

Restek LC Accessories

Restek LC Guard Column Selector: How to Find the Right Guard Fast



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Restek LC Guard Column Selector: How to Find the Right Guard Fast

Using an LC guard column is a quick, cost-effective way to maximize the lifetime of your analytical column. Guards consist of a holder and cartridge (and sometimes a filter) and install easily in front of the analytical column in order to protect it from strongly retained impurities and particulates. Guard columns are just like analytical columns, except they are shorter and are intended to be a consumable part with a limited lifetime. Understanding how to choose an LC guard column correctly can help you protect your analytical column and save money by extending analytical column lifetime.

Restek offers three guard column configurations—EXP, Roc, and Trident (direct and in-line)—that are each designed to match one of our LC column families and are intended for a specific technique. For example, if you're performing UHPLC, you are using a smaller particle column that generates high back pressure, so you need a holder to accommodate that pressure. If you're employing traditional HPLC using a legacy column, you want a holder that houses a legacy cartridge to match.

Step 1: Choose a LC Guard System Based on Your Technique and Analytical Column

EXP Holders and Cartridges

- Holder is compatible with all HPLC through UHPLC instruments and cartridges (rated to 20,000 psi [1400+ bar]).
- Choose the LC guard cartridge that matches your needs (Raptor: UHPLC, 2.7 μm , 5 μm ; Force: 3 μm and 5 μm).
- Designed for use with Raptor and Force LC columns.

Roc Holders and Cartridges

- Compatible with traditional HPLC instrumentation.
- Designed for use with Roc HPLC columns.

Trident Direct Holders and Cartridges

- Compatible with traditional HPLC instrumentation.
- Designed for use with legacy HPLC columns (Ultra, Pinnacle II, Pinnacle DB, Allure, Viva).
- Available in three levels of protection.

Trident In-Line Holders and Cartridges

- Compatible with traditional HPLC instrumentation.
- Designed for use with legacy HPLC columns (Ultra, Pinnacle II, Pinnacle DB, Allure, Viva).
- Requires a coupler to attach to the analytical column.



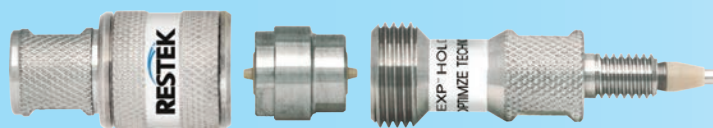
While a guard cartridge is the best choice for analytical column protection, it will add some retention delay because it is a packed bed. For protection from particulates with a negligible amount of additional dead volume, choose an UltraLine in-line filter or an UltraShield filter, both of which are suitable for UHPLC pressures.

Once you know which guard column system you need, the next step is choosing an LC guard cartridge with the packing and dimensions that best match your analytical column. In order to obtain maximum protection without compromising selectivity or efficiency, you should select an LC guard cartridge that contains the same packing material—both stationary phase and silica—as your analytical column. For example, the best LC guard column to use with a Raptor Biphenyl 2.7 μm analytical column is a Raptor Biphenyl 2.7 μm guard cartridge.



In addition to choosing a guard cartridge packing that matches your analytical column, you need to select an LC guard cartridge with the correct inner diameter (ID). A good general rule is that the LC guard column cartridge ID should be the same as, or one size smaller than, the ID of the analytical column. So, a 4.0 mm ID guard cartridge should be used with a 4.6 or 4.0 mm ID analytical column, while a 2.1 mm ID guard cartridge is recommended for 3.2, 3.0, and 2.1 mm ID analytical columns.

Step 2: Choose an LC Guard Cartridge Packing that Matches the Analytical Column

EXP Holders



- Raptor Guard Cartridges
- Force Guard Cartridges
- UltraShield Filters

LC Column Family	Column Particle Size	Analytical Column Phases	Guard Cartridge Phases
	1.8 (UHPLC)	C18, ARC-18, Biphenyl, FluoroPhenyl	Raptor UHPLC: C18, ARC-18, Biphenyl, FluoroPhenyl
	2.7	C18, ARC-18, Biphenyl, FluoroPhenyl, HILIC-Si, EtG/ETS*	Raptor 2.7 µm: C18, ARC-18, Biphenyl, FluoroPhenyl, HILIC-Si
	5	C18, ARC-18, Biphenyl, FluoroPhenyl	Raptor 5 µm: C18, ARC-18, Biphenyl, FluoroPhenyl
	1.8 (UHPLC)	C18, Biphenyl, FluoroPhenyl	Raptor UHPLC guard cartridge in matching phase for maximum protection, or 0.2 µm UltraShield filter for clean samples when minimal dead volume is desired**
	3	C18, Biphenyl, FluoroPhenyl	Force 5 µm guards: C18, Biphenyl, FluoroPhenyl
	5	C18, Biphenyl, FluoroPhenyl	Force 5 µm guards: C18, Biphenyl, FluoroPhenyl


*Restek recommends using a 0.2 µm UltraShield filter with a Raptor EtG/EtS column.

**Raptor UHPLC cartridges are packed with Raptor particles, but they are compatible with any UHPLC column so they can be used with matching phases of 1.8 µm Force and 1.9 µm Pinnacle DB UHPLC columns.

ROC Holders



- Roc Guard Cartridges

Column Family	Column Particle Size	Column Phases	Guard Cartridge Phases
	3	C18, C8, Phenyl-Hexyl, Cyano, Silica	Roc 5 µm guards: C18, C8, Phenyl-Hexyl, Cyano, Silica
	5	C18, C8, Phenyl-Hexyl, Cyano, Silica	Roc 5 µm guards: C18, C8, Phenyl-Hexyl, Cyano, Silica

Trident Holders



- Ultra Guard Cartridges
- Pinnacle DB Guard Cartridges
- Pinnacle II Guard Cartridges
- Viva Guard Cartridges
- Allure Guard Cartridges

Column Family	Column Particle Size	Column Phases	Guard Cartridge Phases
Ultra	3	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate
	5	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate	C18, C8, C4, C1, Biphenyl, Aromax, Aqueous C18, PFP Propyl, Cyano, IBD, Amino, Silica, Quat, Carbamate
Pinnacle DB	1.9	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, IBD, Silica, PAH	Raptor UHPLC guard cartridge in matching phase for maximum protection, or 0.2 μ m UltraShield filter for clean samples when minimal dead volume is desired**
	3	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Silica	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Silica
	5	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, Silica	C18, C8, Biphenyl, Aqueous C18, PFP Propyl, Cyano, Silica
Pinnacle II	4	PAH	Pinnacle II 4 μ m guards: PAH
Viva	3	C18	Viva 5 μ m guards: C18
	3	C18, C8, C4, Biphenyl, PFP Propyl, Silica	Viva 5 μ m guards: C18, C8, C4, Biphenyl, PFP Propyl, Silica
Allure	5	Organic Acids, AK, Silica	Allure 5 μ m guards: Organic Acids, AK, Silica

**Raptor UHPLC cartridges are packed with Raptor particles, but they are compatible with any UHPLC column so they can be used with matching phases of 1.8 μ m Force and 1.9 μ m Pinnacle DB UHPLC columns.

Note: Trident direct holders are available in three configurations, so you can select the level of protection that is best for your application. For more details, review our Trident brochure. Trident in-line filters are also available.



UltraLine UHPLC In-Line Filter

- In-line design installs easily with standard fittings.
- Cost-effective protection for UHPLC systems.
- Reliable way to extend column lifetime.
- Leak tight to 15,000 psi (1,034 bar).
- Replaceable 0.5 µm stainless steel frit in stainless steel body.

Specifications:

Inlet/Outlet: Female/Female 10-32
 Port Geometry: Parker (1/16 CPI)
 Material: Stainless steel housing
 Filter: 0.5 µm stainless steel, 0.125" W x 0.062" T, 5 µL volume
 Pressure Rating: 15,000 psig (1,034 bar)
 Wrench Flat: 3/8"

Description	qty.	cat.#
UltraLine UHPLC In-Line Filter (In-Line Assembly with Filter)	ea.	24993
UltraLine Replacement Filters	5-pk.	24994

UltraShield UHPLC PreColumn Filter

- Cost-effective protection for UHPLC systems.
- Reliable way to filter out particulates and extend column lifetime.
- Minimize extra column volume and maximize UHPLC sample throughput vs. guard cartridges.
- Universal fit—connects easily to any brand column.
- Leak tight to 15,000 psi (1,034 bar).
- 0.5 µm or 0.2 µm stainless steel frit in a stainless steel body with PEEK ferrule.



Specifications:

Inlet/Outlet: Female/Male 10-32
 Port Geometry: Parker (1/16 CPI)
 Material: stainless steel, PEEK ferrule
 Filter: 0.5 µm or 0.2 µm stainless steel
 Pressure Rating: 15,000 psig (1,034 bar)
 Wrench Flat: 5/16"

Description	Filter Porosity	qty.	cat.#
UltraShield UHPLC PreColumn Filter	0.5 µm frit	ea.	24995
		5-pk.	24996
		10-pk.	24997
UltraShield UHPLC PreColumn Filter	0.2 µm frit	ea.	25809
		5-pk.	25810
		10-pk.	25811

EXP Holders and Cartridges

- Free-Turn architecture lets you change cartridges by hand without breaking inlet/outlet fluid connections—no tools needed.
- Patented titanium hybrid ferrules can be installed repeatedly without compromising high-pressure seal.
- Auto-adjusting design provides ZDV (zero dead volume) connection to any 10-32 female port.

To help protect your investment and further extend the life of our already-rugged LC columns, Restek offers the patent-pending guard column hardware developed by Optimize Technologies. A Restek LC guard cartridge in an EXP direct connect holder is the ultimate in column protection, especially when using dilute-and-shoot or other limited-sample preparation techniques.



EXP Direct Connect Holder

- EXP direct connect holder requires separate guard column cartridges; available from Restek in 2.1, 3.0, and 4.6 mm.

Description	qty.	cat.#
EXP Direct Connect Holder for EXP Guard Cartridges (includes hex-head fitting & 2 ferrules)	ea.	25808

Maximum holder pressure: 20,000 psi (1,400 bar)

Raptor EXP Guard Column Cartridges

Description	Particle Size	qty.	5 x 2.1 mm	5 x 3.0 mm	5 x 4.6 mm
			cat.#	cat.#	cat.#
Raptor C18 EXP Guard Column Cartridge	UHPLC	3-pk.	9304U0252	9304U0253	
Raptor C18 EXP Guard Column Cartridge	2.7 μm	3-pk.	9304A0252	9304A0253	9304A0250
Raptor C18 EXP Guard Column Cartridge	5 μm	3-pk.	930450252	930450253	930450250
Raptor ARC-18 EXP Guard Column Cartridge	UHPLC	3-pk.	9314U0252	9314U0253	
Raptor ARC-18 EXP Guard Column Cartridge	2.7 μm	3-pk.	9314A0252	9314A0253	9314A0250
Raptor ARC-18 EXP Guard Column Cartridge	5 μm	3-pk.	931450252	931450253	931450250
Raptor Biphenyl EXP Guard Column Cartridge	UHPLC	3-pk.	9309U0252	9309U0253	
Raptor Biphenyl EXP Guard Column Cartridge	2.7 μm	3-pk.	9309A0252	9309A0253	9309A0250
Raptor Biphenyl EXP Guard Column Cartridge	5 μm	3-pk.	930950252	930950253	930950250
Raptor FluoroPhenyl EXP Guard Column Cartridge	UHPLC	3-pk.	9319U0252	9319U0253	
Raptor FluoroPhenyl EXP Guard Column Cartridges	2.7 μm	3-pk.	9319A0252	9319A0253	9319A0250
Raptor FluoroPhenyl EXP Guard Column Cartridges	5 μm	3-pk.	931950252	931950253	931950250
Raptor HILIC-Si EXP Guard Column Cartridge	2.7 μm	3-pk.	9310A0252	9310A0253	9310A0250

Maximum cartridge pressure: 1,034 bar/15,000 psi* (UHPLC); 600 bar/8,700 psi (2.7 μm); 400 bar/5,800 psi (5 μm)

* For maximum lifetime, recommended maximum pressure for UHPLC particles is 830 bar/12,000 psi.

Force EXP Guard Column Cartridges

Description	qty.	5 x 2.1 mm	5 x 3.0 mm	5 x 4.6 mm
		cat.#	cat.#	cat.#
Force Biphenyl EXP Guard Column Cartridge	3-pk.	962950252	962950253	962950250
Force C18 EXP Guard Column Cartridge	3-pk.	963450252	963450253	963450250
Force FluoroPhenyl EXP Guard Column Cartridge	3-pk.	963950252	963950253	963950250

Maximum cartridge pressure: 600 bar/8,700 psi.

Hybrid Ferrule U.S. Patent No. 8201854, EXP Holders U.S. Patent No. 8696902, EXP2 Wrench U.S. Patent No. D766055. Other U.S. and Foreign Patents Pending. The EXP, Free-Turn, and the Opti- prefix are registered trademarks of Optimize Technologies, Inc.



← Hand-Tight Fitting—No Tools Needed!

← Unidirectional Raptor EXP Guard Column Cartridge

← Holder Body





Roc LC Guard Column Holder

- Protect your Roc LC columns with minimal effect on retention, peak shape, or efficiency.
- Requires separate guard column cartridges (available from Restek).

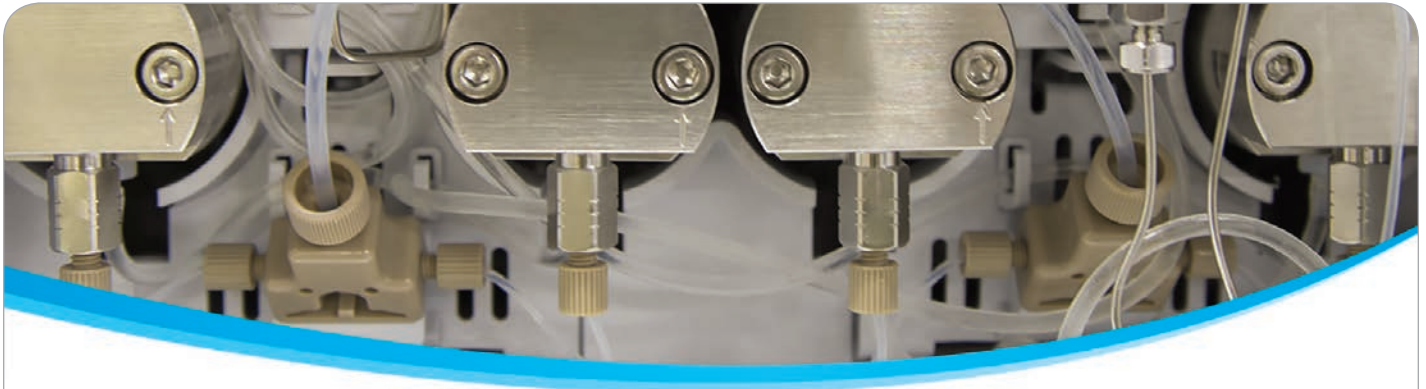
Description	qty.	cat.#
Roc LC Guard Column Holder for 10 x 4.0 mm Roc Guard Cartridges	ea.	25812



Roc LC Guard Column Cartridges

- Protect your Roc LC columns with minimal effect on retention, peak shape, or efficiency.

Description	qty.	10 x 4.0 mm cat.#
Roc C8 Guard Cartridge	3-pk.	953350210
Roc C18 Guard Cartridge	3-pk.	953450210
Roc Cyano Guard Cartridge	3-pk.	953650210
Roc Phenyl-Hexyl Guard Cartridge	3-pk.	953550210
Roc Silica Guard Cartridge	3-pk.	953050210



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Restek is a 100% employee-owned company and the last major independent provider of chromatography supplies in the industry. We proudly work with every analyst to keep any make or model of LC up and running its best, and our line of 100% guaranteed LC instrument replacement parts meets and often exceeds the original instrument manufacturer's performance. For seals, valves, lamps, and many more OEM-equivalent supplies, visit www.restek.com/LCacc

Trident LC Column Protection System

Redesigned to be more rugged and easier to use!

- Match your needs with three levels of protection: filter only, cartridge only, or filter and cartridge.
- Durable metal tip with replaceable PEEK ferrule means easy installation onto column without tools.
- Improved thread design and materials create an optimal seal that releases and reseals easily, allowing multiple installations without galling and binding.
- Easy-to-remove cap frit simplifies filter replacement.
- Direct connection eliminates tubing and connectors that increase system volume and leak potential.
- Low-dead-volume design has negligible effect on chromatography.

Unlike “one size fits all” guard systems, the Trident LC column protection system gives you the power to select just the right level of protection for your work. With three levels of protection and a variety of guard cartridges and cap frits, you can select the best combination to match your specific analytical needs. Choose a filter alone to remove particulate matter, a guard cartridge alone to remove irreversibly adsorbed compounds, or both a filter and a guard cartridge for maximum protection. The economical, leak-free design provides a highly versatile combination of convenience, economy, and reliability.

The foundation of the Trident LC column protection system is a reusable direct connect holder that easily attaches to any HPLC column with standard 10-32 thread ports.* The holder’s durable metal tip and replaceable PEEK ferrule allow a leak-tight seal onto the column to be made quickly and easily without tools. Guard cartridges are available in both 2.1 and 4.0 mm IDs, and the redesigned holder houses either size securely. Because the holder components are machined from specialized materials that will not gall or bind, an optimal seal is created that will withstand rigorous repeated use when installed according to instructions. The holder has also been designed for easy removal of the cap frit, allowing you to replace the cap frit filter in just seconds.

Finally, since the Trident LC column protection system is engineered to be exceptionally low dead volume, it has minimal effect on retention, peak shape, and efficiency. Protect your analytical column and preserve method chromatography with a Trident LC column protection system.



Description	qty.	cat.#	qty.	cat.#
Level 1: Filter Holder Only Includes: filter holder; cap frit filter (4 mm, 2.0 µm); and PEEK ferrule	ea.	27470	4-pk.	27471
Level 2: Cartridge Holder Only Includes: cartridge holder and PEEK ferrule	ea.	27472	4-pk.	27473
Level 3: Filter Holder and Cartridge Holder Power Pack Includes: filter holder; cap frit filter (4 mm, 2.0 µm); cartridge holder; and PEEK ferrule	ea.	27474	4-pk.	27475

* Fittings on all LC columns have 10-32 threads; however, seat depth varies. An improper seat will yield a poor connection and may affect chromatography. While all Restek LC columns will provide a zero-dead-volume connection when used with a properly installed Trident LC column protection system, analysts should consult the manufacturer for non-Restek column connections. A detailed discussion about port configurations can be found at www.restek.com/Pages/faq_lc

Trident HPLC In-Line Guard Cartridge Holders

A Trident in-line guard cartridge holder can be used with almost any HPLC column by connecting it with a short piece of 1/16" tubing, appropriate nuts and ferrules, or finger-tight fittings. The system can be used with Restek columns, or with columns from other manufacturers. Holders are available for 10 mm guard cartridges. Purchase with or without a prefilter, which provides added protection against the particles that can shorten the lifetime of the guard cartridge.



Description	qty.	cat.#
Holder for 10 mm guard cartridge	ea.	25021
Holder with filter for 10 mm guard cartridge	ea.	25040
Frit-Type In-Line Filter, 2.0 µm	ea.	25041
Replacement Cap Frit Filters: 4 mm 2.0 µm**	5-pk.	25022
Replacement Cap Frit Filters: 4 mm 0.5 µm	5-pk.	25023
Replacement Cap Frit Filters: 2 mm 2.0 µm**	5-pk.	25057
Replacement Cap Frit Filters: 2 mm 0.5 µm	5-pk.	25990

**Standard porosity.

Ultra Guard Cartridges

Particle size: 5 µm spherical

Pore size: 100 Å



Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Ultra Amino Guard Cartridge		910750210
Ultra Aqueous C18 Guard Cartridge	917850212	917850210
Ultra Aromax Guard Cartridge	912750212	912750210
Ultra Biphenyl Guard Cartridge	910950212	910950210
Ultra C1 Guard Cartridge	910150212	910150210
Ultra C4 Guard Cartridge	910250212	910250210
Ultra C8 Guard Cartridge	910350212	910350210
Ultra C18 Guard Cartridge	917450212	917450210
Ultra Carbamate Guard Cartridge	917750212	917750210
Ultra Cyano Guard Cartridge	910650212	910650210
Ultra IBD Guard Cartridge	917550212	917550210
Ultra PFP Propyl Guard Cartridge	917950212	917950210
Ultra Silica Guard Cartridge	910050212	910050210
Ultra Quat Guard Cartridge	918150212	918150210

Pinnacle DB Guard Cartridges

Particle size: 5 µm spherical

Pore size: 140 Å



Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Pinnacle DB Aqueous C18 Guard Cartridge	941850212	941850210
Pinnacle DB Biphenyl Guard Cartridge	940950212	940950210
Pinnacle DB C18 Guard Cartridge	941450212	941450210
Pinnacle DB C8 Guard Cartridge	941350212	941350210
Pinnacle DB Cyano Guard Cartridge	941650212	941650210
Pinnacle DB PFP Propyl Guard Cartridge	941950212	941950210
Pinnacle DB Silica Guard Cartridge	941050212	941050210

Pinnacle II PAH Guard Cartridges

Particle size: 4 µm spherical

Pore size: 110 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Pinnacle II PAH Guard Cartridge	921950212	921950210

Viva Guard Cartridges

Particle size: 5 µm spherical

Pore size: 300 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Viva C18 Guard Cartridge	951450212	951450210
Viva C8 Guard Cartridge	951350212	951350210
Viva C4 Guard Cartridge	951250212	951250210
Viva Biphenyl Guard Cartridge	951650212	951650210
Viva PFP Propyl Guard Cartridge	951950212	951950210
Viva Silica Guard Cartridge	951050212	951050210



Allure Guard Cartridges

Particle Size: 5 µm spherical

Pore Size: 60 Å

Description	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)
Allure AK Guard Cartridge		915950210
Allure Organic Acids Guard Cartridge	916550212	916550210
Allure Silica Guard Cartridge	916050212	916050210

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