### Fiber-optic pressure instrument transducers

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Kharkiv, 2019

#### 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.





- 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.





- 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.





- 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







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.