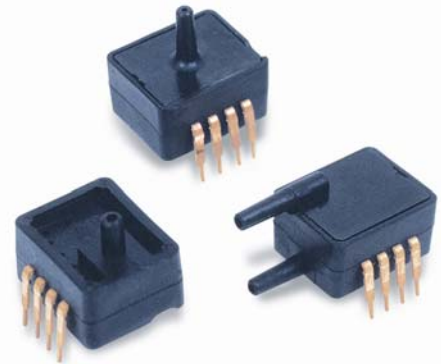


ASDX DO Series

Digital Output Pressure Sensors

0 psi to 1 psi through

0 psi to 30 psi



DESCRIPTION

The ASDX DO Series pressure sensors are fully calibrated and temperature compensated with on-board Application Specific Integrated Circuitry (ASIC). These DIP (Dual In-line Package) sensors provide digital correction of sensor offset, sensitivity, temperature coefficients and non-linearity and are designed for use with non-corrosive, non-ionic working fluids such as air and dry gases.

The ASDX DO Series uses I²C-compatible protocol, which allows easy interfacing to most commonly used microcontrollers and microprocessors, without additional components and electronic circuitry.

FEATURES

- I²C-compatible protocol
- ASIC-enhanced output
- Calibrated and temperature-compensated output
- Wide compensated temperature range 0 °C to 85 °C [32 °F to 185 °F]
- Available in absolute, differential and gage types
- Pressure ranges from 0 psi to 1 psi through 0 psi to 30 psi
- Response time of 8 ms

The 2-wire I²C interface has a Serial Clock Line (SCL) input and serial digital output data line. Sensor output is a corrected pressure value in hexadecimal format with 12-bit resolution.

Sensors are available to measure absolute, differential and gage pressures. The absolute versions have an internal vacuum reference and an output voltage proportional to absolute pressure. Differential versions allow application of pressure to either side of the sensing diaphragm and may be used for differential or gage measurements.

All ASDX DO Sensors are accurate to within $\pm 2.0\%$ full scale and are designed for operation from a single 5 Vdc supply.

POTENTIAL APPLICATIONS

- Flow calibrators
- Ventilation and air flow monitors
- Gas flow instrumentation
- Dialysis equipment
- Sleep apnea monitoring and therapy equipment
- Barometry
- HVAC controls
- Pneumatic controls

ASDX DO Series

TABLE 1. GENERAL SPECIFICATIONS

Characteristic	Parameter	Characteristic	Parameter
Supply voltage (Vs) ⁽¹⁾	4.75 Vdc to 5.25 Vdc	Compensated temp. range	0 °C to 85 °C [32 °F to 185 °F]
Maximum supply voltage ⁽¹⁾	6.50 Vdc (max.)	Operating temp. range	-20 °C to 105 °C [-4 °F to 221 °F]
Consumption current	6 mA (typ.)	Storage temp. range	-40 °C to 125 °C [-40 °F to 257 °F]
Output current (sink)	2 mA (max.)	Vibration	10 g at 20 Hz to 2000 Hz
Output current (source)	2 mA (max.)	Shock	100 g for 11 ms
Lead soldering temperature	2 s to 4 s at 250 °C [482 °F]	Life	1 million cycles minimum

Note:
 1. The sensor is not reverse polarity protected. Incorrect application of excitation voltage or ground to the wrong pin can cause electrical failure. Application of supply voltage above the maximum can cause electrical failure.

TABLE 2. PERFORMANCE CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Note
4R DO						
Zero pressure offset	Hoff	158	19A	1DB	counts hex	–
Full scale span (FSS)	Hfss	–	CCC	–	counts hex	3
Output at full scale pressure	Hfso	E25	E66	EA8	counts hex	–
Accuracy	–	–	–	±2.0	%H full scale	4
Response time	–	–	8	11	ms	5
4R DO						
Zero pressure offset	Hoff	7BE	800	841	counts hex	–
Full scale span (FSS)	Hfss	–	CCC	–	counts hex	3
Output at full scale pressure (P2)	Hfso	E25	E66	EB8	counts hex	6
Output at full scale pressure (P1)	Hfso	158	19A	1DB	counts hex	6
Accuracy	–	–	–	±2.0	% FSS	4
Output resolution	–	–	12	–	bit	–
Response time	–	–	8	11	ms	5

Notes:
 1. Reference conditions (unless otherwise noted): supply voltage, $V_s = 5.0 \pm 0.01$ Vdc, $T_a = 25$ °C [77 °F].
 2. Read operation: *Start, Slave Address, R/W = 1, Data Byte 1 (MSB), Ackn Bit, Data Byte 2 (LSB)*. The output is corrected pressure as unsigned 12 bits. Slave Address is F0h. Acknowledge Bit - pull data line LOW, master generates an extra clock pulse for this purpose.
 3. Span is the algebraic difference between the output voltage at the specified high pressure and the output at lowest pressure. Span is ratiometric to the supply voltage.
 4. Accuracy is the combined errors from offset and span calibration, linearity, pressure hysteresis, and temperature effects. Calibration errors include the deviation of offset and full scale from nominal values. Linearity is the measured deviation based on a straight line. Hysteresis is the maximum output difference at any point within the operating pressure range for increasing and decreasing pressure and temperature.
 5. Response time for 0 PSI to full scale pressure step change, 10% to 90% rise time.
 6. Sensor output when maximum positive pressure is applied on the back side (P2) or the front side (P1) of the sensing element.

TABLE 3. PRESSURE RANGE SPECIFICATIONS

Catalog Listing	Pressure Range	Burst Pressure ⁽¹⁾
ASDX001xxxx-DO	0 psi to 1 psi	5 psi
ASDX005xxxx-DO	0 psi to 5 psi	20 psi
ASDX015xxxx-DO	0 psi to 15 psi	30 psi
ASDX030xxxx-DO	0 psi to 30 psi	60 psi

Note:
 1. If maximum burst pressure is exceeded, even momentarily, the package may leak or burst, or the pressure sensing die may fracture.

FIGURE 1. PERFORMANCE CHARACTERISTICS (Error Band Multiplier Over -20 °C to 105 °C [-4 °F to 221 °F])

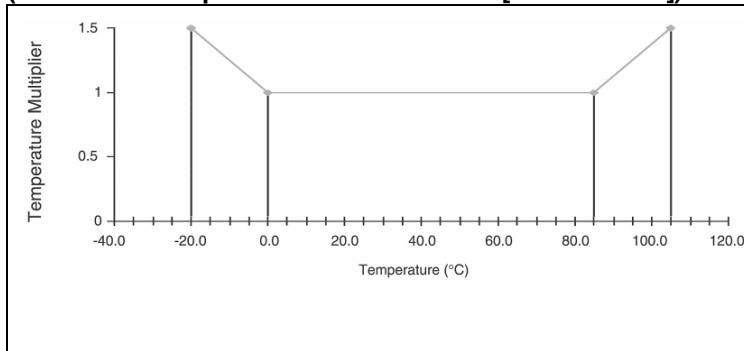
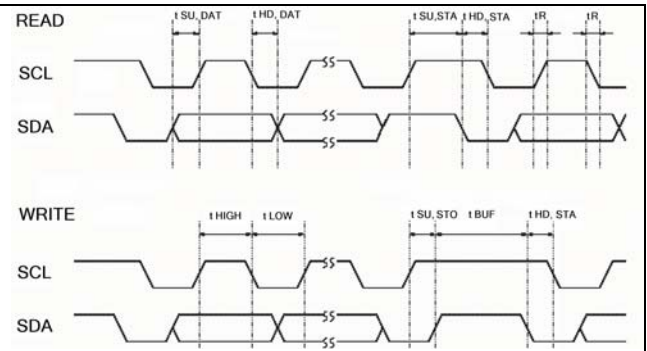
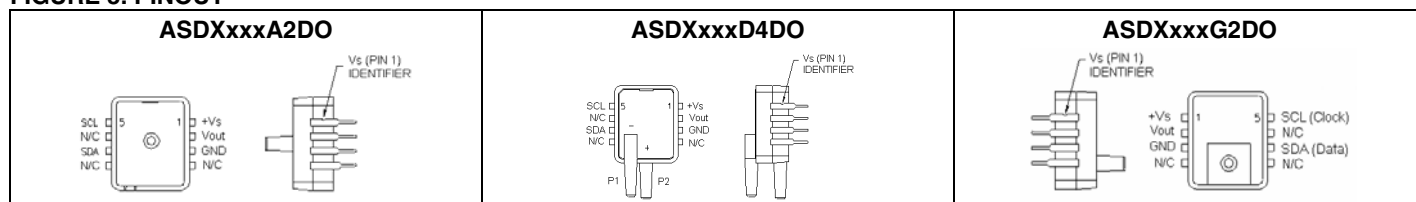


FIGURE 2. SERIAL INTERFACE TIMING CHARACTERISTICS



Digital Output Pressure Sensors, 0 psi to 1 psi thru 0 psi to 30 psi

FIGURE 3. PINOUT^(1,2)



Notes:

1. N/C means no connection. Connecting to ground will damage the sensor.
2. Pin 6 must be left open.

TABLE 4. SERIAL INTERFACE PARAMETERS

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input high level	V_{IH}	—	4.5	—	1	Vs
Input low level	V_{IL}	—	0	—	0.5	Vs
Output low level	V_{OL}	open drain $I_{OL} = -4$ mA	—	—	0.1	Vs
Pull up current	V_{OH}	pin SCL and SDA	5	—	20	μ A
Load capacitance SDA	Cl_{SDA}	—	—	—	400	pF
SCL clock frequency	f_{SCL}	—	—	—	100	kHz
Bus free time between STOP and START condition	t_{BUF}	—	4.7	—	—	μ s
Hold time (repeated) START condition	$t_{HD,STA}$	to first clock pulse	4.0	—	—	μ s
LOW period of SCL	t_{LOW}	—	4.7	—	—	μ s
High period of SCL	t_{HIGH}	—	4.0	—	—	μ s
Setup time repeated START condition	$t_{SU,STA}$	—	4.7	—	—	μ s
Data hold time	$t_{HD,DAT}$	—	0	—	—	ns
Data setup time	$t_{SU,DAT}$	—	250	—	—	ns
Rise time of both SDA and SCL	t_R	—	—	—	300	ns
Fall time of both SDA and SCL	t_F	—	—	—	300	ns
Setup time for STOP condition	$t_{SU,STO}$	—	4	—	—	μ s
Input filter spike suppression	t_{sp}	spikes on SDA or SCL of that length are suppressed	—	—	50	μ s

FIGURE 4. DIMENSIONAL DRAWING (For reference only: mm [in].)

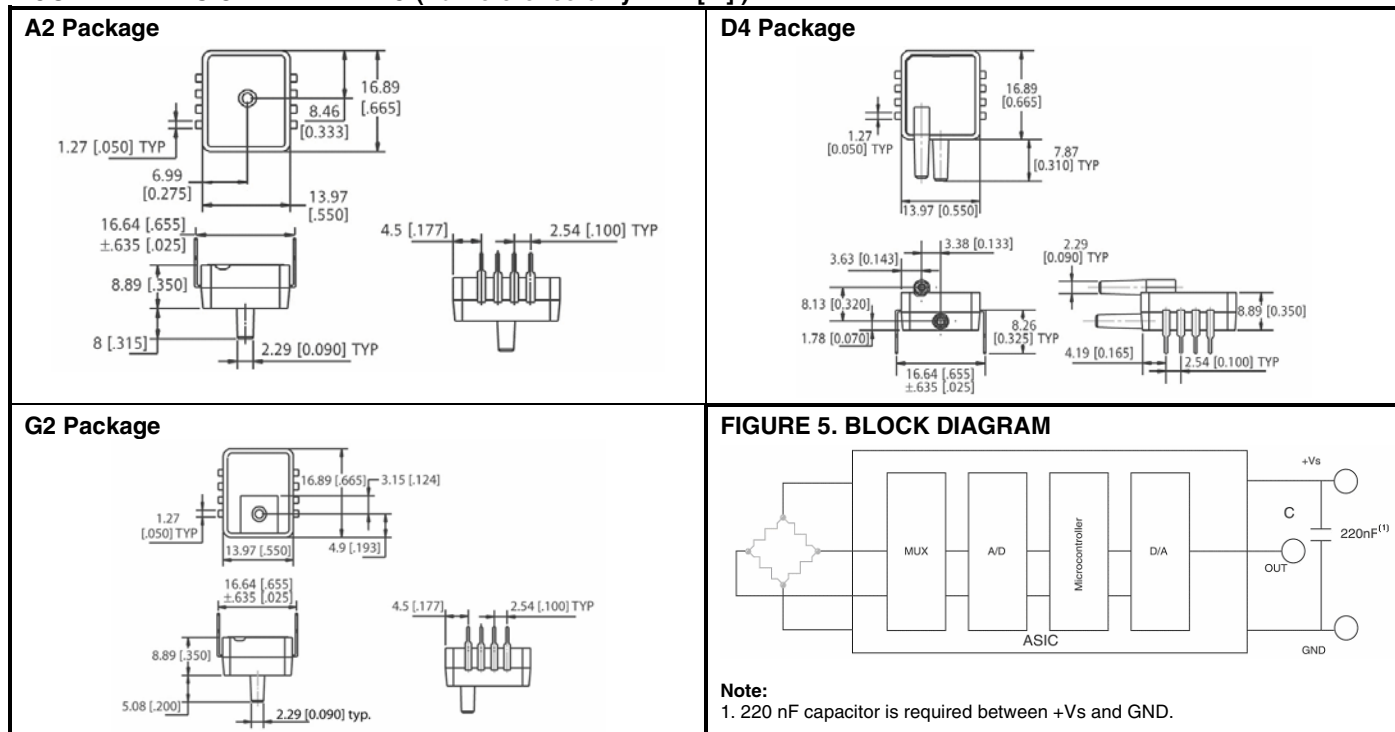
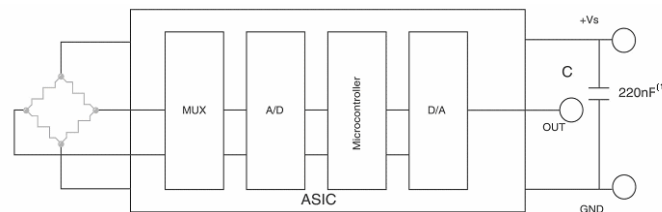
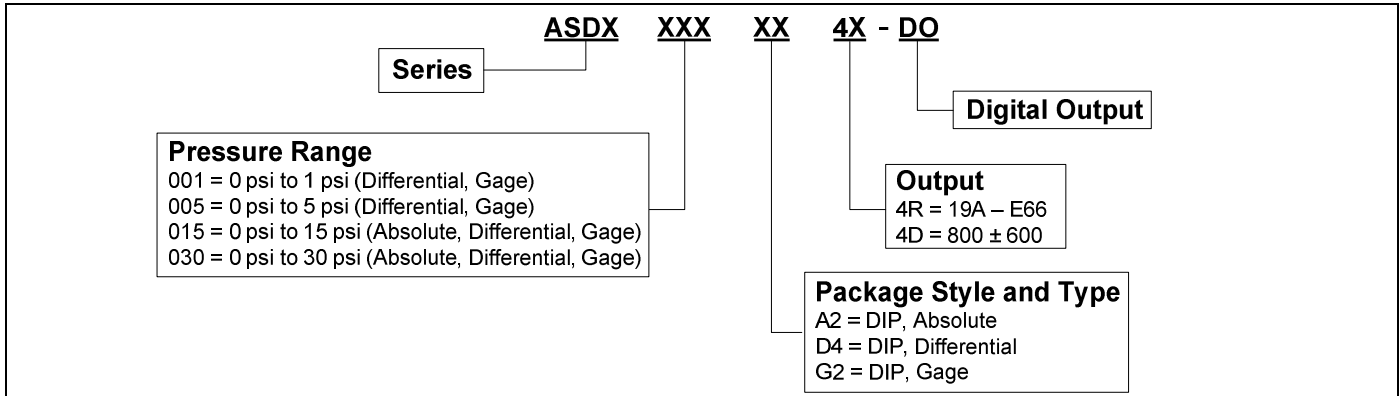


FIGURE 5. BLOCK DIAGRAM



Note:
1. 220 nF capacitor is required between +Vs and GND.

FIGURE 6. NOMENCLATURE TREE



ORDER GUIDE

Differential Catalog Listing ⁽¹⁾	Gage Catalog Listing	Absolute Catalog Listing	Pressure Range	Output
ASDX001D44R-DO	ASDX001G24R-DO	–	0 psi to 1.0 psi	19A – E66
ASDX001D44D-DO	–	–	–	800 ± 600
ASDX005D44R-DO	ASDX005G24R-DO	–	0 psi to 5.0 psi	19A – E66
ASDX005D44D-DO	–	–	–	800 ± 600
ASDX015D44R-DO	ASDX015G24R-DO	ASDX015A24R-DO	0 psi to 15 psi	19A – E66
ASDX015D44D-DO	–	–	–	800 ± 600
ASDX030D44R-DO	ASDX030G24R-DO	ASDX030A24R-DO	0 psi to 30 psi	19A – E66
ASDX030D44D-DO	–	–	–	800 ± 600

Note:

1. May also be used in gage applications.

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