CLAIMS

1. A pressure sensor for detecting the pressure of a fluid, having a sensor body (2; 2') that comprises at least one first body part (3; 3’) and one second body part (4; 4’) each having a first face and a second face opposite to one another,

wherein the first body part (3; 3’) and the second body part (4; 4’) are joined together in such a way that the first face of the first body part (3; 3’) faces the first face of the second body part (4; 4’), at a distance therefrom;

wherein one of the first body part (3; 3’) and the second body part (4, 4’) includes a membrane portion (7; 7’), subject to elastic flexure or deformation towards the other one of the first body part (3; 3’) and the second body part (4; 4’) as a result of pressure of the fluid, the membrane portion (7; 7’) defining at least part of the first face of the first body part (3; 3’) or of the second body part (4; 4’);

wherein the pressure sensor (1) has a circuit arrangement (8, 10) supported by the sensor body (2), which comprises at least one first electrical circuit (10) that extends at least in part at the membrane portion (7; 7’) and is configured at least for detecting one said elastic flexure or deformation through at least one respective detection component (R1, R2, R3, R4) in order to provide first information representative of a measurement of pressure;

wherein the first electrical circuit (10) is associated to the first face of one of the first body part (3; 3’) and the second body part (4; 4’), and the first face of the other one of the first body part (3; 3’) and the second body part (4; 4’) forms or has associated thereto at least one circuit element (20), prearranged for interacting with the first electrical circuit (10) when one said elastic flexure or deformation of the membrane portion (7; 7’) is of a degree at least equal to a substantially predetermined limit, to generate thereby second information or a signalling representative of at least one from among an excessive pressure of the fluid, an incorrect pressure measurement, and an anomalous state of the pressure sensor (1).

2. The pressure sensor according to Claim 1, wherein the at least one circuit element (20) is an element that is functionally distinct from the first electrical circuit (10).

3. The pressure sensor according to Claim 1 or Claim 2, wherein the at least one circuit element (20) comprises an element made of electrically conductive material, such as a resistive material or a metal material or a material with high electrical conductivity, with which at least one part of the first electrical

circuit (10) comes into contact following upon one said elastic flexure or deformation of the membrane portion (6; 6') of a degree at least equal to said substantially predetermined limit.

4. The pressure sensor according to Claim 3, wherein said part of the first electrical circuit (10) comprises at least one of the following:

- one said detection component (R1, …, R4);

- an electrically conductive track (10a) for connection of one said detection component (R1, …, R4); and

- a contact pad (10b; 10b') electrically connected to an electrically conductive track (10a; 10a') of the first electrical circuit (10).

5. The pressure sensor according to Claim 3 or Claim 4, wherein:

- the pressure sensor (1; 1') is prearranged for detecting pressures of the fluid comprised in a nominal working range, between a minimum pressure and a maximum pressure;

- the first electrical circuit (10) is configured for supplying an output signal that represents a pressure value of the fluid, the output signal being an electrical quantity that can assume a value comprised in a range of nominal values, between a minimum value and a maximum value that correspond to said minimum pressure and said maximum pressure, respectively; and

- contact between the circuit element (20) and the at least one part of the first electrical circuit (10) causes a variation of the output signal such that the value of the corresponding electrical quantity is not comprised in said range of nominal values.

6. The pressure sensor according to any one of Claims 1-5, wherein:

- the circuit element (20) belongs to a signalling circuit;

- the interaction between the circuit element (20) and the at least one part of the first electrical circuit (10) causes a corresponding signal representative of said second information or signalling, which is independent of an output signal of the first electrical circuit (10) representative of said first information.

7. The pressure sensor according to Claim 1, wherein the circuit element (20) comprises a first electrically conductive element that provides, together with at least one second electrically conductive element (20") associated to the first face to which also the first electrical circuit (10) is associated, a proximity or position detector, the proximity or position detector being configured for generating said second information or signalling even in absence of contact

between the first electrically conductive element and the second electrically conductive element (20”) when one said elastic flexure or deformation of the membrane portion (6; 6’) is of a degree at least equal to said substantially predetermined limit.

8. The pressure sensor according to Claim 7, wherein the proximity or position detector is of an inductive type or else of a capacitive type or else of a magnetic type.

9. The pressure sensor according to any one of Claims 1-8, wherein the at least one detection component (R1, R2, R3, R4; 20”) is selected from among resistive components, piezoresistive components, piezoelectric components.

10. The pressure sensor according to any one of Claims 1-9, wherein the circuit arrangement (8, 10) further comprises:

- a second electrical circuit (8) associated to the second face of the other one between the first body part (3; 3’) and the second body part (4; 4’); and

- connection means, which electrically connect the first electrical circuit (10) to the second electrical circuit (8) and extend at least in an axial direction of the sensor body (2).

11. The pressure sensor according to Claim 10, wherein the connection means comprise at least one of:

- a plurality of through holes (11) of the other one of the first body part (3; 3’) and the second body part (4; 4’), which extend axially between the respective first face and second face; and

- a plurality of passages or through openings (14) of a layer of material (5) which is set between the first face of the first body part (3; 3’) and the first face of the second body part (4; 4’),

the connection means further comprising an electrically conductive material (12, 13; 12, 13, 12”; 13’; 13”), which extends on the inside of each of the through holes (11) and/or each of the passages or through openings (14) and electrically connects the first electrical circuit (10) to the second electrical circuit (8).

12. The pressure sensor according to any one of Claims 1-11, wherein an annular layer of sealing material (5) is set between the first face of the first body part (3) and the first face of the second body part (4), the first face of the first body part (3), the first face of the second body part (4) and the annular layer of sealing material (5) delimiting a cavity (7) of the sensor body (2).

13. The pressure sensor according to any one of Claims 1-11, wherein the one of the first body part (3') and the second body part (4') has an axial cavity (6'), closed by the membrane portion (7') at its corresponding first face (3a), the axial cavity (6) being open at the corresponding second face (3b) for receiving the fluid the pressure of which is to be detected.

14. The pressure sensor according to any one of Claims 1-13, wherein the circuit arrangement (8, 10) is configured for generating one of:

- a single signal including both said first information and said second information, the circuit arrangement (8, 10) being preferably configured for identifying said first information and said second information in the single signal, in particular for the purposes of a subsequent transmission;

- a first signal including said first information, and a second signal including said second information, the circuit arrangement (8, 10) being preferably configured for combining the first signal and the second signal in a single signal, in particular for the purposes of a subsequent transmission.

15. A pressure-detecting device, comprising a pressure sensor according to one or more of Claims 1 to 14.