

SensSym

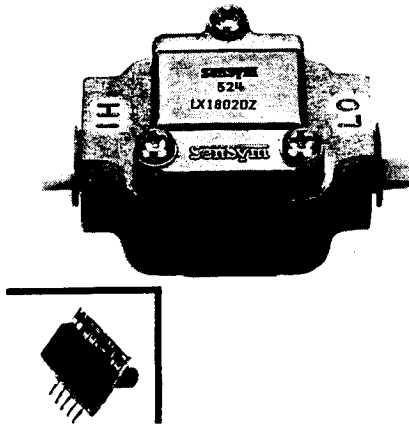
LX16XX and LX18XX Series Low and Mid-Pressure Range Signal Conditioned Pressure Transducers — 10 Volt Output

General Description

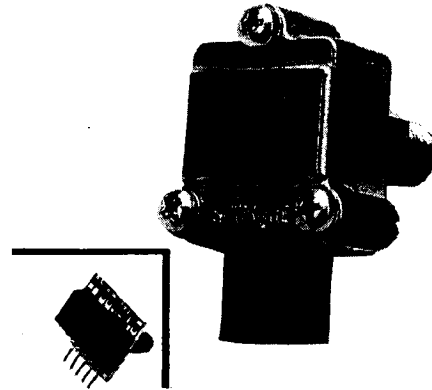
These are fully signal-conditioned pressure transducers with temperature compensation and high-level output voltage. The LX16XX series transducers are provided in compact ceramic packages for easy PC board mounting. The LX18XX series transducers are provided in die cast zinc housings with 1/8" NPT fittings, and a 3-pin Molex connector for easy, low cost electrical interface.

Features

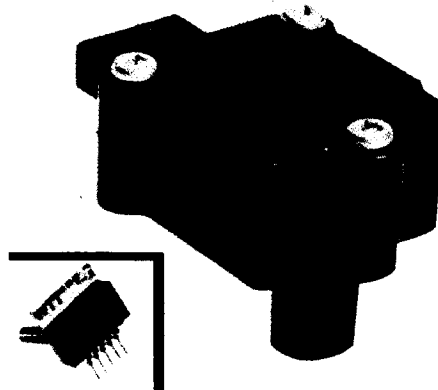
- ± 5 psi to 0–300psi
- High level output voltage, 2.5V to 12.5V
- Temperature compensated
- PC board mountable versions, LX16XX series
- Rugged zinc housings, LX18XX
- Backward gage version for aqueous working fluids
- Silguard option on low-pressure and all GB devices
- Field interchangeability
- Available from local stocking distributors



DIFFERENTIAL PRESSURE TRANSDUCERS:
LO Port Compatible with Aqueous Working Fluids. Ceramic or High Common-Mode Zinc Housing.



BACKWARD GAGE PRESSURE TRANSDUCERS:
Working Fluid Port Compatible with Aqueous Fluids. Ceramic, Zinc Housings.



ABSOLUTE PRESSURE TRANSDUCER:
Enclosed Vacuum Reference
Ceramic, Zinc Housings.

Absolute Pressure Transducer Characteristics

Maximum Ratings

Excitation Voltage (Note 1)	30V
Output Current	
Source	20mA
Sink	10mA
Transducer Bias Current	20mA
Operating Temperature Range (Note 2)	-40°C to +105°C
Lead Temperature (Soldering 2-4 seconds)	250°C
Reference Conditions (Note 3)	
Excitation Voltage, V_E (Note 1)	15V
Reference Temperature	25°C
Reference Temperature Range	0 to 80°C
Reference Offset Pressure	(Note 4)

Typical Characteristics

Output Voltage Change to Excitation Voltage Change	0.5%
Output Impedance	< 50Ω
Electrical Noise Equivalent ($0 < f < 1$ kHz)	0.04% Span
Natural Frequency of Sensor Diaphragm	> 50kHz
Transducer Bias Current	11 - 15mA
Full-Scale Pressure Cycles (Note 9)	tbd
Leak Area (Air Media)	< 10^{-7} cm ²

Performance Characteristics

Device Type	Operating Pressure Range	Maximum Over Pressure	Guaranteed Specifications				Typ. Specifications
			Offset Calibration V (Note 4)	Offset Shift w/ Temperature 0°C to 80°C (Note 5)	Linearity Hysteresis Repeatability (Note 6)		Span Shift w/ Temperature 0°C to 80°C (Note 5)
					%FS	±psi	
LX1601A LX1801AZ	10 to 20 psia	45 psia	2.5 ± 0.70	3.3	0.67	0.067	2.75
LX1602A LX1802AZ	0 to 15 psia	45 psia	2.5 ± 0.50	2.75	0.67	0.10	2.75
LX1603A LX1803AZ	0 to 30 psia	45 psia	2.5 ± 0.35	1.65	0.67	0.20	1.65
LX1610A LX1810AZ	0 to 60 psia	100 psia	2.5 ± 0.30	1.65	0.67	0.40	1.65
LX1620A LX1820AZ	0 to 100 psia	150 psia	2.5 ± 0.30	1.10	0.67	0.67	1.10
LX1830AZ	0 to 300 psia	350 psia	2.5 ± 0.30	1.10	0.67	2.0	1.10

Device Type	Operating Pressure Range	Maximum Over Pressure	Typical Specifications						
			Offset Characteristics				Span Characteristics		
			Repeatability (Note 7)		Stability (Note 8)		Sensitivity Calibration	Stability (Note 8)	
			±%FS	±psi	±%FS	±psi	mV/psi	±%FS	±psi
LX1601A LX1801AZ	10 to 20 psia	45 psia	0.5	0.05	5.0	0.5	1000 ± 20	1.0	0.1
LX1602A LX1802AZ	0 to 15 psia	45 psia	0.4	0.06	3.3	0.5	670 ± 13	0.7	0.1
LX1603A LX1803AZ	0 to 30 psia	45 psia	0.4	0.12	1.7	0.5	333 ± 6.7	0.3	0.1
LX1610A LX1810AZ	0 to 60 psia	100 psia	0.4	0.24	1.5	0.9	167 ± 3.3	0.3	0.2
LX1620A LX1820AZ	0 to 100 psia	150 psia	0.4	0.40	1.2	1.2	100 ± 2	0.3	0.3
LX1830AZ	0 to 300 psia	350 psia	0.4	1.2	1.0	3.0	33.3 ± 0.67	0.3	0.9

Specification Notes:

Note 1: The LX16XX and LX18XX series are not polarity protected. Incorrect application of excitation voltage or ground to the wrong pin can cause electrical failure.

Note 2: Device performance characteristics apply 0 to +80°C, device is functional from -40°C to 0°C and 80°C to +105°C and all the temperature dependent errors are typically doubled over the additional temperature range.

Note 3: Conditions at which device performance characteristics apply.

Note 4: Offset Reference Pressure—for gage and differential devices offset pressure is ambient pressure, for absolute devices offset pressure is the lowest pressure in the pressure range.

Note 5: Temperature tested at 80°C relative to 25°C.

Note 6: Linearity—the maximum deviation of measured output, at constant temperature (25°C), from "best straight line" through three points (offset pressure, full scale pressure, one-half full scale pressure).

$$\text{Linearity} = \left\{ \left(\frac{V_{fs} + V_{OS}}{2} - V_{1/2 \text{ full-scale}} \right) / 2 \right\}$$

(V = measured value for each device)

Note 7: Offset Repeatability—the transducer's ability to reproduce offset voltage at constant temperature (25°C) when cycled through its full operating pressure range.

Note 8: Stability—the transducer's ability to reproduce the output voltage corresponding to a specific pressure and temperature in a period of one year during which maximum ratings are not exceeded.

Note 9: Pressure cycle fatigue is a package related parameter. For LX18XX devices the maximum cycle life is limited by pressure magnitude and package O-ring. LX16XX devices are not limited by O-ring.

Backward Gage Pressure Transducer Characteristics

Maximum Ratings

Excitation Voltage (Note 1)	30V
Output Current	
Source	20mA
Sink	10mA
Transducer Bias Current	20mA
Operating Temperature Range (Note 2)	-40°C to +105°C
Lead Temperature (Soldering 2-4 seconds)	250°C

Reference Conditions (Note 3)

Excitation Voltage, V_E (Note 1)	15V
Reference Temperature	25°C
Reference Temperature Range	0 to 80°C
Reference Offset Pressure	(Note 4)

Typical Characteristics

Output Voltage Change to Excitation Voltage Change	0.5%
Output Impedance	< 50Ω
Electrical Noise Equivalent ($0 \leq f \leq 1$ kHz)	0.04% Span
Natural Frequency of Sensor Diaphragm	> 50kHz
Transducer Bias Current	11 - 15mA
Full-Scale Pressure Cycles (Note 9)	tbd
Leak Area (Air Media)	< 10^{-7} cm ²

Performance Characteristics

Device Type	Operating Pressure Range	Maximum Over Pressure	Guaranteed Specifications				Typ. Specifications
			Offset Calibration V (Note 4)	Offset Shift w/ Temperature 0°C to 80°C (Note 5)	Linearity Hysteresis Repeatability (Note 6)		Span Shift w/ Temperature 0°C to 80°C (Note 5)
					%FS	±psi	
LX1601GB LX1801GBZ	0 to ±5 psig	45 psig	7.5 ± 0.70	3.3	0.67	0.067	2.75
LX1602GB LX1802GBZ	0 to 15 psig	45 psig	2.5 ± 0.50	2.75	0.67	0.10	2.75
LX1603GB LX1803GBZ	0 to 30 psig	45 psig	2.5 ± 0.35	1.65	0.67	0.20	1.65
LX1604GB LX1804GBZ	0 to ±15 psig	45 psig	7.5 ± 0.35	1.65	0.67	0.20	1.65
LX1610GB LX1810GBZ	0 to 60 psig	100 psig	2.5 ± 0.30	1.65	0.67	0.40	1.65
LX1620GB LX1820GBZ	0 to 100 psig	150 psig	2.5 ± 0.30	1.10	0.67	0.67	1.10
LX1830GBZ	0 to 300 psig	350 psig	2.5 ± 0.30	1.10	0.67	2.0	1.10

Device Type	Operating Pressure Range	Maximum Over Pressure	Typical Specifications						
			Offset Characteristics				Span Characteristics		
			Repeatability (Note 7)		Stability (Note 8)		Sensitivity Calibration	Stability (Note 8)	
			±%FS	±psi	±%FS	±psi	mV/psi	±%FS	±psi
LX1601GB LX1801GBZ	0 to ±5 psig	45 psig	0.5	0.05	5.0	0.5	1000 ± 20	1.0	0.1
LX1602GB LX1802GBZ	0 to 15 psig	45 psig	0.4	0.06	3.3	0.5	670 ± 13	0.7	0.1
LX1603GB LX1803GBZ	0 to 30 psig	45 psig	0.4	0.12	1.7	0.5	333 ± 6.7	0.3	0.1
LX1604GB LX1804GBZ	0 to ±15 psig	45 psig	0.4	0.12	1.7	0.5	333 ± 6.7	0.3	0.1
LX1610GB LX1810GBZ	0 to 60 psig	100 psig	0.4	0.24	1.5	0.9	167 ± 3.3	0.3	0.2
LX1620GB LX1820GBZ	0 to 100 psig	150 psig	0.4	0.40	1.2	1.2	100 ± 2	0.3	0.3
LX1830GBZ	0 to 300 psig	350 psig	0.4	1.2	1.0	3.0	33.3 ± 0.67	0.3	0.9

Specification Notes:

Note 1: The LX16XX and LX18XX series are not polarity protected. Incorrect application of excitation voltage or ground to the wrong pin can cause electrical failure.

Note 2: Device performance characteristics apply 0 to +80°C, device is functional from -40°C to 0°C and 80°C to +105°C and all the temperature dependent errors are typically doubled over the additional temperature range.

Note 3: Conditions at which device performance characteristics apply.

Note 4: Offset Reference Pressure—for gage and differential devices offset pressure is ambient pressure, for absolute devices offset pressure is the lowest pressure in the pressure range.

Note 5: Temperature tested at 80°C relative to 25°C.

Note 6: Linearity—the maximum deviation of measured output, at constant temperature (25°C), from "best straight line" through three points (offset pressure, full scale pressure, one-half full scale pressure).

$$\text{Linearity} = \{ (V_{fs} + V_{OS}) / 2 - V_{1/2 \text{ full-scale}} \} / 2$$

(V = measured value for each device)

Note 7: Offset Repeatability—the transducer's ability to reproduce offset voltage at constant temperature (25°C) when cycled through its full operating pressure range.

Note 8: Stability—the transducer's ability to reproduce the output voltage corresponding to a specific pressure and temperature in a period of one year during which maximum ratings are not exceeded.

Note 9: Pressure cycle fatigue is a package related parameter. For LX18XX devices the maximum cycle life is limited by pressure magnitude and package O-ring. LX16XX devices are not limited by O-ring.

Differential Pressure Transducer Characteristics

Maximum Ratings

Excitation Voltage (Note 1)	30V
Output Current	
Source	20mA
Sink	10mA
Transducer Bias Current	20mA
Operating Temperature Range (Note 2)	-40°C to +105°C
Lead Temperature (Soldering 2-4 seconds)	250°C
Pressure at Any Port	
LX16XXD	350psig
LX18XXDZ	
Reference Conditions (Note 3)	
Excitation Voltage, V_E (Note 1)	15V
Reference Temperature	25°C
Reference Temperature Range	0 to 80°C

Reference Offset Pressure	(Note 4)
Common-Mode Line Pressure	
LX16XXD	0psig
LX18XXDZ	
Typical Characteristics	
Output Voltage Change to Excitation Voltage Change	0.5%
Output Impedance	< 50Ω
Electrical Noise Equivalent (0 < f < 1kHz)	0.04% Span
Natural Frequency of Sensor Diaphragm	> 50kHz
Transducer Bias Current	11 - 15mA
Full-Scale Pressure Cycles (Note 9)	tbd
Offset Shift vs. Common-Mode Pressure	tbd
Leak Area (Air Media)	< 10 ⁻⁷ cm ²

Performance Characteristics

Device Type	Operating Pressure Range	Maximum Over Pressure	Guaranteed Specifications				Typ. Specifications		
			Offset Calibration V (Note 4)	Offset Shift w/ Temperature 0°C to 80°C (Note 5)	Linearity Hysteresis Repeatability (Note 8)		Span Shift w/ Temperature 0°C to 80°C (Note 5)		
					±%FS	%FS		±psi	±%FS
LX1801D LX1801DZ	0 to ±5 psid	45 psid	7.5 ± 0.70	3.3	0.67	0.067	2.75		
LX1802D LX1802DZ	0 to 15 psid	45 psid	2.5 ± 0.50	2.75	0.67	0.10	2.75		
LX1803D LX1803DZ	0 to 30 psid	45 psid	2.5 ± 0.35	1.65	0.67	0.20	1.65		
LX1804D LX1804DZ	0 to ±15 psid	45 psid	7.5 ± 0.35	1.65	0.67	0.20	1.65		
LX1810D LX1810DZ	0 to 60 psid	100 psid	2.5 ± 0.30	1.65	0.67	0.40	1.65		
LX1820D LX1820DZ	0 to 100 psid	150 psid	2.5 ± 0.30	1.10	0.67	0.67	1.10		
LX1830DZ	0 to 300 psid	350 psid	2.5 ± 0.30	1.10	0.67	2.0	1.10		
Typical Specifications									
Device Type	Operating Pressure Range	Maximum Over Pressure	Offset Characteristics				Span Characteristics		
			Repeatability (Note 7)		Stability (Note 8)		Sensitivity Calibration	Stability (Note 8)	
			±%FS	±psi	±%FS	±psi	mV/psi	±%FS	±psi
LX1801D LX1801DZ	0 to ±5 psid	45 psid	0.5	0.05	5.0	0.5	1000 ± 20	1.0	0.1
LX1802D LX1802DZ	0 to 15 psid	45 psid	0.4	0.06	3.3	0.5	670 ± 13	0.7	0.1
LX1803D LX1803DZ	0 to 30 psid	45 psid	0.4	0.12	1.7	0.5	333 ± 6.7	0.3	0.1
LX1804D LX1804DZ	0 to ±15 psid	45 psid	0.4	0.12	1.7	0.5	333 ± 6.7	0.3	0.1
LX1810D LX1810DZ	0 to 60 psid	100 psid	0.4	0.24	1.5	0.9	167 ± 3.3	0.3	0.2
LX1820D LX1820DZ	0 to 100 psid	150 psid	0.4	0.40	1.2	1.2	100 ± 2	0.3	0.3
LX1830DZ	0 to 300 psid	350 psid	0.4	1.2	1.0	3.0	33.3 ± 0.67	0.3	0.9

Specification Notes:

Note 1: The LX16XX and LX18XX series are not polarity protected. Incorrect application of excitation voltage or ground to the wrong pin can cause electrical failure.

Note 2: Device performance characteristics apply 0 to +80°C, device is functional from -40°C to 0°C and 80°C to +105°C and all the temperature dependent errors are typically doubled over the additional temperature range.

Note 3: Conditions at which device performance characteristics apply.

Note 4: Offset Reference Pressure—for gage and differential devices offset pressure is ambient pressure, for absolute devices offset pressure is the lowest pressure in the pressure range.

Note 5: Temperature tested at 80°C relative to 25°C.

Note 6: Linearity—the maximum deviation of measured output, at constant temperature (25°C), from "best straight line" through three points (offset pressure, full scale pressure, one-half full scale pressure).

$$\text{Linearity} = \left\{ \left(\frac{V_{fs} + V_{OS}}{2} - V_{1/2 \text{ full-scale}} \right) \right\} / 2$$

(V = measured value for each device)

Note 7: Offset Repeatability—the transducer's ability to reproduce offset voltage at constant temperature (25°C) when cycled through its full operating pressure range.

Note 8: Stability—the transducer's ability to reproduce the output voltage corresponding to a specific pressure and temperature in a period of one year during which maximum ratings are not exceeded.

Note 9: Pressure cycle fatigue is a package related parameter. For LX18XX devices the maximum cycle life is limited by pressure magnitude and package O-ring. LX16XX devices are not limited by O-ring.

Application Guide (Continued)

MEDIA COMPATIBILITY — HUMIDITY

As shown in *Figure 1*, the basic hybrid transducer structure allows for two pressure inlets which differ in susceptibility to moisture and other fluids, depending on whether the fluid is applied to the top side (circuit side) or to the back side (cavity side) of the diaphragm. The top side is coated with a thin compliant layer of protective coating. The circuit side is compatible with many non-aqueous fluids while the back side of the diaphragm is compatible with aqueous fluids. This is summarized below for each pressure transducer type.

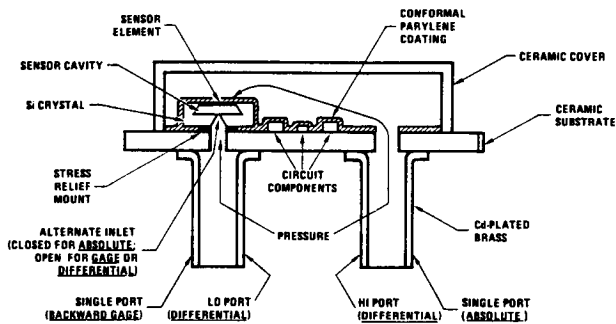


FIGURE 1. Basic LX16XX Series IC Pressure Transducer Structure

The circuit-side inlet is the working fluid port for absolute transducers and the HI port for differential transducers. It is the reference port for backward gage transducers. It can be used with most fuels, oils, refrigerants, hydraulic fluids, and non-corrosive gases (for refrigerants, see LX18XXGBR Data Sheet). But moisture condensate or other ionic, acidic or corrosive fluids can cause erroneous readings and electrical failure.

The cavity-side inlet is the working fluid port for backward gage transducers and the LO port for differential transducers. It can be used with aqueous fluids but cannot be used with acids and other fluids corrosive to device construction material (brass, zinc, nylon, solder, alumina, silicon and Buna-N).

Hence, the *backward gage* version can be used with many aqueous working fluids but requires a dry ambient. The *differential* version can tolerate aqueous fluids in the LO port but not in the HI port. The *absolute* version requires dry working fluids, but the ambient can be humid.

PACKAGE LEAK RATE

The PX6 (LX16XX) and PX8 (LX18XX) packages are not hermetic. Sensym's pressure transducers are guaranteed to have an effective leak area less than 10^{-7} cm². Each transducer is leak tested at room temperature with 45 psig compressed air.

However, the user should be aware that the leak rate can depend on the type, viscosity, pressure, and temperature of the working fluid and can increase with fatigue resulting from pressure cycling. This leak rate applies to package leak rates and not the reference chamber in absolute (A) devices which is hermetically sealed.

"Dead-Ending" Feature

If the pressure applied to the LX16XXA or LX18XXA (N, Z) exceeds proof pressure (maximum specified operating pressure), the silicon diaphragm could rupture. But, unlike gage transducers, the absolute devices are "dead-ended" so that diaphragm rupture does not necessarily result in fluid leakage.

INPUT/OUTPUT POLARITY

The output signal is at pin 1 for all LX16XX series signal-conditioned transducers. *Figure 2* shows the pinout for these transducers, with pressure ports extending out of the drawing.

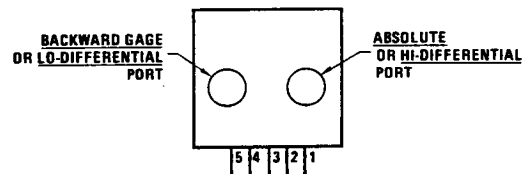


FIGURE 2. LX16XX Pinout, Portside View

The output signal of absolute transducers is positive-going for increasing pressure applied to the absolute port.

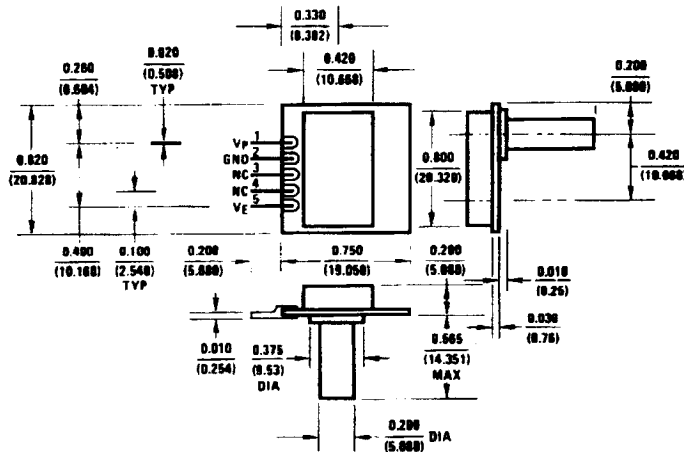
The output signal of backward gage transducers is positive-going for increasing pressure applied to the backward gage port.

The output signal of differential transducers is positive going for increasing pressure applied to the HI port relative to the LO port.

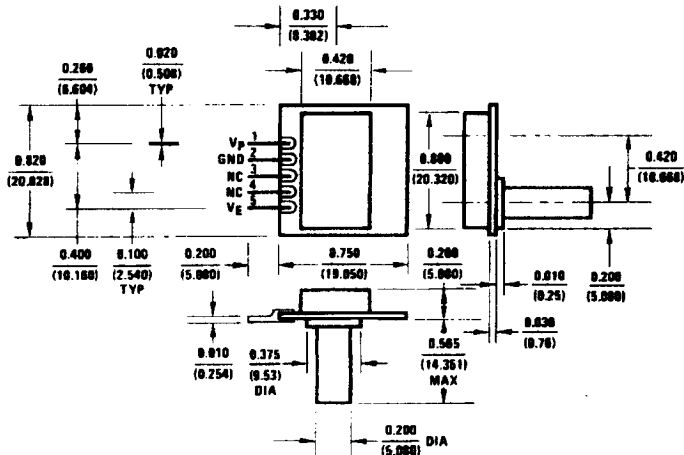
WARNING

The LX16XX and LX18XX series are not polarity protected. Incorrect application of excitation voltage or ground to the wrong pin can cause electrical failure.

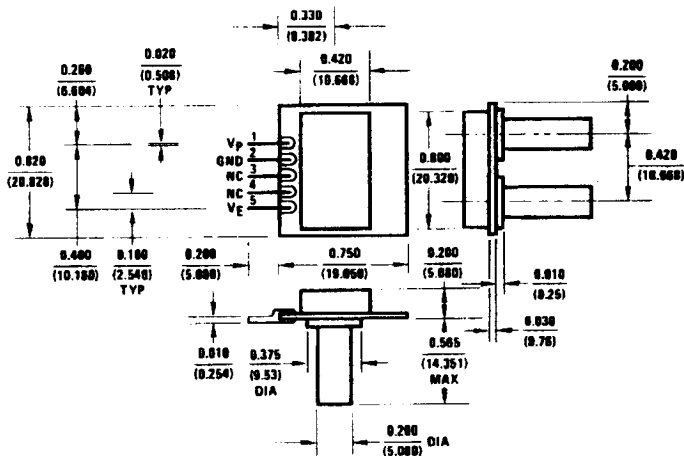
Typical Physical Dimensions inches (millimeters)



PX6
Package for LX16XXA Series Pressure Transducers
Weight: 5 Grams

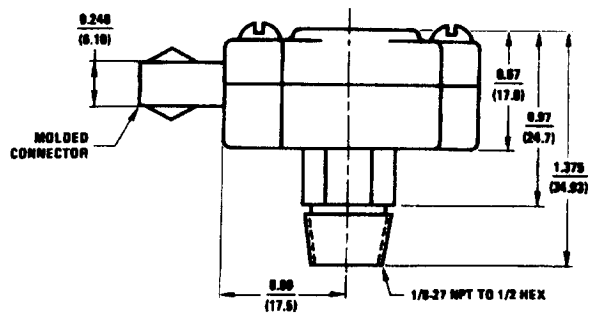
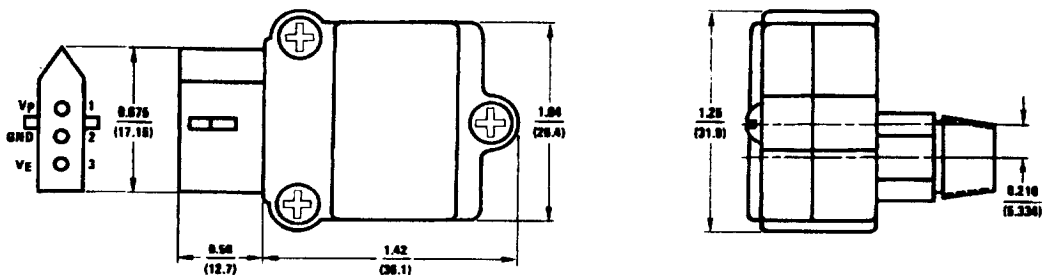


PX6B
Package for LX16XXGB Series Pressure Transducers
Weight: 5 Grams

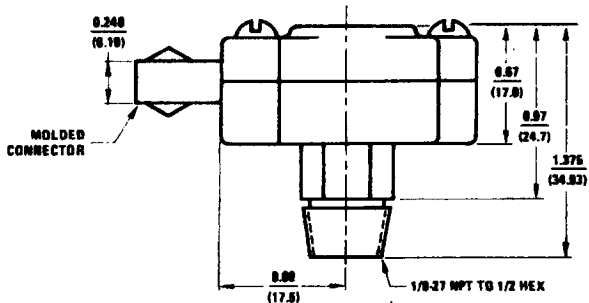
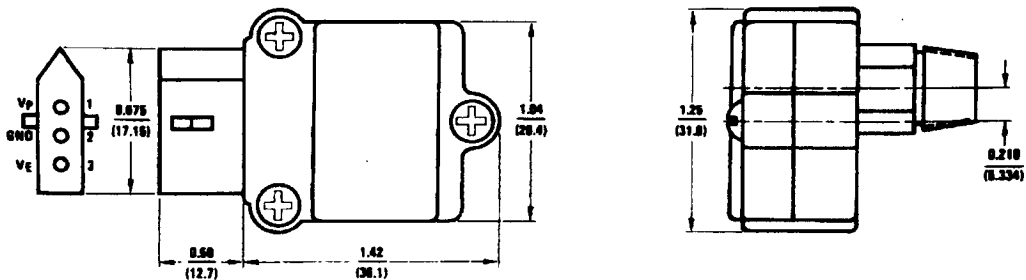


PX6D
Package for LX16XXD Series Pressure Transducers
Weight: 5 Grams

Typical Physical Dimensions (Continued) inches (millimeters)

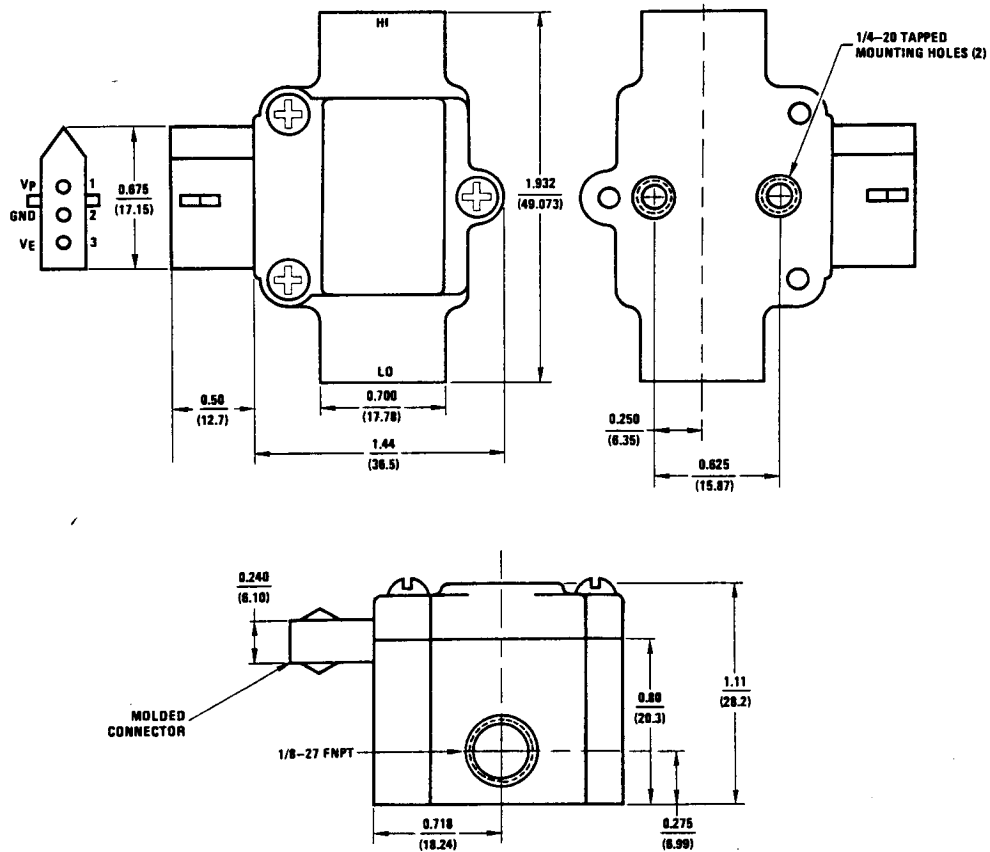


PX8BZ
Package for LX18XXGBZ Series Pressure Transducers
Weight: 100 Grams in Zinc (Z)



PX8Z
Package for LX18XXAZ Series Pressure Transducers
Weight: 100 Grams in Zinc (Z)

Typical Physical Dimensions (Continued) inches (millimeters)



PX8DZ
Package for LX18XXDZ Series Zinc Cast Pressure Transducers
Weight: 170 Grams

LX18XX (PX8) Mating Connector

Vendor	Connector No.	Male Pin No.
Litton-Winchester Win-Com Series	59-03P1000	159-1018P
Waldon/Molex	03-09-2031	02-09-2103
Molex — without mounting ears	03-09-2032	

See Section 10 for Package Styles and Dimensions

Tolerances, unless otherwise noted

- ± 0.01 For Two Decimal Places
- ± 0.005 For Three Decimal Places