

SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Pressure Sensors

Product Overview

Product Description

The MediaNugget™ (P31) absolute & gage pressure sensors are piezoresistive sensors without signal conditioning for low-cost OEM applications.

The MediaNugget™ family of micro-machined, absolute pressure sensors has optimum media isolation for use with both harsh and benign media.

These compact, robust sensors measure pressures from 15 PSI to 5,000 PSI and are well suited for a variety of low-cost OEM applications especially instrumentation and test & measurement.

Product Features

- **Pressure Ranges:** 15 PSI to 5,000 PSI
- **Temperature Range:** -40°C to 105°C
- **Compact, Robust Package:** All laser-welded stainless steel design for optimal media isolation in a compact size
- **Chemical Compatibilities:** Any gas or liquid compatible with 304L & 316L Stainless Steel. For example, Motor Oil, Diesel, Hydraulic fluid, brake fluid, water, waste water, Hydrogen, Nitrogen, and Air.
- **Typical Applications:** OEM applications for Test & Measurement and Instrumentation.
- **Standard and custom options (mechanical interconnects, pressure ranges, etc.) available for OEM quantities**
- **Excellent price/performance ratio.**



SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Pressure Sensors

Product Overview

MediaNugget™ Pressure sensors without signal conditioning for low-cost OEM applications (shown with and without Integral Harness)

Standard Full Scale Pressure Ranges

- **Gage:** 15, 50, 75, 100, 200, and 300 PSIG
- **Absolute:** 15, 50, 75, 100, 200, 300, 500, 750, 1000, 1500, 2000, 3000, and 5000 PSIA

SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Pressure Sensors

Product Overview

Measurement Technology

In general, pressure measurement technology translates force from an induced pressure into an electrical quantity. The MediaNugget™ family of pressure sensors use piezoresistive technology to measure pressure.

A micro-machined stainless steel convoluted diaphragm with a silicon crystal semiconductor sensing element is used. Strain gauges (resistive elements) in the silicon crystal are used in a Wheatstone Bridge circuit. When pressure is applied, the resistivity of the strain gauges changes proportional to the pressure applied.

One leg of the bridge measures the input pressures port. The other leg of the bridge is connected to the reference port the input pressure port is compared to. The connection to this reference port determines the pressure sensing convention used.

The MediaNugget™ family comes in a choice of two pressure sensing type conventions: absolute or gauge.

Absolute MediaNugget™ measure pressure relative to perfect Vacuum pressure (0 PSI) which remains unchanged regardless of temperature, location or other ambient conditions such as weather.

Gauge MediaNugget™ measure pressure relative to ambient room pressure through a port that is vented (open) to the atmosphere.

Packaging

MediaNugget™ is readily available in a large selection of standard packaging options. MediaNugget™ offers an integral harness with 6 standard lengths (6", 12", 18", 24", 36" and 72") and two standard readily available connectors (M12 and Mini DIN). The harness can be constructed of either PVC Jacketed 18 or 24 AWG Wire

In addition, SSI will work with the customer to meet their needs with custom options for large volumes orders. (I.e... special fittings & connectors; special pressure ranges; and operating temperature).



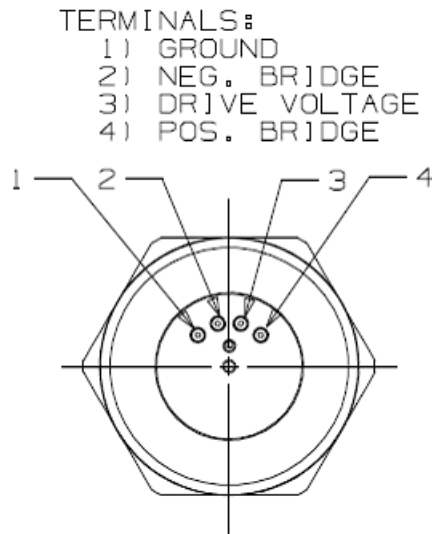
SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Pressure Sensors

Product Overview

Typical Connections

MediaNugget™ Pin connections:



The following torque limits should be used when mounting the MediaNugget™ pressure port.

Straight Thread w/O-Ring:	Recommended Torque
High Pressure (> 750 PSI)	300 in lb
All others with out Port types T, U, Y	150 in lb
Parts with Ports T,U, Y	120 in lb
NPTF Thread:	2 T.F.F.T. (Turns From Finger Tight)

MediaNugget™ Harness connections:

Wire Color	Signals
Black	Ground
Red	Vcc
White	Pos. Bridge
Green	Neg. Bridge



SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Sensors

Product Overview

15 and 50 PSI (Gauge & Absolute) MediaNugget™ Specifications

Parameter	Min	Typical	Max	Units
Bridge Resistance	4000	4700	5500	Ω
Sensitivity	400	500	600	μV/V/psi
TCR	-	2300	-	ppm/°C
TCS	-	-2100	-	ppm/°C
Offset	-5	2.0	5.5	mV/V
Offset Stability	-	-	20	μV/V
Repeatability	-	-	0.05	% of Span

Parameter	Min	Typical	Max	Units
Operating Temperature	-40	25	105	°C
Pressure Non-linearity	-	0	0.25	% Span
Pressure Hysteresis	-0.05	0	0.05	% Span
Proof Pressure	3X			FS Press.
Burst Pressure	10X (A) 3X (G)			FS Press. FS Press.
Response Time			1	ms

75,100 PSI (Absolute) and 75,100,200,300 PSI (Gauge) MediaNugget™ Specifications

Parameter	Min	Typical	Max	Units
Bridge Resistance	4000	4700	5500	Ω
Sensitivity	115	145	175	μV/V/psi
TCR	-	2300	-	ppm/°C
TCS	-	-2100	-	ppm/°C
Offset	-0.5	2.0	5.5	mV/V
Offset Stability	-	-	20	μV/V
Repeatability	-	-	0.05	% of Span

Parameter	Min	Typical	Max	Units
Operating Temperature	-40	25	105	°C
Pressure Non-linearity	-	0	0.25	% Span
Pressure Hysteresis	-0.05	0	0.05	% Span
Burst Pressure	10X (A) 3X (G)			FS Press. FS Press.
Response Time			1	ms

200, 300, 500, and 750 PSI (Absolute) MediaNugget™ Specifications

Parameter	Min	Typical	Max	Units
Bridge Resistance	4000	4700	6000	Ω
Sensitivity	60	70	80	μV/V/psi
TCR	-	2300	-	ppm/°C
TCS	-	-2100	-	ppm/°C
Offset	-0.5	2.0	5.5	mV/V
Offset Stability	-	-	20	μV/V
Repeatability	-	-	0.05	% of Span

Parameter	Min	Typical	Max	Units
Operating Temperature	-40	25	105	°C
Pressure Non-linearity	-	0	0.25	% Span
Pressure Hysteresis	-0.05	0	0.05	% Span
Proof Pressure	3X			FS Press.
Burst Pressure	10X			FS Press.
Response Time			1	ms

1000, 1500, 2000, 3000 and 5000 PSI (Absolute) MediaNugget™ Specifications

Parameter	Min	Typical	Max	Units
Bridge Resistance	4200	5000	5700	Ω
Sensitivity	10	12	14	μV/V/psi
TCR	-	2300	-	ppm/°C
TCS	-	-2100	-	ppm/°C
Offset	-5.5	2.0	9.5	mV/V
Offset Stability	-	-	20	μV/V
Repeatability	-	-	0.05	% of Span

Parameter	Min	Typical	Max	Units
Operating Temperature	-40	25	105	°C
Pressure Non-linearity	-	0	0.5	% Span
Pressure Hysteresis	-0.05	0	0.05	% Span
Proof Pressure	3X			FS Press.
Burst Pressure			15,000	Psia
Response Time			1	ms

- Unless otherwise noted all values are at 25°C

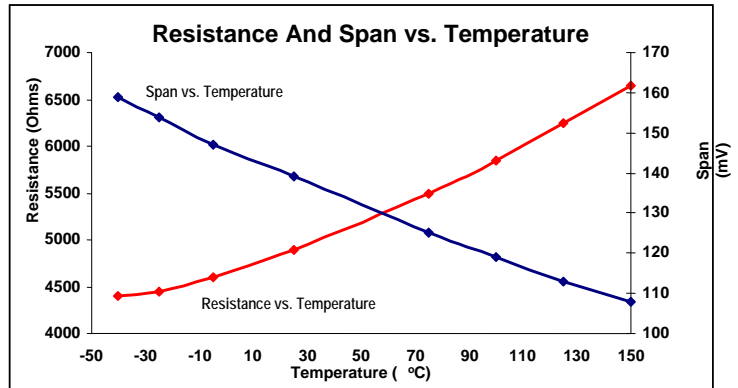
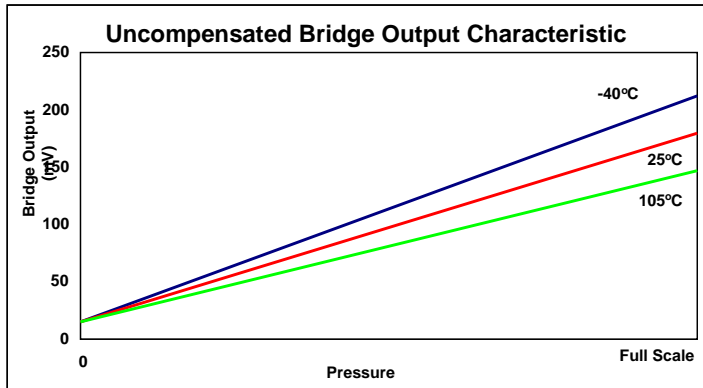


SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Sensors

Product Overview

Temperature Characteristics Performance Tables



Reliability and Environmental Performance

	Test Conditions	Value	Units
Wetted Materials	304L & 316L Stainless Steel	-	-
Pressure/Temperature Cycles ¹	0 to FS @ 8Hz; and -40°C to 105°C	>1.8x10 ⁶	Cycles
Thermal Shock	105°C to -40°C, 0.5 hr soak at Temp. (2s Transfer)	300	Cycles
Vibration	100 to 2000 Hz, 20g Sinusoidal, 3 Axes	144	Hours
Humidity	85°C and 90% to 95% R.H.	250	Hours
Weight	Model 31 with M12 x 1.5 6g 304L Stainless Port	≤ 47	grams

¹Pressure cycling performed at rated full scale pressure.

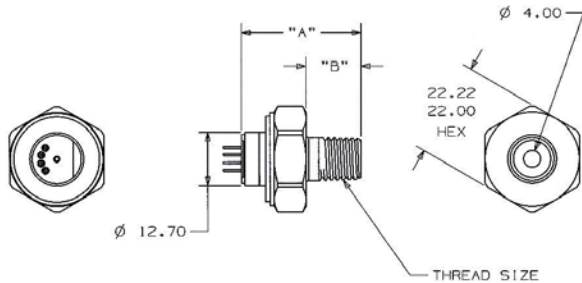


SSI Technologies – Application Note PS-AN1

MediaNugget™ Absolute Sensors

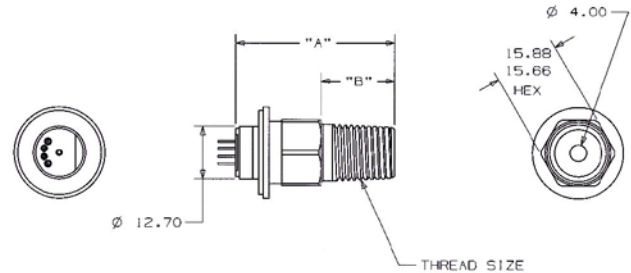
Product Overview

Standard Packaging Options



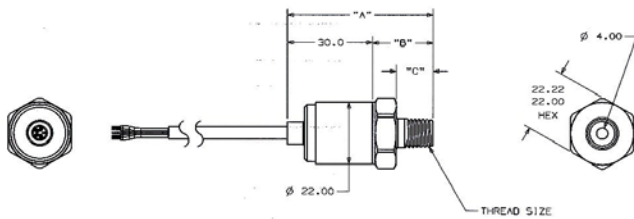
THREAD SIZE	LENGTH "A"	LENGTH "B"
1/4-18 NPT	33.3	18.0
1/8-27 NPT	28.3	13.0
M12-1.5 6g	26.3	11.0
7/16-20 UNF	26.3	11.0
3/8-24 UNF	24.8	9.5

Pins with 5/8" Hex



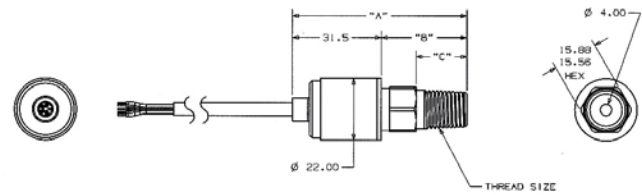
THREAD SIZE	LENGTH "A"	LENGTH "B"
1/4-18 NPT	36.8	18.0
1/8-27 NPT	33.8	13.0
M12-1.5 6g	31.8	11.0
7/16-20 UNF	31.8	11.0
3/8-24 UNF	30.3	9.5

Pins with 22mm Hex



THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	56.6	26.0	18.0
1/8-27 NPT	51.6	21.0	13.0
M12-1.5 6g	49.6	19.0	11.0
7/16-20 UNF	49.6	19.0	11.0
3/8-24 UNF	48.1	17.5	9.5

Integral Harness with 5/8" Hex



THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	62.0	30.5	18.0
1/8-27 NPT	57.0	25.5	13.0
M12-1.5 6g	55.0	23.5	11.0
7/16-20 UNF	55.0	23.5	11.0
3/8-24 UNF	53.5	22.0	9.5

Integral Harness with 22 mm Hex

Harness Construction: PVC Jacketed 24 AWG Wire



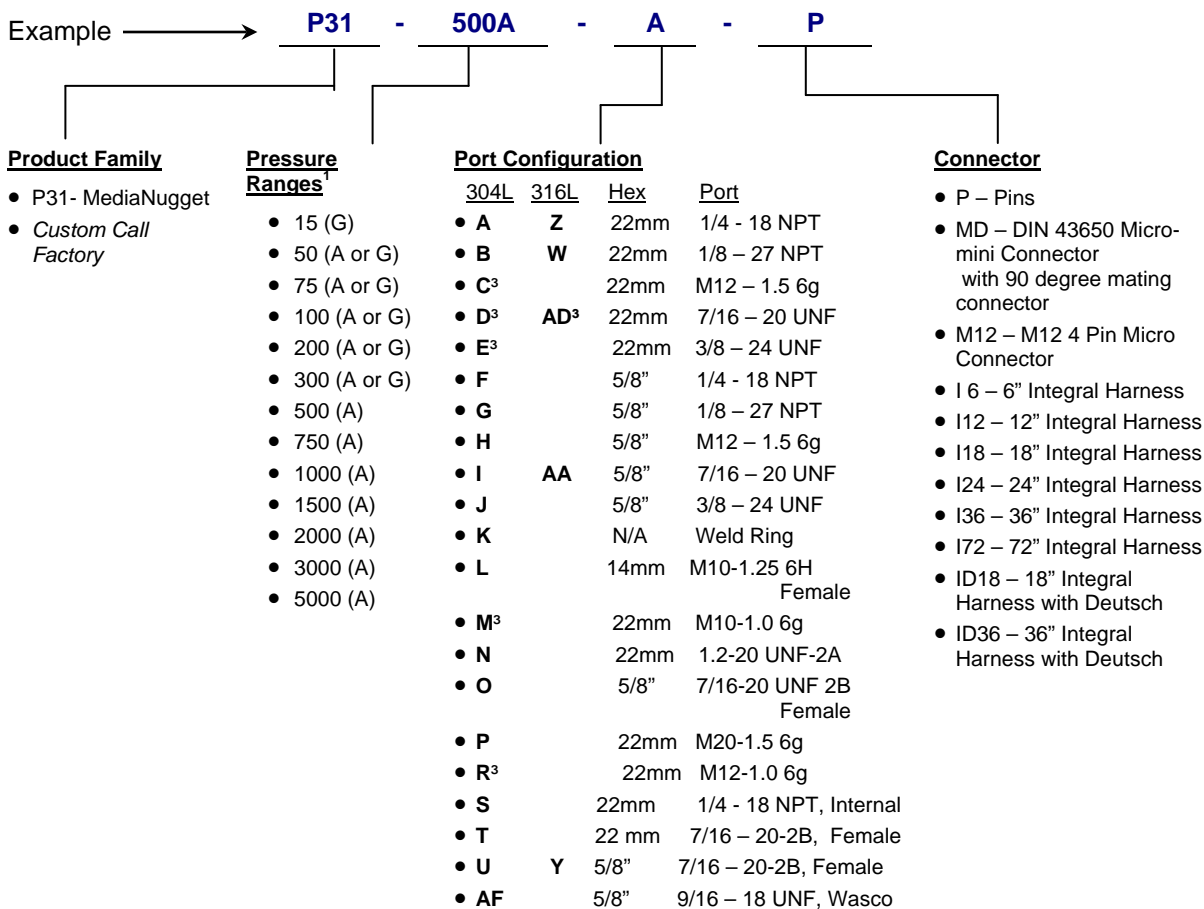
SSI Technologies – Application Note PS-AN1

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Product Overview

MediaNugget™ (P31) Pressure Sensor Ordering System

The following explains SSI's MediaNugget™ pressure sensor order number sequence.



Note: A designates Absolute and G designates Gage

