FLOATING PISTON CYLINDER PP-150

USER MANUAL

214.4.056.013UM

Product P/N 460-01XX

Edition 02.07.2024

Table of contents

1 Description and operation 5
1.1 Basic data on the products 5
1.2 Purpose 5
1.3 Technical specifications and delivery set 6
1.4 Construction and operation 6
2 Intended use 9
2.1 Safety provisions 9
2.2 Preparation for sample loading 10
2.3 Cylinder pre-charging 10
2.4 Sample loading 11
2.5 Introducing the sample into the chromatograph 15
2.6 Troubleshooting 16
3 Maintenance 18
3.1 Routine maintenance 18
3.2 Periodic maintenance 19
4 Transportation and storage 20
5 Claims 20

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.

1 Description and operation

Instructions marked with this box must be followed to avoid injury or damage to equipment.

Indicates important information for operating the Cylinder.



This sign indicates a risk of damage or explosion.

1.1 Basic data on the products

Floating piston cylinder PP-150 is manufactured by JSC SDO "Chromatec" according to TS 3689-018-12908609-2014.

Floating piston cylinder PP-150 is produced in the following models:

- P/N 460-0101, Cross ID 214.4.056.013-01 – connecting fitting G 1/2" male;
- P/N 460-0102, Cross ID 214.4.056.013-02 – connecting fitting NPT 1/4" male;
- P/N 460-0103, Cross ID 214.4.056.013-03 – connecting fitting G 1/2" male, with rupture disc;
- P/N 460-0104, Cross ID 214.4.056.013-04 – connecting fitting NPT 1/4" male, with rupture disc;
- P/N 460-0105, Cross ID 214.4.056.013-05 – connecting fitting G 1/2" male, Incomsteel® treated;
- P/N 460-0106, Cross ID 214.4.056.013-06 – connecting fitting NPT 1/4" male, Incomsteel® treated.

Incomsteel® is sulfinert treatment. Trademark of Scientific Engineering Center Inkomsystem.

Products of SDO “Chromatec” may contain non-essentially upgraded parts in accordance with the new developments or may be subject to irrelevant non-essential improvements that do not affect the technical specifications and safety requirements not included in this document.

1.2 Purpose

1.2.1 Floating piston cylinders of constant pressure of the PP-150 type TS 3689-018-12908609-2014 (hereinafter referred to as the Cylinder) are intended for use in sampling systems if it is necessary to keep a product sample under pressure that is present in the pipeline. The composition of the sample must be compatible with the materials used in the Cylinder.

Cylinders are equipped with a magnet tracker.

Pre-charging of the cylinder with a compensating gas with a pressure corresponding to the pressure of the pipeline allows pumping into the cylinder, transporting it to the laboratory, and analyzing the product sample without pressure drop.

Helium or nitrogen can be used as a compensating gas.

Materials of the cylinder contacting to the sample:

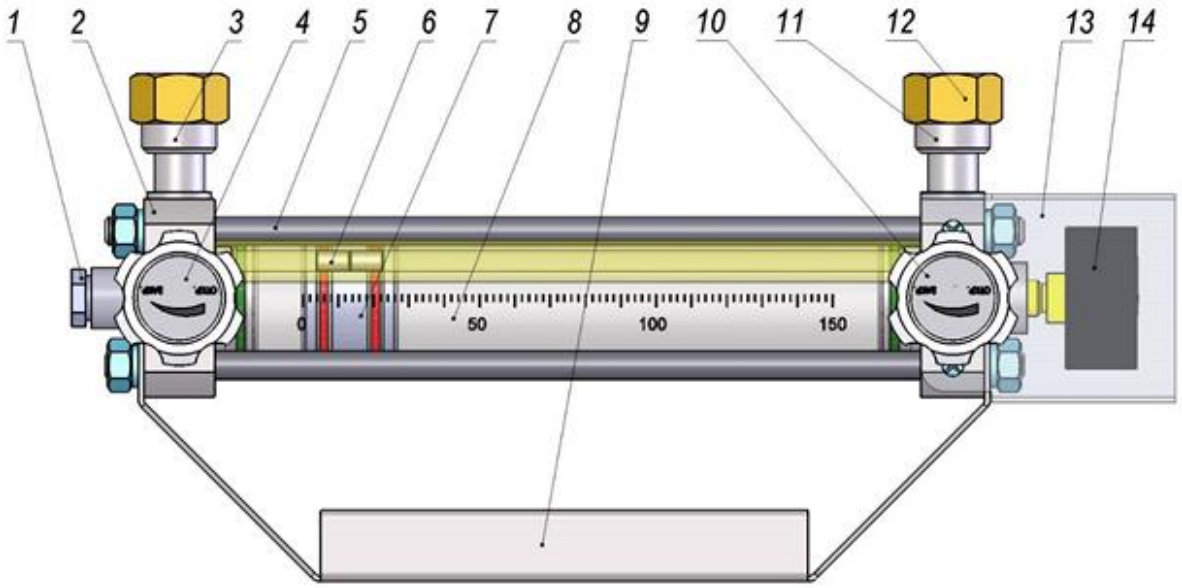
- Stainless steel 12X18H10T (Similar to AISI 316) – cylinder body,
- polyamide – valve,
- fluorocarbon rubber – piston,
- perfluoropolyester lubricant.

1.2.2 Preparation for sampling and its supply from the cylinder for chromatographic analyzes (hereinafter, the GC) is carried out using a gas fitting set 214.4.078.008.

1.3 Technical specifications and delivery set

Technical specifications and delivery set are specified in the Passport of the Cylinder.

1.4 Construction and operation



1 – plug 8.930.260; 2 – flange (2 ea.); 3 – sample inlet (loading) fitting (Ft2); 4 – sample valve (V2); 5 – tie bolt (4 ea); 6 – magnet tracker; 7 – piston; 8 – body; 9 – handle; 10 – valve of compensating gas line (V1); 11 – fitting of compensating gas line (Ft1); 12 – cap (2 ea); 13 – gauge cover; 14 – pressure gauge.

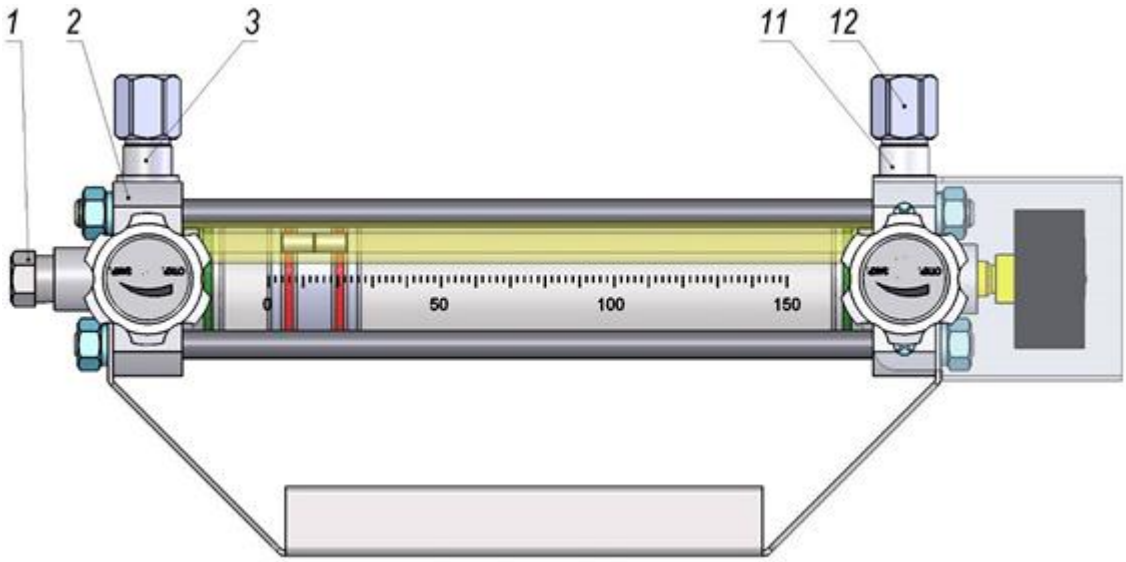
Figure 1 – Floating piston cylinder PP-150, model 214.4.056.013-01 (-03, -05), (P/N 460-0101, 460-0103, 460-0105)

Thread of fittings pos. 3, 11 – G1/2" male.

Thread of the fitting with a plug 1 – M14x1 female.

The cylinder has a body 8 with piston 7, two valves – at the sample line 4 and at pre-charge compensating gas line 10 with nominal bore 2 mm; sealing material of the valve is polyamide to stainless steel. To protect the fitting threads from mechanical shocks the fittings are furnished with the caps 12. Flanges 2 are tightened to the body 8 using tie bolts 5. Magnet tracker indicates to position of the piston 6 position and shows volume of the sample by scale 8 engraved on the body.

Piston 7 divides the volume of the cylinder into two chambers: in the left chamber there is a taken sample, in the right one (from the side of the gauge) is compensating gas.

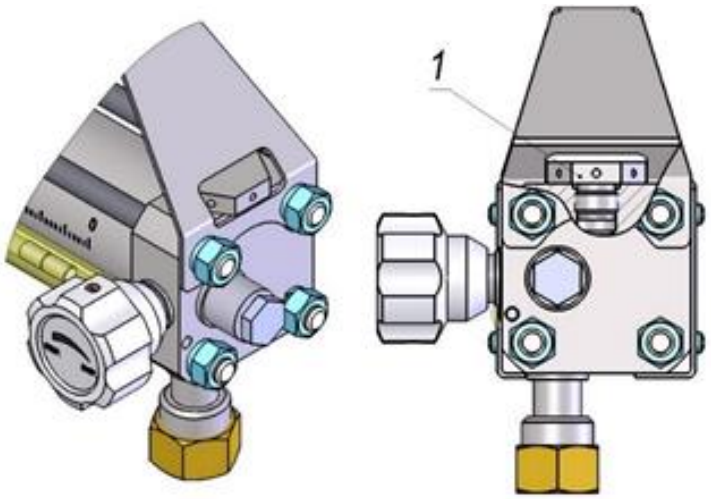


1 – plug 8.632.129; 2 – flange (2 ea) 3 – sample inlet (loading) fitting; 11 – fitting of compensating gas line; 12 – cap 8.632.149 (2 ea)

Figure 2 – Floating piston cylinder PP-150, model 214.4.056.013-02 (-04, -06), (P/N 460-0102, 460-0104, 460-0106)

Thread of fittings pos. 3, 11 – NPT 1/4" male.

Thread of the fitting with a plug 1 – NPT 1/4" female.



1 – fitting with rupture disc (Swagelok, order code: SS-RDK-16-2850)

Figure 3 – Rupture disc kit installation (e.g. model 214.4.056.013-03)

2 Intended use

The cylinder PP-150 is supplied with a metrologically verified pressure gauge.

It is permissible not to conduct metrological verification of the cylinder pressure gauge after the verification period has expired if there is a pressure gauge with metrological verification in the sample collection line to control the sample pressure.

The difference in the readings of the pressure gauges when measuring the sample pressure should not exceed the error corresponding to the class of the Cylinder pressure gauge.

It is permissible not to carry out metrological verification of the pressure gauge in the following cases:

– if the pressure gauge is used to monitor changes in pressure without assessing its value with a specified accuracy,

– pressure readings are not used in calculating the accuracy (uncertainties) of measuring sample components and calculating thermophysical parameters.

The pressure gauge can be transferred to the "Indicator" category by decision of the metrological service of the enterprise operating the Cylinder.

2.1 Safety provisions

2.1.1 When taking samples, it is necessary to observe the "safety regulations for working with vessels operating under pressure".

2.1.2 The sample loading location must be equipped with a sampling device for connection to the sample inlet fitting of the Cylinder.

2.1.3 The Cylinder must be protected from sudden impacts.

2.1.4 Do not use Cylinders with a rupture disc in places where the release of the Cylinder contents could create a dangerous situation. When the disc ruptures, the Cylinder contents are released into the surrounding atmosphere through six radial holes in the valve body with a strong noise.

2.1.5 Check the rupture discs regularly. The safety valve must not be damaged. The holes of the safety valve must not be dirty.

2.2 Preparation for sample loading

2.2.1 Unpack the Cylinder, check delivery set. The cylinder must be clean and tight. Empty clean Cylinders are stored in a closed ventilated room, protected from dust and atmospheric precipitation, with plugs installed.

2.2.2 The Cylinder must be inspected before each sampling.

The surfaces are inspected visually: they should not have dents, cracks or other defects affecting the quality of the cylinder.

Check the presence and quality of sealing elements in the plugs, in the fitting of the sampling site.

2.2.3 When changing the sealing elements, check the condition of the thread. To prevent wear of the threads of the connecting fittings and nuts, it is recommended to apply perfluoropolyether grease to them.

2.2.4 It is necessary to prevent sample leaks by using sealing elements (ferrules, gaskets) free of contamination. Any leakage during the passage of the sample into the Cylinder violates the integrity of the analyzed sample.

2.2.5 The Cylinder for sampling is connected to the sampling site after pre-charging the Cylinder with compensating gas.

2.3 Cylinder pre-charging

2.3.1 To pre-charge the cylinder prior to sampling, use the gas fitting set 214.4.078.008.

2.3.2 Carry out pre-charging as follows:

- close the valve (pos.10, V1, Figure 1) of the Cylinder on the compensating gas side;
- open the valve of the Cylinder on the sample side (pos.4, V2, Figure 1);
- connect the Cylinder fitting (pos.11, Ft1, Figure 1) on the pressure gauge side to the compensating gas source and supply gas;
- smoothly open the valve of the Cylinder on the compensating gas side to avoid sudden movement of the piston inside the Cylinder;
- for manual sample loading, fill the Cylinder with compensating gas to a pressure 20-30% higher than the sample pressure at the sampling site. When supposed to install the Cylinder in an automatic sampling system, fill the Cylinder with compensating gas up to the saturated vapor pressure of the sample. Monitor the pressure using the Cylinder pressure gauge;
- close the Cylinder valve on the compensating gas side and shut off the supply of compensating gas. Disconnect the Cylinder fitting from the gas source and install a cap on the fitting;
- close the Cylinder valve on the sample side and install a cap on it.

2.4 Sample loading

Attention!

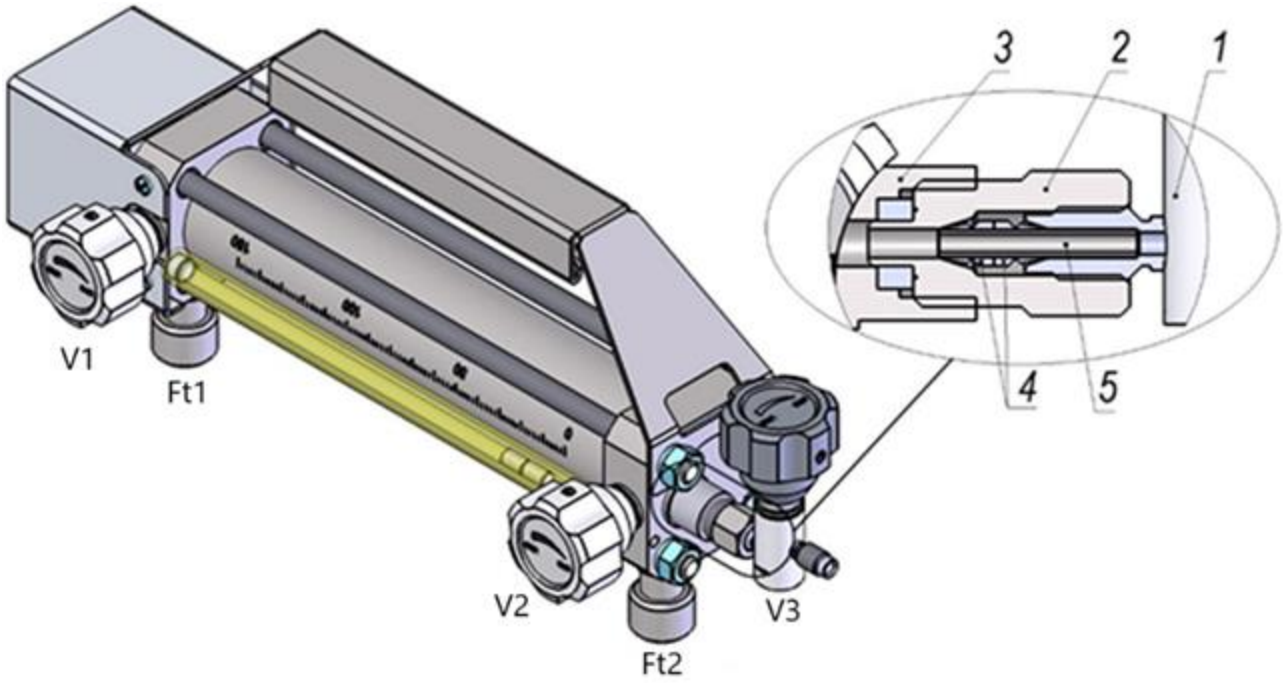
Never fill the cylinder to full volume. Always leave at least 20% of the volume for possible thermal expansion.

When filling and transporting the cylinder, never allow exceeding maximum operating pressure. Keep attention to this point especially when the cylinder exposed to varying temperatures.

After completing analyses, open the cylinder sample valve and empty the remaining contents into a safe container so that the pre-charge gas pressure pushes the piston towards the zero mark of the cylinder, emptying the cylinder.

If the sampling site is not equipped with a valve for flushing the sample prior the Cylinder, it is recommended to install an additional valve from the Cylinder shipping kit.

For model 214.4.056.013-01 (-03), it is necessary to replace the plug 8.930.260 (pos. 1, Figure 1) with the valve 6.451.008-02 from the shipping kit, as shown in Figure 4, and for version 214.4.056.013-05, install the valve 6.451.008-06. All elements necessary for installation are also included in the shipping kit.



1 – valve 6.451.008-02(-06); 2 – fitting 8.652.452(-01); 3 – cylinder's flange; 4 – ferrule 8.658.038-01 (2 ea); 5 – tube 8.626.393 (or 8.626.063-01)

Figure 4 – Installation of valve 6.451.008-02 and 6.451.008-06

For models 214.4.056.013-02(-04), it is necessary to replace the plug 8.632.129 (pos. 1, Figure 2) with valve 6.451.026 from the shipping kit, as shown in Figure 5, and for model 214.4.056.013-06, install valve 6.451.026-02. Install the valve using FUM tape from the shipping kit, or using a sealant such as Loctite 577 or similar.

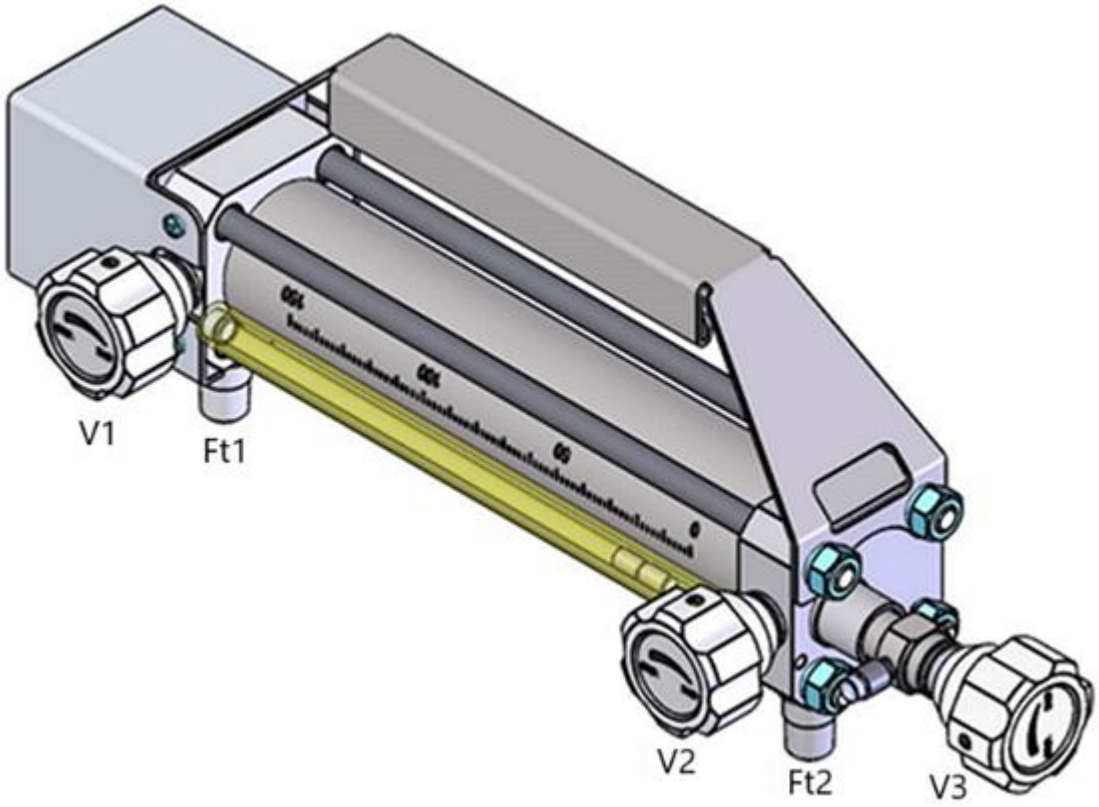


Figure 5 – Installation of valve 6.451.026 and 6.451.026-02

When valve 6.451.008-02(-06) or 6.451.026(-02) installed on the Cylinder, the sample supply lines are flushed, bypassing the cylinder sample volume space.

The cylinder can be positioned vertically or horizontally during sampling (uploading) and sample injection (downloading).

Full opening of the cylinder valve occurs at two full turns counterclockwise twice, from the position when the valve is closed.

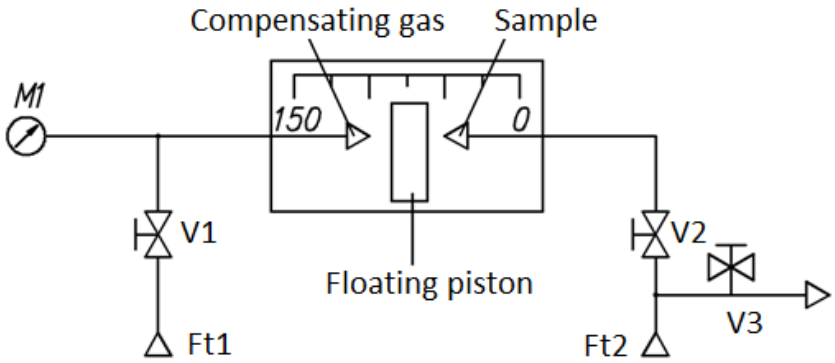


Figure 6 – Flow diagram of pre-charging and sampling channels in the Cylinder

2.4.1 Perform sample loading as follows (for models 214.4.056.013-01(-03, -05)):

- Prepare the sampling site by permanently installing filter 5.884.057 on the sampling line so that the Cylinder can be connected to the filter on the union nut side. It is recommended to fix the filter with a sealant (Loctite 577 or similar) applied to the threads. The filter contains a mesh filter element with a large surface area;
- a shut-off valve must be installed at the sampling site (not included in the Cylinder shipkit);

A sample containing mechanical particles and the sample being collected without a filter may cause failure of the Cylinder.

Do not apply excessive force when closing the valve, as this may cause increased wear of the valve sealing elements.

- connect the Cylinder to filter 2, Figure 7;
- open the shut-off valve at the sampling site;
- open valve V3 of the Cylinder (Figure 7), flush trough the Cylinder a sample volume equal to three to five times sampling line volume;
- close valve V3;
- open valve V2 of the Cylinder. The Cylinder will not be filled immediately, since the pre-charge pressure is greater than the pressure at the sampling point;
- smoothly open valve V1 on the Cylinder on the compensating gas side, the piston will start moving, and the Cylinder will begin filling;

A sharp drop in pre-charge pressure may cause degassing of the sample and, as a consequence, a change in its composition, which may lead to distortion of the analysis results.

- fill the Cylinder with sample up to the 120 ml mark. Check the filling on the Cylinder scale;
- close valve V2 of the Cylinder;
- close the shut-off valve at the sampling line;
- open valve V3 of the Cylinder to remove the sample residue after the shut-off valve at the sampling line;
- close valve V3 of the Cylinder;
- disconnect the Cylinder from filter 2;
- install transport plugs on the Cylinder fittings.

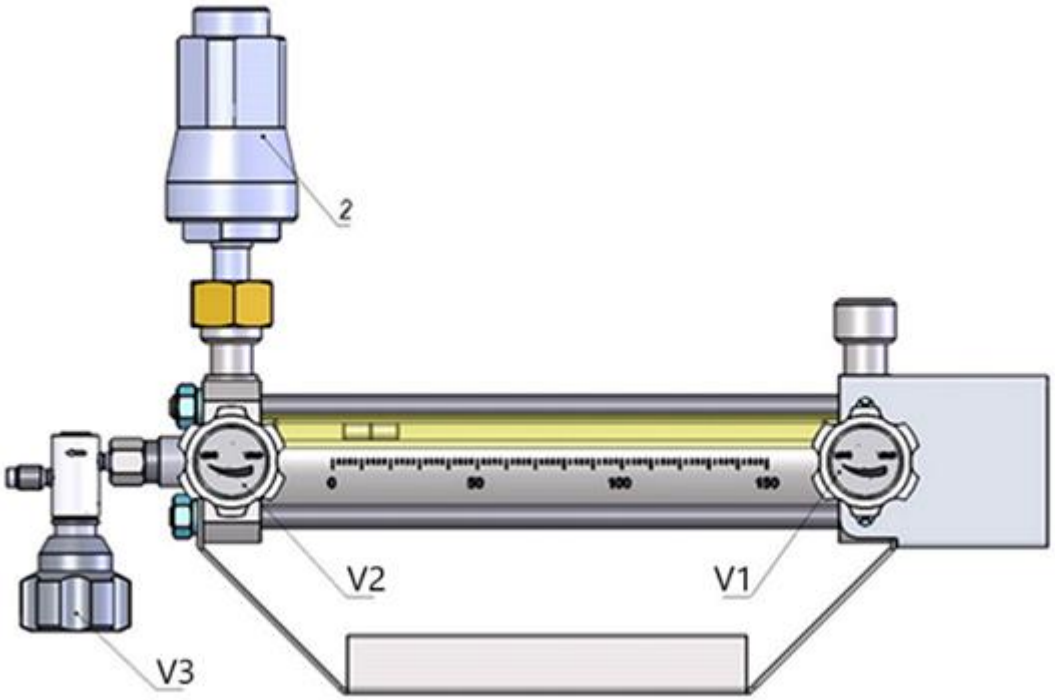
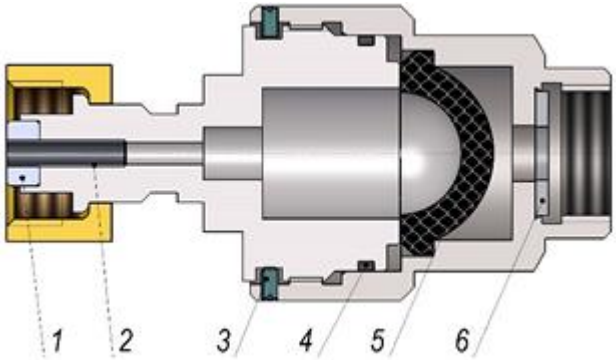


Figure 7 – Floating piston cylinder PP-150, model 214.4.056.013-01(-03, -05) with flushing valve and filter

2.4.2 Mesh filter 5.884.057 (Figure 8) with a spare parts kit are supplied by separate order. It is used when uploading the Cylinder with a sample where solid contaminations may contain. If necessary, the filter can be disassembled and the filter element washed.



Connecting fitting thread G1/2”.

1 – sleeve 8.220.190; 2 – tube 8.626.401; 3 – lock screw M2.5x6 (2 ea); 4 – O-ring 8.685.098 (033-036-19); 5 – mesh filter element (filter FO-14x31); 6 – gasket 8.685.036-06.

Figure 8 – Filter 5.884.057

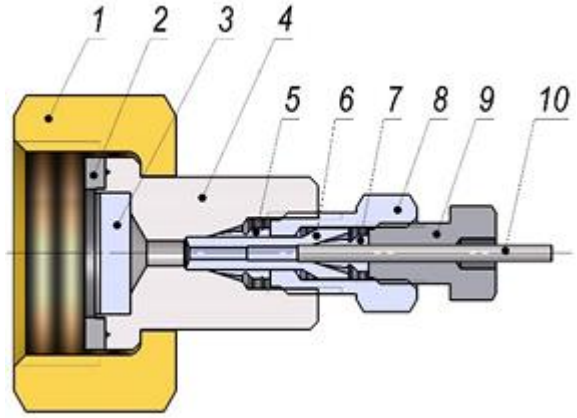
2.4.2 Sampling for Cylinder versions 214.4.056.013-02(-04, -06) shall be carried out in accordance with the sampling site equipment.

It is recommended to install Hy-Lok quick connectors on the Cylinder fitting, Cat. No. Q1BF-4N, internal thread ¼” NPT or other suitable quick connectors.

2.5 Introducing the sample into the chromatograph

2.5.1 When connecting to the chromatograph (the GC), use small diameter tubes (e.g. OD 1/16" x ID 0.04" (OD 1.6mm x ID 1 mm) made of stainless steel. When introducing samples from the Cylinder 214.4.056.013-01 (-03, -05) (with G1/2” fittings) into the GC, install the filter 5.884.056. The filter element of this filter is porous stainless steel with a cell size of 8 µm. Filter 5.884.056 with a spare parts kit is supplied by order. For incomsteel treated Cylinders (214.4.056.013-05 (-06) it is recommended to use sulfinert tube or apply other material which is inert to analytes.

The design of filter 5.884.056 and the connection of the pipeline to it (1/16" tube) are shown in Figure 9.



1 – nut 8.930.046-02; 2 – gasket 8.685.162; 3 – filter 7.062.035; 4 – housing 8.035.238; 5 – ferrule 8.658.038-03; 6 – tube 8.626.995; 7 – ferrule 8.658.039-01; 8 – nut 8.930.359; 9 – nut 8.930.286; 10 – metal tube OD 1.6 mm (1/16").

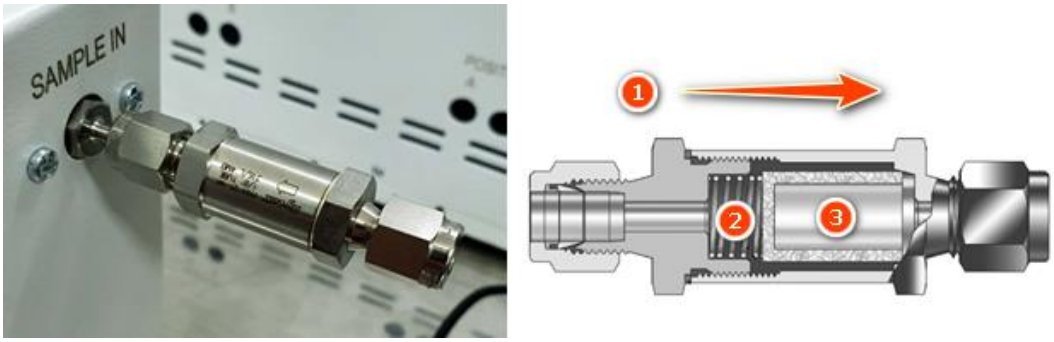
Figure 9 – Filter 5.884.056 and tube connection

To replace or wash the mesh filter (pos. 3, Figure 9), first disconnect the tube, then remove the filter (pos.3, Figure 9) by pushing it out of the housing (pos. 4, Figure 9) (it is recommended to use a metal rod with a diameter of 2 – 2.5 mm to remove the filter). Replace the filter with a new one, inserting it into place with a little force. If necessary, replace the sealing gasket (pos. 2, Figure 9). All necessary elements are included in the shipping kit.

2.5.2 For Cylinder 214.4.056.013-02(-04, -06) (with NPT1/4” fittings), install a filter with a 7-8 um porous frit in the sample feed line to the GC.

For example, use filter Hy-Lok, Cat.N FI1-H-2T-S316 with 7 um frit. Use replaceable frit Hy-Lok Cat.N FI1SE-7 (7 um) for liquid or liquefied sample (figure 10).

For incomsteel treated Cylinder use sulfinert filters (e.g. Siltek Treated Filter 1/4" fittings with 7 um frit, Cat.N 24265 Restek). Besides, use Tube end connector 6.115.284-01 (1/4" – 1/16", Incomsteel (R) treated), and Tube end connector 6.115.285-01 (1/4'' – 1/8'', Incomsteel (R) treated) where it is necessary.



1 – Flow direction; 2 – spring; 3 – frit

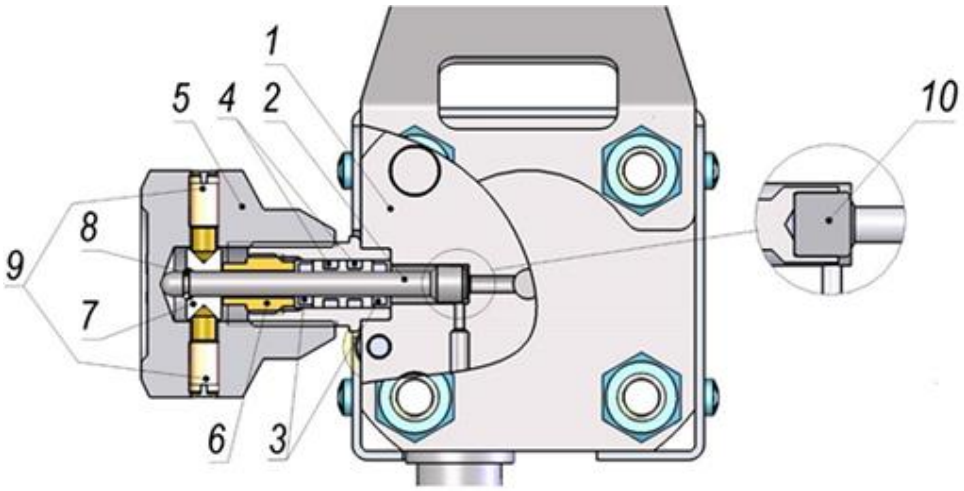
Figure 10 – Filter Hy-Lok, Cat.N FI1-H-2T-S316

2.5.3 To maintain the pressure of the compensating gas when introducing the sample into the GC, use the gas fitting kit 214.4.078.008.

2.6 Troubleshooting

2.6.1 Malfunctions are mainly reduced to the elimination of possible leaks. Leakages are eliminated by tightening the corresponding threaded elements. If necessary, replace the sealing elements. The necessary sealing elements are included in the shipping kit.

The tightness is checked by wetting places of possible leaks with snoop soap, or by the manometric method of control according to GOST 25136. At operating pressure, leaks are unacceptable.



1 – Cylinder flange; 2 – needle 6.054.006; 3 – O-ring 8.685.091-02 (004-004-19); 4 – O-ring 8.683.032 (005-008-19); 5 – handle 8.337.054; 6 – nut 8.934.056; 7 – support 8.074.119; 8 – O-ring 8.241.174; 9 – screw M5x12 GOST 8878-93 (2 ea); 10 – plug 8.632.082.

Figure 11 – Valve

Procedure for replacement of valve seals:

- turn the handle 5 of the valve counterclockwise until it stops;
- unscrew the lock screws 9 and remove the handle 5;
- unscrew the nut 6 and remove the needle 2 with the seals installed;
- inspect the sealing rings 3 and 4, if necessary, replace them with new ones from the ship kit;
- to replace the rings 3, it is necessary to remove the retaining ring 8, remove the support 7 and nut 6 and then replace the rings;
- if there is damage to the sealing plug 10 in the needle 2, it must be replaced with a serviceable one from the ship kit;
- assemble the valve in the reverse order. When assembling, it is recommended to lubricate the sealing rings 3 and 4 with perfluoropolyether grease;
- install the locking screws 9 using a thread lock (Loctite 577 or similar, which prevents the locking screw from spontaneously unscrewing), but taking into account the possibility of disassembling this connection during maintenance, repair or any other work.

2.6.2 If any other faults are detected, please contact the manufacturer or its local representative.

3 Maintenance

For the product two types of maintenance are foreseen:

- Routine maintenance. Performed by personnel who have read this User manual and are working with the cylinder.
- Periodic maintenance. Performed by a service engineer, whose qualifications are confirmed by a certificate certified by the manufacturer of JSC SDO Chromatec or by personnel who have passed certification in accordance with the documents given in the safety measures section of this User Manual and who have studied the User manual.

Data on maintenance or repair records are entered into the Cylinder passport or into the documentation (registration log) of the enterprise operating the Cylinder.

3.1 Routine maintenance

Routine maintenance includes the procedures listed in table 3.1.

Table 3.1 – Procedures of routine maintenance

Procedure	**Periodicity ***
Visual inspection	Daily
Checking the tightness of the gas pressure of the pre-charge cylinder	Daily

* The frequency of routine maintenance is carried out in accordance with the sampling schedule approved by the end user enterprise.

Visual inspection

The surfaces and threads are inspected visually: they should not have dents, cracks or other defects that affect the quality of the cylinder.

Check the condition of the threads of pre-charge and sample fittings of the cylinder.

Check the presence and quality of sealing elements in the plugs, in the filter fitting of the sampling point, in the filter used when transferring samples into the GC. If defects are found that affect the performance of the cylinder, they must be eliminated.

Check for leaks under compensating gas pressure

The leak test of the Cylinder under the compensating gas pressure is carried out by monitoring the drop in gas pressure on the Cylinder pressure gauge for at least 30 minutes. The Cylinder must be in the same conditions in which it was pre-charged by compensating gas. There must be no drop in the compensating gas pressure monitored by the Cylinder pressure gauge. If a drop in pressure is observed, it is necessary to eliminate the cause of the leak in accordance with the instructions in the section "Troubleshooting" of this UM.

3.2 Periodic maintenance

Periodic maintenance includes the procedures listed in table 3.2.

Table 3.2 – Procedures of periodic maintenance

Procedure	**Periodicity ***
Leak test at maximum operating pressure	Annually
Checking thread condition	Once in 6 months

Leak test at maximum operating pressure is carried out by wetting places of possible leaks with snoop soap solution, or by the manometric method of control according to GOST 25136-82. No leakage at operating pressure allowed.

Gas for testing under operating pressure is sequentially supplied from both the sample side and the compensating gas side.

If a pressure drops or a leak is observed, it is necessary to eliminate the cause of the leakage in accordance with the instructions in the Troubleshooting section.

The Cylinders are supplied with pressure gauges that have passed metrological verification. To carry out metrological verification of the pressure gauge, it is necessary to remove the protective casing of the pressure gauge, remove the pressure gauge from the Cylinder, and carry out metrological verification of the pressure gauge.

It is permissible not to conduct metrological verification of the Cylinder pressure gauge when installing and monitoring the compensating gas pressure using an external pressure gauge that has undergone metrological verification. The difference in pressure gauge readings when measuring the compensating gas pressure should not exceed the error corresponding to the class of the Cylinder pressure gauge.

Checking thread condition

The threads of the gas line and sample line fittings of the Cylinder must be intact and clean, lubricated with a thin layer of perfluoropolyether grease.

If defects are found that affect the quality of the Cylinder, they must be eliminated

When checking for leaks, it is necessary to follow the "Rules for the Design and Safe Operation of Vessels Operating under Pressure".

4 Transportation and storage

The Cylinder is to be transported in compliance with the relevant safety regulations in special containers that prevent damage.

It is recommended to transport the sample at a lower temperature relative to the sampling site.

Empty clean Cylinders are stored in a closed ventilated room, protected from dust and precipitation with open valves and installed plugs.

5 Claims

In case of the cylinder failure within warranty period it is necessary to:

- draw up a technically reasoned act of defects concerning its incompliance with technical requirements, specified in the Passport;
- make abstracts from section "Acceptance Certificate";
- specify date and the organization that performed putting into operation;
- specify performed maintenance procedures.

It’s allowable sending copies of sections "Acceptance Certificate" and "Maintenance registration" witnessed by head of customer’s organization.

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.

Service support department

Tel.+7.8362.685919, +7.8362.685932, fax. +7.8362.685987,
E-mail: service@chromatec.ru

For ordering: tel. +7.8362.68-59-64, 68-59-68

E-mail: 68@chromatec.ru