General Instruction and Datasheet

Measuring your business

ESS501 GID-5-EV03.2

ESS501 Ceramic Piezo-Resistive Pressure Sensor

MONOLITHIC THCIK-FILM | Al2O3 96%

▪ Range: 0～480bar/680bar ▪ Diaphragm Material: Ceramic Al_2O_3 96% ▪ Power Supply: 2-30V ▪ Long term stability: 0.3%/FS
▪ Temperature Compensation:-10…70℃ ▪ Temperature: -40…+135 ℃

Description

ESS501 monolithic pressure sensors are made with a ceramic base plate and diaphragm and work following the piezoresistive principle. The Wheatstone bridge is screen printed on one side of the flush ceramic diaphragm which is, in turn, glued to the sensor's body. The bridge faces the inside where a cavity is made and the diaphragm's opposite side can therefore be exposed directly to the medium to be measured.

The Wheatstone bridge is screen printed directly on one side of the ceramic diaphragm by means of Thick Film technology. The diaphragm's opposite side can be exposed directly to the medium to be measured. Because of the Al2O3 ceramic excellent chemical resistance (aggressive gases, most of solvents and acids, etc.), no additional protection is normally required. Thanks to the reinforced outer area (monolithic structure), the sensor can be mounted directly in a plastic or metallic case by using O-ring.

ESS501 sensors are thermally compensated by laser-adjustable PTC resistors and the use of ceramic ensures a high linearity across the entire range of measurement, reducing effects of hysteresis to a minimum.

Key Features & Benefits

- **Pressure range 0.5bar-480bar/680bar**
- **Excellent resistance to corrosion and abrasion**
- **Absolute measurement available**
- **Thermally compensated**
- **Extended customization**
- **Extended choice of measuring ranges**

Application

- **Cooling equipment & A/C system**
- **Automotive and vehicle**
- **Industrial process control**
- **HVAC system**
- **Refrigeration equipment**
- **Air conditioning unit**

Technical Characteristics

Parameter	Units	Description
Sensor type	-	Flush diaphragm, absolute (A), gauge (R) or sealed gauge (S)
Technology	-	Piezoresistive
Diaphragm material	-	Ceramic Al_2O_3 96% (standard), 99.6% or sapphire (on request)
Weight	g	≤ 8 (ceramic cell only)
Response time	ms	≤ 1
Supply voltage	VDC	2...30

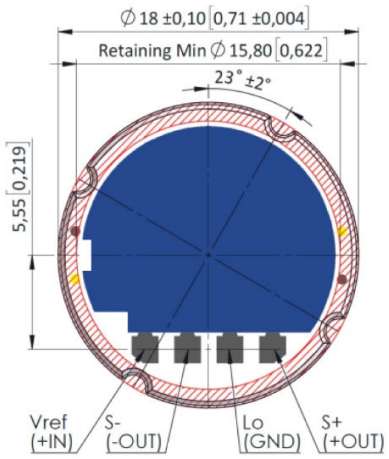
Offset		mv/v	- 0.1 ± 0.1 (Other nominal values available on request)										
Current cons.		mA	≤ 1.3 @ 10V										
Operating		°C	-40...+135 (-40 °F...+275 °F)										
Storage temperature		°C	-40...+150 (-40 °F...+302 °F)										
Impedance		kΩ	11 ± 30%										
Nominal pressure FSO	bar	0.5	1	2	5	10	20	50	100	200	400	600	800
	psi	7	14	29	73	145	290	725	1450	2900	5800	8700	11600
Overload pressure	bar	1	2	4	10	15	35	100	150	350	500	750	1000
	psi	14	29	58	145	217	507	1450	2175	5075	7250	10875	14500
Burst pressure	bar	2	3	6	15	25	65	120	200	500	650	950	1250
	psi	29	43	87	217	362	942	1740	2900	7250	9425	13775	18125
Vacuum capability	bar	-0.1	-0.5	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	psi	-1.4	-7	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14
Type	-	R	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	A/R/S	S	S	S	S	S
Total thickness	mm	6.15	6.17	6.23	6.30	6.35	6.55	6.70	6.70	7.05	7.32	7.55	8.05
	in	0.242	0.2432	0.245	0.248	0.250	0.258	0.263	0.263	0.278	0.288	0.297	0.317
Sensitivity 2	mv/v	1.4-2.4	2.0-3.6	2.3-3.5	2.3-4.0	3.1-5.5	2.4-4.0	4.0-6.0	3.0-4.8	2.5-3.9	3.1-4.8	3.1-4.8	2.0-3.5
Accuracy 3	%/fs	0.4/0.9	0.3/0.9	0.3/0.6	0.2/0.4	0.2/0.5	0.2/0.5	0.2/0.5	0.2/0.5	0.4/0.9	0.5/1.0	0.5/1.0	0.5/1.0
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 -25 °C...0 °C / 70 °C...85 °C -40 °C...-25 °C / 85 °C...135 °C			(32 °F...158 °F) (-13 °F...32 °F / 158 °F...185 °F) (-40 °F...-13 °F / 185 °F...275 °F)				
Reliability tests 4	-	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 Metallux 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 =√NonLinearity2+Hysteresis2 +NonRepeatability2, terminal based.
4. All technical characteristics will remain within indicated ranges performing the above-mentioned reliability tests.

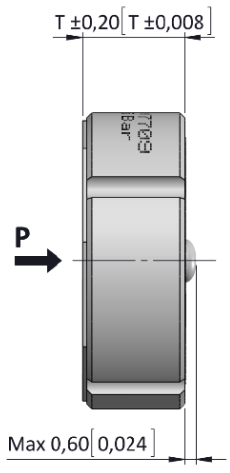
Drawing

ESS501 Ceramic Piezo-resistive Pressure Sensor Range: 0bar~480bar

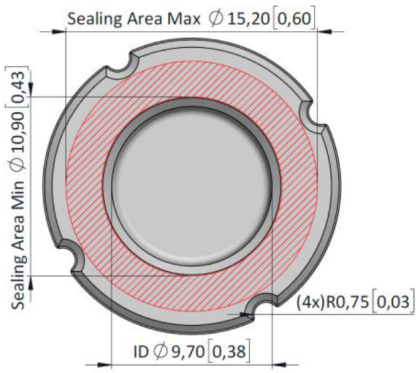
Top View: Pitch 2.54mm (0.100 inches)

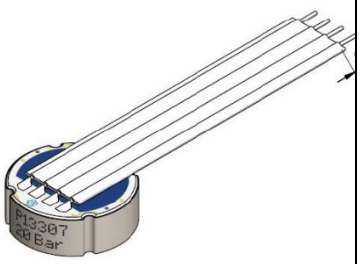
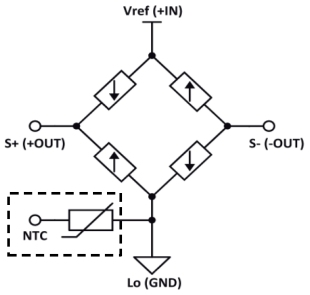


Side View



Bottom View



Type A: Pre-tinned soldering pads		**Type B:** Polyester/Silicone cable	Schematics
	Pitch: 2.54 ± 0.05 Op. Temp: -40°C...+135°C Type A:-40°C..+105°C Type B Cable length: 80.8 ± 2		

Ordering Procedure

ESS5	Ceramic Piezoresistive Pressure Sensor

Code	Model
01	Pressure Sensor
01-I	Pressure Sensor Module (with pcb) 4-20mA
01-V	Pressure Sensor Module (with pcb) 0.5-4.5V
O1-IIC	Pressure Sensor Module (with pcb) I2C Output

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	Thermal offset
0	≤ ± 0.06 % FS/K (not thermally compensated)
1	≤ ± 0.04 % FS/K
2	≤ ± 0.02 % FS/K

Code	Termination type
02	4 pins, Pre-tinned pads, pitch 2.54 mm
03	4 pins, Silicone single wires 80 mm, pitch 2.54 mm

Code	Additional coating
1	Without
2	Parylene coating

ESS5	01	R10	R	0	2	31	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℃*