

## ESS320 Piezoresistive OEM Differential Pressure Sensor



■ Piezoresistive Silicon Chip Employed ■ Perfect Long Term Stability ■ MEMS Technology ■ Diameter:  $\Phi$ 19mm

### Description

#### Brief Introduction

ESS320 OEM Differential Pressure Sensor is a standard and most popular sensor applied in air and liquid pressure measuring. A high sensitivity silicon pressure chip is employed in the sensor. The housing is filled with oil for pressure transmission. The most important specification for industry application is long term stability. ESS320 sensor is designed for industry application with perfect long-term stability

#### Diaphragm and pressure range

The diaphragm diameter has tight relation with pressure measured. Low pressure requires large diameter and high pressure needs small diameter. This is caused by oil expansion during temperature changing. It creates internal pressure due to the resistance of the diaphragm. The smaller diaphragm will create large internal pressure, and it is difficult to make zero compensation.

#### Caution:

- The metal diaphragm is very thin (approx. 20  $\mu$ m), so do not touch it with hard or sharp objects under any circumstances. Even slight deformations can affect the pressure signal!
- In the event of pressure overloads, please note that even pressure pulses < 0,1 us are “detected” by the pressure sensor chip. Short, high pressure peaks can cause the sensor chip to break.

### Standard Range

Code	Range	Overload	Break	Pressure
0~10KPa	0~0.01MPa	300%FS	600%FS	Differential
0~20KPa	0~0.02MPa	300%FS	600%FS	Differential
0~35KPa	0~0.035MPa	300%FS	600%FS	Differential
0~70KPa	0~0.07MPa	200%FS	600%FS	Differential
0~100KPa	0~0.1MPa	200%FS	500%FS	Differential
0~250KPa	0~0.25MPa	200%FS	500%FS	Differential
0~400KPa	0~0.4MPa	200%FS	500%FS	Differential
0~600KPa	0~0.6MPa	200%FS	500%FS	Differential
0~1.0 MPa	0~1.0MPa	200%FS	300%FS	Differential
0~1.6 MPa	0~1.6MPa	200%FS	300%FS	Differential
0~2.5 MPa	0~2.5MPa	150%FS	300%FS	Differential

**Notes:** 10kPa, 35kPa, 70kPa, 100kPa, 250kPa, 400kPa, 600kPa, 1MPa, 1.6MPa, 2.5MPa (bar and psi unit available)

### Technical Parameters

Parameters	Typ.	Max.	Unit
Nonlinearity	$\pm$ 0.2	$\pm$ 0.3	%FS, BFSL
Hysteresis	$\pm$ 0.03	0.05	%FS
Repeatability	$\pm$ 0.03	0.05	%FS
Zero Output	$\pm$ 1	2	mV DC
FS Output	85	100	mV DC
Excitation	1.5		mA
Heat Hysteresis	$\pm$ 0.05	0.075	%FS
Zero Temp. Drift*(1.5mA@-10~70°C C)		1.5	%FS,@25°C
Sensitivity Temp. Drift**(1.5mA@-10~70°C		1.5	%FS,@25°C
Long-term Stability	$\pm$ 0.2	$\pm$ 0.3	%FS/year

*Nonlinearity calculated based on least square method*

*\*The typical value of 0~10kPa and 0~20kPa's zero temperature*



### Construction Performance

- Diaphragm:** Stainless Steel 316L
- Housing:** Stainless Steel 316L
- Pressure leading tube:** Stainless Steel 316L
- O Ring:** Φ16\*1.8mm (Ding cyanide or fluororubber)
- Measuring Medium:** Which is compatible with SS316L, Ding cyanide & fluororubber
- Packing Medium:** Silicon Oil
- Net weight:** 0.1kg

### Specification

Parameters	Min	Typ	Max	Units	Notes
Sensitivity	13.2	20	26.5	mV/V@FS	
Zero Pressure Output	-6.0		8.0	mV/V	①
Pressure Non-Linearity	-0.10		0.10	%Span	②
Pressure Hysteresis	-0.05		0.05	%Span	
Input/Output Resistance	3800	4400	5800	Ω	
Temp. Coefficient -Span	-1450	-1250	-1000	ppm/°C	③
Temp. Coefficient -Offset		1		uV/V/°C	③
Temp. Coefficient -Resistance	1300	1510	1750	ppm/°C	③
Thermal Hysteresis-Span	-0.025		0.25	%Span	③
Thermal Hysteresis-Offset	-0.025		0.25	%Span	③
Line (Common Mode) Pressure			1000	psi	
Line Pressure Effect on Zero			0.5	%Span/1Kpsi	
Pressure Overload			3X	Rated	④
Pressure Burst			4X	Rated	⑤
Operating Temperature	-40		+125	°C	⑥
Storage Temperature	-40		+125	°C	⑥
Vibration (10~2000Hz)			20	g	
Insulation Resistance (50Vdc)	50			M Ω	⑦
Output Load Resistance	5			M Ω	⑧
Supply Voltage		5	9.5	V	
Supply Current			1.5	mA	
Voltage Breakdown			500	Vrms	⑨
Endurance (FS@25°C)		1,000,000		Cycles	
Media Compatibility	All fluid and gasses compatible with SS316 & Nitrile				

**Notes:** Above data is based on the following parameter:  
range: 0-15psid, power supply: 5V, material of O-Ring: Viton

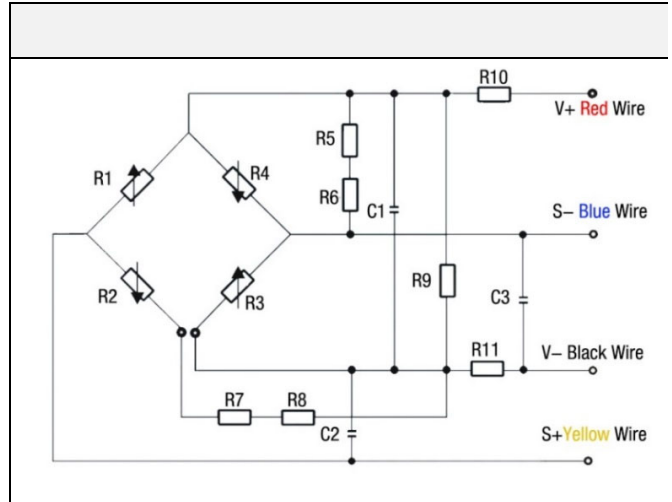
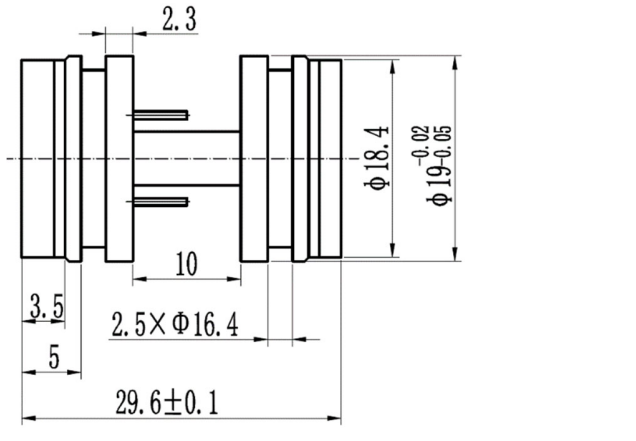
### Electric & Environment Performance

- Power supply:** ≤2mA (constant current)
- Insulation Resistance:** ≤250M Ω @250VDC
- Bridge Resistance:** 3k Ω ~6k Ω
- Electrical Connection:** Silicone shielded
- Vibration (20~5000Hz):** 20G
- Useful Time (25°C):** >1\*100 Million Times  
@Pressure Circulation(80%FS)
- Response Time:** ≤1ms (90%FS)
- Storage Temp.:** -40~+125°C
- Operating Temp.:** -40~+125°C
- Compensation Temp.:** 0~60°C
- Wire Connection:** 4 wire (typical) | 5 wire (available)  
39× Φ.015, Silicon shield

- Note**
- ① Measured at ambient.
  - ② Best fit straight line
  - ③ Over the temperature range -20 °C to +85 °C (0 °C to 50 °C for 1psi, 0 °C to 70 °C for 5psi) with Respect to 25 °C
  - ④ For high-end port, rated or 1000psi whichever is less; for low-end point, rated or 150psi whichever is less. The Maximum pressure that can be applied without changing the transducer performance accuracy.
  - ⑤ The maximum pressure that can be applied to a transducer without rupture of either the sensing element or transducer.
  - ⑥ Temperature range for cable and connector is -20 °C to +105 °C
  - ⑦ Between case and sensing element.
  - ⑧ Load resistance to reduce measurement errors due to output loading.
  - ⑨ At dry air
- Direct mechanical contact with diaphragm is prohibited. Diaphragm surface must remain free of defects (scratches, punctures, fingerprints. Etc) for device to operate properly.
- Caution is advised when handing parts with exposed diaphragms. Use protective cap whenever devices are not in used.**

## Drawing & Electrical Connection

**ESS320 OEM Piezoresistive Differential Pressure Sensor**  
Range: 10Kpa~2.5Mpa



## Ordering Procedure

ESS3	High Stable OEM Piezoresistive Sensor					
	Code	Model				
	20	OEM Piezoresistive Differential Pressure Sensor				
	Cod	Span	Co	Span	Code	Span
	R01	0~10KPa	R0	0~100KPa	R09	0~1.0 MPa
	R02	0~20KPa	R0	0~250KPa	R10	0~1.6 MPa
	R03	0~35KPa	R0	0~400KPa	R11	0~2.5 MPa
	R04	0~70KPa	R0	0~600KPa		
	Code	Pressure Type				
	D	Differential				
	Code	Power Supply				
	M	1.5mA				
	V5	5V				
	V10	10V				
	Code	Pressure connection				
	0	O-ring -NBR				
	1	O-ring -Viton				
	Code	Electric connection				
	1	Ding cyanide				
	2	Fluororubber				
ESS3	20	R03	D	M	0	2

**Note:** ① Extremely attention must be paid to sensor installation process to avoid any miss conduction that affect the sensor performance, ② please protect the diaphragm and the compensated board carefully to prevent any damage. ③ Please contact us if your requested working temperature lower than -20°C