SSI Technologies – Application Note PS-AN17
MediaSensor™ P51 Series HS1
High Pressure Sealed Gage Pressure Sensors

Product Description

SSI Technologies Inc. offers the **MediaSensor™ Series HS1 Sealed Gage pressure sensors** targeted at industrial and commercial applications where high pressure, cost, compact size, robust packaging, chemical compatibility and performance are critical.

These MediaSensor™ P51 Series HS1 bulk micro-machined, Sealed Gage pressure sensors are designed to work at high pressure ranges (**5000 psi to 7500 psi**) with superior *accuracy.*

The MediaSensor™ P51 Series HS1 pressure sensor are cost competitive, compact, have robust packaging with a wide variety of fittings that work in both harsh and benign media. They are ideal for a variety of pressure measurement applications in the automotive, industrial and commercial industries. Three different electrical signal outputs are available for use by computers, digital panel meters, PLCs, chart recorders and other devices that can display, record or change the pressure in a closed loop system.

Product Features

- **Pressure Ranges:**
  - 5000 psia (34.5 MPa)
  - 6000 psia (41.4 MPa)
  - 7500 psia (51.7 MPa)
- **Superb Specifications:**
  - ***±1.0% zero pressure output error* at 22°C (room temperature)**
  - ***±1.0% Thermal error over -40° to 105°C***
- ***Maximum Flexibility:*** Custom ASIC provides signal conditioning for calibration and temperature compensation

MediaSensor™ High Pressure Sensors with integrated signal conditioning (shown with various ports and connectors)

- **Compact, Robust Package:** All laser-welded stainless steel design for optimal media isolation
- **Electrical Connectors:** Packard, Deutsch, MD-DIN, M12, Integral Harness
- **Electronics:**
  - 0.5 – 4.5 Volt output (5V input)
  - 0.5 – 4.5 Volt output with overvoltage Protection (5V input)
  - 1 – 5 Volt Output (8 – 30V input)
  - 4-20 mA (8 – 30V input)
- **Standard and Custom Options**

Call us at ***(888) 477-4320***
Or visit our
Web Site: ***http://ssitechnologies.com***

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Chemical Compatibilities: Any gas or liquid compatible with 304L & 316L stainless steel.

- **Refrigerant**
- **Motor Oil**
- **Diesel**
- **Hydraulic Fluid**
- **Brake Fluid**
- **Water**
- **Waste Water**
- **Hydrogen**
- **Nitrogen**
- **Air**

Typical Applications

- **Refrigeration**
- **Fuel Cells**
- **Pumps**
- **Hydraulics**
- **Compressors**
- **Robotics**
- **Pneumatics**
- **Agriculture**
- **Spraying Systems**
- **Process Control**
- **Flow**
- **Hydrogen Storage**

Typical Connections

The following torque limits are recommended when mounting the MediaSensor™ pressure port.

Straight Thread w/O-Ring:	**Recommended Torque**
SAE#4, SAE #6	300 in lb

NPT Thread:	**Recommended Torque**
1/8-27	Working: 100 in lb Maximum: 175 in lb
1/4-18	Working: 150 in lb Maximum: 300 in lb

MediaSensor™ Transmitter (4 -20mA) connections:

1) Connect the Power Lead (Red) to the + terminal of the supply voltage.
2) Connect the Return Lead (White) to the + terminal of the current measuring device or to a pull-down resistor (referenced to supply ground).
3) Pull-down resistor maximum voltage minus supply voltage should not be less than (6) volts.

MediaSensor™ Transducer

(Voltage Output) connections:

1) Connect the Power Lead (Red) to the + terminal of the supply voltage.
2) Connect the Ground Lead (Black) to supply ground
3) Connect the Vout Lead (White) to measuring equipment (referenced to supply ground).

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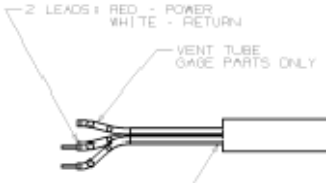
Packaging

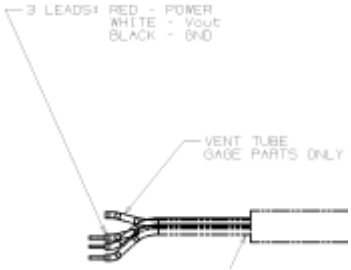
MediaSensor™ is readily available in a large selection of standard packaging options. MediaSensor™ offers an integral harness with 6 standard lengths and four standard readily available connectors (Packard, Deutsch, M12 and Mini DIN). In addition, SSI will work with the customer to meet their needs with custom options for large volumes orders. (I.e... special fittings & connectors; special pressure ranges; operating temperature; and increased accuracy).

Integral Harness (Standard lengths of 12”, 18”, 24”, 36” and 72”). The Harness can be constructed of PVC Jacketed 18 or 24 AWG Wire.



Wire Color
Red - Power
White - Return

Integral Harness Transmitter (4 to 20 mA)



Wire Color
Red - Power
White - Vout
Black - Ground

Integral Harness Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)

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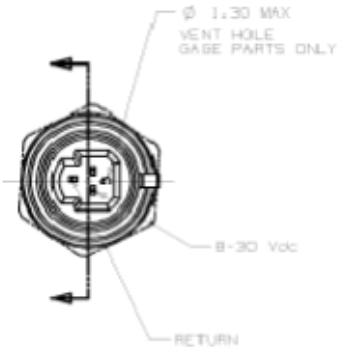
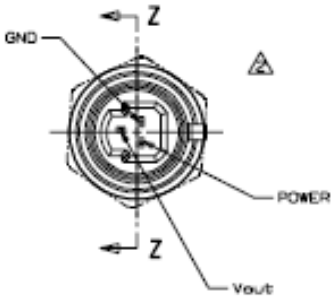
Standard Connector Options



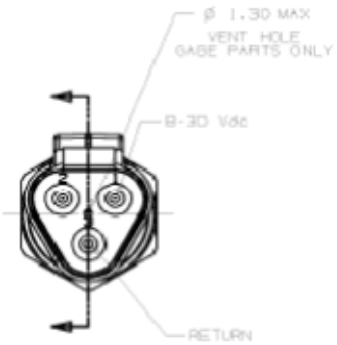
Pin 1 - Power
2 - Not Used
3 – Return

Packard Connector Transmitter (4 to 20 mA)



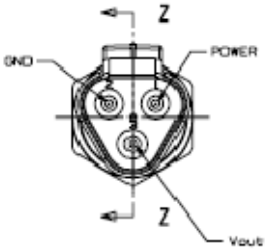
Pin 1 - Power
2 - Ground
3 - Vout

Packard Connector Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)



Pin 1 - Power
2 - Not Used
3 - Return

Deutsch Connector Transmitter (4 to 20 mA)



Pin 1 - Power
2 - Ground
3 - Vout

Deutsch Connector Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)

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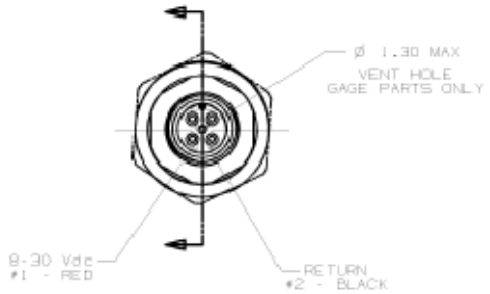
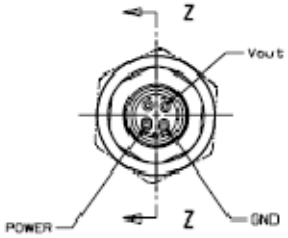


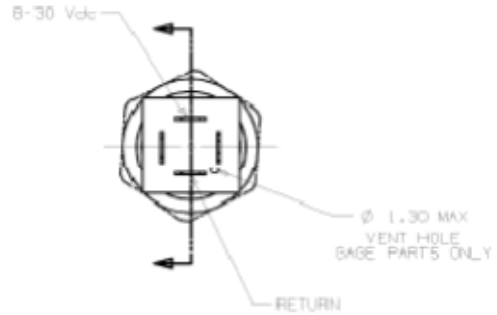
Pin 1 - Power
2 - Return
3 – Not Used
4 – Not Used

M12 Connector Transmitter (4 to 20 mA)



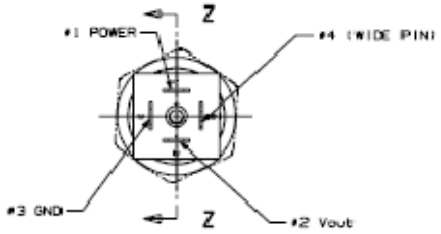
Pin 1 - Power
2 - Ground
3 – Vout
4 – Not Used

M12 Connector Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)



Pin 1 - Power
2 - Return
3 – Not Used
4 – Not Used

DIN 43650 Transmitter Connector



Pin 1 - Power
2 - Vout
3 – Ground
4 – Not Used

DIN 43650 Transducer Connector

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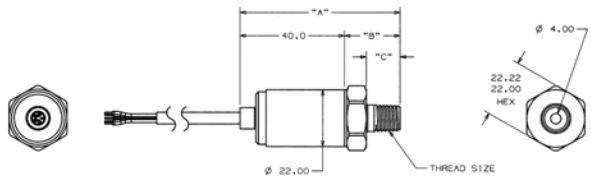
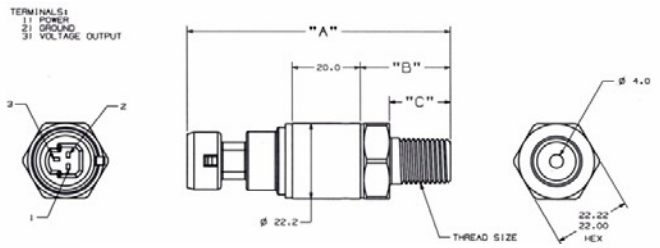
Standard Packaging Options



THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	66.6	26.0	18.0
1/8-27NPT	61.6	21.0	13.0
7/16-20UNF	59.6	19.0	11.0
9/19-18 UNF	59.6	19.0	11.0

Integral Harness with 22mm Hex



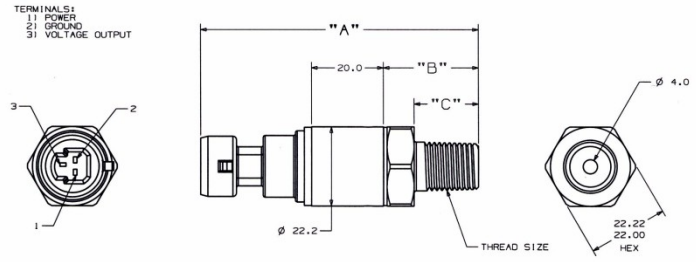
THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	70.0	26.0	18.0
1/8-27NPT	65.0	21.0	13.0
7/16-20UNF	63.0	19.0	11.0
9/19-18 UNF	63.0	19.0	11.0

Packard Connector with 22mm Hex

5 Vdc Input: 0.5 – 4.5 Vdc Ratio metric Output

Harness Construction: PVC Jacketed 24 AWG Wire

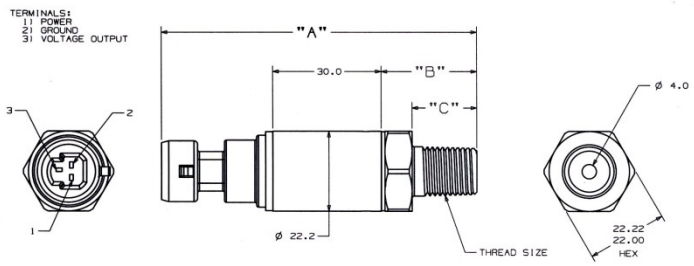
Mating Packard Connector P/N 12065287 and Mating Packard Terminal P/N 12103881



THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	70.0	26.0	18.0
1/8-27NPT	65.0	21.0	13.0
7/16-20UNF	63.0	19.0	11.0
9/19-18 UNF	63.0	19.0	11.0

Packard Connector with 22mm Hex

8 - 30 Vdc Input : 1 - 5 Vdc Output



THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	80.0	26.0	18.0
1/8-27NPT	75.0	21.0	13.0
7/16-20UNF	73.0	19.0	11.0
9/19-18 UNF	73.0	19.0	11.0

Packard Connector with 22mm Hex

8 - 30 Vdc Input : 4 - 20 mA Output

Mating Packard Connector P/N 12065287 and Mating Packard Terminal P/N 12103881

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Typical Performance Specifications (all values at 22°C unless noted otherwise)

Output Type	0.5 to 4.5 Volts	4 – 20 mA	1 – 5 Volts
Accuracy[1]	<± 1.0% FS	<± 1.0% FS	<± 1.0% FS
Thermal Error[6] (-40°C to 105°C)	<± 1.0% FS	<± 1.0% FS	<± 1.0% FS
Zero Pressure Offset[2]	0.50 V	4.0 mA	1.0 V
Full Scale Output[3]	4.5 V	20 mA	5.0 V
Operating Temperature	-40 to 105°C	-40 to 105°C	-40 to 105°C
Storage Temperature	-40 to 105°C	-40 to 105°C	-40 to 105°C
Proof Pressure	2 X FS	2 X FS	2 X FS
Burst Pressure	20,000 PSIA	20,000 PSIA	20,000 PSIA
Reverse Voltage Protection (±16V over 5 minutes)	(Optional)	Reverse	Reverse
Overvoltage Protection (optional)	Voltage Transient, Over-voltage	Voltage Transient	Voltage Transient

Electrical Specifications

Output Type	0.5 to 4.5 Volts	4 – 20 mA	1 – 5 Volts
Supply Voltage	5 +/- 0.5	8 to 30 Volts	8 to 30 Volts
Supply Current	< 3 mA	Not Applicable	< 5 mA
Output Current	0.45mA Max (Sink or Source)	Not Applicable	0.45mA Max (Sink or Source)
Response Time	< 1 ms	< 1 ms	< 1ms

Reliability and Environmental Performance

	Test Conditions	Value	Units
Pressure/Temperature Cycles[4]	0 to 3000psi @ 7Hz at -40°C to +105°C	>6 million	Cycles
Thermal Shock	–40°C to +105°C, 0.5 hr soaks at Temp. (2s Transfer)	300	Cycles
Vibration at Temperature	100 to 2000 Hz, 20g Sinusoidal, 3 Axes, simultaneous cycling –40°C to +105°C,	144	Hours
EMC Compatibility[5]	EN 61000-4-3	10	Volts/meter
Mechanical Shock	½ Sine duration 0.011s, velocity 11.3ft/sec	50	g-pk
ESD	EN61000-4-2	8	KV
Humidity	85°C at 85% R. H.	250	Hours
Weight	Model 51 with A Port M12 Connector	≤85	Grams

[1]Includes hysteresis, repeatability, & non-linearity (BFSL)

[2]Transducer output @ 0 PSIA or 0 PSIS (consult factory for other options)

[3]Sealed Transducer output @ Pressure Range + 14.5 PSIA

[4]Performed at -40°C to +105°C.

[5]Higher levels of EMC Compatibility are available upon request.

[6] Additional over temperature

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MediaSensor™ Series HS1 High Pressure Sensor Ordering System

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

Example → **P51 - 5000S(1) - A - P - 4.5V**

Product Family

- P51- MediaSensor

Pressure Ranges[1]

- 5000 S
- 6000 S
- 7500 S

Custom calibrations upon request

Port Configuration

304L	316L	Hex	Port
A	**Z**	22mm	1/4 - 18 NPT
B	**W**	22mm	1/8 – 27 NPT
-	**AA**	5/8"	7/16-20 UNF-2A (SAE J514 #4)
-	**AJ**	5/8"	9/16-18 UNF-2A (SAE J514 #6)
-	**AK**	5/8"	9/16-18 UNF-2A (SAE J514 #6) Snubber

Connector

- D - Deutsch
- P – Packard
- MD – DIN 43650 Micro-mini Connector with 90 degree mating connector
- M12 – M12 4 Pin Micro Connector
- I12 – 12" Integral Harness
- I18 – 18" Integral Harness
- I24 – 24" Integral Harness
- I36 – 36" Integral Harness
- I72 – 72" Integral Harness
- ID18 – 18" Integral Harness with Deutsch
- ID36 – 36" Integral Harness with Deutsch

Output Options[2]

- 4.5V – 0.5 to 4.5V (5V input only)
- 5V – 1 to 5V (8 to 30V input only)
- 20mA – 4 to 20mA (8 to 30V input only)

Notes: 1) (A) designates Absolute Pressure (S) designates Sealed Gage

2) Calibration of the transducer is as follows:

a. Absolute Transducers are calibrated to have the 0.5 Vdc, 1 Vdc, or 4 mA respectively at 0 PSIA

To place an order or to view our other pressure sensors, please see our website http://www.ssitechnologies.com for a listing of our distribution partners and Regional Sales Managers

For custom orders or specifications not listed, call SSI toll-free at **1- 888- 477- 4320**

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