PU & PGO SAMPLING CYLINDERS

USER MANUAL

214.4.056.000UM

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1 Important notes

Before using the equipment accurately read the present User Manual.

Instructions marked by this box are necessary for carrying out in order to avoid injuries sustaining at working with IUTD and to avoid IUTD damage.

Two marking types of parts are used in this and accompanied documents:

XXX-XXXX – Part number or Cat. Number referred to ordering documents;

214.X.XXX.XXX(-XX) or simplified X.XXX.XXX(-XX) – Cross ID referred to internal manufacturer documents.

Both can be used for ordering parts.

2 Description and operation

2.1 Basic product information

This manual contains information on sampling cylinders operation, including versions:

- PGO-50,
- PGO-100,
- PGO-50AL,
- PGO-400,
- PGO-400M,
- PU-50,
- PU-100,
- PU-400.

These sampling cylinders are made by SDO Chromatec in accordance with TU 3689-019-12908609-2010.

Sampling cylinders meet requirements of TR CU 010/2011 “On machine and equipment safety” based on the Conformity Declaration, registration number TS No. RU D-RU.MG05.V.00092.

Chromatec products may contain non-essentially updated parts in accordance with new developments or may be subject to non-essential reworks that do not affect the specifications and safety requirements and are not reflected herein.

2.2 Purpose

PU & PGO sampling cylinders (hereinafter referred to as the Cylinders) are designed to sample liquefied hydrocarbon gases from vessels, pipelines, rail car tanks and fixed vessels.

PGO-50 AL is a specialized cylinder used for sampling petroleum products containing sulphur compounds.

Samples for chromatographic analyses are injected in the chromatograph using the adjustable pneumatic resistor 214.5.150.019 and the valve-sampler for liquefied gases 214.4.464.017 described accordingly in User Manuals 214.5.150.019UM and 214.4.464.017UM.

The Cylinder design, operation principle, service conditions and safety precautions are the same as of PU and PGO type cylinders as per GOST 14921-78 “Liquefied hydrocarbon gases. Sampling methods”.

PGO Cylinders with metal-polyamide seal valves may be used in the temperature range from minus 20 to plus 50 °C; with metal-metal seal valves, in a wider temperature range, from minus 60 to plus 80 °C. However, account should be taken of saturated vapour pressure: it should not exceed pressure marked on the Cylinder.

PGO Cylinders (except PGO-400M) contain a fitting with rubber membrane that allows for aspirating sample into syringe. In PGO-400M this fitting is replaced by a fitting for connecting a pressure gauge enabling control of pressure of a sample taken in.

2.3 Specifications and scope of delivery

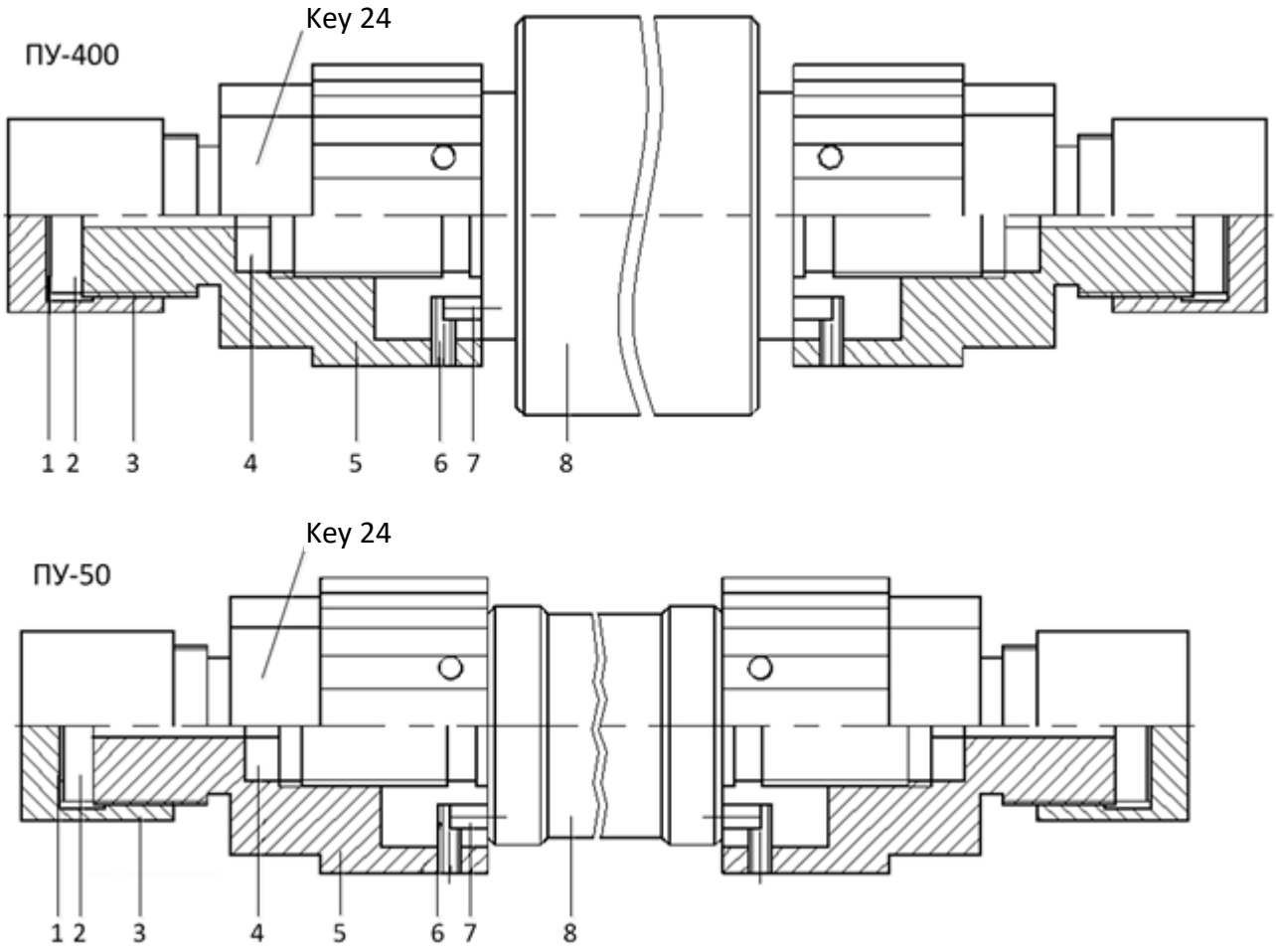
Specifications and scope of delivery are given in the Cylinder passport.

2.4 Design and operation

The cylinder is made of steel 12X18H10T according to GOST 5632-72.

2.4.1 PU cylinders. Design and operation principle

Cylinder design is shown in Figure 1.



1 – fluoroplastic gasket (disc 7.858.010-06); 2 – rubber gasket (disc 7.858.010-02); 3 – cap 8.632.036; 4 – rubber O-ring (disc 7.858.010); 5 – locking bushing; 6 –screw; 7 – pin; 8 – body.

Figure 1 – PU-400 & PU-50 cylinders

PU-50 and PU-100 cylinders vary in length of body 8 (see Figure 1), so PU-100 is not shown in Figure 1.

As the locking bushing 5 is turned clockwise, the O-ring 4 is strained and fitting frontal surfaces of the body 8 and bushing 5 are sealed, then as the O-ring 4 continues to strain, its opening is closed.

Locking bushings 5 have six threaded holes located evenly in a circumferential manner for inserting screws 6. The screw restrains rotational movement of the locking bushing 5 by stopping it against the pin 7 on the cylinder body as the feedthrough opening in the O-ring 4 is closed.

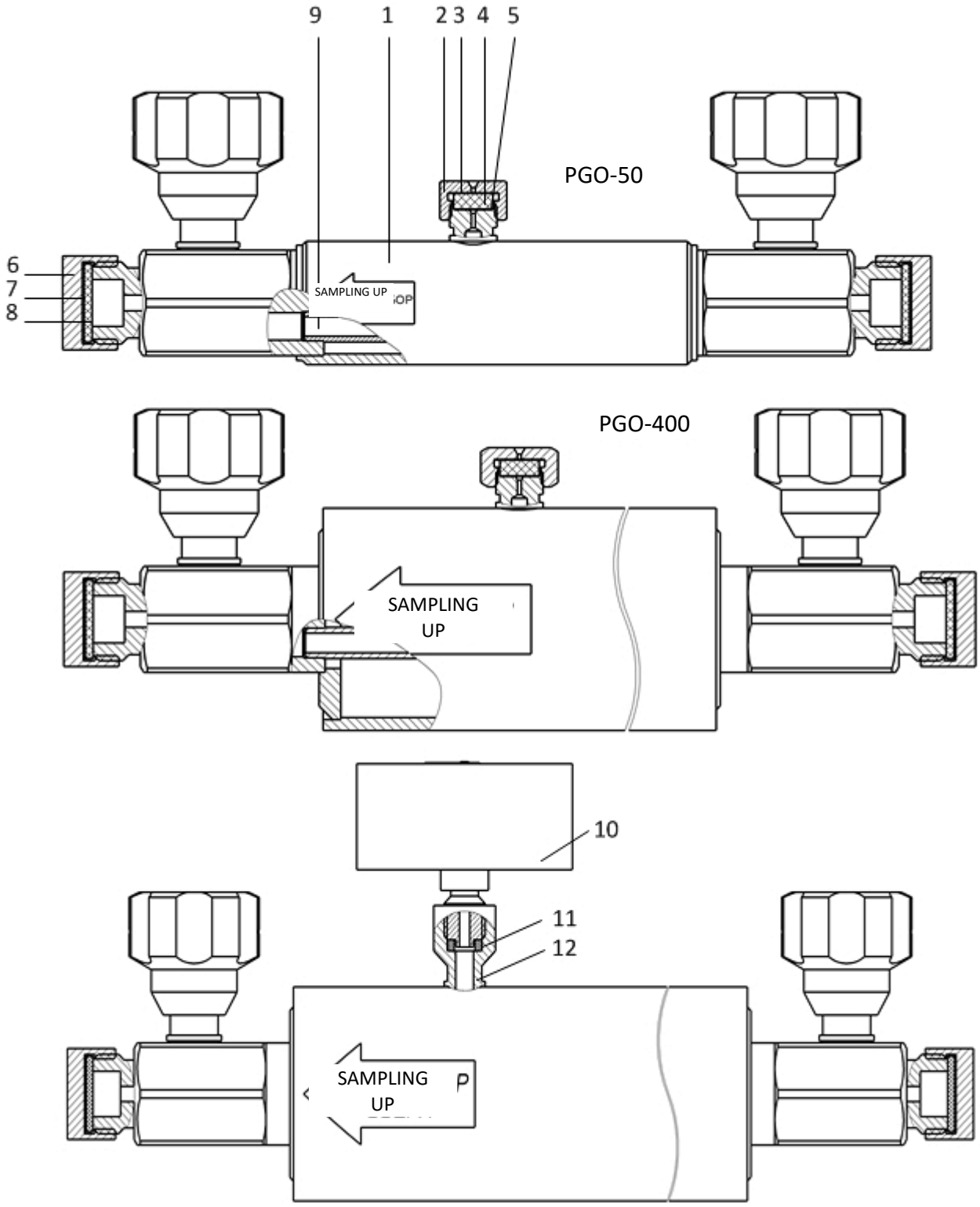
The screw may be inserted in any of the six threaded holes of the locking bushing so that the screw is hit against the pin 7 as the feedthrough opening in the O-ring 4 is fully closed. And vice versa, as the locking bushing is turned one time counterclockwise, the feedthrough opening in the O-ring is opened and the screw 6 is hit against the pin on the other side.

To ensure reliable sealing of fittings, the cylinder has caps 3 with sealing elements 1 and 2.

Cylinder seals support at least 50 sampling cycles without damage. Spare sealing elements are available in the Shipping kit, as well as delivered under an additional order.

2.4.2 PGO cylinders. Design and operation principle

Design of PGO-50, PGO-400 and PGO-400M cylinders is shown in the figure below (**FIGURE 2**). PGO-50 and PGO-100 cylinders vary in length of body 1 (see Figure 2), so PGO-100 is not shown in Figure 2.



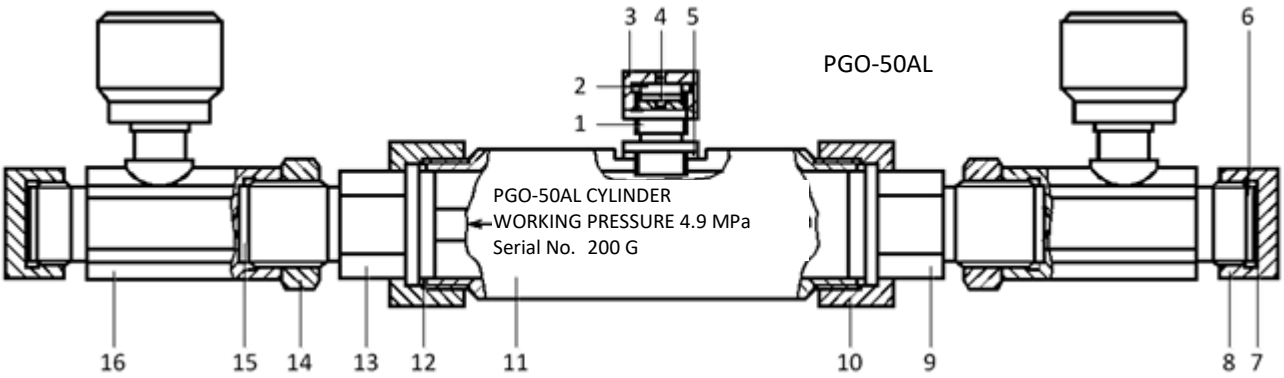
1 – body; 2 – nut 8.936.036; 3 – gasket 8.685.024 (1 pc.); 4 – membrane 7.010.019 (1 pc.); 5 – gasket 8.685.024-01; 6 – cap 8.632.036 (2 pcs.); 7 – disc 7.858.010-06 (2 pcs.); 8 – disc 7.858.010-02 (2 pcs.); 9 – pipe 8.626.401; 10 – pressure gauge; 11 – washer 8.947.094; 12 – body 6.113.196.

Figure 2 – PGO-50, PGO-400 and PGO-400M cylinders

The cylinder consists of the body 1 formed by the pipe, two valves – inlet and outlet, the fitting for sampling with a syringe, in PRO-400M the fitting for connecting a pressure gauge. To ensure reliable sealing of valve fittings, the cylinder has caps 6 with sealing elements 7 and 8.

The specialized cylinder PGO-50AL consists of the assembly body (positions 9, 11 and 13), two valves – inlet and outlet, and the fitting for sampling with a syringe. Valves are connected to the body through paronite sealing gaskets 15. To ensure reliable sealing of valve fittings, the cylinder has caps 8 with sealing elements 6 and 7.

Body parts of the cylinder are made of aluminium alloy, valves are made of stainless steel.



1 – fitting 8.652.345; 2 – membrane 7.010.019-01; 3 – nut 8.936.036; 4 – 8.685.024-01; 5 – O-ring 8.241.122-01; 6 – disc 7.858.010-02 (2 pcs.); 7 – disc 7.858.010-06 (2 pcs.); 8 – cap 8.632.036 (2 pcs.); 9 – fitting 8.652.344; 10 – nut 8.930.207; 11 – pipe 8.236.212; 12 – O-ring 8.241.122 (2 pcs.); 13 – fitting 6.454.096; 14 – nut 8.930.205 (2 pcs.); 15 – gasket 8.685.053 (2 pcs.); 16 – valve 6.451.013 (-01) 2 pcs.

Figure 3 – PGO-50AL cylinder

Spare sealing elements are available in the Shipping kit, as well as delivered under an additional order.

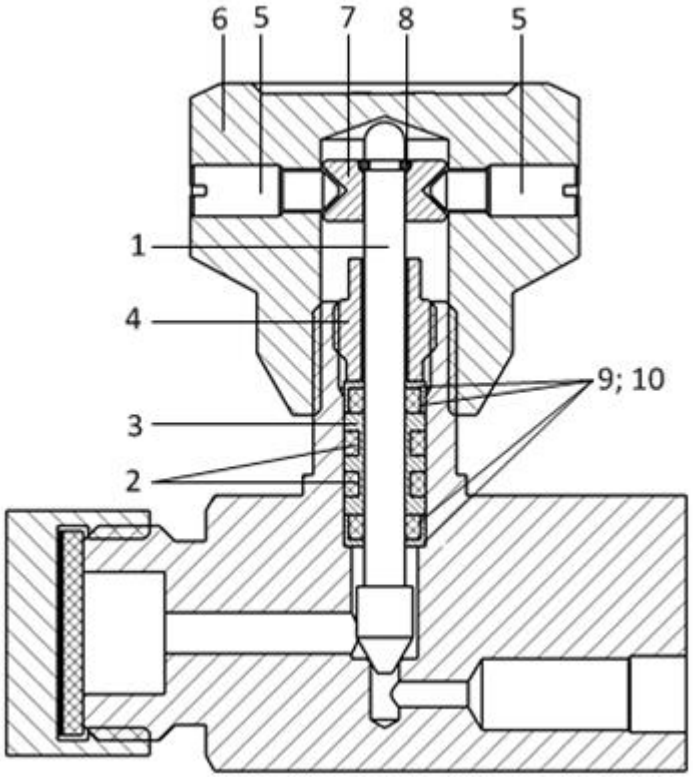
The Shipping kit also includes products for connecting the cylinder to the sampling device (see cylinder passport).

Depending on valve types, the following cylinder versions are available:

- PGO-50 214.4.056.004-02 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-50 214.4.056.004-02.01 with valves V 12 (1.M-P). Metal-polyamide valves;
- PGO-100 214.4.056.021 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-100 214.4.056.021-01 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-400 214.4.056.007-02 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-400 214.4.056.007-02.01 with valves V 12 (1.M-P). Metal-polyamide valves;
- PGO-400M 214.4.056.015 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-400M 214.4.056.015-01 with valves V 12 (1.M-P). Metal-polyamide valves;
- PGO-50AL 214.4.056.008 with valves V 12 (1.M-M). Metal-metal valves;
- PGO-50AL 214.4.056.008-01 with valves V 12 (1.M-P). Metal-polyamide valves.

The valve V 12 (1.M-P) is different from the valve V 12 (1.M-M) by design of the needle 1: valve V 12 (1.M-P) uses needle 6.054.012 sealed with polyamide tip 8.632.082.

If needle replacement is necessary, consult the manufacturer. The needle may also be replaced by the consumer's specialist who was trained at Chromatec.



1 – needle 7.059.015; 2 – O-ring 8.683.032; 3 – bushing 8.224.064; 4 – nut 8.934.056; 5 – screw 8.914.023 (2 pcs.); 6 – handle 8.337.054; 7 – base 8.074.119; 8 – O-ring 8.241.174; 9 – bushing 8.223.687; 10 – O-ring 8.865.091; 11 – bushing 7.860.041-01.

Figure 4 – Valve V 12 (1.M-M)

3 Usage

Caution! Pressure gauge of PGO-400M cylinder should be subject to metrological calibration.

Calibration interval is 1 year.

Caution! When opening the valve, rotate the handle counterclockwise against the stop. When the stop is sensed, stop rotation and turn the handle by half a turn clockwise.



Caution! Saturated vapour pressure should not exceed pressure marked on the cylinder in its entire temperature range of application.

3.1 Safety precautions

Only persons who have read this manual and whose operation skills have been tested are allowed to work with cylinders.

When sampling, observe applicable safety rules for working with liquefied gases and pressure-operated vessels.

A place for sampling should be equipped with a sampling device to connect the inlet valve to the cylinder.

Avoid subjecting the cylinder to sharp blows.

3.2 Preparation to sampling

The cylinder should be clean and free of leaks. Empty and clean cylinders are kept in a closed ventilated room protected from dust and precipitation with caps installed.

The cylinder should be checked before each sampling.

Surfaces are checked visually. They should not have indents, cracks and other defects that affect cylinder performance.

Check presence and quality of sealing elements in caps and the membrane in the sampling fitting.

When replacing sealing elements, threads should be checked. All threads should be integral, clean and lubricated with grease, e.g. TSIATIM-221.

Check presence of additional gaskets in the point of connecting the cylinder with a sampling device.

In PU cylinders, screw 6 should be fitted in the locking bushing so that when the locking bushing is turned clockwise by one turn, the feedthrough opening in O-ring 4 is fully closed as the pin is hit, and vice versa, when the locking bushing is turned by one turn counterclockwise against the stop, the feedthrough opening in O-ring 4 should be fully open.

No leaks in connections during sampling is allowed.

3.3 Sampling

Sampling is made in quantities that meet requirements of applicable regulatory documentation.

During sampling consider as follows:

- Before sampling is made from a fixed vessel, liquefied gases should settled off water. Sampling is made from the middle of vessel filling height.
- Sampling from rail car tanks is made using a test tank draining valve available at the bottom level of draining and filling pipes.
- Sampling of liquefied gas pumped through a pipeline is made from a vertical pipeline section.

After use the cylinder the product is fully cleaned from a product and purged with pressurized nitrogen according to GOST 9293-74 or air according to GOST 11882-73. Where necessary, before nitrogen purging cylinders are treated with water vapour.

Caution! Using salt solutions as displacing fluid is not allowed for PGO-50AL cylinder.

3.3.1 Sampling with PU cylinders

Sampling is made under the following procedure.

1. Caps are to be removed from the cylinder.
2. The cylinder is to be connected vertically (using a fitting and gaskets from the Shipping kit) to a sampling device via any fitting, then outlet and inlet locking bushings are to be opened.
3. Locking devices on a sampling device are opened and the cylinder is purged with a sample. When an even stream of fluid appears, purging is finished, then outlet and inlet locking bushings and locking valves of a sampling device should be closed serially.
4. The cylinder is disconnected and caps are screwed onto its both fittings.
5. The locking bushing is carefully opened by one turn to create a gas cushion in the cylinder body and then closed again. While doing so, the cylinder is held vertically, with the bushing to be opened should be in the bottom.
6. Caps are fitted on the cylinder.

3.3.2 Sampling with PGO cylinders

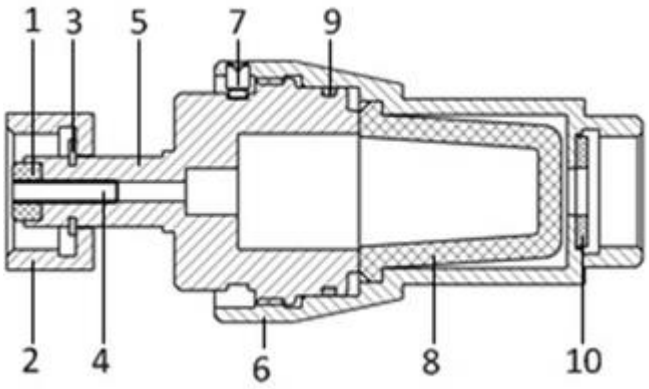
Sampling is made under the following procedure.

1. Caps are to be removed from the cylinder.
2. The cylinder is connected vertically (using a fitting and gaskets from the Shipping kit) to a sampling device via the inlet valve (sample flow direction during sampling is shown by arrow), the outlet valve is directed upwards, then the outlet and inlet valves are opened.
3. Locking devices on a sampling device are opened and the cylinder is purged with a sample. When an even stream of fluid appears, purging is finished, then outlet and inlet valves and valves of a sampling device are closed serially.
4. The cylinder is disconnected, then to create a gas cushion, the outlet valve is opened immediately and 15 to 20 % of sample is removed. While doing so, the cylinder is held vertically, with the outlet valve in the bottom.
5. Caps are screwed onto both cylinder valves.

When filling the cylinder with contaminated samples, use filter 5.884.057, which is delivered together with the cylinder under a separate order. The filter is fixed at the sampling point. The cylinder is connected from the side of the filter swivel nut.

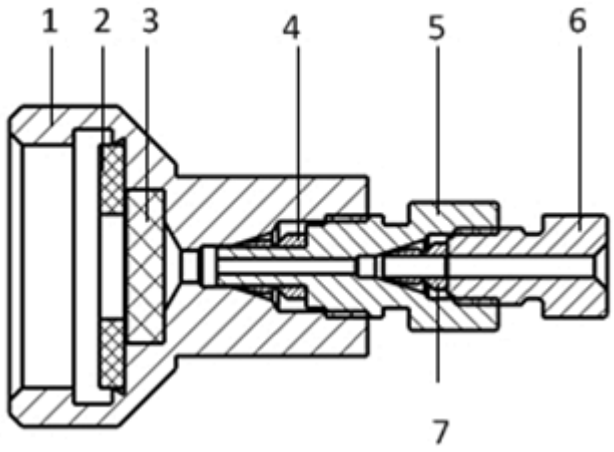
When a sample is injected from the cylinder to the chromatograph, the cylinder outlet valve is fitted with filter 5.884.056, 5.884.083 or 5.884.071 (Figure 6, Figure 7 and Figure 8). Adapter 6.115.311 is used to connect the cylinder to a sampling line. Filters and adapter are delivered under a separate order with respective shipping kits.

Where necessary, filters may be disassembled and a filtering element may be washed.



1 – bushing 8.220.190; 2 – nut 8.930.046; 3 – locking washer; 4 – tube 8.626.401; 5 – body 6.113.144; 6 – body 8.034.735; screw 8.914.030; 8 – filter FO-100-3511330-01; 9 – O-ring 8.685.098-02; 10 – gasket 8.685.036-06.

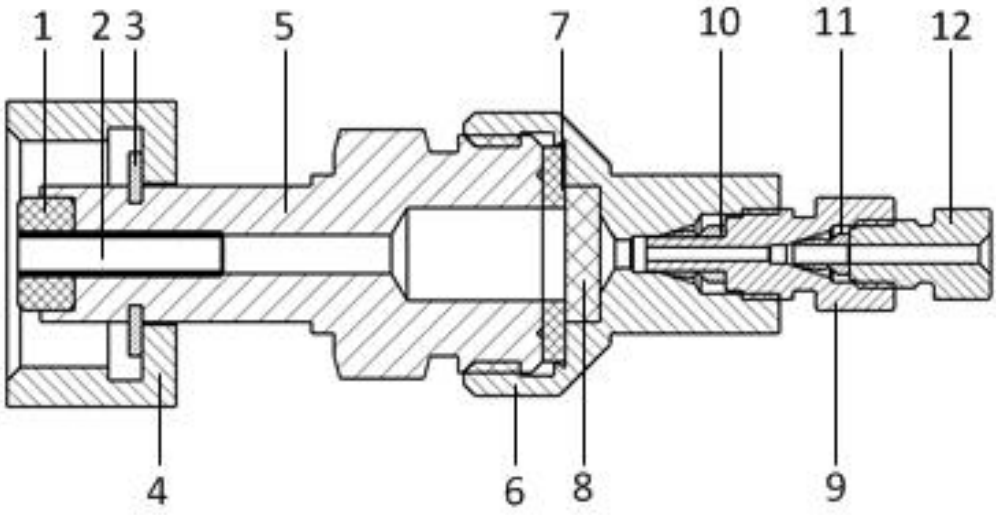
Figure 5 – Filter 5.884.057



1 – body 8.034.649; 2 – gasket 8.685.036-06; 3 – filter 7.062.035 (frit); adapter 6.115.210: 4 – ferrule 8.658.038; 5 – nut 8.930.217; 6 – nut 8.930.161; 7 – ferrule 8.658.039.

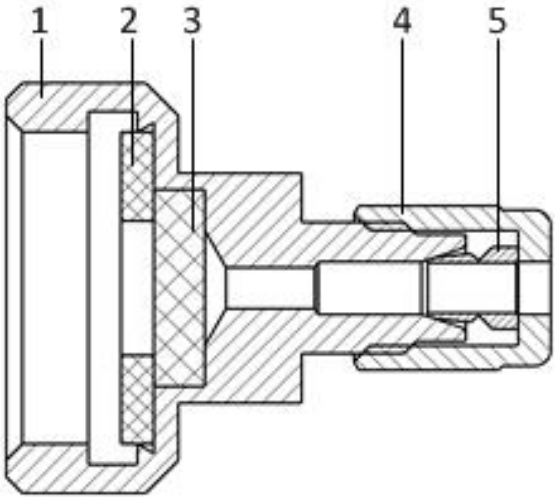
Figure 6 – Filter 5.884.056

Adapter (pos. 5 Figure 6 and pos. 9 Figure 7) 6.115.210 is fitted with ferrules (pos. 4, 7 Figure 6 and pos. 10, 11 Figure 7) 8.658.038, 8.658.039 and nuts 8.930.161, 8.930.217. To wash (or replace by a spare one from the Shipping kit) filter 7.062.035 (pos. 3, Figure 6 and pos. 8 Figure 7), first, remove gasket 8.685.036-06 (e.g. using hook 1 from the Shipping kit for the chromatograph), then remove filter 7.062.035 (frit) from the body.



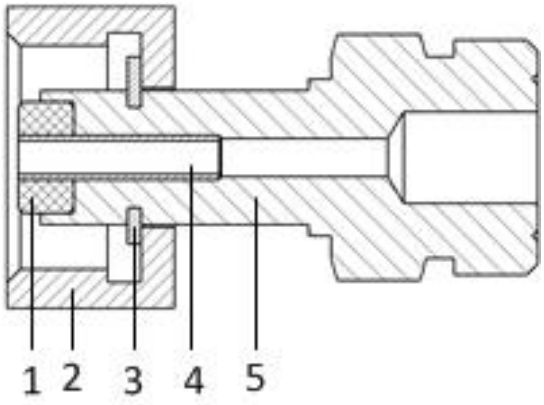
1 – bushing 8.220.190; 2 – tube 8.626.401; 3 – locking washer; 4 – nut 8.930.046; 5 – body 6.113.227; 6 – body 8.034.649; 7 – gasket 8.685.036-06; 8 – filter 7.062.035 (frit); adapter 6.115.210: 9 – nut 8.930.217; 10 – ferrule 8.658.038; 11 – ferrule 8.658.039; nut 8.930.161.

Figure 7 – Filter 5.884.083



1 – body 8.034.771; 2 – gasket 8.685.036-06; 3 filter 7.062.035 (frit); 4 nut 8.930.167; 5 – ferrule 8.658.038.

Figure 8 – Filter 5.884.071



1 – bushing 8.220.190; 2 – nut 8.930.046; 3 – locking washer; 4 – tube 8.626.401; 5 – body 6.113.227.

Figure 9 – Adapter 6.115.311

3.4 Troubleshooting

Caution! When eliminating faults in the cylinder, make sure the cylinder is relieved from pressure and there is no pressure inside the cylinder.

Faults basically include possible leaks at points of connection.

Leaks are eliminated by tightening respective threaded elements. Where necessary, sealing elements are replaced by ones from the shipping kit.

When sample filtering time is getting poor or when leaks appear, filters are to be washed or their parts are replaced using spare ones from the Shipping kit.

Check for leaks of PU cylinders is carried out by applying a soap solution on places of possible leaks or by a manometric test method according to GOST 25136-82. No leaks under working pressure are allowed.

To check leaks, nitrogen under pressure of 6.1 MPa is supplied to the cylinder inlet. Before pressure is supplied to the cylinder, it should be immersed in a vessel with water (“Armored bath” – specifications are given in RD 26-12-29-88 (Appendix 2)). The cylinder outlet should be closed. No gas bubble is allowed on the cylinder surface for five minutes.

When checking leaks in PGO cylinders, loosen screws 5 (Figure 2), remove handle 6, O-ring 8 and base 7. Then tighten nut 4. In metal-polyamide seal valves, where necessary, tip 8.632.082 is also replaced.

If other faults are found, consult the manufacturer or its regional representative.

Caution! When testing PGO-400M for strength and leaks, instead of a pressure gauge, cap 8.632.119 (delivered in the Shipping kit for the cylinder) is fitted.

4 Maintenance

The product is subject to two types of maintenance:

- Current maintenance. Performed by personnel who have read this manual and worked with the cylinder.
- Periodic maintenance. Performed by service engineers whose qualification is confirmed by a certificate certified by management of Chromatec, or by personnel who have been attested in accordance with documents given in the Safety Precautions section hereof and who have read this User Manual.

Current maintenance

Current maintenance includes operations listed in Table 3.1.

Table 3.1 – Parameters of current maintenance

Operations	**Frequency***
Visual check	Daily

* Frequency of current maintenance in accordance with the sampling schedule approved by the company.

Visual check

Surfaces and threads are checked visually. They should not have indents, cracks and other defects that affect cylinder performance.

Threads of inlet and outlet fittings of the cylinder are checked.

Presence and quality of sealing elements in caps, in the filter fitting sampling points, in the filter used when the chromatograph is put into operation, are checked.

When defects that affect cylinder performance are found, they should be eliminated.

Periodic maintenance

Periodic maintenance includes operations listed in Table 3.2.

Table 3.2 – Parameters of periodic maintenance

Operations	**Frequency***
Check for leaks under maximum working pressure	Once a year
Checking threads	Once every six months

Check for leaks under maximum working pressure

Check for leaks is carried out under maximum working pressure by applying a soap solution on places of possible leaks or by a manometric test method according to GOST 25136-82. No leaks under working pressure are allowed.

If pressure drop is observed, it is necessary to determine a reason of leak in accordance with instructions in Troubleshooting section hereof.

Checking threads

Threads of inlet and outlet fittings of the cylinder should be integral, clean and lubricated by grease, e.g. TSIATIM-221.

When defects that affect cylinder performance are found, they should be eliminated.

Data on periodic maintenance or repair are recorded in the cylinder passport.

When checking for leaks, it is necessary to observe safety rules of working with pressure-operated vessels. PB 03-576-03 “Safety rules of installation and use of pressure-operated vessels”.

5 Information on claim reports

Where the cylinder fails during the warranty period:

- execute a technically substantiated claim report on defects with specifications given in the cylinder passport;
- make extracts from Acceptance Certificate section.

The claim should be sent to the address:

Special Design Office “Chromatec”, 94 Stroiteley Str., Yoshkar-Ola, Russian Federation 424000; or at Correspondence address: Central post office, P.O. box 84, Yoshkar-Ola, Mari-El republic, Russian Federation 424000.

424000 г. Йошкар-Ола, ул. Строителей 94, СКБ "Хроматэк" или 424000, г.Йошкар-Ола, Главпочтамп, а/я 84.

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