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PX161, PX162, PX163, PX164

Pressure Transducers

INSTRUCTION SHEET

M0260/0902

Signal conditioned pressure sensors are solid state piezoresistive devices. They are ideally suited to applications requiring exact measurement of pressure where the benefits of repeatability low hysteresis, and long term stability are important. They offer state-of-the-art benefits of hybrid IC devices, including compactness, ruggedness, and reliability. Computer controlled laser trimming provides close control of important sensor 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 each 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.

Soldering

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

Cleaning

Proper cleaning fluids should be selected, based on type of contaminant to be removed. OMEGA recommends alcohols or fluorinated solvents.

PX160

PX-160 Series Transducers measures pressure in very low ranges, such as -20 to +120 cm H_2O, ±5" H_2O, 0-10", H_2O, and 0-27.68" H_2O (0-1 psi). The gage and differential type sensors feature excellent sensitivity

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:

a) Pressure transducer exhibits an output at zero pressure (large zero offset). If zero offset is less than 10% F.S., user can usually re-zero meter, install proper snubber and continue monitoring pressures.

b) Pressure transducer output remains constant regardless of pressure.

c) In severe cases, there will be no output.

The PX160 Series are contained in a thermornoplastic housing. The 0.10" x .020" printed circuit board terminals exit on the opposite side from the ports.

OMEGA Order Number	Housing Number	Type	Measuring Range - In. H_2O	Pressure Port
PX161-027D5V	161PC0lD	Vacuum	0-27.68	P_2
PX162-027D5V	162PC0lD	Differential	0-27.68	P_1 & P_2
PX162-027G5V	162PC01G	Gage	0-27.68	P_2
PX163-005BD5V	163PC0ID36	Bi-Dir Diff.	±5	P_1 & P_2
PX163-2.513135V	163PC0ID75	Differential	±2.5	P_1 & P_2
PX164-005D5V	164PC01D76	Differential	0-5	P_1 & P_2
PX164-010D5V	164PC01D37	Differential	0-10	P_1 & P_2
PX163-120D5V	163PC01D48	Differential	-7.87 to 47.24	P_1 & P_2

PX160 General Specifications*

Parameter		Min.	Typ.	Max.	Units
Full Scale Output (F.S.O.)**	(1)	4.85	5.00	5.15	V
	(2)		±2.5		
Null Offset	(1)	0.95	1.00	1.05	V
	(2)	3.45	3.50	3.55	
Output at Full Pressure	(3)	5.80	6.00	6.20	V
Response Time				1	msec
*Excitation (10 Vdc PX 163-120 D5V)		4.80	8.00	12.00	Vdc
Supply Current			8.00	20.00	mA
Output Current					
Source		10.0			mA
Sink		5.0			
Ratiometricity					
7 to 8 or 8 to 9 V			±0.50		% F.S.O.
8 to 12 V			±2.00		
Stability over 1 year			±0.50		% F.S.O.
Shock		Qualification tested to 50 G, 11 msec, half sine			
Vibration		Qualification tested to 10 to 2,000 Hz at 10 G sine			
Temperature					
Compensated		-18 to +63°C (0 to +145°F)			
Operating		-40 to +85°C (-40 to +185°F)			
Storage		-55 to +125°C (-67 to +257°F)			
Media Compatibility		P_1: Dry gases only			
Cavity Volume $P_1 = 0.081$ in^3 $P_2 = 0.0081$ in^3		P_2: Limited only to those media which will not attack polyester, silicon or silicone based adhesive.			
Weight		28 grams nominal (1 oz.)			
Termination		0.010" x 0.020" nominal printed circuit board terminals			
Output Ripple		None, dc device			
Short Circuit Protection		Output may be shorted indefinitely to ground			
Ground Reference		Supply and Output are common			

*General specification at 8.0 ±0.01 Vdc Excitation, 25°C (except for PX163-120D5V at 10.0 ±.01 Vdc excitation, 25°C

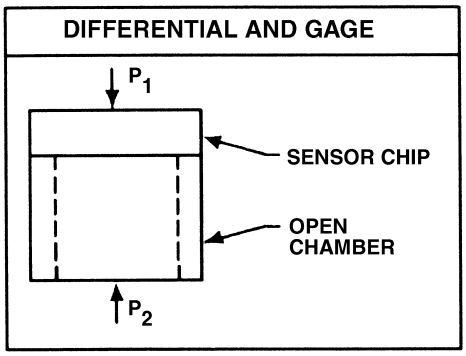
**F.S.O. is the algebraic difference between end points (output at null and full pressure). The F.S.O. will vary proportionately with supply voltage (sensor not internally regulated).

(1) Positive (or negative) pressure measurement.
(2) Positive and negative pressure measurement
(3) Output at positive (or negative) pressure.

PX160 SPECIFICATIONS	Pressure Ranges, Inches H_2O						
Parameter	**±3**	**±2.5**	**0-5**	**0-10**	**0-27.68**	**-20 to 120cm H_2O**	**Units**
Sensitivity: per inch. H_2O, typ.	0.50	1.0	1.0	0.50	0.18	0.91	V
Linearity (Best Fit Straight Line)							
$P_2>P_1$, max.	±1.00	±1.00	±1.00	±1.00	±2.00	±0.50 Typ.	%F.S.O.
$P_2<P_1$, max.	±0.50	±0.50	±0.50	±0.50	±1.00	±0.50 Typ.	%F.S.O.
Temperature Error, Combined & Sensitivity Shift							
25° to 5°, 25° to 45°	±1.00	±1.00	±1.00	±1.00	-	±1.25	%F.S.O.
25° to -18°, 25° to 63°C, max.	-	-	-	-	±1.00	±1.25	%F.S.O.
25° 25° to 85°, typ.	-	-	-	-	+2.00	±1.25	%F.S.O.
Overpressure, max.	5	5	5	5	10	350 cm H_2O	psi
Repeatibility & Hysteresis, typ.	±0.25	±0.25	±0.25	±0.25	±0.15	±0.15% F.S.O.	%F.S.O.

Differential and Gage Types

Gage and **differential** devices measure one pressure with respect to another. In differential devices, measurands are applied to both ports. In gage devices, P_1 is vented to atmospheric pressure and the measurand is applied to P_2.

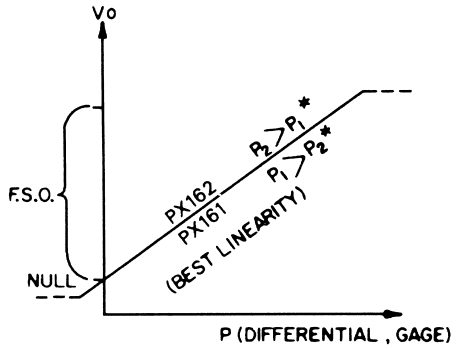


Temperature Error

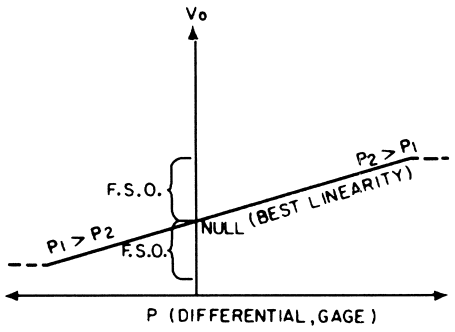
Temperature error is calculated with respect to 25°C and expresses the deviation that could occur as temperature is raised or lowered to limits indicated.

Typical (as used herein): the error is within ±1 standard deviation (±d) of the nominal specified value, as computed from the total population.

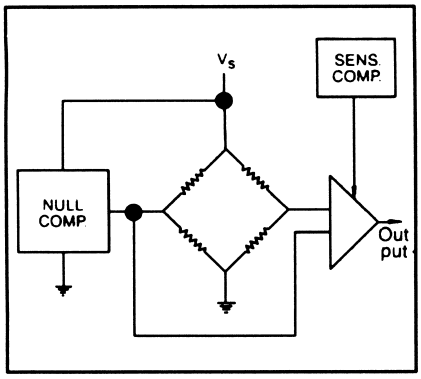
Differential, Gage (+)

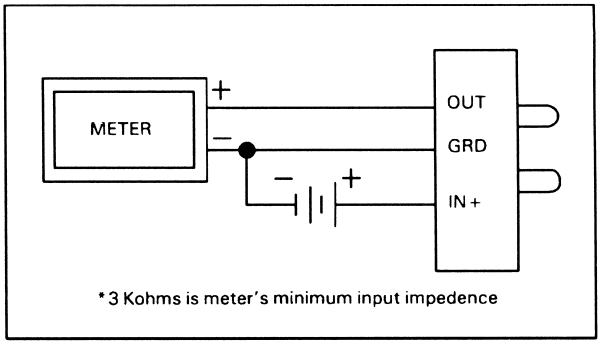


Differential, Gage (±)



ELECTRICAL BLOCK DIAGRAM

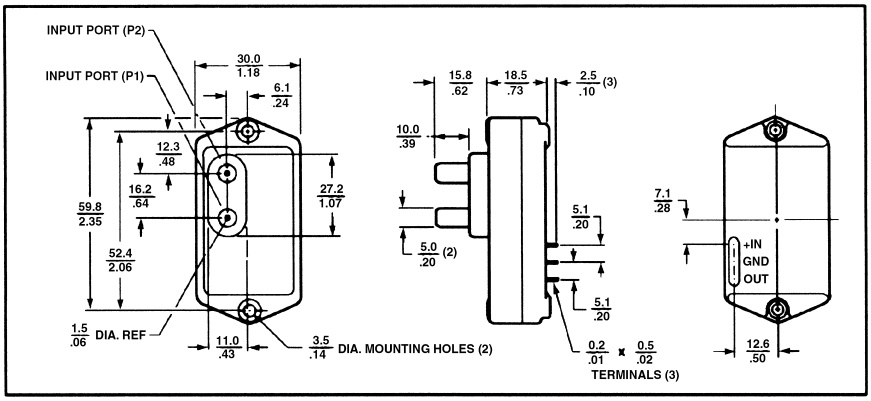




WARNING

Damage may result from reversal of supply and ground connections.

OUTLINE DIMENSIONS PX160



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WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

MADE IN USA

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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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