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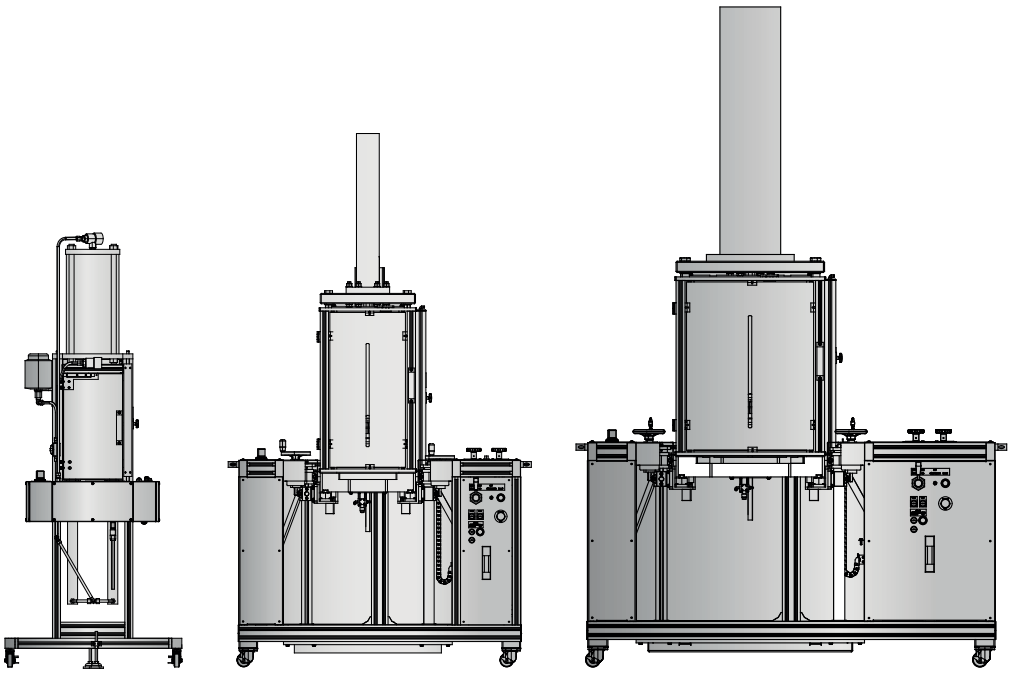
Any Column, Any Size, Any Media



MODcol

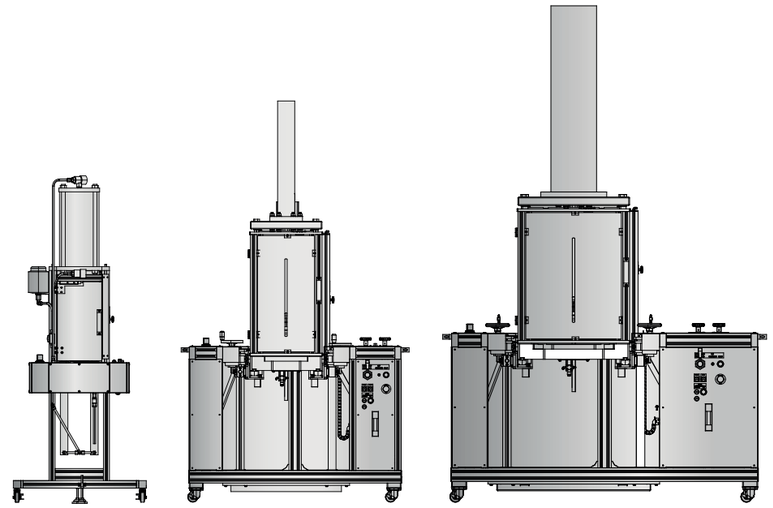
Spring Columns and Multipacker Instruments

MADE BY DR. MAISCH

CONTENT

MODCOL SPRING COLUMNS AND MULTIPACKER INSTRUMENTS MADE BY DR. MAISCH

From one of the biggest
High-**P**erformance **L**iquid **C**hromatography (HPLC) and
Preparative **L**iquid **C**hromatography
Column Manufacturers in Europe.



Fixed Bed: Column Packing using the Solvent Flow.

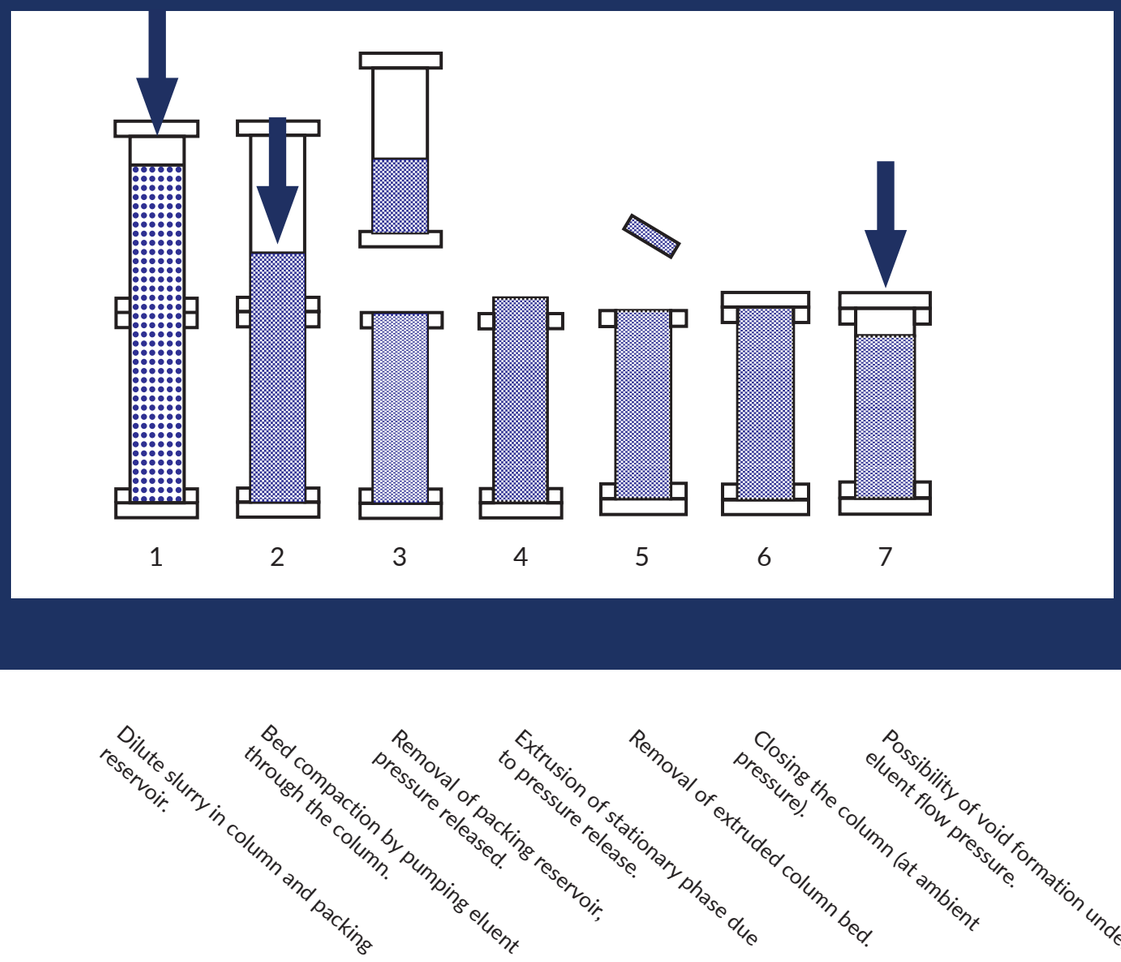


Figure 1: Scheme of the Column Packing Process using the Solvent Flow.

Traditional fixed-bed columns often suffer from void formation and channeling due to sample load and mobile phase flow, which degrades performance. DAC technology eliminates these issues by continuously applying pressure via a piston at the column inlet.

INTRODUCTION
FIXED BED: COLUMN PACKING USING THE SOLVENT FLOW

Intrinsic Problems Related to Fixed Bed Column Packing

Need of excess media in packing reservoir.

Further loss of media after release of the packing pressure.

- Less loading capacity.
- Lower efficiency.

Possibility of bed disruption upon pressure release.

Non-uniform bed packing density due to pressure drop along the column length under flow pressure packing.

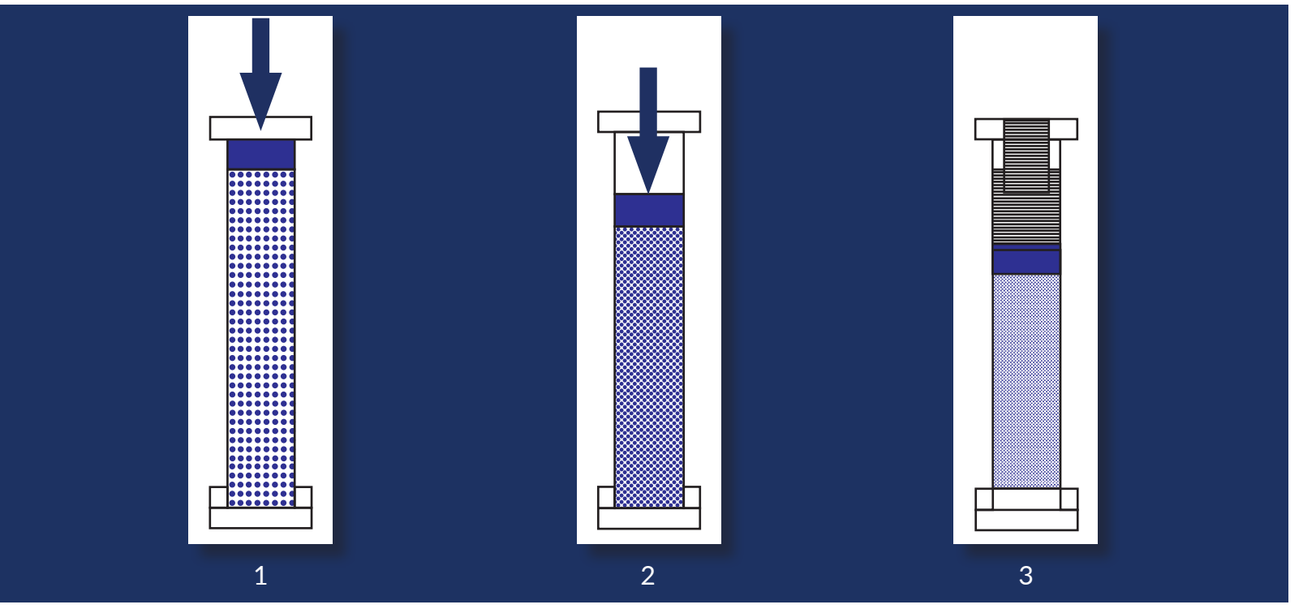
The possibility of void formation during use may limit the column lifetime.

Axial Compression: Column Packing using a Piston

Axial compression overcomes the intrinsic problems of the column packing using the solvent flow:

SAC – **S**tatic **A**xial **C**ompression

DAC – **D**ynamic **A**xial **C**ompression



Dilute slurry in column.

No need of excess media or loss of media.

Piston-driven mechanical pressure:

- Full pressure is applied to the bed along the entire column length, ensuring uniform packing density.

No release of mechanical pressure:

- No bed disruption.
- Consistent packing density.
- No void formation.
- Increased column lifetime.

Figure 2: Scheme of the Column Packing Process using the Axial Compression.

Conventional DAC systems rely on hydraulic mechanisms, making them complex and expensive. Traditionally, such systems were limited to large, permanent installations or high-cost preparative setups, where the column was integrated into the packing unit.
Alternative designs that allow column detachment from the packing unit typically lose DAC functionality, reducing them to simple Static Axial Compression (SAC) systems.

MODcol Spring Columns

Dynamic Axial Compression (DAC) has been widely used in process chromatography to maintain column efficiency and peak symmetry.
MODcol Spring Columns are the preferred choice for chromatographers seeking high performance, durability, and long-lasting columns. This advanced DAC technology is housed in a compact and portable package, making it highly flexible for preparative and semi-preparative chromatography applications. Unlike other DAC systems, MODcol Spring Columns are the only mobile DAC columns available, capable of full DAC functionality without being mounted in the MODcol Multipacker Instrument.

Spring Columns are offered in various Inner Diameters (ID): 25 mm, 30 mm, 40 mm, 50 mm, 70 mm, 101 mm, 150 mm, 200 mm and 300 mm with two length options, allowing packed bed lengths from 5 mm to 500 mm.

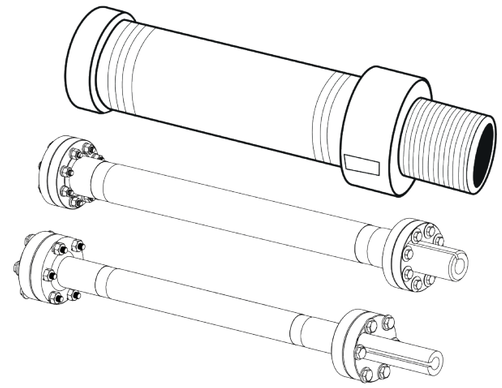
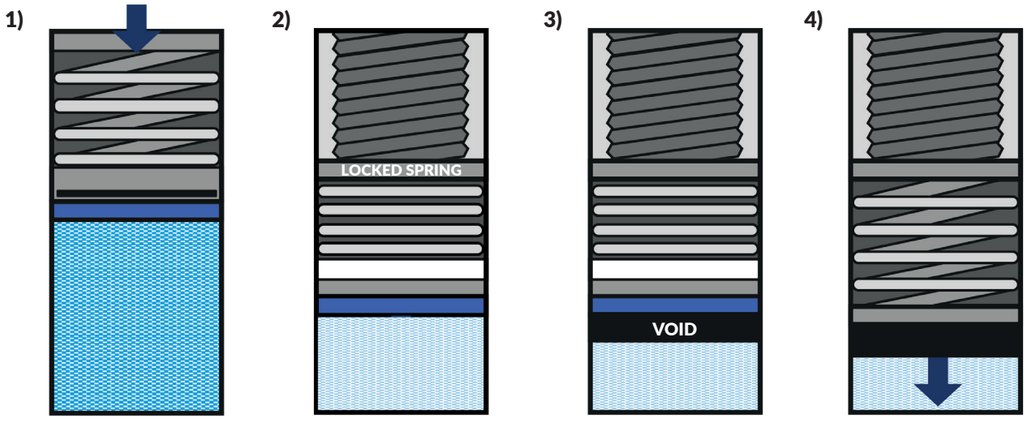


Figure 3: MODcol Spring Columns in different Sizes.

The Spring Column System: A Portable, High-Performance DAC Solution

The Spring Column System features a portable design with patented Dynamic Axial Compression (DAC) technology, ensuring consistent performance without an external packing device. DAC eliminates voids, enhances the peak symmetry, extends the column lifetime, and improves the efficiency. Packed with ReproSil or Reprospher, these columns offer effective purification by compensating for bed settling without external power. A patented internal spring maintains constant axial pressure, ensuring long-term performance stability. The user-friendly design enables a single operator to pack sensitive, large-pore media efficiently, making it ideal for protein and peptide separations while significantly reducing purification costs.

The Spring Column is the only system with INTERNAL DAC.



Media slurry is packed by downward movement of the piston.

Column is closed. Spring is locked. Force is applied to the column bed.

During column operation, voids may form due to bed settling.

Internal DAC Spring Mechanism eliminates voids by spring expansion.

Figure 4: Spring Column Principle.

Inside the Spring Column: The Key to its Superior Performance

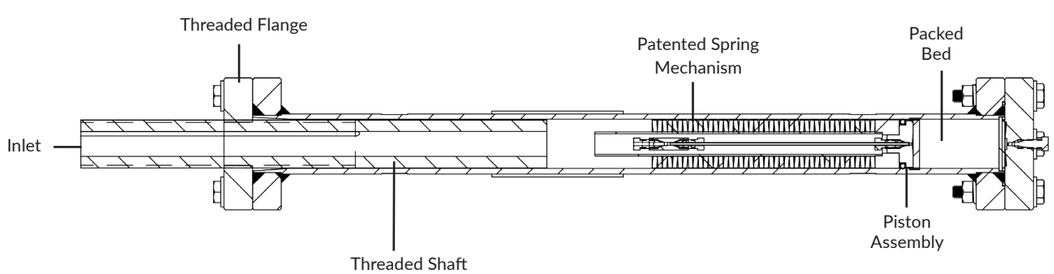


Figure 5: Scheme of a Spring Column.

Reliable Performance and Extended Column Lifetime

The Spring Mechanism continuously adjusts the pressure to compensate bed consolidation under high-flow conditions.
As media volume decreases, the piston advances automatically, preventing void formation before it begins. This ensures that MODcol Spring Columns deliver consistent performance over thousands of injections and operational hours — significantly outlasting traditional column designs.

By preventing premature failure, Spring Columns reduce process downtime. MODcol Spring Columns are ready-to-use DAC solutions that eliminate the need for frequent repacking.

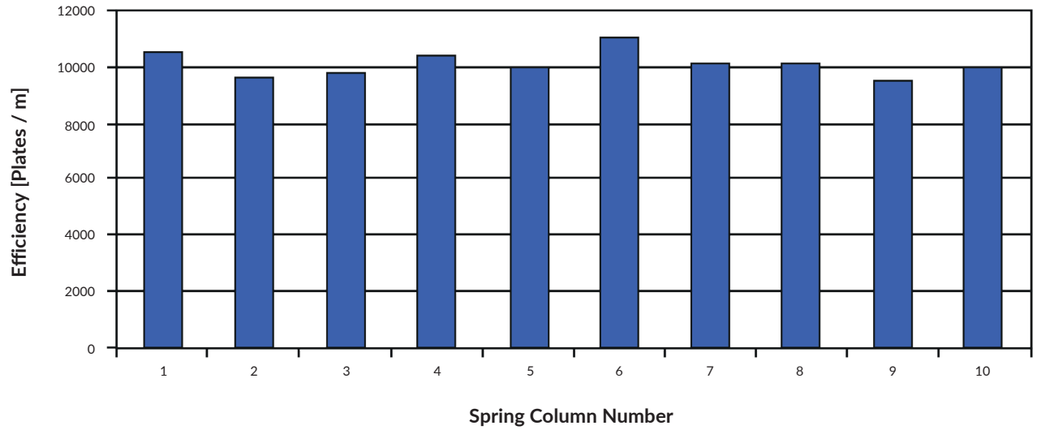


Figure 6: Efficiency vs. Spring Column Number.

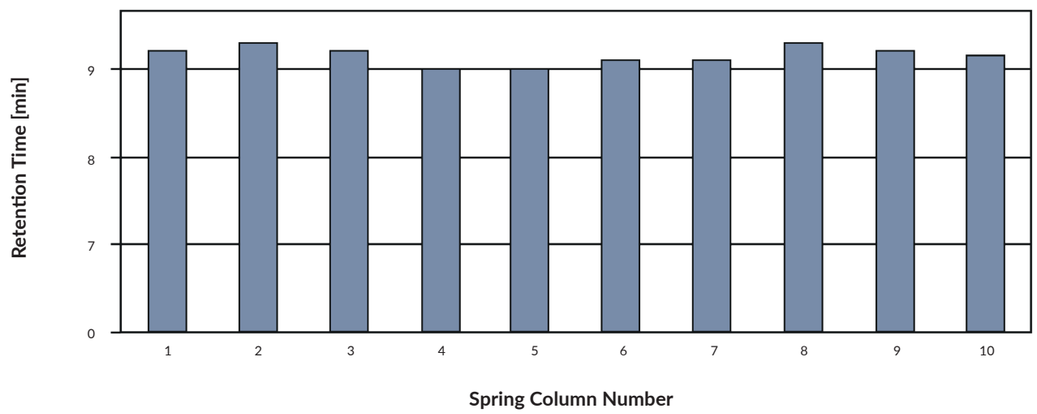


Figure 7: Retention Time vs. Spring Column Number.

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Flexible Design for Various Media and Applications

Spring Columns are optimized for silica- or polymer-based media (5 µm or larger particles).
A selection of springs with different force constants allows precise pressure adjustments for various media and flow rates. Additionally, Spring Columns can be equipped with a water jacket, making them ideal for temperature-sensitive separations.

Features and Advantages

Feature		Advantage
Bed is compressed mechanically by a spring.	→	Improves the column efficiency and extends the column lifetime.
Can be used anywhere, just like a free standing fixed bed column.	→	No need for dedicated hydraulic system to compress the column during LC use.
Variable bed pressues (up to 2000 psi/ 138 bar) and bed lengths (5 to 50 cm packings).	→	Ideal for wide variety of separations and media.
Easy to pack and easy to unpack.	→	Fast, convenient, clean and flexible for use with different media.
Packing process requires less media.	→	More cost effective than traditional column packing techniques.
Excellent, highly reproducible packing results.	→	Compares more favorably than other self-packing schemes.

Key Features of Spring Columns

- Easy, fast and safe column packing from 25 - 300 mm ID.
- Improved chromatographic performance.
- Extended column lifetime.
- Easy self-packing and repacking.
- Truly mobile Dynamic Axial Compression (DAC).
- Highly economic.
- FDA approved materials.

MODcol Multipacker Instruments: Safe, Efficient and Precise Column Packing

Unlike traditional hydraulic packing systems, which lack damping devices, the MODcol Multipacker Instruments prevent pressure peaks that can damage sensitive large-pore media. Hydraulic pumps in other systems can cause particle breakage, leading to high backpressure, efficiency loss, and poor peak shape.

Additionally, packing speed and pressure in conventional systems are often linked, whereas the MODcol Multipacker Instruments allow independent control of both parameters.

Smooth Packing with Superior Control

The MODcol Multipacker Instrument for 25 - 70 mm ID Spring Columns solves these issues by combining a pneumatic packing mechanism with a hydraulic damping circuit.

This enables smooth and controlled packing without pressure peaks, as the packing speed remains completely independent of the packing pressure.

Larger MODcol Multipacker Instruments also use an air-driven hydraulic system with advanced damping, allowing precise and gentle packing of nearly all chromatography media.

User-Friendly, Low-Maintenance, and Certified Safety

All MODcol Multipacker Instruments are easy to use, require minimal training, and are virtually maintenance-free. They are TÜV Rheinland approved under the EU Machinery Directive, fully CE-certified, and ATEX-exempt, confirming their suitability for explosion-hazard environments.

The packing process is simple and efficient, typically completed within minutes. Unpacking and cleaning are simple processes, enabling fast preparation for the next use.

25 - 70 mm ID MODcol Multipacker Instrument

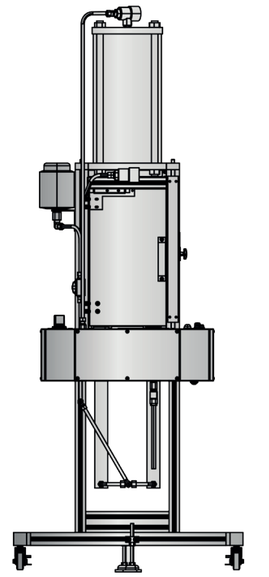

Figure 8: Scheme of the 25 - 70 mm ID MODcol Multipacker Instrument.

With this MODcol Multipacker Instrument 25, 30, 40, 50 and 70 mm ID Spring Columns can be packed efficiently and with high performance. The packer has a high safety standard and can be used in explosion-hazard areas. The ease of use results in reproducible column packing, nearly operator independent. This makes the MODcol Multipacker instrument the ideal choice for column self-packing needs in the pharmaceutical industry.

It utilizes a pneumatic packing mechanism, eliminating the need for electrical power and ensuring safety when working with solvents in hazardous environments.

50 - 150 mm ID MODcol Multipacker Instrument

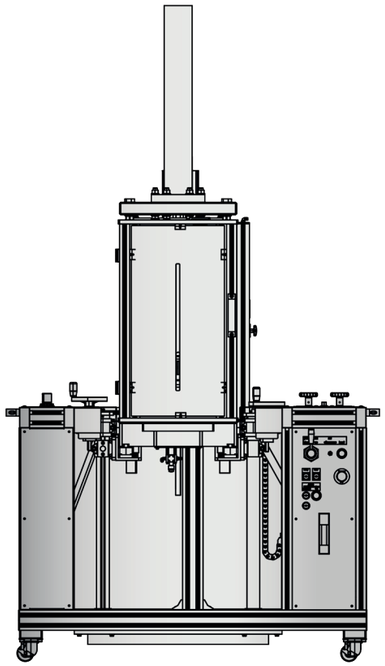

Figure 9: Scheme of the 50 - 150 mm ID MODcol Multipacker Instrument.

With this MODcol Multipacker Instrument 50, 70, 101 and 150 mm ID Spring Columns can be packed using the same principle and performance as the 25 - 70 mm ID MODcol Multipacker Instrument. Both instruments have state-of-the-art safety features and are designed to work in modern pharmaceutical lab and production environments. They are nearly maintenance-free and easy to handle with very little training requirements.

This model features an air-driven hydraulic mechanism with a sophisticated damping circuit, which prevents pressure peaks that could damage sensitive chromatography media. Unlike traditional hydraulic systems that generate pressure fluctuations, the MODcol Multipacker Instrument ensures a smooth packing operation with independent control over packing speed and pressure, enhancing efficiency and column longevity.

150 - 300 mm ID MODcol Multipacker Instrument

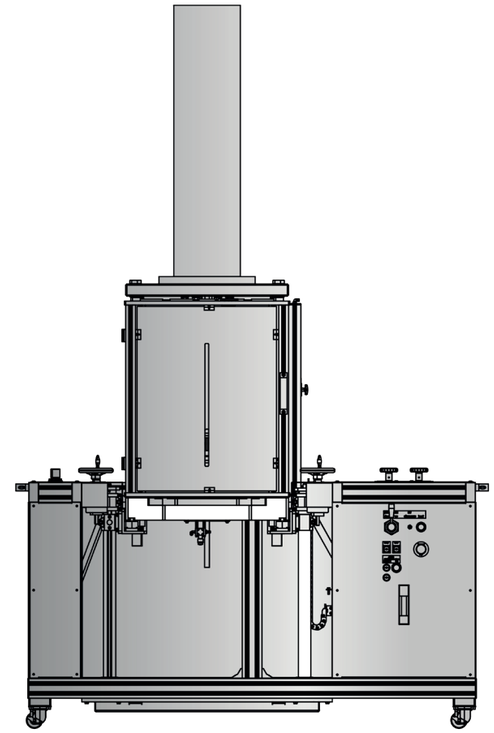

Figure 10: Scheme of the 150 – 300 mm ID MODcol Multipacker Instrument.

With this NEW MODcol Multipacker Instrument 150, 200 and 300 mm ID Spring Columns can be packed with the same analytical-like performance as its smaller counterparts. This NEW MODcol Multipacker Instrument allows the seemless scale-up to full production size column dimensions.

MODCOL MULTIPACKER INSTRUMENTS

FEATURES AND ADVANTAGES

Feature		Advantage
On-site packing instrument for DAC Spring Columns.	→	Self-packing instrument for ultimate flexibility and multiple column use that pays off quickly after packing 8 to 10 Spring Columns vs. re-pack service of Flanged Columns.
Self-contained, mobile unit.	→	Column can be packed anywhere (only a 6 bar air supply is required).
Easy and safe use.	→	Requires very little training to operate and is virtually maintenance-free.
Adjustable packing pressure up to 2000 psi (138 bar), independent from packing speed.	→	Efficiently packs everything from hard spherical silica to soft polymer-based media.
Easy control of media quantity, packing pressure, and speed.	→	Outstanding packing reproducibility for consistently top-performing columns.
Identical technical features from 25 - 300 mm ID.	→	Completely scalable.

Key Features of MODcol Multipacker Instruments

- Easy and safe use.
- Versatile unit for packing various column IDs and unlimited columns.
- Unprecedented safety features.
- Certified by the German TÜV to meet the highest safety requirements.
- Extended lifetime of preparative columns.
- Reliable column packing made easy – no expert knowledge needed.
- Ideal for sensitive media like irregular silica, wide-pore materials, and polymers – thanks to precise control of pressure and speed.
- Low-maintenance design for maximum uptime.
- Small footprint compared to conventional DAC systems.

MODCOL MULTIPACKER INSTRUMENTS

PUBLICATIONS

Publications

C. Orihuela, R. Fronek, L. Miller, D. Honda, J. Murphy, "Unique dynamic axial compression packing system", *Journal of Chromatography A*, Volume 827, Issue 2, 11 December 1998, Pages 193 - 196.

C. Laub, "Reproducible preparative liquid chromatography columns", *Journal of Chromatography A*, Volume 992, Issues 1 - 2 , 11 April 2003, Pages 41 - 45.

T. Q. Yan, C. Orihuela, "Rapid and high throughput separation technologies - Steady state recycling and supercritical fluid chromatography for chiral resolution of pharmaceutical intermediates", *Journal of Chromatography A*, Volume 1156, Issues 1 - 2 , 13 July 2007, Pages 220 - 227.

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Customer Comes First!

We are committed to meeting your needs with our exceptional column packing expertise.

For those who want to experience the full benefits of the Spring Column Technology without the hassle of packing, Dr. Maisch offers prepacked Spring Columns and a Packing Service.

With extensive experience in analytical and preparative column manufacturing, Dr. Maisch is an expert in packing various chromatography media and column dimensions.

We proudly offer a wide selection of in-house silicas and bonded phases, engineered to the highest standards and adaptable to a broad spectrum of applications—including fully customized solutions.

Performance & Reproducibility

At Dr. Maisch, we recognize the critical importance of column-to-column reproducibility. Our expertise in silica engineering ensures consistently high performance across all packed columns, regardless of media or scale. We welcome inquiries for any column packing needs—trust the experts in silica innovation!

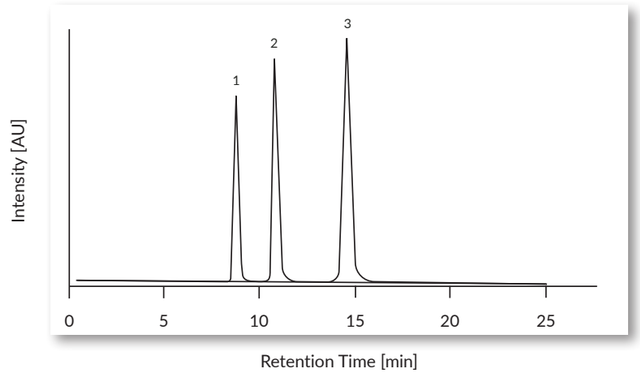
Available Media

- Silica or Polymer-Based Phases.
- Ion Exchange Phases.
- Silica-Based Scavengers.
- Catalysts.
- Other Media.

MODCOL MULTIPACKER INSTRUMENTS
PACKING SERVICE

Examples of different Media packed in MODcol Spring Columns

Vydac 218TBP1015

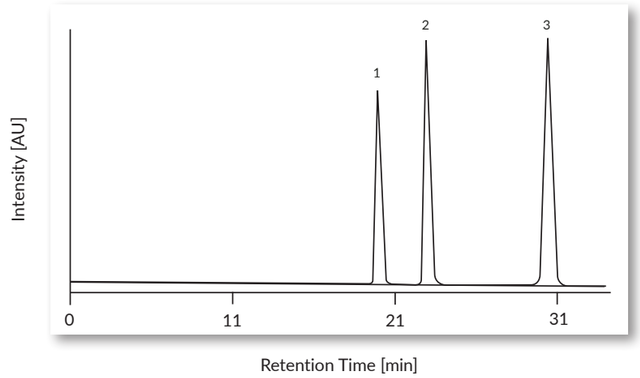


Column:	**Vydac 218TPB1015**
Particle Size:	10 - 15 µm
Pore Size:	300 Å
Dimension:	260 x 50 mm
Mobile Phase:	MeOH/H2O 70:30 (v/v)
Flow Rate:	85 ml/min
Detection:	UV @254 nm

Figure 11: Separation of Toluene, Naphthalene and Biphenyl on Vydac 218TBP1015.

No.	Name	Retention Time [min]	Height [mAU]	Area [mAU·s]	Efficiency [Plates / m]	Asymmetry
1	Toluene	8.77	43.85	733.27	23,319	1.27
2	Naphthalene	10.78	52.67	1140.92	24,142	1.30
3	Biphenyl	14.55	58.12	1770.30	19,331	1.26

Kromasil 100-10-C8

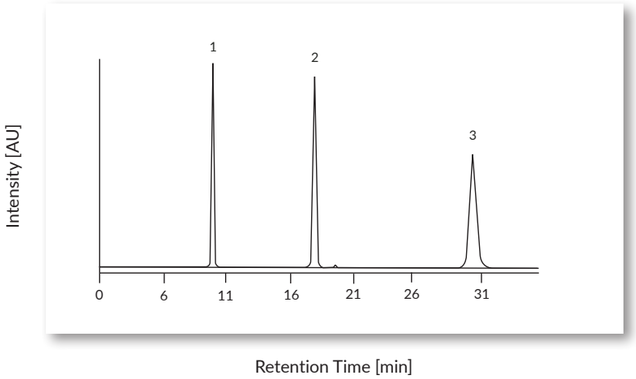


Column:	**Kromasil 100-10-C8**
Particle Size:	10 µm
Pore Size:	100 Å
Dimension:	280 x 101 mm
Mobile Phase:	MeOH/H2O 75:25 (v/v)
Flow Rate:	220 ml/min
Detection:	UV @254 nm

Figure 12: Separation of Toluene, Naphthalene and Biphenyl on Kromasil 100-10-C8.

No.	Name	Retention Time [min]	Height [mAU]	Area [mAU·s]	Efficiency [Plates / m]	Asymmetry
1	Toluene	8.77	13.74	309.71	60,271	1.14
2	Naphthalene	22.83	17.26	448.36	59,243	1.12
3	Biphenyl	30.44	17.68	610.43	60,514	1.05

Davisil 710N Diol



Column: **Davisil 710N Diol**
Particle Size: 10 - 14 µm
Pore Size: 60 Å
Dimension: 340 x 101 mm
Mobile Phase: n-Heptane/IPA 90:10 (v/v)
Flow Rate: 250 ml/min
Detection: UV @254 nm

Figure 13: Separation of Toluene, 2-Chlorophenol and 4-Nitrophenol on Davisil 710N Diol.

No.	Name	Retention Time [min]	Height [mAU]	Area [mAU•s]	Efficiency [Plates / m]	Asymmetry
1	Toluene	9.33	20.71	210.75	45,812	1.25
2	2-Chlorophenol	17.38	19.43	398.86	41,800	1.15
3	4-Nitrophenol	29.81	29.81	469.65	34,026	1.12

Batch Reservation Service

Dr. Maisch fully understands the critical importance of column-to-column reproducibility in both retention time and efficiency. Your requirements are our highest priority. We recognize that modern separation demands call for the highest standards—and meeting those standards is our commitment. To support this, we offer an in-house batch reservation service, ensuring consistent quality, minimized lead times, and the avoidance of batch-to-batch variability.

MODcol Multipacker Instruments

Table 1: Available MODcol Multipacker Instruments.

Part Number (PN)	Description
IM2018-2570CE	MODcol Multipacker Instrument for 25 to 70 mm ID MODcol Spring Columns
IM2018-50150CE	MODcol Multipacker Instrument for 50 to 150 mm ID MODcol Spring Columns
IM2025-150300CE	MODcol Multipacker Instrument for 150 to 300 mm ID MODcol Spring Columns

MODcol Spring Column Hardware

Table 2: Available MODcol Spring Column Hardware.

Part Number (PN)	Description
SC2002-025040	MODcol Spring Column Hardware, Standard, Complete, 400 x 25 mm
SC2002-025070	MODcol Spring Column Hardware, Standard, Complete, 700 x 25 mm
SC2018-030050	MODcol Spring Column Hardware, Standard, Complete, 500 x 30 mm
SC2018-030070	MODcol Spring Column Hardware, Standard, Complete, 700 x 30 mm
SC2018-040050	MODcol Spring Column Hardware, Standard, Complete, 500 x 40 mm
SC2018-040070	MODcol Spring Column Hardware, Standard, Complete, 700 x 40 mm
SC2002-050040	MODcol Spring Column Hardware, Standard, Complete, 400 x 50 mm
SC2002-050070	MODcol Spring Column Hardware, Standard, Complete, 700 x 50 mm
SC2018-070050	MODcol Spring Column Hardware, Standard, Complete, 500 x 70 mm
SC2018-070070	MODcol Spring Column Hardware, Standard, Complete, 700 x 70 mm
SC4CE4-101050	MODcol Spring Column Hardware, Standard, Complete, CE, 500 x 101 mm
SC4CE4-101070	MODcol Spring Column Hardware, Standard, Complete, CE, 700 x 101 mm
SC2018-150050	MODcol Spring Column Hardware, Standard, Complete, CE, 500 x 150 mm
SC2018-150070	MODcol Spring Column Hardware, Standard, Complete, CE, 700 x 150 mm
SC2018-200050	MODcol Spring Column Hardware, Standard, Complete, CE, 500 x 200 mm
SC2018-300050	MODcol Spring Column Hardware, Standard, Complete, CE, 500 x 300 mm

MODcol Spring Column Holders

Table 3: Available MODcol Spring Column Holders.

Part Number (PN)	Description
SC6CE6-HOLDER	MODcol Mobile Column Holder for 101, 150 and 200 mm ID MODcol Spring Columns
SC4CE4-HOLDER	MODcol Mobile Column Holder for 50 and 101 mm ID MODcol Spring Columns

Repack Kits for MODcol Spring Columns

Table 4: Available Repack Kits for MODcol Spring Columns.

Part Number (PN)	Description
AS2002-025A16	Repack Kit for 25 mm ID MODcol Spring Columns with 2 µm Double Density Frits (3 Sets of Parts)
AS2002-025A17	Repack Kit for 25 mm ID MODcol Spring Columns with 5 µm Double Density Frits (3 Sets of Parts)
AS2018-030A16	Repack Kit for 30 mm ID MODcol Spring Columns with 2 µm Frits (3 Sets of Parts)
AS2002-050A18	Repack Kit for 50 mm ID MODcol Spring Columns with 2 µm Double Density Frits (3 Sets of Parts)
AS2002-050A19	Repack Kit for 50 mm ID MODcol Spring Columns with 5 µm Double Density Frits (3 Sets of Parts)
AS2018-070A18	Repack Kit for 70 mm ID MODcol Spring Columns with 2 µm Double Density Frits (3 Sets of Parts)
AS4004-101A20	Repack Kit for 101 mm ID MODcol Spring Columns with 2 µm Double Density Frits (1 Set of Parts)
AS4004-101A21	Repack Kit for 101 mm ID MODcol Spring Columns with 5 µm Double Density Frits (1 Set of Parts)
AS6006-150A21	Repack Kit for 150 mm ID MODcol Spring Columns with 5 µm Double Density Frits (1 Set of Parts)

MODCOL MULTIPACKER INSTRUMENTS
ORDERING INFORMATION

MODcol SFC Spring Column Hardware

Table 5: Available MODcol SFC Spring Column Hardware.

Part Number (PN)	Description
SY2018-025040	MODcol Spring Column Hardware, SFC, Complete, 400 x 25 mm
SY2002-025070	MODcol Spring Column Hardware, SFC, Complete, 700 x 25 mm
SY2025-050040	MODcol Spring Column Hardware, SFC, Complete, 400 x 50 mm
SY2002-050070	MODcol Spring Column Hardware, SFC, Complete, 700 x 50 mm

Repack Kits for MODcol SFC Spring Columns

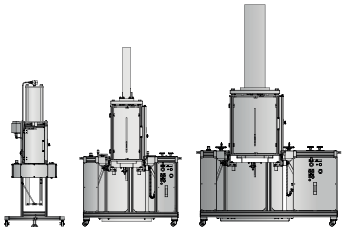
Table 6: Available Repack Kits for MODcol SFC Spring Columns.

Part Number (PN)	Description
AY2002-025A14	Repack Kit for 25 mm ID MODcol SFC Spring Columns with 1 µm Double Density Frits (3 Sets of Parts)
AY2002-050A12	Repack Kit for 50 mm ID MODcol SFC Spring Columns with 1 µm Double Density Frits (3 Sets of Parts)

Dr. Maisch

Any Column, Any Size, Any Media

Distributor:



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