

CAPACITIVE PRESSURE TRANSDUCER

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The present invention relates to a capacitive pressure transducer.

According to one aspect of the present invention, a
10 capacitive pressure transducer includes a transducer housing; a sensor housing having a central cavity and being mounted relative to the transducer housing; diaphragm means supported on said sensor housing and extending across the central cavity to thereby divide the
15 central cavity into two central chambers, said diaphragm means being deflectable under pressure and at least a portion thereof being conductive to provide a first capacitor plate; each of said central chambers having a conductive surface portion spaced from the diaphragm
20 means for providing second plates of a pair of variable sensor capacitors, each formed with the diaphragm means comprising the first plate; a pair of isolators, said isolators each having an isolator chamber and an isolator diaphragm disposed therein; separate passageway means
25 coupling each isolator chamber to a separate one of the central chambers; means to permit applying separate pressures to the respective isolator diaphragms at a static line pressure, each isolator chamber, its associated passageway means and connected central chamber
30 enclosing a substantially incompressible fluid, the diaphragm means deflecting and changing the capacitance of the variable sensor capacitors responsive to the

5 differential between the static line pressures applied to
the isolator diaphragms, means for physically supporting
the isolators in a position spaced from the sensor
housing, the sensor housing and the diaphragm means being
10 constructed to warp and to deflect to reduce error in
capacitance indicated by the variable sensor capacitors
as the diaphragm means deflects in response to the same
differential in the static line pressures on the isolator
diaphragms but at substantially different static pressure
15 levels.

The pressure applied to the respective isolator
diaphragms will act on the sensing diaphragms
respectively, and if there is a differential in pressure
on opposite sides of the sensing diaphragm, the sensing
15 diaphragm deflects causing a change in capacitance
between the sensing diaphragm and the respective second
plate. The sensor housing and the sensing diaphragm are
constructed so that as the static line pressure changes,
that is the pressure levels on both isolator diaphragms
20 becomes greater or less, the sensor housing and the
sensing diaphragm warp and deflect to reduce errors in
indicated capacitance as the diaphragm deflects in
response to the same differential in the static line
pressures, but at different static pressure levels.

25 According to another aspect, the invention comprises
a capacitive pressure transducer including a sensor
housing with an internal cavity, a deflectable,
electrically conducting sensing diaphragm mounted on the
sensor housing and dividing the cavity into first and
30 second cavity sections, said sensor housing having a
central axis lying generally normal to said diaphragms, a
filling of insulation material in each of said cavity

sections, said insulation material having recessed surfaces adjacent the diaphragm on opposite sides thereof to form chambers permitting deflection of said diaphragm under loads toward the respective recessed surface, means
5 on the respective recessed surfaces forming capacitor plates which in combination with the diaphragm form first and second sensing capacitors generally symmetrical with each other relative to the diaphragm at a rest position having capacitance values C_1 and C_2 , respectively, means
10 including an isolator to provide pressure to opposite sides of said diaphragm tending to deflect said diaphragm when pressures on opposite sides are different from each other to thereby lower the capacitance value of one of the sensing capacitors and raise the value of the other
15 sensing capacitor, the reference position of the diaphragm being reached when the pressure on opposite sides of the diaphragm is equal; characterized by the dimensions and the coefficients of elasticity of the diaphragm, the insulation material and the sensor housing
20 in relation to the diaphragm diameter, ^(being selected) to insure that the product of diaphragm stretch times the capacitance spacing at rest position of the diaphragm remains substantially equal to a constant under changing pressures of equal magnitudes on opposite sides of said
25 diaphragm.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a sectional view of a pressure transducer made in accordance with the instant invention;

Figure 2 is a sectional view of the sensor housing
30 of another embodiment of the sensor housing of the pressure transducer;

Figure 3 is a graph showing the results of testing a transducer in accord with an embodiment of the invention showing percent error (in tenths (1/10) of one percent (1%)) v. differential pressure for five different calibrations having from 0 PSIG (pounds per square inch gauge) static line pressure applied to both sides of the transducer to 2000 PSIG to both sides of such transducers;

Figure 4 is a graphic representation of the results of testing a transducer in accord with an embodiment of the invention showing output deviation in percent v. differential line pressure to show temperature effect (uncompensated) for several calibrations;

Figures 5A and 5B are illustrative cross-sectional representations showing the effect of increasing static line pressures on a capacitive sensing cell such as that shown in Figures 1 and 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A transducer which preferably is used for differential pressure, gauge pressure, flow, level or other such pressure measurement is shown generally at 10. The transducer includes a transducer housing or frame 12 which supports a sensor housing 14 and a pair of isolator housings 16a and 16b. It is envisioned that housings 14, 16a and 16b may be included in or spaced from housing 12. The pressures to be sensed are represented by arrows 18 and 20 at the transducer input ports. Pressures 18 and 20 act on isolator diaphragms 22 and 24, respectively. Diaphragms 22 and 24 preferably are very flexible and are formed in a conventional manner. The corrugations 26 of diaphragms 22 and 24 represent a preferred isolator diaphragm construction having a plurality of convolutions, as desired. Chambers 27 and 29 are

defined by diaphragms 22 and 24 in cooperation with the respective housings 16a and 16b. Chambers 27 and 29 are coupled to passageways 28 and 30, which preferably are formed by stainless steel tubing, but may be formed from other suitable materials.

5 Sensor housing 14 is preferably machined and formed from a metal such as stainless steel, preferably an austenitic stainless steel such as 304 is used. Generally, housing 14 is formed from two portions 32 and 34 which preferably are substantially equal in size and when assembled are generally divided by a
10 sensor diaphragm 36 which is held at its edges and will elastically deflect under differential pressures and which typically is subjected to a desired radial tension. A central cone shaped cavity 38 with bores 42 and 44 is formed in portion 32 and, similarly a central cone shaped cavity 46 with bores 48 and 50 is formed in portion 34. Conduits
15 52 and 54 are formed in portions 32 and 34 to communicate with passageways 28 and 30, respectively. The interior openings of the conduits 52 and 54 form continuations of the passageways 28 and 30 to communicate with a chamber 53 defined in portion 32 by diaphragm 36 and the central section of material 60a in portion 32 and a second chamber
20 55 defined in portion 34 by diaphragm 36 and the central section of material 60b in portion 34. An electrical conductor 56 is inserted through bore 42 to chamber 38 and, similarly, a conductor 58 is inserted through bore 48 to chamber 46. Conductors 56 and 58 may be metal tubes to aid in filling the sensor chambers with a non-compressible
25 fluid.

 The electrically conductive portions of the housing 14 are electrically insulated from the metal tubes forming passageways 28 and 30 and from conductors 56 and 58. An insulative non-porous material 60a and 60b such as glass or ceramic, is filled
30 into cavities 38 and 46 and bores 42 and 48 and is bonded to housing portions 32 and 34 along a surface forming an angle θ with respect to the plane formed by the joining of portions 32 and 34. The central section of material 60a and 60b and the central area of housing portions 32 and 34, as well as inner ends of

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conductors 56 and 58 are then contoured or recessed by grinding or machining, preferably to provide a suitable stop surface for sensor diaphragm 36 when the diaphragm 36 deflects under an over-range pressure applied to the isolator diaphragms. Conduits 52,
5 54 may be a single cylinder as shown, or a plurality of small cylinders in accord with the teaching of U.S. Patent No. 3,618,390 to provide diaphragm support in an overpressure condition.

A suitable electrically conductive material is then deposited in a layer on the inner surface of material 60a and 60b
10 in each housing portion as at 61 and 63. The layers face opposite sides of the sensor diaphragm 36 and are electrically coupled to conductors 56 and 58, respectively. Sensor diaphragm 36 preferably is formed from a suitable electrically conductive material and is fixed into position between housing portions 32 and 34
15 and layers 61 and 63 by a continuous bead weld 62 thus forming a common plate for material 61 and 63, hence forming two capacitors C_1 and C_2 . A suitable conductor 64 is then coupled to sensor housing 14 which is at the same electrical potential as diaphragm 36. Sensor diaphragm 36 can also be formed from a non-
20 conductive material and have a conductive portion disposed in or on the diaphragm to form such common plate for a variable sensor capacitor. A suitable conductor 64 is then coupled to such conductive portion. Bolts 70 may then be added to take up the pressure forces on sensor housing 14.

25 A suitable, substantially incompressible fluid, such as silicone oil, is then filled into each side of the transducer assembly through conductors 56 and 58 to the sensor diaphragm chamber formed in housing portion 32 by diaphragm 36, and to isolating chamber 27, and similarly to the sensor chamber in
30 housing portion 34, and isolating chamber 29. When such spaces are filled, conductors 56 and 58 are pinched off at their outer ends and suitable leadwires are attached thereto.

The action of pressure on isolator diaphragms 22 and 24, the substantially incompressible fluid in chambers 27 and 29,

passageways 28 and 30, and on sensing diaphragm 36 is fully explained, for example, in United States Patent 3,618,390.

The invention of the sensing diaphragm 36 bottoming out in an overpressure condition as taught in U.S. Patent 3,618,390 or
5 the isolating diaphragm 22 or 24 bottoming out in an overpressure condition may, as desired, be used with the present invention.

The physical location of isolator diaphragms 22 and 24 spaced from sensor diaphragm 36 is shown somewhat schematically, as the location of isolator diaphragms 22 and 24 is not critical, pro-
10 viding that such diaphragms are located so as not to apply undesired mechanical stress, other than the pressure through the incompressible fluid, to sensor housing 14. While sensor housing 14 preferably is fixedly mounted in housing 12 it is not required that it be rigidly mounted as by welding. As shown, it is re-
15 tained by flexible straps 71, which are formed from an electrical insulative material to electrically isolate the sensor housing 14 from transducer housing 12 and to support sensor housing 14.

With chambers 27, 29, passageways 28 and 30 (including openings in conduits 52 and 54) and the chambers between layers 61
20 and 63 and diaphragm 36 filled with incompressible fluid, differentials between pressures represented by arrows 18 and 20 will cause diaphragm 36 to deflect proportional to pressure differential and its capacitance relative to layers 61 and 63 changes.

Another embodiment of the invention is shown in Fig. 2.
25 In this embodiment the sensor housing 14A is somewhat wider than the embodiment of Fig. 1. While the numbering corresponds to Fig. 1, (with a capital letter forming a part of the alphanumeric designations thereof) it is observed that with the increased width of sensor housing 14A, bores 44A and 50A are somewhat deeper in
30 Fig. 2 than bores 44 and 50, and material 60A and 60B, has been filled to include a portion of such bores. An angle θ is the

included angle from the plane of diaphragm 36A at its rest position to the conical surface forming the recess in the respective housing portion in which material 60A and 60B is filled. This angle determines the effective depth of the material 60A, 60B (or 60a, 60b in the first form of the invention) which backs the capacitor plates 61A and 63A (or 61 and 63). Although an angle θ of approximately 45° is preferred for the embodiments of Fig. 1 and 2, it has been found that angles from 25° to 70° have resulted in improved stability and thus improved performance over known constructions which comprise, for example, a non-compressive bond between the insulating material and metal. The angle also can be measured with respect to the central axis of the sensor housing which is perpendicular to the plane of diaphragm 36A (or 36) when it is at rest.

One significant advantage of the present invention is improvement of the static pressure effect on the pressure span of the transducer. In prior art embodiments, the effect of static pressure on span error has been found to be approximately a one percent (1%) change in output across the instrument span per one thousand (1000) pounds per square inch (PSI) change of static pressure. In such known transducers, the pressure on the outside of the sensor housing, caused by the pressure being sensed acting on the isolating diaphragms, and pressure from the inside of the sensor chamber caused by the pressure being sensed on the incompressible fluid resulted in sensor housing deformation outwardly in a known manner, as per Poisson's ratio.

Further, in known methods of manufacturing such capacitive transducers, the insulating material, upon which the conductive material is deposited to form the second plate of each of the variable capacitors, has been relatively thin in comparison to the insulative material thickness in the central cavity of the

sensor housing as disclosed herein. When the insulative material is thin or when the insulating material to metal interface is somewhat parallel to the rest axis of the diaphragm (perpendicular to plane of the diaphragm), the insulating material-metal interfaces (bond) 65a, 65b, 65A, 65B are then subjected to a shear force which may cause the bond to weaken or fracture. When pressure is applied to a sensor having a fractured bond, such pressure causes the insulating material to move away from the diaphragm. The movement of the insulator material causes an undesirable change in capacitance not representative of the sensed pressure, which adds to the error effect caused by the static line pressure. When the sensor is formed in accordance with the present disclosure, bonds 65a, 65b, 65A, 65B are substantially in compression and, consequently, much less vulnerable to such fracture.

By removing the isolators from the side of the sensor housing, the capacitor plate spacing on both sides of the diaphragm 36 increases with increasing static line pressure applied at 18, 20 due to slight outward motion of the sensor portions with respect to the sensor diaphragm. This static line pressure increase also causes portions 32 and 34 to warp slightly about their respective neutral axes (shown in Figs. 2 and 5 at X-X) as the two housing portions tend to contract adjacent the diaphragm (as shown by arrows 70A in the Figs. 2 & 5B). (The insulation material is not specifically shown in Figs. 5A or 5B since these Figures are illustrative only and apply to the configurations of Figs. 1 and 2.) Such warping is perhaps best explained by reference to Fig. 5A which shows portions 32 and 34 at rest and in Fig. 5B which shows an exaggerated warp condition (for emphasis) as caused by increasing static line pressure. As the static line pressure is increased the capacitance spacing (d) of Fig. 5A between the diaphragm 36 and capacitor plates 61 and 63 increases to d' (as shown in Fig. 5B) and such spacing change is not representative of the applied differential pressure. In

the described embodiments, the change in capacitance caused by such warping is substantially compensated for by the decrease in diaphragm radial tension caused by the contraction adjacent the diaphragm. Radial tension or prestress applied to the diaphragm at time of construction along with suitable dimensions and materials results in the elastic stiffness of the diaphragm decreasing with increasing static pressure. Preferably the diaphragm material is high strength steel having good elastic characteristics. The compensation advantage is present at all static line pressures, but more fully realized at static line pressures above 500 psi.

The following equations further explain the static line pressure compensation according to a preferred embodiment of the instant invention having a first capacitor C_1 and a second capacitor C_2 as described herein:

$$O = \frac{CH - CL}{CH + CL} = \frac{X_p}{X_o} \times \frac{1}{\delta_o}$$

Where O = the output signal from the differential pressure capacitance cell.

CH = the capacitance of the greater of C_1 or C_2 .

CL = the capacitance of the lesser of C_1 or C_2 .

X_p = diaphragm deflection with differential pressure.

X_o = capacitance spacing at zero (0) static line gauge pressure.

X_o' = capacitance spacing at elevated static line pressure.

δ_0 = diaphragm stretch at
time of construction
(initial prestretch).

δ_0' = diaphragm stretch at
elevated static line
pressure.

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Simplifying:

$$0 \propto \frac{X_p}{X_0 \delta_0}$$

10 When the transducer is formed in accordance with the present in-
vention as the static line pressure increases, the capacitance
spacing X_0 increases to X_0' and the diaphragm stretch (δ_0) de-
creases to δ_0' . By holding the product of $X_0 \cdot \delta_0$ substantially
equal to $X_0' \cdot \delta_0'$ hence, substantially equal to a constant, the
15 diaphragm deflection (X_p) is responsive to the differential
pressure applied thereto and the output (0) is thus independent of
static line pressure.

A transducer, made in accordance with the embodiments of
Fig. 1 and Fig. 2, but not having an angle θ between 25° and 70°
rather having a cylindrical, metal-insulating material interface bond;
20 that is, the bond interface was first generally perpendicular
($\theta = 90^\circ$) from diaphragm 36, then generally parallel ($\theta = 0^\circ$)
from diaphragm 36 generally as shown in U.S. Patent No. 3,618,390,
was tested under actual loading conditions. This early
form of the invention did not then include the compressive
25 bond taught herein, but rather had the prior art shear bond.
The improved bond is helpful as taught to avoid bond fracture
and it is believed from analyzation and evaluation that such
fracture did not occur and, therefore the nature of the bond
did not affect test results. In the embodiment tested,
30 the isolators 16a, 16b were separated from sensor housing 14 and
the output was compensated for sensor housing 14 warp with a suitable
sensor diaphragm 36 prestress. Sensor diaphragm 36 was 1.8 mils thick

and approximately 1.12 inch in diameter and had approximately 105,000 PSI in prestress applied (though prestress from 50,000 to 200,000 PSI may be acceptable) and was formed from NiSpan C (NiSpan is a Registered Trade Mark); insulative material

5 60a, 60b, 60A, 60B was Owens 0120 glass; and, sensor housing 14 was NiSpan C material approximately 1.250 inches in diameter. Capacitance spacing (X_0) in the center was approximately .0075 inches. Isolators 16a, 16b were formed from stainless steel (304SST) and were approxi-
10 mately 3 inches in diameter and were coupled to chambers 53, 55 by passageways 28,30 formed from 1/16 inch O.D. stainless steel tubing. The results of such testing are shown in Fig. 3. As shown, all test points deviations due to static line pressure effect from zero (0) PSIG to two thousand (2000) PSIG are less than .2% across the differential pressure span of 0 to 240 inches of water. The
15 curves of Fig. 3 show a very small mechanical hysteresis. Such mechanical hysteresis is not uncommon and depends not only on the instantaneous value of stress as caused by differential pressure and static line pressure but also on the previous history of such stress.

20 Yet a further improvement is attained by the present invention, as the zero stability of the transducer, which in known transducers varies with both temperature and static pressure, is improved because the isolator housings are not in direct physical contact with the sensor housing. Only the tubes forming passageways
25 28 and 30 are in direct contact with sensor housing 14 and these tubes yield to accommodate loads or changes due to temperature on the isolators without stressing the sensor housing 14.

A test also was conducted to demonstrate the improved
uncompensated temperature effect with respect to the stability
30 of the output capacitance signal of the present invention of the embodiment described above; such results are shown in Fig. 4. The "uncompensated" effect is the error present before any compensation of an electrical signal is applied. Electrical signal compensation

is commonly used to reduce errors further, but it is highly advantageous to provide a structure having a low uncompensated error. Each curve of Figure 4 represents a separate calibration. Several such calibrations were accomplished, seven of which are shown on Figure 4, one at 100°F, then again at 100°F, then at 200°F, then 100°F, then 0°F, then 100°F, again 200°F, and finally at 100°F. The curves show that the configuration results in excellent stability and in a very low thermal hysteresis as the capacitance deviation at 100°F for three calibrations at that temperature was less than $\pm .18\%$. Thermal hysteresis refers to the difference in calibration results at a specific temperature after coming to that calibration temperature from higher and lower temperatures respectively.

Many embodiments formed of different materials and having different dimensions have been successfully tested; in successful tests, the sensor diaphragm 36 was formed from Havar steel of Hamilton Industries or Elgiloy alloy of Elgiloy Co. (Elgiloy is a Registered Trade Mark), insulative material 60 was alkali lead glass, specifically Corning 1990 glass (Corning is a Registered Trade Mark) and the sensor housing 14 was austenitic stainless steel.

One further advantage of the present invention is that since the isolator diaphragms are no longer an integral part of the sensor housing 14, the size of the isolator diaphragms may be increased relative to the sensor housing. This increase in size is important in some instances to reduce the effects of temperature and other factors on overall transducer performance.

Further, sensor housing 14 preferably is electrically isolated from transducer housing 12 resulting in a simplification of the transducer circuitry when electrical isolation is desired which is often the
5 case for industrial pressure measurements.

In summary, the several listed advantages as well as those apparent to those skilled in the art are realized from the improvements of the present invention.



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CLAIMS:

1. A capacitive pressure transducer including:
 - a transducer housing;
 - a sensor housing having a central cavity and being mounted relative to the transducer housing;
 - diaphragm means supported on said sensor housing and extending across the central cavity to thereby divide the central cavity into two central chambers, said diaphragm means being deflectable under pressure and at least a portion thereof being conductive to provide a first capacitor plate;
 - each of said central chambers having a conductive surface portion spaced from the diaphragm means for providing second plates of a pair of variable sensor capacitors, each formed with the diaphragm means comprising the first plate;
 - a pair of isolators, said isolators each having an isolator chamber and an isolator diaphragm disposed therein;
 - separate passageway means coupling each isolator chamber to a separate one of the central chambers;
 - means to permit applying separate pressures to the respective isolator diaphragms at a static line pressure, each



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isolator chamber, its associated passageway means and connected central chamber enclosing a substantially incompressible fluid, the diaphragm means deflecting and changing the capacitance of the variable sensor capacitors responsive to the differential between the static line pressures applied to the isolator diaphragms;

means for physically supporting the isolators in a position spaced from the sensor housing, the sensor housing and the diaphragm means being constructed to warp and to deflect to reduce error in capacitance indicated by the variable sensor capacitors as the diaphragm means deflects in response to the same differential in the static line pressures on the isolator diaphragms but at substantially different static pressure levels.

2. A capacitive pressure transducer according to Claim 1 further characterized by the diaphragm means being supported with respect to the sensor housing to provide an initial prestress on the diaphragm means.

3. A capacitive pressure transducer according to Claim 1 characterized by the isolators being physically spaced from the sensor housing for isolation.



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4. A capacitive pressure transducer according to Claim 1 further characterized by the diaphragm means being constructed of material that changes in stress to substantially compensate for warping of the sensor housing under changes in static line pressure.

5. A capacitive pressure transducer according to Claim 4 further characterized by the sensor housing and diaphragm means having coefficients of elasticity and being of relative size so that the stress on the diaphragm means changes to provide a maximum error in output across the span of response of the transducer of less than 1% for each 68.9 BARS (1000 psi) of static line pressure change on the diaphragm means at the same differential pressure.

6. A capacitive pressure transducer according to Claim 4 further characterized by the sensor housing and diaphragm means material being such that the maximum error in output across the span of response of the transducer is less than .25% per 68.9 BARS (1000 psi) of static line pressure change on the diaphragm means at the same differential pressure.

7. A capacitive pressure transducer according to Claim 4 further characterized in that the sensor housing is formed from metal and includes the central cavity, the cavity being partially filled with a non-porous, insulating material forming an interface surface with the metal of the sensor housing, and the central chambers are each formed in the insulating material, the conductive surface portions of the central chambers being disposed on the insulating material, the interface surface of the insulating

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material and metal being positioned so as to be subjected to compression forces under static line pressures.

8. A capacitive pressure transducer according to Claim 1 further characterized by the sensor housing being electrically isolated from the transducer housing and the isolators.

9. A capacitive pressure transducer according to Claim 2 wherein the prestress on the diaphragm means is between 3447.2 BARS (50,000 psi) and 13789 BARS (200,000 psi).

10. A capacitive pressure transducer according to Claim 1 further characterized by the transducer housing having a support frame attached thereto and by said isolators being mounted on said support frame at a location spaced from said transducer housing.

11. A capacitive pressure transducer according to Claim 1 further characterized by the separate passageway means comprising tubing which will bend under external loads.

12. A capacitive pressure transducer according to Claim 1 further characterized by said sensor housing having a central axis lying generally normal to said diaphragm means, said sensor housing comprising an outer shell defining a pair of cavities on opposite sides of the diaphragm means, said cavities each being defined by cavity surfaces which taper from the diaphragm means inwardly toward the central axis in direction away from the diaphragm means, a filling of insulation material in each of said cavities, said insulation material having recessed surfaces adjacent the diaphragm means on



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opposite sides thereof to form said central chambers for permitting deflection of said diaphragm means under loads toward the respective recessed surface.

13. A capacitive pressure transducer according to Claim 12 further characterized by said insulation material being a glass or ceramic material bonded to the cavity surfaces.

14. A capacitive pressure transducer according to Claim 13 further characterized by said cavity surfaces being generally conical, and being generated about the central axis to form an included angle of between 20° and 70° with respect to the central axis.

15. A capacitive pressure transducer according to Claim 14 further characterized by the bond between the housing surfaces and the glass or ceramic material being substantially in compression.

16. A capacitive pressure transducer including a sensor housing with an internal cavity, a deflectable, electrically conducting sensing diaphragm mounted on the sensor housing and dividing the cavity into first and second cavity sections, said sensor housing having a central axis lying generally normal to said diaphragms, a filling of insulation material in each of said cavity sections, said insulation material having recessed surfaces adjacent the diaphragm on opposite sides thereof to form chambers permitting deflection of said diaphragm under loads toward the respective recessed surface, means on the respective recessed surfaces forming capacitor plates which in combination with the diaphragm form first and



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second sensing capacitors generally symmetrical with each other relative to the diaphragm at a rest position having capacitance values C_1 and C_2 , respectively, means including an isolator to provide pressure to opposite sides of said diaphragm tending to deflect said diaphragm when pressures on opposite sides are different from each other to thereby lower the capacitance value of one of the sensing capacitors and raise the value of the other sensing capacitor, the reference position of the diaphragm being reached when the pressure on opposite sides of the diaphragm is equal; characterized by the dimensions and the coefficients of elasticity of the diaphragm, the insulation material and the sensor housing in relation to the diaphragm diameter being selected to insure that the product of diaphragm stretch times the capacitance spacing at rest position of the diaphragm remains substantially equal to a constant under changing pressures of equal magnitudes on opposite sides of said diaphragm.

17. A capacitive pressure transducer according to Claim 16 further characterized by the diaphragm being formed from a cobalt based, high strength stainless steel and the insulation material is an alkali-lead glass and the housing is stainless steel.

18. A capacitive pressure transducer with isolated sensing diaphragm substantially as herein described with reference to and as shown in the accompany drawings.
