Series sensors were developed for pressure applications that involve measurement of hostile media in harsh environments compatible with 316 stainless steel. The special Vacuum Gage Series sensors are specifically designed for applications that can be exposed to vacuum.

The 19C Series are calibrated and temperature compensated. They are available for use with either a constant voltage or current source. They feature a variety of pressure connections to allow use in a wide range of OEM (Original Equipment Manufacturer) equipment. The 19U Series is uncompensated for applications that use their own specialized circuit designs.

The 19C and 19U Series sensors are rugged and reliable transducers for use in a wide variety of pressure sensing applications where corrosive liquids or gases are monitored.

### 19C, 19U, AND 19 VACUUM GAGE EQUIVALENT CIRCUIT



### **⚠ 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 |

## PRESSURE RANGE SPECIFICATIONS (19C, 19U)

| Catalog Listing                    | Pressure range    | Proof pressure <sup>(7)</sup> | Burst pressure <sup>(8)</sup> |
|------------------------------------|-------------------|-------------------------------|-------------------------------|
| 19(C,U) 003P G (1...9) (K/L)       | 0 psig to 3 psig  | 9 psig                        | 15 psig                       |
| 19(C,U) 005P G (1...9) (K/L)       | 0 psig to 5 psig  | 15 psig                       | 25 psig                       |
| 19(C,U) 010P G (1...9) (K/L)       | 0 psig to 10 psig | 30 psig                       | 50 psig                       |
| 19(C,U) 015P (A,G,V) (1...9) (K/L) | 0 psi to 15 psi   | 45 psi                        | 75 psi                        |
| 19(C,U) 030P (A,G,V) (1...9) (K/L) | 0 psi to 30 psi   | 90 psi                        | 150 psi                       |
| 19(C,U) 050P (A,G,V) (1...9) (K/L) | 0 psi to 50 psi   | 150 psi                       | 250 psi                       |
| 19(C,U) 100P (A,G,V) (1...9) (K/L) | 0 psi to 100 psi  | 300 psi                       | 500 psi                       |
| 19(C,U) 200P (A,G,V) (1...9) (K/L) | 0 psi to 200 psi  | 600 psi                       | 1000 psi                      |
| 19(C,U) 300P (A,G,V) (1...9) (K/L) | 0 psi to 300 psi  | 900 psi                       | 1500 psi                      |
| 19(C,U) 500P (A,G,V) (1...9) (K/L) | 0 psi to 500 psi  | 1200 psi                      | 2400 psi                      |

Notes:

- 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.

## 19C SERIES PERFORMANCE CHARACTERISTICS <sup>(1)</sup>

| Characteristic                                                                 | Minimum | Typical | Maximum | Unit |
|--------------------------------------------------------------------------------|---------|---------|---------|------|
| Zero pressure offset                                                           | -2      | 0       | 2       | mV   |
| Full-scale span <sup>(2)</sup>                                                 | 98      | 100     | 102     | mV   |
| Full-scale span (3 psi and 5 psi “K” units only) <sup>(2)</sup>                | 48      | 50      | 52      | 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 |
| Temp. effect on span (0 psi to 3 psi and 0 psi to 5 psi only) <sup>(4)</sup>   | –       | –       | ±2.0    | %FSS |
| Temp. effect on offset (0 psi to 3 psi and 0 psi to 5 psi only) <sup>(4)</sup> | –       | –       | ±2.0    | %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>                       | 0.5     | 1.3     | 2.0     | Vdc  |
| Input impedance (current version “L”)                                          | 2.0     | 4.5     | 8.0     | kΩ   |
| Input impedance (voltage version “K”)                                          | 8.0     | 25      | 50      | kΩ   |
| Output resistance                                                              | 3.0     | 4.5     | 6.0     | kΩ   |

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## 19U SERIES PERFORMANCE CHARACTERISTICS <sup>(1)</sup>

| Characteristic                                                                    | Minimum | Typical | Maximum | Unit    |
|-----------------------------------------------------------------------------------|---------|---------|---------|---------|
| Zero pressure offset                                                              | -7.5    | 1.0     | 7.5     | mV/V    |
| Full-scale span <sup>(2)</sup>                                                    | 35      | 40      | 60      | mV/V    |
| Full-scale span (3 psi and 5 psi only) <sup>(2)</sup>                             | 20      | 30      | 40      | 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 resistance <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F]) | 2700    | 3420    | 4500    | ppm/°C  |
| Temp. coefficient of offset <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F])     | –       | 30      | –       | µV/V/°C |
| Temp. coefficient of span <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F])       | 360     | 720     | 1260    | ppm/°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                                                                  | 4.00    | 4.75    | 6.0     | kΩ      |
| Output resistance                                                                 | 4.00    | 4.75    | 6.0     | kΩ      |

## 19C VACUUM GAGE COMPENSATED SERIES PERFORMANCE CHARACTERISTICS <sup>(1)</sup>

| Characteristic                                                 | Minimum | Typical | Maximum | Unit |
|----------------------------------------------------------------|---------|---------|---------|------|
| Zero pressure offset (at 0 psig)                               | -2      | 0       | 2       | mV   |
| Full-scale span <sup>(2)</sup> (0 psig to positive full-scale) | 98      | 100     | 102     | 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>       | 0.5     | 1.3     | 2.0     | Vdc  |
| Input impedance (current version “L”)                          | 1.5     | 4.5     | 8.0     | kΩ   |
| Input impedance (voltage version “K”)                          | 8.0     | 25      | 50      | kΩ   |
| Output resistance                                              | 3.0     | 4.5     | 6.0     | kΩ   |

## 19U VACUUM GAGE UNCOMPENSATED SERIES PERFORMANCE CHARACTERISTICS <sup>(1)</sup>

| Characteristic                                                                    | Minimum | Typical | Maximum | Unit    |
|-----------------------------------------------------------------------------------|---------|---------|---------|---------|
| Zero pressure offset                                                              | -7.5    | 1.0     | 7.5     | mV/V    |
| Full-scale span <sup>(2)</sup> (0 psig to positive full-scale)                    | 35      | 40      | 60      | 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 resistance <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F]) | 2700    | 3420    | 4500    | ppm/°C  |
| Temp. coefficient of offset <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F])     | –       | 30      | –       | µV/V/°C |
| Temp. coefficient of span <sup>(10)</sup> (0 °C to 82 °C [32 °F to 180 °F])       | 360     | 720     | 1260    | ppm/°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                                                                  | 4.00    | 4.75    | 6.0     | kΩ      |
| Output resistance                                                                 | 4.00    | 4.75    | 6.0     | kΩ      |

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### NOTES

- Reference conditions (unless otherwise noted):  $T_A = 25\text{ }^\circ\text{C}$  [77 °F]; 19C Supply  $V_s = 10\text{ Vdc} \pm 0.01\text{ Vdc}$  or  $I_s = 1.5\text{ mA} \pm 0.0015\text{ mA}$ ; 19U Supply  $V_s = 5\text{ Vdc} \pm 0.01\text{ Vdc}$  or  $I = 1.0\text{ mA} \pm 0.0015\text{ mA}$
- 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 operation 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.
- Common mode voltage as measured from output to ground. For higher levels of common mode voltage, contact factory.
- The error band resulting from a maximum deviation of a transducer's output parameter (offset, span, or resistance) as temperature is varied 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.

### PHYSICAL DIMENSIONS, for reference only, mm [in]

#### Package 1 (see note): Cell Package



**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 2: Flush Mount Package



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## Package 3: Flush Mount with Flange



## Package 4: Male 1/8-27 NPT



## Package 5: Male 1/4-18 NPT



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## Package 6: Male 7/16 UNF



## Package 7: Male 1/4 BSPP



## Package 8: Euro Ring (See note)



**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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## Package 9: VCR Gland (Female nut)



## ORDERING INFORMATION

### 19C Series



For example:  
Part #19C100PA4K =  
19 mm Cell,  
Compensated, 100 psi,  
Absolute, 1/8NPT Port  
with 10 Vdc excitation.

### 19U Series



For example:  
Part #19U100PA4K =  
19 mm Cell,  
Uncompensated, 100  
psi, Absolute, 1/8NPT  
Port with 5 Vdc  
excitation.

### 19 Vacuum Gauge Series



For example: Part  
#19C100PV4K = 19  
mm Cell, Comp., 100  
psi, Vacuum Gauge,  
1/8NPT Port with 10  
Vdc excitation.

For example: Part  
#19U100PV4K = 19  
mm Cell,  
Uncompensated, 100  
psi, Absolute, 1/8NPT  
Port with 5 Vdc  
excitation.

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## WARRANTY/REMEDY

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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.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA/Canada

1-815-235-6847 International

## FAX

1-815-235-6545 USA

## INTERNET

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)

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# Honeywell

Sensing and Control

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