

Fiber-optic pressure instrument transducers

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Fiber-optic instrument transducers with elastic sensors

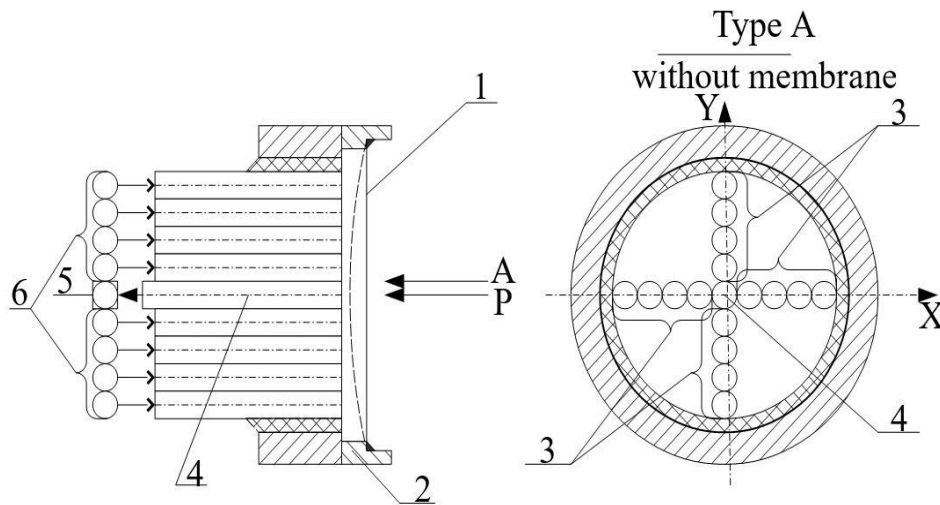


Fig. 1 – Fiber-optic pressure instrument transducer design

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

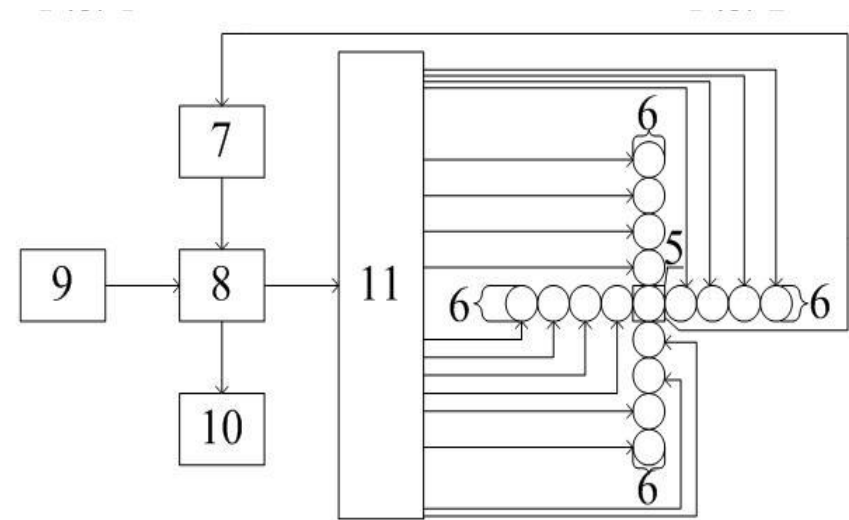


Fig. 2 – Electrical functional circuit of the instrument transducer

- 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

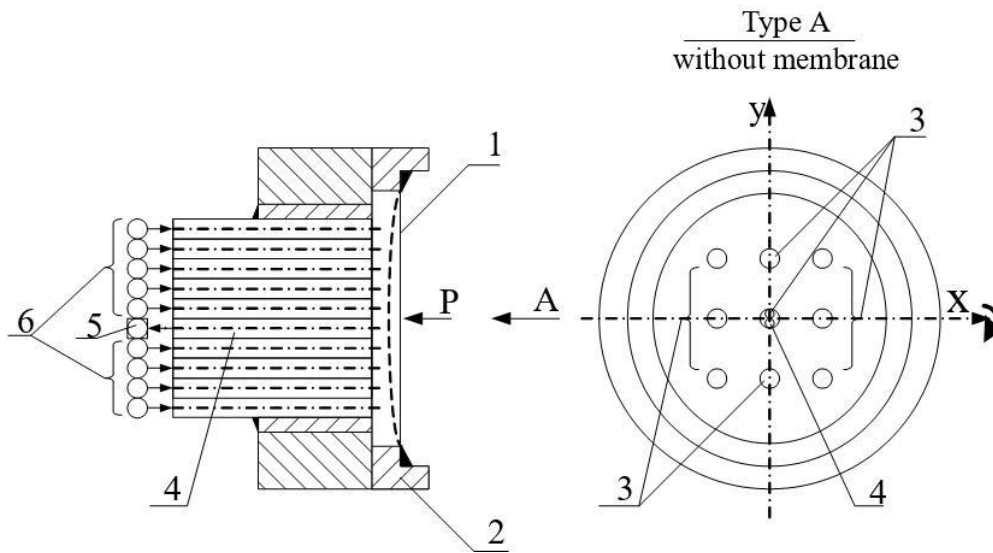


Fig. 3 – Fiber-optic pressure instrument transducer construction

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

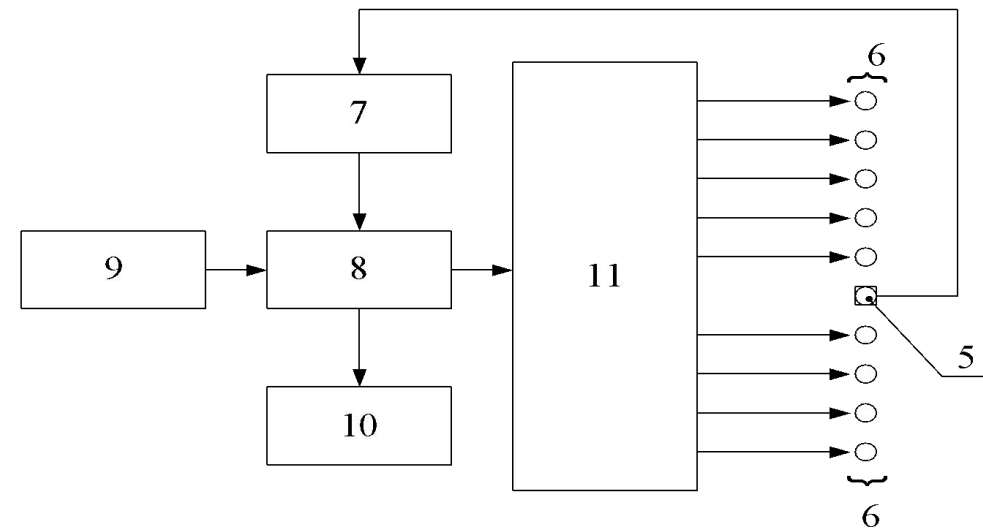


Fig. 4 – Electrical functional circuit of the instrument transducer

- 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

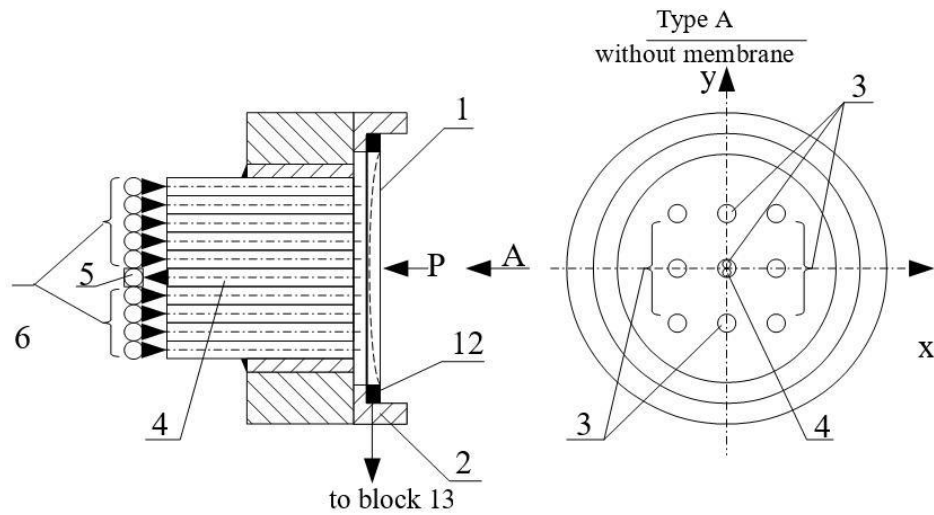


Fig. 5 – Fiber-optic pressure instrument transducer construction

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

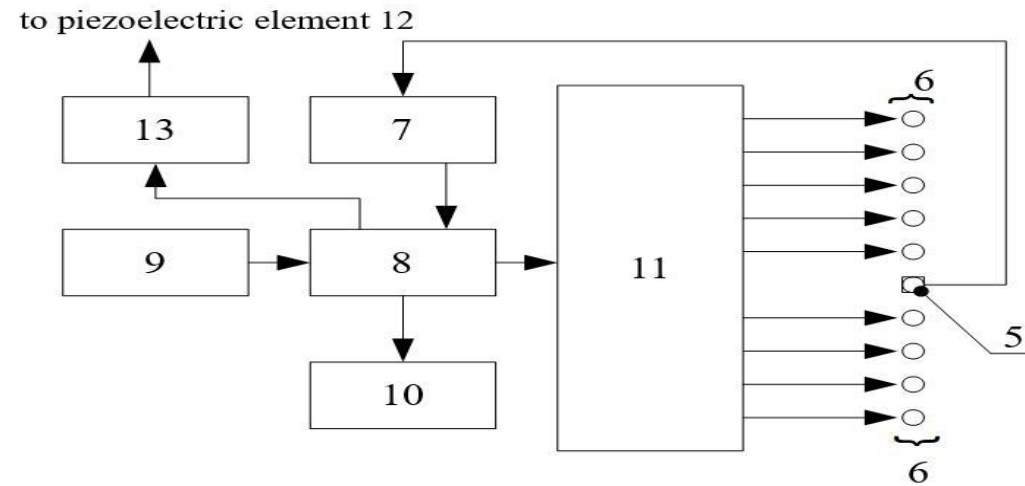


Fig. 6 – Electrical functional circuit of the instrument transducer

- 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

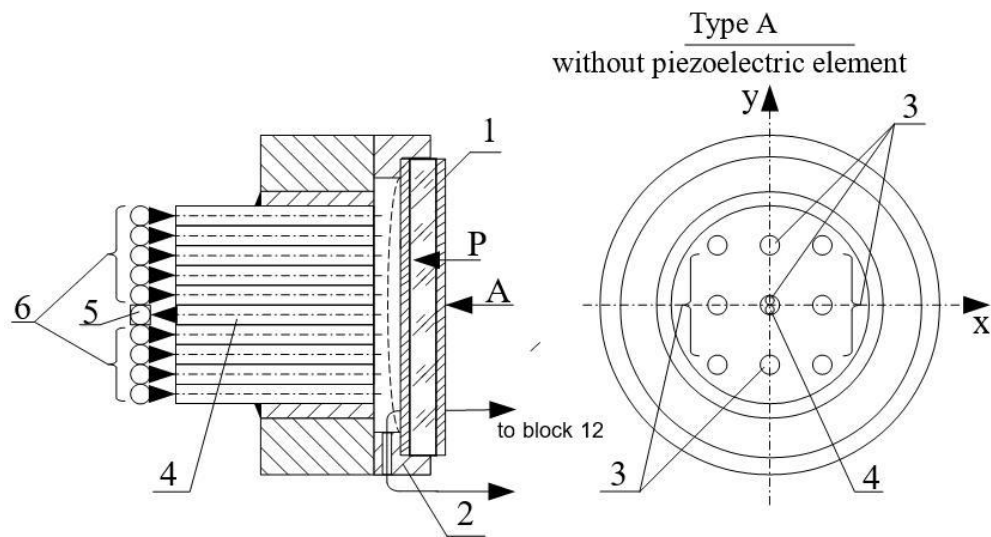


Fig. 7 – Fiber-optic pressure instrument transducer construction

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

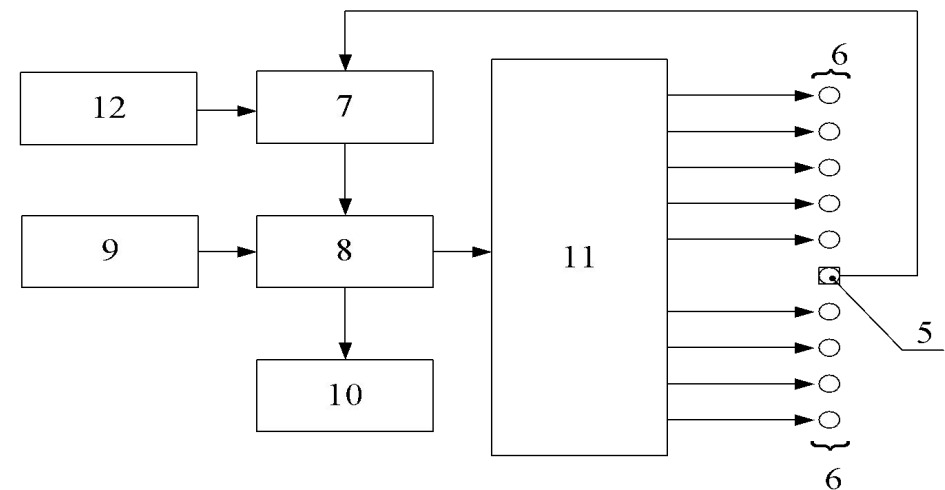


Fig. 8 – Electrical functional circuit of the instrument transducer

- 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

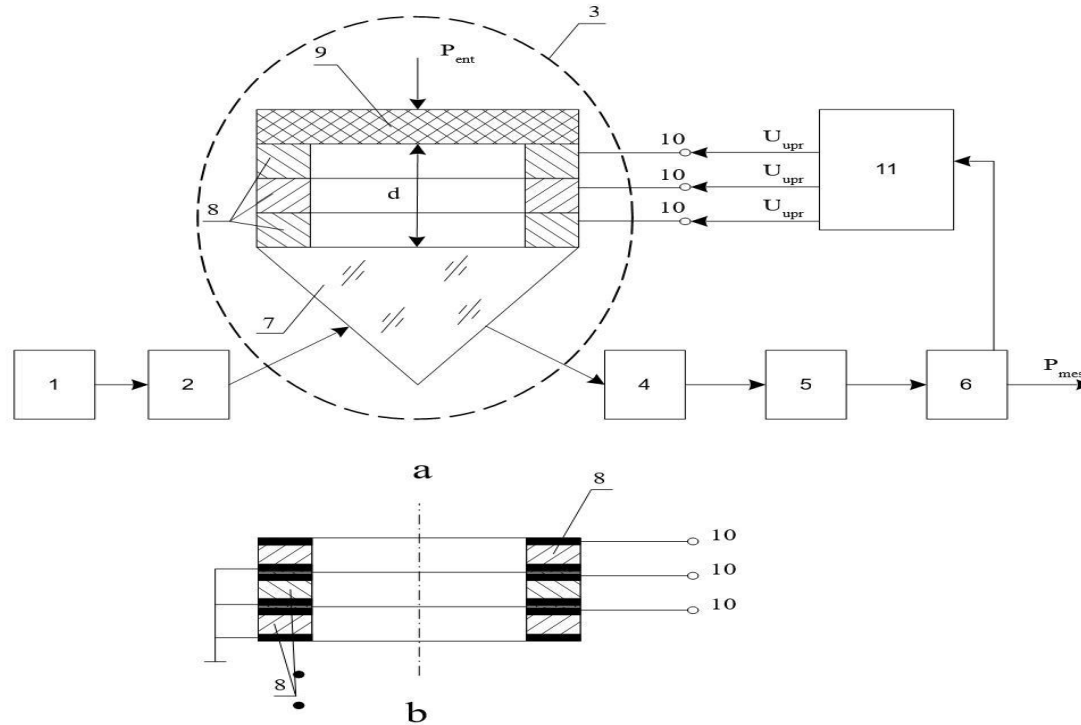


Fig. 9 – Fiber-optic pressure instrument transducer:
a – functional circuit; b – electric contacts of isolated pads connection circuit;
1- emission source, 2, 4 – optical fibers, 3 – sensor, 5 – receiver, 6 – data processing block, 7 – prism of complete internal reflection, 8 – isolated pads, 9 – reflecting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

Fiber optic pressure sensor with dynamically adjustable range and integrated control

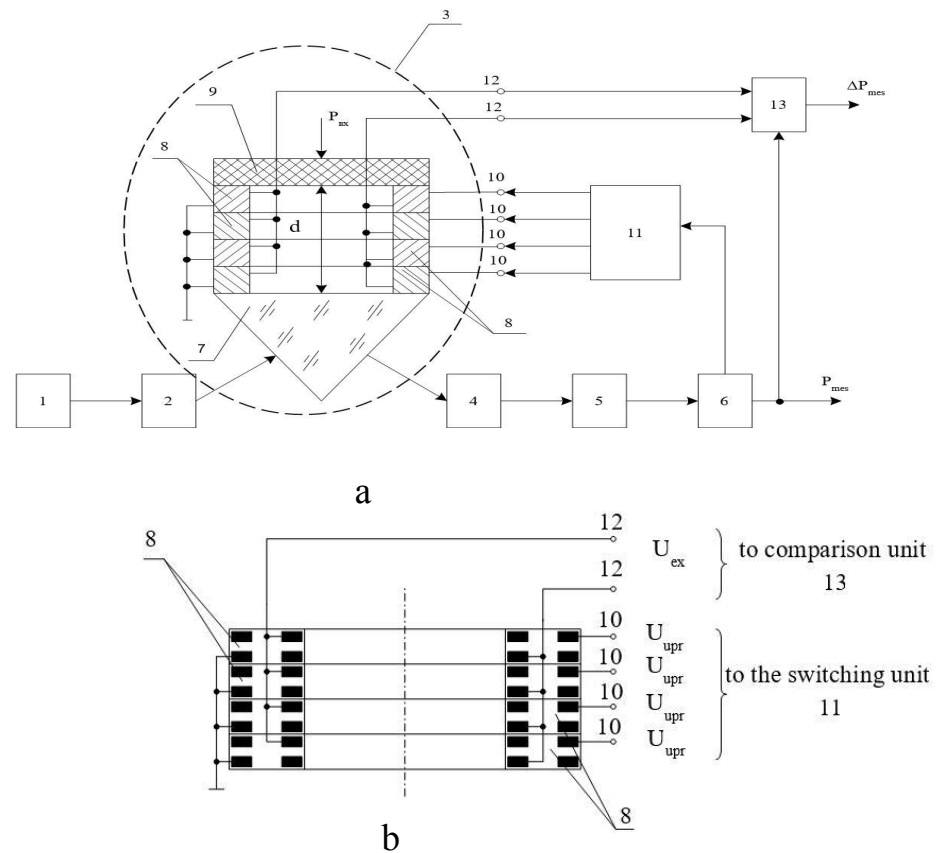


Fig. 10– Fiber-optic instrument transducer with embedded control:
 a – functional circuit,
 b – electrical contacts of isolated pads connection circuit

Fiber optic pressure sensors for measuring the weight of moving objects

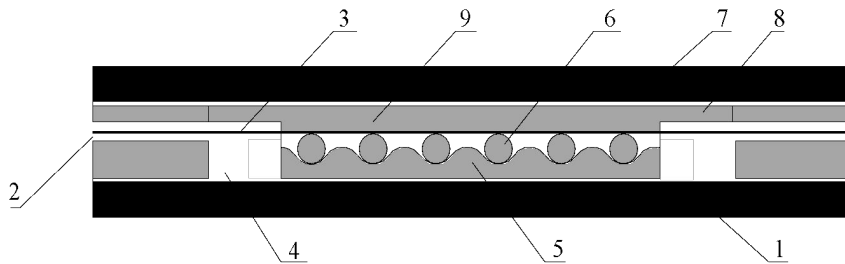


Fig. 11– Fiber-optic pressure instrument transducer's sensor design

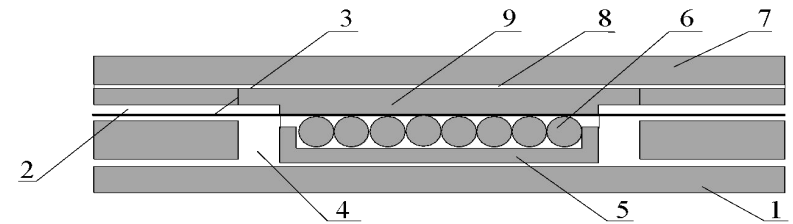


Fig. 12 – Simplified sensor's design of a fiber-optic pressure instrument transducer

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.