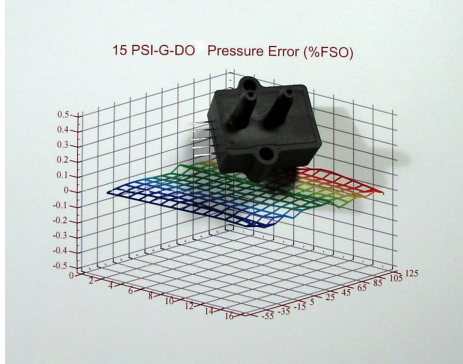


Digital Output Pressure Sensors

FOR OPERATION IN "SLAVE" MODE



Features

- 1" H₂O to 100 PSI Pressure Ranges Available.
- All Combined Errors Over Temperature Less Than 0.1%, Typical
- Wide -20 to 85°C Compensated Temperature Range
- Conversion time of less than 10 msec
- Address multiple sensors

Applications

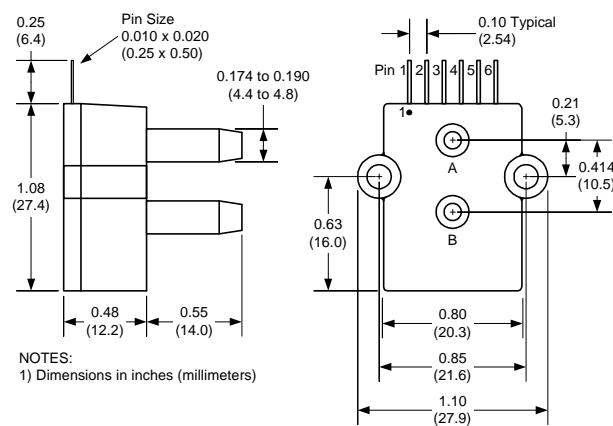
- Medical
- Industrial
- Environmental

Product General Description

The Digital Output pressure sensors are based upon a proprietary surface mapping technology to produce a fully digital output that virtually eliminates all repeatable errors over temperature and pressure. This series provides a 16 bit (12 bit resolution) digital serial output with superior offset, span and linearity characteristics. The output is SPI (slave) compatible.

This series is intended for use with non-corrosive, non-ionic working fluids such as air, dry gases and the like. All signals are 5V TTL/CMOS compatible.

Physical Dimensions



Pin Descriptions

Pin Label	Description
1 Vcc	+5V power supply input
2 Data	Data output
3 Clock	Clock Input
4 Mode	Mode/Test Input (must be tied high)
5 CS	Chip Select
6 Ground	Ground for power and signals

Absolute Maximum Ratings

Supply Voltage (Vcc)	7Vdc
Voltage on Any Pin with Respect to Gnd	-0.6 to Vcc+0.6V
Common-mode pressure	50 psig
Lead Temperature (soldering 2-4 sec.)	250°C

Environmental Specifications

Operating Voltage	+4.75Vdc to +5.25Vdc
Compensated Temperature	-20° C to +85° C
Operating Temperature	-25 to +90° C
Storage Temperature	-40 to 125° C
Humidity Limits	0 to 95% RH (non condensing)

Special Part Numbers

Part Definitions

Part Number	Operating Pressure	Units	FSO ⁽²⁾	Digital Span	Proof	Burst
10 INCH-D-DSLAVE	-10 to 10	inH2O	10	⁽⁴⁾	Pressure	Pressure
5 PSI-D-DSLAVE	-5 to 5	PSI	5	1	200 inH2O	300 inH2O
15 PSI-A-DSLAVE	0 to 15	PSIA	15	1	10 PSI	30 PSI
				2	60 PSI	120 PSI

General Performance Characteristics (All Models)

Parameter ⁽¹⁾	Minimum	Nominal	Maximum	Units
Resolution	12	--	--	Bit
Update Rate	--	--	4	msec
Response Delay	--	1.5	2.2	msec
Supply Current	--	8	12	mA

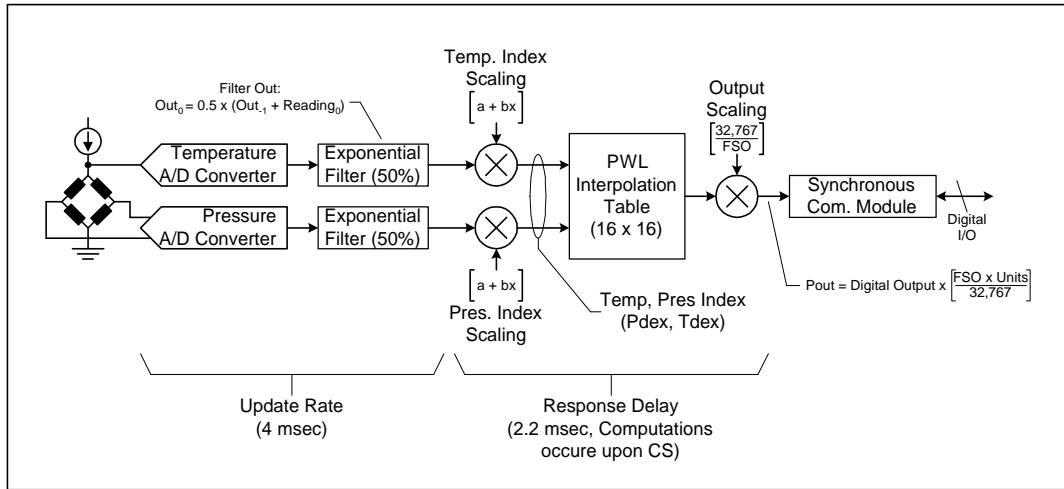
Performance Characteristics for 10 INCH-D-DSLAVE

Parameter ⁽¹⁾	Minimum	Nominal	Maximum	Units
Overall Accuracy ⁽⁵⁾	--	0.25	0.5	%FSO
Long Term Drift (one year)	--	--	0.5	%FSO
Offset Position Sensitivity (1g)	--	--	0.03	%FSO
Offset Warm-up Shift ⁽³⁾	--	--	0.25	%FSO

Performance Characteristics for 5 PSI-D-DSLAVE & 15 PSI-A-DSLAVE

Parameter ⁽¹⁾	Minimum	Nominal	Maximum	Units
Overall Accuracy ⁽⁵⁾	--	0.10	0.25	%FSO
Long Term Drift (one year)	--	--	0.25	%FSO

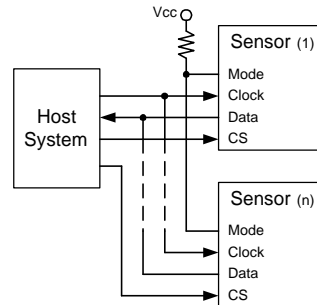
Internal Model



Typical Configuration

Synchronous Slave Communications

Typical synchronous communications configuration. The Mode pin is interrogated at power up and must be tied high. This mode supports multiple sensors by using the CS line.



Specification Notes

- NOTE 1: UNLESS OTHERWISE SPECIFIED, ALL PARAMETERS ARE MEASURED AT 5.0 VOLT SUPPLY, POSITIVE PRESSURE APPLIED TO PORT B.
- NOTE 2: THE DIGITAL OUTPUT IS A 16 BIT SIGNED BINARY OUTPUT IN A TWO'S COMPLIMENT FORMAT. THE APPLIED PRESSURE IS COMPUTED USING THE PRESSURE CONVERSION FORMULA (BELOW). FSO AND UNITS ARE FOUND IN THE PART DEFINITIONS (PREVIOUS PAGE).
- NOTE 3: SHIFT IS WITHIN THE FIRST HOUR OF EXCITATION APPLIED TO THE DEVICE.
- NOTE 4: DIGITAL SPAN IS DEPENDENT ON THE SPECIFIED PRESSURE RANGE. REFER TO THE DIGITAL SPAN TABLE (BELOW) TO IDENTIFY THE DIGITAL SPAN OF THE SPECIFIC MODEL. IN THE EVENT OF AN OVER-PRESSURE OR UNDER-PRESSURE CONDITION, THE DIGITAL OUTPUT WILL BE ONE COUNT HIGHER OR ONE COUNT LOWER (RESPECTIVELY) THAN THE LISTED DIGITAL SPAN TO INDICATE THE CONDITION. ERROR BIT-8 WILL ALSO BE SET TO INDICATE THIS CONDITION.
- NOTE 5: OVERALL ACCURACY INCLUDES THE COMBINED EFFECTS OF OFFSET AND SPAN SHIFTS OVER TEMPERATURE, LINEARITY, HYSTERESIS, AND OFFSET AND SPAN CALIBRATION.

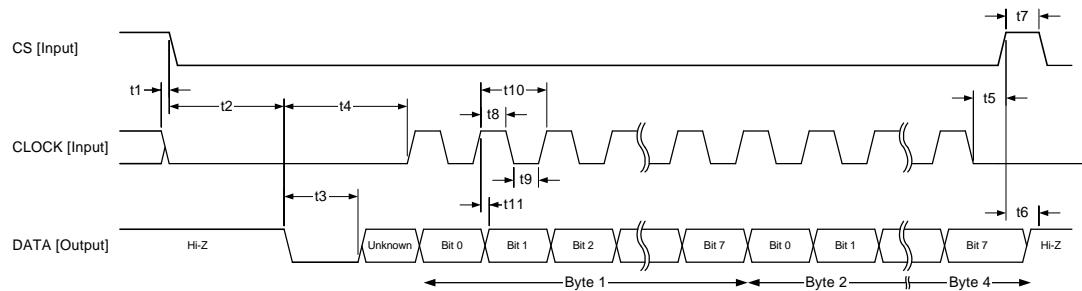
Pressure Conversion Form

$$P_{out} = \text{Digital Output} \times \left[\frac{\text{FSO} \times \text{Units}}{32,767} \right]$$

Digital Span Table

Span	High Resolution
1	-32,767 to 32,766
2	-999 to 32,766

Timing Diagram



Timing Specifications

Ref	Parameter	Min	Typ	Max	Units
t1	Clock Inactive Setup	0	--	--	msec
t2	CS to Data Available	--	1.5	2.2	msec
t3	Data Available Width	--	25	--	usec
t4	Data Available to Clock	40	--	--	usec
t5	Clock to Deselect	0	--	--	usec
t6	Deselect to Hi-Z	0	--	10	usec
t7	Reselect Interval	10	--	--	usec
t8	Clock High Width	400	--	--	nsec
t9	Clock Low Width	400	--	--	nsec
t10	Clock Interval	1.0	--	--	usec
t11	Clock to Data	--	--	400	nsec

Byte Definition Table

Byte #	Description
Byte 1	Digital pressure output (low byte)
Byte 2	Digital pressure output (high byte)
Byte 3	Error code byte (low byte)
Byte 4	Error code byte (high byte)

Error Codes

Errors are indicated with a double byte that follows the digital pressure output. All bits being zero indicate no errors. Refer to the table to the right for the specific error code definitions. Also, refer to the internal model for correlating the error code to the internal process being performed.

Error Code Table

Bit 0	: Part not compensated
Bit 1	: Tdex Overflow
Bit 2	: Tdex Over-range
Bit 3	: Pdex Overflow
Bit 4	: Pdex Over-range
Bit 5	: PWL Overflow
Bit 6	: Scaling Overflow
Bit 7	: High resolution overflow
Bit 8	: Pressure Output Limited to Specified Value
Bit 9 through Bit 15	: Reserved