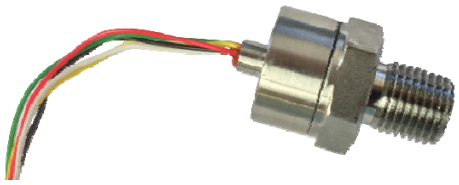
High Pressure Sensor
Digital Output – 175ºC

APS73



- 0-175°C Operating Temperature
- 0.875” Hex
- Media Isolate Sensor Element
- 1ms Response Time
- Pressure/temperature read-out
- 0.25% Total Error Band
- Digital Output (14 Bit) – SPI
- 1,000-6,000 PSIA Pressure Range
- Media – Harsh Liquid, Air, & Gas

DESCRIPTION

The APS73 is a pressure transducer manufactured for a high operating temperature range for the most challenging of applications. This silicon pressure transducer was designed for demanding industrial and commercial applications. The stainless steel media isolated port design allows for pressure measurement of liquid or gas media.

The APS73 series utilizes MEMS piezo-resistive sensors pressurized on the passive backside of the stainless steel diaphragm which has superior long term stability and accuracy (.15% Linearity).

The design is simple and proves value for OEM customers. Please contact us for Custom design availability.

APPLICATIONS

- Military/Aerospace
- Industrial Automation
- HVAC
- Engine Controls
- Compressors
- Pneumatic/Hydraulic Systems

Maximum Environmental Ratings

Operating Temperature ……. 0°C to 175°C
Storage Temperature Range ……..-55°C to 190°C

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

Application Information

Package

The one piece body design is made of 316L stainless steel, which allows for easy manufacturability and long term stability.

Stability

The silicon MEMS pressure sensor is welded into a 316 stainless media isolated housing. That in turn is mounted in the 316 stainless hex housing with the threaded port.

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

Pressure port

1/4 -18 NPT or 7/16-20 UNF.

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 1,000-6,000 PSIA.

Soldering

The electrical connection wires for the APS73 sensor can be easily attached to a connector or soldered directly to a board.

APS73 Digital Output Operational Characteristics

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

PARAMETER	SYMBOL	Min	Typ	Max	UNITS
Supply Voltage	V_{DD}	2.7	5	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_{stdby}		.5	32	µA
Accuracy					
Total Error Band		-0.25		0.25	%Full Scan
Non-Linearity (Note 2)		-.1		.1	%Full Scan
Temperature Error (Null and Span) (Note 3)		-1	.5	1	C
Response Time	t_R	1	2	20	ms
Analog-to-Digital					
Resolution	ADC		14		Bits
Temperature Resolution			0.1		C
SPI Interface					
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	Csda @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 - SCL/SCLK

Green - SDA/MISO

White- INT/SS

Red- V+

Black GND

Fig. 1

Digital Interface – SPI

SPI is available only as half duplex (read-only from the APS73). The factory default is negative edge detect with a clock frequency of 4 MHz.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
SCLK clock frequency (4MHz clock)	f_{SCL}	50		800	kHz
SCLK clock frequency (1MHz clock)	f_{SCL}	50		200	kHz
SS drop to first clock edge	t_{HDSS}	2.5			µs
Minimum SCLK clock low width	t_{LOW}	0.6			µs[1]
Minimum SCLK clock high width	t_{HIGH}	0.6			µs[1]
Clock edge to data transition	t_{CLKD}	0		0.1	µs
Rise of SS relative to last clock edge	t_{SUSS}	0.1			µs
Bus free time between rise and fall of SS	t_{BUS}	2			µs

[1] *Combined low and high widths must equal or exceed minimum SCLK period.*

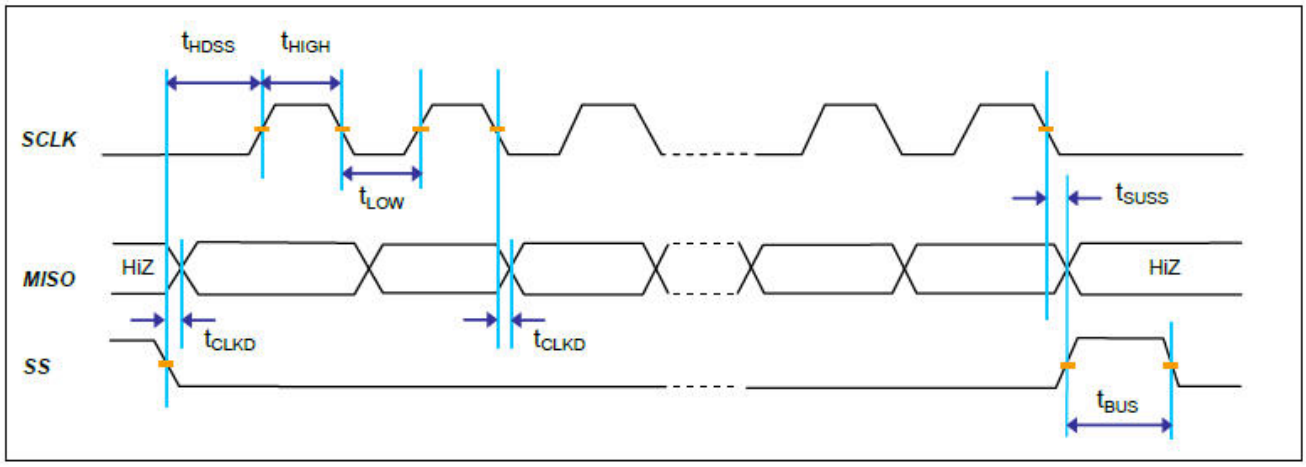


Figure 2

SPI Read

SPI Read Operations

For simplifying explanations and illustrations, only falling edge SPI polarity will be discussed in the following sections. The SPI interface will have data change after the falling edge of SCLK. The master should sample MISO on the rise of SCLK. The entire output packet is 4 bytes (32 bits). The high bridge data byte comes first, followed by the low bridge data byte. Then 11 bits of corrected temperature (T[10:0]) are sent: first the T[10:3] byte and then the {T[2:0],xxxxx} byte. The last 5 bits of the final byte are undetermined and should be masked off in the application. If the user only requires the corrected bridge value, the read can be terminated after the 2nd byte. If the corrected temperature is also required but only at an 8-bit resolution, the read can be terminated after the 3rd byte is read.

Figure 3.8 SPI Output Packet with Falling Edge SPI_Polarity

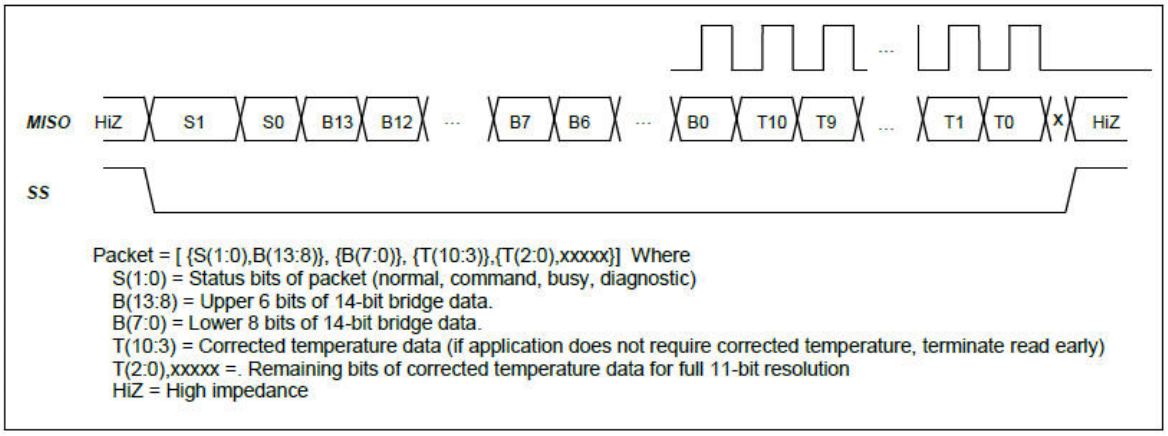
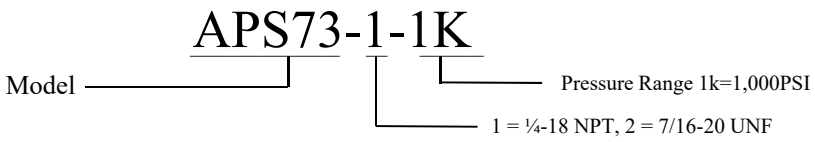


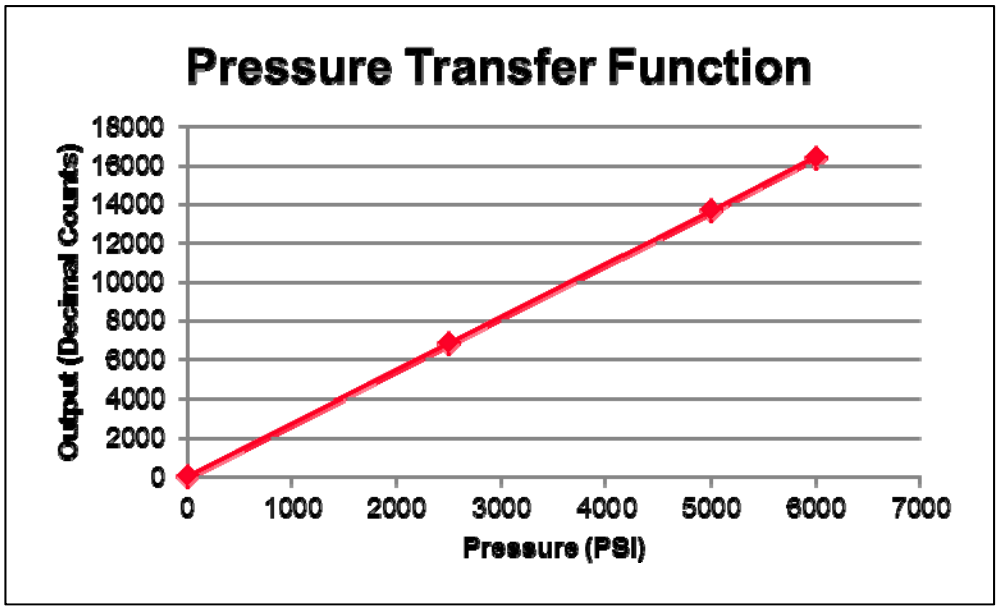
Figure 3

Part Number Configuration



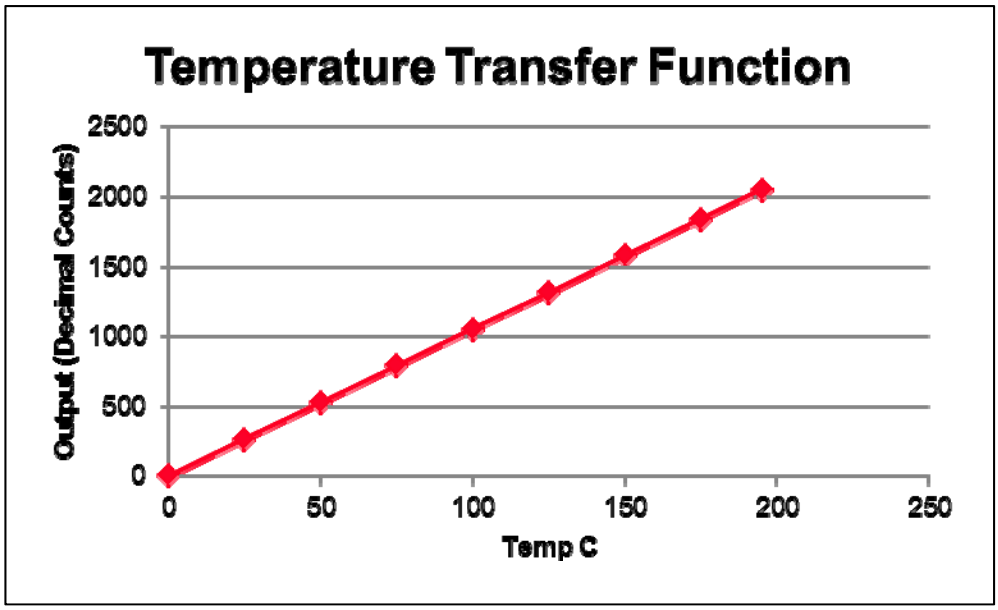
Standard Part Numbers

Model	Pressure Range PSI	Type	Max Over Pressure
APS73-1-1K	1000	Abs	2500
APS73-1-3K	3000	Abs	5000
APS73-1-5K	6000	Abs	7500



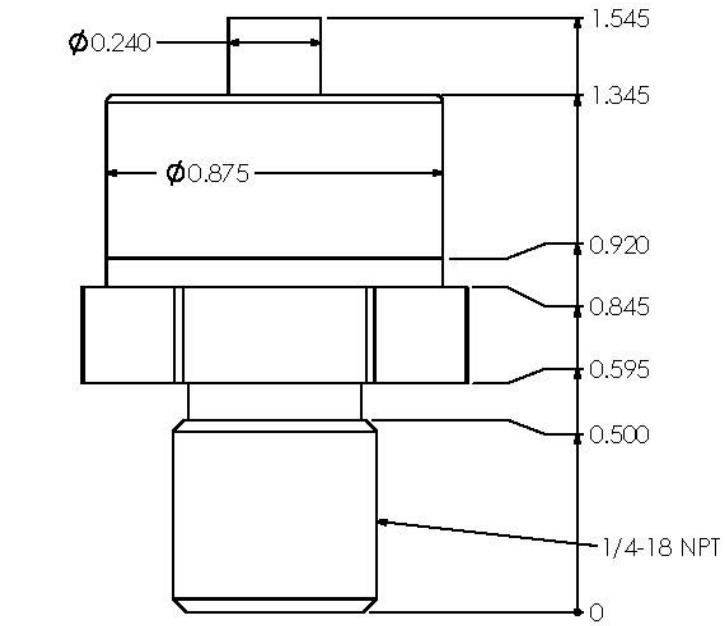
PSI	PSI	PSI	% Output	Decimal	Hex
0	0	0	0	0	0 x0000
100	300	600	10	1638	0 x 0666
200	600	1200	20	3277	0 x 0CCD
300	900	1800	30	4915	0 x 1333
400	1200	2400	40	6553	0 x 1999
500	1500	3000	50	8192	0 x 2000
600	1800	3600	60	9830	0 x 2666
700	2100	4200	70	11468	0 x 2CCC
800	2400	4800	80	13106	0 x 3332
900	2700	5400	90	14745	0 x 3999
1000	3000	6000	100	16383	0 x 3FFF

Sensor Outputs

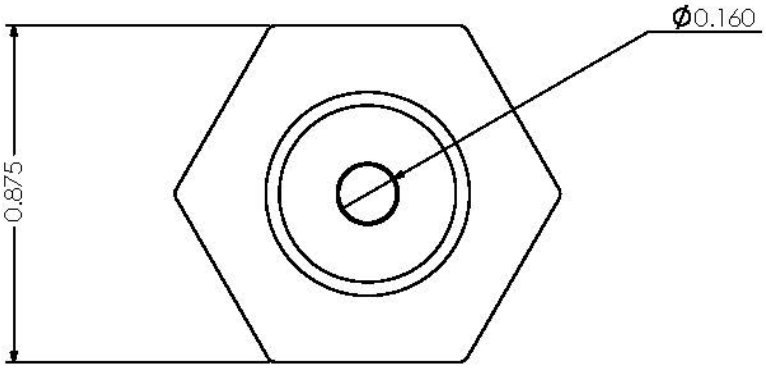


Temp C	% Output	Decimal	Hex
0	0	0	0 x0000
25	13	263	0 x 0107
50	26	525	0 x 020D
75	38	788	0 x 0314
100	51	1050	0 x 041A
125	64	1313	0 x 0521
150	77	1575	0 x 0627
175	90	1838	0 x 072E
195	100	2047	0 x 07FF

Mechanical Dimensions (inches)



SCALE 2 : 1



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