

PolyPro[®] XL

CUNO[®]

Fluid Purification

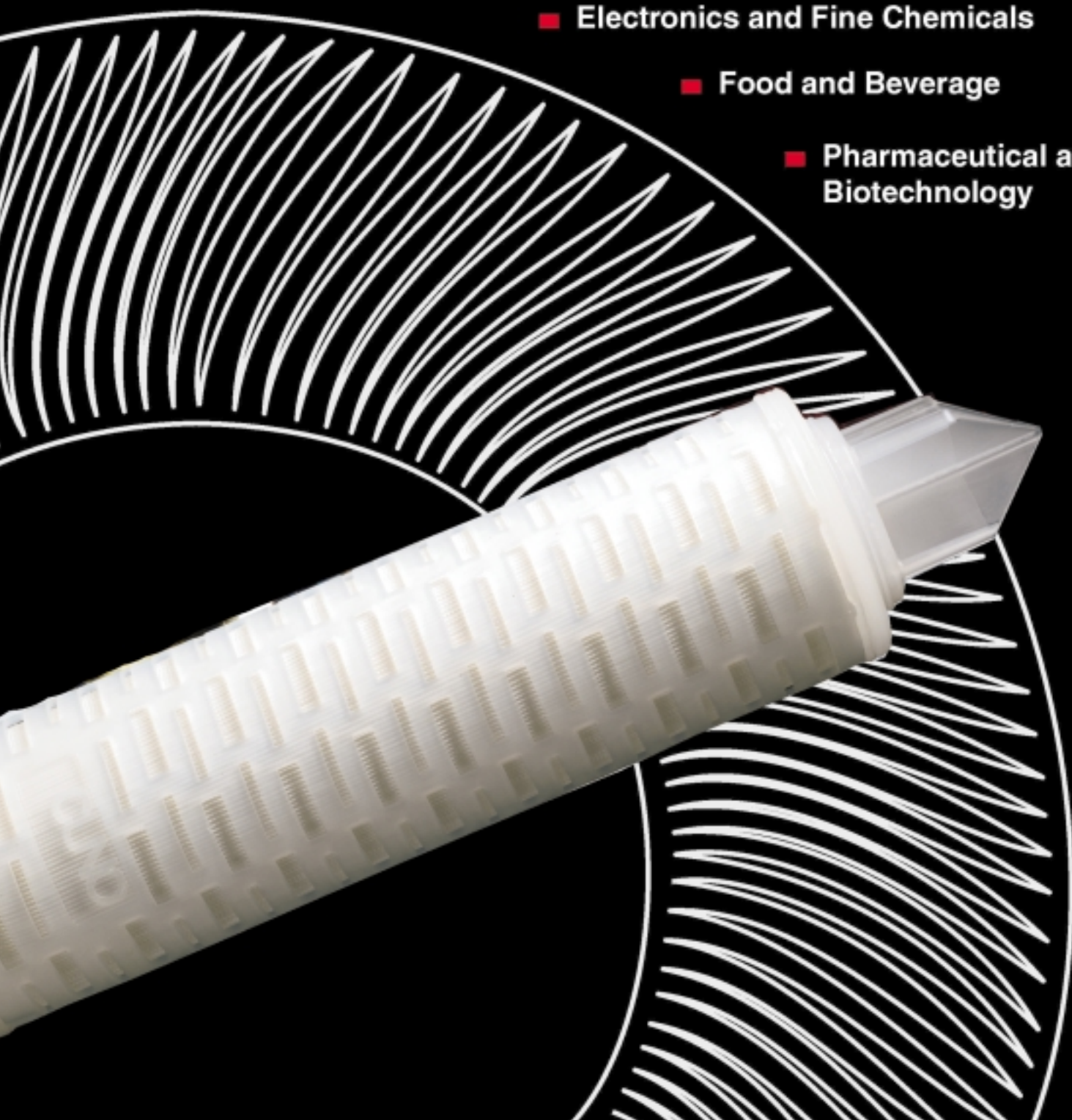
**Polypropylene Absolute Rated
Graded Density Filter Cartridges**

with

MaxMedia[™] Construction for Extra Long Life

Applications include:

- Electronics and Fine Chemicals
- Food and Beverage
- Pharmaceutical and Biotechnology



PolyPro® XL

Polypropylene Pleated Graded-Density Filter Cartridges

Featuring MaxMedia™ Construction for Extended Filter Lifetime

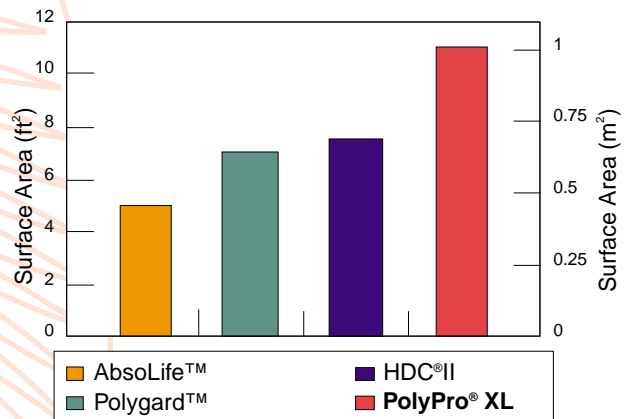
Cuno's PolyPro XL filter cartridge represents a major advance in pleated polypropylene filter design and performance. MaxMedia construction (patent pending) combines:

- > **Up to 50% more filter media (surface area) than competitive filters**
- > **Graded-density media for optimum contaminant holding**
- > **New cartridge design for increased flow and reduced pressure drop.**

The result is a filter cartridge that **lasts longer, performs better, and saves money.**

The MaxMedia Advantage

Surface area dictates just how long a filter will last and how it will perform. However, increasing surface area without considering the flow path between the media's pleats could result in flow restrictions and early media blinding. To ensure the optimum between surface area and performance, Cuno has ensured that the pleating process and media support materials work together to provide enhanced flow characteristics and longer service life.



FEATURES

- MaxMedia construction for extremely high surface area
- Absolute-rated filter performance
- Graded-density multi-layer filter media
- Polypropylene cartridge components free of adhesives and surfactants
- 100% integrity tested versions available
- Backflushable, rugged polypropylene cartridge construction

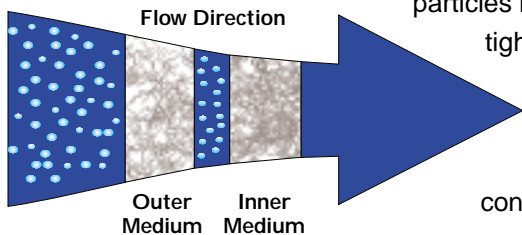
BENEFITS

- Higher product throughputs for extraordinarily long service life
- Lower total filtration operating costs
- Lower pressure drops for higher flow rates
- Consistent and reproducible contaminant removal
- Higher product quality and yields
- Selective entrapment of contaminant throughout the filter media to maximize filter life
- Higher contaminant holding capacity
- Very low extractable levels for optimum filtrate purity
- Broad chemical compatibility for most aggressive process applications
- Assurance of safety and regulatory compliance in pharmaceutical, bioprocessing, and biological filtration
- Prequalification and assurance in critical applications
- Suitable for final filtration in many applications
- Extends service life and compatible with a wide range of solvents and cleaning solutions

AbsoLife™ is a trademark of Gelman Sciences. Polygard™ is a trademark of Millipore Corporation. HDC® is a registered trademark of Pall Corporation.

Graded-Density - the Key to Longer Life

The PolyPro® XL filter's graded-density media structure removes particles sequentially by size - the larger particles by the more open, outer medium and the smaller particles by the tighter, inner medium. The outer medium acts as a prefilter, while the inner provides the absolute removal specified by the cartridge rating. This construction effectively spreads the contaminant through the depth of the filter media resulting in extremely high contaminant capacity with lower pressure drop for longer service life.

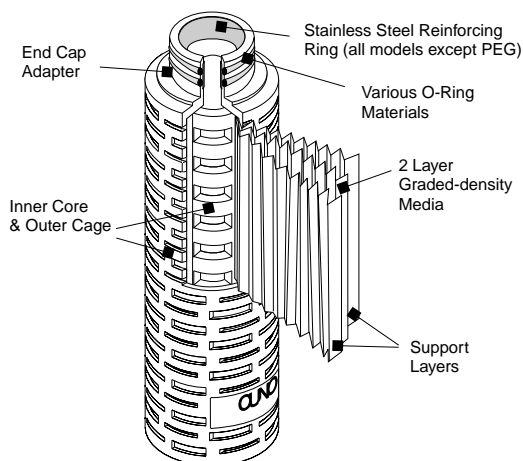


PolyPro XL Cartridge Specifications

Materials	
Media	Graded-Density Pleated Polypropylene
Supports	Polypropylene
Core, Sleeve, End Caps	Polypropylene
Gasket and O-ring Options	Silicone, Fluorocarbon, EPR, Nitrile

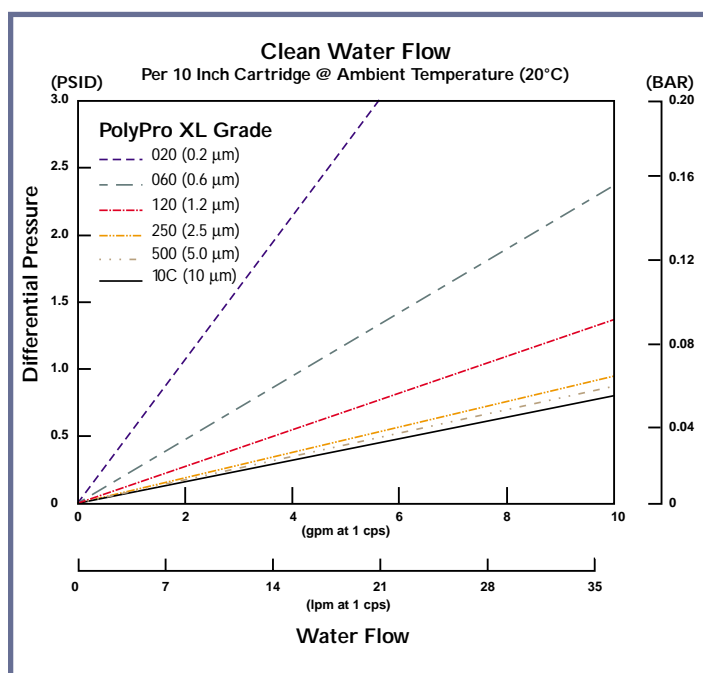
Operating Conditions	
Maximum Operating Temperature	130°F (60°C) continuous, 175°F (80°C) short term
Maximum Forward Pressure Differential	60 psid at 77°F (4 bar at 25°C)
Maximum Reverse Pressure Differential	60 psid at 77°F (4 bar at 25°C)

Cartridge Dimensions	
Media Area	11 ft ² (1m ²); 10 micron cartridge has media area of 6.5 ft ² (0.6m ²)
Diameter	2.75 inches (7 cm)
Length	Nominal 10", 20", 30", and 40".



Chemical Compatibility

Polypropylene construction provides chemical compatibility in many demanding process fluid applications. Compatibility is influenced by process operating conditions; in critical applications, cartridges should be tested under actual conditions to ensure correct selection.

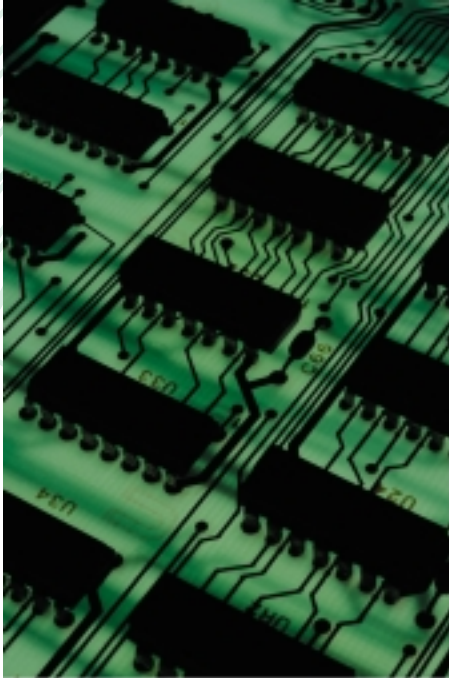


Flow Characteristics and Sizing Options:

- **Reduced cartridge changeout frequency** - For a given process flow rate, the graded-density structure and maximum filter area decrease filter cartridge changeout frequency by 30 to 50 percent or more depending on the application.
- **Reduced filter housing costs** - For new applications, the low pressure drops of the PolyPro XL filter allow smaller or fewer housings to be specified. Fewer filter cartridges and smaller housings ensure lower capital and consumables costs, year after year!

Ideally, filter systems should be sized at an initial differential pressure of 0.5 to 1 psid (0.04 to 0.07 bar). Low flow rates further extend the life of the filter system. In most applications, doubling the filter area (reducing the flow rate per unit area by one-half) results in two and one-half times the throughput.

PolyPro® XL Filters for Electronics & Chemicals



Today's electronics manufacturing and chemicals processing demand ever increasing levels of filtration efficiency and filtrate purity. PolyPro XL cartridge filters provide the answer for a broad range of applications.

- > **Pre-reverse osmosis (Pre-RO)** water filtration requires robust cartridges with long life to protect expensive RO membranes from seasonal fluctuations and process upsets. Low particle count ultrapure water is necessary at multiple points in every defect-sensitive production facility.
- > **Plating and cleaning baths** must maintain very low particle counts, despite constant contaminant addition, to provide the highest yields.
- > Complex **multi-layer board processes** need an economical filter capable of high throughputs and extended lifetimes. Heavy contaminant loads must be handled without premature plugging of the filter.

..... Cuno's PolyPro XL filter cartridge delivers the performance and lower total filtration cost advantage you demand!

- > **Fine chemical production** demands economical, rigorous filter cartridges with long service life. PolyPro XL filter cartridges are compatible with a wide range of process chemicals.

Durable polypropylene construction provides superior chemical and mechanical compatibility under the most severe service conditions.

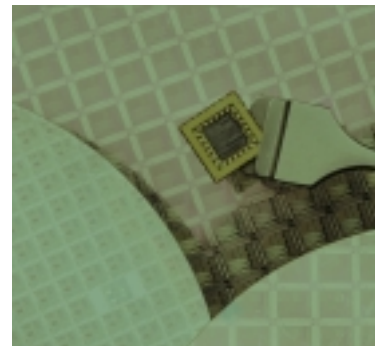
Proper cartridge selection for individual process conditions sized for low initial pressure drop will ultimately extend cartridge lifetime and compatibility.

The PolyPro XL Filtration Advantage

A recirculating electroless nickel plating bath can be optimized with PolyPro XL filters. For high density memory devices, particle defects can be safely controlled with in-line 0.6 µm filtration. By replacing a 0.6 µm absolute rated competitive cartridge with an equally retentive PolyPro XL filter, the pressure drop can be reduced by one half, providing the flexibility to increase the flow through the bath by a factor of 4. With the PolyPro XL filters, the bath will clean up more efficiently after the high density devices are introduced into the plating solution. PolyPro XL filters effectively remove the contaminating particles while maintaining or increasing process yields. Product throughput in this critical process step can be increased, and filter changeout frequency reduced, a direct result of the 60% surface area increase - **only available with the PolyPro XL filter's innovative MaxMedia technology.**

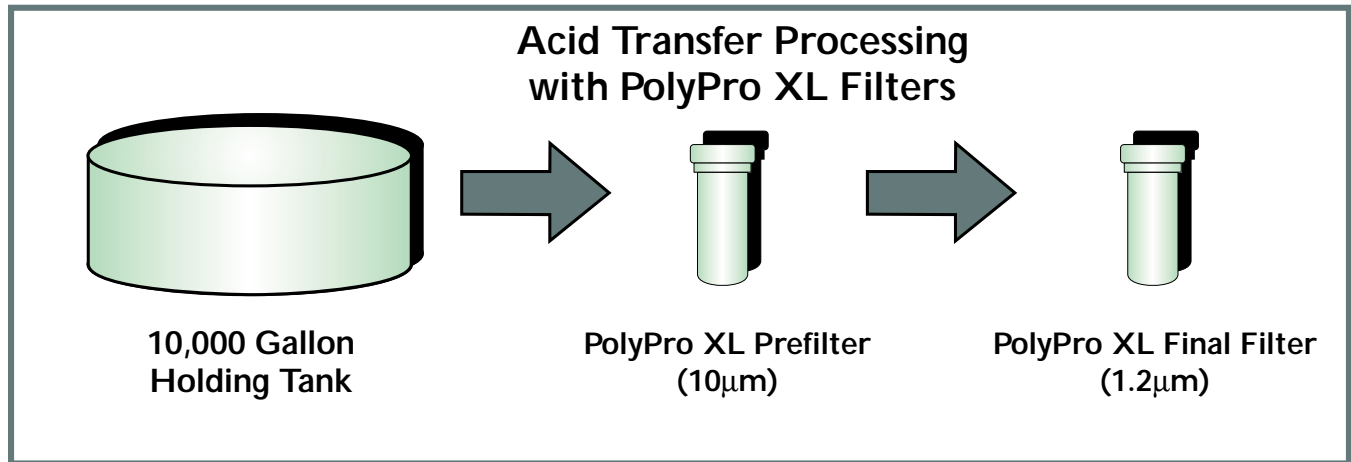
Absolute Rating	HDC®II 0.6 µm Filter	PolyPro XL 0.6 µm Filter	PolyPro XL Advantage
Flow at 1 psid	0.8 gpm	4.2 gpm	400%
Media Area	6.6 ft ²	11 ft ²	60%
Lifetime*			22%

* Based on testing using a model challenge (ACFTD) in water.



The PolyPro® XL Filtration Advantage continues...

Serial filtration was employed in this ambient temperature acid transfer, with a 10 µm PolyPro XL prefilter prior to a 1.2 µm PolyPro XL final filter. The low initial pressure drop and graded-density construction of the PolyPro XL filter allowed the process to run for extended periods before filter plugging. This optimized filtration scheme delivered premium quality acid with very low particle counts.



Initial Particle Counts

	Raw acid	After 10 µm Prefiltration	After 1.2 µm Final Filtration
Particles / gallon 10 µm *	390	0	0
Particles / gallon 5 µm *	3,125	1,500	0
Particles / gallon 1.2 µm *	200,000	190,000	190

* All calculations are based on in-house testing of PolyPro XL with controlled inlet particle challenges suspended in water.

PolyPro XL Filter Cartridge Ordering Guide

The PolyPro XL filter model PEG filter is specifically designed, manufactured, and quality engineered for the requirements of the electronics and fine chemical processing industry. The model PEG polypropylene filter contains no metal support structures and is not recommended for uses where thermal sterilization methods are employed.

Model	Absolute Rating*	Configuration	Nominal Length	End Modification	O-ring/ Gasket Material
PEG	020 - 0.2µm 060 - 0.6µm 120 - 1.2µm 250 - 2.5µm 500 - 5.0µm 10C - 10.0µm	B - Cartridge OD 2.8" (7.1cm)	01 - 10" 02 - 20" 03 - 30" 04 - 40"	B - 226 O-ring & spear C - 222 O-ring & spear D - DOE, flat gasket, 10" E - DOE, Flat gasket, 9 3/4" F - 222 O-ring & flat cap	A - Silicone B - Fluorocarbon C - EPR D - Nitrile H - Clear silicone

* Retention ratings determined by CUNO test method TP 430.008. The 0.2 micron rating has been extrapolated. For more information, contact your CUNO representative

PolyPro® XL Filters for Food & Beverage



PolyPro XL filter cartridges are recommended for the broad range of prefiltration and clarification applications where reliability and economy are critical. Suggested applications include:

- > Protection and Life Extension Of Expensive Membrane Final Filters
- > Final Product Clarification
- > Food Fermentation Feeds, Intermediates, and Fermentation Clarification
- > Blending Water Filtration
- > Cleaning Fluids
- > Solvent Streams, Air & Gas Prefiltration, and Final Filtration

..... Cuno's PolyPro XL filter cartridge delivers the performance and lower total filtration cost advantage you demand!

PolyPro XL Filters - Engineered for Food & Beverage

PolyPro XL filter cartridges meet the requirements for today's food and beverage processing needs. All materials used to construct the filter are FDA CFR Title 21 listed and are safe for food contact applications. The filter cartridge can be autoclaved, steamed-in-place (*in situ*), and sanitized with hot water. The rugged polypropylene construction and extra large surface area provide excellent performance in all food and beverage filtration applications.

- > **Backflushable** - PolyPro XL filter applications can be designed with a variety of methods to extend service life. Combined with hot water sanitation or other in-line cleaning procedures, backflushing PolyPro XL systems can extend service life significantly.

Protection of Final Membranes

Beverage bottlers frequently employ membrane cartridge filters, such as Cuno's BevASSURE™ II filter, to achieve microstability without heat pasteurization. Typical retention ratings for the final filter are 0.45 µm or 0.65 µm. The PolyPro XL filter's absolute retention, graded-density structure, and extra large surface area are ideal for prefiltration protection of final sterilizing membranes. By removing contaminants before the final filter, the life of expensive membrane filter cartridges are extended significantly.



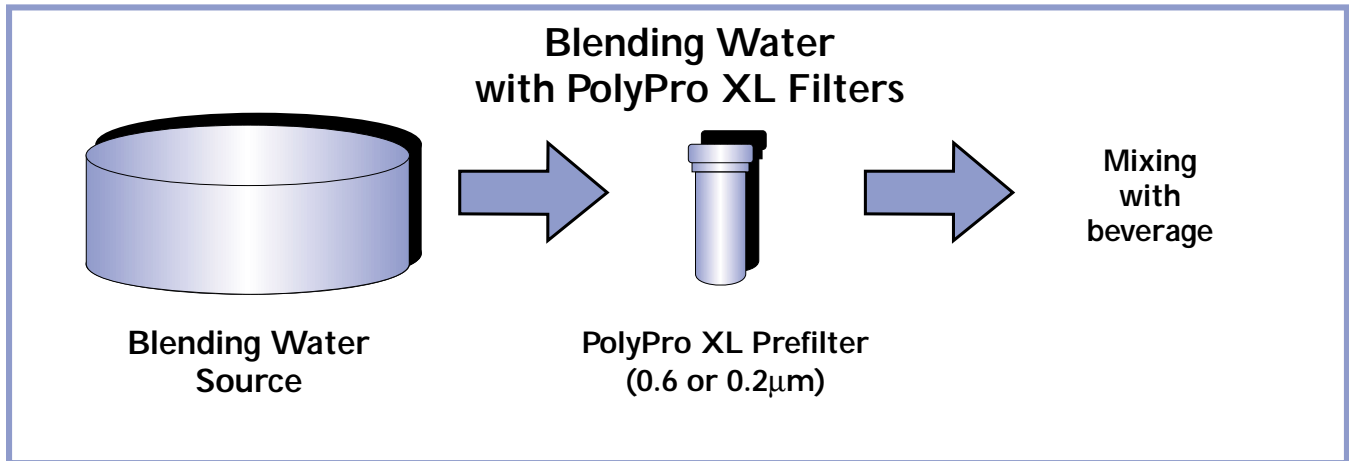
Recommended PolyPro XL Cartridges for Prefiltration Applications

Degree of Protection	When Using a Final Membrane Filter with the Rating:	
	0.45 µm	0.65 µm
Regular Service	PBP060 *	PBP120
Greater Protection	PBG020	PBG060

* Surface Area is 9.8 ft²

The PolyPro® XL Filtration Advantage

Today's demanding beverage consumer insists on high quality, turbidity-free juices, teas, and fruit drinks. Blending water needs to be free of microscopic particulate that can cause haze and undesirable cloudiness in the final beverage. With 11ft² of filtration area per cartridge, the PolyPro XL 0.6 µm absolute rated filter provides substantially **lower filtration costs** as compared to competitive offerings such as the Gelman AbsoLife™.



	Gelman AbsoLife 0.6 µm	Cuno PolyPro XL 0.6 µm
Typical surface area	4.4 ft ² (0.41 m ²)	11 ft ² (1.02 m ²)
Flow/cartridge @ 1 psid	1 GPM (3.8 LPM)	4 GPM (15.1 LPM)
Number of filters for a flow rate of 50 GPM	16 x 30" cartridges	4 x 30" cartridges
Housing sizing	16 around x 30"	4 around x 30"

For the same initial differential pressure, bottlers using Cuno Polypro XL filters require a housing only **one fourth** the size needed for Gelman AbsoLife. This results in significantly lower capital investment for filtration equipment and fewer cartridges to purchase.

The Bottom line - more cost effective filtration.

PolyPro XL filters for food and beverage applications are available in three models - model PBG for general service, model PTG with factory certified integrity, and model PBP for membrane protection.

PolyPro XL Filter Cartridge Ordering Guide

Model	Absolute Rating ⁺	Configuration	Nominal Length	End Modification	O-ring/ Gasket Material
PBG PTG* PBP**	020 - 0.2µm 060 - 0.6µm 120 - 1.2µm 250 - 2.5µm 500 - 5.0µm 10C - 10.0µm	B - Cartridge OD 2.8" (7.1cm)	01 - 10" 02 - 20" 03 - 30" 04 - 40"	B - 226 O-ring & spear C - 222 O-ring & spear D - DOE, flat gasket, 10" E - DOE, Flat gasket, 9 3/4" F - 222 O-ring & flat cap	A - Silicone B - Fluorocarbon C - EPR D - Nitrile H - Clear silicone

* PTG020 not available with D & E end modifications

** Available in 060 (0.6µm) and 120 (1.2µm) ratings only

⁺ Retention ratings determined by CUNO test method TP 430.008. The 0.2 micron rating has been extrapolated. For more information, contact your CUNO representative

PolyPro® XL Filters for Pharmaceutical, Bioprocess, & Biological Applications



PolyPro XL filter cartridges serve a broad range of prefiltration and clarification applications in pharmaceutical, biological, and bioprocess manufacturing where economy and reliability are critical. Recommended applications include:

- > Parenterals (SVP and LVP), Membrane Protection, Ophthalmics, Orals, Topicals, Vaccines, and Serum
- > Tissue Culture Media, Fermentation Feeds, and Intermediates
- > Rinse Fluids and Pharmaceutical Fine Chemicals
- > Blood Plasma Fractionation
- > Reagents and Buffers, High Purity Water Systems, Air & Gas Pre- and Final filtration
- > Diagnostics
- > Cosmetics Manufacturing

..... Cuno's PolyPro XL filters deliver the performance and lower total filtration cost advantage you demand!

PolyPro XL Filters - Engineered for Pharmaceuticals and Bioprocessing

Constructed from polypropylene media and support materials, the PolyPro XL series has ultra-low extractable levels and broad fluid compatibility, providing an ideal choice for a broad range of pharmaceutical applications. PolyPro XL filters can be used for general prefiltration, clarification, or as a final filter in appropriate applications. All component materials meet the requirements of USP Class VI Biological Tests for Plastics. PolyPro XL cartridges may be autoclaved or steamed-in-place (*in-situ*). Two versions of the pharmaceutical grade PolyPro XL filters are available- models PPG and PTG. Both are supplied with Certificates of Quality detailing the product attributes and qualification testing. Model PTG is integrity tested prior to shipment for applications where "factory integrity tested" provides added assurance.

- > **Safety** - All component materials meet the requirements of USP Class VI Biological Tests for Plastics
- > **Sterilizable** - may be autoclaved or steamed-in-place (*in-situ*)
- > **Certificate of Quality** details the product attributes and qualification testing

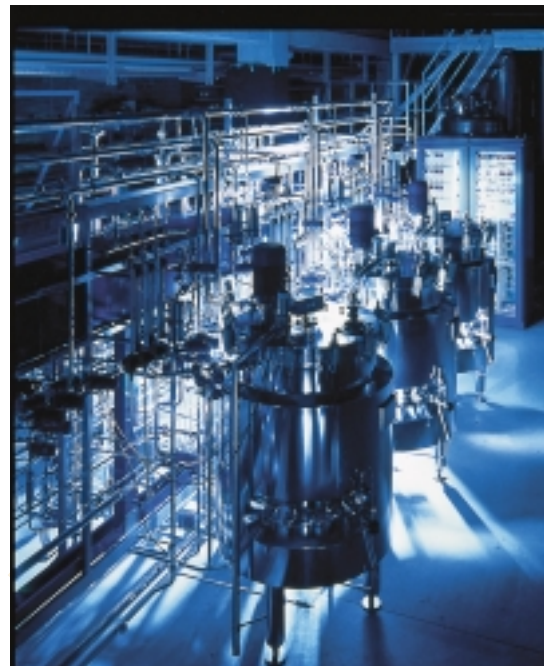
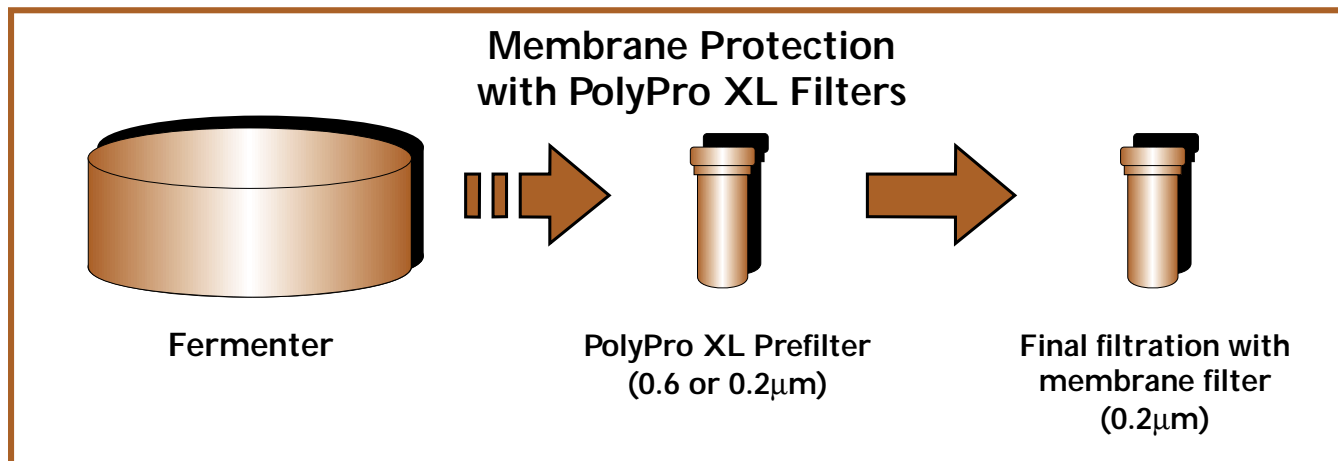


Photo courtesy of BioEngineering AG, Switzerland

The PolyPro® XL Filtration Advantage

In applications such as fermentation feed streams, serial filtration is often employed to ensure sterility. A typical configuration could be a 0.6 µm PolyPro XL prefilter upstream of a 0.2 µm rated sterile membrane filter cartridge. In those instances where greater membrane protection is required, a 0.6 µm or a 0.2 µm rated PolyPro XL filter will provide longer final membrane life than competitive 0.6 µm rated products. The high surface area of PolyPro XL filters coupled with graded-density construction allows the process to run for extended periods of time before filter plugging and changeout.



To underscore the PolyPro XL filter cost benefit advantage, use following sizing example for a as a guideline:

25 GPM System	Pall HDC® II 0.6µm Filter	PolyPro XL PPG 0.6µm Filter
Filter Configuration	Eleven (11) thirty (30) inch cartridges	Four (4) twenty (20) inch cartridges
Filter Pressure Drop	1 psid	0.75 psid
Approximate Housing Cost	(11 round by 3-high) \$10,000	(4 round by 2-high) \$5,000
Cost of Replacement Cartridges	\$3300	\$825
Total System Cost	\$13,300	\$5,825

-Total System Savings of almost \$7,475-

> **Capital Costs reduced 50%**

> **Ongoing filtration costs reduced 75%!!!**

PolyPro XL Filter Cartridge Ordering Guide

Model	Absolute Rating ⁺	Configuration	Nominal Length	End Modification	O-ring/Gasket Material
PPG PTG*	020* - 0.2µm 060 - 0.6µm 120 - 1.2µm 250 - 2.5µm 500 - 5.0µm 10C - 10.0µm	B - Cartridge OD 2.8" (7.1cm)	01 - 10" 02 - 20" 03 - 30" 04 - 40"	B - 226 O-ring & spear C - 222 O-ring & spear D - DOE, flat gasket, 10" E - DOE, Flat gasket, 9 3/4" F - 222 O-ring & flat cap	A - Silicone B - Fluorocarbon C - EPR D - Nitrile H - Clear silicone

* PTG020 not available with D & E end modifications

** Available in 060 (0.6µm) and 120 (1.2µm) ratings only

+ Retention ratings determined by CUNO test method TP 430.008. The 0.2 micron rating has been extrapolated. For more information, contact your CUNO representative

PolyPro® XL Filter Housings

A broad range of filter housings to meet all customer needs are available. These filter housings provide easy access for filter changeout and the greatest assurance that PolyPro XL filter cartridges are seated securely, thus eliminating the possibility of fluid bypass. Cuno will design and manufacture specialized housings to meet specific customer specifications.

Filter Housings with Sanitary Connections

All housings are constructed using 316L stainless steel to maximize corrosion resistance. All internal surfaces are polished to 20 microinch Ra to limit microbial adhesion and provide easy cleaning.

PolyPro XL Sanitary Housing Ordering Guide

Housing Model	ZWC	ZWB	ZMS	ZVS
Basic Part Number / Number of Cartridge Positions	70180 / 4	70192 / 4	70220 / 1	70221 / 1
	70189 / 8	70193 / 8		
	70190 / 11	70194 / 11		
	70191 / 21	70195 / 21		
Housing Style	t-line	t-line	t-line	In-line
Equivalent Cartridge Lengths	10, 20, 30, and 40 inches			
Materials of Construction	All 316L Stainless Steel			
Pressure & Temperature Ratings	75 psi (5 bar) @ 200°F (93°C)	150 psi (10 bar) @ 200°F (93°C)	150 psi (10 bar) @ 250°F (121°C)	150 psi (10 bar) @ 250°F (121°C)
Literature #	LITZRH106	LITZRH106	LITZRH104	LITZRH104

Note: PolyPro XL filter housings are available to meet local design codes; not all housings are available at all CUNO locations worldwide; consult your local CUNO distributor for more information.

Industrial Filter Housings with Raised-Face Flange Connections

All housings are constructed using carbon or stainless steel to maximize economy and durability. Various internal and external surface treatments are available to provide years of service in even the most demanding process environments.

PolyPro XL Industrial Housing Ordering Guide

Housing Model	ZM	ZMCMP	Flex Line™
Basic Model/Number of Cartridge Positions	4ZM / 4	21ZMCMP / 21	FLxx / 4 to 340
	11ZM / 11	30ZMCMP / 30	
	21ZM / 21	41ZMCMP / 41	
Housing Style	Raised Face Flange	Raised Face Flange	Raised Face Flange
Equivalent Cartridge Lengths	10, 20, 30, and 40 inches		
Materials of Construction	316 Stainless Steel	316L Stainless Steel	316L Stainless Steel
Pressure & Temperature Ratings	Up to 150 psi (10 bar) @ 250°F (121°C)	150 psi (10 bar) @ 200°F (93°C)	Up to 300 psi (20 bar) @ 250°F (121°C)
Literature #	LITZRH107	LITZRH105	LITHSFL1

Note: PolyPro XL filter housings are available to meet local design codes; not all housings are available at all CUNO locations worldwide; consult your local CUNO distributor for more information.



ZWC & ZWB Model Filter Housings



ZMS & ZVS Model Filter Housings



ZM Model Filter Housing



ZMCMP Model Filter Housing



Flex Line™ Model Filter Housings

Industrial Filter Housings with Threaded Connections (NPT or BSP)

All housings are constructed using 304 or 316L stainless steel to maximize economy and durability. Housings can accept both double open end (DOE) cartridges and the recommended 222 o-ring configuration for positive cartridge sealing. Various internal and external surface treatments are available to provide years of service in even the most demanding process environments.

PolyPro XL Industrial Housing Ordering Guide

Housing Model	DC	SD
Basic Model/ Cartridge Capacity	4DC / 4 12DC / 12	5SD / 5 12SD / 12 22SD / 22
Housing Style	Threaded (NPT or BSP) and Raised Face Flange	
Equivalent Cartridge Lengths	10, 20, 30, and 40 inches	
Materials of Construction	304 Stainless Steel	316L Stainless Steel
Pressure & Temperature Ratings	Up to 150 psi (10 bar) @ 250°F (121°C)	Up to 150 psi (10 bar) @ 200°F (93°C)
Literature #	LITHSDC1	LITHSSD1

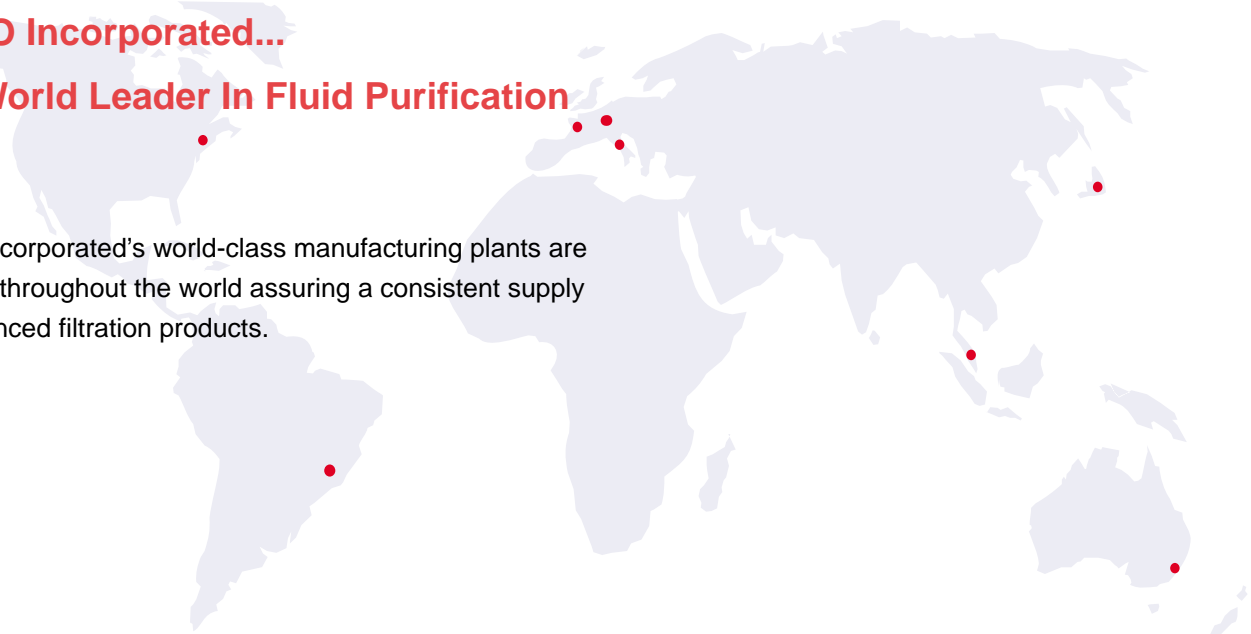


DC & SD Model Filter Housings

Note: PolyPro XL filter housings are available to meet local design codes; not all housings are available at all CUNO locations worldwide; consult your local CUNO distributor for more information.

CUNO Incorporated... ...A World Leader In Fluid Purification

Cuno Incorporated's world-class manufacturing plants are located throughout the world assuring a consistent supply of advanced filtration products.



Scientific Applications Support Services (SASS)

Dedicated technical support teams comprised of Cuno scientists and engineers are available to provide application specific recommendations for the most effective and economical filtration system. In addition to comprehensive testing and analysis conducted at Cuno's advanced laboratories, the SASS staff frequently performs on-site testing at customer facilities. Contact your Cuno representative for additional information.



Service Worldwide



Fluid Purification

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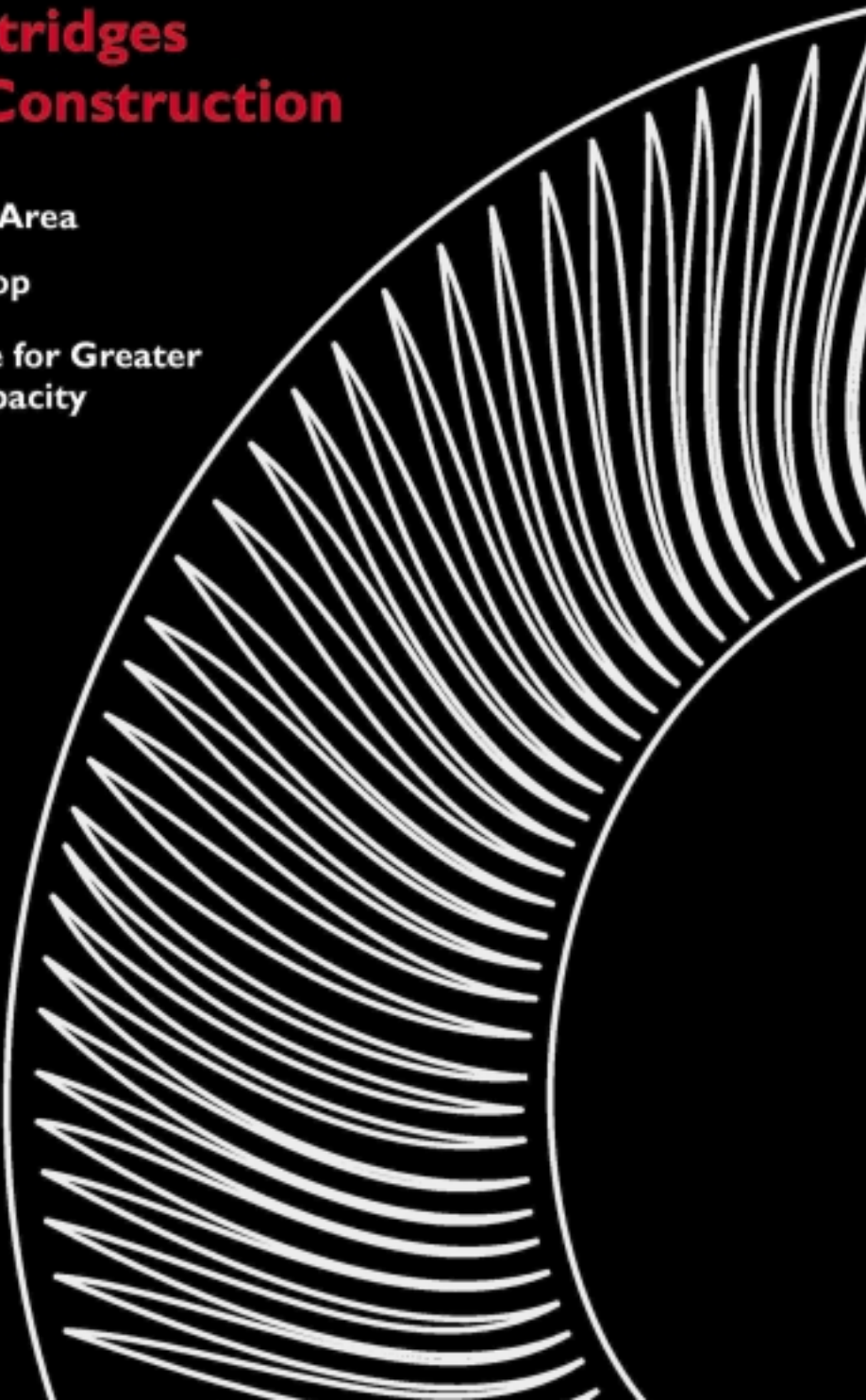
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PolyPro XL Filter Cartridges Featuring MaxMedia Construction

- Significantly Larger Filter Area
- Lower Initial Pressure Drop
- Graded-Density Structure for Greater Contaminant Holding Capacity
- Absolute Rated



LITPXLEL0497

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