



- 0-150°C Operating Temperature
- Calibrated Over The Operating Temperature Range
- Compact Absolute Pressure Sensor
- 1ms Response Time
- Pressure/temperature read-out
- 3.3V Operation
- ± 0.10% Linearity Error
- ± 0.2% Full Scale Error
- 15 Bit Digital Output – SPI
- 6,000 PSI Pressure Range
- Media – Harsh Liquid, Air, & Gas

#### DESCRIPTION

The APS200 is a pressure transducer manufactured for monitoring pressure and temperature in down hole applications. The continuous operating temperature is 150°C with external pressures of up to 8,000 PSI. The 316L stainless steel media isolated port design allows for pressure measurement of liquid or gas media.

The APS200 series utilizes MEMS piezo-resistive sensors pressurized on the passive backside of the SS diaphragm which has superior long term stability and accuracy (.10% Linearity).

The design is simple and proves value for OEM customers. Please contact the factory for custom design availability.

#### APPLICATIONS

- Oil and Gas Wells
- Water Wells
- Industrial Automation
- Compressor
- Pneumatic
- Hydraulic

### Maximum Environmental Ratings

Operating Temperature ..... 0°C to 150°C  
 Storage Temperature Range .....-55°C to 175°C

Proof pressure ..... 3x full scale pressure  
 Burst pressure ..... 5x full scale pressure

### Package

The body is made of 316L stainless steel, which is tolerant of most harsh chemicals.

### Stability

The silicon MEMS pressure sensor is welded into a 316 stainless media isolated housing. That in turn is welded in the 316 stainless housing.

Additional stability is gained from a 2 week factory burn-in.

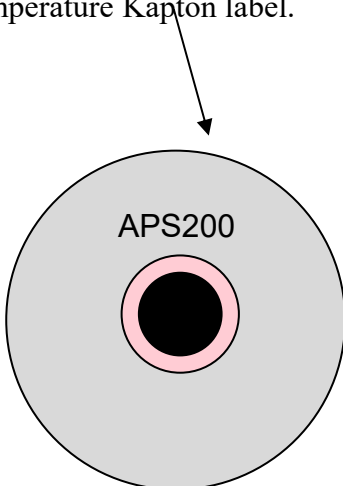
### Pressure port

The pressure port is a 1/4" NPT fitting and the port for the electrical connection is 1/4" compression fitting.

### Cover Marking

#### Part Number

Serial Number and date code is added to the side of the cover on a high temperature Kapton label.



### Media

The 316 media isolated pressure port is tolerant to most media including oil, air, gas, some corrosive media, and salt water.

### Wetted parts

The wetted surfaces are composed of 316L stainless steel.

### Pressure Range

The standard pressure range is 6,000.

### Soldering

The electrical connection wires for the APS200 sensor can be easily attached to a connector or soldered directly to a board.

## APS200 Digital Output Operational Characteristics

$V_+ = 5V$ ,  $V_- = 0V$ , Temperature = 25°C

PARAMETER	SYMBOL	Min	Typ	Max	UNITS
Supply Voltage	$V_{DD}$	2.7	3.3	5.5	V
Operating Temperature	$T_s$	0		175	°C
Supply Current (Note 1)	$I_{DD}$	70	120	2500	μA
Sleep Mode Supply Current	$I_{stbby}$		.5	32	μA
<b>Accuracy</b>					
Pressure Error		-0.2		0.2	%Full Scan
Non-Linearity (Note 2)		-.1		.1	%Full Scan
Temperature Error (Note 3)		-2		2	°C
Response Time	$t_R$	1	2	20	ms
<b>Analog-to-Digital</b>					
Resolution	ADC		15		Bits
Temperature Resolution			0.1		°C
<b>SPI Interface</b>					
Input Low Level	$V_{in\_low}$	0		.2	Vdd
Input High Level	$V_{in\_high}$	.8		1	Vdd
Output Low Level	$V_{o\_low}$			.1	Vdd
Load Capacitance @SDA	$C_{sda}$ @400khz			200	pF
Pull-Up Resistor	$R_{I2C\_PU}$	500			Ω
Input Capacitance (each pin)	$C_{I2C\_in}$			10	pF

Notes: 1) Measured at zero pressure. 2) Defined as best straight line 3) Measured from 0°C to 150°C.

## Electrical Pin Configuration (Digital [SPI])

Yellow - SCLK  
 Green - MISO  
 White- INT/SS  
 Red - V+  
 Black - GND  
 Orange – MOSI

**Fig. 1**

**Digital Interface – SPI**

- SPI Clock Speed: 125kHz
- Data Order: MSB First
- Clock Polarity: SCK low, idle
- Clock Phase: sample trailing edge
- Chip Select: CS on, idle high

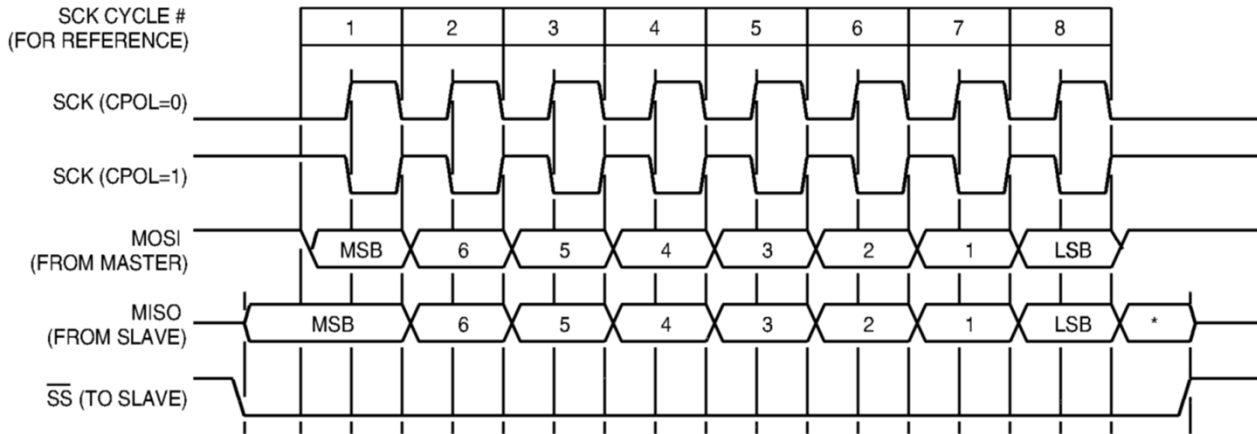


Figure 2

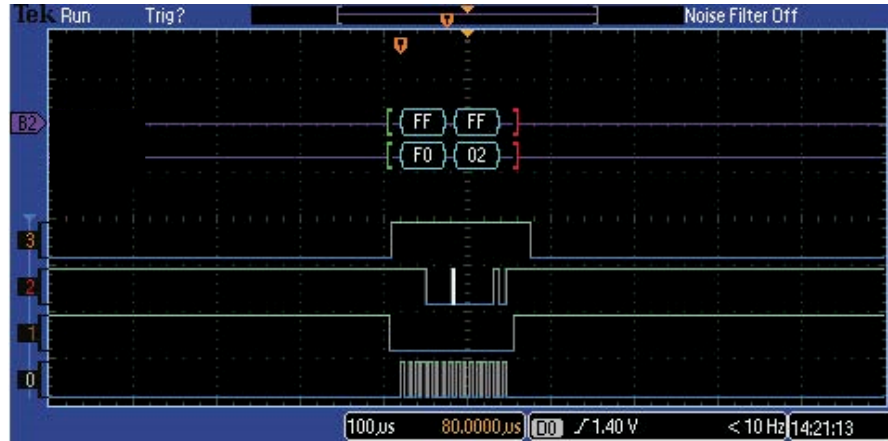
Nr.	Parameter	Symbol	min	typ	max	Unit	Conditions
1	SCK to internal clock frequency ratio	$f_{SCK\_CLK}$			$f_{CLK}/5$		$f_{SCK}$ must be 5 times smaller than $f_{CLK}$
2	MISO hold time after SCK sample slope	$t_{SPI\_HD\_MISO}$	200			ns	
3	MOSI setup time before SCK sample slope	$t_{SPI\_SU\_MISO}$	$2/f_{CLK}$				
4	/SS setup time before SCK sample slope	$t_{SPI\_SU\_SS}$	10			ns	
5	/SS hold time after SCK sample clk	$t_{SPI\_HD\_SS}$	$1/f_{SCK\_CLK}^*$				

Figure 3

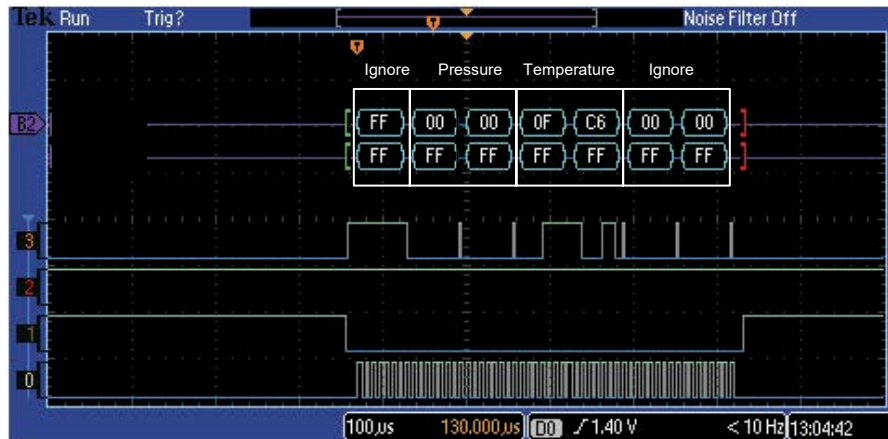
# Sensor Outputs

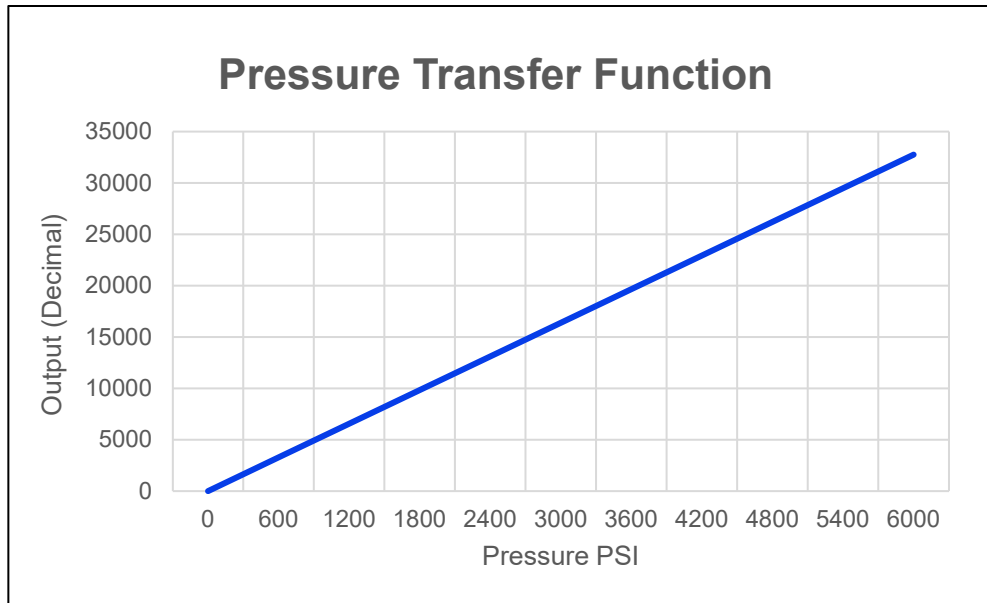
## Digital Interface - SPI

**Read Command**  
Send 0x02



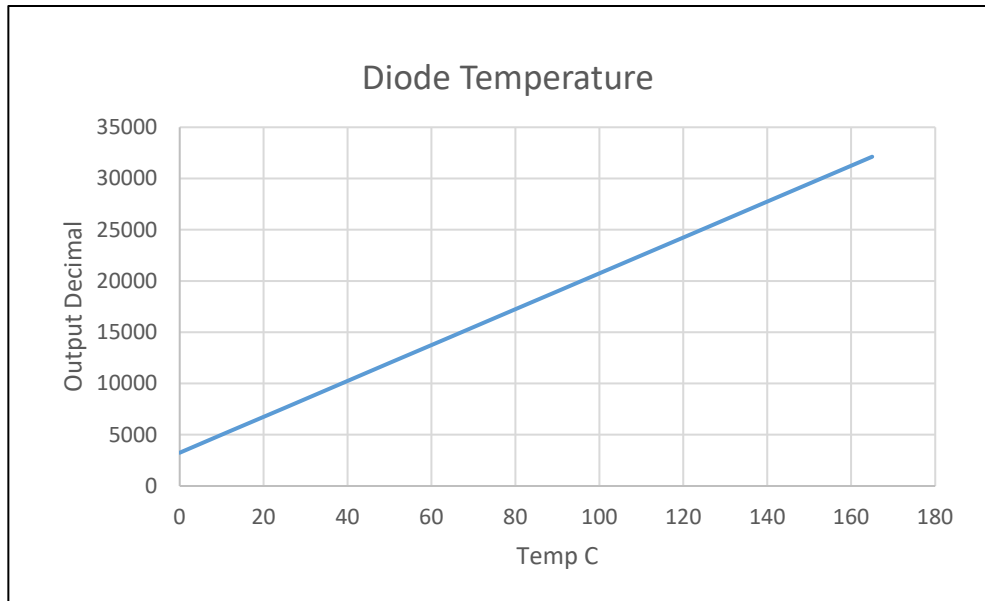
**Data Output**  
CS/ (1) Pulled Low  
Starts Data Output





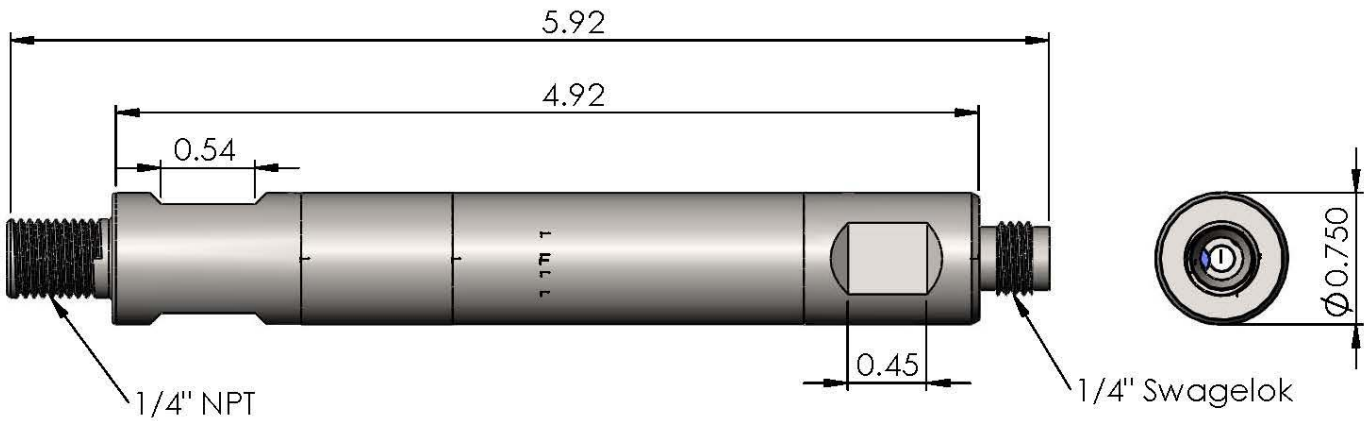
PSI	% Output	Decimal	Hex
0	0	0	0 x0000
600	10	3277	CCC
1200	20	6554	1999
1800	30	9830	2666
2400	40	13107	3333
3000	50	16384	4000
3600	60	19661	4CCC
4200	70	22938	5999
4800	80	26214	6666
5400	90	29491	7333
6000	100	32768	8000

## Sensor Outputs



Temp C	Decimal	Hex
0	3250	CB2
25	7625	1DC9
50	12000	2EE0
75	16375	3FF7
90	19000	4A38
100	20750	510E
125	25125	6225
150	29500	733C
165	32125	7D7D

## Mechanical Dimensions (inches)



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