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## 1 Intended use

1.1 USD-7000 hydraulic press (Pressure generator) is a manual pump that enables creating excess pressure. It is intended for testing and calibration of instrument pressure transducers (sensors) and other instrumentation by interchange comparison with pressure standards.

1.2 The pressure generator is not an instrumentation device. Therefore the reference pressure standards shall be chosen based on the methods of testing of the respective instrumentation devices. The standards are not included in the basic delivery set of the pressure generator (may be supplied optionally).

1.3 The pressure generator is designed to operate in a laboratory environment at an ambient temperature of 15-30 °C with a relative humidity not exceeding 80%.

## 2 Specifications

The main specifications for the pressure generator are presented in table 1.

Table 1

Parameter name	Value
Upper limit of the generated pressure, MPa (kgf /cm <sup>2</sup> )	700 (7000)
Lower limit of the generated pressure, MPa (kgf/cm <sup>2</sup> )	0 (0)
Number of slots for tested pressure measuring instruments, pcs.	1
Pressure fluid	70% Glycerine (GOST 6259-52) – 30% Ethylene glycol (GOST 10164-62)
Bucket volume, ml	250
Dimensions, L x W x H, mm, no more than	575x560x240
Device weight, kg	35

## 3 Delivery set

1	Pressure generator .....	1
2	Drive flywheel .....	1
3	Manual pressure pump handle.....	1
4	Nut.....	2
5	Plug.....	2

6 Clutch .....	4
7 Adapter .....	<i>Optional</i>
8 Operation Manual.....	1
<i>Spare parts, tools and accessories</i>	
9 Hex key S4.....	1
10 Set of sealings.....	1

## 4 Design and principle of operation

4.1 USD-7000 appearance of is shown in Figure 1.

Base 1 (Fig. 1) of the device is made in the form of a steel plate with four adjustable feet 12. On the base there are: bucket 2 for the working fluid, manual pump 3 for filling up the system and generating a preliminary pressure, press 4 with the drive 9 to generate and smoothly adjust high pressure, filter 6 for treatment of the working fluid, check valve 7, brace 8.

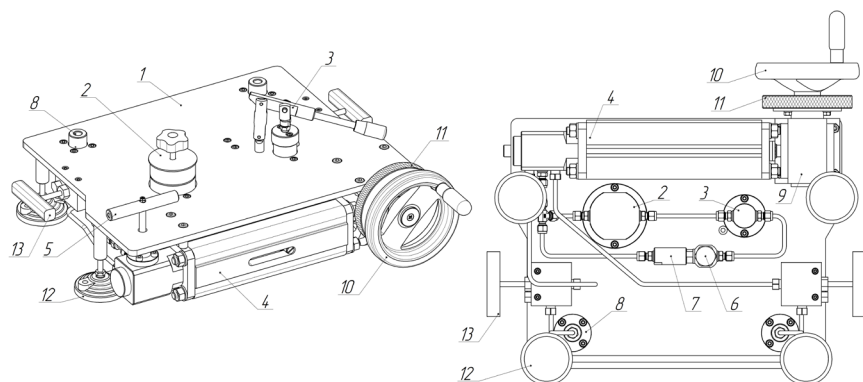


Figure 1. USD-7000

- 1 — base; 2 — bucket; 3 — manual pump; 4 — press; 5 — shut-off valve;  
6 — filter; 7 — check valve; 8 — brace; 9 — drive;  
10 — drive flywheel; 11 — drive brake; 12 — adjustable feet;  
13 — shut-off valve of the brace

4.2 The working fluid bucket consists of the bucket base 1 (Fig. 2), transparent body 2, inlet valve 3, safety valve 4, pressure relief valve needle 5, bucket cover 6. Circular path 7 indicating the upper limit of the working fluid level is made on the transparent body 2 of the bucket.

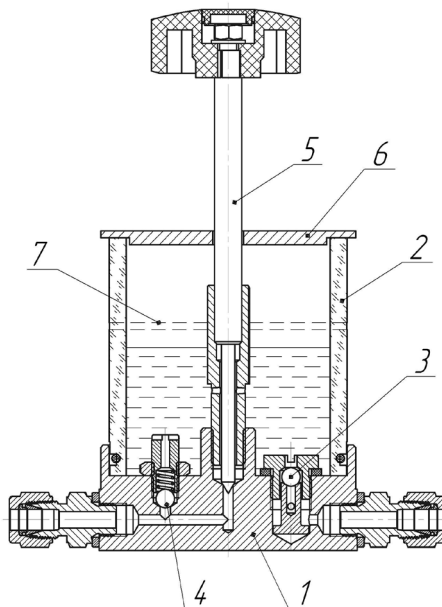


Figure 2. Bucket

1 – bucket base; 2 – body; 3 – inlet valve; 4 – safety valve;  
5 – pressure relief valve; 6 – bucket cover; 7 – path.

The manual pump is made as a separate unit and consists of body 1 (Fig. 3), lever system 2 and handle 3. It is installed in the hydraulic system of the pressure generator after the working fluid bucket and before the filter with the check valve.

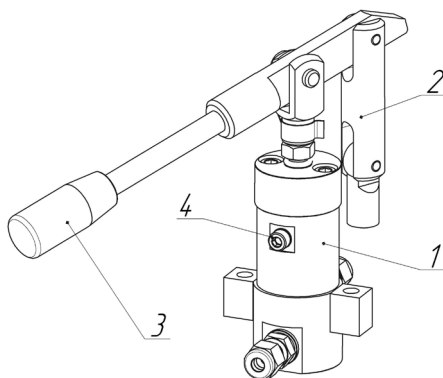


Figure 3. Manual pump

1 – body; 2 – lever; 3 – handle; 4 – screw.

Design of the working fluid filter is shown in Figure 4.

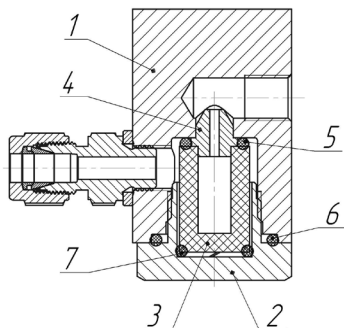


Figure 4. Filter

1 — body; 2 — cover; 3 — filtering element; 4 — centring sleeve;  
5, 6 — sealing ring; 7 — biasing ring.

The standard and the tested instrumentation are installed on braces 8 (Fig. 1) of the pressure generator by connecting via the tube or the adapter. Figure 5 shows a diagram of connection of the instrumentation to the pressure generator brace with the tube. If the thread in the connected instrumentation 2 is the same as standard thread (9/16"–18 UNF), nut 5 shall be installed instead of adapter 6.

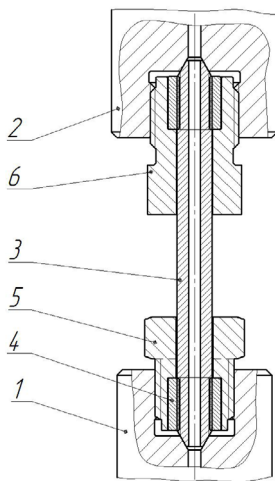


Figure 5. Connecting the instrumentation device to the brace

1 — brace; 2 — instrumentation device; 3 — tube;  
4 — coupling; 5 — nut; 6 — adapter.

4.3 The pressure generator operates as follows. Using manual pump 3 (Fig. 1) the working fluid is pumped from bucket 2 through filter 6 into press 4, and then (under high pressure) into braces 8 with the instrumentation devices connected. The manual pump is needed to fill up the hydraulic system of the pressure generator and preliminary compressing of the air in the connected instrumentation devices in order to reduce its volume. Check valve 7 ensures unidirectional flow of the working fluid within the system. After the preliminary pressure (at least 18 MPa) is generated by the manual pump, shut-off valve 5 should be closed in the system. Then, by rotating the drive flywheel 10 clockwise, the required pressure is smoothly generated by press 4. It is necessary to fix drive 9 with drive brake 11 by turning it counterclockwise in order to prevent spontaneous rollback of the press 4 and to maintain the set pressure. To reduce the pressure, drive flywheel 10 of press 4 should be rotated counterclockwise, after releasing (turn clockwise) drive brake 11. To relieve the pressure remaining in the system, open shut-off valve 5 and pressure relief valve 5 (Fig. 2) located in the bucket.

## **5 Safety precautions**

5.1 This section is aimed at ensuring safe work of personnel, integrity of the pressure generator and the pressure measuring instrumentation used with the device.

5.2 It is not allowed to generate pressure exceeding the upper limit of the measurements.

5.3 It is prohibited to use the pressure generator for a work not referred to in this manual.

5.4 Before installing the tested instrumentation, make sure they are clean and that the connecting fittings are in a good repair.

5.5 The instrumentation may only be dismantled from the pressure generator after complete pressure release.

5.6 When degreasing and treating individual parts with gasoline (B 70 — TU 38.101913-82, Galosha — TU 38.401-67-108-92, Nefras — GOST 8505-80), safety measures for working with gasoline must be observed.

5.7 The working fluid in the pressure generator is under high pressure. Personal eye protection should be used when working.

## **6 Setting-up procedures**

6.1 Unpack the pressure generator and wipe it with a clean cloth.

6.2 Place the device on a table, level its position by rotating the adjustable feet 12 (Fig. 1). It is recommended to secure the pressure generator to the table with screws (not included in the basic delivery set).

6.3 By rotating the drive flywheel 10 counterclockwise, extend the press rod 4 back to the stop and close the shut-off valve 5.

6.4 Pressure relief valve 5 (Fig. 2) must be opened.

6.5 Pour the working fluid into the bucket to a level not exceeding the maximum (Fig. 6).

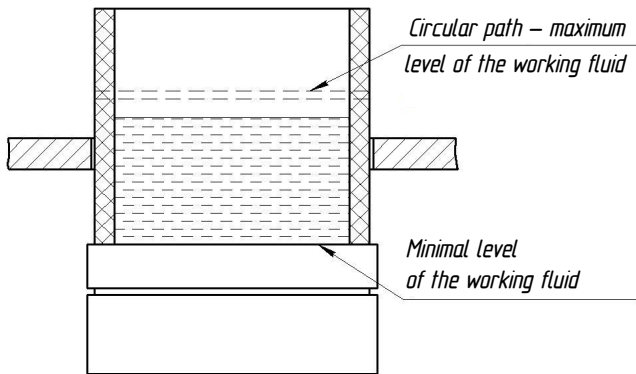


Figure 6. Checking the working fluid level

6.6 Release screw 4 on the manual pump using S4 hex key from the pressure generator delivery set (Fig. 3) by 1/2 turn. Smoothly swing the pump handle 3 until air bubbles stop coming out from under the screw 4 seal. After that, tighten the screw 4 with a low force.

6.7 Open the shut-off valve 5 (Fig. 1). With smooth movements of the manual pump 3, pump the working fluid into the system until it appears in the holes of the braces 8, while continuously monitoring its level in the bucket. Install the plug (if necessary) on the brace 8, in which the working fluid appeared first and the air bubbles stopped coming out. Then make sure that the working fluid comes out without bubbles from the second brace 8. Close the shut-off valve 5.

## 7 Operation procedure

7.1 Calibration of the operating instrumentation should be performed in accordance with the calibration methods for the tested instrumentation.

7.2 Install the standard and the calibrated instrumentation devices on the braces 8 of the pressure generator.

7.3 Close the pressure relief valve 5 (Fig. 2). The valve should be closed with a low force.

7.4 Open the shut-off valve 5 (Fig. 1).

7.5 By smooth movements with effort, pump up with the manual pump. The level of the generated preliminary pressure in the system should be at least 18 MPa. Simultaneously with lowering down the pump handle, forcefully close the shut-off valve 5.

7.6 By turning the drive flywheel 10 clockwise, gradually increase the pressure up to the required level.

### **Caution!**

It is necessary to fix drive 9 with drive brake 11 by turning it counterclockwise in order to prevent spontaneous rollback of the press 4 and to maintain the set pressure.

7.7 To reduce the pressure, turn the drive flywheel 10 counterclockwise, having previously released (by turning it clockwise) the drive brake 11.

### **Caution!**

The pressure generator drive contains a worm gear, which significantly increases and transmits the torque from the flywheel 10 to the screw gear of the press 4. When approaching the extreme forward and extreme rear positions of the press 4, it is necessary to slow down the rotation speed of the drive flywheel 10. When reaching the end position, it is prohibited to apply force while rotating the flywheel 10, in order to avoid damage and destruction of the press 4 of the pressure generator.

7.8 To relieve the pressure remaining in the system, open shut-off valve 5 and pressure relief valve 5 (Fig. 2) located in the bucket.

7.9 Remove the calibrated instrumentation.

## **8 Maintenance**

8.1 Daily and routine maintenance is required to keep the pressure generator in working order.

8.2 With daily maintenance, an external inspection shall be performed, the device should be cleaned of dirt and dust with a dry clean cloth (where necessary, moistened with pure gasoline (B 70 - TU 38.101913-82, Galosha



- TU 38.401-67-108-92, Nefras - GOST 8505-80)). Check for presence of grease on the surface of the manual pump rod and in the rotation units.

The manual pump rotation units should be lubricated with LITOL-24 GOST 21150-87 grease, and the manual pump rod surfaces should be lubricated with the working fluid used in the device.

8.3 During the routine maintenance, it is necessary to replace the working fluid with preliminary flushing of the hydraulic system of the pressure generator.

8.3.1 Open the pressure relief valve 5 (Fig. 2) and the shut-off valve 5 (Fig. 1). By rotating the drive clockwise, move the press rod 4 to the extreme forward position.

8.3.2 Install the plug with the nut from the pressure generator set onto the first brace 8. Close the shut-off valve 5.

8.3.3 By rotating the drive flywheel 10 counterclockwise, move the press rod 4 to the extreme rear position.

8.3.4 Install the plug with the nut from the pressure generator set onto the second brace 8. Open the shut-off valve 5. By rotating the drive clockwise, move the press rod 4 to the extreme forward position. Close the shut-off valve 5.

8.3.5 Remove the plug with the nut from the second brace 8. By rotating the drive flywheel 10 counterclockwise, move the press rod 4 to the extreme rear position.

8.3.6 Install the plug with the nut from the pressure generator set onto the second brace 8. Open the shut-off valve 5. By rotating the drive flywheel 10 clockwise, move the press rod 4 to the extreme forward position. Close the shut-off valve 5.

8.3.7 Using a syringe (not included in the delivery set), remove the working fluid from the bucket 2.

8.4 Flush the pressure generator filter. To do this, unscrew the cover 2 on the filter (Fig. 4), and remove the filter element 3. Wash the filter element, filter cover and wipe the inner cavity of the filter with coarse calico dipped in pure gasoline (B 70 - TU 38.101913-82, Galosha - TU 38.401-67-108-92, Nefras - GOST 8505-80) and let dry. After that, install the filter element, the rubber seals and the filter cover in the reverse order (where necessary, replace the rubber seals and the filter element (not included in the delivery set)).

### Caution!

Tighten the filter cover with a slight effort until it comes into contact with the filter housing. Sealing occurs by compression of rubber rings and does not depend on the tightening force.

The rubber biasing ring 7 installed under the filter element must be cut.

8.5 Fill the hydraulic system of the pressure generator with clean working fluid.

8.5.1 Follow points 6.5 – 6.7. By pumping alternately the braces 8 with the manual pump 3, achieve appearance of a clean working fluid without bubbles. Remove the contaminated working fluid from the braces 8 with a syringe.

## 9 Storage

9.1 Storage of the pressure generator in laboratory conditions. When storing the pressure generator in laboratory conditions, wipe it with a clean cloth and cover with a polyethylene cap.

9.2 Storage of the pressure generator in a warehouse. Prior to storage of the pressure generator, wipe it with a clean cloth, carry out routine maintenance according to clauses 8.3 – 8.4 and pack it in its original factory packaging (or similar). Store the device in a dry, heated room at an air temperature not lower than +5 °C and a relative humidity not higher than 80%.

## 10 Possible failures and troubleshooting

Malfunction	Cause of the malfunction	Remedy
The manual pump fails to generate pressure	Manual pump seal damaged	Replace the seal
	Inlet valve 3 is defective (Fig. 2)	Contact a technician
	Check valve 7 is defective (Fig. 1)	Contact a technician
	Air has entered the pump	Follow point 6.6
Leakage from under the manual pump rod	Manual pump seal damaged	Replace the seal
Leakage from under the main rod	The main rod seal is damaged	Contact the manufacturer

## **11 Warranty**

11.1 The manufacturer warrants conformity of the pressure generator to requirements of CD AP.069.000.000 subject to compliance with transportation, storage and operation conditions.

11.2 The warranty period of operation is 12 months from the date of shipment of the pressure generator to the customer.

11.3 Average service life of the pressure generator is at least 5 years.

11.4 The warranty does not cover all types of seals, shut-off valve 5 (Fig. 1), pressure relief valve 5 (Fig. 2), filter element and defects caused by intensive use of the device.

## **12 Claims information**

In event of a malfunction of the pressure generator, the customer should issue a protocol on the need for repair and should send it to the manufacturer address:

454047, Chelyabinsk, 2nd Paveletskaya st., 36, Alfapaskal LLC.

Tel. (351) 725-74-50, e-mail: q@alfapascal.ru

## **13 Certificate of Acceptance**

The pressure generator meets the requirements of KD AP.069.000.000 and found ready for operation.

Date of manufacture

Responsible person \_\_\_\_\_ ( \_\_\_\_\_ ) place for affix of a seal

## **14 Certificate of packaging**

Pressure generator, serial number has been packed in accordance with requirements of КД АП.069.000.000.

Packing date

Responsible person \_\_\_\_\_ ( \_\_\_\_\_ ) place for affix of a seal

## **15 Note**

The manufacturer reserves the right to make modifications to design of the device, which do not affect its basic characteristics, without additional notice.