

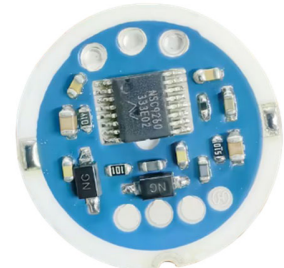
ESS505 Ceramic Capacitive Pressure Sensor FLUSH DIAPHRAGM CERAMIC | Al₂O₃ 96%



18mm * 3.5mm



21mm * 3.5mm



0.5-4.5v Ratiometric

- **Range:** 0~50bar/100bar
- **Size:** 18mm*3.5mm; 21mm*3.5mm
- **Diaphragm:** Flush Ceramic Al₂O₃ 96%
- **Capacitance :** 13-22Cx
- **Temperature drift:** 0.015%FS/°C
- **Response time:** <=2ms
- **Working Temperature:** -40...+150 °C

Description

ESS505 pressure sensors feature a **ceramic base plate** and a **flush diaphragm**, operating on the principle of **capacitance** changes resulting from the deformation of capacitor plates. The moving capacitor plate is **screen-printed onto the ceramic diaphragm** and affixed to the sensor's body, with the plate oriented towards an internal cavity. The reverse side of the diaphragm is exposed directly to the medium being measured. A specialized filter affixed to the ceramic cell (PCS) safeguards the sensor's vent hole from moisture and contaminants.

The generous **diameter (18mm-21mm)** coupled with capacitive technology enables the ESS505 to accurately measure low pressures, down to **5 bar**, while ensuring high burst pressure for dependable performance in various applications. The Al₂O₃ ceramic's **superior chemical resistance** to aggressive gases, most solvents, and acids typically obviates the need for additional protection. ESS505 sensors are available in both **gauge and absolute variants**.

When a ceramic capacitive pressure sensor element is exposed to pressure, the elastic diaphragm bends and deforms, resulting in a change in capacitance. Within its measurement range, the relationship between pressure and capacitance is linear. This capacitance change is subsequently processed by a conditioning chip, which amplifies, calibrates, and performs nonlinear fitting on the small signal output, ultimately producing either a linear analog voltage output or a digital signal that corresponds to the pressure.

For example, after signal conditioning, the output of the ESS505 cell can be amplified to a **0.5-4.5V ratiometric** voltage using the techniques of electronics on ceramic. The ESS505V model is available in two different sizes: **18*3.5mm and 21*3.5mm**.

Key Features & Benefits

- Pressure range 0-5bar-100bar
- Excellent resistance to corrosion and abrasion
- Ceramic capacitance
- High burst pressure 3X-5X
- Very low temperature drift

• Application

- Automotive and vehicle
- Industrial process control
- HVAC system
- IOT applications
- Engine oil & brake fluid,
- Gasoline & diesel

Technical Characteristics

Parameter		Units	Description											
Sensor type		-	Flush diaphragm, absolute (A), gauge (R) or sealed gauge (S)											
Technology		-	Capacitive/ratio (Ceramic Plate)											
Diaphragm material		-	Ceramic Al ₂ O ₃ 96% (standard), 99.6% or sapphire (on request)											
Weight		g	≤ 15 (ceramic cell only)											
Response time		ms	≤ 2(cell); ≤ 10(signal conditioned);											
Long term stability		%/FS	<0.25%/FSO @25°C											
ESD			Air discharge 15kV, contact discharge 8kV. (signal conditioned only);											
Capacity (Cx&Cr)		pF	50-80;											
Offset		-	Cx/Cr=1±0.07											
Life Cycles		-	>3,000,000 (cell); >5,000,000 (signal conditioned);											
Operating temperature		°C	-40...+135 (-40 °F...+275 °F)											
Storage temperature		°C	-40...+150 (-40 °F...+302 °F)											
Temperature drift		%/FS/°C	0.5~10bar: <±0.015; >=10bar: <±0.010											
Excitation voltage		V	5.0V±10% DC (signal conditioned only);											
Working current		mA	<10(signal conditioned only);											
Output signal		V	0.5-4.5V Ratiometric											
Nominal pressure FSO	bar	0.5*	1*	2*	5	10	20	35	45	70	100	*	*	
	psi	7	14	29	73	145	290	507	652	1015	1450			
Overload pressure	bar	1	2	4	10	20	40	70	90	140	200			
	psi	14	29	58	145	290	580	1015	1305	2030	2900			
Burst pressure	bar	2	3	6	25	50	100	175	225	350	500			
	psi	29	43	87	362	725	1450	2538	3263	5076	7251			
Type	-	R	A/R/	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	S			
Total thickness	mm/in					3.35±0.05~3.95±0.05/0.1318±0.0019~0.1555±0.0019 (cell only)								
	mm/in					4.25±0.05~4.85±0.05/0.167±0.0019~0.191±0.0019(signal conditioned only);								
Sensitivity	△C(pF)	-	-	-	3.5-6.5								3.1-4.8	2.0-3.5
Capacitance	Cx/100KHZ, 1.0Vrms	-	-	-	13-17								-	-
Sensing area D	/D(mm)				9.5-10									
Hysteresis+ repeatability	%/fs	-	-	-	0.2/0.4	0.2/0.5	0.2/0.5	0.2/0.5	0.2/0.5	0.4/0.9 8	0.5/1.0	0.5/1.0	0.5/1.0	
Non linearity	%/fs	-	-	-	6.0-9.0(First fitting); <=0.5(Second fitting); <=0.2(Third fitting);								-	-
Thermal offset shift(typ./max.)	%/fs/k	± 0.005 / ± 0.040				25 °C...85 °C (77 °F...185 °F)								
Thermal span shift	%/fs/k	≤ ± 0.010 ≤ ± 0.012 ≤ ± 0.014				0 °C...70 °C (32 °F...158 °F) -25 °C...0 °C / 70 °C...85 °C (-13 °F...32 °F / 158 °F...185 °F) -40 °C...-25 °C / 85 °C...135 °C (-40 °F...-13 °F / 185 °F...275 °F)								
Reliability tests	-	1000 hours @85 °C (185 °F) & 85 %RH 1000 hours burn-in @150 °C (302 °F)				500 thermal shocks -40°C...+150 °C (-40 °F... +302 °F) 10 million 0 bar to Pnom pressure cycles								

Tests performed at 25°C in Eastsensor housings, unless otherwise specified. Different housings may affect performances.

1. Psi values for reference only.

2. The sensitivity of each production batch is constant, within the indicated range and with minimal dispersion.

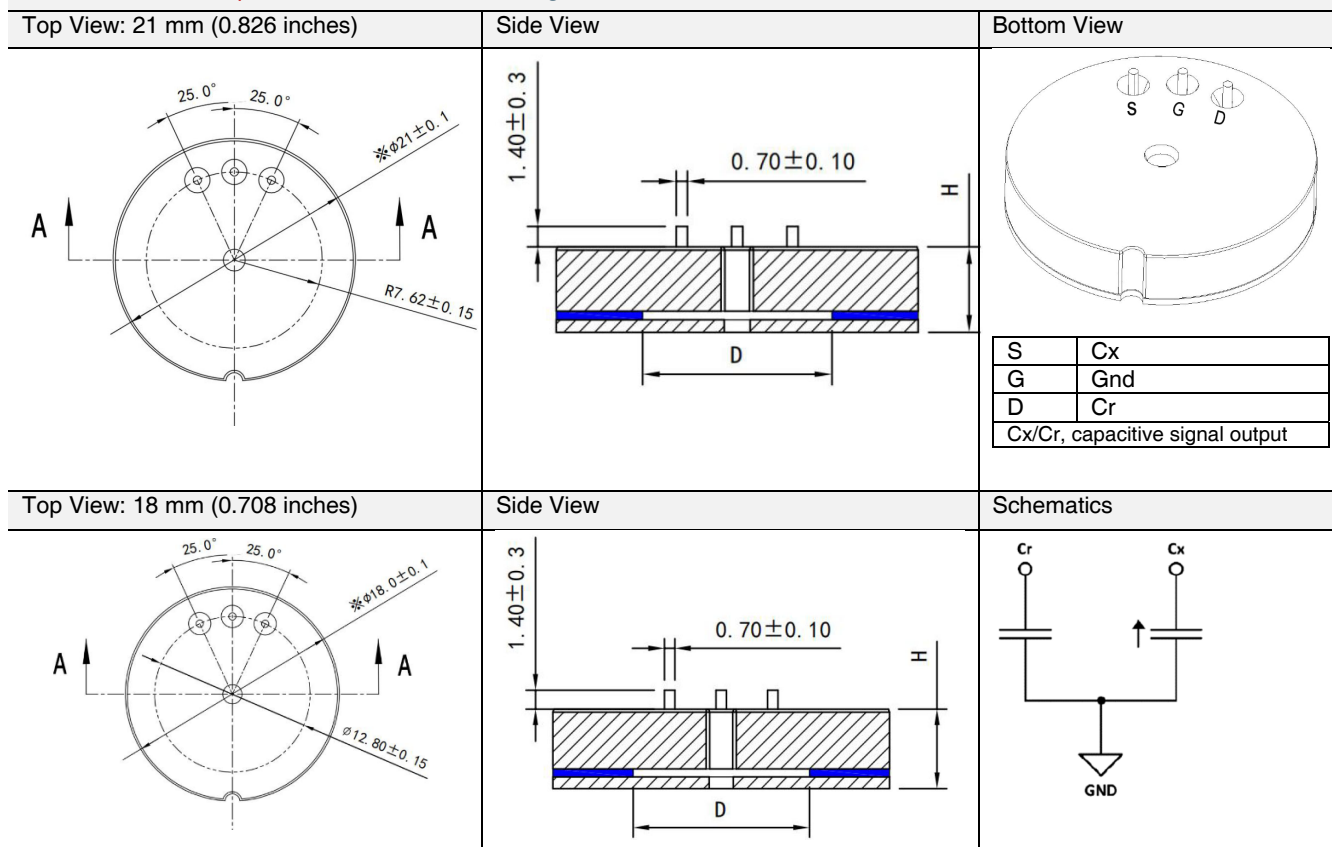
3. Accuracy = $\sqrt{\text{NonLinearity}^2 + \text{Hysteresis}^2 + \text{NonRepeatability}^2}$, terminal based.

4. All technical characteristics will remain within indicated ranges performing the above-mentioned reliability tests.

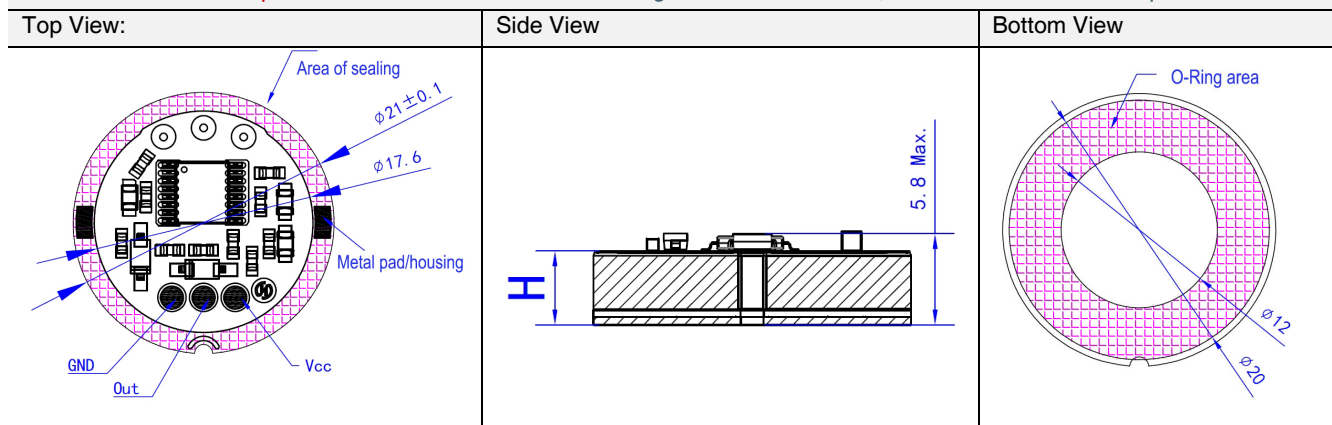
5. Please consult manufacturer when pressure range with "*" *

Drawing

ESS505 Ceramic Capacitive Pressure Sensor Range: 0bar~5bar-100bar; D21&D18



ESS505-V Ceramic Capacitive Pressure Sensor Module Range: 0bar~5bar-100bar; 0.5-4.5V Ratiometric Output



1. **Storage Environment:** Store the item in an environment with a temperature range of 10~35°C and a relative humidity of ≤70%. Avoid placing the item in areas subjected to excessive heat, direct sunlight, dust, or corrosive gases. Metal pin needles are prone to oxidation when exposed to air; therefore, it is recommended to use them within ten days of unpacking. The effective soldering period, under optimal storage conditions, is twelve months. If the item is stored for more than twelve months, the ceramic core should undergo reinspection for solderability and can only be utilized post successful inspection.

2. **Product Installation Riveting:** It is advised that the riveting pressure should not exceed 20KN, and the pressure applied on the core should not exceed 5KN. Excessive pressure may compromise the core structure or cause stress overload, leading to abnormal output signals. During the packaging process of the ceramic core, it should not come into direct contact with hard objects such as the metal casing to prevent significant internal stress, which may cause output instability.

3. **Sealing Recommendations:** When employing an O-ring for sealing, ensure that the O-ring is positioned concentrically with the elastic diaphragm, and that the force applied is uniform. After compression deformation, the inner diameter of the O-ring should exceed 12.0mm, and the outer diameter should be less than 20.0mm.

4. **Pad Specifications:** The pads consist of Ag/Pd. It is recommended to preheat the ceramic core to a temperature range of 100-120°C. Utilize solder wire of composition Sn99.3/Cu0.7, with a soldering temperature maintained between 330-350°C. Ensure that the soldering process is completed within a time frame of less than five seconds.

Ordering Procedure

ESS5		Ceramic Capacitive Pressure Sensor									
		Code		Model							
		05-18		Pressure Sensor Cell, Diameter 18*3.5mm							
		05-21		Pressure Sensor Cell, Diameter 21*3.5mm							
		05V-18		Pressure Sensor Module (0.5-4.5V output), Diameter 18*3.5mm							
		05V-21		Pressure Sensor Module (0.5-4.5V output), Diameter 21*3.5mm							
		Code		Span			Code		Span		
		R01		0...0.5 bar [0...7psi]			R07		0...50 bar [0...720psi]		
		R02		0...1 bar [0...14psi]			R08		0...100 bar [0...1450psi]		
		R03		0...2 bar [0...29psi]			R09		0...200 bar [0...2900psi]		
		R04		0...5 bar [0...72psi]			R10		0...400 bar [0...5800psi]		
		R05		0...10 bar [0...145psi]			R11		0...600 bar [0...8700psi]		
		R06		0...20 bar [0...290psi]			R12		0...800 bar [0...11600psi]		
		Code		Pressure Type							
		R		Gauge							
		A		Absolute							
		S		Sealed Gauge							
		Code		Sensitivity adjustment							
		0		Without							
		9		On request							
		Code		Venting hole							
		0		Without							
		1		Metal pipe							
		2		On request							
		Code		Termination type							
		02		Pre-tinned pads							
		03		Silicone single wires 80 mm							
		04		Pins 10-13mm							
		Code		Additional coating							
		1		Without							
		2		Parylene coating							
ESS5	05-18	R05	R	0	0	02	1				

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