Protec® Filters

MEISSNER

Table of Contents - Protec® Filters

Protec® Filters

Protec® is a borosilicate glass fiber prefilter that offers a high critical degree of retention and provides outstanding protection of more expensive downstream sterilizing filters. The filter is optimized for bioburden reduction as well as removal of colloidal contaminants, aggregated and non-product proteins, lipids and other particles in a broad range of biopharmaceutical applications. It is ideal for prefiltration and clarification of biologicals, protein solutions, vaccines, fermentation broths, cell culture media, serum and plasma fractions. The Protec® filter protects final membrane filters in processing solutions with high particle loads and high bioburden.

Materials of Construction

The Protec® filter is manufactured using high quality components made from non-toxic and biologically inert raw materials. All components of the Protec® filter are FDA listed for food contact use in the Code of Federal Regulations (CFR), Title 21 as below:

Components

Media:		
RF (single layer)	Borosilicate glass microfiber	CFR Title 21, 177.2420
RM (double layer)	Borosilicate glass microfiber (outer layer),	CFR Title 21, 177.2420
	Polyvinylidene fluoride membrane (inner layer)	CFR Title 21, 177.2510
Upstream/Downstream support:	Polypropylene	CFR Title 21, 177.1520
Core/Outer guard:	Polypropylene	CFR Title 21, 177.1520
End caps/Adaptors:	Polypropylene	CFR Title 21, 177.1520
Capsule housing:	Polypropylene	CFR Title 21, 177.1520
O-rings:	Buna, EPR or Silicone	CFR Title 21, 177.2600
	Tef on® over Silicone or	CFR Title 21, 177.1550
	Tef on® over Viton®	
Sealing method:	Thermal bonding	

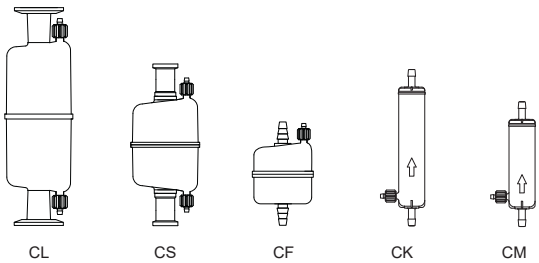
The Protec® filter meets requirements as specified in the current USP Class VI plastics and cytotoxicity tests.

Configurations

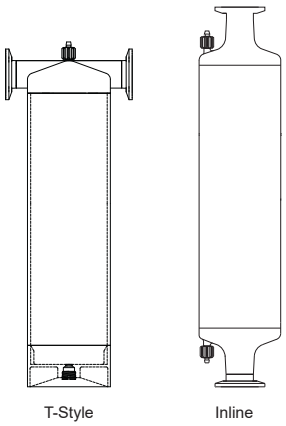
Protec® can be ordered in a variety of configurations from SFE filter cartridges through UltraCap® high capacity capsule filters.

SFE Cartridge

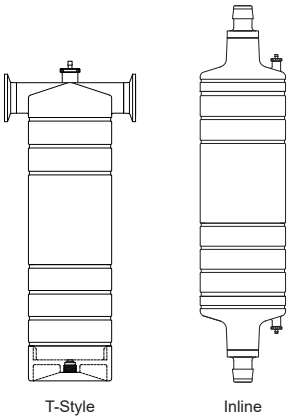
Cartridge



Capsule



UltraCap®



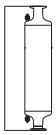
UltraCap® H.D.

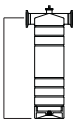
Dimensions

Cartridge	Diameter	Length (nominal)	EFA** (RF Grade)	EFA (RM Grade)
	2.75" (7 cm)	10" (25 cm)	6.4 ft² (0.59 m²)	5.7 ft² (0.53 m²)
		20" (50 cm)	12.8 ft² (1.19 m²)	11.4 ft² (1.06 m²)
		30" (75 cm)	19.2 ft² (1.78 m²)	17.1 ft² (1.59 m²)
		40" (100 cm)	25.6 ft² (2.38 m²)	22.8 ft² (2.12 m²)

SFE Cartridge	Diameter	Length (nominal)	EFA (RF Grade)	EFA (RM Grade)
	2.25" (5.7 cm)	2.5" (6.4 cm)	1.0 ft² (0.09 m²)	0.86 ft² (0.08 m²)
		5" (12.7 cm)	2.0 ft² (0.19 m²)	1.7 ft² (0.16 m²)

Capsule	Diameter	Length (nominal)	EFA (RF Grade)	EFA (RM Grade)
CL/CL2	2.75" (7.0 cm)	6.9" (17.5 cm)	2.0 ft² (0.19 m²)	1.7 ft² (0.16 m²)
CS/CS2	2.75" (7.0 cm)	4.5" (11.4 cm)	1.0 ft² (0.09 m²)	0.86 ft² (0,08 m²)
CF2-A	2.25" (5.7 cm)	3.3" (8.3 cm)	0.33 ft² (305 cm²)	0.28 ft² (260 cm²)
CF2-B	2.25" (5.7 cm)	3.3" (8.3 cm)	0.50 ft² (465 cm²)	0.42 ft² (390 cm²)
CK2	1.15" (2.9 cm)	6.25" (15.9 cm)	0.36 ft² (335 cm²)	0.33 ft² (305 cm²)
CM2	1.15" (2.9 cm)	5.50" (14.0 cm)	0.29 ft² (270 cm²)	0.26 ft² (240 cm²)

UltraCap®	Diameter *	Length (nominal)	Capsule Dimension (overall)		EFA (RF Grade)	EFA (RM Grade)
T-style	3.25" (8 cm)	10" (25 cm)	12.3" (31.2 cm)		6.4 ft² (0.59 m²)	5.7 ft² (0.53 m²)
		20" (50 cm)	22.3" (56.6 cm)		12.8 ft² (1.19 m²)	11.4 ft² (1.06 m²)
		30" (75 cm)	32.3" (82 cm)		19.2 ft² (1.78 m²)	17.1 ft² (1.59 m²)
Inline	3.25" (8 cm)	10" (25 cm)	14.8" (37.6 cm)		6.4 ft² (0.59 m²)	5.7 ft² (0.53 m²)
		20" (50 cm)	24.9" (63.2 cm)		12.8 ft² (1.19 m²)	11.4 ft² (1.06 m²)
		30" (75 cm)	34.9" (88.6 cm)		19.2 ft² (1.78 m²)	17.1 ft² (1.59 m²)

UltraCap® H.D.	Diameter *	Length (nominal)	Capsule Dimension (overall)		EFA (RF Grade)	EFA (RM Grade)
T-style	3.5" (9 cm)	10" (25 cm)	11.7" (29.7 cm)		6.4 ft² (0.59 m²)	5.7 ft² (0.53 m²)
		20" (50 cm)	21.1" (53.6 cm)		12.8 ft² (1.19 m²)	11.4 ft² (1.06 m²)
		30" (75 cm)	30.6" (77.7 cm)		19.2 ft² (1.78 m²)	17.1 ft² (1.59 m²)
		40" (100 cm)	40.0" (101.6 cm)		25.6 ft² (2.38 m²)	22.8 ft² (2.12 m²)
		50" (125 cm)	49.5" (125.7 cm)		32.0 ft² (2.97 m²)	28.5 ft² (2.65 m²)
Inline	3.5" (9 cm)	10" (25 cm)	17.3" (43.9 cm)		6.4 ft² (0.59 m²)	5.7 ft² (0.53 m²)
		20" (50 cm)	26.8" (68.1 cm)		12.8 ft² (1.19 m²)	11.4 ft² (1.06 m²)
		30" (75 cm)	36.2" (91.9 cm)		19.2 ft² (1.78 m²)	17.1 ft² (1.59 m²)
		40" (100 cm)	45.7" (116.1 cm)		25.6 ft² (2,38 m²)	22.8 ft² (2.12 m²)
		50" (125 cm)	55.2" (140.2 cm)		32.0 ft² (2.97 m²)	28.5 ft² (2.65 m²)

Inlet/outlet fittings extend beyond stated diameter **EFA = Effective Filtration Area

Operating Characteristics

Cartridges and SFE (Small Flow Elements)

Maximum Operating Temperatures and Pressures 80 psid @ 32°F to 100°F
(Δp 5.5 bar @ 0°C to 38°C)

60 psid @ 150°F
(Δp 4.1 bar @ 66°C)

30 psid @ 180°F
(Δp 2.1 bar @ 82°C)

Capsules - CS/CL & CF Models

Maximum Operating Pressure, Liquids
75 psig @ 32°F to 100°F
(5.2 bar @ 0°C to 38°C)

Maximum Operating Pressure, Gas
50 psig @ 32°F to 100°F
(3.4 bar @ 0°C to 38°C)

Maximum Operating Temperature Rating
160°F @ 35 psig
(71°C @ 2.4 bar)

Capsules - CM/CK Models

Maximum Operation Pressure & Temperature, Liquids
100 psig @ 32°F to 122°F
(6.9 bar @ 0°C to 50°C)

Maximum Operating Pressure & Temperature, Gas
100 psig @ 32°F to 122°F
(6.9 bar @ 0°C to 50°C)

UltraCap® Model

Maximum Operating Pressure & Temperature, Liquids
75 psig @ 32°F to 100°F
(5.2 bar 0°C to 38°C)

45 psig @ 140°F
3.1 bar @ 60°C)

Maximum Operating Pressure & Temperature, Gas
50 psig @ 32°F to 100°F
(3.4 bar @ 0°C to 38°C)

30 psig @ 140°F
(2.1 bar @ 60°C)

UltraCap® H.D. Model

Maximum Operating Pressure & Temperature, Liquids
90 psig @ 32°F to 100°F
(6.2 bar @ 0°C to 38°C)

55 psig @ 140°F
(3.8 bar @ 60°C)

Maximum Operating Pressure & Temperature, Gas
60 psig @ 32°F to 100°F
(4.1 bar @ 0°C to 38°C)

35 psig @ 140°F
(2.4 bar @ 60°C)

Cartridge Installation Instructions

Meissner filters are available in a number of different adapter and O-ring configurations designed to fit modern filter housings. The filter should fit snugly in the housing. Improper installation can impair filtration efficiency.

1. Verify that the correct filter part number for the application has been chosen.
2. Keep the filter in its plastic bag to avoid contaminating the cartridge as long a possible. Cut open the bag at the O-ring end. While holding the bagged cartridge, lubricate the O-rings by dipping the O-rings into clean water or other suitable liquid compatible with the process fluid.
3. Line up the open end of the cartridge with the housing seat and install using a slight twisting motion while holding the bagged cartridge near the O-ring adapter. Verify that the O-rings are fully seated and not twisted. If the cartridge has locking tabs, rotate the tabs into place with a clockwise motion until engaged. Caution: always rotate cartridges while firmly grasping the O-ring end of the cartridge to prevent excessive torque damage to the filter.
4. Repeat with additional cartridges. Remove protective bags from the cartridges. If present, install cartridge retainer system (plate or spring). Reassemble housing.

Autoclave Instructions

Meissner filters may be autoclaved repeatedly without loss of integrity.

Capsule, UltraCap® and UltraCap® H.D. Filters

The following outlines the steps recommended in the autoclave sterilization of Meissner filter capsules.

1. Loosely cover the capsule inlet and outlet with autoclave wrap. All capsule vents are on the upstream side of the filter and should be loosened or removed to facilitate steam penetration. Hose barb vent valves must be opened at least two full turns to prevent valve leakage post autoclaving.
2. The weight of clamps or fittings attached to the capsule must be supported to avoid damaging the adapters. Sanitary flanges may have clamps and gaskets loosely attached to the filter. If fittings must be attached to flanges, tri-clamps are preferable to bi-clamps and should be tightened after the assembly has cooled.
3. Autoclave the capsule at a minimum of 121 °C for 60 minutes or 125 °C for at least 45 minutes with the capsule in a horizontal position using a slow exhaust or liquid cycle. T-style UltraCap® capsules may be autoclaved horizontally or with the outlet oriented downward to facilitate the removal of condensate from the downstream side of the filter. As autoclave systems vary, sterilization cycles should be validated under actual system or autoclave loading conditions. Downstream attachments can significantly increase the time required to sterilize the filter core.
4. Allow the capsule to cool. Gently close vents finger tight. Excessive tightening of vent valves will damage the sealing surfaces. Integrity test if desired. Install filter into system aseptically.

Cartridge and SFE (Small Flow Elements)

The following outlines the steps required to autoclave a Meissner filter cartridge and housing assembly. A stainless steel reinforcement ring is required for filter configurations with 222 or 226 O-rings.

1. Install the filter into the housing. Loosely cover the inlet and outlet with autoclave wrap. Vent and drain valves should be fully open.
2. Autoclave the cartridge and housing assembly at a minimum of 121°C for 30 minutes with the filter outlets in an outlet down or horizontal position using a slow exhaust or liquid cycle. As autoclave systems vary, sterilization cycles should be validated under actual system or autoclave loading conditions. Assemblies attached to the outlet can increase the required sterilization times.
3. Allow the housing assembly to cool.
4. Install the sterile filter assembly into the system using aseptic techniques.

Different autoclave temperature and time combinations may be used to sterilize the filters but the combination should be validated to ensure that sterilization occurs under those conditions. Temperatures above 135°C are not recommended.

Inline Steam Sterilization Procedure

Steaming in place (SIP) is frequently used in critical applications where a sterile effluent is desired. To prevent damage to the filter cartridge's O-ring adapter, cartridges with 222 or 226 O-ring adapters must be reinforced with a stainless steel ring. Protec® filter cartridges with reinforced O-ring adapters are capable of repeated sterilization cycles without loss of integrity. The steps required to steam sterilize the Protec® filter cartridge and system using saturated steam are outlined in the procedure, below.

The steam should be free of rust and other particulates. The housing should be clean before the cartridge is installed. If you are steam sterilizing a wetted cartridge, upstream and downstream gauges must be provided to verify that the differential pressure across the membrane does not exceed 5 psi (0,3 bar). To assure sterilization, steam pressure in the assembly must not be allowed to fall below 15 psi (1 bar) or 121°C. Condensate should be drained from the system during sterilization. A typical piping schematic is outlined in Figure 1.

Caution: Capsules, UltraCap® and UltraCap® H.D. are not designed for inline steam sterilization!

Procedure (Figure 1)

1. Close all valves.
2. Open valve V_4.
3. If cartridge is wet, or if there is a large volume tank downstream of the filter, open V_5.
   a. Slowly open V_2. This will connect both sides of the filter to steam pressure.
   b. Crack open V_7 to vent trapped air.
   c. Crack open V_6 allowing steam to flow through the system.
   d. Slowly close V_5 but do not allow the differential pressure across the cartridge to exceed 5 psi (0,3 bar).
   e. Leave drain V_8 cracked during sterilization to drain condensate.
4. If sterilizing a dry cartridge, slowly open V_2.
   a. Crack open V_7 to vent trapped air.
   b. Crack open V_6 to allow steam to flow through the system. Do not allow the differential pressure across the cartridge to exceed 5 psi (0,3 bar).
   c. Leave drain V_8 cracked during sterilization to drain condensate.
5. Steam sterilize for 30 to 60 minutes at 15 to 20 psig (1,0 to 1,4 bar), or as long as experience dictates.
6. When sterilization is complete, close V_2.
7. Open V_3 and introduce sterile air or nitrogen regulated to the same pressure as the steam.
8. Close V_8 once steam and condensate flow stops.
9. Allow the system to cool to room temperature. Do not allow the differential pressure across the cartridge to exceed 5 psi (0,3 bar). Then close V_3, V_7 and V_6. Keep the system under pressure until ready for use.
10. Crack vent V_7 and allow the system pressure to equalize. The filtration process may now be started.

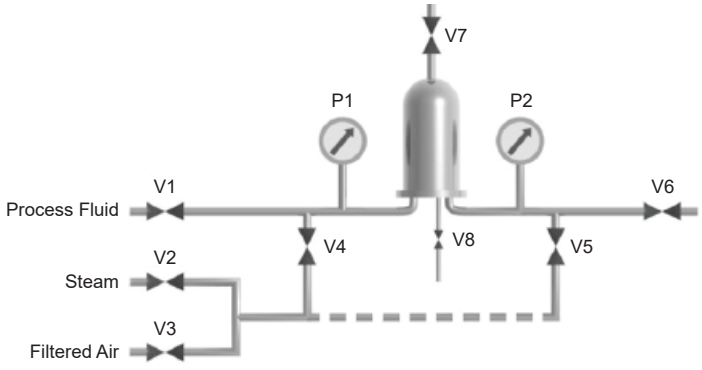


Figure 1

Storage and Shelf Life

Meissner manufactures a complete line of filter products and One-Touch® single use assemblies. Products are suitably bagged and boxed for shipping and may be stored in the original packaging in a clean dry area between 0°C and 40°C (32°F to 100°F). The following gives the minimum shelf life expectancies for Protec® products.

Filters

The Protec® filter has an expected shelf life greater than 5 years in the cartridge, small flow, large and small capsule lines, and disc configurations. Filter product age can be determined from the date on the original Certificate of Conformance.

Gamma irradiated filters, which include capsule, UltraCap® and UltraCap® H.D. capsules have a shelf life of at least 2 years from the date of irradiation. Gamma irradiated capsules are distinguished with part numbers beginning with the letter “G”.

One-Touch® Products

The One-Touch® product line of single-use systems, including but not limited to biocontainers, tubing, and/or filter assemblies, has labeling which identifies the product specific expiration date. The standard shelf life of nonsterile One-Touch® products is 2 years from the date of manufacture. These standard time periods may be amended to reflect the various components included in a specific configuration, a change that will be indicated on the product label. Filters that are part of a One-Touch® single-use system begin with “C” and are irradiated once with the One-Touch® assembly.

Protec® Media Grade Descriptions

RM = This pleated filter combines an outer layer of borosilicate glass microfiber media with an inner layer of Meissner's proprietary hydrophilic PVDF membrane. A Certificate of Conformance is available on a lot basis.

RF = This pleated filter contains a single layer of borosilicate glass microfiber media. A Certificate of Conformance is available on a lot basis.

Cartridge Ordering Matrix Description

RM	0.5	–	2	C6	R	S
Filter Grade	Absolute Rating (µm)	–	Cartridge Length	End Cap Configuration	Reinforcement Ring Option	Seal Material (O-ring or Gasket)
RM	0.2, 0.3, 0.5		1 = 10"	GS = DOE; flat gaskets (9.75", 19.5", 29.25", 39" length filters)	(Blank) = Standard - no reinforcement ring	O-ring Seal
RF	0.5, 1		2 = 20"	GL = DOE; flat gaskets (20", 30", 40" length filters)	R = Reinforcement ring required for autoclave/ SIP applications	B = Buna
			3 = 30"	C1 = SOE; 222 nO-Ring®, button cap end		E = EPR
			4 = 40"	C2 = SOE; 222 O-rings, button cap end		S = Silicone
				F1 = SOE; 222 nO-Ring®, fin end		T = Teflon® over Silicone
				F2 = SOE, 222 O-rings, fin end		V = Viton®
				C5 = SOE; 226 nO-Ring®, button cap end		X = Teflon® over Viton®
				C6 = SOE; 226 O-rings, button cap end		Gasket Seal
				F5 = SOE; 226 nO-Ring®, fin end		B = Buna
				F6 = SOE; 226 O-rings, fin end		E = EPR
				DN = DOE; internal 120 O-rings		P = Polyethylene
				RN = SOE; internal 120 O-ring, recessed cap end		S = Silicone
				DA = DOE; internal 213 O-rings		T = Teflon®
				RA = SOE; internal 213 O-ring, recessed cap end		V = Viton®

Small Flow Elements (SFE Filters) Ordering Matrix Description

L	RM	0.5	—	5	6	R	S
L	☐	☐	—	☐	☐	☐	☐

Model	Filter Grade	Absolute Rating (µm)	—	Filter Length/(Area) nominal	Adapter Selection	Reinforcement Ring Option	O-ring Material
L	RM	0.2, 0.3, 0.5		For RM grade filters: 2 = 2.5"/0.86 ft² (0.08 m²) 5 = 5.0"/1.7 ft² (0.16 m²) For RF grade filters: 2 = 2.5"/1.0 ft² (0.09 m²) 5 = 5.0"/2.0 ft² (0.19 m²)	P = Standard internal 116 O-ring 2 = 222 O-rings (for autoclave/ SIP applications, select "R" under "Reinforcement Ring Option") 6 = 226 O-ring style locking adapter (for autoclave/SIP applications, select "R" under "Reinforcement Ring Option") SK = Skirt-flange adapter (no reinforcement or O-ring options available) L = 116 O-ring with Mini Lock	(Blank) = Standard - no reinforcement ring R = Reinforcement ring - required only for the 222 and 226 adapter when autoclaving or steam sterilizing	B = Buna E = EPR S = Silicone T = Teflon® over Silicone V = Viton® X = Teflon® over Viton®
	RF	0.5, 1					

Capsule (CS/CL) Ordering Matrix Description

C	S	2	RM	0.5	—	02	2
Sterile Option	**Filtration Area (nominal)**	**Material Code**	**Filter Grade**	**Absolute Rating (µm)**	—	**Inlet/Outlet Connections**	**Vent/Drain Ports**
C = Standard (non-sterile) G = Gamma Irradiated	For RM grade filter: S = 0.86 ft² (0.08 m²) L = 1.7 ft² (0.16 m²) For RF grade filter: S = 1.0 ft² (0.09 m²) L = 2.0 ft² (0.19 m²)	(Blank) or 1 = Polypropylene capsule shell material 2 = Animal component free polypropylene capsule shell material	RM RF	0.2, 0.3, 0.5 0.5, 1		00 = 1" sanitary flange 02 = 1" sanitary flange inlet; 3/8" hose barb outlet 0C = 1" sanitary flange inlet; 1/2" hose barb outlet 22 = 3/8" hose barb 2B = 3/8" hose barb with filling bell CC = 1/2" hose barb 44 = 1/4" MNPT 55 = 3/8" FNPT 66 = 3/8" MNPT 77 = 3/4" sanitary flange 88 = 3/4" hose barb 99 = 1/2" hose barb flexible tubing	0 = No vent/drain port 1 = 1 luer port with cap, outlet side 2 = Standard - 2 luer ports with caps 4 = 2 sanitary valves with hose barb 5 = 1 sanitary valve with hose barb connection, outlet side 6 = 1 sanitary valve with hose barb connection, inlet side

Capsule (CF) Ordering Matrix Description

CF	2	RM	0.5	–	33	A	1
☐	2	☐	☐	–	☐	☐	☐
Sterile Option	**Material Code**	**Filter Grade**	**Absolute Rating (µm)**	–	**Inlet/Outlet Connections**	**Filtration Area (nominal)**	**Vent/Drain Ports**
CF = Standard (non-sterile) GF = Gamma Irradiated	2 = Animal component free polypropylene capsule shell material	RM RF	0.2, 0.3, 0.5 0.5, 1		33 = Hose barb (1/4" - 3/8") 3B = Hose barb (1/4" - 3/8") with filling bell 41 = 1/4" MNPT inlet; 1/4" hose barb outlet 44 = 1/4" MNPT 77 = 3/4" sanitary flange	For RM grade filter: A = 0.28 ft² (260 cm²) B = 0.42 ft² (390 cm²) For RF grade filter: A = 0.33 ft² (305 cm²) B = 0.50 ft² (465 cm²)	0 = No vent/drain port 1 = Standard - 1 luer port with cap, outlet side 2 = 2 luer ports with caps 4 = 2 sanitary valves with hose barbs 5 = 1 sanitary valve with hose barb connection, inlet side

Capsule (CM/CK) Ordering Matrix Description

C	K	2	RM	0.5	–	77	4
		2			–		

Sterile Option	Filtration Area (nominal)	Material Code	Filter Grade	Absolute Rating (µm)	Inlet/Outlet Connections	Vent/Drain Ports
C = Standard (non-sterile) G = Gamma Irradiated	For RM grade filter: M = 0.26 ft² (240 cm²) K = 0.33 ft² (305 cm²) For RF grade filter: M = 0.29 ft² (270 cm²) K = 0.36 ft² (335 cm²)	2 = Animal component free polypropylene capsule shell material	RM RF	0.2, 0.3, 0.5 0.5, 1	11 = 1/4" hose barb 1B = 1/4" hose barb w/ filling bell 22 = 3/8" hose barb 2B = 3/8" hose barb w/ filling bell 41 = 1/4" MNPT; 1/4" hose barb out 44 = 1/4" MNPT 71 = 3/4" TC in; 1/4" hose barb out 72 = 3/4" TC in; 3/8" hose barb out 77 = 3/4" sanitary (TC) flange	0 = No vent/drain port 1 = 1 luer port with cap, inlet side 2 = Standard - 2 luer ports with caps 4 = 2 sanitary valves with hose barb 5 = 1 sanitary valve with hose barb connection, inlet side 6 = 1 sanitary valve with hose barb, outlet side

UltraCap® (T-Style & Inline) Ordering Matrix Description

CU	RM	0.5	—	2	T	00	2
☐	☐	☐	–	☐	☐	☐	☐

Sterile Option

CU = Standard (non-sterile)

GU = Gamma Irradiated

Filter Grade

RM

RF

Absolute Rating (µm)

0.2, 0.3, 0.5

0.5, 1

Cartridge Length

1 = 10"

2 = 20"

3 = 30"

Body Style

T = T-style

N = Inline

Inlet/Outlet Connections

00 = 1" sanitary flange

77 = 3/4" sanitary flange

02 = 1" sanitary flange inlet; 3/8" hose barb outlet

0C = 1" sanitary flange inlet; 1/2" hose barb outlet

09 = 1" sanitary flange inlet; 9/16" hose barb outlet

08 = 1" sanitary flange inlet; 3/4" hose barb outlet

22 = 3/8" hose barb

CC = 1/2" hose barb

99 = 9/16" hose barb

88 = 3/4" hose barb

AA = 1/2" Flaretek®

BB = 3/4" Flaretek®

Vent/Drain Ports T-Style

0 = No vent or drain

1 = No vent; 1/4" sanitary drain plug

2 = Sanitary vent; 1/4" sanitary drain plug

3 = Sanitary vent; 3/4" sanitary flange gauge port; 1/4" sanitary drain plug

4 = Sanitary vent; no drain

5 = Sanitary vent; 3/4" sanitary flange gauge port; no drain

6 = No vent or drain; 3/4" sanitary flange gauge port

Vent/Drain Ports Inline

0 = No vent or drain

2 = Two sanitary vent/drain valves

4 = One sanitary vent or drain valve, outlet side

UltraCap® H.D. (T-Style & Inline) Ordering Matrix Description

CR	2	RM	0.5	—	2	T	00	2
	2			—				
Sterile Option	**Material Code**	**Filter Grade**	**Absolute Rating (µm)**	—	**Cartridge Length**	**Body Style**	**Inlet/Outlet Connections**	**Vent/Drain Ports T-Style**
CR = Standard (non-sterile)	2 = Animal component free polypropylene capsule shell material	RM	0.2, 0.3, 0.5		1 = 10"	T = T-style	00 = 1" sanitary flange	0 = No vent or drain
GR = Gamma Irradiated		RF	0.5, 1		2 = 20"	N = Inline	77 = 3/4" sanitary flange	1 = No vent; 1/4" sanitary drain plug
					3 = 30"		02 = 1" sanitary flange inlet; 3/8" hose barb outlet	2 = Sanitary vent; 1/4" sanitary drain plug
					4 = 40"		0C = 1" sanitary flange inlet; 1/2" hose barb outlet	3 = Sanitary vent; 3/4" sanitary flange gauge port; 1/4" sanitary drain plug
					5 = 50"		09 = 1" sanitary flange inlet; 9/16" hose barb outlet	4 = Sanitary vent; no drain
							08 = 1" sanitary flange inlet; 3/4" hose barb outlet	5 = Sanitary vent; 3/4" sanitary flange gauge port; no drain
							0D = 1" sanitary flange inlet; 1" hose barb outlet	6 = No vent or drain; 3/4" sanitary flange gauge port
							22 = 3/8" hose barb	A = No vent; sanitary drain valve
							CC = 1/2" hose barb	B = Sanitary vent; sanitary drain valve
							99 = 9/16" hose barb	C = Sanitary vent; sanitary drain; 3/4" sanitary flange gauge port
							88 = 3/4" hose barb	
							DD = 1" hose barb	
							AA = 1/2" Flaretek®	
							BB = 3/4" Flaretek®	

Vent/Drain Ports Inline

0 = No vent or drain

2 = Two sanitary vent/drain valves

4 = One sanitary vent or drain valve, outlet side

Viton® and Teflon® are registered trademarks of E. I. du Pont de Nemours and Company.
Flaretek® is a registered trademark of Entegris, Inc.

GD007-4.0