



**HIGH PRESSURE PREPARATIVE**  
**COLUMN    **MAGic** 5x2/400LH**



**OPERATING MANUAL**

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2004

## 1. Description

**MAGic 5x2H** columns are inovated MAG 5 columns specially designed for plant scale HPLC using hydraulic stand for all column handling. L types are distinguished, as all vetted parts are made of 316L stainless steel (AISI).

All columns can be used for high - efficient separation in instances where rigid sorbents capable of withstanding pressure of several MPa (several thousand p.s.i.) are used. All used materials are resisting to all common chromatographic solvents.

The **MAGic 5x2\_400 LH** column consists of tube (1), I.D. 396 mm made of 316L stainless steel and several units (see Fig. 1).

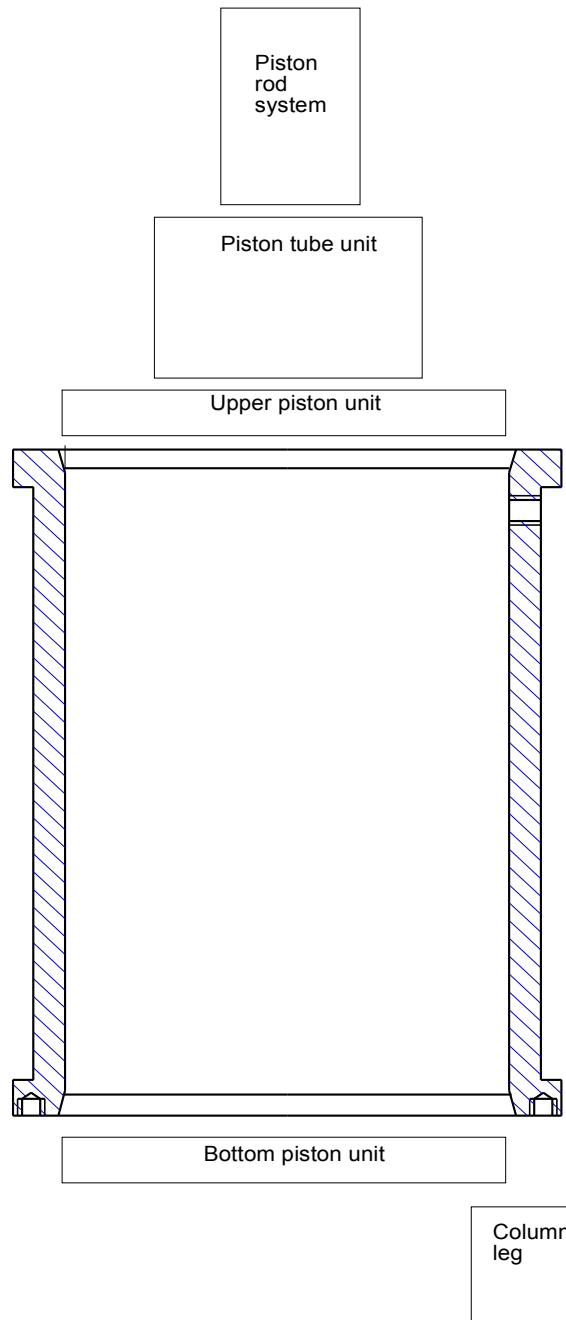
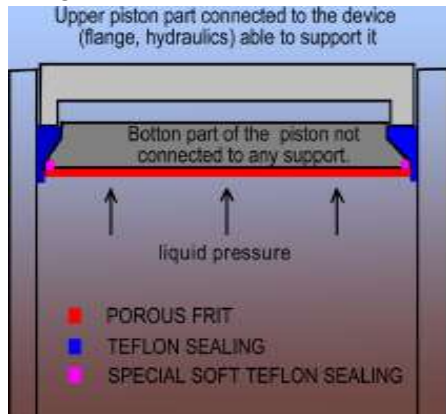


Fig. 1 Column tube with units

Tube inner surface is highly polished ( $Ra < 0,2 \mu m$ ). Tube is provided with two integral flanges. One (bottom) has 4 holes for the column legs which are installed when column is unpacked. A 10 mm hole with 3/8 thread is made on the opposite side, just under the column flange. It is used to pump sorbent slurry into the column.

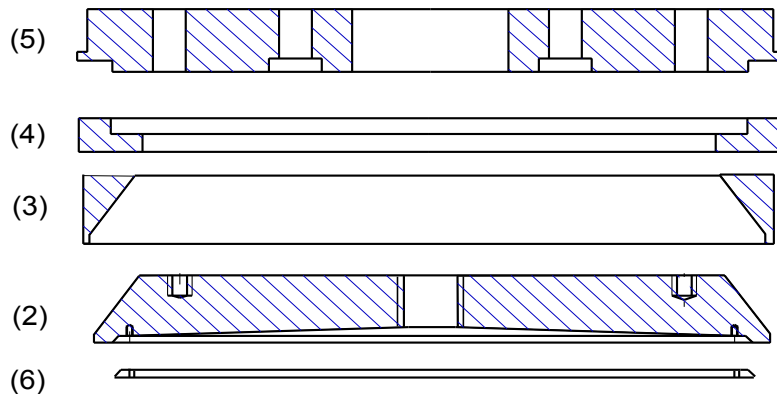


Both upper and bottom sides of the column are closed by piston units (see Fig. 3). Own pistons (2) are 30 mm thick, made of 316L stainless steel. PTFE seal (3) is inserted into the outer piston conus and supported with polypropylene ring (4) and piston flange (5). This design provided column with reliable sealing in all pressure ranges as sealing force is proportional to internal pressure (see Fig. 2).

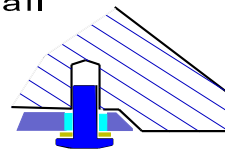
Pistons have flat conus on sorbent side where a distributors (6) and frits (7) are situated. Special POREMET<sup>®</sup> type frit 5 mm thick consisting of 10 layers is used to fix sorbent in the column. Frit has conus shape on edges and is sealed by soft teflon tape layers (thickness 0,2 mm). Frit is fixed to the piston (see detail on Fig. 3) by serie of M5 screws (19) with PTFE inserts

**Fig. 2** Piston sealing principle

(20) which are pressed inside frit holes and PEEK inserts (21) which seal screws heads an frit surface. There is no fixing ring. It allow to use the frit in whole column diameter without „blind“ corners.



**Detail**



**Fig. 3** Upper piston unit

Distributors are made according new patented design (see Fig. 4), to provide successful spreading of the liquid in whole column diameter. They consist of a 316L stainless steel (8) and fluoroelastical (9 - FLUORTEX<sup>®</sup>) screens multi-layer. Screens have different diameter and form the same flat conus as is cutted in piston platform. Some stainless steel screens have embedded radial grooves (see Fig 4 and Fig. 5) which form channels between piston and screen or inside the multilayer. These channels force the radial flow which is then distributed over whole column by slots which are in stainless steel screens (large mesh)between teflon ones (low mesh).

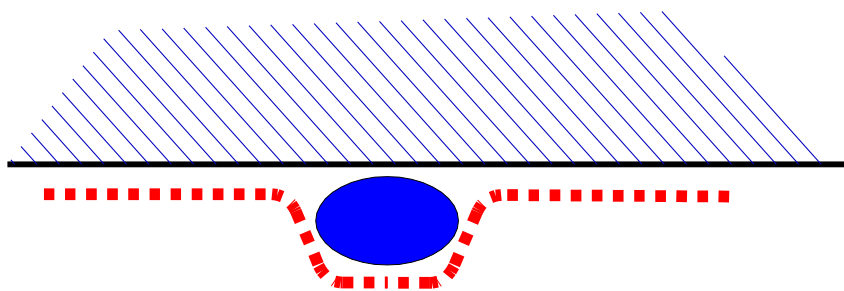
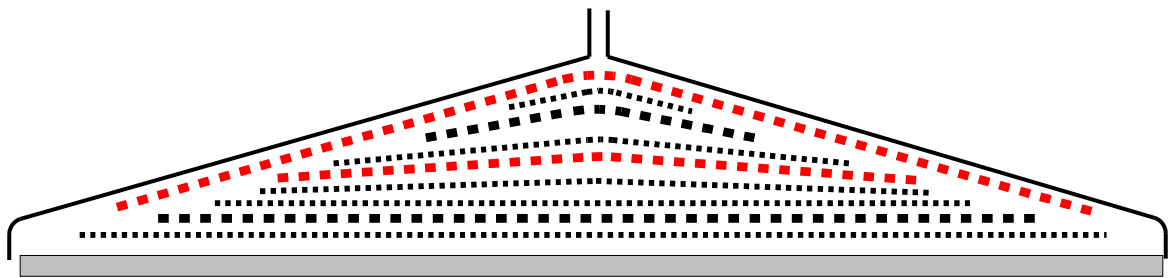


Fig. 4 Distributor schema

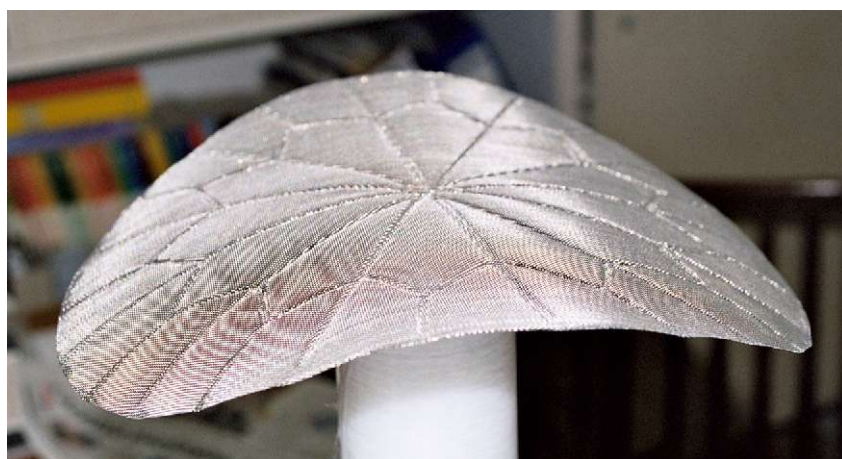
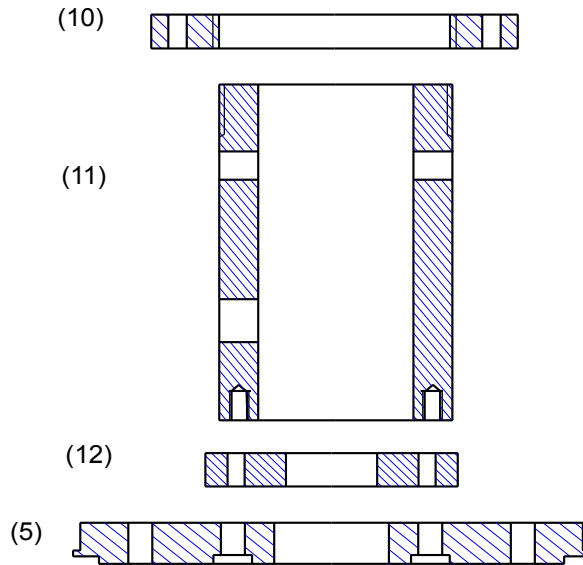
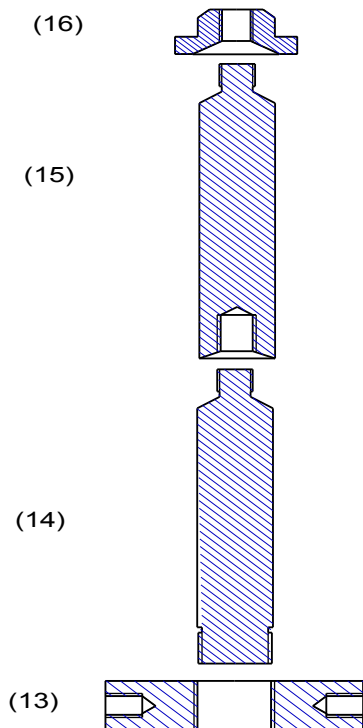


Fig. 5 Stainless steel screen with embeded channels



**Fig. 6 Piston tube unit**

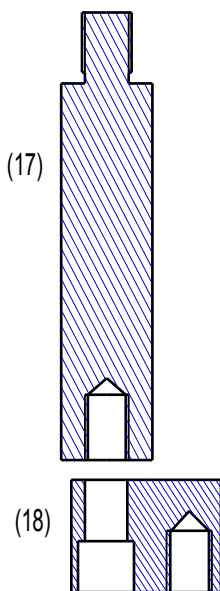
Column pistons are equipped on both sides by Swagelok® connecting units for tube with O.D. 1/2" (12,5 mm). Bottom piston flange is connected directly to the hydraulic stand platform. Upper piston unit is connected to the piston tube unit to be jointed to stand upper platform (see Fig 6). Piston tube unit consists of a upper flange (10), own tube (11) and piston unit support (12).



**Fig. 7 Piston rod system**

Column MAG5\_400/900 is used in column stand which can serve also for unpacking of the column. For such purposis is column equipped with piston rod systém which allow to elongate piston tube and press upper piston through whole column length (see Fig. 7). Thus systém consists of a kern (13) which is connected to piston tube *via* .four bolts, two piston rods (14), (15) and upper support (16).

Unpacking process in PCS 400 HPWU stands needs to connect column with stand platform by four legs (see Fig. 8). Legs consist of own leg (17) and connecting cam (18). Leg is screwed to column bottom hole and connected to the cam by M14 bolt. Another bolt M14 is used to connect cam to the stand platform.



**Fig. 8 Column leg**

## **2. Column packing**

Prior to packing the column, the bottom piston unit parts have to be assembled. Firstly, the frit is equipped with seal (six layers of teflon tape) and distributor is inserted into piston conus. The frit is inserted then. Teflon inserts are pressed into screw holes followed by screws with PEEK insers. Screws are tightened stepwise to keep in the same deep on all edges (it is usefull to use four longer screws M5 to prefix the frit before proper screws are inserted). Piston with frit and distributor is then equipped with main PTFE seal. In case of botton piston a bottom PP insert in put on the main seal and bottom flange is connected via 8 bolts M10 which heads are covered in the flange.

In case of upper side, the complete piston with main sealing is connected to the flange just before it is immersed into the tube (upper flange is a assembled with piston tube before).

Column is completed with bottom piston in the stand. A well mixed suspension of the sorbent in proper solvent is poured into the column (upper column piston in most upper position) to be finally 40 mm under the upper edge. The column piston is now moved down and when is near to the column edge a special attention is give to centre the column and piston axis to allow the piston to move into the column (there is a small cone on the column edge).

Piston is moved into the column slowly (a proper tube is connected to the upper inlet of the column which is opened). When the liquid without bubbles is going out of the upper outlet, this output is closed, bottom output is opened, proper pressure limit is set on the stand control unit and controller is switched to auto regime. The piston is moved down and column is packed. When the piston comes to the sorbent bed, the pressure increased and piston stops the movement automatically.

Alternatively the suspension can be entered *via* upper column hole which is equipped for such purposis with an insert **(22)** and a valve **(23)** with quick fit connecting unit **(24)**. In such case upper piston is entered to the column tube at first, suspension is then transported to the column and finnaly the process of dynamic packing is started.

## **4. Manufacture and servicing:**

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