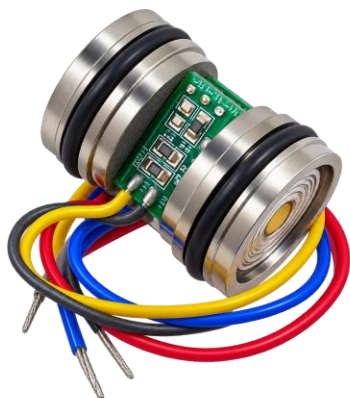


PPS90 Differential Pressure Sensor Element

Media-isolated, oil-filled piezoresistive mV bridge in an SS316L body



DIFFERENTIAL

SS316L

MV OUTPUT

DESCRIPTION

The PPS90 is a piezoresistive silicon differential pressure sensor element for OEM pressure sensors and transmitters. A diffused-silicon sensing die is sealed inside an SS316L housing; pressure on each side reaches the die through a stainless steel diaphragm and the silicone oil sealed behind it.

The die never contacts the measured medium, giving an all-solid, media-isolated construction suited to liquids and gases. The PPS90 seals with O-rings, so it drops into a standard differential-cell bore. Its millivolt bridge output is designed to be conditioned by the host electronics.

FEATURES

- Differential pressure ranges from 1.5 PSI to 350 PSI
- Constant-current excitation — 1.5 mA typical, 2.0 mA max
- Non-linearity $\pm 0.2\%$ FS typical (BFSL)
- Response time ≤ 1 ms (up to 90% FS)
- Long-term stability $\pm 0.2\%$ FS/year typical
- Optional temperature compensation, -10 to 70 °C
- SS316L housing and diaphragms, silicone-oil filled
- O-ring sealed for simple installation — NBR or FKM
- 4-wire silicone leads, 4 in [100 mm]

APPLICATIONS

- Gas & liquid differential pressure measurement
- Pressure calibrators
- Venturi and pipeline flow meters
- Liquid level measurement
- Hydraulic system monitoring
- Industrial process control
- Differential pressure transmitter cores

MAXIMUM ENVIRONMENTAL RATINGS

Operating Temperature	-40 to 125 °C • -40-257 °F
Storage Temperature	-40 to 125 °C • -40-257 °F
Mechanical Vibration	20 g (20-5000 Hz)

Pressure Range	1.5 to 350 PSI differential
Overload / Burst	See range table, page 6
Shock	100 g / 10 ms

Electrical & performance specifications

PARAMETER	MIN	TYP	MAX	UNITS
Operating / storage temperature	-40	—	125	°C
Compensation temperature (option C)	-10	—	70	°C
Excitation (constant current)	—	1.5	2.0	mA
Input impedance	3	—	6	kΩ
Response time (up to 90% FS)	—	—	1	ms
Non-linearity (BFSL)	±0.1	±0.2	±0.3	%FS
Hysteresis	-0.05	±0.03	0.05	%FS
Repeatability	-0.05	±0.03	0.05	%FS
Zero output	-2	±1	2	mV
Span output (at 1.5 mA)	55	85	100	mV
Zero temp. coefficient (-10 to 70 °C, option C)	—	1.2	1.5	%FS
Span temp. coefficient (-10 to 70 °C, option C)	—	1.2	1.5	%FS
Thermal hysteresis	-0.075	±0.05	0.075	%FS
Long-term stability	—	±0.2	±0.3	%FS/yr
Insulation resistance (at 250 VDC)	200	—	—	MΩ
Durability	—	10 ⁶	—	cycles
Mechanical vibration	20 g (20–5000 Hz)			—
Shock	100 g / 10 ms			—

Electrical connections

WIRE COLOR	FUNCTION
Red	+IN · excitation +
Blue	-IN · excitation -
Yellow	+OUT · output +
White	-OUT · output -

TEST CONDITIONS

Specifications at 1.5 mA excitation and 25 °C unless noted. Non-linearity calculated by the BFSL least-squares method. Temperature coefficients apply to temperature-compensated (option C) parts, referenced to 30 °C. Thermal hysteresis measured after a high/low temperature excursion and return to reference.

Bridge circuit

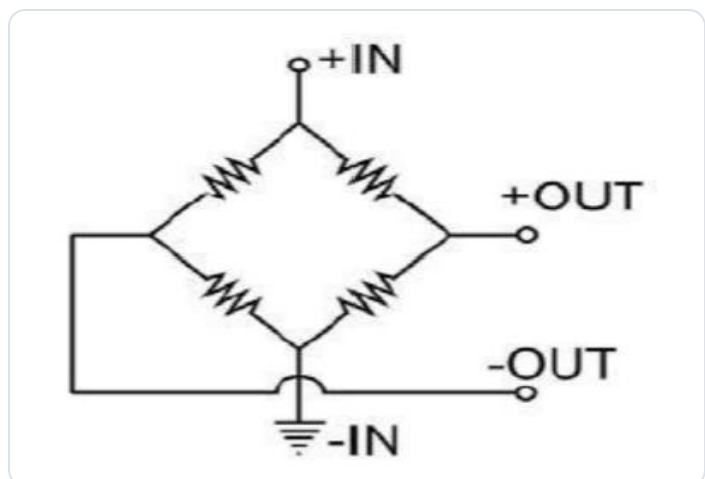


Fig. 1 – Piezoresistive Wheatstone bridge, 4-wire connection (+IN, -IN, +OUT, -OUT).

Package, media & installation

Package

A compact, cylindrical SS316L body, 0.750 in [19 mm] in diameter and 1.09 in [27.6 mm] long. Pressure is sealed with an O-ring on each end, so the element installs into a machined differential-cell bore without threads or welding.

Pressure ports

The PPS90 has a high-pressure side and a low-pressure side, one diaphragm on each. The high side is identified by the "H" mark on the body. Output increases as high-side pressure rises above low-side pressure.

Wetted parts

SS316L diaphragms and housing. O-ring seals in NBR (standard) or FKM fluororubber (option). No other materials are exposed to the process.

Construction

A diffused-silicon sensing die is encapsulated in the SS316L shell behind two stainless steel diaphragms. Pressure is transferred to the die through sealed silicone oil, forming an all-solid structure with no moving parts and no media contact with the die.

Media

Compatible with all liquids and gases that are compatible with SS316L and the selected O-ring material (NBR or FKM). Verify compatibility for aggressive or corrosive media.

O-ring temperature limits

NBR O-rings are rated -40 to 120 °C; FKM O-rings are rated -20 to 150 °C. When the application exceeds the O-ring range, or for harsh media, contact Phoenix Sensors to confirm the seal selection.

Application examples



Venturi Flow Meters



Industrial Process Control



Pressure Calibrators



Gas/Liquid Pressure Measurement

mV bridge output

The PPS90 is an unamplified sensing element. Its output is a millivolt-level differential signal across +OUT and -OUT. It must be conditioned by the host — amplified, offset-corrected and, for uncompensated parts, temperature-corrected — before use as a process signal.

Excitation

Drive the bridge from a **constant-current source** connected across +IN and -IN. Rated excitation is 1.5 mA (2.0 mA maximum). Output scales with excitation current, so use a stable, low-drift source.

ITEM	VALUE
Rated excitation	1.5 mA constant current
Maximum excitation	2.0 mA
Input impedance	3–6 kΩ
Bridge voltage at 1.5 mA	4.5–9 V ($I \times R_{in}$)

Size the current source for the full 9 V compliance across the bridge.

Zero & span

With equal pressure on both sides, output is the **zero** offset. At full-scale differential pressure, output rises by the **span**. Both are characterized at 1.5 mA.

$$V_{out} \approx V_{zero} + V_{span} \times (\Delta P / FS)$$

PARAMETER	MIN	TYP	MAX
Zero output	–2 mV	±1 mV	2 mV
Span output	55 mV	85 mV	100 mV

ΔP = high-side – low-side pressure. Span varies part to part; calibrate each unit in the host.

Compensated vs. uncompensated

OPTION	CODE	TEMPERATURE BEHAVIOR
Temperature compensated	C	Compensated over –10 to 70 °C. Zero and span temperature coefficients 1.2% FS typical, 1.5% FS max (reference 30 °C).
No compensation	N	Raw bridge. Temperature coefficients are not specified; characterize and correct zero and span over temperature in the host electronics.

4-wire hookup — uncompensated (N)

WIRE	CONNECT TO
Red · +IN	Current source output (+)
Blue · -IN	Current source return / ground
Yellow · +OUT	Instrumentation amp / ADC (+) input
White · -OUT	Instrumentation amp / ADC (–) input

SIGNAL CONDITIONING NOTES

Read ±OUT differentially with a high-impedance instrumentation amplifier or a differential-input ADC. Keep output leads short and twisted, away from switching noise. The full-scale signal is only 55–100 mV, so offset and gain drift in the front end add directly to the error budget.

Mechanical dimensions – inches [mm]

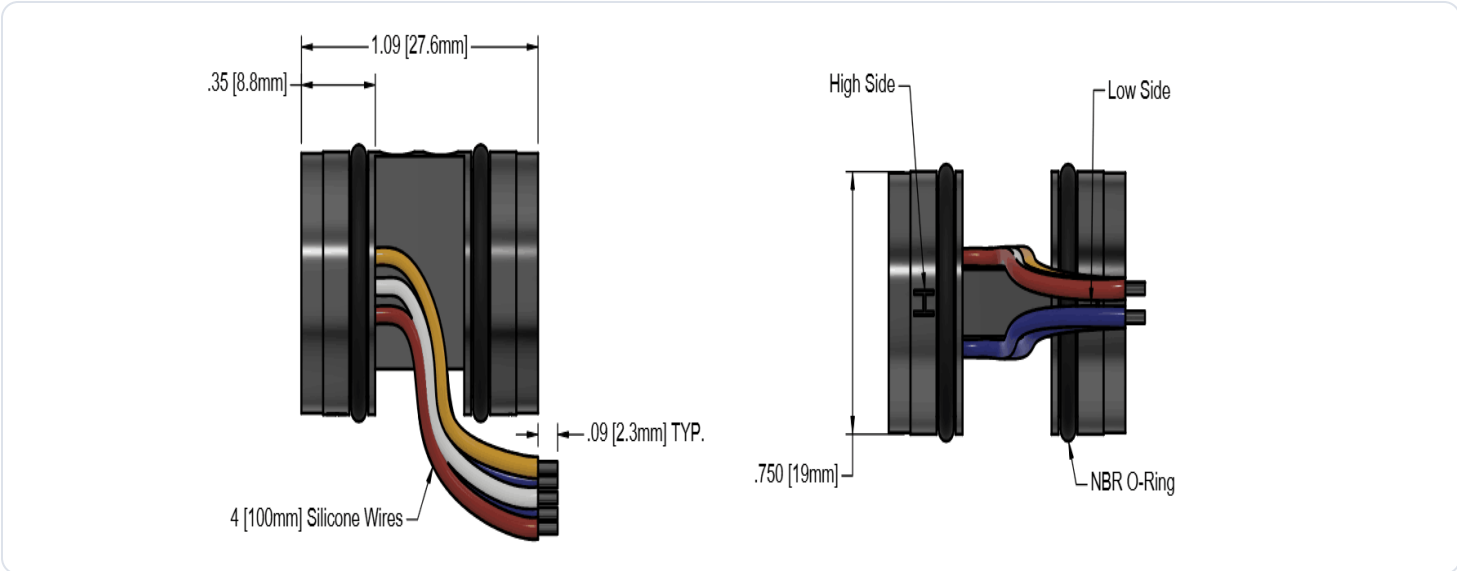


Fig. 2 – Outline, wire side and top views. Overall length 1.09 [27.6], body Ø.750 [19], end-to-seal .35 [8.8], wire strip .09 [2.3] typ. “H” marks the high side. Drawing PPS90 Series Rev A.

FEATURE	DETAIL
Housing & diaphragms	SS316L
Oil filling	Silicone oil
Seals	NBR O-ring (std) · FKM (option)
Electrical	4 × silicone wire, 4 in [100 mm]
Body	Ø 0.750 [19] × 1.09 [27.6]
O-ring OD	Ø 0.87 [22.1]

TOLERANCES (INCHES)

X ± 0.5 · X.X ± 0.15
X.XX ± 0.010 · X.XXX ± 0.005

Seal on the O-rings only – do not clamp or load the diaphragm faces.

Ordering information — part-number configuration

PPS90	—	100	D	4	1	C
MODEL		RANGE	TYPE	WIRES	EXCITATION	COMP.

RANGE CODE	RANGE	≈ KPA	OVERLOAD	BURST	FIELD	CODE
1.5	0–1.5 PSI	10	300% FS	600% FS	Model	PPS90
3	0–3 PSI	20	300% FS	600% FS	Pressure range	See range table
5	0–5 PSI	35	300% FS	600% FS	Pressure type	D = Differential
10	0–10 PSI	70	200% FS	600% FS	Electrical connection	4 = 4 wires
15	0–15 PSI	100	200% FS	500% FS	Excitation	1 = 1.5 mA
23	0–23 PSI	160	200% FS	500% FS	Compensation	N = None C = Temperature compensated
36	0–36 PSI	250	200% FS	500% FS	O-ring	NBR standard · FKM on request
58	0–58 PSI	400	200% FS	500% FS		
87	0–87 PSI	600	200% FS	500% FS		
145	0–145 PSI	1,000	200% FS	300% FS		
232	0–232 PSI	1,600	200% FS	300% FS		
350	0–350 PSI	2,400	150% FS	300% FS		

EXAMPLE PART NUMBERS

PPS90-15D41N → 0–15 PSI · differential · 4-wire · 1.5 mA excitation · no compensation

PPS90-145D41C → 0–145 PSI · differential · 4-wire · 1.5 mA excitation · temperature compensated

Configure your PPS90

REQUEST A QUOTE

Custom ranges, FKM seals, and lead lengths available for OEM volumes. Talk to an engineer sales@phoenixsensors.com
to spec your part. (480) 462-1810

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