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Ω OMEGA<sup>®</sup>

## PX140 Series Pressure Transducers

INSTRUCTION  
SHEET

M0258/1105



The OMEGA<sup>®</sup> PX140 Series pressure transducers are solid state piezoresistive devices ideally suited to applications requiring exact measurement of pressure where the benefits of repeatability, low hysteresis, and long term stability are important. The PX140 series offers state-of-the-art benefits of a hybrid IC device, including compactness, ruggedness and reliability. Computer controlled laser trimming provides close control of important transducer parameters at a lower total cost and higher performance than can be achieved with discrete circuitry. Circuitry to provide temperature compensation is an integral part of the device and is optimized on each unit as part of the calibration procedure. Null and full scale output are similarly controlled. No adjustment or recalibration by the user is required.

Three types of PX140 pressure transducers are available to measure positive pressures. Differential and gage pressure types measure pressure over five ranges (0-1, 0-2, 0-5, 0-15, and 0-30 psi). For vacuum measurement three negative gage pressure ranges are available (-1 to 0, -5 to 0, and -15 to 0 psi) Absolute types are available in two ranges (0-15, 0-30, psi).

Two types are available to measure both positive and negative pressures. Differential and gage types measure in four ranges  $\pm 1.0$ ,  $\pm 2.5$ ,  $\pm 5.0$ ,  $\pm 15$  psi).

PX140 pressure transducers

perform in industrial, consumer, military, medical and automotive environments. The heart of each device is a 0.100" square silicon sensor chip.

The sensing diaphragm with implanted resistors is an integral part of the chip. Pressure applied on the diaphragm causes it to flex and the resistance to change, resulting in an output voltage proportional to pressure. Because of the unique construction, this output is very predictable, providing an ideal sensor element for OMEGA pressure transducers.

The circuitry is contained in a thermoplastic housing. The .010" x .020" printed circuit board terminals exit on opposite side from the ports.

### SOLDERING

Limit soldering to 315°C (600°F) maximum, with 10 seconds maximum duration.

### CLEANING

Select proper cleaning fluids, based on contaminants to be removed. OMEGA recommends alcohols or fluorinated solvents.

### WARNING! READ BEFORE INSTALLATION

Fluid hammer and surges can destroy any pressure transducer and must always be avoided. A pressure snubber should be installed to eliminate the damaging hammer effects.

Fluid hammer occurs when a liquid flow is suddenly stopped, as with quick closing solenoid valves. Surges occur when flow is suddenly begun, as when a pump is turned on at full power or a valve is quickly opened.

Liquid surges are particularly damaging to pressure transducers if the pipe is originally empty. To avoid damaging surges, fluid lines should remain full (if possible), pumps should be brought up to power slowly, and valves opened slowly. To avoid damage from both fluid hammer and surges, a surge chamber should be installed, and a pressure snubber should be installed on every transducer.

Symptoms of fluid hammer and surge's damaging effects:

- Pressure transducer exhibits an output at zero pressure (large zero offset). If zero offset is less than 10% FS, user can usually re-zero meter, install proper snubber and continue monitoring pressures.
- Pressure transducer output remains constant regardless of pressure.
- In severe cases, there will be no output.

# Pressure Sensors

## Absolute Differential, Gage, Vacuum Gage / Amplified

PX 140 Series

### PX140 SERIES ORDER GUIDE, VACUUM GAGE TYPE

Model Number	Pressure Range psi	Shift Null, Sensitivity Combined**				Sensitivity V/psi	Overpressure psi Max.	Linearity, B.F.S.L.		Repeatability & Hysteresis % Span Typ.	
		25 to 5° 25 to 45°C		25 to -18° 25 to +63°C	25 to -40° 25 to 85°C			P2 > P1	P2 < P1		
		% Span						Max.	Max.		
		Typ.	Max.	Max.	Max.						
PX141-001D5V	0- -1	-	+1.50	-	-	5.000	20	-	±0.75	±0.30	
PX141-005V5V	0- -5	±0.50	-	±1.00	±2.00	1.000	20	-	±0.75	±0.25	
PX141-015V5V	0- -15	±0.50	-	±1.00	±2.00	0.333	45	-	±0.40	±0.15	

### PX140 SERIES ORDER GUIDE, GAGE TYPE (FOR REFERENCE ONLY)

Model Number	Pressure Range psi	Shift Null, Sensitivity Combined**				Sensitivity V/psi	Overpressure psi Max.	Linearity, B.F.S.L.		Repeatability & Hysteresis % Span Typ.	
		25 to 5° 25 to 45°C		25 to -18° 25 to +63°C	25 to -40° 25 to 85°C			P2 > P1	P2 < P1		
		% Span						Max.	Max.		
		Typ.	Max.	Max.	Max.						
PX142-001G5V	0-1	-	±1.50	-	-	5.000	20	±0.75	—	+0.30	
PX142-002G5V	0-2	-	±1.50	-	-	2.500	20	±0.75	—	±0.30	
PX142-005G5V	0-5	±0.50	-	±1.00	±2.00	1.000	20	±1.50	—	±0.25	
PX142-015G5V	0-15	±0.50	-	±1.00	±2.00	0.333	45	±0.75	—	±0.15	
PX142-030G5V	0-30	±0.50	-	±1.00	±2.00	0.167	60	±0.75	—	±0.15	
PX143-01BG5V	±2.5	-	-	±1.00	±1.50	1.000	20	±0.75	—	±0.25	
PX143-05BG5V	±5	-	-	±1.00	±1.50	0.500	30	±0.75	—	±0.15	
PX143-15BG5V	±15	-	-	±1.00	±1.50	0.177	50	±0.75	—	±0.15	

### PX140 SERIES ORDER GUIDE, DIFFERENTIAL TYPE

Model Number	Pressure Range psi	Shift Null, Sensitivity Combined**				Sensitivity V/psi	Overpressure psi Max.	Linearity, B.F.S.L.		Repeatability & Hysteresis % Span Typ.	
		25 to 5° 25 to 45°C		25 to -18° 25 to +63°C	25 to -40° 25 to 85°C			P2 > P1	P2 < P1		
		% Span						Max.	Max.		
		Typ.	Max.	Max.	Max.						
PX142-001D5V	0-1	-	±1.50	-	-	5.000	20	±0.75	±0.40	+0.30	
PX142-002D5V	0-2	-	±1.50	-	-	2.500	20	±0.75	±0.40	±0.30	
PX142-005D5V	0-5	±0.50	-	±1.00	±2.00	1.000	20	±1.50	±0.75	±0.25	
PX142-015D5V	0-15	±0.50	-	±1.00	±2.00	0.333	45	±0.75	±0.40	±0.15	
PX142-030D5V	0-30	±0.50	-	±1.00	±2.00	0.167	60	±0.75	±0.40	±0.15	
PX143-2.5BD5V	±2.5	-	-	±1.00	±1.50	1.000	20	±0.75	±0.40	±0.25	
PX143-05BD5V	±5	-	-	±1.00	±1.50	0.500	30	±0.75	±0.40	±0.15	
PX143-15BD5V	±15	-	-	±1.00	±1.50	0.177	50	±0.75	±0.40	±0.15	

### PX140 SERIES ORDER GUIDE, ABSOLUTE TYPE\*

Model Number	Pressure Range psi	Shift Null, Sensitivity Combined**				Sensitivity V/psi	Overpressure psi Max.	Linearity, B.F.S.L.		Repeatability & Hysteresis % Span Typ.	
		25 to 5° 25 to 45°C		25 to -18° 25 to +63°C	25 to -40° 25 to 85°C			P2 > P1	P2 < P1		
		% Span						Max.	Max.		
		Typ.	Max.	Max.	Max.						
PX142-015A5V	0-15	±0.50	-	±1.00	±2.00	0.333	45	-	+0.40	+0.15	
PX142-030A5V	0-30	±0.50	-	±1.00	±2.00	0.167	60	-	±0.40	±0.15	

\*Tested at 2 psia reference.

\*\*% Span specification applies to each shift independently. (Null, sensitivity, or combined).

# Pressure Sensors

## Absolute Differential, Gage, Vacuum Gage / Amplified

PX 140 Series



### FEATURES

- PCB terminals on opposite side from the ports.
- Fully signal conditioned

### PX140 SERIES PERFORMANCE CHARACTERISTICS at 8.0 ±0.01 VDC Excitation, 25°C

	Min.	Typ.	Max.	Units
Excitation	7.00	8.00	16.0	VDC
Supply Current	–	8.00	20.0	mA
Current Sourcing Output	–	–	10	mA
Null Offset (141/142PC)	0.95	1.00	1.05	V
Null Offset (143PC)*	3.45	3.50	3.55	V
Null Offset				
142PC15A @ 2 psia	1.62	1.67	1.72	V
142PC30A @ 2 psia	1.28	1.33	1.38	V
Output at Full Pressure	5.90	6.00	6.10	V
Span† (141 /142PC)	4.95	5.00	5.05	V
Span† (143PC)*	–	5.00	–	V
Span				
142PC15A (2 to 15 psia)	4.28	4.33	4.48	V
142PC30A (2 to 30 psia)	4.62	4.67	4.72	V
Ratiometricity Error				
7 to 8V or 8 to 9V	–	±0.50	–	% Span
9 to 12V	–	±2.00	–	
Stability over One Year	–	±0.50	–	% Span
Response Time	–	–	1.00	msec
Common Mode Pressure**	–	–	40	psi
Weight	–	28	–	grams
Short Circuit Protection	Output may be shorted indefinitely to ground			
Output Ripple	None, DC device			
Ground Reference	Supply and output are common			

\* Positive and negative pressure measurement.

\*\* Higher common mode pressures possible if sensor is not used over entire operating temperature range.

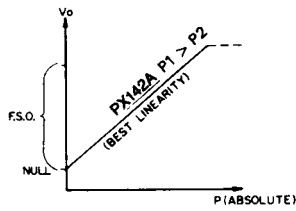
† Span is defined as the algebraic difference between end points. Please note: actual output is 1V to 6V (at 8.00 ±0.01 VDC). Span is then 5V.

### ENVIRONMENTAL SPECIFICATIONS

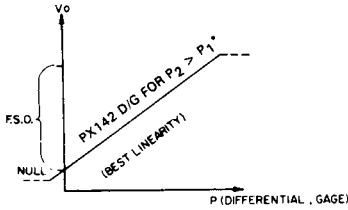
Operating Temperature	–40° to +85°C (–40° to +185°F)
Storage Temperature	–55° to +125°C (–67° to +257°F)
Compensated Temperature	–18° to +63°C (0° to +145°F)
Shock	MIL-STD-202, Method 213 (50g, half sine, 6 msec)
Vibration	MIL-STD-202, Method 204 (10 to 2000 Hz at 10g)
Media	P2 port Wetted materials; polyester housing, epoxy adhesive, silicon, borosilicate glass, and silicon-to-glass bond *
	P1 port Dry gases only

\*Liquid media containing some highly ionic solutions could potentially neutralize the chip-to-glass tube bond.

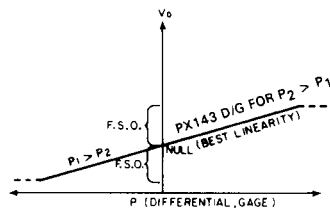
**PRESSURE REFERENCE**  
**Absolute**



**Differential, Gage Types (+)**

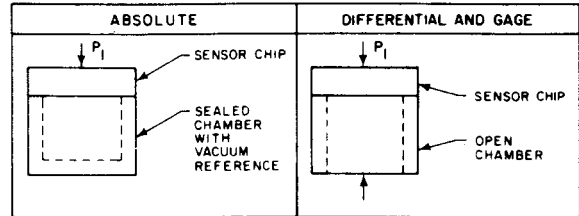


**Differential, Gage Types (+)**

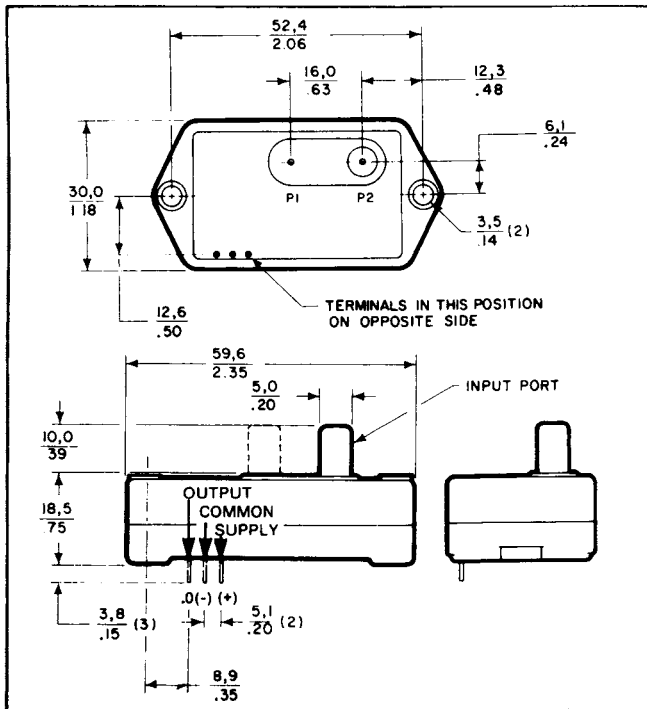


**ABSOLUTE, DIFFERENTIAL AND GAGE TYPES**

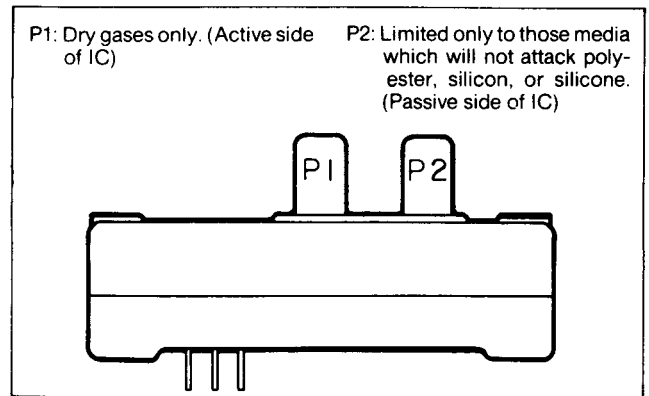
In absolute devices, P2 is sealed with a vacuum providing a fixed reference. The difference in pressure between the vacuum reference and the measurand applied to P1 causes the diaphragm to deflect, providing the output voltage change. Gage and differential devices measure one pressure with respect to another. In differential devices, measurands are applied to both ports. In gage devices, P1 is vented to atmospheric pressure and the measurand is applied to P2.



**MOUNTING DIMENSIONS (for reference only)**

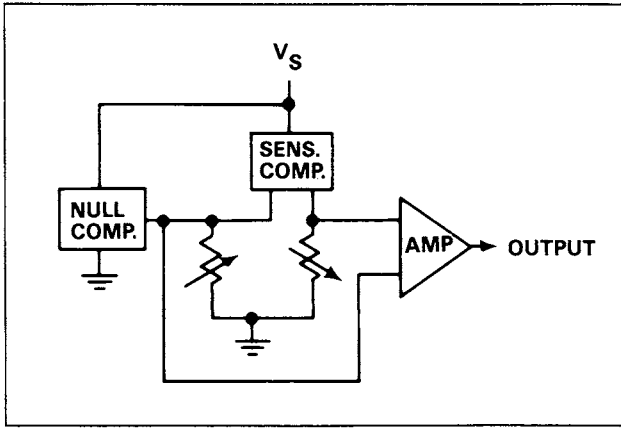


**MEASURE COMPATIBILITY**

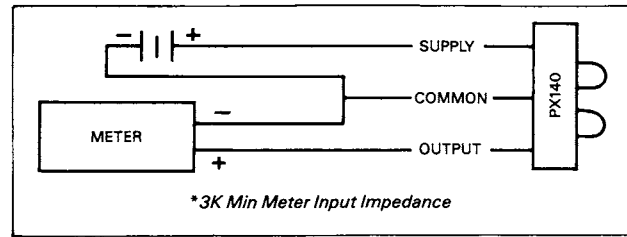


Type	Measure Applied to Port
Absolute (A)	P1 only
Differential (D)	P1 and P2
Gage (G)	P2 only

## ELECTRICAL BLOCK DIAGRAM



## ELECTRICAL CONNECTIONS



### **WARNING**

Damage may result from reversal of supply and ground connections.

## NOTES

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**WARRANTY/DISCLAIMER**

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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**RETURN REQUESTS / INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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