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## 1 Purpose

1.1 Small-sized hydraulic-pneumatic pump (PGM) is a manual pump that allows creating gauge pressure and is intended for inspection of the working elastic-element pressure gages and other metering instrument (MI) by means of comparison with the reference pressure metering instruments (RMI), as well as for other types of operations in accordance with its technical capabilities.

1.2 PGM is not MI therefore selection of RMI shall be done based on the methods of the checked MI inspection. RMI is not included in the standard set of supply of PGM (to be supplied upon additional order).

1.3 Small-sized hydraulic-pneumatic pump is designed for operation at the ambient air temperature 15–30°C and maximum relative humidity 80%.

## 2 Technical Characteristics

Generated pressure

Liquid .....	0...60 MPa
Air .....	-0,09...1,6 MPa
Number of connection points.....	2 pcs.
Instrument weight .....	4,8 kg
Sleeve volume.....	200 ml
Overall dimensions (LxWxH), maximum .....	330×365×280 mm
Working fluid.....	oil <sup>1</sup> , water <sup>2</sup>

## 3 Scope of supply (in pieces)

Small-sized hydraulic-pneumatic pump .....	1
Connecting nut M20x1.5 .....	2
Connecting nut M12x1.5 .....	1
Connecting nut G $\frac{1}{2}$ .....	1
Connecting nut G $\frac{1}{4}$ .....	1
Plug.....	2
Clamp .....	1
Handwheel handle .....	2
Pilot wheel of connecting nut .....	2
Pressure release valve .....	1
Clamp fixing screw .....	3

<sup>1</sup>Transformer oil GOST 982-80, GOST 10121-76;

<sup>2</sup>Distilled water GOST 6709-72.

Operation manual, data sheet .....	1
Pressure gage rubber-metal seal .....	6
Piston seal K02-PD 15×7×5 .....	1
Rack seal 008-011-19 .....	4
Ramp seal 005-008-19 .....	3
Hexagonal wrench S 5 .....	1

## 4 Instrument Design and Principle of Operation

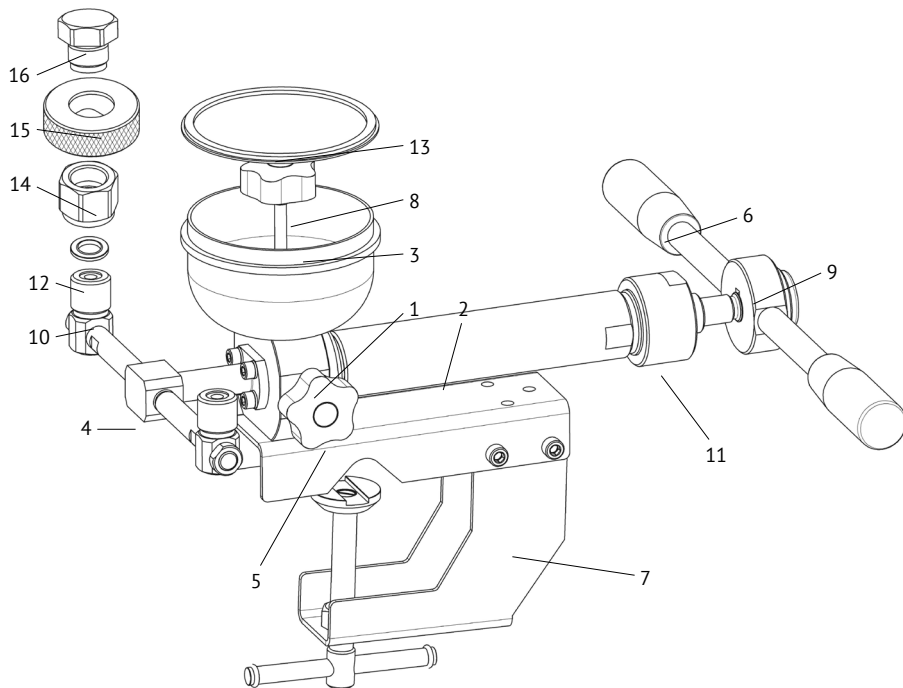


Fig. 1. Instrument view:

- 1 — press housing; 2 — working cylinder; 3 — sleeve; 4 — ramp; 5 — ramp valve;  
 6 — handwheel handle; 7 — clamp; 8 — pressure release valve; 9 — handwheel;  
 10 — rack ; 11 — guide screw; 12 — rubber-metal seal; 13 — cover;  
 14 — connecting nut; 15 — nut handwheel; 16 — plug

4.1 Small-sized hydraulic-pneumatic pump PGM consists of bronze housing 1 (Fig. 1) with connected working cylinder 2, with guide screw 11 and handwheel 9 with detachable handles 6. Sleeve 3 with cover 13 for working liquid with pressure release valve 8 is located at the top. Ramp

4 with racks 10 for MI connection is located at the back side. Clamp 7 for PGM connection to the tabletop or pipe is located at the bottom.

4.2 Working liquid goes from sleeve 3 to working cylinder 2 by gravity during operation. Required pressure is generated by rotating handwheel 9 clockwise. In order to reduce pressure handwheel shall be rotated counterclockwise. Ramp valve 5 serves for locking ramp 4 with racks 10. Pressure release valve 8 is provided for residue pressure relief.

## **5 Safety Precautions**

### **Attention**

The section is intended for the personnel safe operation, safekeeping of PGM and the pressure metering devices used with the unit.

5.1 The unit must not be used for any operations not specified in the manual.

5.2 Prior to MI installation make sure that they are clean and connecting nozzles are serviceable.

5.3 Use only standard O-rings.

5.4 Manually tighten connecting nuts to notable stop.

5.5 Make sure that connecting nuts are tightened to the entire thread both from the rack side and the inspected instrument side.

5.6 Pressure release and ramp valves shall be tightened with small torque up to notable stop.

5.7 Pressure value specified in the manual shall not be exceeded.

5.8 Instruments can be removed from the unit only after complete pressure release.

## **6 Preparation for Operation**

6.1 Unpack press and wipe it down with clean cloth.

6.2 Connect clamp 2 (Fig. 2) to the housing 1 with three screws 3.

6.3 Securely fix PGM on the tabletop or pipe by means of clamp 7 (Fig. 1).

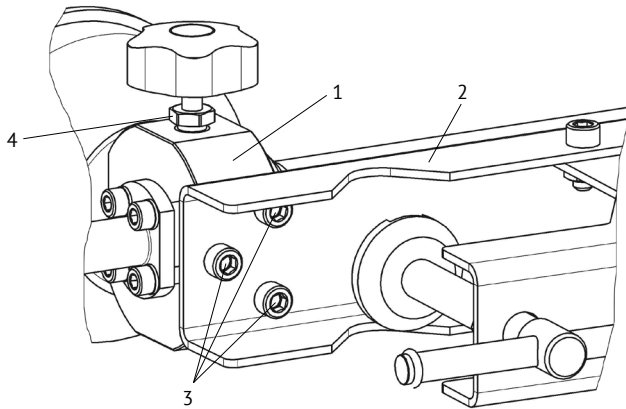


Fig. 2. Bottom view

6.4 Screw pressure release valve needle 1 (Fig. 3) into threaded coupling 3 of sleeve 2 up to stop without excessive efforts.

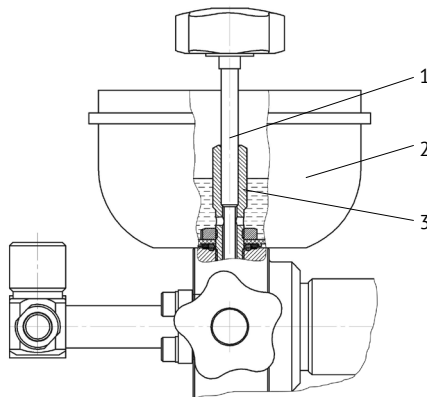


Fig. 3. Side view

6.5 Install rubber-metal seals 12 (Fig. 1) on racks 10 and screw connecting nuts 14 of required size (left thread) from the set of spare parts and accessories. Check ramp valve condition 5 (shall be 1–2 turns open).

6.6 Fill-in 100–150 ml of working liquid in the sleeve. Open pressure release valve 8 unscrewed needle for 2–3 turns until the working liquid appears in racks holes for checked MI. Then, rotate ramp valve clockwise 5 (Fig. 1) to close it to the stop without any excessive efforts.

6.7 Rotate handwheel 9 clockwise to move guide screw 11 forward to stop, then rotate counterclockwise to move guide screw back to stop. Pump working liquid in the system until air bubbles disappear in the sleeve coupling holes 3 (Fig. 3).

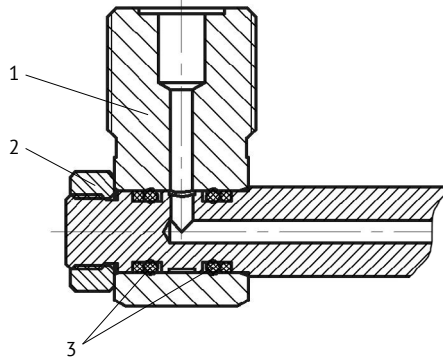


Fig. 4. Rack

6.8 Rack 1 (Fig. 4) is able to turn relative to the ramp tube axis. Rack required position is fixed with nut 2.

## 7 Operation Procedure

7.1 Operating MIs shall be calibrated in compliance with calibrating methods for MIs to be calibrated.

7.2 Check condition and accuracy of installation of rubber-metal seals 12 (Fig. 1), condition of the end surfaces of nozzles of connected MI.

7.3 Install reference and working metering instruments at the places of installation on the unit by means of manual rotation of handwheels 15 of connecting nuts 14 counterclockwise until instruments are pressed to O-rings. Install plug 16 (if required). Tighten connecting nuts manually.

7.4 Open ramp valve 5 (Fig. 1) unscrewed needle for 0.5-1 turn.

7.5 System pumping with installed metering instruments allows removing air residues from the system. For this purpose rotate handwheel 9 clockwise to move guide screw 11 forward to stop. Close pressure release valve 8. Rotate handwheel counterclockwise to move guide screw back to stop having generated discharge in the system. Slowly open pressure release valve 8 for 0.5-1 turn. Repeat system pumping according to item 6.7 checking working liquid level in the sleeve. Top-up working liquid if required.

7.6.6 Close pressure release valve 8 with minor effort.

7.7 Slowly rotate handwheel 9 clockwise to rise pressure to required value. When pressure is increased regularly check the degree of pressure release valve 8 closing.

#### **Attention**

Being compressed, residual air in MI is heated increasing system pressure. When the pressure rise stops, the air starts getting the ambient temperature (i.e. cooling down), being reduced in volume and decreasing the system pressure. It is important to take this into account and to give the system some time to get into thermodynamic balance.

7.8 In order to decrease pressure rotate handwheel 9 counterclockwise.

#### **Attention**

In case of a sudden drop in pressure, the residual air in the MI is cooled down, reducing the system pressure. When the pressure drop stops, the air starts getting the ambient temperature (i.e. it is being heated), being increased in volume and increasing the system pressure. This is important to take into account and to give system some time to get into thermodynamic balance.

7.9 Decrease pressure by rotating handwheel 9 counterclockwise to stop, reduce residual pressure by slowly opening pressure release valve 8.

7.10 Remove inspected MI.

7.11 Pressure release valve 8 is recommended to stay open at the intervals between inspections.

7.12 PGM structure allows moving it from one work place to the other. For this purpose install connecting nuts 14 marked «M20x1.5» on racks 10 and install plugs 16. Unscrew pressure release valve 8 and remove it from sleeve 3. Rotate handwheel 9 clockwise to move guide screw 11 forward to stop. Close sleeve 13 cover (working liquid can stay in the sleeve closed with tight cover).

7.13 For compact carrying of press, unscrew handwheel handles 6. Disconnect clamp 2 (Fig. 2) from press housing 1 by unscrewing screws 3.

## **8 Maintenance**

8.1 In order to keep the unit serviceability daily and routine maintenance is required.

8.2 Daily maintenance: perform visual inspection, clean from dirt and dust with dry clean cloth. Check lubricant on the press guide screw surface 11 (Fig. 1). If lubricant is not available or insufficient, lubricate screw surface with grease LITHOL-24 GOST 21150-87.

8.3 Routine maintenance: replace the working liquid with preliminary flushing, for which:

- open pressure release valve 8;
- move press guide screw 11 forward to stop rotating handwheel 9 clockwise and pushing working liquid to sleeve 3;
- discharge working liquid from sleeve 3;
- fill-in 50–100 ml of working liquid to PGM and pump it according to item 6.7;
- discharge working liquid from sleeve once again;
- fill-in PGM with working liquid according to items 6.6–6.7
- remove old lubricant and apply the new one on the press guide screw 11 surface .

Routine maintenance shall be done when required but not less than once every 3 months.

## 9 Storage

9.1 In laboratory conditions: clean PGM with clean cloth and cover it with polyethylene cap.

9.2 In a storage room: clean PGM with clean cloth, perform flushing according to item 8.3 and put it in factory package (or equivalent one). Store in dry heated room at minimum air temperature +5°C and maximum relative humidity 80%.

## 10 Troubleshooting

<b>Malfunction</b>	<b>Cause of the malfunction</b>	<b>Repair method</b>
Pressure is not generated	O-ring is damaged or incorrectly installed under pressure gage	Replace or re-install O-ring
	The end surface of a manometer union is damaged	Replace or repair the manometer
	Press seal is damaged	Replace the seal
Leakage from under rack	Rack seal is damaged	Replace seal 3 (Fig. 4)



<b>Malfunction</b>	<b>Cause of the malfunction</b>	<b>Repair method</b>
Leakage from under ramp valve nut	Ramp valve needle seal is poorly tightened	Tighten nut 4 (Fig. 2) until leakage is repaired

## 11 Warranty Obligations

Manufacturer guarantees PGM operation provided that requirements to operation, storage and transportation are met.

The warranty service life is 18 months.

The warranty storage life is 6 months.

The average service life is at least 8 years.

## 12 Claim Details

In case of a failure, prepare a certificate of required repair and submit it to the following address: «Alfapascal» LLC, 36, 2nd Paveletskaya, Chelyabinsk, 454047, Russia, phone: +7 (351) 725-74-50, e-mail: q@alfapascal.ru

## 13 Acceptance Certificate

Small-sized hydraulic-pneumatic pump (PGM), factory number \_\_\_\_\_ complies with TU 4212-009-91357274-2015 and approved as fit for operation.

Date of issue

Responsible person \_\_\_\_\_ LS  
 Signature Surname

## 14 Packing Certificate

Small-sized hydraulic-pneumatic pump (PGM) factory number \_\_\_\_\_ was packed at «Alfapascal» LLC in accordance with TU 4212-009-91357274-2015.

Date of packing

Responsible person \_\_\_\_\_ LS  
 Signature Surname

## 15 Note

Manufacturer reserves the right to incorporate changes in the instrument structure that do not affect major properties without any additional notification.