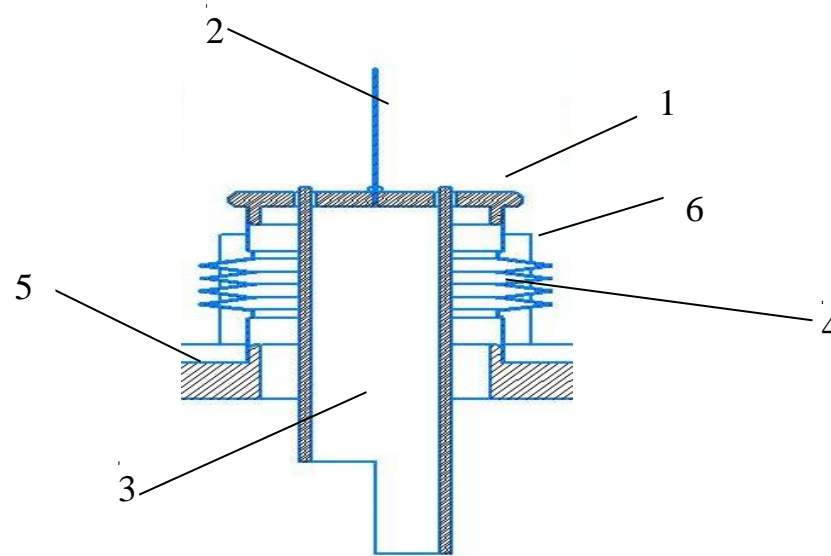


Technological characteristics of assembly procedure for fiber-optic sensors of fluid media parameters

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As part of fluid data-measuring systems, particularly within hydraulic engineering structures, life-support systems, petroleum pipeline systems, etc. the measuring instruments for fluid parameters are subject to strict requirements in terms of intrinsic-fire-explosion safety, as well as absence of hazardous electromagnetic effect on living organisms, assembly convenience, measurement accuracy and survival in corrosive environment. Fiber-optic sensors of fluid flow parameters fully comply with the necessary requirements for the abovementioned systems.

Design map of FOSLFP detecting element



- 1- Bellow cap
- 2- Reflector .
- 3- Cylinder
- 4- Bellow .
- 5- Sensor bottom
- 6- Sensor body

Technological characteristics of manufacturing process

1. Assembly of FOSLFP detecting element (DE) (refer to figure 1) includes several stages.

At the first stage

mirror-bright reflecting plate 2 (refer to figure 3) is attached to bellows cap 1 (refer to figure 2) by means of laser spot welding in such a way so that bellows cap and mirror-bright plate planes form 90° angle.

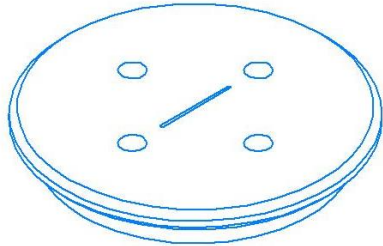


Figure 2. Bellow cap 1



Figure 3. Reflector 2

At the second stage of DE assembly it is necessary to place and secure cylinder 3 (refer to figure 4) on the bellows cap 1 in such a way so that section plane of these parts is parallel with the plane of reflecting plate 2. Cylinder is secured on the bellows cap 1 as follows: cylinder upper part has four males, and bellows cap has four females.



Figure 4. Cylinder 3

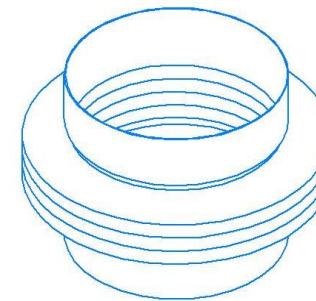


Figure 5. Bellow 4

At the third stage

bellows 4 (refer to figure 5) and bellow cap 1 are connected by means of adhesive or laser pulse welding

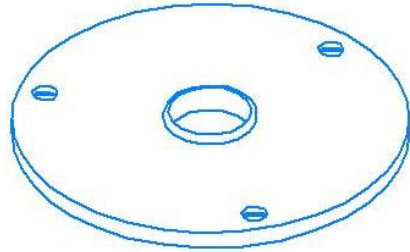


Figure 6. Sensor bottom 5

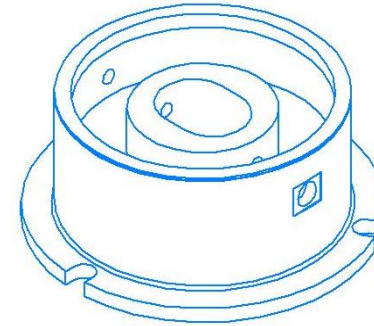


Figure 7. Sensor body 6

2. Bellows is secured to the sensor bottom as follows:

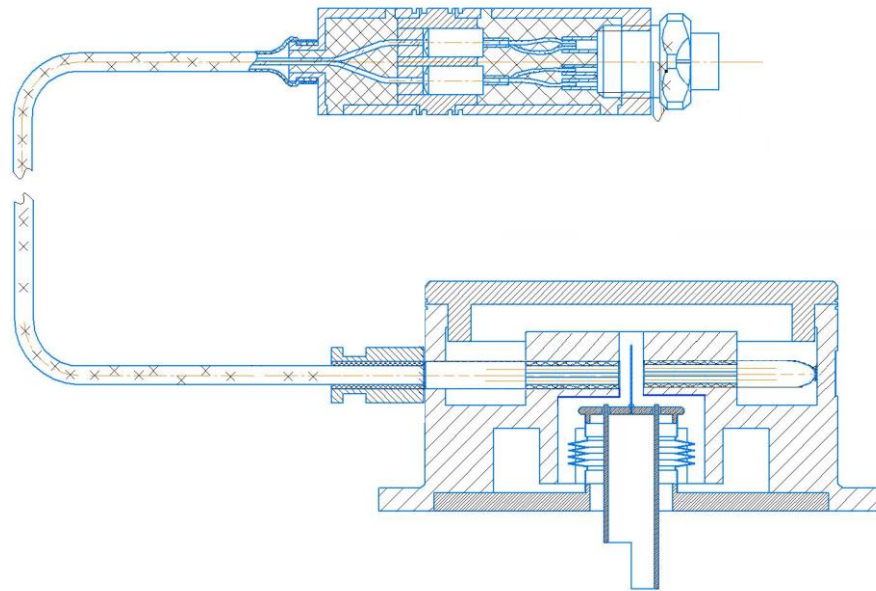
Sensor bottom 5 (refer to figure 6) has a male for bellows fastening, which has to be covered with adhesive first, then bellows is placed on top of it subject to the following:

2.1 plane of the lower male is to be exactly parallel with the matchmarks on the sensor bottom (for example, parallel with OX or OY axis);

2.2 plane that has been formed at the junction of bellows cap and cylinder is to be parallel with the fluid flow (for this purpose the cap is engraved with direction of flow).

The sensor bottom 5 is to be secured to the body 6 (refer to figure 7) with screws, observing the conditions as per para. 2.2.

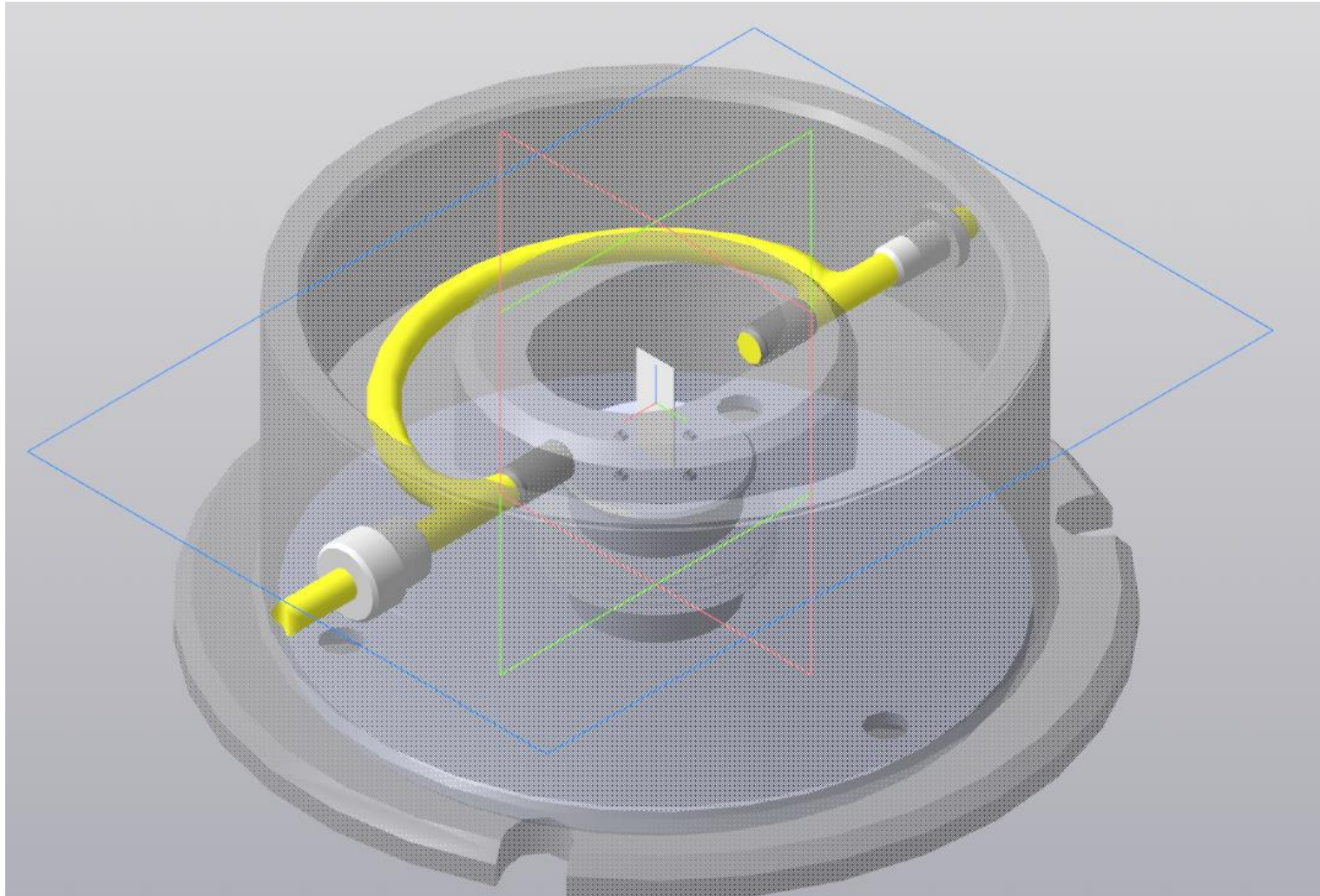
Design map of the sensor with optical fibers



Optical fiber is put in a metal bushing and sealed with adhesive or sealer compound. Protruding of fiber end out of the bushing is not permitted. Bushings (not shown for clarity) within the sensor body 7 are arranged at 6.2 mm distance of reflecting planes of DE mirror-bright plate. Distance between the bushing end and reflecting planes is monitored with micrometer microscope. Bushings are to be secured with screws. Screws are to be locked by adhesive sealant «Viksint».

Place fibers into the groove within the body, notice that fibers bending radius is not to exceed 10 degrees.

3D-model of a fiber-optic sensor of fluid flow parameters



***Acknowledgment.** The work has been accomplished with financial support in the form of Grant No 18-38-20045/18 from The Russian Foundation for Basic Research.*

Thanks for attention!