

Installation and Operating Instructions

Green Line Single Use Hollow Fiber Cartridges

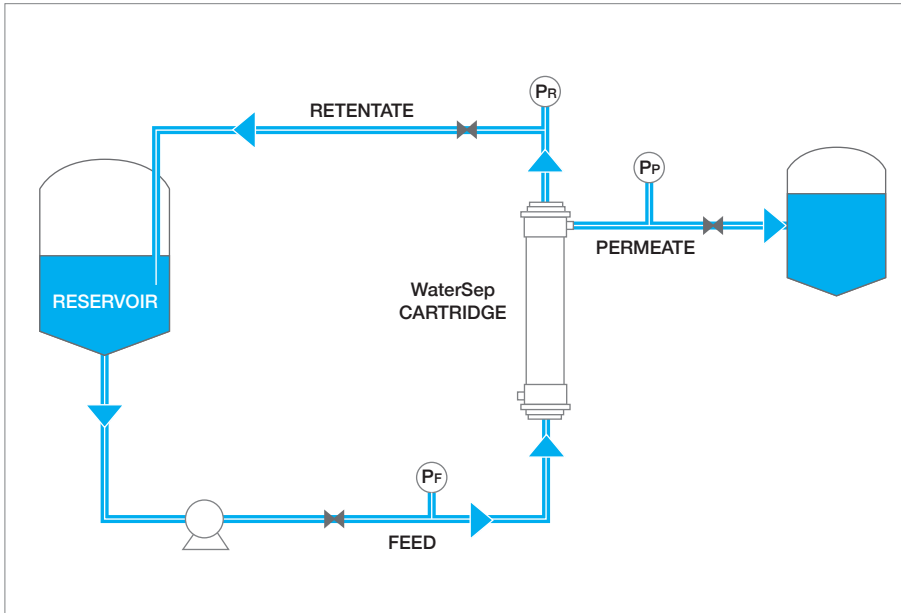
www.watersep.net



WaterSep's **Green Line** single use hollow fiber cartridges are gamma irradiated and pre-wetted with deionized water so they are ready to use. They do not contain humectant therefore minimal amounts of flushing are required to obtain very low or undetectable extractable levels.

Membrane Type	Operating Limits						
	Maximum Feed Pressure		Maximum Transmembrane Pressure (TMP)		Maximum Temperature		pH Range
	bar	psi	bar	psi	°C	°F	
3K - 100K MWCO	2.8	40	2.4	35	60	140	2 to 13.5
300K - 500K MWCO	2.1	30	1.7	25	50	122	2 to 13.5
750K MWCO	1.7	25	1.4	20	50	122	2 to 13.5
0.1µm	1.4	20	1.0	15	40	104	2 to 13.5
0.2µm, 0.45µm & 0.65µm	1.0	15	0.7	10	40	104	2 to 13.5

Crossflow System



Step 1: Inspect the cartridge

On the bag containing the cartridge, check that the gamma label is red indicating that the cartridge was gamma irradiated.

Step 2: Connect the cartridge

Open the bag and connect the cartridge to the system. A typical crossflow system is shown to the left with tubing, pump, valves and pressure sensors.

Step 3: Wet the system

To fully wet the cartridge and system, fill the reservoir with water or buffer. Start the feed pump at a slow speed. Slowly increase the pump speed so the feed and transmembrane pressure (TMP) is 0.5-10 psig to wet the cartridge with 0.5 L/m² and remove air from the system.

TMP is calculated using the equation: $TMP = \{(P_{\text{feed}} + P_{\text{retentate}}) / 2\} - P_{\text{permeate}}$

Step 4: Flush the cartridge

The Recommended Flush Volume is 0.5 L/m² through the permeate. During flushing, adjust the retentate backpressure. After the cartridge is flushed, stop the feed pump and discard the water or buffer prior to introducing your product.

Step 5: Filtration process

Connect or add the process feed to the reservoir. Close the permeate valve and start the feed pump at a slow speed to recirculate the process fluid. Slowly increase the pump speed and open the permeate valve to achieve the crossflow feed and permeate flow rate for your cartridge per the Flow Rates below. If needed, use the retentate valve to change the retentate backpressure to achieve the permeate flow rate for your cartridge. A typical TMP range for a concentration/diafiltration process is 10-30 psi (1-2 Bar) and for a cell harvest/clarification process is 3-10 psi (0.2-0.5 Bar). For TMP and permeate flow processing modes, see 'Filtration Operating Modes' on back cover.

Step 6: Monitor the process

Pressures observed during filtration should not exceed the maximum 'Operating Limits' (front cover).

Step 7: Complete the process

Recover your retentate or permeate product; disconnect and discard cartridge.

Cartridge, Model, Membrane Surface Area and Sample/Batch Volume

MWCO/Pore Size	Discover			Explorer			Researcher			Investigator			mini-BioProducer			BioProducer			Maximizer		Grand XL	
Cartridge Length (in)	12"	24"	41"	12"	24"	41"	12"	24"	41"	12"	24"	41"	12"	24"	41"	12"	24"	41"	24"	41"	24"	43"
Surface Area (m ²)	0.0052	0.0107	0.019	0.0155	0.032	0.058	0.0444	0.094	0.172	0.13	0.27	0.5	0.63	1.3	2.5	1.3	2.7	5	5.1	10	8	15
Sample/Batch Volume	10 - 850mL			150 - 3,000mL			400 - 8,000mL			1 - 25L			5 - 250L			25 - 500L			100 - 1,000L		250 - 1,500L	

Recommended Crossflow Pump Requirements

0.5 mm ID (L/min)	0.036	0.11	0.33	1	5	10	19	29
1.0 mm ID (L/min)	0.14	0.43	1.3	4	19	38	77	115
2.0 mm ID (L/min)	0.58	1.7	5.2	16	77	155	310	460

Note: The crossflow pump requirements listed are for 4000 sec⁻¹ crossflow requirements. For higher crossflow, multiply the L/min by a factor of 1.5. For very high crossflow requirements, multiply the L/min by a factor of 2.0.

LMH Permeate Flow Rate

30 Ultrafiltration (L/hr)	0.16	0.32	0.58	0.47	1.0	1.7	1.3	2.8	5.2	3.9	8	15	19	39	75	39	81	150	153	300	240	450
60 Ultrafiltration (L/hr)	0.31	0.64	1.2	0.93	1.9	3.5	2.7	5.6	10	7.8	16	30	38	78	150	78	162	300	306	600	480	900
20 Microfiltration (L/hr)	0.10	0.21	0.39	0.3	0.6	1.2	0.9	1.9	3.4	2.6	5.5	10	13	26	50	26	54	100	102	200	160	300
40 Microfiltration (L/hr)	0.21	0.43	0.77	0.6	1.3	2.4	1.8	3.8	6.9	5.2	11	20	25	52	100	52	108	200	204	400	320	600

Note: The permeate flow rate for UF is 30-60 LMH and MF is 20-40 LMH. Process flow rates may vary depending on the feed composition and viscosity, membrane, operating conditions such as TMP, crossflow rate and temperature.

Assemblies and
Accessory Kits
for Green Line
Single Use
Hollow Fiber
Cartridges are
available at
www.watersep.net

Filtration Operating Modes

The operating mode you choose will depend on your application and filtration conditions. **TMP processing** is typically used with ultrafiltration membranes. For **TMP processing**, the user sets the crossflow rate and uses the retentate valve to adjust the backpressure and initial TMP. During **TMP processing**, adjust the retentate back pressure to be below the maximum Operating Limits listed on the cover while allowing the flux to vary during the process.

Permeate flow control processing is often used with microfiltration for cell harvesting to control the flow through the more open pores. **Permeate flow control processing** uses a pump to maintain a relatively constant flux while allowing the TMP to vary during the process.

Materials of Construction

The product as assembled is USP Class VI compliant.

Membrane	Modified Polyethersulfone (m-PES)
Housing	Polysulfone
Encapsulant	Epoxy

WaterSep's Green Line HF cartridge assemblies are ideal for process specific, single use crossflow applications. Assemblies available with single use sensors, pumps, flowmeters, aseptic connectors, and bags.



For questions, contact us at:
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