

# Permeate flow control used in clarification applications with hollow fiber microfiltration cartridges - discussion of technique

Permeate flow control for various 30 or 60 cm L hollow fiber microfiltration cartridges are chosen based on the size of the target protein and the density and fouling potential of particulates in the starting material. Some processes with very heavy particulated feeds or high viscosity may not be suited to the use of 60 cm L fibers due to excessive localized TMP. For example, microfiltration clarification of recombinant intracellular protein from bacterial lysate is often most successful in a range of 10-30 l/mh with 0.1 or 0.2 micron pore sizes, depending on the degree of fouling or particulate loading; whereas, clarification of larger expressed proteins (such as monoclonal antibodies) from mammalian cell culture may be successful in a range of 20-50 l/mh using 0.2, 0.45 or 0.65 micron pores sizes, depending on the degree of cell viability in the final batch culture. Flow control rates should be tested for protein recovery and membrane capacity at small scale using the same fiber ID and length as intended for full scale process using clean membranes and starting material representative of the full scale process.

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## Volumetric flow rates in ml/min for selected flux rates in liters/m2/hour (l/mh)

Catalog Model number*	Flow Path	Area (cm <sup>2</sup> )	10 l/mh	30 l/mh	50 l/mh
CFP-x-E-3MA	1.0 mm x 30 cm	110	1.8	5.5	9.2
CFP-x-D-3MA	0.75 mm x 30 cm	120	2.0	6.0	10.0
CFP-x-E-3X2MA	1.0 mm x 60 cm	225	3.8	11.3	18.8
CFP-x-E-4MA or CFP-x-E-4A	1.0 mm x 30 cm	420	7.0	21.0	35.0
CFP-x-D-4MA or CFP-x-D-4A	0.75 mm x 30 cm	460	7.7	23.0	38.3
CFP-x-E-4X2MA	1.0 mm x 60 cm	850	14.2	42.5	70.8
CFP-x-D-4X2MA	0.75 mm x 60 cm	950	15.8	47.5	79.2
CFP-x-E-5A	1.0 mm x 30 cm	1200	20.0	60.0	100.0
CFP-x-D-5A	0.75 mm x 30 cm	1600	26.7	80.0	133.3
CFP-x-E-6A	1.0 mm x 60 cm	2800	46.7	140.0	233.3
CFP-x-D-6A	0.75 mm x 60 cm	3700	61.7	185.0	308.3
CFP-x-E-8A	1.0 mm x 30 cm	3600	60.0	180.0	300.0
CFP-x-D-8A	0.75 mm x 30 cm	4100	68.3	205.0	341.7
CFP-x-E-9A	1.0 mm x 60 cm	8400	140.0	420.0	700.0
CFP-x-D-9A	0.75 mm x 60 cm	9300	155.0	465.0	775.0

\* Note: "x" =1, 2, 4 or 6 corresponding to 0.1, 0.2, 0.45 or 0.65 micron pore sizes, respectively.

Not all pore sizes are available in all flow path options, for details refer to "Selection Handbook Hollow Fiber Cartridges and Systems", literature# 18-1165-29).



Peristaltic pumps are listed below that may be calibrated for metering the permeate flow rates listed in the previous table:

**P1 Peristaltic pump (18-1110-91) flow range:**

0.1-8.3 ml/min using 3.1 mm ID tubing

**PRP-09WM Peristaltic pump (56-4106-53) flow ranges**

5.4-108 ml/min using 1.6 mm ID tubing

20-400 ml/min using 3.1 mm ID tubing

72-1440 ml/min using 6.4 mm ID tubing

Calibrate pump with the appropriate tubing ID that allows selected flow rate to be in the middle of the range of flow rate for that tubing.

