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1 Purpose

1.1 Comparison Calibrating Pneumatic Device (PUSK) consists of a manual pump, which allows generating gauge pressure or vacuum. The device is designed for calibrating elastic element manometers, vacuum manometers, pressure-and-vacuum manometers and other measuring instruments through verifying against pressure reference standards (except for oxygen measuring instruments).

1.2 PUSK is not a measuring instrument, so reference standards shall be chosen based on the calibrating technique used for calibrating units under test. Reference standards are not included into PUSK basic scope of supply (can be supplied optionally).

1.3 Comparison Calibrating Pneumatic Device is designed for operation in laboratory conditions at ambient temperature 10-30°C with relative humidity not exceeding 80%.

2 Specifications

Pressure generating range	-0,096...1,6 MPa
Number of connections for units under test	1 pcs
Device weight, not exceeding	6 kg
Working medium	air
Overall dimensions (L×W×H), maximum	300×250×190 mm

3 Delivery set

Basement with pressure generator	1
Connecting nut	
M20×1.5	2
M12×1.5	1
G½	1
G¼	1
Operating manual	1
Manometer sealing ring GOST 9833-73	
manometer 008-012-25-2-2	6
cylinder 020-025-30-2-2	3
Connection nut flywheel	2

4 Design and operating principle

4.1 The device exterior is shown in Fig. 1.

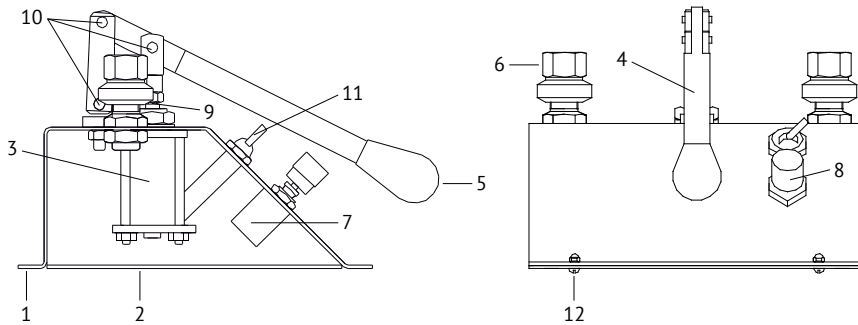


Fig. 1 Comparison Calibrating Pneumatic Device:

- 1 — body; 2 — bottom cover; 3 — cylinder; 4 — lever; 5 — lever handle;
- 6 — connecting nut; 7 — adjustable throttle; 8 — throttle handle;
- 9 — stem; 10 — swivel joint; 11 — pressure/vacuum selector;
- 12 — fastening screws.

4.2 Pneumatic circuit is shown in Fig. 2.

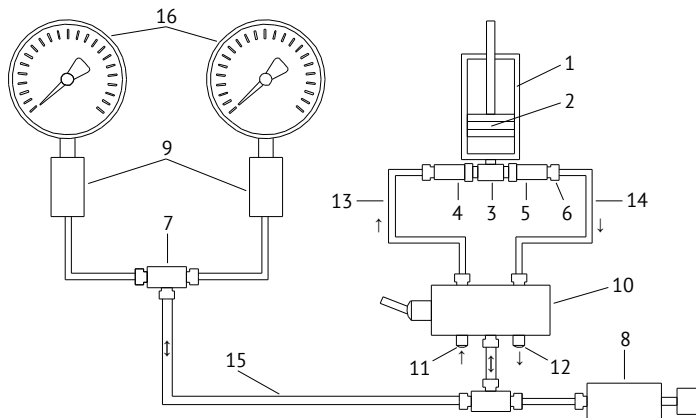


Fig. 2 PUSK pneumatic circuit:

- 1 — cylinder; 2 — piston; 3 — swivel tee-piece; 4,5 — valves;
- 6 — connecting fittings; 7 — tee-piece; 8 — adjustable throttle; 9 — connecting nuts; 10 — pressure/vacuum selector; 11,12 — filter; 13 — vacuum line;
- 14 — pressure line; 15 — measuring line; 16 — manometers (manometer and reference manometer).

Connecting fittings and tubes are not shown in this schematic view.

4.3 Device operation for pressure generating.

4.3.1 Selector 10 is in pressure position in this case vacuum line 13 is connected through selector 10 and filter 11 to the atmosphere, and pressure line 14 through selector 10 is connected to measuring line 15. Adjustable throttle 8 is closed.

4.3.2 When piston 2 (Fig. 2) moves up, valve 4 opens, and air is delivered to cylinder 1 through filter 11, selector 10, vacuum line 13 and valve 4. When piston 2 moves down, valve 4 closes, and valve 5 opens, and the air from the cylinder through pressure line 14 and selector 10 is delivered to measuring line 15, generating gauge pressure. During further pumping, pressure in the measuring line will increase. In order to reduce pressure in the measuring line it's required to slowly half-open the adjustable throttle 8.

4.4 Device operation for vacuum generating.

4.4.1 Selector 10 is switched to vacuum position; in this case vacuum line 13 through selector 10 is connected to measuring line 15, and pressure line 14 through selector 10 and filter 12 is connected to the atmosphere. Adjustable throttle 8 is closed.

4.4.2 When piston 2 moves up, valve 4 opens, and the air from the measuring line 15 through selector 10 and vacuum line 13 is delivered to cylinder 2, generating vacuum in measuring line 15. When piston 2 moves down, valve 4 closes, and the air pumped out of the measuring line is charged into the atmosphere through open valve 5, pressure line 14, selector 10 and filter 12. During further pumping out, vacuum in the measuring line will increase. In order to reduce vacuum in the measuring line it's required to slowly half-open the adjustable throttle 8.

5 Safety measures

Attention

This section is intended to provide safe operation of the personnel, preservation of PUSK and measuring instruments used with it.

5.1 *Never* use this device for other purposes than those specified in this operating manual.

5.2 Before installation of units under test make sure that connecting nozzles are clean and free of damage.

5.3 Use only standard sealing rings.

5.4 Tighten the connecting nuts manually.

5.5 Make sure that pressure/vacuum selector is set to a proper position, otherwise you can damage the unit under test.

5.6 *Never* exceed pressure value specified in the operating manual for the instrument.

5.7 Measuring instruments can be dismantled from the device only when pressure (vacuum) is completely released.

5.8 Adjustable throttle is to be closed with a very small torque, otherwise the throttle can be damaged.

5.9 *Never* use pressure/vacuum selector when the system is under pressure (vacuum).

6 Preparation for operation

6.1 Unpack the device and wipe it with clean cloth.

6.2 Install the device on a table and secure it using screws (not included into the scope of supply).

6.3 Install the sealing rings to the connecting nozzles.

7 Operation order

7.1 Measuring instruments calibrating shall be carried out in accordance with calibrating techniques specified for the units under test.

7.2 Install the reference standard and the measuring instrument into their positions on the device by rotating the connecting nuts manually counter clockwise until all the instruments are pressed against the sealing rings. Tighten the connecting nuts manually.

7.3 Make sure that the adjustable throttle is closed. Adjustable throttle is to be closed with a very small torque, otherwise the throttle can be damaged.

7.4 Perform pumping slowly operating the pump, without jerking and shocks. Make sure that the piston travels from one limit position to the other while pumping.

7.5 Use the adjustable throttle for reducing pressure.

7.6 When calibrating operation is finished, release pressure completely.

7.7 Dismantle the unit under test.

7.8 The adjustable throttle shall be kept in open position between calibrating operations.

8 Technical maintenance

8.1 In order to keep the device in good operating condition it's required

to carry out daily and routine maintenance.

8.2 Daily maintenance includes visual inspection and cleaning from dust and dirt with dry clean cloth. Check the presence of grease on the surface of the stem 9 (Fig. 1) and in the swivel joints 10. In case of no or insufficient amount of grease on these elements, lubricate the swivel joints 10 with grease LITOL-24 GOST 21150-87, and apply silicone grease (not aerosol) to the surface of the stems 9.

8.3 During routine maintenance it's required to disassembly the device, perform visual inspection and lubrication of the pump components according to the following procedure:

8.3.1 remove screws which secure the device on the table;

8.3.2 remove the screw 12 (Fig. 1) and dismantle the bottom cover 2;

8.3.3 while fixing the lever 4 (Fig. 3), loosen the lock nut 3;

8.3.4 remove the axis 2 and move the lever 4 to the opposite side;

8.3.5 while fixing the stem 9 by hand (!), unscrew the fork 1 and lock nut 3 from it;

8.3.6 place the device with bottom part toward you

8.3.7 while holding the valve assembly (check valves 7, fittings 8 and swivel tee-pierce 6) by hand, remove the hollow screw 5 and, without disconnecting plastic tubes, move it aside;

8.3.8 while holding the studs 11, unscrew the nuts 10 (Fig. 10) and dismantle the bottom cover 12;

8.3.9 carefully remove the sealing ring 13, wash it and the cover in clean petrol (petroleum solvent, Б-70), check the ring for damages and elasticity degradation; in case of non-compliance with the requirements replace the ring with a new one;

8.3.10 apply a good amount of silicone grease to the entire surface of the ring and install it into the groove in the bottom cover;

8.3.11 remove the cylinder liner 14 and the piston 15 with the stem 9 from the device;

8.3.12 carefully remove the sealing rings 16;

8.3.13 wash the dismantled components in clean petrol (petroleum solvent, Б-70), wipe with lint free cloth, perform thorough visual inspection of metal parts for mechanical damages, and rubber sealing rings — for wearing and elasticity degradation. In case of any defects identified on the components, replace them with new ones.

8.3.14 lubricate all the components with silicone grease;

8.3.15 carefully install the sealing rings into the grooves;

8.3.16 apply a thick layer of grease to the surface of the piston 15 and between the rings 16;

8.3.17 assemble the pump following the steps above in reverse sequence. Routine maintenance shall be performed as required, but at least every 6 months.

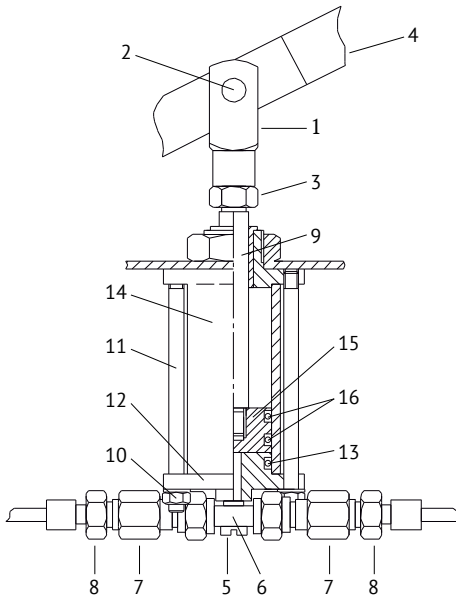


Fig. 3 Arrangement of the pump:

- 1 – fork; 2 – axis; 3 – lock nut; 4 – lever; 5 – hollow screw;
6 – swivel tee-piece; 7 – check valve; 8 – fitting; 9 – stem; 10 – nut;
11 – stud; 12 – bottom cover; 13,16 – sealing rings; 14 – cylinder liner;
15 – piston.

Attention

When using petrol, observe safety precautions for handling fuels and lubricants! Do not apply excessive force for tightening threaded connections!

9 Storage

9.1 Storing PUSK in laboratory conditions.

9.2 For storage in laboratory conditions PUSK shall be wiped with clean cloth and covered with a plastic hood. Adjustable throttle shall be open.

9.3 Storing PUSK in warehouse.

9.4 Before putting PUSK into storage perform routine maintenance following the steps in para. 8.3, open adjustable throttle and pack it into the original package (or similar).

9.5 The device shall be stored in dry heated room at ambient temperature not lower than +5°C with relative humidity not exceeding 80%.

10 Possible troubles and their elimination

Trouble	Cause	Elimination
No pressure generating	Sealing ring under the manometer is damaged or not installed	Replace or install the sealing ring
	Butt end of the manometer nozzle is damaged	Replace or repair the manometer
	Check valve is faulty	Replace the valve
	Leak-tightness of connections is broken	Using soap solution detect the location of leakage and eliminate it by tightening, or replace the gasket.
	Leak-tightness of pump cylinder is broken	Perform maintenance operation described in para. 8.3, replace the sealing rings (if required)

11 Warranty

11.1 The manufacturer guarantees proper functioning of PUSK, when the conditions of operation, storage and transportation are observed.

11.2 Guaranteed service life — 18 months.

11.3 Guaranteed warehouse storage life — 6 months.

11.4 Average lifetime — not less than 8 years.

12 Data on claims

In the case of gauge deadweight tester fault, the user should draw up a report about the necessity in repair and about its dispatch to the Manufacturer's address: 2nd Paveletskaya st., 36, Chelyabinsk, 454047, Russia Federation, Alfapascal, phone: +7 (351) 725-74-50, e-mail: q@alfapascal.ru.

13 Acceptance certificate

Comparison calibrating pneumatic device (PUSK) serial number _____
has been accepted for operation.

Date of manufacturing

Responsible person

Signature

Surname

Stamp

14 Packing certificate

Comparison calibrating pneumatic device (PUSK) serial number _____
was packed in Alfapascal.

Packing date

Responsible person

Signature

Surname

Stamp

Note

The manufacturer reserves the right to make alterations in the design of the device.

