



Tangential Flow Filtration Portfolio

TFF Cassettes | TFF Systems |
Hollow Fiber Modules

Simplifying Progress

SARTORIUS

Tangential Flow Filtration Overview

Sartorius offers solutions for the biopharmaceutical industry and laboratories, from drug discovery and development to production platforms for biomanufacturing.

The Sartorius products are excellent for a variety of protein-based applications such as:

- Purification of mAbs, ADC and vaccines
- Oligonucleotides and peptides
- DNA and protein concentration
- Desalination
- Adjusting buffer conditions

Tangential Flow Filtration enables separation and concentration of biomolecules in a gentle and efficient way.

Features and Benefits

- **Distinctive:** Unique portfolio able to meet range of process requirements
- **Scalable:** Different options are available to meet your process needs
- **Diversity:** Single-use and multi-use formats suitable for process development, pilot and commercial scale operations
- **Data:** Usage and chemical compatibility available
- **Easy of Use:** Proven, reliable and well-known design
- **Support:** Local field application specialists and service engineer on-site support available



TFF Consumables

Cassettes, Hollow Fiber

Sartorius offers TFF Cassettes, Hollow Fiber modules and the fitting systems. Within this portfolio there are many configurations available. There is the right combination for every filtration need.



How to Choose Between Cassettes or Hollow Fiber?

Flux Driven

- Proteins
- mAbs
- Non-enveloped viruses (AAV, adenovirus)
- ADC

Evaluate Cassettes First

→ Highest flow rate
(and high recovery)

- mRNA, pDNA
- SC IVIG

Evaluate Both

Find best compromise between flux and recovery.
→ Consider chemical compatibility

Recovery Driven

- Lentiviruses, MVA, Vaccinia, big enveloped viruses
- Exosomes, LNP
- Large pDNA

Evaluate Hollow Fiber First

→ Highest recovery

Cassettes

Sartocon® Cassettes

- High mass transfer at low feed flow rate and high product recovery
- Broad pH and temperature range for a wide choice of sanitizing agents
- Self-sealing cassette design with no gaskets needed
- Silicone sealing compound ensures low extractables
- Enlarged feed and retentate ports provide a lower pressure drop for increased efficiency

Sizes

From the Sartocon® Slice 50 with a filtration area of 0.005 m² to the Sartocube® with a filtration area of 3.5 m², Sartorius offers many cassettes which are easily scalable.

Each size is also available with a MWCO between 1 kDa and 300 kDa. The ECO-Screen is ideal for low protein-concentration or high viscosity.

Membranes (incl. Cutoff)

Two different Membranes:

- Polyethersulfone (PESU): low adsorption and protein-binding, economical filtrations runs, used in blood and plasma, enzymes, conventional vaccines.
- Hydrosart®: non-absorptive and non-protein binding, easily cleanable, no loss of proteins, used in: mAbs, mRNA, ADC, recombinant proteins, Oligo and Nucleotides, AAV, LVV, AV, Cell Therapy.

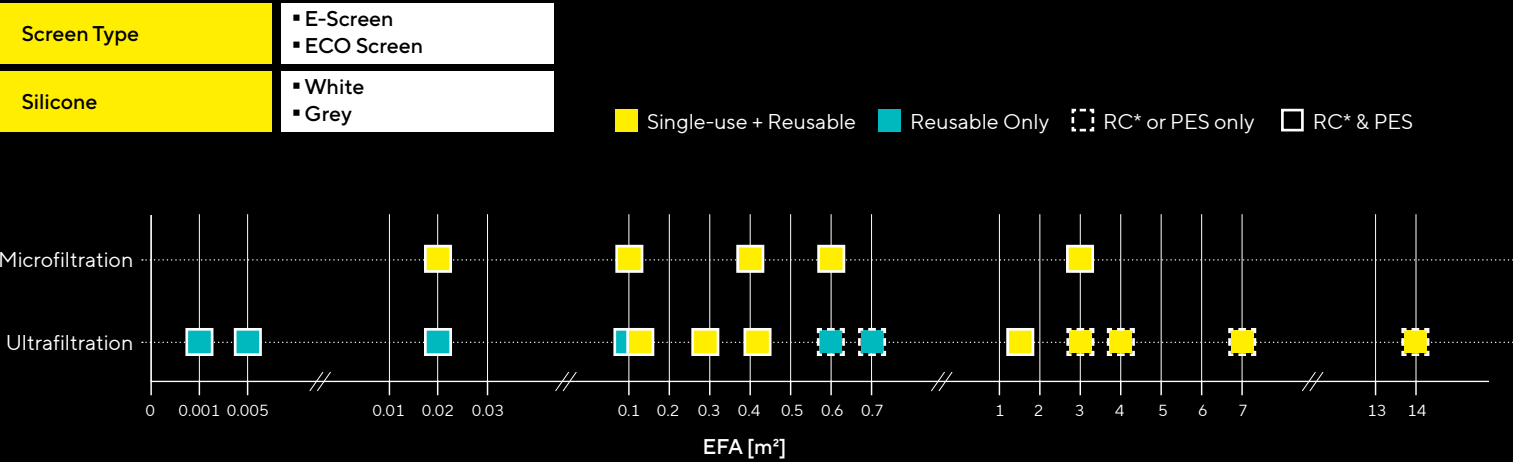
Self-Contained Unit (SCU)

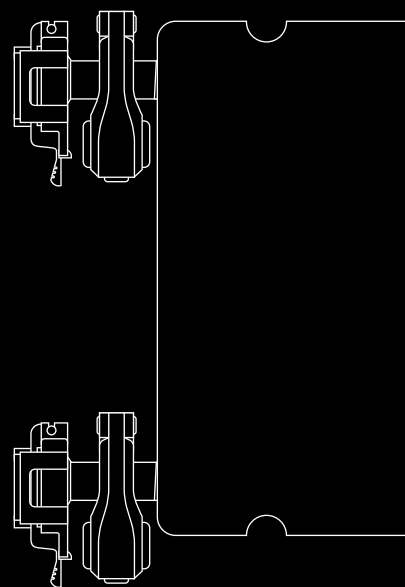
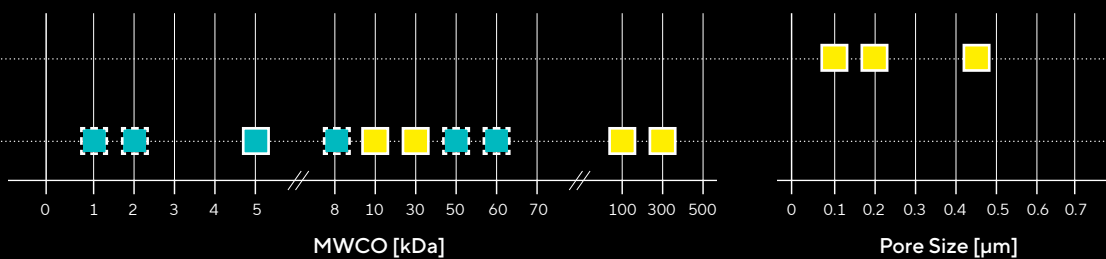
The Self-Contained Units are already gamma irradiated. The use of a SCU offers several advantages such as being pre-flushed, sterile, and ready to use. Additionally, there is no need for cleaning in place (CPI) with associated water flush and validation, which leads to cost and time savings in set up and validation efforts.

Sartocon® Single Pass

The concentration and buffer exchange at the same time allow continuous processing, higher productivity and efficiency, less buffer usage, and decreased setup time. No recirculation results in less shear. In addition, single pass cassettes have a smaller footprint.

Product Landscape TFF Cosumables – Ultrafiltration & Microfiltration







Hollow Fiber

Cut-Offs and Fiber Diameter

MWCO: 3 – 750 kDa for ultrafiltration
and 0.1 – 0.45 μm for microfiltration

- Fiber diameter: 0.5 – 1 mm

Scalability

- 52 cm^2 – 15.45 m^2 filtration area
- 10 mL – 1,500 L process volume

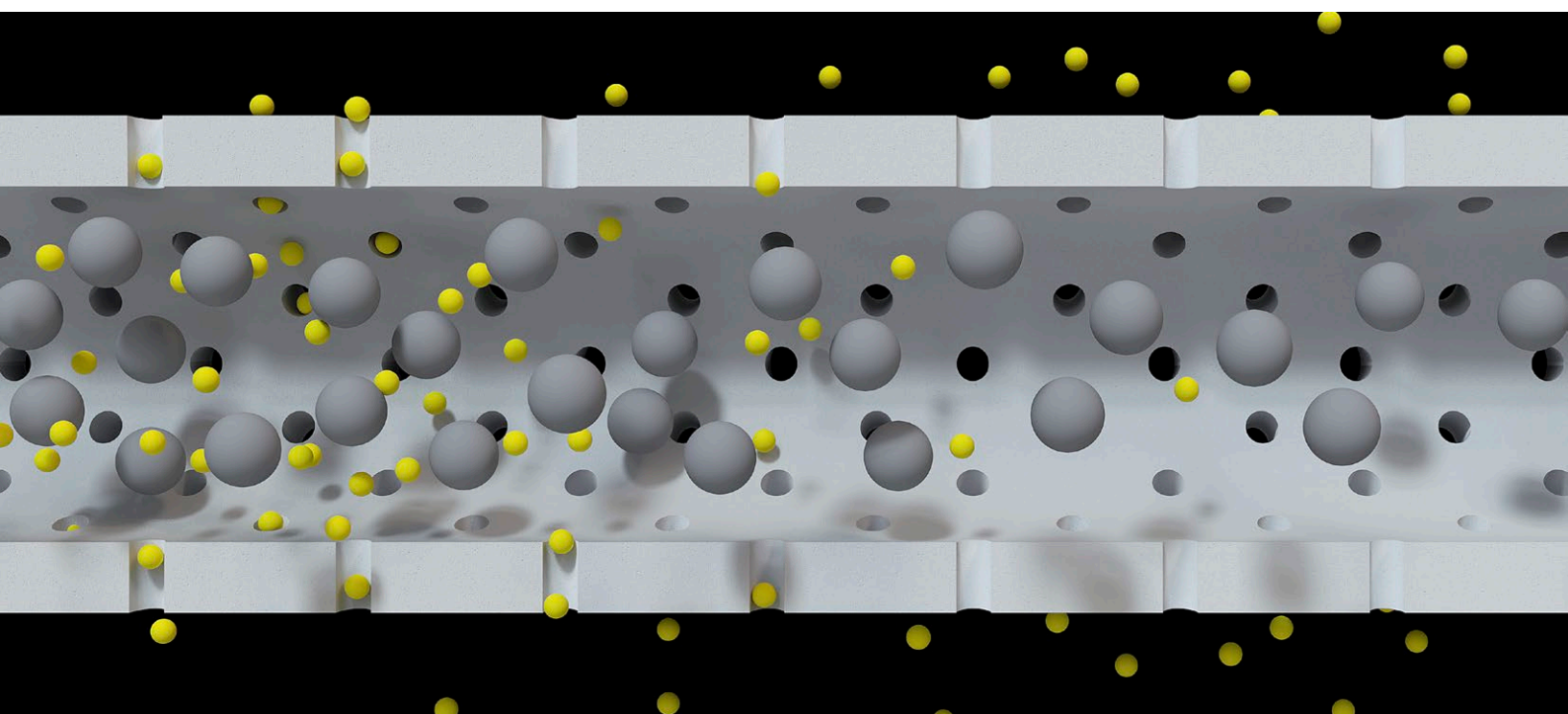
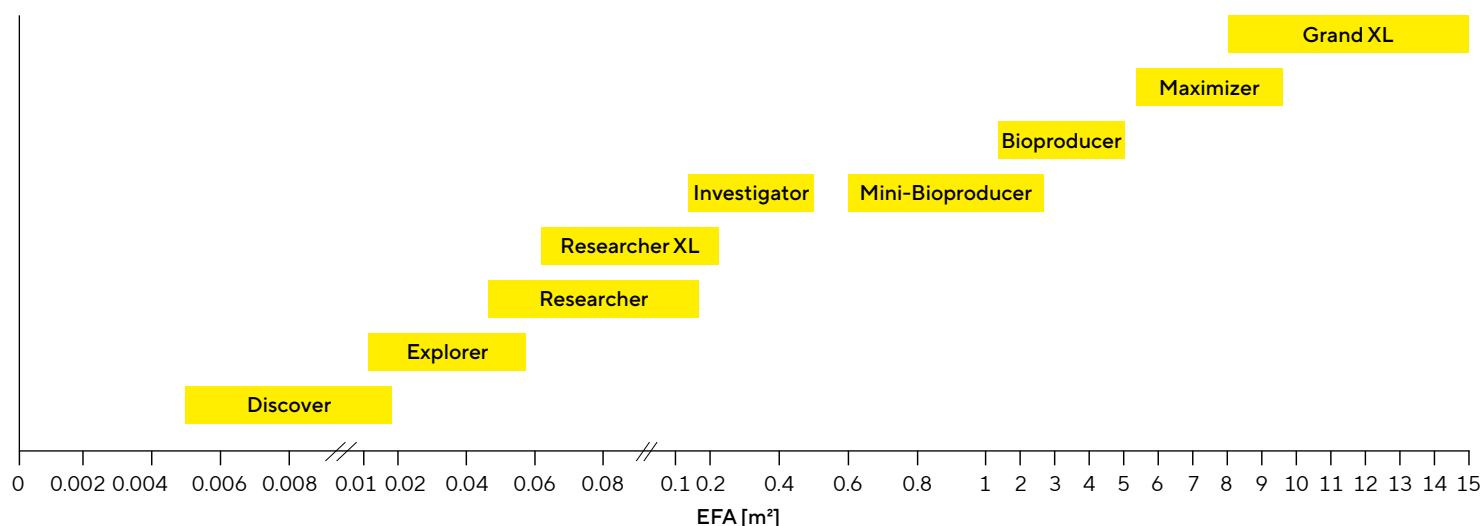
Compatibility

- Sartoflow® 1000 and Sartoflow® 4500

Product Lines

- All lines are gamma-irradiated
- Single-Use Line: fully integrity tested and ready to use
- Steamer Line: autoclavable up to 5 times
- Re-use line: can be easily cleaned and stored in NaOH

TFF Hollow Fiber— Ultrafiltration & Microfiltration



Sartoflow® Systems

Sartorius offers flexible tangential flow filtration (TFF) systems for process development and clinical trials, from laboratory environments up to commercial production batches.

The TFF portfolio can flex to accommodate different process requirements, with options that include cost efficient multi-use systems or closed systems with single-use flow kits for aseptic processing.

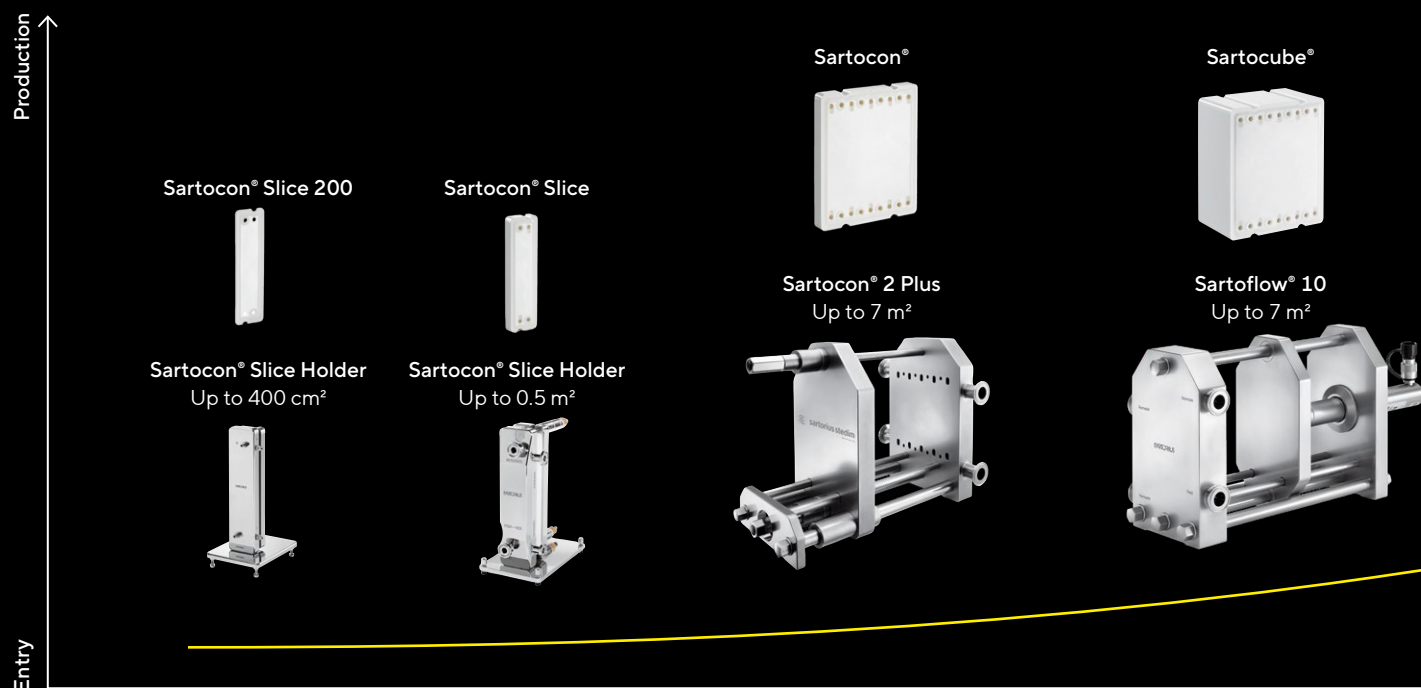
Data

- Filter surface area: 50 cm² – 10 m²
- Good Laboratory Practice (GLP) and cGMP systems
- R&D, PD, Pilot scale and commercial scale
- Flow rate: 1 L/h – 4,500 L/h
- Range of sensors (e.g. pressure, conductivity, pH, UV)
- Touchscreen-based process visualization, monitoring, and control software
- Scalable Process Holders
- Manual, semi-automated, or fully automated

Compatibility

The combination of Sartorius TFF cassettes with Sartorius TFF systems provides an optimal TFF experience. With the scalable TFF system portfolio Sartorius can support the range of cassette types dedicated to your needs.

The Hollow Fiber modules are only suitable for the Sartoflow® 1000 and Sartoflow® 4500.



Technical Detail and Efficient Scale-up With Sartorius TFF Filter Holders

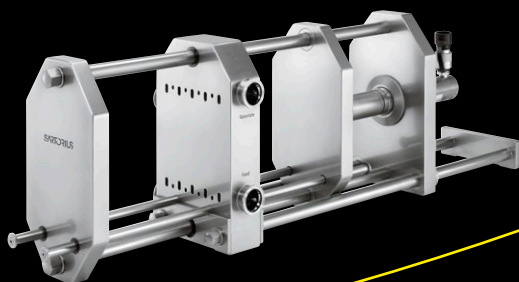
Product Development

Commercial Production



Attributes	Ambr® Crossflow	Sartoflow® Smart	Sartoflow® SP	Sartoflow® Advanced	Sartoflow® Expert SU	Sartoflow® 1000	Sartoflow® 4500
Process mode (multi single)	Multi-use Single-use	Multi-use	Multi-use	Multi-use	Single-use	Single-use	Single-use
Membrane area flatsheet cassette	Ambr® CF Filter Sartocon® Slice 50 10 cm² and 50 cm²	Sartocon® Slice 50 Sartocon® Slice 200 50 cm² – 0.14 m²	Sartocon® SP 0.2 m²	Sartocon® Slice Sartocon® 0.7 – 2.1 m²	Sartocon® Slice SC Sartocube® SC Sartocon® 0.1 – 1.4 m²	Sartocon® 0.6 – 2.8 m²	Sartocon® Sartocube® 3 – 10 m²
Membrane area hollow fiber*	Hollow fiber type	Not available	Not available	Not available	Not available	Investigator Mini-Bioproducer 0.13 – 2.5 m²	Bioproducer 2.69 – 5 m²
Vessel volume	100 mL	1 L	Not applicable	10 L	20 L mixing	10, 20, 100 L	-
Flow rate pump capacity	0 – 4.8 L/hr	1 – 100 L/hr	Buffer: 11.6 L/hr @2 bar (29 psi) Feed: 3.4 L/hr @2 bar	42 L/hr	1,000 L/hr	900 L/hr	4,500 L/hr
Minimum recirculation volume	5 mL	< 20 mL	Not applicable	200 mL	600 mL	1.2 L	Customizable
Automation level	Full	Semi	Full	Full	Full	Full	Full

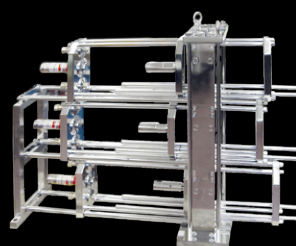
Sartoflow® 20
Up to 14 m²



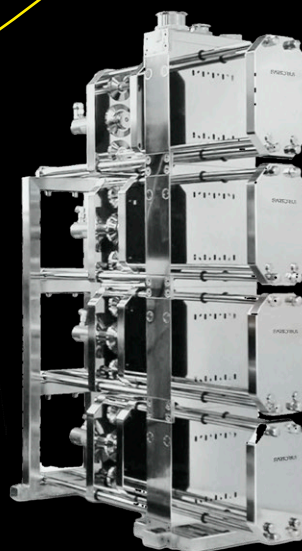
Sartoflow® 40
Up to 28 m²



Sartoflow® 60
Up to 42 m²



Sartoflow® 80
Up to 56 m²



Process Volume →

How to Order

302	144	79	06	E	SW	
						Silicone Encapsulation
						Cassette Type
						Membrane Polymer
						Pore Size Cut-Off (NMWCO*)
						Filtration Area
						Spacer Type

Silicone Encapsulation		Cassette Type		Membrane		Pore Size Cut-Off	
-SG	Grey	302	Sartocon®	144	Hydrosart® (2 5 10 30 100 300 kDa)	AL	PESU Max for Albumin
-SW	White Sartocon®	302	Sartocube®	146	Polyethersulfone (moderate binding)	06	0.45 µm
-BSW	White Sartocube®	305	Sartocon® Slice	(1 5 8 10 30 50 100 300 kDa AL)		07	0.2 µm
		306	Sartocon® Slice Disposable	154	Polyethersulfone (0.1 µm)	58	0.1 µm
		308	Sartocon® Slice 200	175	Polypropylene (0.2 µm)	79	300 kDA
		3M2	Sartocon® ECO	186	Hydrosart® (0.2 0.45 µm)	68	100 kDA
		3M2	Sartocube® ECO			50	50 kDA
		3M5	Sartocon® Slice ECO			59	30 kDA
		3M8	Sartocon® Slice 200 ECO			39	10 kDA

Filtration Area		Spacer Type	
02	0.02 m²	E	Narrow spacer (E-Screen ECO)
01	0.1 m²	K	PESU Max
04	0.4 m²	O	Open Channel (MF)
06	0.6 m²	W	Wide Spacer (MF)
07	0.7 m²		
30	3.0 m²		
35	3.5 m²		

02	0.02 m²	Sartocon® Slice 200 (UF, MF)
01	0.1 m²	Sartocon® Slice (UF, MF)
04	0.4 m²	Sartocon® (MF open channel)
06	0.6 m²	Sartocon® (Hydrosart® UF, MF wide spacer)
07	0.7 m²	Sartocon® (PESU UF)
30	3.0 m²	Sartocube® (Hydrosart® UF)
35	3.5 m²	Sartocube® (PESU UF)

*NMWCO: nominal molecular weight cutoff
General overview of the structure behind the order codes of our TFF cassette portfolio.
Note, that not all combinations are available.

Germany
Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen
Phone +49 551 308 0

USA
Sartorius Stedim North America Inc.
565 Johnson Avenue
Bohemia, NY 11716
Toll-Free +1 800 368 7178

 **For more information, visit**
www.sartorius.com