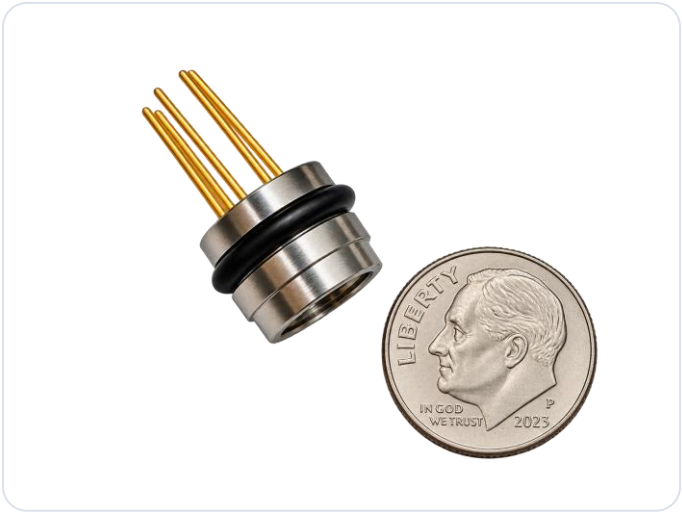
PPS03M High Pressure Miniature Sensing Element

10 mm media-isolated silicon piezoresistive element · 150 to 6,000 psi



FEATURES

- Compact Ø0.394" (10 mm) stainless steel package
- Pressure ranges from 150 to 6,000 psi
- Absolute or sealed gauge reference
- ±0.15% FS typical linearity (BFSL)
- MEMS piezoresistive die, oil-filled and media isolated
- 316L stainless steel diaphragm and housing
- Millivolt bridge output · 1.5 mA or 10 V excitation
- Uncompensated or temperature-compensated versions
- -40 to 125 °C operating temperature

DESCRIPTION

The PPS03M is a miniature, high pressure sensing element for medical, industrial, and commercial OEM applications. A silicon MEMS piezoresistive die sits in a Ø10 mm 316L stainless steel housing, sealed behind a stainless steel diaphragm and silicone oil fill. The die never contacts the process media, so the element works with liquids, air, gas, and many corrosive media.

The PPS03M is available with 5 Kovar pins or 5 wire leads, as a bare element or pre-mounted in a threaded port. It can be supplied uncompensated or with an on-board compensation circuit. Contact us about custom designs.

APPLICATIONS

- Medical devices
- Industrial automation
- Hydraulic systems & valves
- Agricultural equipment
- Chemical process
- Natural gas

MAXIMUM ENVIRONMENTAL RATINGS

Operating Temperature	**-40 to 125 °C · -40–257 °F**	Proof Pressure	**1.5× full scale**
Storage Temperature	**-40 to 125 °C · -40–257 °F**	Burst Pressure	**Consult factory**
Media	**Liquid, air & gas**	Pressure Range	**150 to 6,000 psi**

Electrical & performance specifications

Unless otherwise noted: V_{EX} = 5.0 V or I_{EX} = 1.5 mA, T = 25 °C

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Excitation voltage (constant voltage)	V_{EX}	4.75	5.0	10	V
Excitation current (constant current)	I_{EX}	—	1.5	2.0	mA
Input impedance	R_{IN}	2	5	8	kΩ
Output impedance	R_{OUT}	3.5	5	6	kΩ
Zero pressure offset (1)	V_{OS}	−30	—	+30	mV
Full scale span output	V_{FSO}	70	—	—	mV
Linearity (2)	—	—	±0.15	±0.25	%FS
Hysteresis	—	—	±0.05	±0.075	%FS
Repeatability	—	—	±0.05	±0.075	%FS
Temperature error, span / offset (3)	—	—	±0.75	±1.0	%FS
Temperature coefficient of resistance	TCR	2300	—	3300	ppm/°C
Long-term drift	—	—	—	0.2	%FS/yr
Insulation resistance @ 250 VDC	—	200	—	—	MΩ
Proof pressure	—	—	—	1.5×	FS
Compensated temperature range (3)	—	−10	—	80	°C
Operating temperature	—	−40	—	125	°C
Storage temperature	—	−40	—	125	°C

Notes: (1) Measured at zero pressure. (2) Best straight line (BFSL). (3) Compensated versions (compensation code 2).

Electrical connections

ELEMENT PIN	FUNCTION	CONNECTOR	FUNCTION
J4	+IN (excitation)	P1	+OUT
J8, J9	−IN (excitation)	P2	GND
J5	+OUT	P3	VDD
J10	−OUT	P4	−OUT
J3	No connection	P5, P6	No connection

WIRING NOTES

Element pins apply to the Kovar pin version (K5). Connector pins apply to compensated ported assemblies. Follow the pinout exactly: miswiring can damage the element.

Pin configuration

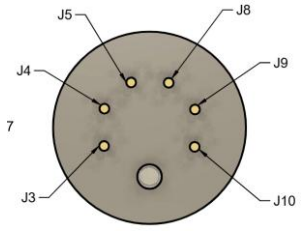


Fig. 1 — Element rear view showing pin positions J3–J10.

Package, media & installation

Package

The body is SS316L stainless steel, Ø0.394" (10 mm) across the sealing flange and 0.315" (8 mm) tall without pins. Gold-plated pins exit the rear of the element for direct soldering, or for connection to the compensation board in ported assemblies.

Stability

The silicon MEMS piezoresistive die sits behind a stainless steel diaphragm and is sealed in silicone oil, which carries the applied pressure to the die. This all-solid, media-isolated construction gives very good long-term stability: drift is ≤0.2% FS per year.

Pressure port

The element is available bare (no port) or pre-installed in a threaded port. Standard threads are 1/4"-18 NPT, 1/8"-27 NPT, 7/16"-20 UNF-2A, and M12×1.75-6g. Custom port fittings are available for OEM customers.

Media

Compatible with oil, air, gas, water, and many corrosive media, including salt water. Check that your specific media is compatible with the 316L stainless steel wetted surfaces and the NBR O-ring.

Wetted parts

316L stainless steel diaphragm and housing. The element seals radially with an NBR (Buna-N) O-ring.

Pressure ranges

Ranges from 150 to 6,000 psi, in absolute or sealed gauge. Sealed gauge versions are referenced to atmospheric pressure at the factory. Custom pressure ranges are available for OEM customers.

Range selection

Choose a range so that the highest system pressure, including spikes and water hammer, stays below the 1.5× FS proof rating. Exceeding the proof rating shortens element life and can permanently damage the element.

Handling

Never touch the diaphragm with hard or sharp objects. Seal on the O-ring only, and do not apply sealant or mechanical load to the diaphragm face.

±0.15%	6,000	Ø10 mm	≥70 mV
Typical linearity FS	Max range psi	Element diameter	Full scale span

Millivolt output & excitation

EXCITATION MODE	RECOMMENDED	MAXIMUM	OUTPUT BEHAVIOR
Constant current	1.5 mA	2.0 mA	Code I · preferred; used for factory compensation
Constant voltage	5.0 V	10 V	Code V · offset and span scale with V_{EX} (ratiometric)

Bridge output

Four piezoresistors diffused into the silicon diaphragm form the PPS03M's Wheatstone bridge. Applied pressure unbalances the bridge, producing a differential millivolt signal between +OUT and -OUT that is proportional to pressure:

$$V_{OUT} = V_{OS} + V_{FSO} \times (P / P_{FS})$$

The bridge output is low-level and differential. Read it with an instrumentation amplifier or a differential ADC input. Don't reference either output pin to ground.

Uncompensated vs. compensated

Uncompensated (code 1): the raw bridge output. Offset is up to ±30 mV and span changes with temperature. Use this where the host system does its own calibration and temperature correction.

Compensated (code 2): an on-board compensation circuit mounted in the port corrects offset and thermal errors to ±1.0% FS max over -10 to 80 °C.

Wheatstone bridge

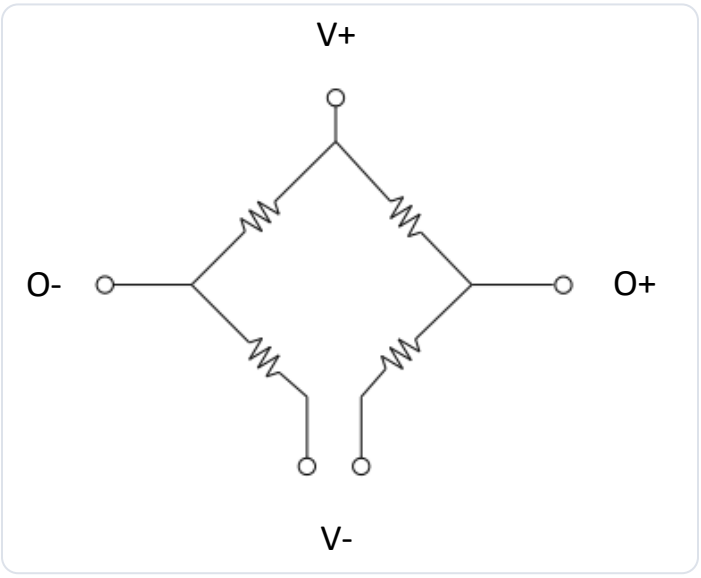


Fig. 2 — Bridge schematic with element pin assignments.

APPLICATION NOTES

Keep excitation within the maximum ratings to avoid self-heating errors.

Use shielded, twisted-pair wiring for the output signal on long runs.

Decouple excitation with 0.1 µF close to the element.

J8 and J9 are both –IN; connect at least one.

Compensated assembly

On compensated ported assemblies, the compensation board sits inside the port hex behind the element. The assembly connects through a 6-position connector: P1 +OUT, P2 GND, P3 VDD, P4 -OUT, P5–P6 no connection.

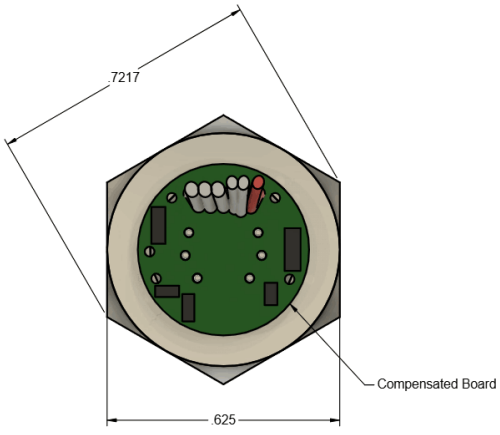


Fig. 3 — Compensation board inside the 0.625" port hex.

Mechanical dimensions — inches

Sensing element

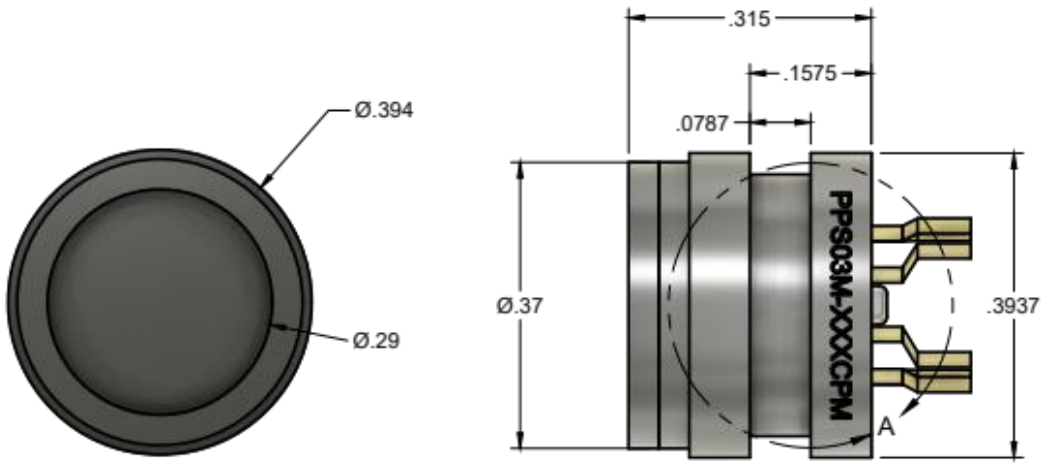


Fig. 4 — Diaphragm face (left) and side view (right). Height without pins: 0.315" (0.310–0.320).

Ported assemblies

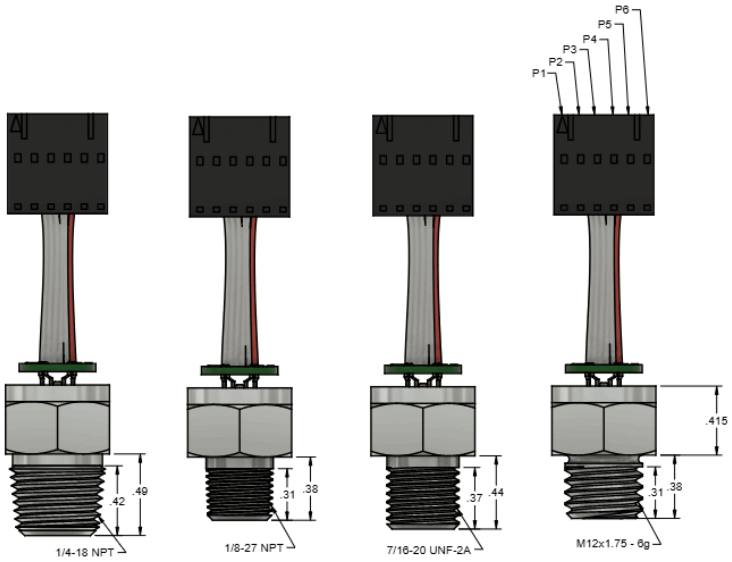


Fig. 5 — Left to right: 1/4"-18 NPT, 1/8"-27 NPT, 7/16"-20 UNF-2A, M12×1.75-6g, shown with ribbon cable and connector.

FEATURE	DIMENSION
Flange diameter	Ø0.394 [10.0]
Body diameter	Ø0.37 [9.4]
Diaphragm diameter	Ø0.29 [7.4]
Element height (no pins)	0.315 [8.0]
Port hex	0.625 [15.9] flats · 0.722 [18.3] corners

NOTES

1) Dimensions are in inches [mm].
2) Tolerances: X.XX ±0.010 · X.XXX ±0.005.
3) Thread lengths, overall: 1/4 NPT 0.49 · 1/8 NPT 0.38 · 7/16 UNF 0.44 · M12 0.38.
4) Material: 316L stainless steel.
5) Do not apply load or sealant to the diaphragm face.

Ordering information — part-number configuration

PPS03M	–	1K	S	2	1	–	K5	–	I
MODEL		RANGE	TYPE	COMP	PORT		ELECTRICAL		EXCITATION

Model	Range (XX)	Type (Y)	Compensation (C)	Port (P)	Electrical (E)	Excitation (X)
PPS03M	150 = 150 PSI 6K = 6,000 PSI	A = Absolute S = Sealed Gauge	1 = Uncompensated 2 = Compensated	0 = No Port 1 = 1/4"-18 NPT 2 = 1/8"-27 NPT 3 = 7/16"-20 UNF 4 = M12x1.75 C = Custom	K5 = 5 Kovar Pins W5 = 5 Wire Leads	I = 1.5 mA Constant Current V = 10 V Constant Voltage

SPECIFY WITH YOUR ORDER

Custom pressure range or units · Custom port fitting · Wire lead length · Special calibration or compensation requirements.

EXAMPLE PART NUMBERS

PPS03M-1KS21-K5-I → 1,000 psi · sealed gauge · compensated · 1/4"-18 NPT · 5 Kovar pins · 1.5 mA

PPS03M-5KA10-W5-V → 5,000 psi · absolute · uncompensated · no port · 5 wire leads · 10 V

Configure your PPS03M sensing element

Custom ranges, ports, compensation, and lead options are available at OEM volumes. Talk to an engineer to spec your part.

REQUEST A QUOTE
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