

# | P1A

  
Pressure Sensor

## Description

P1A family features a highly modular compact geometry. This modularity and extensive range of options offered by the P1A family make the advantages of Ceramic Capacitive technology in low-pressure sensing now available to the broadest spectrum of industrial applications. Besides the multiple standard configurations available, customized adaptations can also be considered.

Kavlico's P1A Ceramic Capacitive Pressure Sensor incorporates the latest generation sensing elements with state-of-the-art ASICs. Designed to withstand harsh environments, it features superior EMI protection, outstanding shock and vibration performance, impressive longevity and lifetime performance and high quality. It is tested to parameters that match or exceed those of competing products on the market.



## Features

- Small Compact Size
- Highly Modular Product Configurations
- Kavlico Ceramic Capacitive Technology
- Outstanding Long Term Stability and Performance
- Vacuum to 16 Bar Gage and Absolute
- Media Resistant CCAP Technology

## Applications

- Vacuum Machinery / Plant
- Medical and Laboratory Sterilizers / Autoclaves
- HVAC Systems
- Water Pump Booster Sets
- Pneumatic Systems
- Waste and Water Management
- Industrial OEM Applications

## MAIN FEATURES

|                              |                                                                                                                   |
|------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Pressure Ranges</b>       | 0 to 0.25 up to 0 to 16 bar (gage)<br>0 to 1.6 up to 0 to 16 bar (absolute)<br>-1 to 0 up to -1 to 0 bar (gage) * |
| <b>Electrical Connection</b> | Packard Electric Metri-Pack 150 Series *                                                                          |
| <b>Pressure Connection</b>   | G1/4A DIN 3852-E, 1/4 - 1/8 NPTF *                                                                                |
| <b>Housing Material</b>      | 304 Stainless Steel (1.4301)                                                                                      |
| <b>Connector Material</b>    | PBT (30% Glass Fibre)                                                                                             |
| <b>Output Signal</b>         | 4 - 20 mA, 0.5 - 4.5 VDC, 0 - 5 VDC, 0 - 10 VDC                                                                   |



## Pressure Ranges

|                              |                |      |     |     |    |     |     |    |    |    |    |
|------------------------------|----------------|------|-----|-----|----|-----|-----|----|----|----|----|
| <b>from 0 to...</b>          | bar (gage)     | 0.25 | 0.4 | 0.6 | 1  | 1.6 | 2.5 | 4  | 6  | 10 | 16 |
| <b>from 0 to...</b>          | bar (absolute) |      |     |     |    | 1.6 | 2.5 | 4  | 6  | 10 | 16 |
| <b>Proof Pressure Factor</b> |                | 4x   | 4x  | 4x  | 4x | 4x  | 4x  | 3x | 3x | 3x | 2x |
| <b>Burst Pressure Factor</b> |                | 6x   | 6x  | 6x  | 6x | 6x  | 6x  | 5x | 5x | 4x | 3x |

|                       |            |         |         |  |  |  |  |  |  |  |  |
|-----------------------|------------|---------|---------|--|--|--|--|--|--|--|--|
| <b>from -1 to...</b>  | bar (gage) | 0       | 1       |  |  |  |  |  |  |  |  |
| <b>Proof Pressure</b> | bar (gage) | -1 / +4 | -1 / +4 |  |  |  |  |  |  |  |  |
| <b>Burst Pressure</b> | bar (gage) | 6       | 6       |  |  |  |  |  |  |  |  |

|                              |                |    |    |    |    |    |    |    |     |     |     |
|------------------------------|----------------|----|----|----|----|----|----|----|-----|-----|-----|
| <b>from 0 to...</b>          | PSI (gage)     | 5  | 10 | 15 | 20 | 30 | 50 | 75 | 100 | 150 | 200 |
| <b>from 0 to...</b>          | PSI (absolute) |    |    |    | 20 | 30 | 50 | 75 | 100 | 150 | 200 |
| <b>Proof Pressure Factor</b> |                | 4x | 4x | 4x | 4x | 4x | 4x | 3x | 3x  | 3x  | 2x  |
| <b>Proof Pressure Factor</b> |                | 6x | 6x | 6x | 6x | 6x | 6x | 5x | 5x  | 4x  | 3x  |

## Physical

|                                  |                                                                                                                                        |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operating Life Cycle</b>      | min. 10 million full pressure cycles over the full range                                                                               |
| <b>Vibration Resistance</b>      | IEC 60068-2-64 (RANDOM) 20 PSD                                                                                                         |
| <b>Shock Resistance</b>          | 100 g minimum according to DIN EN 60068-2-27                                                                                           |
| <b>Drop Test</b>                 | 1 meter drop on concrete as per SAE J1455 / DIN EN 60068-2-3-1                                                                         |
| <b>Weight</b>                    | ≤ 50 grams                                                                                                                             |
| <b>Ingress Protection</b>        | IP 65 or IP67 - depending on electrical connector                                                                                      |
| <b>Medium Temperature</b>        | -30°C to + 120°C (others on request)                                                                                                   |
| <b>Environmental Temperature</b> | -30°C to + 100°C (depending on internal and external seal ring capability) <sup>1</sup>                                                |
| <b>Storage Temperature</b>       | -30°C to + 100°C (depending on internal and external seal ring capability) <sup>1</sup>                                                |
| <b>Media</b>                     | All class II fluids and gases compatible with stainless steel 304 (1.4301) and the internal and external (optional) seal ring material |

## Performance

|                                  |                                                                 |
|----------------------------------|-----------------------------------------------------------------|
| <b>Accuracy<sup>2</sup></b>      | ≤ 1 % of span <sup>4</sup>                                      |
| <b>Non-linearity<sup>3</sup></b> | 0.2 % of span <sup>4</sup>                                      |
| <b>Non-repeatability</b>         | 0.1 % of span <sup>4</sup>                                      |
| <b>1-year stability</b>          | 0.2 % of span <sup>4</sup>                                      |
| <b>Temp. Coefficients - Zero</b> | 0.2 % of span / 10 K within temperature range 0°C to + 80°C.2 % |
| <b>Temp. Coefficients - Span</b> | 0.2 % of span / 10 K within temperature range 0°C to + 80°C.2 % |

## Electrical

|                                    |                                                                                   |                              |                            |                            |
|------------------------------------|-----------------------------------------------------------------------------------|------------------------------|----------------------------|----------------------------|
| <b>Output Signal</b>               | 4...20 mA                                                                         | 0.5...4.5 VDC<br>ratiometric | 0...5 VDC                  | 0...10 VDC                 |
| <b>Operating Supply Signal</b>     | 9-30 VDC <sup>4</sup>                                                             | 5 VDC $\pm$ 5% <sup>4</sup>  | 8-30 VDC <sup>4</sup>      | 14-30 VDC <sup>4</sup>     |
| <b>Power Consumption</b>           | $\leq$ 600 mW                                                                     | $\leq$ 25 mW                 | $\leq$ 600 mW              | $\leq$ 600 mW              |
| <b>Overvoltage Protection</b>      | min. 33 VDC                                                                       | min. 33 VDC                  | min. 33 VDC                | min. 33 VDC                |
| <b>Short-circuit Proofness</b>     | not applicable                                                                    | Yes <sup>5</sup>             | Yes <sup>5</sup>           | Yes <sup>5</sup>           |
| <b>Insulation Voltage</b>          | 500 VDC                                                                           | 500 VDC                      | 500 VDC                    | 500 VDC                    |
| <b>Reverse Polarity Protection</b> | Yes <sup>6</sup>                                                                  | Yes <sup>6</sup>             | Yes <sup>6</sup>           | Yes <sup>6</sup>           |
| <b>Load</b>                        | $\leq (V_{sup}-8 \text{ VDC})/(0.02 \text{ A}) [\Omega]$                          | $\geq 4.7 \text{ k}\Omega$   | $\geq 4.7 \text{ k}\Omega$ | $\geq 4.7 \text{ k}\Omega$ |
| <b>Response Time</b>               | $\leq 5 \text{ ms max. to 63\% of full scale pressure with step change on input}$ |                              |                            |                            |

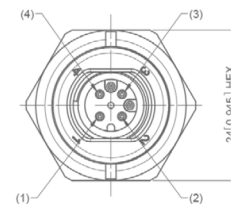
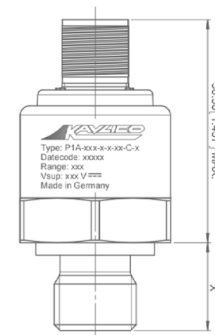


## DIMENSIONS

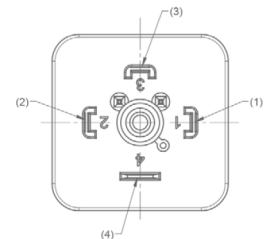
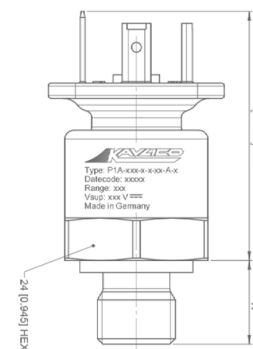
Dimensions in mm [Inch]

### Pressure Sensor with Electrical Connection

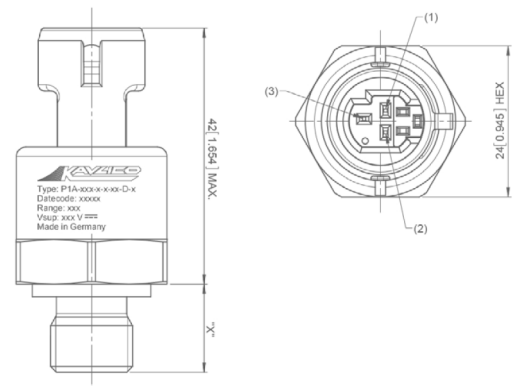
| M12 Pin Call Outs          |       |       |       |       |
|----------------------------|-------|-------|-------|-------|
| Output                     | Pin 1 | Pin 2 | Pin 3 | Pin 4 |
| 4-20 mA                    | Vsup  | ...   | Iout  | ...   |
| 0.5-4.5 VDC<br>ratiometric | Vsup  | ...   | Vout  | GND   |
| 0-5 VDC                    | Vsup  | ...   | Vout  | GND   |
| 0-10 VDC                   |       |       |       |       |



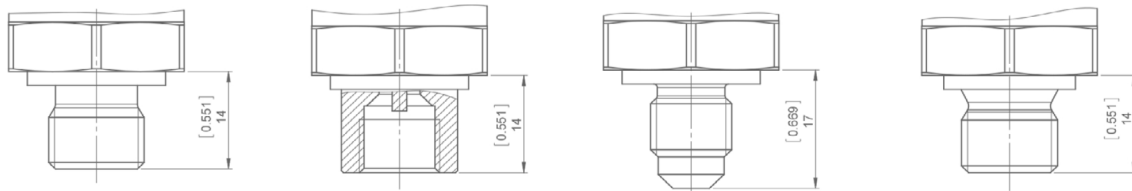
| 18 mm Pin Call Outs        |       |       |       |       |
|----------------------------|-------|-------|-------|-------|
| Output                     | Pin 1 | Pin 2 | Pin 3 | Pin 4 |
| 4-20 mA                    | Vsup  | Iout  | ...   | ...   |
| 0.5-4.5 VDC<br>ratiometric | Vsup  | Vout  | GND   | ...   |
| 0-5 VDC                    | Vsup  | Vout  | GND   | ...   |
| 0-10 VDC                   |       |       |       |       |



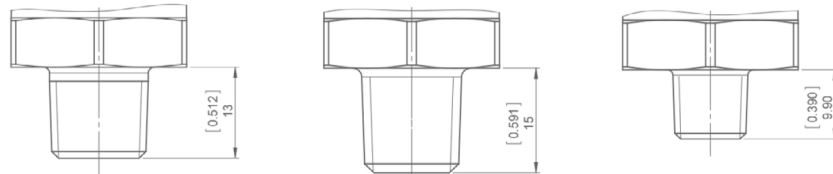
| Packard (metri-pack 150) Pin Call Outs |       |       |       |
|----------------------------------------|-------|-------|-------|
| Output                                 | Pin 1 | Pin 2 | Pin 3 |
| 4-20 mA                                | Iout  | Vsup  | ...   |
| 0.5-4.5 VDC<br>ratiometric             | GND   | Vsup  | Vout  |
| 0-5 VDC                                | GND   | Vsup  | Vout  |
| 0-10 VDC                               |       |       |       |



## Pressure Connections and Recommended Installation Torque



| Name   | G1/4A DIN 3852-E | 7/16-20 UNF-2B<br>SAE J1926-1 | 7/16-20 UNF-2A<br>SAE J1926-2 | G1/4A DIN 3852-A |
|--------|------------------|-------------------------------|-------------------------------|------------------|
| Thread | External         | Internal                      | External                      | External         |
| Torque | 20 Nm            | 20 Nm                         | 20 Nm                         | 20 Nm            |



| Name   | 1/4-19 BSPT<br>R1/4 PER DIN EN 10226 | 1/4-18 NPTF | 1/8-27 NPTF |
|--------|--------------------------------------|-------------|-------------|
| Thread | External                             | External    | Internal    |
| Torque | 20 Nm                                | 20 Nm       | 20 Nm       |

Note: Recommended torque may vary according to material and specific application



## GENERAL NOTES

\* for more options see How to Order

<sup>2</sup> Including non-linearity, hysteresis, non-repeatability, zero point and full scale error (corresponds to error of measurement per IEC 61298-2). Adjusted in vertical mounting position with pressure port down.

<sup>3</sup> BFSL according to IEC 61298-2 reference conditions to EN 61298-1

<sup>4</sup> Others on request

<sup>4</sup> Unit shall be supplied by a power supply with double/reinforced insulation (SELV) and limited energy in accordance to UL/EN/IEC 61010-1 or LPS in accordance to UL/EN/IEC 60950-1 or class 2 per UL1310/UL1585 (NEC or CEC). The power supply shall be approved for usage above 2000m if the pressure sensor is used in this environment.

For indoor and outdoor use, not exposed to direct sunlight.

<sup>5</sup> for min. 3 intervals at 5 minutes each

<sup>6</sup> for min. 10 seconds on assigned pins



## ORDERING OPTIONS

Example : P1A-06G-1-A-01-A-D

P1A Sensor, 0 - 2.5 bar Gage, 4 - 20 mA Output, No External Seal Ring, G1/4  
DIN 3852-E Pressure Connection, with 18mm, EN 175301-803-A003MS, 4 pole  
Electrical Connector and Fluorocarbon FKM Internal Seal Ring

| Family                                                                        | P1A | 06             | G | 1 | A | 01 | A | D |
|-------------------------------------------------------------------------------|-----|----------------|---|---|---|----|---|---|
| <b>P1A</b>                                                                    |     |                |   |   |   |    |   |   |
| <b>Pressure Ranges</b>                                                        |     |                |   |   |   |    |   |   |
| 01 0 - 0.25 Bar                                                               |     | 50 0 - 5 PSI   |   |   |   |    |   |   |
| 02 0 - 0.4 Bar                                                                |     | 51 0 - 10 PSI  |   |   |   |    |   |   |
| 03 0 - 0.6 Bar                                                                |     | 52 0 - 15 PSI  |   |   |   |    |   |   |
| 04 0 - 1 Bar                                                                  |     | 53 0 - 20 PSI  |   |   |   |    |   |   |
| 05 0 - 1.6 Bar                                                                |     | 54 0 - 30 PSI  |   |   |   |    |   |   |
| 06 0 - 2.5 Bar                                                                |     | 55 0 - 50 PSI  |   |   |   |    |   |   |
| 07 0 - 4 Bar                                                                  |     | 56 0 - 75 PSI  |   |   |   |    |   |   |
| 08 0 - 6 Bar                                                                  |     | 57 0 - 100 PSI |   |   |   |    |   |   |
| 09 0 - 10 Bar                                                                 |     | 58 0 - 150 PSI |   |   |   |    |   |   |
| 10 0 - 16 Bar                                                                 |     | 59 0 - 200 PSI |   |   |   |    |   |   |
| 30 -1 - 0 Bar                                                                 |     |                |   |   |   |    |   |   |
| 31 -1 - 1 Bar                                                                 |     |                |   |   |   |    |   |   |
| <b>Reference</b>                                                              |     |                |   |   |   |    |   |   |
| A: Absolute                                                                   |     |                |   |   |   |    |   |   |
| G: Gage                                                                       |     |                |   |   |   |    |   |   |
| <b>Output</b>                                                                 |     |                |   |   |   |    |   |   |
| 1: 4-20 mA                                                                    |     |                |   |   |   |    |   |   |
| 2: 0.5-4.5 VDC radiometric                                                    |     |                |   |   |   |    |   |   |
| 3: 0-5 VDC                                                                    |     |                |   |   |   |    |   |   |
| 4: 0-10 VDC                                                                   |     |                |   |   |   |    |   |   |
| <b>External Seal Ring</b>                                                     |     |                |   |   |   |    |   |   |
| A: None                                                                       |     |                |   |   |   |    |   |   |
| B: Fluorocarbon FKM (Viton)                                                   |     |                |   |   |   |    |   |   |
| Only for pressure connection port option 1 lower temperature limited to -20°C |     |                |   |   |   |    |   |   |
| C: Aluminium Washer G1/4                                                      |     |                |   |   |   |    |   |   |
| Only for pressure connection port option 4                                    |     |                |   |   |   |    |   |   |
| D: Copper Washer G1/4                                                         |     |                |   |   |   |    |   |   |
| Only for pressure connection port option 4                                    |     |                |   |   |   |    |   |   |
| F: Ethylene Propylene - EPDM                                                  |     |                |   |   |   |    |   |   |
| Only for pressure connection port option 1                                    |     |                |   |   |   |    |   |   |
| <b>Pressure Connection (Port)</b>                                             |     |                |   |   |   |    |   |   |
| 01: G 1/4A DIN 3852-E                                                         |     |                |   |   |   |    |   |   |
| 02: 7/16-20UNF-2B (female) SAE J1926-1 (modified)                             |     |                |   |   |   |    |   |   |
| With 45° cone and schrader                                                    |     |                |   |   |   |    |   |   |
| 03: 7/16-20UNF-2A (male) SAE J1926-2 (modified)                               |     |                |   |   |   |    |   |   |
| With 45° cone                                                                 |     |                |   |   |   |    |   |   |
| 04: G1/4A DIN 3852-A                                                          |     |                |   |   |   |    |   |   |
| 05: 1/4-19 BSPT                                                               |     |                |   |   |   |    |   |   |
| Is equivalent to 1/4-19PT and R1/4 per DIN EN 10226 5                         |     |                |   |   |   |    |   |   |
| 06: 1/4-18 NPTF                                                               |     |                |   |   |   |    |   |   |
| 11: 1/8-27 NPTF                                                               |     |                |   |   |   |    |   |   |
| <b>Built-In Electrical Connection</b>                                         |     |                |   |   |   |    |   |   |
| A: 18mm, EN 175301-803-A003MS, 4 pole                                         |     |                |   |   |   |    |   |   |
| Sensor delivered without mating connector                                     |     |                |   |   |   |    |   |   |
| C: M12, 4 pole according to IEC 61076-2-101                                   |     |                |   |   |   |    |   |   |
| Sensor delivered without mating connector                                     |     |                |   |   |   |    |   |   |
| D: Packard Metri-Pack 150, 3 pole                                             |     |                |   |   |   |    |   |   |
| Sensor delivered without mating connector                                     |     |                |   |   |   |    |   |   |
| <b>Internal Seal Ring</b>                                                     |     |                |   |   |   |    |   |   |
| C: Neoprene - CR                                                              |     |                |   |   |   |    |   |   |
| Operating Temp: - 30 to 120°C                                                 |     |                |   |   |   |    |   |   |
| D: Fluorocarbon - FKM (VITON)                                                 |     |                |   |   |   |    |   |   |
| Operating Temp: - 20 to 120°C                                                 |     |                |   |   |   |    |   |   |
| E: Fluorosilicone - FVMQ                                                      |     |                |   |   |   |    |   |   |
| Operating Temp: - 30 to 120°C                                                 |     |                |   |   |   |    |   |   |
| F: Ethylene Propylene - EPDM                                                  |     |                |   |   |   |    |   |   |
| Operating Temp: - 30 to 120°C                                                 |     |                |   |   |   |    |   |   |



Before installation and operation, ensure that the appropriate pressure sensor has been selected in terms of pressure range, design and specific measuring conditions. Non-compliance can result in serious injury and/or damage to the equipment.

**Warning:** The product information contained in this catalogue is given purely as information and does not constitute a representation, warranty or any form of contractual commitment. Kavlico reserve the right to modify their products without notice. It is imperative that we should be consulted over any particular use or application of our products and it is the responsibility of the buyer to establish, particularly through all the appropriate tests, that the product is suitable for the use or application. Under no circumstances will our warranty apply, nor shall we be held responsible for any application (such as any modification, addition, deletion, use in conjunction with other electrical or electronic components, circuits or assemblies, or any other unsuitable material or substance) which has not been expressly agreed by us prior to the sale of our products.



## AGENCY APPROVALS & CERTIFICATIONS



Pressure equipment directive 97/23/EC  
EMC directive 2004/108/EG,  
IEC 61326 Emission (Group 1, Class B) and Immunity (industrial locations)



2011/65/EU ROHS Directive



In Process

Sensata Technologies, Inc. ("Sensata") data sheets are solely intended to assist designers ("Buyers") who are developing systems that incorporate Sensata products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products. Sensata data sheets have been created using standard laboratory conditions and engineering practices. Sensata has not conducted any testing other than that specifically described in the published documentation for a particular data sheet. Sensata may make corrections, enhancements, improvements and other changes to its data sheets or components without notice.

Buyers are authorized to use Sensata data sheets with the Sensata component(s) identified in each particular data sheet. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER SENSATA INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN. SENSATA DATA SHEETS ARE PROVIDED "AS IS". SENSATA MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE DATA SHEETS OR USE OF THE DATA SHEETS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. SENSATA DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO SENSATA DATA SHEETS OR USE THEREOF.

All products are sold subject to Sensata's terms and conditions of sale supplied at [www.sensata.com](http://www.sensata.com) SENSATA ASSUMES NO LIABILITY FOR APPLICATIONS ASSISTANCE OR THE DESIGN OF BUYERS' PRODUCTS. BUYER ACKNOWLEDGES AND AGREES THAT IT IS SOLELY RESPONSIBLE FOR COMPLIANCE WITH ALL LEGAL, REGULATORY AND SAFETY-RELATED REQUIREMENTS CONCERNING ITS PRODUCTS, AND ANY USE OF SENSATA COMPONENTS IN ITS APPLICATIONS, NOTWITHSTANDING ANY APPLICATIONS-RELATED INFORMATION OR SUPPORT THAT MAY BE PROVIDED BY SENSATA.

Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA.

## CONTACT US

### Americas

+1 (800) 350 2727

[sensors@sensata.com](mailto:sensors@sensata.com)

### Europe, Middle East & Africa

+33 (3) 88 20 8080

[position-info.eu@sensata.com](mailto:position-info.eu@sensata.com)

### Asia Pacific

[sales.isasia@list.sensata.com](mailto:sales.isasia@list.sensata.com)

China +86 (21) 2306 1500

Japan +81 (45) 277 7117

Korea +82 (31) 601 2004

India +91 (80) 67920890

Rest of Asia +886 (2) 27602006  
ext 2808