separlab

PREPARATIVE COLUMN FOR LIQUID CHROMATOGRAPHY
SEPARCHROM PC02 500/1000 H

HYDRAULIC DEVICE
SEPARPRESS D20 MM 250/500 PC02

user manual

Stainless steel made liquid chromatography column SEPARCHROM PC 02 500/1000 H is designed for low pressure preparative chromatography. It is used together with hydraulic axial compression device SEPARPRESS D20 MM 250/500 PC02, which press column piston to the sorbent bed.

1. Description

Column design is apparent from Fig. 1. Column consists of a stainless steel made tube with inner diameter 503 mm and wall thickness 3 mm. Column has on both sides flanges with 12 holes where are inserted long connecting rods with M12 threads on both ends. There are low nuts the bottom (output) side and long nuts on the upper (input) side.

In the column are from both sides inserted pistons made of circular polypropylene plates (40 mm thickness). Pistons are provided with PTFE tape sealing. There is a flow distributor made of three layers of stainless steel nets with channels on front sides of each piston, covered by a two layers of polypropylene fabric with pore size 10 um, which acts as a frit. The whole is fixed to the piston plate by a stainless steel ring with smal bolts. Column pistons are connected to inlet and outlet tubes by end fittings. Both are designed for plastic tube 1/2" (12,7 mm) in diameter. Output tube is going straight out, input has to be channeled through a tube connecting upper piston and hydraulic piston.

Bottom piston is inserted to the column tube and fixed to bottom stainless steel flange. Between the piston and the flange is an additional polypropylene ring inserted. Its role is to press layers of PTFE seals. To the piston body are screwed bolts which are going thru a bottom flange. Their tightening increases a sealing power. Bottom flange can be equipped with four stainless steel legs (instead of standard nuts with plastic spheres on their ends.

Upper piston design is more complicated (see Figure). Its side being in contact with a liquid is the same as in the case of bottom piston. Upper piston but has not one seal pressing ring, but 12 independent PP made elements which are pressed by a stainless steel ring. Stainless steel ring is connected by 12 bolts M8 to the polypropylene piston plate. There is in addition 24 bolts M8 screwed to the ring. . Each 2 are pressing one PP element to the PTFE sealing layer.

Hydraulic cylinder is situated in upper flange of the unit. Hydraulic piston is provided by a circular stopper with a grove and it is connected to a piston tube (3 side bolts M8) which is screwed into a stainless steel flange connected to the piston PP plate. The hydraulic flange is connected to the upper part of the column by 12 long bolts M12 screwed into long nuts on the column tube flange. Six of them are equipped by distance tubes.

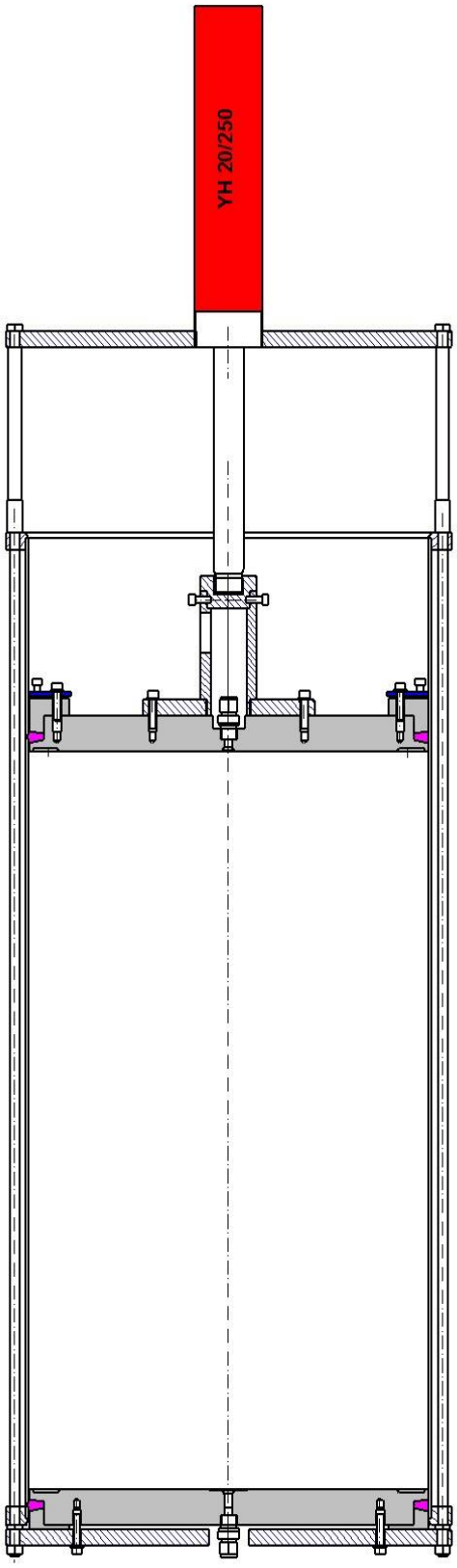

Fig. 1: Column schema

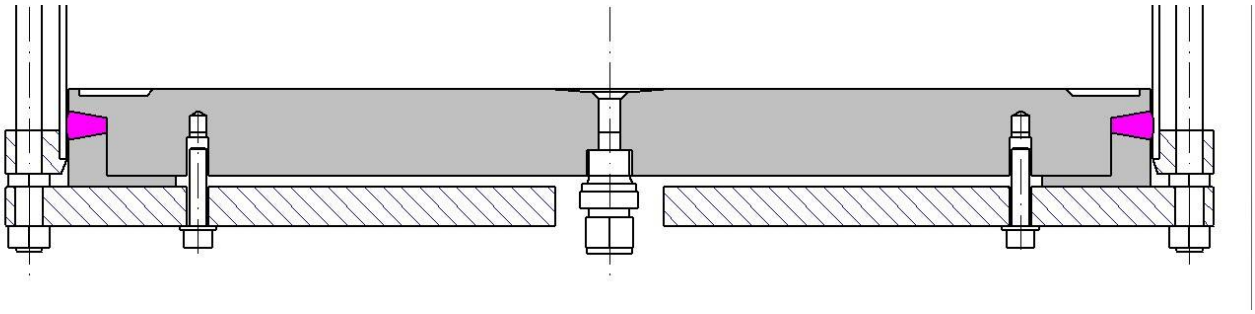

Fig. 2: Bottom piston schema

Hydraulic dual action cylinder with maximal pressure 700 bar (only 310 bar is allowed for PC 02 500 column) is connected by two high pressure rubber tubes to the manual oil pump. Tubes have fast connection parts on the side of the cylinder. The oil pump with a manometer has 2 l reservoir and a switching valve for movement of hydraulic piston up and down.

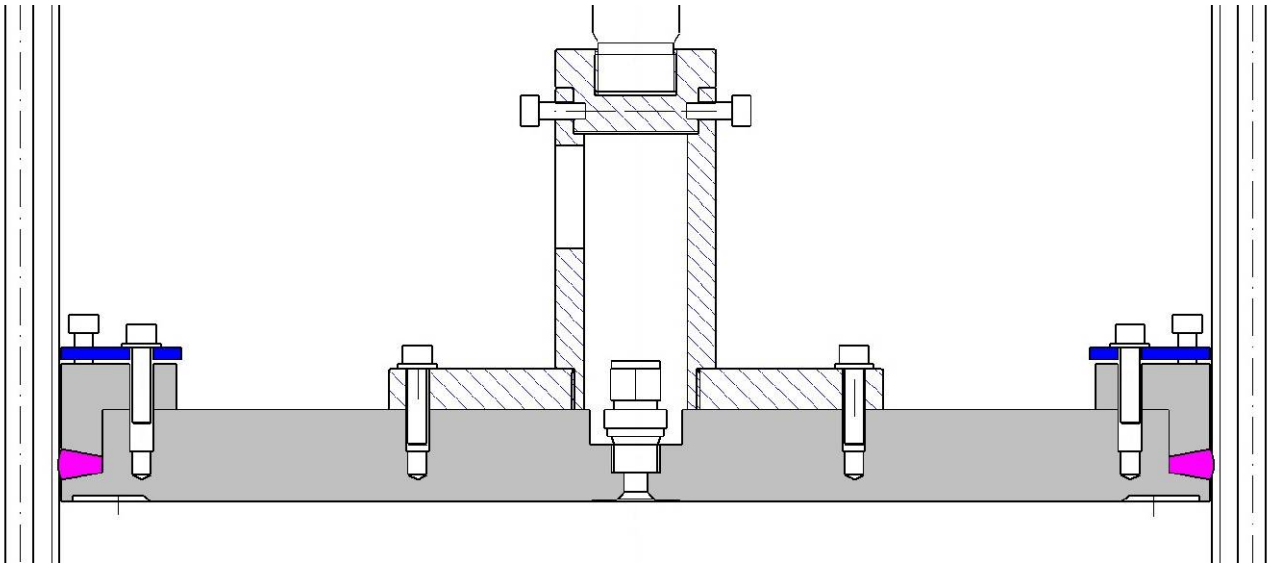

Fig. 3: Upper piston schema

2. Column assembling

Column tube is symmetrical, but the tube itself is not quite spherical and thus all parts have to connected properly according signs on tube flanges, pistons and hydraulic accessories. There are numbers on all parts which has to be put together according number value and its position.
Column piston plates are identical, as well as PTFE seals, but upper and bottom piston supports differ. Column assembling starts just with piston units. First of all is assembled circular piston plate with end fitting parts. Then are pistons are equipped with distributors and filters according following figures:

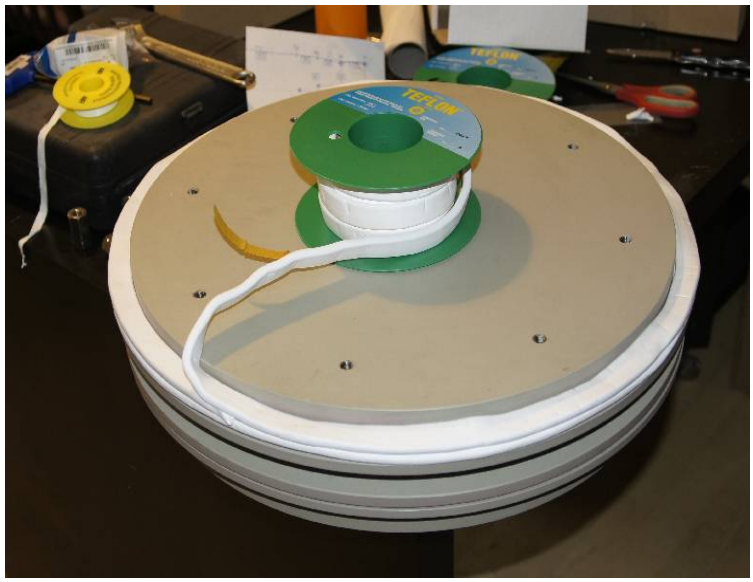

Fig. 4: Sealing tape installing, bottom piston

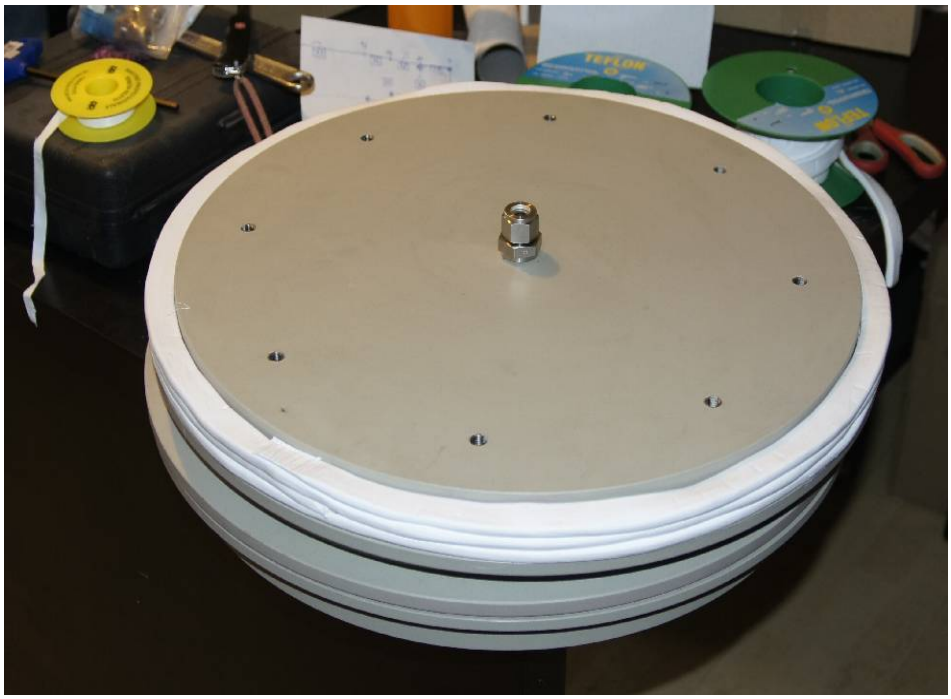

Fig. 5: Output fitting installing, bottom piston

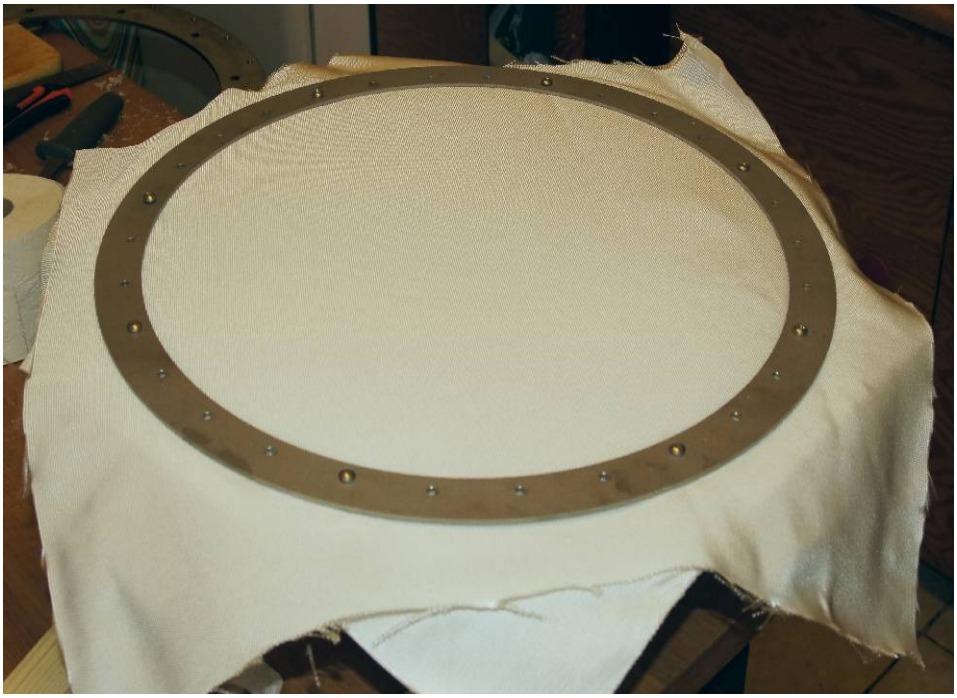

Fig. 6:: Filter installing 1

Fig. 7: Filter installing 2

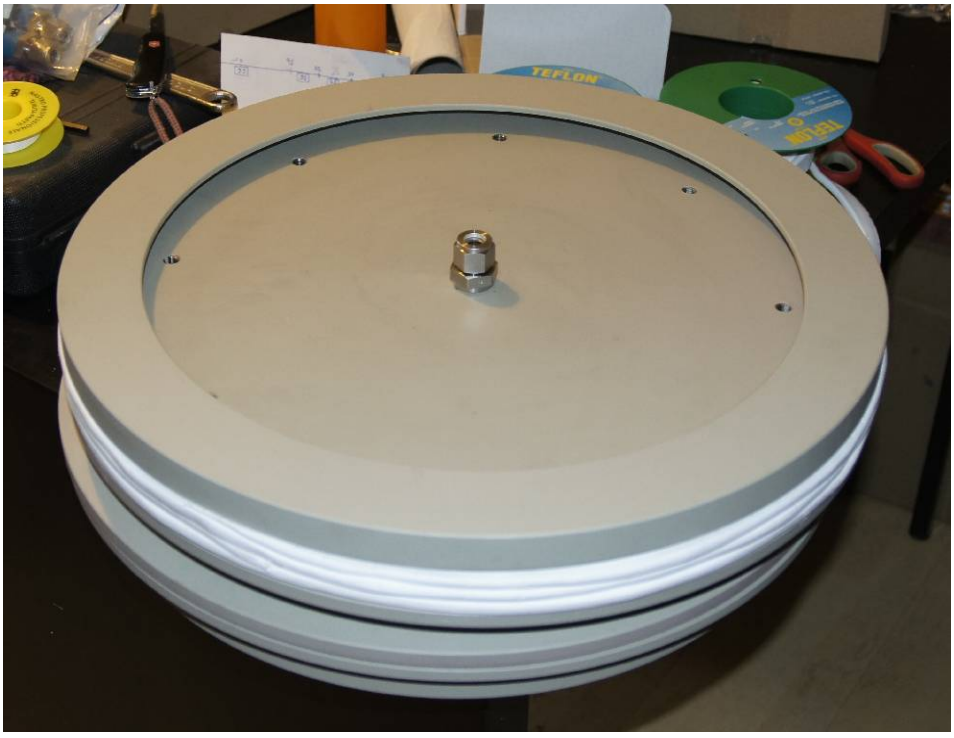

Fig. 8: Pressing ring installing, bottom piston

PTFE sealing tape (20x7 mm, 6 layers) is inserted to the cylindrical part of bottom piston plate. The pressurizing ring is added followed by bottom flange which is connected by bolts. The whole is gently pressed to the open bottom neck of column tube which has to be adjusted its head down. Before the piston is pressed to the column an output tube has to be connected as shown on the figure.

Fig. 9: Input fitting installing, upper piston

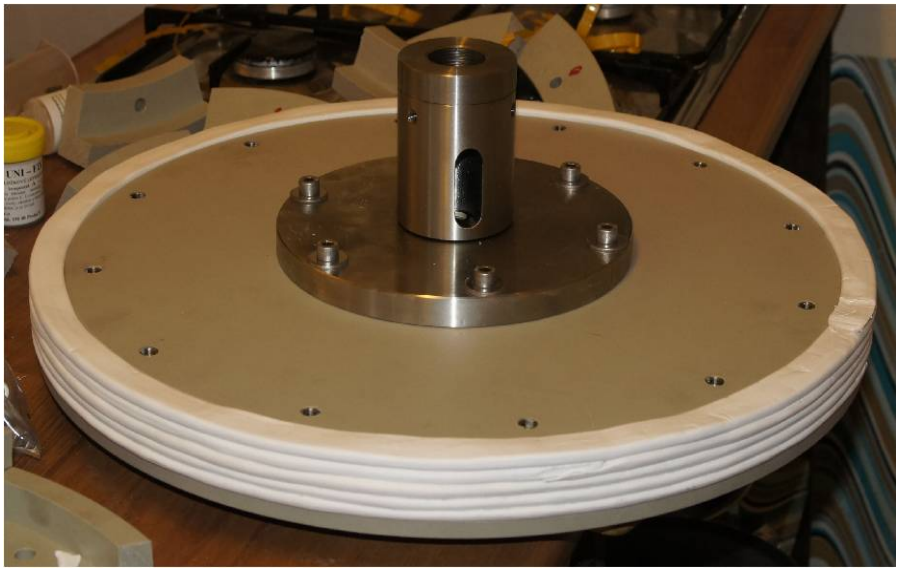

Fig. 10: Stainless steel plate installing, upper piston

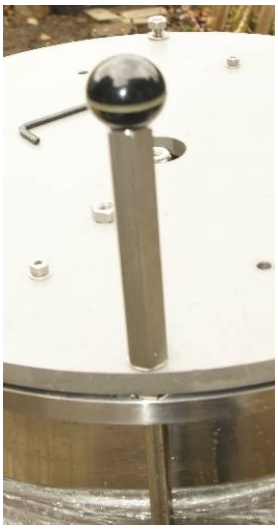

Fig. 11: Column leg installing

Fixing bolt are tightened finally and nuts are screwed to ends of connecting rods. Four rod ends are designed for legs. Each leg consist of a thread rod and plastic sphere on the bottom end. Legs have to be tightened properly.

Upper piston is now assembled the same way as bottom one. The whole is equipped with an input tube and a stainless steel plate. A tube connecting the piston to the hydraulic unit is to be screwed on the central part of the stainless steel plate. Input tube has to be inserted and fix before the plate is mounted. On the piston are installed PP segments and stainless steel ring. Stainless steel ring is fixed slightly by bolts to the piston plate. (On the ring has to be installed 24 short bolts M8 before).

Upper column flange is connected to the hydraulic cylinder and assembled to the top of column tube. Four connecting bolts equipped with distance tubes are used for. Each two of these bolts have to be situated near to each other to allow the piston to move inside the column tube.

Fig. 12: Upper flange installing

Fig. 13:: Upper piston installing

Fig. 14:: Upper piston ring installing

Column is now filled with proper sorbent according manufacturer prescription. It is necessary to be assured that sorbent upper layer is quite flat and laying cca 8 cm under upper column edge. The piston unit is inserted into free space between rods supporting upper flange with hydraulic unit. Two thin skids are put on the column edge defore. The oil cylinder has to be connected to an oil pump before using delivered rubber tubes with quck fit connectors.
The piston inside the column cage is connected to the hydraulic unit using three M8 bolts. A hydraulic piston is moved slightly down to reach a proper position. The column piston has to be positioned to be quite parallel with column edge.
When properly connected, column piston is slowly moved inside the column. PTFE sealing tape should be lubrificated (by pure glycerol for example) before. When the piston is fully pressed into the column, M8 bolts of the stainless steel ring are tightened. Care is taken to have all PP elements in the same position. Bolts pressing PP segments are slightly tightened too.
The piston is moved down slowly again and the liquid starts to flow out of the input tube (output tube is closed). It means that piston is on the sorbent level. Now is necessary again tighten stainless steel ring bolts and all short M8 bolts have to be screwed down to press elements to the sealing tape layers.
When all bolts are tightened, the movement of column piston can be proceed until sorbent layer is pressed. As the surface of hydraulic piston is very different from column piston surface, the ratio between column pressure and oil pressure approximately 1:70. It means that oil pressure 100 bar is equivalent to the the pressure 1,4 bar inside the tube.
It is recommended to move piston inside the tube as for as the pressure on oil manometer start to grow. It is necessary to open column output tube before. Pressure which is set on the oil side depends on the sorbent type in use and should be similar like the pressure of mobile phase during separation process. When the proper pressure of the oil is reached it is recommended to tighten all M8 bolts on the upper piston ring again to fix finally the piston seal. Column is now ready to be use.

3. Column delivered partially assembled

Some columns are delivered partially assembled. It means that bottom piston is inserted and fully ready to be used. It is necessary only to install bottom legs according the manual and connect the output tube to the unit. Upper piston unit is assembled too and sealing tape is installed. To install input

tube a stainless steel plate is to be removed, tube connected to the input fitting and thread through side hole in the stainless steel tube connecting the column piston and hydraulic unit. The plate is to be install back and slightly tighten M 8 bolts.
It is important to keep the orientation of the pistons, plates and flanges in the tube which as they weres used during column tests. There are number on all columns, pistons and plates pressed. Same numbers have to installed as near as possible.

4. Column pressure test

Column fully assembled was tested by manufacturer on the oil pressure 350 bar filled by water.
Maximal allowed operating oil pressure is 300 bars!

5. Manufacturing by

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