C190-E219

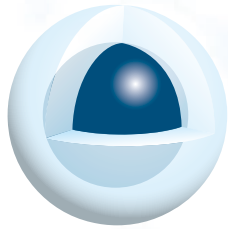
SHIMADZU
Excellence in Science

Maximize LC Separation Performance with Core Shell Technology

Shim-pack Velox LC Columns

Maximize LC Separation Performance with Core Shell Technology

Designed to maximize performance of LC systems, Shimadzu's Shim-pack Velox columns with core shell technology enable you to achieve increased separations and faster analysis times on any LC platform.
Whether developing a high efficiency LC separation method, transferring an existing method for increased throughput while maintaining resolution, or are trying to improve the resolution of a complex separation, Shim-pack Velox columns will satisfy your needs.
Column ruggedness is critical to any LC analysis and Shim-pack Velox core-shell columns deliver excellent column lifetime for even the most challenging sample matrices.



Shim-pack Velox column will deliver

- Increased resolution with maximum efficiency → improving separation and detection
- Faster separation without sacrificing performance → maximizing laboratory productivity and reducing cost of analysis
- Increased sample throughput → reducing overall analysis time
- Superior ruggedness → reducing cost of analysis
- Excellent reproducibility → maintaining analysis and data integrity

Column Selection Guide for Different LC Platforms

Column particle sizes and column volumes affect chromatography results significantly if the column configuration does not match the LC system. As column particle size is reduced, or the column volume (ID and/or the length of the columns) decreases, the necessity for a lower dispersion system is increased.
Choosing the optimal column configuration for your LC system allows you to achieve improved chromatography. The following table summarizes the starting recommendations of column configuration for each LC system.

Prominence Prominence-i plus

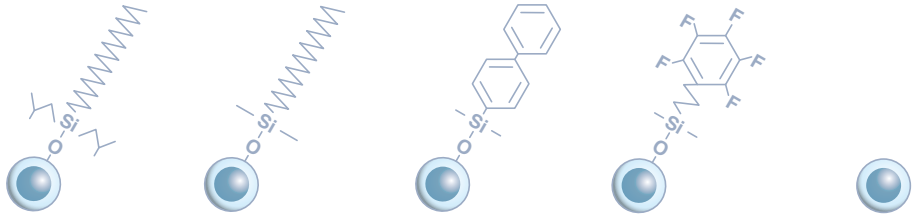
Nexera XR

Nexera-i plus Nexera X2

LC System	HPLC	UHPLC-like	UHPLC
Particle size	2.7 µm & 5 µm	2.7 µm	1.8 µm & 2.7 µm
Column I.D.	4.6 mm (3.0 mm)	3.0 mm (2.1 mm)	2.1 mm
Column Length	100-250 mm	50-100 mm	≤150 mm

Column Chemistries

Combining highly efficient core shell particle technology with a wide range of surface chemistries provides you with the best opportunity for optimal resolution. With different chemistry characteristics, Shim-pack Velox columns are suitable for use in a wide variety of applications and challenging separations.

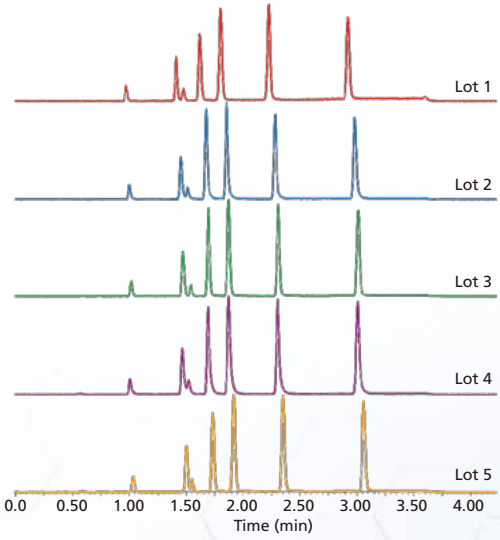


		SP-C18	C18	Biphenyl	PFPP	HILIC
USP Classification		L1	L1	L11	L43	L3
Ligand type		Sterically protected C18	C18	Biphenyl	Pentafluorophenyl propyl	None
Particle Size (µm)		1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	2.7
Pore size (Å)		90	90	90	90	90
Suraface Area	1.8 µm	125 m^2/g	125 m^2/g	125 m^2/g	125 m^2/g	
	2.7 µm	130 m^2/g	130 m^2/g	130 m^2/g	130 m^2/g	130 m^2/g
	5 µm	100 m^2/g	100 m^2/g	100 m^2/g	100 m^2/g	
Carbon Load	1.8 µm	7 %	9 %	7 %	4 %	
	2.7 µm	7 %	7 %	7 %	4 %	N/A
	5 µm	5 %	5 %	5 %	3 %	
End-Cap		No	YES	YES	No	No
pH range		1.0-8.0	2.0-8.0	1.5-8.0	2.0-8.0	2.0-8.0
Max Pressure	1.8 µm	100 MPa*	100 MPa*	100 MPa*	100 MPa*	
	2.7 µm	60 MPa	60 MPa	60 MPa	60 MPa	60 MPa
	5 µm	40 MPa	40 MPa	40 MPa	40 MPa	

* For maximum lifetime, recommended maximum pressure for 1.8 µm particles is 80MPa.

Lot to Lot Reproducibility

We understand that lot to lot consistent performance of columns is required to maximize your laboratory performance. From one lot to the next, every Shim-pack Velox column you purchase will perform consistently.



Compounds (50 ng/mL) :
1. Cortisol
2. 11-Deoxycortisol
3. Estradiol
4. Boldenone
5. Testosterone
6. Androstenedione
7. Progesterone

Column: Shim-pack Velox Biphenyl 2.7 µm, 3.0×100 mm
(P/N: 227-32016-03)
Flow Rate: 0.7 mL/min
Column Temp.: 30 °C
Sample Dilulent: Initial mobile phase
Injection Volume: 5 µL
Mobile Phase A: 0.1 % formic acid in water
Mobile Phase B: 0.1 % formic acid in acetonitrile
Gradient: 40 % B (0 min) → 80 % B (3 min)
→ 40 %B (3.01 min – 5 min)

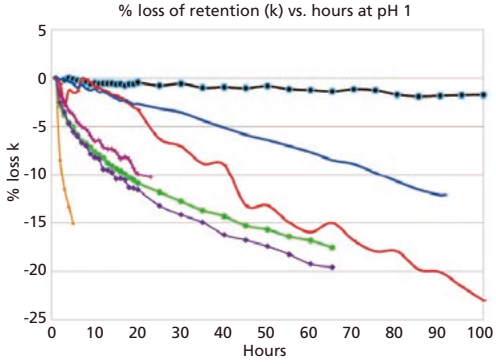
Shim-pack Velox SP-C18

Designed and intended specifically for use under low pH condition, Shim-pack Velox SP (Sterically Protected)-C18 offers a well balanced retention profile with a long life time even under harsh, acidic condition needed for LC/MS(/MS) analysis.

- Sterically protected to resist strongly acidic (pH 1-3) mobile phase condition
- Well balanced retention profile
- Suitable for LC/MS(/MS) analysis

Low pH Stability

Sterically protected ligand provides extended low pH stability for the core shell particle. Shim-pack Velox SP-C18 columns maintain a stable retention profile under strongly acidic mobile phase condition (pH1) .

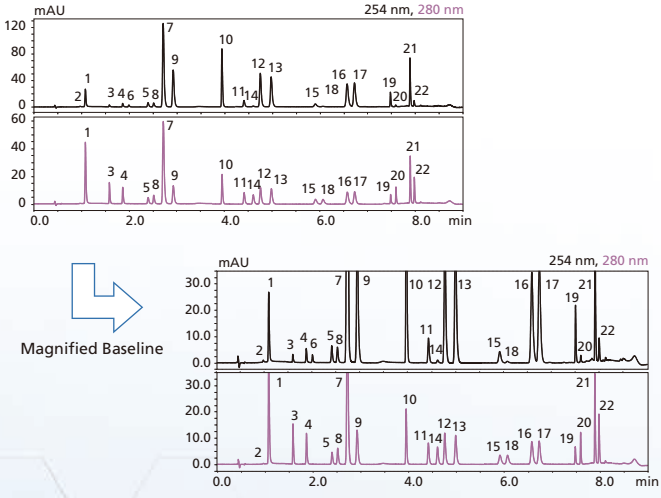


Flow Rate : 0.6 mL/min
Column Temp. : 60 °C
Mobile Phase A : 0.1 % TFA in water
Mobile Phase B : Acetonitrile
Gradient : 45 % B (0 min – 7.5 min) → 5 % B (7.51 min – 50 min)
→100 % B (55 min) → 45 % B (55.01 min → 60 min)

- Shim-pack Velox SP-C18
- Brand A FPP C18
- Brand B FPP C18
- Brand C FPP C18
- Brand D Core-shell C18
- Brand E Core-shell C18
- Brand F Core-shell C18

Simultaneous Analysis of 22 Preservative Agents

More than 20 compounds used as the preservative agent for industrial products like foods and cosmetics can can be separated by Shim-pack Velox SP-C18. The simultaneous determination and quantitation of multiple target compounds are possible in a wide range of commercial product within acceptable analytical times.

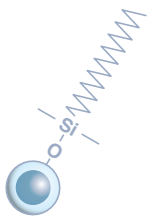


Preservative agents

1 2-methyl-4-Isothiazolin-3-one
2 2-Bromo-2-Nitro-1,3-propanediol
3 Salicylic Acid
4 Isothiazolinones
5 Benzoic Acid
6 Benzyl Alcohol
7 Sorbic Acid
8 2-Phenoxyethanol
9 Methyl Paraben
10 Ethyl Paraben
11 Methyl Benzoate
12 Isopropyl Paraben
13 Propyl Paraben
14 4-Chloro-3-Methylphenol
15 Ethyl Benzoate
16 Isobutyl 4-Hydroxybenzoate
17 Butyl Paraben
18 Chloroxylenol
19 Phenyl Benzoate
20 Clorofene
21 Triclocarban
22 Triclosan

LC Conditions
Column: Shim-pack Velox SP-C18, 2.7 µm, 3.0×100 mm (PN: 227-32004-03)
Flow Rate: 1.0 mL/min
Column Temp.: 45 °C
Mobile Phase A: NaH_2PO_4 aq. (25 mM, pH3.8)
Mobile Phase B: MeOH/ACN = 9/1
Gradient: 8 %B (0 min)→30 % B (0.7 min – 2.7 min)→47 % B (2.71 min – 5min)→52 % B (6 min)→80 %B (7 min – 8 min) → 8 %B (9.01 min -10 min)
Injection Volume: 1 µL
Conc.: 50 mg/L

Shim-pack Velox C18



Shim-pack Velox C18 is a traditional end-capped C18-bonded phase which offers the highest hydrophobic retention of any Shim-pack Velox phases and is applicable to a wide range of applications such as pharmaceutical, food, environmental and clinical and neutrals at moderately low and mid-range pH.

- General purpose column for reversed-phase chromatography
- Highest hydrophobic retention among Shim-pack Velox series
- Compatible with moderately acidic to neutral mobile phases (pH 2-8)

Method Transfer for Cyanocobalamin Analysis within the USP Allowable Adjustment

The assay of cyanocobalamin (a synthetic form of vitamin B12) with 5 µm fully-porous ODS column described in the USP monograph is transferred to a new method with Shim-pack Velox C18 2.7 µm column, within USP allowable adjustments. Analytical time and solvent consumption can be saved with transferred methods while meeting the requirements of system suitability.

USP requirement of Chromatography <621>

When the column size is changed, the following conditions should be met;

1) *L*/*dp* ratio: within -25 % to +50 %

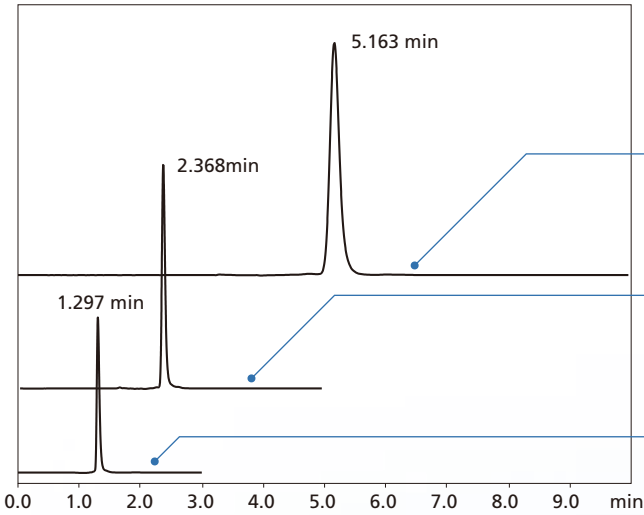
or

Number of theoretical plates (*N*): within -25 % to +50 % (For SPP)

2) Flow rate: *Based on particle size and internal diameter and ±50%

$$* F_2 = F_1 \times \frac{dc_2^2 \times dp_1}{dc_1^2 \times dp_2}$$

L : Column length
dp : Particle size
F : Flow rate
dc : Internal diameter of the column



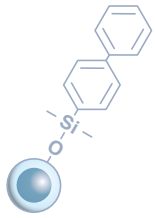
Original Method
Shim-pack VP-ODS (5 µm, 4.6×150 mm)
Flow rate: 0.5 mL/min
Injection Volume: 100 µL
Column temperature: 25 °C
Detection: UV 361 nm

Faster Method
Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate: 0.50 mL/min
Injection Volume: 67 µL
Column temperature: 25 °C
Detection: UV 361 nm

Optimized Method
Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate: 0.93 mL/min
Injection Volume: 67 µL
Column temperature: 25 °C
Detection: UV 361 nm

Column	*L*/*dp*	Flow rate (mL/min)	*N*	System suitability test result (Requirement: %RSD < 2.0 %)
VP-ODS (5 µm, 4.6×150 mm)	30,000	0.50	5,244	tR: 0.025 % Area: 0.175 % (n=6)
Velox C18 (2.7 µm, 4.6×100 mm)	37,037 (+23 %)	0.50	9,497 (+81 %)	tR: 0.035 % Area: 0.103 % (n=6)
		0.93	4,466 (-15 %)	tR: 0.084 % Area: 0.220 % (n=6)

Shim-pack Velox Biphenyl

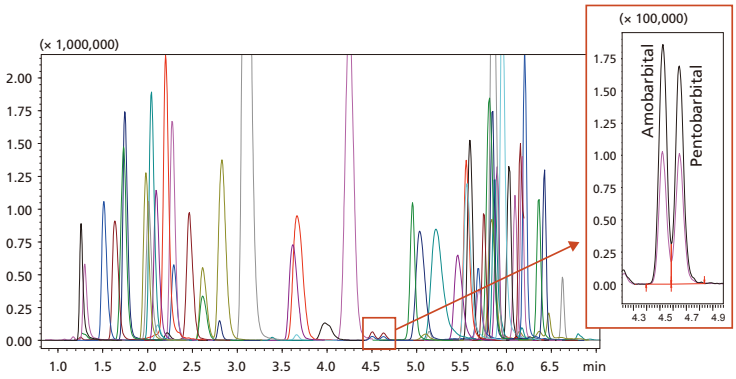


Shim-pack Velox Biphenyl provides enhanced retention of aromatic compounds. It is useful for fast separations in bioanalytical applications due to the increased retention of early eluting analytes such as dipolar, unsaturated and conjugated analytes.

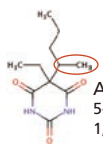
- Complementary selectivity to alkyl phases
- Enhanced separation of aromatic compounds
- Ideal for increasing sensitivity and selectivity in LC/MS(/MS) analysis

Separating the Structural Isomers

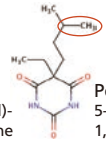
Even under the condition where 56 drugs of abuse and metabolites in human urine are quantitated within 10 minutes, two structural isomers, amobarmital and pentobarbital, which have been historically difficult to separate due to their similarity in chemical structures, could be relatively well resolved with shim-pack Velox Biphenyl column.



Chromatogram of 56 compounds in human urine spiked at the cut off concentration



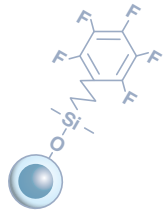
Amobarbital
5-ethyl-5-(3-methylbutyl)-1,3-diazinane-2,4,6-trione



Pentobarbital
5-ethyl-5-pentan-2-yl-1,3-diazinane-2,4,6-trione

System: Nexera UHPLC System / LCMS-8050
Column: Shim-pack Velox Biphenyl 2.7 µm, 2.1 mm × 100 mm
(PN: 227-32015-03)
Column Temp.: 30 °C
Flow Rate: 0.5 mL/min
Mobile Phase A: 0.15 mM ammonium fluoride in water
Mobile Phase B: Methanol
Gradient: 20 % B (0 min) → 48 % B (1.5 min) → 53 % B (4 min)
→ 100 %B (6 min - 7.5 min) → 20 % B (7.51 min - 9.5 min)
Sample preparation:
Enzymatically hydrolyzed human urine was spiked with target compounds between 10 - 1000 % of the required cut off concentration. Samples were subsequently diluted 5x with 0.1 % formic acid.

Shim-pack Velox PFPP

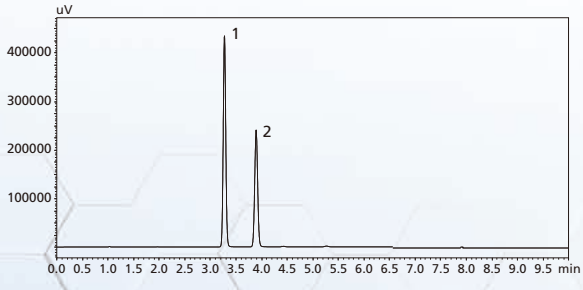


Shim-pack Velox PFPP (Pentafluorophenylpropyl) provides an alternative selectivity to C18 columns and is suitable for the analysis of halogenated compounds, positional isomers and charged bases.

- Alternative selectivity to C18 columns
- Suitable for positional isomers and halogenated compounds
- Offers increased retention for charged bases

Good Separation of Cis / Trans Stilbene

Cis and trans isomers of stilbene that are difficult to resolve with an ODS column due to their similarity in hydrophobicity can be well separated with Shim-pack Velox PFPP column.



1. *cis*-Stilbene

2. *trans*-Stilbene

LC Conditions
Column: Shim-pack Velox PFPP, 2.7 µm, 3.0×100 mm (PN: 227-32022-04)
Column Temp.: 40 °C
Flow Rate : 0.4 mL/min
Mobile Phase : Methanol/Water = 9/1
Detection : UV 254 nm
Sample: 1. cis-Stilbene, 2. trans-Stilbene
Injection Volume : 1 µL

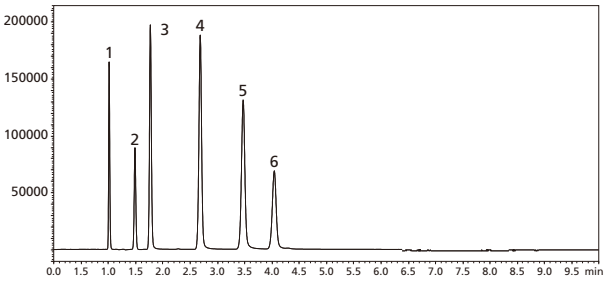
Shim-pack Velox HILIC

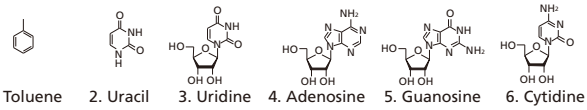
Hydrophilic interaction chromatography (HILIC) is an increasingly popular separation mode that can be used to improve the retention of challenging polar analytes. Shim-pack Velox HILIC using unbonded core shell particles is specifically designed for this application.

- Orthogonal selectivity to reversed phase chromatography
- Increased retention of polar analytes
- Increased MS sensitivity
- Direct compatibility with sample preparation eluates

Retention of Nucleosides

Nucleosides are polar molecules that are not well retained on reversed phase LC columns due to their hydrophilic nature are well retained and separated with Shim-pack Velox HILIC column.





1. Toluene 2. Uracil 3. Uridine 4. Adenosine 5. Guanosine 6. Cytidine

LC Conditions
Column: Shim-pack Velox HILIC, 2.7 µm, 3.0×100 mm (PN: 227-32026-02)
Column Temp.: 30℃
Flow Rate : 0.4 mL/min
Mobile Phase : Acetonitrile/20mM $AcONH_4$aq.=9/1
Detection : UV 254 nm
Sample1. Toluene, 2. Uracil, 3. Uridine, 4. Adenosine, 5. Guanosine, 6. Cytidine
Injection Volume : 1 µL

Ordering Information

Shim-pack Velox 1.8 µm Columns

Chemistry	SP-C18		C18		Biphenyl		PFPP	
ID(mm) / Length(mm)	2.1	3.0	2.1	3.0	2.1	3.0	2.1	3.0
30	227-32001-01	–	227-32007-01	–	227-32013-01	–	227-32019-01	–
50	227-32001-02	227-32002-01	227-32007-02	227-32008-01	227-32013-02	227-32014-01	227-32019-02	227-32020-01
100	227-32001-03	227-32002-02	227-32007-03	227-32008-02	227-32013-03	227-32014-02	227-32019-03	227-32020-02
150	227-32001-04	–	227-32007-04	–	227-32013-04	–	227-32019-04	–

Shim-pack Velox 2.7 µm Columns

Chemistry	SP-C18			C18			Biphenyl		
ID(mm) / Length(mm)	2.1	3.0	4.6	2.1	3.0	4.6	2.1	3.0	4.6
30	227-32003-01	227-32004-01	227-32005-01	227-32009-01	227-32010-01	227-32011-01	227-32015-01	227-32016-01	227-32017-01
50	227-32003-02	227-32004-02	227-32005-02	227-32009-02	227-32010-02	227-32011-02	227-32015-02	227-32016-02	227-32017-02
100	227-32003-03	227-32004-03	227-32005-03	227-32009-03	227-32010-03	227-32011-03	227-32015-03	227-32016-03	227-32017-03
150	227-32003-04	227-32004-04	227-32005-04	227-32009-04	227-32010-04	227-32011-04	227-32015-04	227-32016-04	227-32017-04

Chemistry	PFPP			HILIC		
ID(mm) / Length(mm)	2.1	3.0	4.6	2.1	3.0	4.6
30	227-32021-01	227-32022-01	227-32023-01	227-32025-01	–	–
50	227-32021-02	227-32022-02	227-32023-02	227-32025-02	227-32026-01	227-32027-01
100	227-32021-03	227-32022-03	227-32023-03	227-32025-03	227-32026-02	227-32027-02
150	227-32021-04	227-32022-04	227-32023-04	227-32025-04	227-32026-03	227-32027-03

Ordering Information

Shim-pack Velox 5 µm Columns

Chemistry	SP-C18	C18	Biphenyl	PFPP
Length(mm) \ ID(mm)	4.6			
50	227-32006-01	227-32012-01	227-32018-01	227-32024-01
100	227-32006-02	227-32012-02	227-32018-02	227-32024-02
150	227-32006-03	227-32012-03	227-32018-03	227-32024-03
250	227-32006-04	227-32012-04	227-32018-04	227-32024-04

Shim-pack Velox EXP Guard Column Cartridge (3 pk)

Type	UHPLC				2.7 µm				
ID (mm)	SP-C18	C18	Biphenyl	PFPP	SP-C18	C18	Biphenyl	PFPP	HILIC
2.1	227-32028-01	227-32031-01	227-32034-01	227-32037-01	227-32029-01	227-32032-01	227-32035-01	227-32038-01	227-32040-01
3.0	227-32028-02	227-32031-02	227-32034-02	227-32037-02	227-32029-02	227-32032-02	227-32035-02	227-32038-02	227-32040-02
4.6	–	–	–	–	227-32029-03	227-32032-03	227-32035-03	227-32038-03	227-32040-03

Type	5 µm			
ID (mm)	SP-C18	C18	Biphenyl	PFPP
4.6	227-32030-01	227-32033-01	227-32036-01	227-32039-01

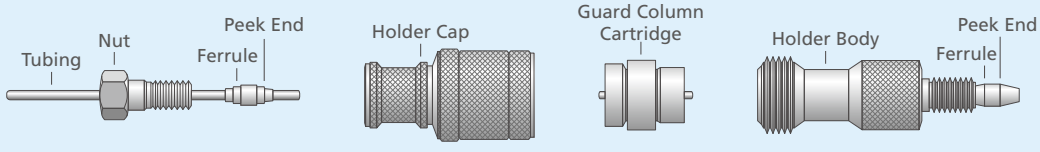
＊Shim-pack Velox EXP Direct Connect Holder : 227-32041-01

Shim-pack Velox UHPLC Precolumn Filter (0.2 µm)

Part No. 1 pack	227-32042-01
Part No. 5 pack	227-32042-02
Part No. 10 pack	227-32042-03

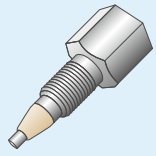
Shim-pack Velox EXP Guard Column

Free-turning architecture lets you change cartridges by hand without breaking inlet / outlet fluid connections — no tools needed.
Guard column cartridges require Shim-pack Velox EXP Direct Connect Holder (227-32041-01)



Shim-pack Velox UHPLC Precolumn Filter (0.2 µm)

To minimize extra column volume and maximize UHPLC sample throughput with SPE, SLE, or other sample preparation techniques, pair 1.8 µm Shim-pack Velox UHPLC columns with an Shim-pack Velox UHPLC Precolumn filter instead of a guard cartridge.



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