



靜態軸向壓縮製備層析管柱 安裝及使用手冊

Static Axial Compression preparative chromatography Installation & User Manual



靜態軸向壓縮製備層析管柱 Static Axial Compression preparative chromatography column

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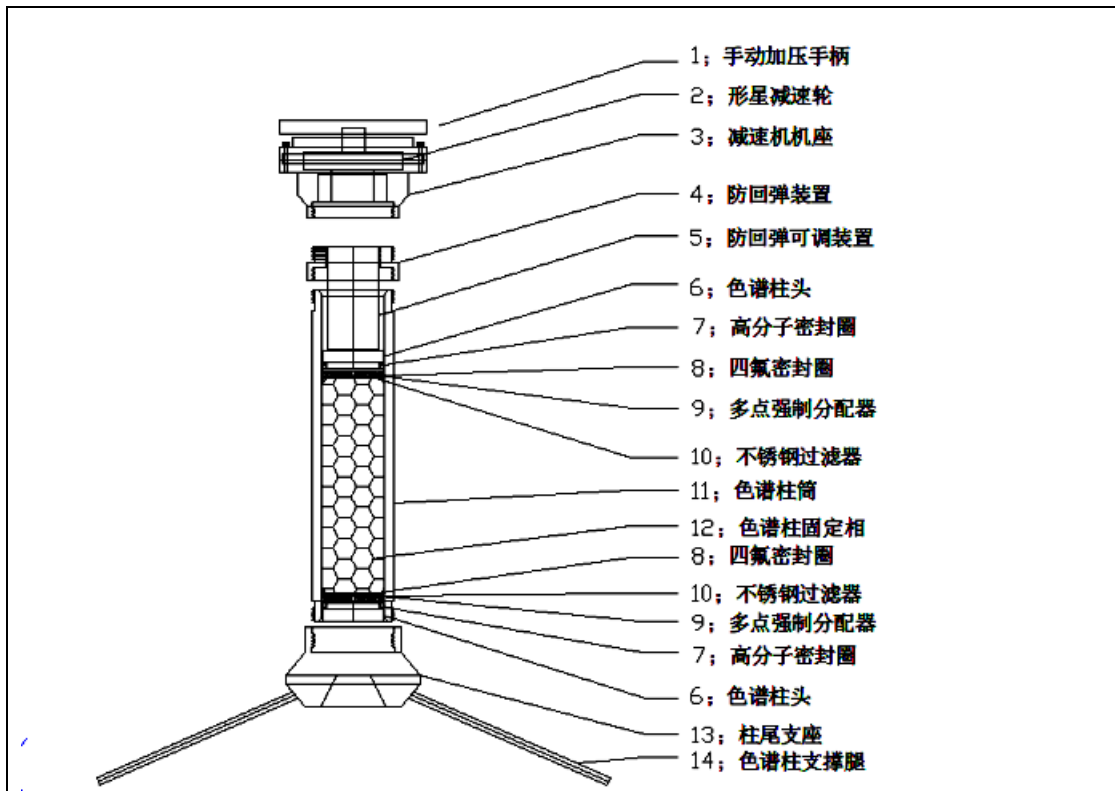
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目錄 Content

1. 靜態軸向壓縮技術(SAC) Static Axial Compression technology (SAC)	8. 有前置保護管的分離管柱 SAC with Guard column
2. SAC 分離管柱的結構及安裝 SAC column structure and installation	9. 串聯分離管柱 Column connection
3. 無前置保護管的分離管柱 SAC column with no Guard column	10. 測試 SAC 分離管柱 Testing Column
4. 分離管柱的平衡 Column equilibrium	11. 重要告誡 Important key notice and rules
5. 更換分離管柱 Column replacement	12. SAC 分離管柱的維護 Column maintenance
6. 分離管柱的保存 Column preservation	12.1. 更換入口線上過濾器 Replacing the Online Filter
7. 前置線上過濾器 Online Filter	12.2. 更換軸向壓縮活塞密封圈 Replace axial compression piston seal
	12.3. 不銹鋼配件清單 Stainless steel Parts List

1. 靜態軸向壓縮技術(SAC)

Static Axial Compression technology (SAC)



<ol style="list-style-type: none"> 1. 手動加壓手柄, 2. 行星減速齒輪 3. 減速機機座 4. 防回彈裝置 5. 防回彈可調裝置 6. 層析管柱頭 7. 高分子密封圈 8. 四氟以烯密封圈 9. 多點強制分配器 10. 不鏽鋼過濾器 	<ol style="list-style-type: none"> 11. 層析管柱 12. 層析管柱固定相 8. 四氟以烯密封圈 10. 不鏽鋼過濾器 9. 多點強制分配器 7. 高分子密封圈 6. 層析管柱頭 13. 管柱支撐座 14. 層析管柱支撐腳
<ol style="list-style-type: none"> 1. Manual pressing handle 2. The planetary reduction gear 3. Reducer base 4. Anti-rebound device 5. Anti-rebound adjustable device 6. Chromatography column head 7. Polymer seal 8. Tetra-fluoro-ethylene seals 9. Multi-points distributor 10. Stainless steel filter 	<ol style="list-style-type: none"> 11. The chromatography column 12. The stationary phase 8. TPFE seals 10. The stainless steel filter 9. Multi-points distributor 7. Polymer seals 6. Chromatography column head 13. The column support base 14. The column support legs

SAC 系統是一個預充填的製備型 HPLC 的層析管柱系統。它採用了特殊技術，稱為靜態軸向壓縮技術(Static Axial Compression)，只需在適當時間輕輕的手動索緊柱頂再加壓裝置，使填料長期在柱床中使用時的結構緊密分佈可保持不變，彌補了固定式填料床在使用過程中的縮減或塌陷，也避免了繁瑣的頂部填料刮除過程。

The high density and homogenous distribution of the packing materials within the column bed can be kept in long-term, just necessary for the user to gently tighten manually the re-pressing device on the column top °

It solves the shrinking and collapsing problems during the application courses of the fixed packed column bed, and avoids the cumbersome process of scraping the upper contaminated packing layer.

SAC 製備管柱與 DAC(動態軸向壓縮製備管柱)，引領了製備管柱技術的創新發展，它可以提供最大的樣品容量和單位容積最低的成本，可以提供與其它高性能分析型層析分離管柱相同或相近的填料容量與分離效率。

ID80mm SAC 型管柱在所有的化學領域中使用時均置於 25cm 長的床體中。格萊的 SAC 管柱已廣泛應用於蛋白質及多肽和天然產物的分離純化。

SAC and DAC (Dynamic Axial Compression) preparation columns lead the innovation development of preparative column technologies, which can provide maximum sample capacity and lowest cost per unit volume, can provide same or similar separation packing capacity and separation efficiency as that from other high-performance analytical chromatography columns.

D80mm SAC type column, when used in all areas of chemistry are designed with 25cm bed length.

The Gelai SAC column has been widely used in the separation and purification of proteins and peptides and natural products.

2. SAC 分離管柱的結構及安裝

SAC column structure and installation



ID80mmSAC 型管柱

SAC 管柱可單獨使用，也可以直接與同型管柱串連，也可以前置 5cm 長的管柱形前置保護管或線上過濾器，用以過濾雜質及滯留污染物質。

SAC 管柱末端裝置可以在管柱的內表面形成高壓密封。進行再加壓緊固時無需任何工具。

SAC 靜態軸向壓縮柱系統的硬體設計，保證了低初始成本，長壽命和低更新費用，同時具有高的管柱效能。

SAC column may be used alone, can also be directly connected in series with the same type of column, and can also be pre-equipped with 5 cm long cylindrical Guard column or Online Filter to filter impurities and for the retention of contaminants.

SAC End-device can form high pressure sealing on the inner surface of the column. enabling easy recompressions performed without any tools.

The SAC column system hardware is designed to ensure low initial cost, long life and low cost of updating, but also has a high column efficiency.

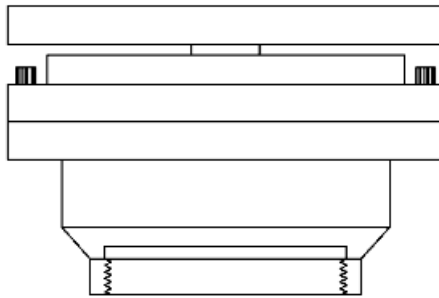
與其它尺寸的固定式法蘭盤管柱相比，Gelai 的 SAC 管柱的靜態軸向壓縮特性，消除了填料間隙，延長了管柱壽命。在 Gelai 的 SAC 系統中，管柱入口處具有真正的軸向壓縮機構。它包含了一個行星式齒輪裝置，保證了其機構設計優勢在壓緊管柱填料的過程中的得以體現。無須工具，只需用手輕輕地上緊驅動轉

輪, 即可把一個管柱的內置活塞往前推進, 達成再加壓及消除入口間隙的功能。

Compared with other fixed size flange type column, the static axial compression characteristics of Gelai SAC column , eliminates the gap within packed materials, extending the column lifetime.

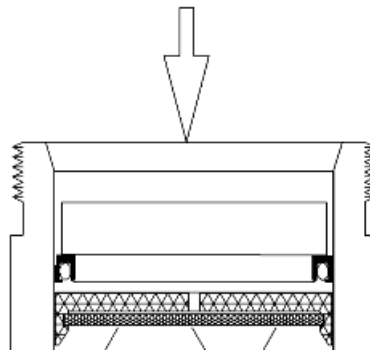
In the column entrance of the Gelai SAC system, there is a real axial compression mechanism which includes a planetary gear device to ensure to reflect its mechanism advantage in the column packing and compressing process.

Just without tools, gently tightened drive wheel, to push forward the piston in column and realize re-compression and entrance gap elimination function.



SAC 管柱頭再加壓驅動裝置

Recompression device of SAC column head

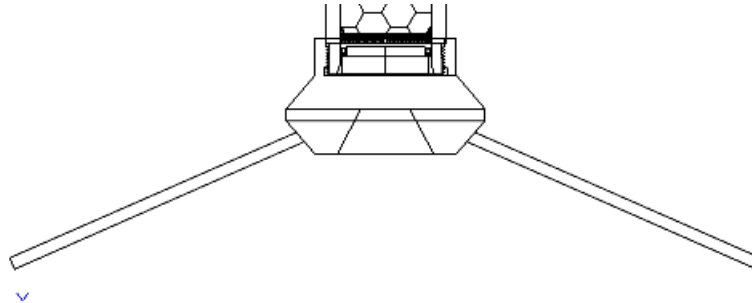


ID80mm 型 SAC 管柱入口端示意圖

箭頭所指方向為施力方向和運動方向

Schematic view of the inlet end of the ID80mm SAC column type

The arrow indicate the force and motion direction



管柱尾固定座及支撐腳

Column support base and support leg

每一個預充填 SAC 管柱內有一個高壓的，填滿漿料的吸附劑床(C18 等)。在入口端帶有一個可移動的管柱床傳動座。出口端有一個固定的管柱床傳動座。管柱床傳動座置於管柱內，離兩端距離都較近。

Each pre-packed SAC column has a high-pressure compressed adsorbent bed that is fully packed with packing material (C18, etc.). There is a movable "column bed driving seat" at the column inlet end, and a fixed one at the column outlet end

The "column bed driving seats" are placed inside column, located near to both ends .

管柱入口端和出口端的方向：

- A. 標籤上的箭頭需與液流的方向一致。
- B. 管柱外壁上的扳手平面或凹槽靠近入口端。

The direction of column inlet and outlet ends:

- A. Arrows on the label must be the same with the direction of fluid flow.
- B. The wrench flats or grooves of the column outer wall are located near the inlet end.

把 SAC 軸向壓縮活塞在管柱內可達到高壓密封，活塞與端面 and 管柱床傳動座之間的管柱內壁能夠緊密地組合。當管柱填料未壓緊時，其密封圈可很容易地

滑動。

Inside the column the SAC axial compression piston can reach sealing against high pressure. The piston can be integrated closely with the column inner wall section between the end surface and "column bed driving seat".

When the column packing is not compressed tightly, the seal ring can slide very easily.

手動上緊 SAC 軸向壓縮模組上的驅動輪，把入口處的軸向壓縮活塞推向入口的管柱床傳動座。手動旋緊驅動輪，最大限度地發揮了從活塞到管柱床傳動座的軸向作用力。這一軸向力使入口床傳動座緩慢壓縮填料床，補償使用過程中帶來的填料體積的縮減，可以維持最優的床層填料結構。

Manually tighten the drive wheel on the SAC axial compression module will push the axial compression piston toward column bed driving seat of the inlet end。

Manually tighten the drive wheel, to maximize the axial force from piston to the column bed driving seat。

The axial force causes the column bed driving seat of the inlet end to slowly compress packing bed and compensate the packing material reduction to maintain optimal bed packing structure.

SAC 軸向壓縮活塞和管柱床傳動座中均有液流分配器，用以把溶劑均勻地引入填料床的入口端和引出出口端。這些通道經過了最優化，以獲得最小的帶狀鋪展。HPLC 系統的 1/8" 管經由帶紋軸襯和金屬套環與軸向壓縮活塞連在一起。Both the SAC axial compression piston and the column bed driving seat have fluid distributor that are used to uniformly introduce the solvent into the inlet end and out of outlet end of the packed bed. These passages have been mostly optimized to obtain minimal strip spreading.

The 1/8 " tube of the HPLC system are connected together with axial compression piston via patterned bushing and metal ferrule.

SAC 高壓密封是被動密封, 與 HPLC 泵中的活塞密封相似. 密封圈是一個凹形的斜簧密封鑄造環, 一端開口, 另一端閉合. 開口端總是朝向管柱內部.

SAC high pressure seal is a passive seal, similar to the HPLC pump piston seal. The seal is a concave casting ring with oblique spring, and with one open end and the other closed end, and the open end always towards to the inside of the column .

當管柱填料未受壓時, 密封圈內的斜簧仍保證有足夠大的張力, 在低壓下也能使管柱壁與密封圈保持接觸, 同時不影響手緊驅動輪時密封圈的滑移.

當管柱受壓時, 溶劑從開口端進入密封圈, 隨著壓力的增加, 壓迫密封圈使其與管柱壁和活塞體緊密接觸. 在 HPLC 系統壓力下, 外力也能起到密封的作用.

When the column packing is not pressured, the oblique spring ring within the seal still has enough tension to keep the seal in contact with the column wall at low pressure status . and also without affecting the seal to slip when manually tighten the drive wheel .

When the column is pressured, the solvent enter the ring from the open end , and as the pressure increases, it press the seal to closely contact with the column wall and the piston body. In the HPLC system pressure, external forces can also play a role in sealing.

警告 : SAC 管柱的有效密封只受這種被動密封機制的作用. 它只需用手來緊固末端裝置, 無須用更大的力. 用工具緊固不會加強密封, 反而會損壞管柱和填料床. 這對 ID80mm 型 SAC 系統特別重要. 在壓縮填料床時, 行星式齒輪裝置可以體現足夠的機械優勢.

***** 禁止使用工具, 僅需用手上緊驅動輪 *****

Warning: Effective sealing of SAC column depends only on the passive sealing mechanism. It only needs by hand to fasten the end device with no need to use greater force.

Fastening with tools will not enhance sealing, but on the reverse, will

damage the column and packed bed. This is particularly important for ID80mm type SAC system.

In the compressing packed bed, a planetary gear unit can provide enough mechanical advantage.

*** Prohibit the use of tools, only hand tight wheels ***

3. 無前置保護管的分離管柱

SAC column with no Guard column

最簡單的 SAC 管柱配置包括了一個線上過濾器 and 管柱末端裝置。

安裝 SAC 管柱:

把管柱從包裝箱中取出。管柱兩端應有用來在運輸過程中，用於管柱上螺紋的保護的塑膠包裝蓋。開封後，把包裝蓋拿下來保存好。如果你需要把管柱從系統中取出時，需要蓋上包裝蓋。(注意：已裝填好的成品管柱是不帶包裝蓋的)

The easiest SAC column configuration includes a Online filter and column end devices.

Installation SAC Column:

The column was removed from the box. The column should be covered with plastic covers to protect threads on the column during transportations.

(Note: The plastic cover is not included in pre-packed column).

把末端裝置箱從包裝箱內取出。檢查下列配置是否齊備：

軸向壓縮模組一件(注意：已裝填好的成品管柱是不帶包裝蓋的)

出口軸向壓縮螺母一件/管柱支架(含 4 支支撐腳)

入口軸向壓縮活塞一件(含 4 個內六角螺釘，與 1/8" 進口端相對應)

備用入口軸向壓縮活塞體一件(注意：已裝填好的成品管柱是不帶包裝蓋的)

Take the end devices from the packaged box, and check the following parts is available:

An axial compression module (Note: The packaging covers are not included in pre - packed column)

An outlet axial compression nut / column seat and support(including four supporting legs)

An inlet axial compression piston(with 4 hexagon socket screws, corresponding to 1/8" inlet side)

An spare inlet axial compression piston

(Note: The packaging covers are not included in pre - packed column)

每個箱內也裝有管柱與 HPLC 系統之間的連接件。

這些連接件中包括一個 1/8"外徑(OD)管的母-母活接頭和一個塑膠的可重複使用的兩通型裝置連接器, 一個 50cm 長×1/8" OD×0.062", 兩端配了 1/8" 螺母和金屬套環的 PEEK 管。

管的一端插入活接頭, 另一端與管柱的入口相連接。塑膠可重複使用的裝置通過活接頭把管柱與 HPLC 系統連接起來。另外還有兩個 1/8"螺母和兩個金屬套環備用。

Each box is also provided with parts for connection between the column and the HPLC system.

These connection parts include a female - female union for 1/8 " outer diameter (OD) pipe and a reusable plastic two-way type device connector, a 50cm long × 1/8" OD × 0.062 " PEEK tubing with a 1/8 "nut and ferrules on the ends.

One end of the tube is inserted into the union, the other end is connected to column inlet.

With the union, the reusable plastic device connects the column and HPLC system together.

There are also two 1/8 "nuts and two ferrules spare parts.

檢查每個軸向壓縮活塞, 確保有密封圈, 且密封圈的開口端(可以看見彈簧)對著密封傳動座。(注意: 已裝填好的成品管柱是看不見上述配件的)

把出口軸向壓縮活塞由管柱出口滑入。管柱的標籤上用箭頭注明了流質方向, 出口軸向壓縮活塞裝在離管柱入口較遠的一端。

Check each axial compression piston, ensure that seals included, and the open side of seal (you can see the spring) faces against the sealing drive seat (Note: The above parts is not visible in the pre - packed

column).

Slide the axial compression piston from and into the column outlet.

The arrow on the column label indicate the direction of the liquid path, with the outlet axial compression piston mounted on one end farther away from the entrance of the column.

把軸向壓縮活塞用手盡力推入管柱中。然後，把密封圈裝在管柱中，安裝出口壓縮螺母和管柱支架，把4只腳放進相應的螺母中並旋緊螺紋即可完成。這樣就形成了一個四基座，使分離管柱可以自己站住。用手把出口軸向壓縮螺母旋緊到管柱出口上。用手旋緊止退螺釘，保證基礎牢固。把管柱安放在水平面上。

Push with more strength the axial compression piston into the column · then mount the seal ring into column °

Install outlet compression nut and column support base, and put the four support legs into the corresponding nut and tighten the screw to complete and form a four-base support, enabling the stand status of the separation column.

Manually screw to tighten the outlet axial compression nut to column outlet, and

Rotate manually to tighten the retaining screws to ensure a solid foundation.

The column should be placed in a horizontal plane.

檢查管柱的入口壁，確保沒有微粒材料殘留，這對防止密封圈擦傷尤為重要。

然後，把入口軸向壓縮活塞滑進管柱的入口。用手盡力地把軸向壓縮活塞推進管柱，然後把密封圈裝在管柱中。

用連接管把入口軸向壓縮活塞與母-母活接頭連起來。

Check the column inlet wall, make sure there is no residual particule material, which is particularly important to prevent abrasion of seal ring. Slide the inlet axial compression piston into column inlet. With

more strength by hand to push the axial compression piston into column, then mount the seal ring into the column.

Connect the inlet axial compression piston to female - female union with pipe.

首先, 反時針擰開並取下軸向壓縮模組驅動輪。順著螺紋上緊活接頭, 把連接管穿過軸向壓縮模的中間孔連接起來。用手慢慢地把軸向壓縮模組上緊到管柱入口, 直到手感覺到已經上緊了為止 (無須用很大勁)。

First, counterclockwise to unscrew and remove the drive wheel of axial compression module. Along the threads to tight the union. Pass the connecting pipe through the center hole of the axial compression module for connection.

Slowly by hand to tightened axial compression module to the column inlet, until it feels tighted (no need to use a lot of strength).

禁止使用工具! 手緊可保證軸向力適度, 且可防止過緊, 因為過緊會損壞管柱結構。

Prohibit the use of tools !

Man power can ensure appropriate axial force, and to prevent too tight that will damage the column structure.

慢慢地用手沿順時針方向擰上驅動輪, 直到感覺到裡面的活塞與軸向壓縮活塞入口接觸到為止。接觸到時, 會有一個輕微的但是不連續的, 明顯增大的阻力, 阻礙驅動輪的旋轉。這時把驅動輪再擰一整圈就可以了。

用提供的連接螺帽和金屬套環把組裝的管柱與 HPLC 系統連接起來。確認流質方向是管柱標籤上指示的箭頭方向。所有連接件參見目錄冊中的 NO.38-3060,38-3061,1533,U-175 或 U-176)。推薦用一個塑膠的可重複使用的連接件(參見目錄冊中的 NO. FTF-110) 把管柱出口和系統連接起來。

第一次使用 SAC 管柱時, 請按下列平衡的步驟操作。

Slowly and clockwise to tighten the drive wheel, until it feels its embedded piston has contact with the inlet of axial compression

piston. While touched, there will be a slight, not continuous, and perceptible increase of resistance, that will resist the rotation of the drive wheel, and then tighten the wheels once circle again.

Connect the assembled column to HPLC system with the provided nuts and ferrules. Confirm that the fluid direction is in consistence with that indicated by the arrow on the column label. See NO.38-3060,38- 3061,1533, U-175 or U-176 catalog items for All connection parts .

A plastic and reusable connector (see catalog item NO. FTF-110) is recommended for connecting the column outlet to the system.

On the first time to use SAC column, please do the following steps in for mobile phase equilibrium.

4. 分離管柱的平衡

Column equilibrium

SAC 管柱使用前必須調節平衡至啟動狀態.

確定移動相與管柱中的填料是相容的. SAC 管柱中的填料是固定相, 參見化學指南.

在運行條件下, 抽吸足夠的移動相, 使管柱達到平衡. 用檢測器監控流出物. 所需的體積由溶劑決定.

ID80mm 型*25cm (長度) 的管柱填料床體積約為 1250ml.

當基線漂移達到最小值, 以及最大滯留體積的在連續的測試運行中可重複時, 管柱就平衡了.

Before each sample loading, the column mobile and stationary phases must be equilibrated.

Ensure that the mobile phases through the column are compatible with column packing material · the stationary phase.

See Chemistry Guide for reference.

According to the mobile phase isocratic or gradient program · pump sufficient volume of mobile phase through column until the phases reach equilibrium .

Use detector to monitor to see if the phase equilibrium reached .

The mobile phase volume needed depends on the phases used .

For generic cases , 4 times column volume is necessary .

The packing volume of the ID80mm * 25cm (length) SAC column is about 1250ml.

When baseline drift reaches the minimum , and the retention volume can be repeated in successive test runs, the column has reach the equilibrium state.

5. 更換分離管柱

Column replacement

使 HPLC 系統減壓.

用手反時針旋轉, 把軸向壓縮螺母和軸向壓縮模組從管柱的兩端移開. 在移開軸向壓縮模組前, 反時針旋轉驅動輪, 直到其內部的活塞不再與入口軸向壓縮活塞接觸為止. 然後, 旋開軸向壓縮模組.

從管柱端部把軸向壓縮活塞拉出來. 如果管柱已經與系統分離, 把 10-32 或 1/8" 軸襯嵌入軸向壓縮活塞, 可以很方便地用手抓住軸襯, 把活塞從分離管柱中拉出來.

把新管柱上的包裝蓋取下來, 按照第三部分的提示進行安裝.

Counter-clockwise rotate to remove the axial compression nut from both ends of the column.

Before the axial compression module is removed , Counter-clockwise to rotate the drive wheel , until its embedded piston is no longer in touch with the inlet axial compression piston , and then unscrew to remove the axial compression module.

Draw the axial compression piston from both ends of the column.

In case the column has been separated from the system, then the embedding of a 10-32 or 1/8 "bushing into the axial compression piston will help to easily pull out the piston from the column by holding the bushing .

Take the new packaging cover on the column down, and follow the steps in part 3 to install.

6. 分離管柱的保存

Column preservation

如果要把 SAC 管柱從 HPLC 系統中取下來保存, 請按下列的步驟操作 :

當分離管柱還在系統中時, 使之與貯存的溶劑平衡.(見第 4 部分, 按照分離管柱平衡的說明進行, 以保持穩定, 請參照化學指導手冊.)

把管柱從系統中取出(參照第 5 部分) 把包裝蓋蓋在分離管柱兩端.

If you want to get down for preservation of the SAC column from HPLC system, follow these steps:

When the column is still connected to the system, equilibrate with the solvent for preservation. (See part 4, process according to the column equilibrium instructions in order to maintain stability. See Chemistry Guide for reference)

The column was then removed from the system (see part 5) and the package cap covered on both ends of column.

7. 前置線上過濾器

Online Filter

線上過濾器或前置保護管, 可用於在物料進入 SAC 分離管柱前, 過濾雜質及滯留污染物質. 由於製備型 HPLC 的進料都必須經過良好的前處理, 一般情況下使用線上過濾器即可.

使用者可以自行更換線上過濾器的濾膜, 特別簡便.

線上過濾器因為體積很小, 流體擴散效應極微小, 特別適合用於製備型 HPLC 分離管柱前的保護.

Before the material enters the SAC column, the Online filter or Guard column, can be used to filter impurities and contaminants.

Also, since the preparative HPLC separation conditions must be

Since the preparative HPLC feed must be well pretreated to maximize yield with minimized solvent and media cost, the use the online filters prefers.

The online filter membranes can be replaced easily.

The online filter has very small volume factor and tiny fluid diffusion

effect that is particularly suitable for the protection in front of the preparative HPLC columns.

8. 有前置保護管的分離管柱

SAC with Guard column

前置保護管的填充材料與分離管柱填充材料相同。

可以過濾雜質及滯留污染物質，但由於前置保護管有一定的體積，及一定程度的流體擴散效應，因此製備型 HPLC 分離管柱前的保護，應以良好的樣品前處理為優先基礎。對於樣品前處理複雜度高，雜質及滯留污染物質不確定性高的進料，才考慮使用前置保護管。

The guard column is filled with the same packing material as that of separation column. It can filter impurities and retain pollutants, but the guard column has definite volume, that exhibits fluid diffusion effect to certain extent.

And hence · the feed (raw material) should be well prepared as possible in advance · and only adopt guard column in cases that the feed(raw material) preparation is complex and has high uncertainty of impurities and contaminants 。

8.1 安裝有前置保護管的分離管柱:

安裝有前置保護管的分離管柱時，需要一個預填充分離管柱，一個預填充前置保護管和末端裝置箱。

分離管柱和前置保護管應當使用相同的填充材料。

在已有的管柱上加裝前置保護管時，請參照第 9 部分。

把分離管柱和前置保護管上的包裝蓋取掉。包裝箱中取出末端裝置箱。查下列部件是否齊備：

8.1 Installation of column with guard column :

To installation a column with guard column, a packed column, a packed guard column, and column end devices box is necessary 。

The guard column is filled with the same packing material as that of separation column.

For adding a guard column to existing column, please refer to part

9.

Remove the packaging covers from column and guard column .

Take the end devices box from packaging case.

Check the following components are available:

- ✓ 軸向壓縮模組件一件
- ✓ 出口軸向壓縮螺帽一件/管柱支架 (帶 4 條腳)
- ✓ 入口軸向壓縮活塞一件(4 個內六角螺釘, 1-32-1/8 進口端相對應)
- ✓ 出口軸向壓縮活塞一件(2 個內六角螺釘, /4-28 出口端鄰近)
- ✓ 軸向耦合活塞一件(活塞有兩個密封圈)
- ✓ 前置保護管管柱適配器插套一件
- ✓ 備用入口軸向壓縮活塞體一件
- ✓ an axial compression module
- ✓ a outlet axial compression nut and column base support(with four legs)
- ✓ an inlet axial compression piston (4 hexagon socket screws, 1-32-1/8 corresponding to inlet end)
- ✓ an outlet axial compression piston (2 hexagon socket screws, /4-28 near the outlet end)
- ✓ an axial coupling piston (piston with two seal rings)
- ✓ a guard column adapter plug
- ✓ an inlet axial compression piston body

每只裝置箱內備齊了將“有前置保護管的分離管柱”

連接到 HPLC 系統, 所需的連接配件(第 3 部分所描述的末端裝置箱)

檢查每個活塞, 確認密封圈放置方向是否正確(見第 3 部分),

同時檢查管柱壁和前置保護管壁, 把可能存在的微渣清除掉.

把出口軸向壓縮活塞滑入分離管柱的出口(見第 3 部分).

安裝出口軸向壓縮螺帽/管柱支架 (見第 3 部分).

Each device box contains all the parts(the end devices box description in part3) required to connect a column with guard column to HPLC system

Check each piston . confirm the correct seal ring direction is located

(see Part 3),

Also check the column and guard column wall to remove possible presence of micro-slag .

Slide the outlet axial compression piston into the column outlet (see Section 3).

Install outlet axial compression nut and column bracket (see section 3).

把耦合活塞滑入分離管柱的入口(參照第 3 部, 類似入軸向壓縮活塞安裝).

把前置保護管適配器插套套在前置保護管上, 小心地把它緊固在柱口上,

不要太用力. 確保適配器插套螺紋比較容易擰上. 如果遇到擰螺紋受阻,

把它旋下來, 清洗後重試. 勿用力! 禁止使用工具!

警告: 適配器插套很重要. 注意防摔. 用連接管把入口軸向壓縮活塞和活接頭連接起來.

Slide the coupling piston into the column inlet, (see Part 3, similar to the inlet axial compression piston installation).

Set guard column adapter plug on the guard column and carefully fix it firmly on the column mouth.

Do not over force. Ensure that the thread on the adapter plug can be screwed more easily. If screwing blocking encountered, screw it down, and try again after cleaned. Do not force and prohibit using tools!

Warning: The adapter plug is very important. Note to protect it against falling.

Use pipe to connect inlet axial compression piston and unions.

把活接頭和連接管穿過軸向壓縮模組的中孔, 用手旋緊螺紋, 與前置保護管適配器插套連接起來, 注意不要太用力. 慢慢地用手將驅動輪順時針旋緊, 至能感覺到裡面的活塞接觸到了入口軸向壓縮活塞.(見第 3 部分.), 再把驅動輪旋一整圈.

Lead the union and the connecting pipe through the central hole in the axial compression module, and hand-tighten the screw to connect the guard column adapter plug. Be careful not to be too forced.

Slowly and clockwise to tighten the drive wheel, until it feels its embedded piston has contact with the inlet of axial compression piston (see part 3), then tighten the drive wheel one circle.

靜置幾分鐘是必須的，它可以使在前置保護管和分離管柱之間的空氣排出，以免形成死體積，導致管柱性能的下降。把驅動輪再旋緊一整圈。

把有前置保護管的 SAC 分離管柱與 HPLC 系統連起來，如第 3 部分所述。第一次使用管柱時，按照第 4 部分講述的步驟進行平衡。

To standing for a few minutes is necessary. It can purge out air between guard column and column, to avoid the formation of dead volume that may result in column performance degradation.

Tighten the drive wheel one circle turn.

Connect the SAC column with guard column to HPLC system, as in part 3.

In accordance with the described steps in part 4 to equilibrate mobile and stationary phases for the column before sample loaded.

8.2 更換前置保護管：

前置保護管更換週期：根據樣品的前處理複雜度，雜質及滯留污染物質的實際情況，確定所需的更換頻率，週期性及特定性地更換前置保護管，以保護分離管柱免遭化學污染。

8.2 Replacing guard column：

Guard column replacement cycle: According to the complexity of sample preparation for the actual impurities and contaminants situations · to determine the required replacement frequency · Periodically and/or conditionally replace the guard column to protect against chemical contamination.

更換步驟:

讓 HPLC 系統減壓。取出軸向壓縮模組，如第 5 部分所述。把入口軸向壓縮活塞從前置保護管中拉出來。如果管柱已經與 HPLC 系統分離，可以把

1/16"-10-32 或 1/8"軸襯嵌入活塞, 這樣方便手抓住軸襯取出活塞.

把舊的前置保護管取下, 更換一個新的. 確認新前置保護管標籤上的箭頭方向與流體方向一致.

把入口軸向壓縮活塞滑入新的前置保護管中, 重新連接及排出進入的空氣等步驟, 如第 8.1 所述.

Replacing Procedure:

Release HPLC system to zero pressure · then

remove the axial compression module, as described in Part 5.

Pull out the inlet axial compression piston from the guard column.

If the column has been separated from the HPLC system, then a 1. / 16 "-10-32 or 1/8" bushing could be embedded in the piston, to let easily grasping the bushing by hand to remove the piston.

Remove the old guard column, replace it with a new one. Confirm the direction of the arrow of the guard column label is consistent with the direction of the fluid.

Slide the inlet axial compression piston into the new guard column, and again to conduct the connection, exhausting air entered and other steps, as described in Section 8.1.

8.3 添加前置保護管

用一個前置保護管/管柱耦合裝置, 可以在已經裝好的分離管柱上添加一個前置保護管. 分離管柱和前置保護管必須具有相同的直徑, 而且填充相同的填料.

前置保護管/分離管柱裝配組合包括:

前置保護管的管柱適配器一件和軸向耦合活塞一個.

檢查是否所有的部件都齊備, 以及軸向耦合活塞上的密封圈的放置方向是否正確.

8.3 Prepend prepend

With a "guard column-column" coupling devices, a guard column can be added in front to a pre-packed column. The diameter and packing material of the guard column must be the same with that of the connected column.

The "guard column-column" coupling devices include a column adapter of guard column and an axially coupling piston.

Check if all the parts are available, and check if the seal ring on the axially coupling piston is placed on correct direction.

把前置保護管添加到管柱上：

把管柱入口與 HPLC 系統分離。

用手逆時針旋轉軸向壓縮模組的驅動輪，直到軸向壓縮模組內的活塞不再與入口軸向壓縮活塞相接觸。然後用手沿逆時針方向旋轉，把軸向壓縮模組取出來。

把入口軸向壓縮活塞從分離管柱中拉出來。

把軸向耦合活塞滑進分離管柱入口，取代軸向壓縮活塞。

Adding the guard column to column:

Separate the column inlet from the HPLC system.

Counterclockwise rotate the drive wheel of the axial compression module by hand · until that the piston within the axial compression module is no longer in contact with the inlet axial compression piston. Then, counter-clockwise rotate to take the axial compression modules out.

Pulled out the inlet axial compression piston from the column.

Slide the axial coupling piston into the column inlet. That is step to substitute the removed axial compression piston.

把前置保護管出口套在軸向耦合活塞上。前置保護管標籤上的箭頭方向需與流體方向一致。

把從分離管柱上取下來的入口軸向壓縮活塞滑進前置保護管的入口中。

把前置保護管管柱適配器插套套在前置保護管上，用手擰緊到分離管柱上。

用連接管把入口軸向壓縮活塞與活接頭連起來。

連接軸向壓縮模，如第 8.1 所述。

排出進入的空氣，如第 8.1 所述。

重新把管柱入口與 HPLC 系統相連。

Set the guard column outlet to the axial coupling piston ·

Confirm the direction of the arrow of the guard column label is

consistent with the direction of the fluid.

Slide the inlet axial compression piston that is take from column, into the inlet of guard column.

Set the "guard column adapter plug " on the guard column, hand-tighten onto the chromatography column.

Connect the inlet axial compression piston to union with tube °

Connect axially compressive module, as described in part 8.1.

Exhaust entered air, as described in Section 8.1.

Reconnect the column inlet to HPLC system.

9. 串聯分離管柱

Column connection

分離管柱可以用最小長度的不銹鋼管 (0.062"ID 型) 串聯起來. 用合適的 1/8" 手動旋緊接頭(或塑膠的, 可重複使用的連接件)配合連接管, 可以把一個分離管柱的出口和另一個管分離管柱的入口連接起來.

More than one column could be serially connected with a minimum length of stainless steel tubing (0.062 "ID type).

Connect the outlet of one column to the inlet of another column with a suitable 1/8 "hand - tightened joint (or plastic reusable connector).

10. 測試 SAC 分離管柱

Testing Column

當一個新的分離管柱安裝好後, 或長時間未使用時, 通常需要用標準測試方法來評價其性能. 特殊的測試條件詳見化學手冊.

關於 SAC 管柱的注意事項和使用方法, 請參照與分離管柱的相關化學手冊.

When a new column installed, or when not in use for a long time, it is usually required to evaluate its performance using standard test methods. See the specific test conditions detailed in the Handbook of Chemistry.

For precaution and usage of SAC column · please refer to chromatography column related Handbook of Chemistry

11. 重要告誡

Important key notice and rules

填料空隙會導致管柱性能降低，為了保證管柱的壽命長，需週期性地把 HPLC 系統降壓，然後手動旋緊 SAC 管柱上的所有軸向壓縮部件。這樣可以維持最優的填充床層結構，並使形成的填料空隙最小化。

而當管柱處於 HPLC 系統充壓的條件下，密封圈不易滑動，切勿緊固 SAC 軸向壓縮裝置。

在緊固前一定要使系統完全降壓。

SAC 管柱系統在設計上保證用手緊固就足夠了。

用工具過度緊固會損壞內部的重要部件，切勿使用工具緊固 SAC 軸向壓縮裝置。

The Interspace in the packing may lead to reduced performance of the column.

In order to ensure long life of the column, it is required to periodically to release the HPLC system pressure to zero, and then manually rotate to tightened all the axial compression parts of the SAC column. That can maintain optimal packed bed layer structure, and minimize formation of packing bed Interspace.

Do not tighten SAC axial compression device when the column of the HPLC system is under pressured status, since the seal rings can not slide easily.

So, the HPLC system pressure must be completely released before tightening.

The SAC column system is designed to ensure that hand - tightening is sufficient.

Excessive tightening by tool may damage the crucial internal parts.

Do not use tools to tighten SAC axial compression device.

重要的是：

SAC 密封圈周圍發生洩露的時候，應更換密封圈，而不能經由增加軸向壓力來改善，也就是說，再旋緊軸向壓縮模組上的驅動輪是無效的。

在連接管柱到 HPLC 系統時，連接管長度儘量保持接近最小，以避免在裝置和連接件中留有死體積。

當連接系統時，不要過度緊固軸襯和金屬套環。過度緊固會損壞軸向壓縮活塞。

Importantly:

If leaking around seal rings of the SAC column occurs, the seal rings should be replaced, not resolved by increasing the axial pressure. That is, it is invalid by rotate to tighten the drive wheel of axial compression module.

Keep connecting pipe to the HPLC system to minimum length to avoid and eliminate dead volume that may be left in the device and connectors.

When connecting to system, do not over tighten the bushing and the metal ferrule.

Excessive tightening by tool may damage the axial compression piston.

連接前置保護管到分離管柱上時，一定要依照說明，把引入的空氣從軸向壓縮耦合活塞中排出。否則，會導致裝置中產生死體積，因而使管柱性能降低。

只能使用 HPLC-等級的溶劑，溶劑需用氦除氣或用真空過濾。

過濾所有的移動相時，建議使用 0.22um 膜線上過濾器清除微粒(使用可耐受 HPLC 溶劑的材質的濾膜)。這對使用含溶鹽或支持細菌繁殖的溶劑系統來說是最基本的。

When connecting guard to the column, be sure to follow the instructions, to purge the introduced air out of the axial coupling piston, or it may produce dead volumes and column performance degradation.

Use only HPLC- grade solvents, which need to use helium degassing or vacuum filtration.

When all of the mobile phase was filtered, the Online—Filter with 0.22um membrane is recommended to filter micro-particles on line (using membrane material tolerable to HPLC solvents).

It is a fundamental demand for solvents with dissolved salts or for

solvents that may support bacteria multiplication.

在開始進行層析分離前，把分離管柱完全調整到進樣前的相平衡狀態。

不要超出分離管柱的壓力極限。預充填的 ID80mm 型 SAC 管柱的極限壓力約為 2000 psi(140Bar)。ID80mm 型 SAC 管柱硬體的壓力極限是 4000 psi(280Bar)。一旦過壓，入口密封圈通常是首先被破壞的部件。

使用脈衝節氣閘可以降低震動。震動是造成管柱壽命降低的主要原因。例如在預置刻度套色板中使用時，由於溶劑流動速度極快，這就顯得特別重要。

由於化學污染引起的管柱性能惡化通常可以用清洗的辦法恢復，但所使用的溶劑常規層析中所使用的要濃。詳細資料請參照化學手冊。

Adjust the column to equilibrium state before the sample loading at the beginning of chromatographic separation,

Do not exceed the pressure limit of the column.

The pressure limit of the pre-packed ID80mm type SAC column is about 2000 psi (140Bar). The pressure limit of the ID80mm type SAC column hardware is 4000 psi (280Bar) . Once the overvoltage, the first inlet seal rings is usually the first part to be damaged.

The Pulse damper reduces vibration. Vibration is the main reason of causing reduced column life. It is especially important when the solvent flow very fast.

The column performance deterioration due to chemical contamination can usually be recovered with a cleaning method, but the solvents have more concentration than that used in routine chromatography.

For more information, please refer Handbook of Chemistry.

12. SAC 分離管柱的維護

Column maintenance

12.1 更換入口線上過濾器 Replacing the Online Filter

使管柱完全降壓。

把軸向壓縮模組取出。

從帶有舊線上過濾器的入口軸向壓縮活塞上, 依次取下 4 顆內六角螺釘, 密封圈固定器和密封圈。

在新的軸向壓縮活塞上裝好新的溶劑線上過濾器, 接著按正確的方向把密封圈和密封圈固定器裝上去, 然後用手擰緊內六角螺釘。

把入口軸向壓縮活塞置於分離管柱的入口端, 重新安裝軸向壓縮模。

12.1 Replacing the Online Filter

Completely release the column pressure to zero.

Remove the axial compression module.

From the inlet axial compression piston with online filter, sequentially removed the four hexagon socket screws, the seals and seal retainer.

Install a new solvent online filter to the new axial compression piston, then according right direction to install seal ring and seal ring holder, and tighten the hexagon socket screws.

Place the inlet axial compression piston to the inlet of column, and re-install the axial compression module.

12.2 更換軸向壓縮活塞密封圈 Replace axial compression piston seal

使管柱完全降壓。

如果入口裝置發生洩露, 軸向壓縮模組必須取出。

如果出口裝置發生洩露, 軸向壓縮螺帽/管柱支架必須取出: 把管柱出口與 HPLC 系統分離, 逆時針旋轉拇指螺杆, 把它解下來。用手支撐著管柱, 把軸向壓縮螺帽用手沿逆時針方向卸下來。不必取下螺帽上的支架, 因為它形成了一個穩固的四基座。

12.2 Replace axial compression piston seal

Completely release the column pressure to zero.

If the inlet device leaks · the axial compression module have to be removed.

If the outlet device leaks · the axial compression module nut / column support base(the base cap)have to be removed as following:

Separate the column outlet apart from the HPLC system.

Counter-clockwise rotate thumb screw bar to remove it, while the column is supported by hand. In counterclockwise direction, remove the axial compression screw cap(the base cap) by hand. Do not need to remove the nuts on the cap · for it forms a solid base of four.

從管柱上取下軸向壓縮活塞。

解開並卸下內六角螺釘(出口活塞兩個, 入口活塞四個, 這些螺栓把密封圈固定器與活塞體連在了一起), 把密封圈固定器與活塞體分開。

取下舊及更換新的密封圈。密封圈的開口端(可見彈簧) 應對向密封圈固定。換密封圈固定器, 重新安裝裝置。

軸向耦合活塞上的密封圈的更換方法相似。

Remove the axial compression piston from the column.

Unlock and remove the hexagon socket screws (two on outlet piston, four on inlet · these bolts link the seal ring retainer and piston body together) · to separate the seal ring retainer and piston body apart ·

Remove the old and replace the new seal ring. The open end of the seal (with visible spring) should face to the seal ring retainer.

Replace seal ring retainer and reinstall the device.

The replacement of the seal ring of the axial coupling piston is similar.

12.3 SAC 不銹鋼配件清單

Stainless steel Parts List

SAC 末端裝置箱 SAC end device box

配件編號	描述 Part Number / Description
83-840	80mm ID 型 SAC 管柱末端裝置箱 1 號 80mm ID type SAC column end device box 1
83-842	80mm ID 型 SAC 管柱末端裝置箱 2 號 80mm ID type SAC column end device box 2

前置保護管管柱耦合裝置 "Guard column - column" coupling device

配件編號	描述 Part Number / Description
83-841	80mm ID 型管柱的前置保護管管柱耦合裝置 Coupling device of Guard column for 80mm ID type column

自立前置保護管套件 Independence Guard column set

配件編號	描述 Part Number / Description
83-844	80mm ID 型前置保護管的自立前置保護管套件 Independence Guard column set of Guard column for 80mm ID type column

備用密封圈 Spare seal rings

配件編號	描述 Part Number / Description
83-947	80mm 系統的備用密封圈, 兩包。 Spare seal rings for 80mm system, two packets

備用裝置和連接管 Backups and the connection pipe

配件編號	描述 Part Number / Description
38-3060	PEEK, 1/8 OD x 0.062"OD 型 x 50cm PEEK, 1/8 OD x 0.062 "OD x 50cm type
38-3061	PEEK, 1/8" OD x 0.062"OD 型 x 50cm PEEK, 1/8 "OD x 0.062" OD x 50cm type
01-0140	手動旋緊接頭, 帶 1/8"-螺紋, 配 1/8"x 0.062"OD 連接管, 2 只。 Manually tighten fitting with 1/8 " - thread, with 1/8" x 0.062 "OD connection tube , two pieces.
01-0142	不銹鋼金屬套環, 1/8", 10 只。 Stainless steel ferrule, 1/8 " , 10 pieces
01-0150	不銹鋼兩通, 配 1/8"OD , 1 只。 Stainless steel two - way with 1/8 "OD, 1 pieces.
FTF-110	塑膠可重複使用連接件, 配 1/8"連接管.與不銹鋼型裝置用螺紋相配

	合 Reusable plastic fittings, with 1/8 "connection tube to match with stainless steel screw-type device.
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備用活塞配置 (配密封圈和固定器)
Spare piston configuration (with seal rings and retainer)

配件編號	Part Number / Description
7002-211	80mm ID 型系統的入口軸向壓縮活塞裝置 Inlet axial compression piston device for 80mm ID System
7002-059M	80mm ID 型系統的出口軸向壓縮活塞裝置 Outlet axial compression piston device for 80mm ID System
7002-060M	80mm ID 型系統的軸向耦合活塞裝置 Axial coupling piston device of for 80mm ID System

備用硬體 Backup hardware

配件編號	描述 Part Number / Description
7002-013	80mm ID 型系統的前置保護管適配器插套 Guard column adapter plug for 80mm ID System
7002-047	80mm ID 型系統的出口軸向壓縮螺帽/管柱支架 (包括止退螺釘的手柄) Outlet axial compression nut and column bracket (including the retaining screw handle)
7002-048	管柱支架的腳, 4 套 Column bracket feet, 4 pieces

SAC 鈦部件清單 The Titanium parts list

配件編號	描述 Part Number / Description
83-840-TI	末端裝置箱, SS316/鈦/含氟高分子材料(不銹鋼燒結板), 用於 80mm ID 型型 SAC 分離管柱. Terminal devices box, SS316 / titanium / fluorinated polymer materials (stainless steel sintered plate) for 80mm

	ID System.
83-947	備用管柱密封圈, SS316/ 含氟高分子材料(不銹鋼燒結板), 用於 80mm ID 型型 SAC 分離管柱, 兩包. Spare column seals, SS316 / fluorinated polymer materials (stainless steel sintered plate) for 80mm ID System.

備用連接管 Spare connection pipe

配件編號	描述 Part Number / Description
U-175	PEEK 接管, 1/8" OD x 0.062" ID 型 x 50cm PEEK tube, 1/8 "OD x 0.062" ID type x 50cm
U-176	PEEK 接管, 1/8" OD x 0.062" ID 型 x 50cm PEEK tube, 1/8 "OD x 0.062" ID type x 50cm
1533	耐高壓化學用內置 PEEK 連接管, 1/8" OD x 0.062" ID 型 x 100cm. High pressure PEEK connection pipe embedded for chemical application, 1/8 "OD x 0.062" ID type x 100cm.
U-175	鈦金屬套環, 與 1/8" OD 連接管配合使用, (與兩通型裝置相配), 2 只. Titanium ferrules, use with the 1/8 "OD connection tube (and matched with the two-way type device), 2 pieces

訂購時如需瞭解有關分離管柱和前置保護管的特定應用資訊及數據, 請參閱化學手冊.

For more application specific information and data for column and guard column when ordering, see Handbook of Chemistry.

Ordering & Service Information: 訂購和服務信息.

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靜態軸向壓縮製備層析管柱 安裝及使用手冊

Static Axial Compression preparative chromatography Installation & User Manual

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