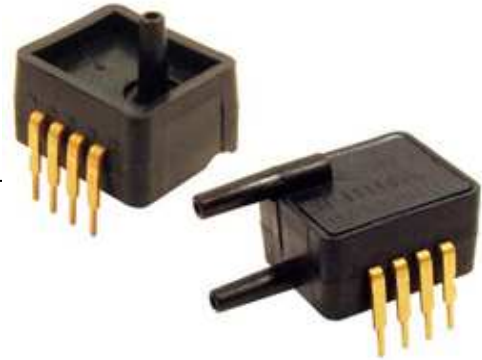


ASDXL-DO Series

Low Pressure Plastic Silicon Pressure Sensors with Compensated Digital Output



DESCRIPTION

The ASDXL-DO is a Low Pressure Plastic Silicon Pressure sensor offering either an I²C or SPI digital interface for reading pressure over the specified full scale pressure span and temperature range.

The ASDXL-DO is fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects and non-linearity using an on-board Application Specific Integrated Circuit (ASIC). Calibrated output values for pressure are updated at approximately 1 kHz.

The standard ASDXL-DO is calibrated over the temperature range of 0 °C to 85 °C [32 °F to 185 °F]. The sensor is characterized for operation from a single power supply of either 3.3 Vdc or 5.0 Vdc.

FEATURES

- I²C or SPI compatible 14 bit digital output
- Precision ASIC conditioning and temperature compensated over 0 °C to 85 °C [32 °F to 185 °F] temperature range
- Available in differential and gage types
- Pressure ranges available are 5 in H₂O and 10 in H₂O
- Standard calibrations available in: in H₂O, mbar, kPa, cm H₂O
- Total error band of ±2.0% of full scale span maximum

These sensors are available to measure differential and gage pressures. Differential versions allow application of pressure to either side of the sensing diaphragm. Gage versions are referenced to atmospheric pressure and provide an output proportional to pressure variations from atmosphere.

The ASDXL-DO Series sensors are intended for use with non-corrosive, non-ionic working fluids such as air and dry gases. They are designed and manufactured according to standards in ISO 9001.

POTENTIAL APPLICATIONS

- Ventilation and air flow monitors
- Gas flow instrumentation
- Sleep apnea monitoring and therapy equipment
- HVAC controls

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Table 1. Absolute Specifications

Parameter	Min	Max	Units
Supply voltage	-0.3	6.0 ¹	V
Voltage to any pin	-0.3	VDD + 0.3	V
Digital clock frequency:			
I ² C	100	400	kHz
SPI	50	800	
ESD susceptibility (human body model)	3	-	kV
Storage temperature	-50 [-58]	125 [257]	°C [°F]
Lead temperature (2 s to 4 s)	-	250 [482]	°C [°F]
External capacitance between VDD and ground ²	100	470	nF
Pull-up on SDA and SCL (I ² C output only)	1	-	kOhm
I ² C or SPI voltage level low	-	0.2	VDD
I ² C or SPI voltage level high	0.8	-	VDD
Total error band ³	-	2.0	%FSS ⁴

Notes:

1. Application of supply voltage above the maximum value may cause electrical failure.
2. An external bypass capacitor is **required** across the supply voltage as close to the device supply pin as possible for correct sensor operation.
3. Total error band is the maximum deviation in output from ideal transfer function over the entire compensated temperature and pressure range, and includes errors due to: offset, full scale span, pressure non-linearity, pressure hysteresis, repeatability, thermal effect on offset, thermal effect on span and thermal hysteresis. Specification units are in percent of full scale span (%FSS).
4. Full scale span (FSS) is the algebraic difference between the digital output at the positive full scale pressure and the digital output at the negative full scale pressure.

Table 2. Environmental Specifications

Parameter	Characteristic
Humidity	0% to 95% RH non-condensing
Vibration	10 G at 20 Hz to 2000 Hz
Shock	100 G for 11 ms
Life	1 million cycles minimum

Table 3. Operating Specifications

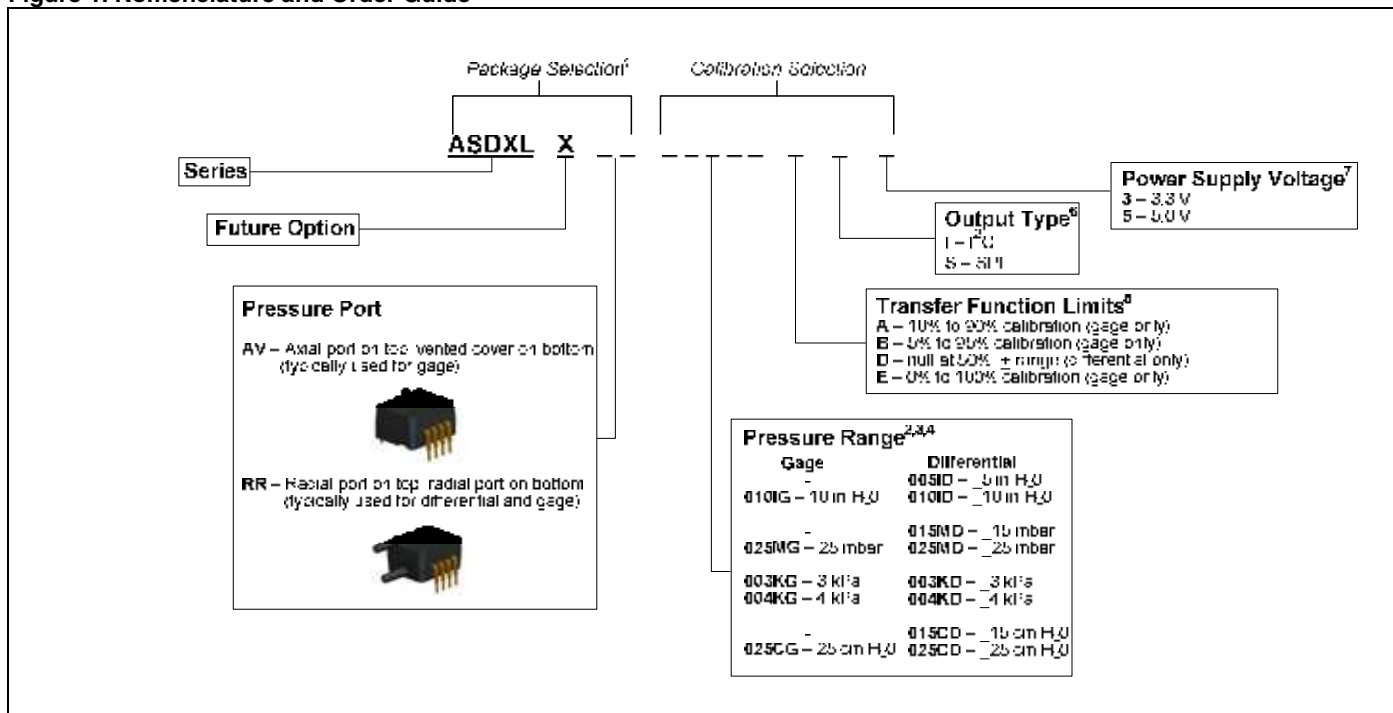
Parameter	Min.	Typ. ⁴	Max.	Unit
Supply voltage:				Vdc
3.3 V	3.0	3.3 ¹	3.6	
5.0 V	4.75	5.0 ¹	5.25	
Supply current	2.0	3.5	5.0	mA
Compensated temperature range ⁵	0 [32]	-	85 [185]	°C [°F]
Operating temperature range ⁶	-20 [-4]	-	105 [221]	°C [°F]
Proof pressure ²	40	-	-	in H ₂ O
Burst pressure ³	80	-	-	in H ₂ O
Startup time (power up to data ready)	-	2.8	7.3	ms
Response time	-	0.46	-	ms
I ² C address	-	0x28	-	hex
Output resolution	12	-	-	bits

Notes:

1. The sensor is not reverse polarity protected. Incorrect application of excitation voltage or ground to the wrong pin may cause electrical failure.
2. Proof pressure is the maximum pressure allowed without damaging calibration.
3. Burst pressure is the maximum pressure allowed without damaging the sensor.
4. Typical performance, 1 sigma.
5. The compensated temperature range is the temperature range (or ranges) over which the sensor will produce an output proportional to pressure within the specified performance limits.
6. The operating temperature range is the temperature range over which the sensor will produce an output proportional to pressure but may not remain within the specified performance limits.

Compensated Digital Output

Figure 1. Nomenclature and Order Guide



Notes:

- Other package combinations are possible, please contact Honeywell Customer Service.
- The pressure range defines the pressure measurement units used during sensor calibration. Custom pressure ranges are available, please contact Honeywell Customer Service.
- The pressure units (in H₂O, kPa, mbar, cm H₂O) define the units used during calibration and in the application.
- See Table 4 for an explanation of sensor types.

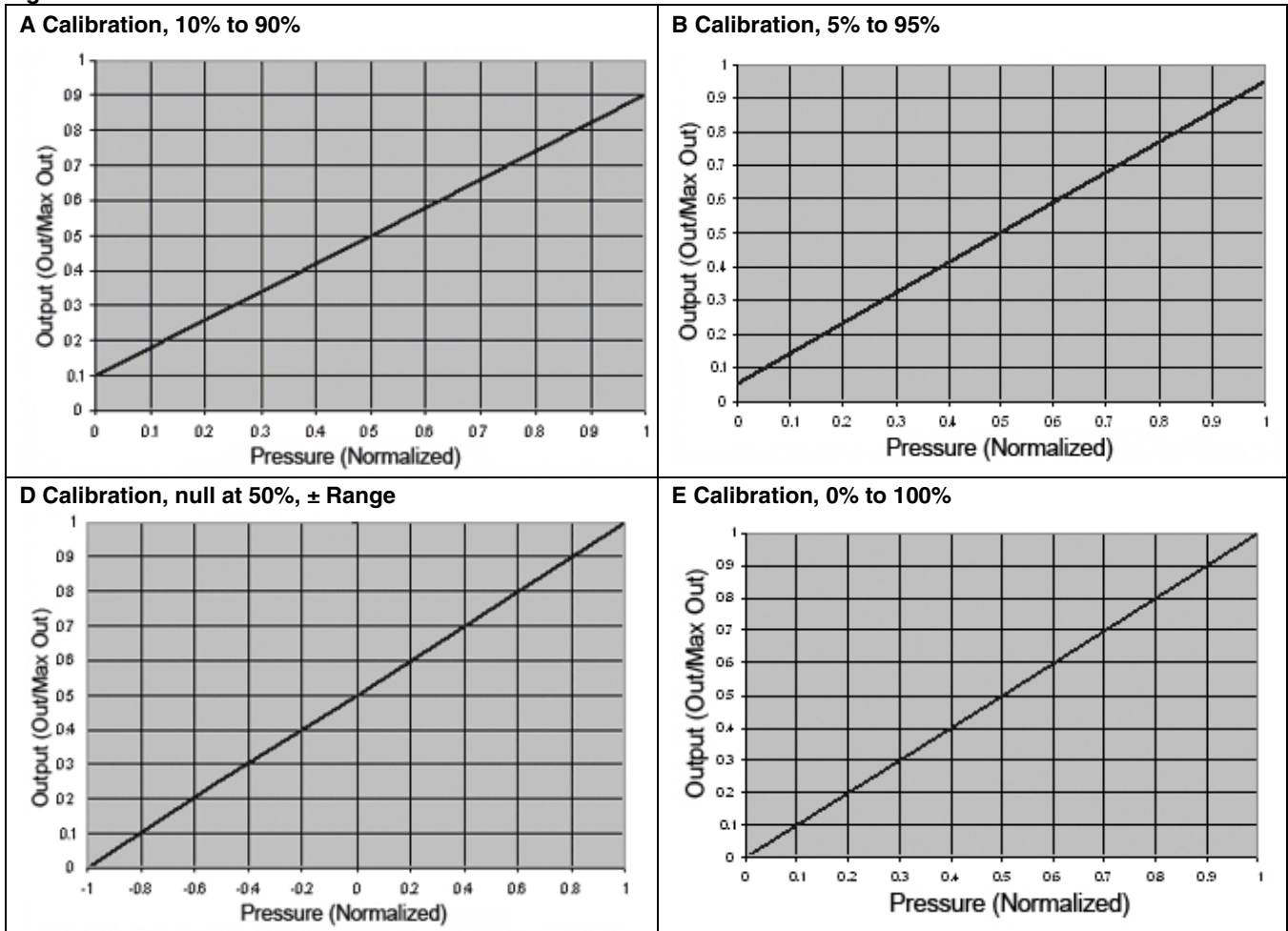
Table 4. Sensor Types

Type	Description
Gage	Reference to atmospheric pressure. Is affected by changes in atmospheric pressure.
Differential	Pressure is applied to both sides of the sensing diaphragm.

- The transfer function limits define the output of the sensor at a given pressure input. By defining the pressure range, the output at null pressure and the output at full scale pressure, the complete transfer curve for the sensor is defined.
 - Null pressure is atmospheric pressure for a gage sensor and any pressures that are equivalent on both ports of a differential pressure sensor. Full scale pressure is the maximum operating pressure of the sensor.
 - Care should be taken when selecting the transfer function limits for a sensor. For example, a 0% to 100% (E) calibration is not suitable when measurement is at null pressure and full scale pressure is important. Instead, a 5% to 95% (B) calibration should be selected to prevent potential output clipping due to sensor error (up to 2% FSS) causing resolution loss in these regions of operation. A 0% to 100% transfer function is acceptable where guard bands have already been designed into the pressure range limits.
 - See Figure 2 for a graphical representation of each calibration.

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Figure 2. Transfer Function Limits



- For the 14 bit digital output, Table 5 provides the output of the sensor at significant percentages. These outputs are valid at the rated input voltage of the sensor.

Table 5. Sensor Output at Significant Percentages

% Output	Digital Counts (dec)	Digital Counts (hex)
0%	0	0x0000
5%	819	0x0333
10%	1638	0x0666
50%	8192	0x2000
90%	14746	0x399A
95%	15565	0x3CCD
100%	16383	0x3FFF

- The output type defines which communication protocol the sensor uses to communicate. The available protocols are I²C or half duplex SPI (sensor acts only as a slave). This communication protocol is not field selectable, and must be defined when ordering the sensor. For I²C communications, all communication must be done using the default address of 0x28.
- Ratiometricity of the sensor (the ability of the output to scale to the input voltage) is achieved at the specified operation voltage. This means that accuracy of a sensor intended for 3.3 V operation will not be achieved when used outside the 3.0 V to 3.6 V operating window. Other custom supply voltages are available, please contact Honeywell Customer Service.

Compensated Digital Output

Completed Catalog Listing Example

Figure 3 shows catalog listing ASDXLXRR010IGA13. It is an RR package, 10 in H₂O gauge sensor, with I²C output and 3.3 V operation using a 10% to 90% calibration.

Figure 3. ASDXLXRR010IGA13

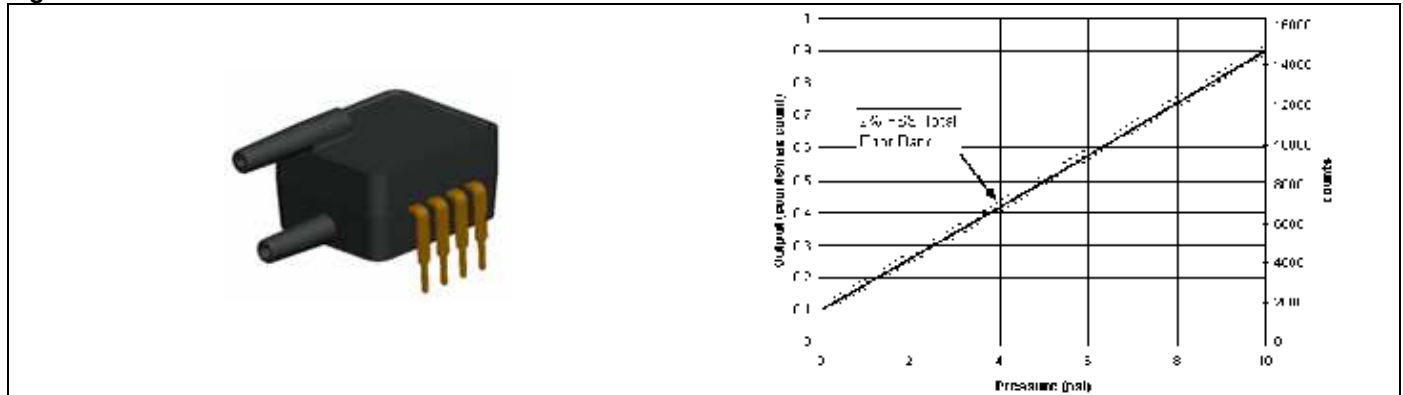


Figure 4. Dimensional Drawings (For reference only: mm [in].)

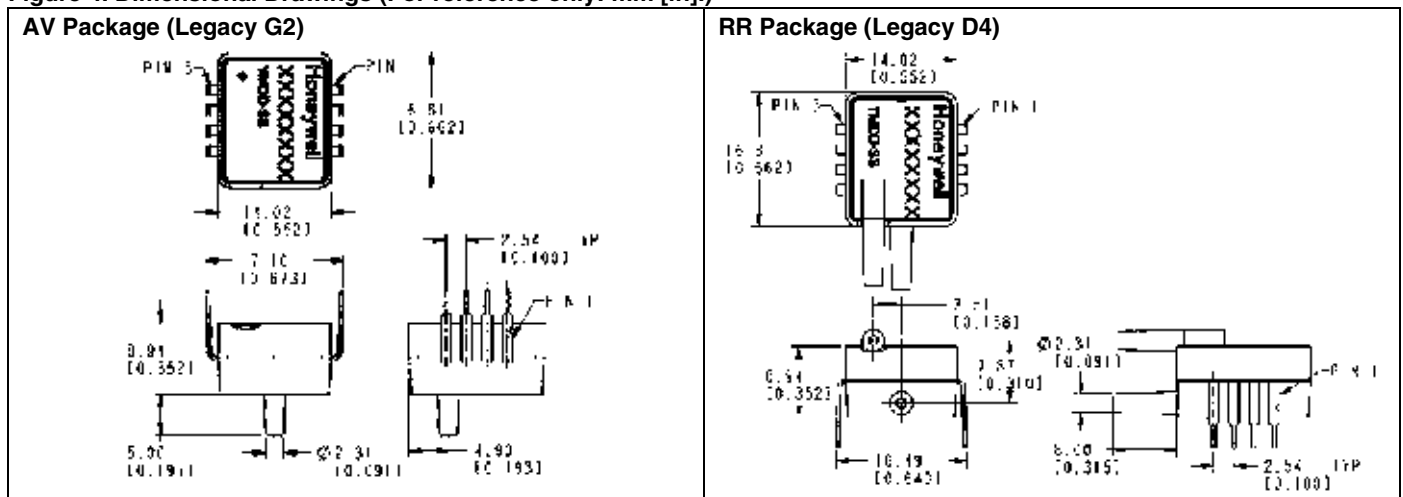


Table 6. Pinout

I ² C				SPI			
Pin	Definition	Type	Description	Pin	Definition	Type	Description
1	SDA	digital I/O	serial bidirectional data; data is clocked in or out on clock edge of SCL	1	MISO	digital output	“Master In Slave Out” - serial output data; data is clocked out on clock edge of SCK
2	SCL	digital input	serial clock input; used to clock data on SDA	2	SCK	digital input	serial clock input; used to clock data on MISO
3	GND	supply	power supply ground	3	GND	supply	power supply ground
4	N/C	not used	do not connect in the application	4	N/C	not used	do not connect in the application
5	SS	digital output	interrupt signal (conversion complete output)	5	SS	digital input	slave select
6	VDD	supply	power supply source	6	VDD	supply	power supply source
7	N/C	not used	do not connect in the application	7	N/C	not used	do not connect in the application
8	N/C	not used	do not connect in the application	8	N/C	not used	do not connect in the application

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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