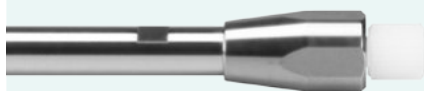


## EC standard columns for analytical HPLC / UHPLC



- Analytical column system manufactured from stainless steel M8 outer threads on both ends combination of sealing element and very fine-meshed stainless steel screen, PTFE ring and fitting adaptor column heads SW 12, with inner threads M8 x 0.75 and UNF 10-32 (= 1/16" connection)
- EC column hardware guarantees pressure stability of 1200 bar - hereby EC columns are suitable for UHPLC applications (ultra fast HPLC) and all modern HPLC systems.
- As screw-on guard column system we recommend the Column Protection System used with EC guard column cartridges with 4 mm length.
- EC guard columns supplied with NUCLEODUR<sup>®</sup>, NUCLEOSIL<sup>®</sup> spherical silicas and NUCLEOSHELL<sup>®</sup> spherical core shell silica particles

### Available standard dimensions of EC columns

| ID     | Length → |       |       |       |        |        |        |        |        |        |
|--------|----------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
|        | 20 mm    | 30 mm | 50 mm | 75 mm | 100 mm | 125 mm | 150 mm | 200 mm | 250 mm | 300 mm |
| 2 mm   | +        | +     | +     | +     | +      | +      | +      | +      | +      | +      |
| 3 mm   | +        | +     | +     | +     | +      | +      | +      | +      | +      | +      |
| 4 mm   | +        | +     | +     | +     | +      | +      | +      | +      | +      | +      |
| 4.6 mm | +        | +     | +     | +     | +      | +      | +      | +      | +      | +      |

Please ask for availability of certain phases.

Note: NUCLEODUR<sup>®</sup> and NUCLEOSHELL<sup>®</sup> column head must not be removed!

### Guard columns for EC columns

| EC column with ID | EC guard column* |
|-------------------|------------------|
| 2 mm              | 4/2              |
| 3 mm              | 4/3              |
| 3 mm              | 4/3              |
| 3 mm              | 4/3              |

Packs of 3 cartridges

\* Information about the Column Protection System on page 251.

For preparative applications MN offers the so-called VarioPrep<sup>®</sup> hardware system, which is described from page 252 on.

## Valco type columns



- Analytical column system manufactured from stainless steel
- Available inner diameters: 4.6 mm ID (1/4" OD) and 7.7 mm (3/8" OD)
- Mainly used for NUCLEOGEN<sup>®</sup> and NUCLEOGEL<sup>®</sup> (see page 226)

### Ordering information

| Description  | Pack of | REF    |
|--|---------|--------|
| <b>Accessories for Valco type columns</b>            |         |        |
| Guard column holder B for VA columns 5 x 3 mm        | 1       | 719539 |
| Guard column holder C for VA guard columns 21 x 4 mm | 1       | 719538 |



## Column Protection System

Innovative and universal guard column holder system



- Suitable for all analytical HPLC columns with 1/16" fittings
- Cartridges filled with special NUCLEODUR®, NUCLEOSIL® and NUCLEOSHELL® HPLC adsorbents
- Ideal protection for your analytical main column → significant increase in column lifetime
- Minimized dead volume → suitable also for ultra-fast HPLC
- Special ferrules → pressure stability up to 1300 bar (18 850 psi)
- Visual contamination check → in-time changing of the guard column
- Suitable guard columns with 4 mm length, 2 mm ID (for main columns with 2 mm ID); 3 mm ID (for main columns with 3, 4 and 4.6 mm), respectively
- UNIVERSAL RP guard columns suitable for all HPLC columns under RP conditions

### Content of the Column Protection System



| Description              | Pack of | REF    |
|--------------------------|---------|--------|
| Guard column holder      | 1       | 718966 |
| Capillaries (0.12 mm ID) | 2       |        |
| Ferrules                 | 3       |        |
| Wrenches                 | 2       |        |
| Manual                   | 1       |        |

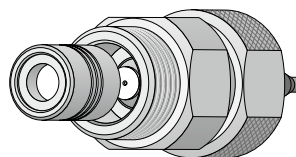
### Ordering information

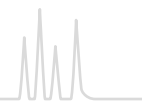
| Description   | Pack of | REF       |
|---|---------|-----------|
| <b>Replacement parts for the Column Protection System</b>                               |         |           |
| Special ferrules made of PEEK   | 5       | 718967    |
| Replacement connector including O-ring  | 1       | 718968    |
| Stainless steel capillaries 0.12 mm ID, nuts and metal ferrules                         | 3       | 718969    |
| Stainless steel capillaries 0.18 mm ID (for higher flow rates), nuts and metal ferrules | 3       | 718971    |
| Wrench (size 12 and 14 mm)  | 1       | 718970    |
| EC 4/2 UNIVERSAL RP guard column (for main columns with 2 mm ID)                        | 3       | 728777.20 |
| EC 4/2 UNIVERSAL RP guard column (for main columns with 2 mm ID), value pack            | 9       | 728778.20 |
| EC 4/3 UNIVERSAL RP guard column (for main columns with 3, 4 and 4.6 mm ID)             | 3       | 728777.30 |
| EC 4/3 UNIVERSAL RP guard column (for main columns with 3, 4 and 4.6 mm ID), value pack | 9       | 728778.30 |

### Visual contamination check

The cartridge is fitted with a special filter membrane:

- If this silver membrane is contaminated (bright or dark discoloration), it is advisable to replace the cartridge.
- If the contaminants are colorless, replace the cartridge if the pressure rises or the chromatographic performance decreases.





## VarioPrep (VP) columns for preparative HPLC



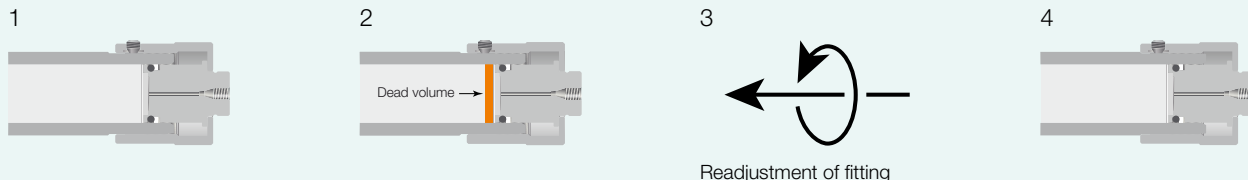
- Column system for preparative HPLC, manufactured from stainless steel with two adjustable end fittings, suitable for frequent use of back-flushing techniques
- Allows compensation of a dead volume, which could occur at the column inlet after some time of operation, without need for opening the column
- Can be packed with all NUCLEODUR® and NUCLEOSIL® spherical silicas

### Available standard dimensions of VarioPrep columns with axially adjustable end fittings

| End fitting design | ID | Length → |        | Length → |       |        |        |        |        |        |
|--------------------|----|----------|--------|----------|-------|--------|--------|--------|--------|--------|
|                    |    | 10* mm   | 15* mm | 50 mm    | 75 mm | 100 mm | 125 mm | 150 mm | 250 mm | 500 mm |
|                    | 8  | +        |        | +        |       | +      | +      | +      | +      |        |
|                    | 10 |          |        | +        |       | +      | +      | +      | +      |        |
|                    | 16 | +        |        | +        |       | +      | +      | +      | +      |        |
|                    | 21 |          |        | +        | +     | +      | +      | +      | +      |        |
|                    | 32 |          | +      |          |       | +      |        | +      | +      |        |
|                    | 40 |          |        | +        |       | +      | +      | +      | +      | +      |
|                    | 50 |          | +      |          |       | +      |        | +      | +      |        |
|                    | 80 |          |        |          |       |        |        |        | +      | +      |

\* 10 x 8, 10 x 16, 15 x 32 and 15 x 50 mm ID columns are used as guard columns and require the respective holders, see page 253.

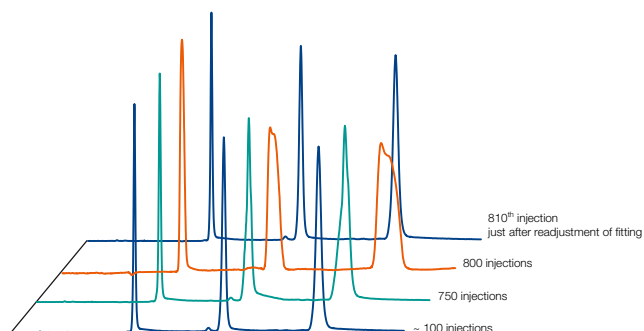
### The VarioPrep principle



VarioPrep columns are produced with highest packing quality and bed density (1). Due to intensive chemical and/or mechanical exposure of the column adsorbent, shrinking of the column bed can occur (2; orange gap). In this even unlikely case readjustment of the VarioPrep

column fitting (3; turning the nut at the column inlet clockwise) will eliminate the emerged dead volume (4). The performance of the VarioPrep column is completely reconstituted and column lifetime is significantly extended.

### Column reconstitution



### Reconstitution of VarioPrep column performance

- Slight peak broadening and deformation after 800 injections under strongly demanding conditions (pH 11; 50 °C; sample in DMSO)
- Readjustment of the column fitting restores column performance and prolongs column lifetime noticeably.



## The improved guard column system for (semi-) preparative HPLC



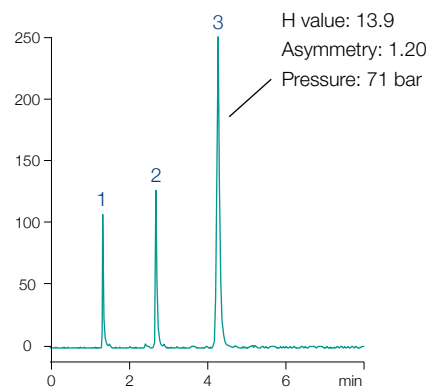
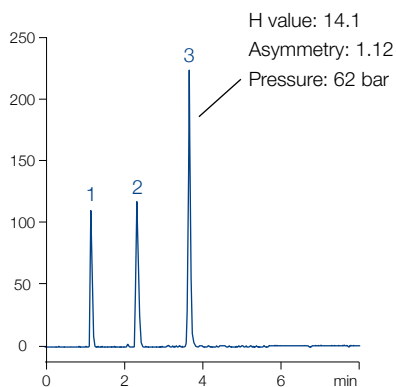
- ① VP 15/32 for 32 and 40 mm ID columns
- ② VP 10/16 for 16 and 21 mm ID columns
- ③ VP 10/8 for 8 and 10 mm ID columns
- ④ VP 15/50 for  $\geq 50$  mm ID columns

- Easy handling and cartridge exchange
- Robust hardware
- Free rotary plunger fittings – low O-ring abrasion
- Cost-efficient cartridges
- Minimally invasive / no disturbance of the separation efficiency of main column
- Low back pressure
- Designed for pressures up to 400 bar

### Column performance without and with guard column

Columns: 125 x 16 mm NUCLEODUR® C<sub>18</sub> HTec, 5  $\mu$ m  
 125 x 16 mm NUCLEODUR® C<sub>18</sub> HTec, 5  $\mu$ m + 10 x 16 mm NUCLEODUR® C<sub>18</sub> HTec guard column  
 Eluent: acetonitrile – water (80:20, v/v)  
 Flow rate: 16 mL/min  
 Temperature: 22 °C

- Peaks:  
 1. Phenol  
 2. Naphthalene  
 3. Anthracene



Using VarioPrep guard columns provides ideal protection of your main column – symmetry, pressure and retention stay almost constant.

### Technical data

• 1/16" thread • free rotary plunger fittings – low O-ring abrasion • stainless steel

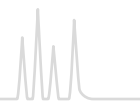
| Guard cartridge | Holder REF | Holder ID | Recommended for column ID | Preferred capillary ID | Typical flow rate |
|-----------------|------------|-----------|---------------------------|------------------------|-------------------|
| VP 10/8         | 718251     | 8 mm      | 8 and 10 mm ID            | 0.17 and 0.25 mm       | 1–12 mL/min       |
| VP 10/16        | 718256     | 16 mm     | 16 and 21 mm ID           | 0.17, 0.25 and 0.5 mm  | 2–32 mL/min       |
| VP 15/32        | 718253     | 32 mm     | 32 and 40 mm ID           | 0.25, 0.5 and 1.0 mm   | 5–150 mL/min      |
| VP 15/50        | 718255     | 50 mm     | $\geq 50$ mm ID           | 0.5 and 1.0 mm         | 20–250 mL/min     |

### Ordering information

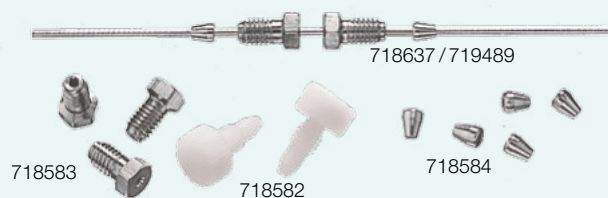
#### Guard column holders for VarioPrep columns

| VP Guard columns for VarioPrep columns with ID → |           | Pack of guard columns | Replacement O-ring (pack of 2) | Holder ID | REF    |
|--|-----------|-----------------------|--------------------------------|-----------|--------|
| 8, 10 mm   | 16, 21 mm |                       |                                |           |        |
| VP 10/8  |           | 2                     | 718975                         | 8 mm      | 718251 |
| VP 10/16   |           | 2                     | 718976                         | 16 mm     | 718256 |
| VP 15/32   |           | 1                     | 718977                         | 32 mm     | 718253 |
| VP 15/50   |           | 1                     | 718978                         | 50 mm     | 718255 |

For REF numbers of individual VP guard column cartridges see respective NUCLEODUR® and NUCLEOSIL® phases.



## Accessories for stainless steel HPLC columns



- Stainless steel columns are most frequently used in HPLC.
- The material is corrosion resistant, pressure stable and easy to work mechanically.

### Ordering information

| Description                                | Pack of | REF    |
|--|---------|--------|
| <b>Capillary accessories</b>               |         |        |
| 1/16" column end caps (plastic)            | 4       | 718582 |
| 1/16" nut for connecting 1/16" capillaries | 5       | 718583 |
| 1/16" ferrule                              | 5       | 718584 |
| <b>Capillary unions</b>                    |         |        |
| Typ 1: 100 mm x 1/16" x 0.25 mm            | 1       | 718637 |
| Typ 2: 100 mm x 1/16" x 0.12 mm            | 1       | 719489 |
| Cutter for 1/16" capillary tubing          | 1       | 706290 |

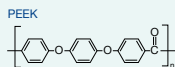
For accessories and replacement parts for EC columns see page 251, for accessories and replacement parts for VarioPrep columns see page 253.



SPE accessories for sample preparation, like e.g., CHROMABOND® vacuum manifolds can be found on page 65.



## PEEK accessories



• PEEK (= polyether ether ketone) is a high performance polymer belonging to the group of polyarylether ketones (PAEK), which meets all requirements of HPLC columns with respect to chemical resistance and mechanical stability. In some fields of application in HPLC like, e.g., in ion chromatography and chromatography of biopolymers, PEEK fulfils the requirements for a nonmetallic material.

• All fittings can be tightened by hand.

### Ordering information

| Description  | Pack of | REF    |
|--|---------|--------|
| <b>PEEK fittings</b>   |         |        |
| 1/16" PEEK fingertight fitting, 1-part combination nut + ferrule | 1       | 718770 |
| 1/16" PEEK fingertight Nut                                       | 1       | 718771 |
| 1/16" PEEK ferrule for REF 718771                                | 1       | 718772 |
| 1/16" PEEK double ferrule  | 1       | 718775 |



|  |   |        |  |
|--|---|--------|--|
| 1/16" PEEK union, both sides inner threads, equipped with 2 fingertight nuts and double ferrules | 1 | 718766 |  |
| 1/16" PEEK union, both sides inner threads, however without nuts and without ferrules            | 1 | 718767 |  |
| 1/16" PEEK union, both sides outer threads   | 1 | 718768 |  |

| AD                               | ID [mm] | Length | Pack of | REF    |
|----------------------------------|---------|--------|---------|--------|
| <b>PEEK standard capillaries</b> |         |        |         |        |
| 1/16"                            | 0.13    | 1 m    | 1       | 718765 |
| 1/16"                            | 0.17    | 1 m    | 1       | 718760 |
| 1/16"                            | 0.25    | 1 m    | 1       | 718761 |
| 1/16"                            | 0.5     | 1 m    | 1       | 718762 |
| 1/16"                            | 0.75    | 1 m    | 1       | 718763 |

| Description | Pack of | REF |
|-------------|---------|-----|
|-------------|---------|-----|

### Tools for PEEK capillaries

|  |   |        |  |
|--|---|--------|--|
| Guillotine cutter for PEEK and PTFE capillaries          | 1 | 718769 |  |
| Clean-Cut cutter for different capillary outer diameters | 1 | 718755 |  |