Fiber-optic pressure instrument transducers

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Fiber-optic instrument transducers with elastic sensors

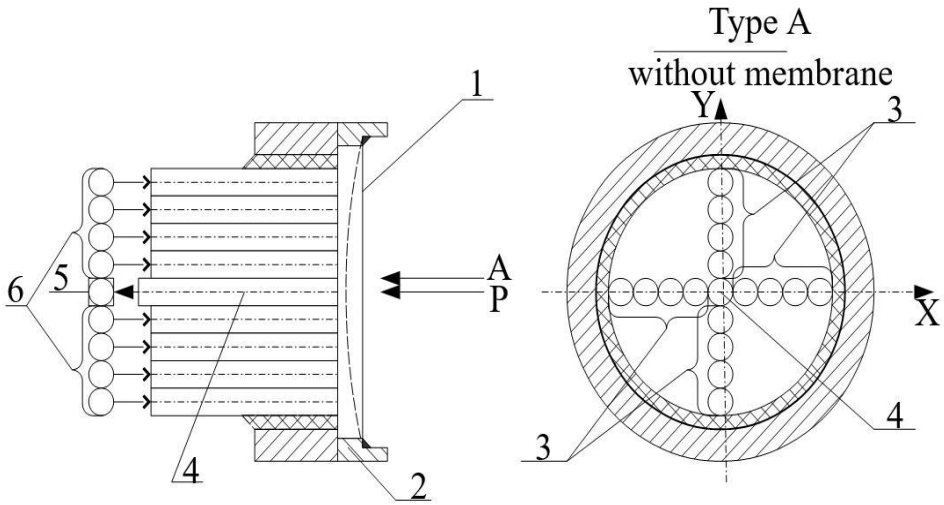

Fig. 1 – Fiber-optic pressure instrument transducer design

1 - membrane;
2 - case;
3 - transmitting optical fibers;
4 - central receiving optical fiber.
5 - photodetector;
6 - LEDs.

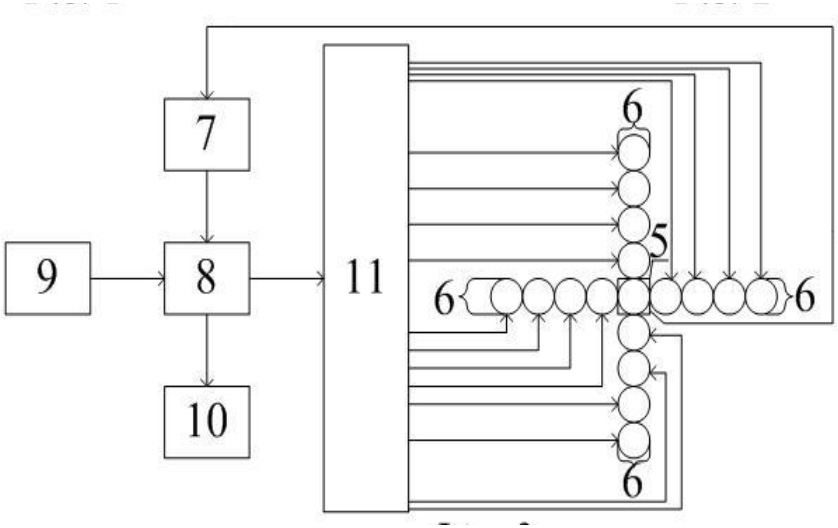

Fig. 2 – Electrical functional circuit of the instrument transducer

5 - photodetector;
6 - LEDs;
7 - ADC converter;
8 - microchip;
9 - digital temperature sensor;
10 - digital numerical indicator;
11 - LED driver.

Fiber optic pressure sensor using a mathematical model of the measurement process

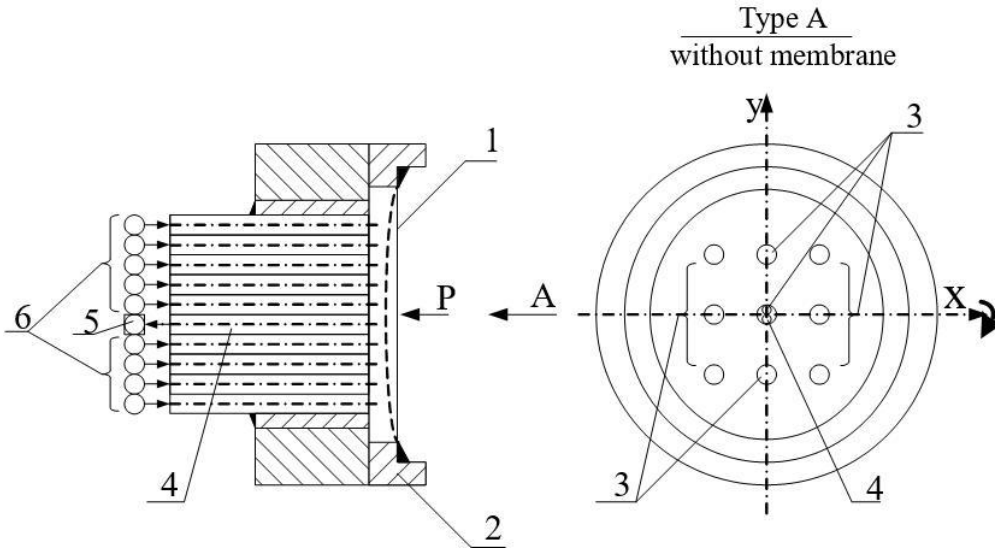

Fig. 3 – Fiber-optic pressure instrument transducer construction

1 - membrane sensor;
2 - case;
3 - transmitting optical fibers;
4 - receiving optical fiber;
5 - photodetector;
6 - LEDs.

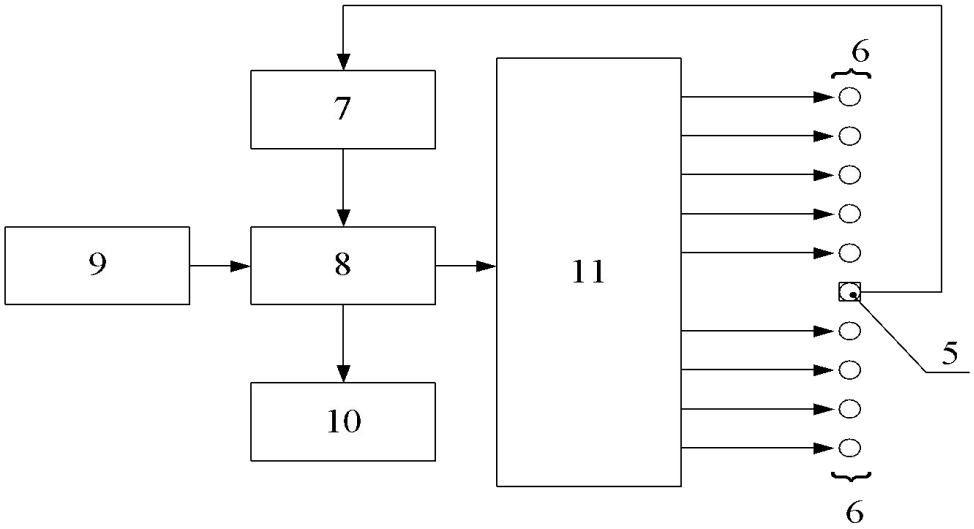

Fig. 4 – Electrical functional circuit of the instrument transducer

5 - photodetector;
6 - LEDs;
7 - ADC converter;
8 - microcontroller;
9 - temperature sensor;
10 - indicator;
11 - LED driver.

Fiber optic pressure sensor with automatic compensation for temperature error

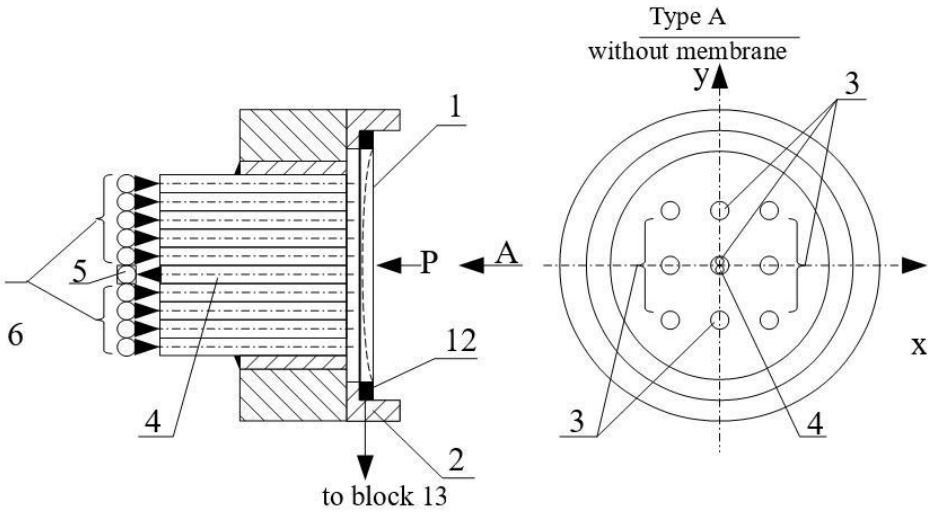

Fig. 5 – Fiber-optic pressure instrument transducer construction

1 - membrane;
2 - case;
3 - transmitting optical fibers;
4 - receiving fiber;
5 - photodetector;
6 - LEDs.

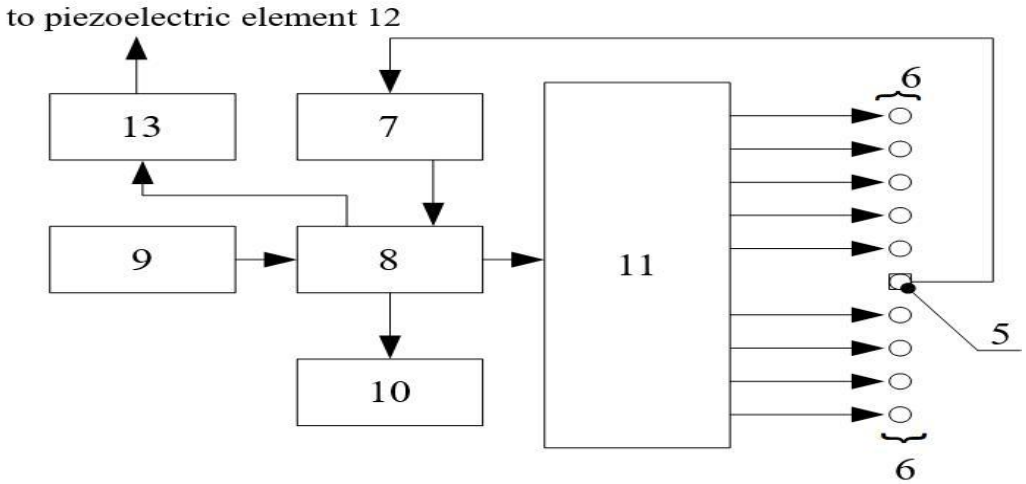

Fig. 6 – Electrical functional circuit of the instrument transducer

5 - photodetector;
6 - LEDs;
7 - ADC converter;
8 - microcontroller;
9 - temperature sensor;
10 - digital indicator;
11 - LED driver;
12 - piezoelectric element;
13 - ADC converter.

Fiber optic pressure sensor with integrated control

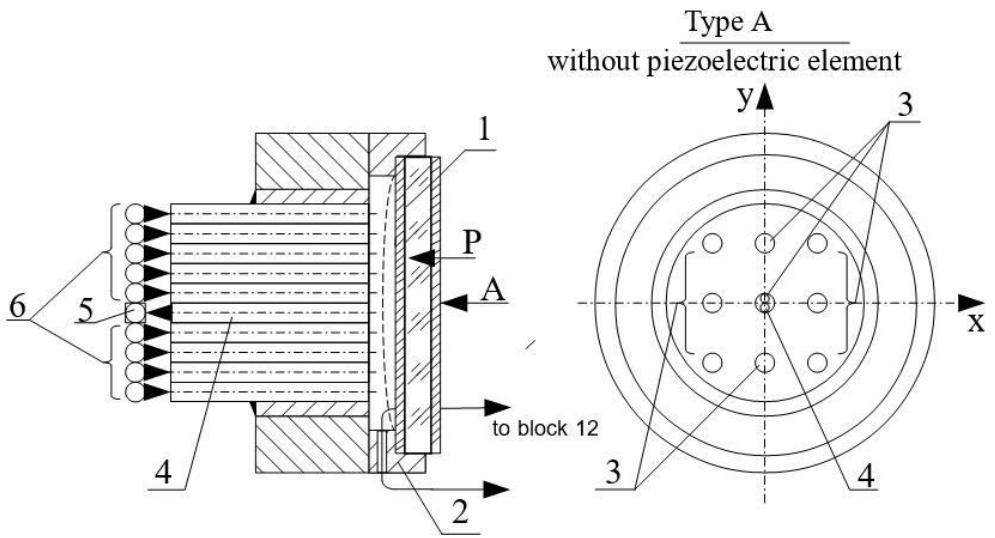

Fig. 7 – Fiber-optic pressure instrument transducer construction

1 - sensor;
2 - case;
3 - transmitting optical fibers;
4 - receiving fiber;
5 - photodetector;
6 - LEDs.

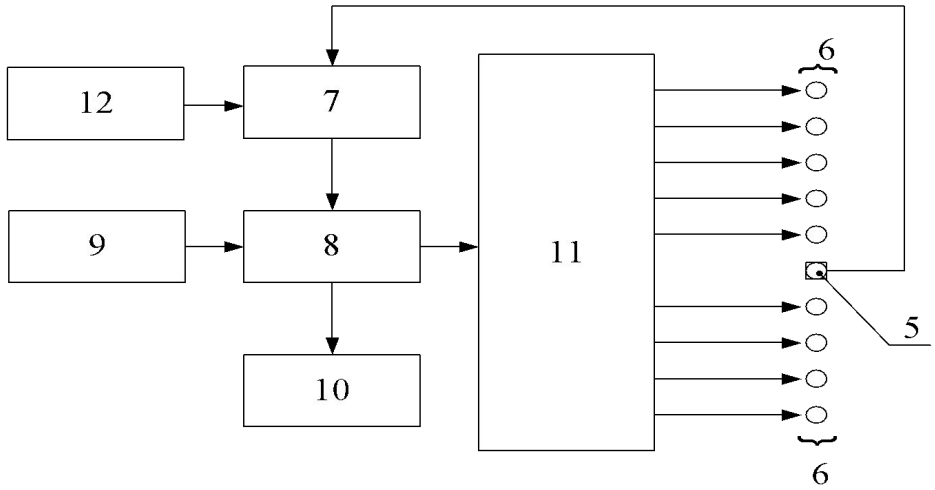

Fig. 8 – Electrical functional circuit of the instrument transducer

5 - photodetector;
6 - LEDs;
7 - ADC converter;
8 - microcontroller;
9 - temperature sensor;
10 - digital indicator;
11 - LED driver;
12 - amplifier.

Fiber optic pressure sensor with dynamically adjustable range

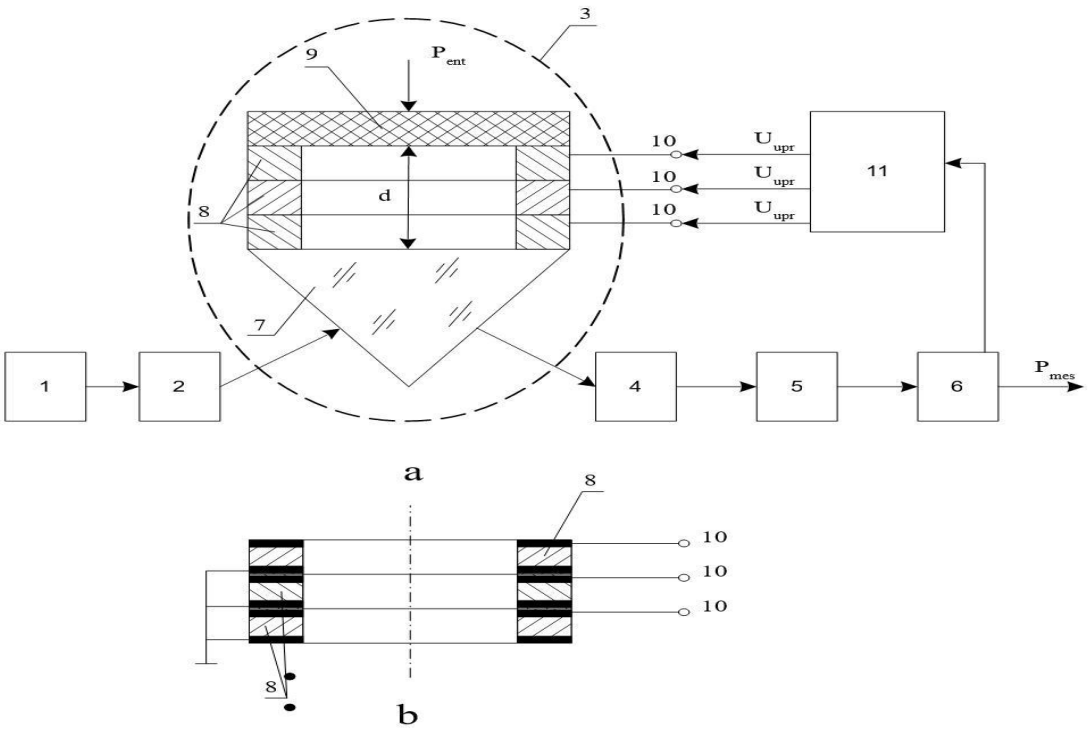

Fig. 9 – Fiber-optic pressure instrument transducer:
a – functional circuit; b – electric contacts of
isolated pads connection circuit;
1- emission source, 2, 4 – optical fibers, 3 – sensor,
5 – receiver, 6 – data processing block, 7 – prism
of complete internal reflection,
8 – isolated pads, 9 – reflecting membrane, 10 –
switch block

Fiber optic pressure sensor with dynamically adjustable range and integrated control

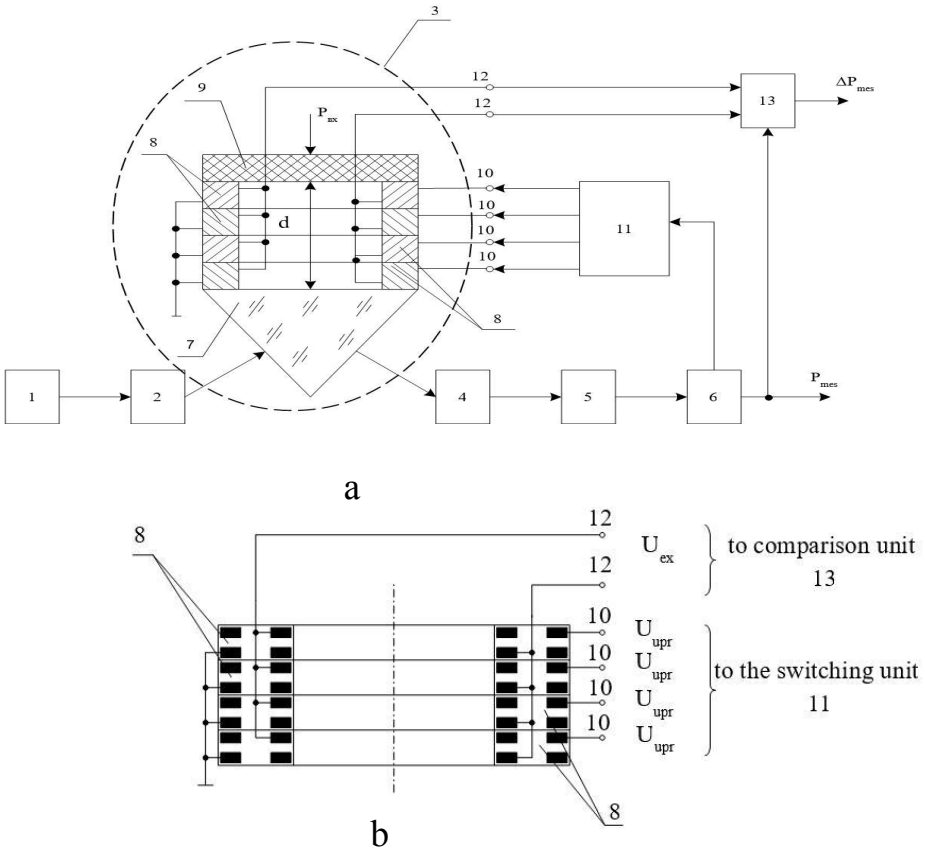

Fig. 10– Fiber-optic instrument transducer with embedded control:
a – functional circuit,
b – electrical contacts of isolated pads connection circuit

Fiber optic pressure sensors for measuring the weight of moving objects

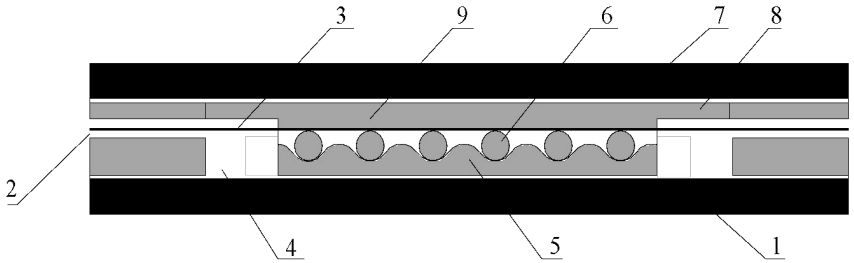

Fig. 11– Fiber-optic pressure instrument transducer's sensor design

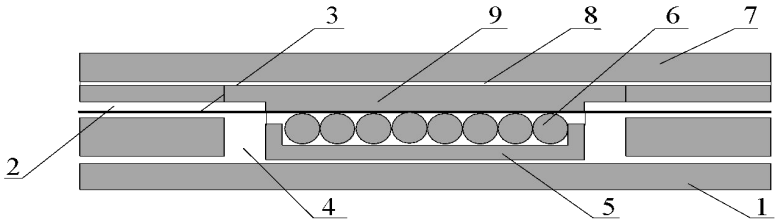

Fig. 12 – Simplified sensor's design of a fiber-optic pressure instrument transducer

Conclusions

Fiber-optic pressure instrument transducers with elastic sensors, dynamically tuned measurement range, to measure weight of mobile objects were proposed.

Functional circuits of developed fiber-optic instrument transducers and the description of their work are given. Fiber-optic instrument transducers are protected with utility model patents of Ukraine.

Developed fiber-optic pressure instrument transducers can be widely applied in information-measuring systems and in control systems for different objects.