

SSI Technologies – Application Note PS-AN10

MediaSensor™ P51 Series LG

Low Pressure Gage Pressure Sensors

Product Description *RoHS*

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

These MediaSensor™ P51 Series LG bulk micro-machined, gage pressure sensors are designed to work at low pressure ranges (**15 psi to 300 psi**) with superior *accuracy*.

The MediaSensor™ P51 Series LG 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. Four 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.



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

Product Features

- **Pressure Ranges:**
 - 15 psig (103 kPa),
 - 50 psig (345 kPa)
 - 75 psig (517 kPa)
 - 100 psig (689 kPa)
 - 200 psig (1380 kPa)
 - 300 psig (2070 kPa)
- **Superb Accuracy:**
 - $\pm 0.5\%$ overall full scale at room temperature
 - $\pm 1\%$ overall full scale over -40°C to 105°C for 75 PSI to 200 PSI.
 - includes Repeatability, Hysteresis and Linearity
- **Compact, Robust Package:** All laser-welded stainless steel design for optimal media isolation
- **Maximum Flexibility:** Custom ASIC provides signal conditioning for calibration and temperature compensation
- **Electrical Connectors:** Packard, Deutsch, MD-DIN, M12, Integral Harness
- **Electronics:**
 - 0.5 – 4.5 Volt output (with 5V input)
 - 0.5 – 4.5 Volt output with overvoltage protection (with 5V input)
 - 1 – 5 Volt Output (with 8 – 30V input)
 - 4-20 mA (with 8 – 30V input)

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

- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ Refrigerant ▪ Motor Oil ▪ Diesel ▪ Hydraulic Fluid ▪ Brake Fluid | <ul style="list-style-type: none"> ▪ Water ▪ Waste Water ▪ Hydrogen ▪ Nitrogen ▪ Air |
|--|---|

Typical Applications

- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ Refrigeration ▪ Fuel Cells ▪ Pumps ▪ Hydraulics ▪ Compressors ▪ Robotics | <ul style="list-style-type: none"> ▪ Pneumatics ▪ Agriculture ▪ Spraying Systems ▪ Process Control ▪ Flow ▪ Hydrogen Storage |
|---|--|

Typical Connections

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

Straight Thread w/O-Ring:	Recommended Torque
All others with out Port types T, U, Y	150 in lb
Parts with Ports T,U, Y	120 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
- 3) Connect the – terminal of the current measuring device to the – terminal of the supply voltage

MediaSensor™ Transducer (Voltage Output) connections:

- 1) Connect the Power Lead (Red) to the + terminal of the supply voltage.
- 2) Connect the Ground Lead (Black) and the – terminal of the supply voltage to – input of your voltage measurement equipment.
- 3) Connect the Vout Lead (White) to the + input of your voltage measurement equipment.

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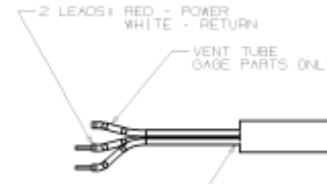
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Packaging

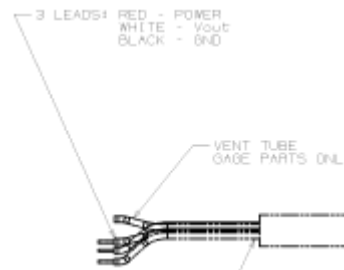
MediaSensor™ is readily available in a large selection of standard packaging options. MediaSensor™ offers an integral harness with 6 standard lengths and four standard readily available connectors (Packard, Deutsch, M12 and Mini DIN). In addition, SSI will work with the customer to meet their needs with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

Integral Harness (Standard lengths of 6”, 12”, 18”, 24”, 36” and 72”). The Harness can be constructed of either 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

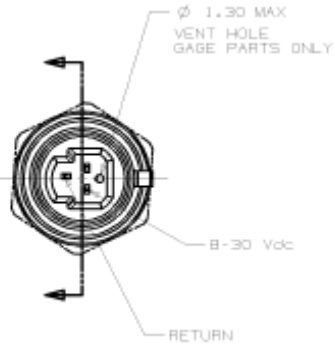
Integral Harness Transducer(1 to 5 Vdc or 0.5 to 4.5Vdc)

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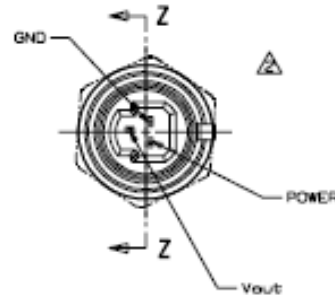
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Standard Connector Options

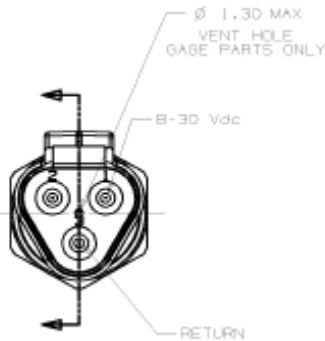


- Pin 1 - Power
- 2 - Not Used
- 3 - Return



- Pin 1 - Power
- 2 - Ground
- 3 - Vout

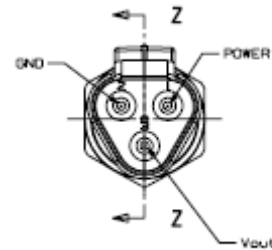
Packard Connector Transmitter (4 to 20 mA)



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

Deutsch Connector Transmitter (4 to 20 mA)

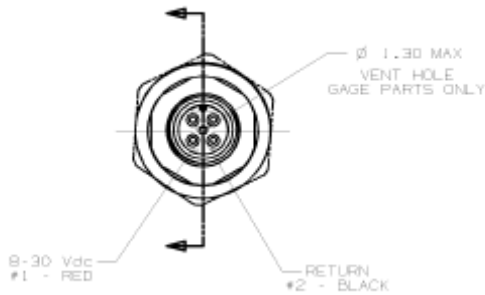
Packard Connector Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)



- Pin 1 - Power
- 2 - Ground
- 3 - Vout

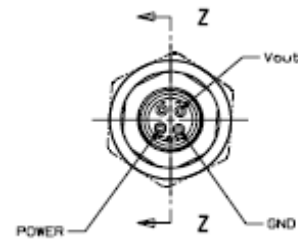
Deutsch Connector Transducer (1 to 5 Vdc or 0.5 to 4.5Vdc)

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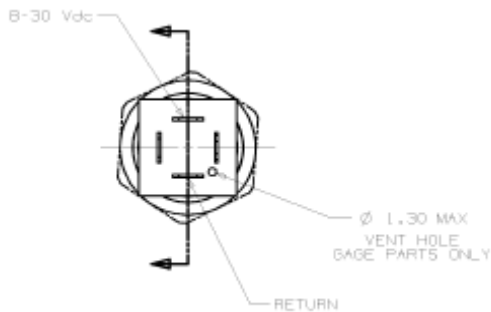
- Pin 1 - Power
- 2 - Return
- 3 - Not Used
- 4 - Not Used

M12 Connector Transmitter (4 to 20 mA)



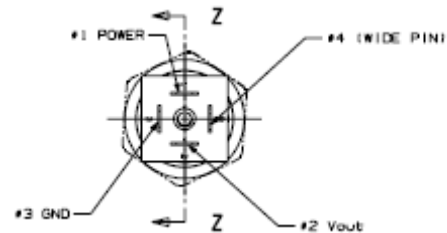
- Pin 1 - Power
- 2 - Ground
- 3 - Vout
- 4 - Not Used

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

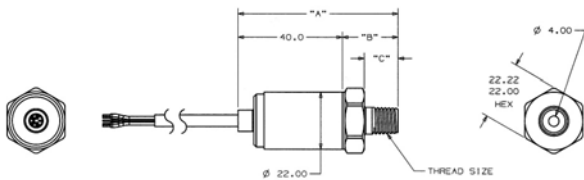


- Pin 1 - Power
- 2 - Vout
- 3 - Ground
- 4 - Not Used

DIN 43650 Transducer Connector

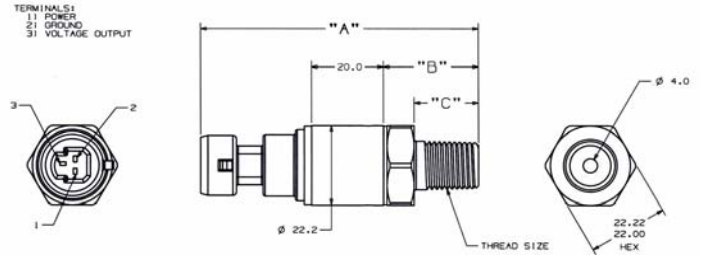
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Standard Packaging Options



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
3/8-24 UNF	58.1	17.5	9.5

Integral Harness with 22mm Hex

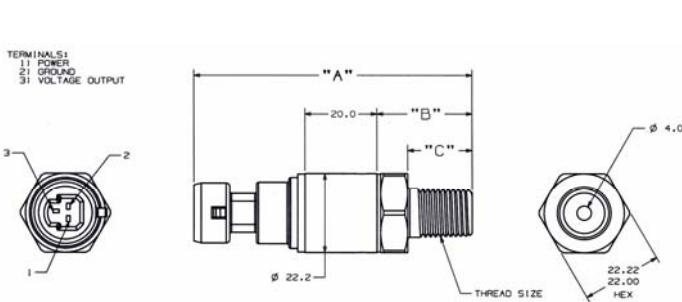


THREAD SIZE	LENGTH "A"	LENGTH "B"	LENGTH "C"
1/4-18 NPT	70.0	26.0	18.0
1/8-27NPT	65.0	21.0	13.0
7/16-20UNF	63.0	19.0	11.0
9/19-18 UNF	63.0	19.0	11.0
3/8-24 UNF	61.5	17.5	9.5

Packard Connector with 22mm Hex
5 Vdc Input: 0.5 – 4.5 Vdc Ratiometric Output

Harness Construction: PVC Jacketed 24 AWG Wire

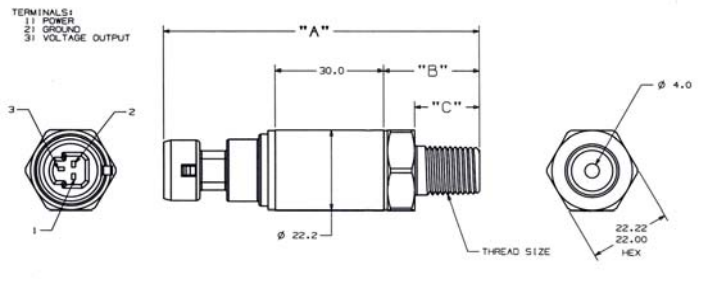
Mating Packard Connector P/N 12065287 and Mating Packard Terminal P/N 12103881



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
3/8-24 UNF	61.5	17.5	9.5

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
3/8-24 UNF	71.5	17.5	9.5

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 (75 PSI TO 300 PSI)	<± 0.50% FS	<± 0.50% FS	<± 0.50% FS
Thermal Error ⁶ (-40°C to 105°C)	<± 0.50% FS	<± 0.50% FS	<± 0.50% FS
Accuracy ¹ (15 PSI TO 60 PSI)	<± 1.00% FS	<± 1.00% FS	<± 1.00% FS
Thermal Error ⁶ (-40°C to 105°C)	<± 1.00% FS	<± 1.00% FS	<± 1.00% 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	3 X FS	3 X FS	3 X FS
Burst Pressure	3 X FS	3 X FS	3 X FS
<i>Gage Pressure Transducers</i>			
Reverse Voltage Protection (+/- 16V over 5 minutes)	N/A	Reverse	Reverse
Overvoltage Protection Option (+/- 16V over 5 minutes)	Available	N/A	N/A

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	< 6 mA	Not Applicable	< 3 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 FS @ 8Hz; and -40°C to 105°C	>1.8x10 ⁶	Cycles
Thermal Shock	105°C to -40°C, 0.5 hr soaks at Temp. (2s Transfer)	300	Cycles
Vibration	100 to 2000 Hz, 20g Sinusoidal, 3 Axes	144	Hours
EMC Compatibility ⁵	10 Volts/meter per EN 61000-4-3		
Humidity	85°C and 90% to 95% R. H.	250	Hours
Weight	Model 51 with M12 x 1.5 6g 304L Stainless Port	≤85	Grams

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

²Transducer output @ 0 PSIA, 0 PSIG, or 0 PSIS (consult factory for other options)

³Sealed Transducer output @ Pressure Range + 14.5 PSIA

⁴Pressure cycling performed at rated full scale pressure.

⁵Higher levels of EMC Compatibility are available upon request.

⁶Additional over temperature

MediaSensor™ Series LG Pressure Sensor Ordering System

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

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Example → **P51 - 50G - A - P - 4.5V**

<u>Product Family</u>	<u>Pressure Ranges¹</u>	<u>Port Configuration</u>				<u>Connector</u>	<u>Output Options²</u>
		<u>304L</u>	<u>316L</u>	<u>Hex</u>	<u>Port</u>		
• P51- MediaSensor	• 15 G	• A	Z	22mm	1/4 - 18 NPT	• D - Deutsch	• 4.5V – 0.5 to 4.5V (5V input only)
• Custom Call Factory	• 50 G	• B	W	22mm	1/8 – 27 NPT	• P – Packard	
	• 75 G	• C ³		22mm	M12 – 1.5 6g	• MD – DIN 43650 Micro-mini Connector with 90 degree mating connector	• 4.50V – 0.5 to 4.5V includes Overvoltage Protection Option (5V input only)
	• 100 G	• D ³	AD ³	22mm	7/16 – 20 UNF	• M12 – M12 4 Pin Micro Connector	
	• 200 G	• E ³		22mm	3/8 – 24 UNF	• I 6 – 6” Integral Harness	• 5V – 1 to 5V (8 to 30V input only)
	• 300 G	• F		5/8”	1/4 - 18 NPT	• I12 – 12” Integral Harness	
		• G		5/8”	1/8 – 27 NPT	• I18 – 18” Integral Harness	
		• H		5/8”	M12 – 1.5 6g	• I24 – 24” Integral Harness	
		• I	AA	5/8”	7/16 – 20 UNF	• I36 – 36” Integral Harness	
		• J		5/8”	3/8 – 24 UNF	• I72 – 72” Integral Harness	
		• K		N/A	Weld Ring	• ID18 – 18” Integral Harness with Deutsch	
		• L		14mm	M10-1.25 6H Female	• ID36 – 36” Integral Harness with Deutsch	
		• M ³		22mm	M10-1.0 6g		
		• N		22mm	1.2-20 UNF-2A		
		• O		5/8”	7/16-20 UNF 2B Female		
		• P		22mm	M20-1.5 6g		
		• R ³		22mm	M12-1.0 6g		
		• S		22mm	1/4 - 18 NPT, Internal		
		• T		22 mm	7/16 – 20-2B, Female		
		• U	Y	5/8”	7/16 – 20-2B, Female		
		• AF		5/8”	9/16 – 18 UNF, Wasco		

- Notes:**
- 1) G designates Gage Pressure
 - 2) Calibration of the transducer is as follows:
 - a. Gage Transducers are calibrated to have 0.5 Vdc, 1 Vdc, or 4 mA respectively at 0 PSIG
 - 3) These ports are not available with pressure sensors with the 50 PSI or below pressure ranges.