

# Cadence™

## SINGLE-USE TANGENTIAL FLOW FILTRATION (SUTFF) MODULES

Our single-use tangential flow filtration modules are ready-to-use, gamma-irradiated cassette modules that can be integrated into SUTFF set-ups. They simplify use, speed up turnaround, and increase flexibility and safety in cGMP operations. Cadence™ SUTFF modules can be easily implemented in SUTFF systems for concentration and diafiltration steps from R&D to commercial production of biotech products or vaccines.

They are available in scalable formats from 93 cm<sup>2</sup> up to 2.5 m<sup>2</sup> of membrane area, integrating the process-proven Omega™ polyethersulfone (PES) membrane.

### Key attributes

- Simpler and easier solutions: preassembled, ready-to-use modules for easy integration into SUTFF systems.
- Safer solutions: single-use, gamma-irradiated modules for product and operator safety.

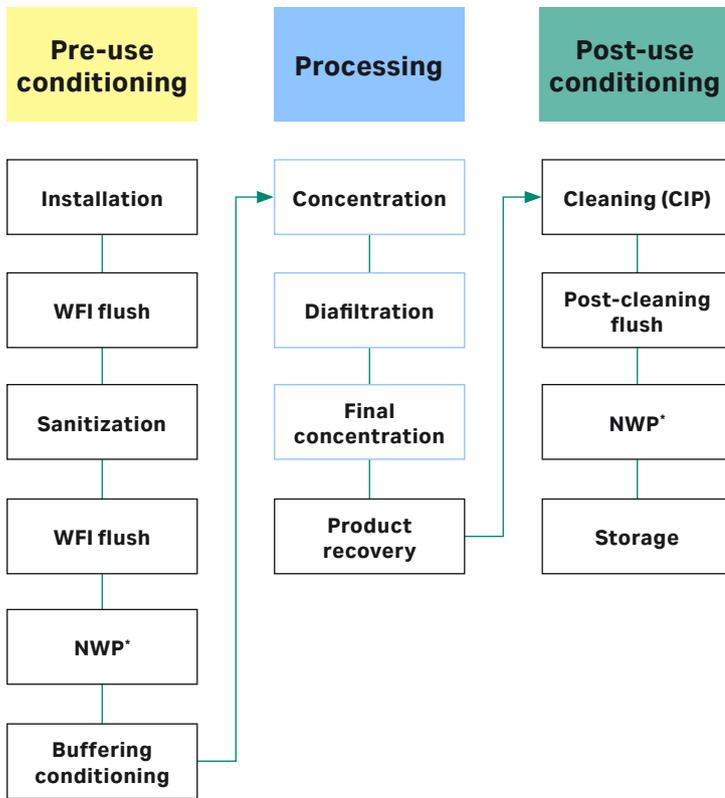
### Features and benefits

- **Easy to use** – Delivered preassembled and gamma-irradiated, enabling quick installation with minimal setup.
- **Time and resource efficient** – Require minimal flushing and no chemical handling, reducing downtime and water/ buffer usage.
- **Improved productivity** – Preconditioned modules streamline operations, allowing focus on core processing tasks.
- **Scalable and flexible** – Support smooth transitions between single-use and reusable systems with consistent performance.
- **Reliable performance** – Use proven Omega PES membrane for robust and dependable processing.

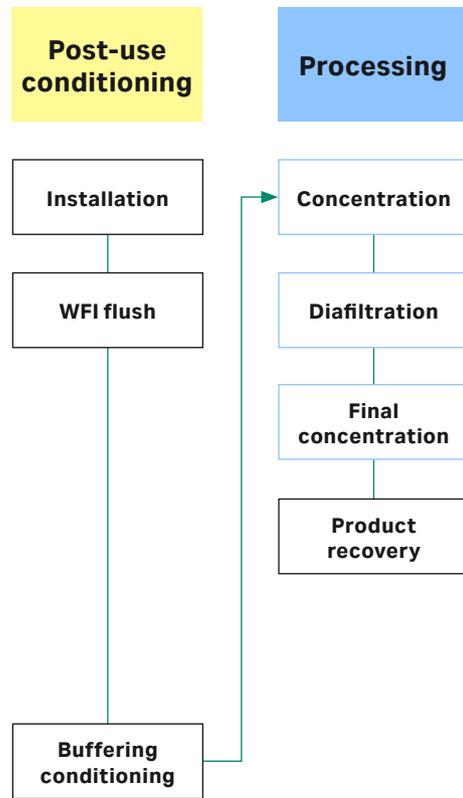


Fig 1. Cadence SUTFF modules.

## TFF with reusable cassettes



## SUTFF with Cadence modules



\* Normalized water permeability

**Fig 2.** Comparison of TFF operations, reusable cassettes versus Cadence SUTFF modules.

## Applications

Typical applications for Cadence SUTFF modules are in the downstream processing operations for the concentration and/or diafiltration of biological products in the biotech and vaccines industries.

Cadence SUTFF modules can be implemented from R&D lab to commercial production. The drug product development and validation steps are fully scalable, allowing for streamlined processes. Purpose-designed for single use, these systems are especially recommended for multipurpose facilities or contract manufacturing organizations (CMOs), whether for clinical material or for commercial production with batch sizes up to several hundred liters.

## Product platform

Cadence SUTFF modules are available in five formats with the following membrane areas: 93 cm<sup>2</sup>, 186 cm<sup>2</sup>, 0.1 m<sup>2</sup>, 0.5 m<sup>2</sup>, and 2.5 m<sup>2</sup>.

The modules integrate our process-proven Omega polyethersulfone (PES) membranes to offer high flux and selectivities. The Omega membranes have been specifically modified to minimize protein binding.

Cadence SUTFF modules are available with Omega membrane in three different nominal molecular weight cutoffs (NMWC)—10, 30, and 100 kDa—meeting the majority of the needs for SUTFF applications in the biotech and vaccines industries.

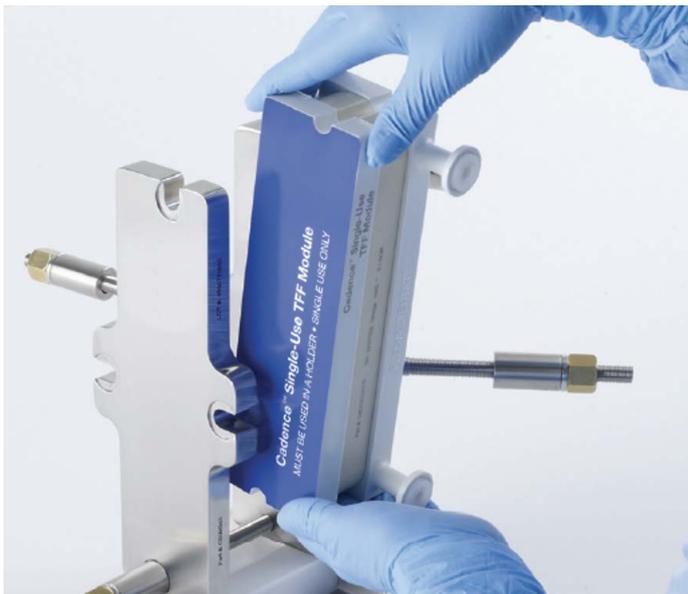
They can be installed and torqued into our specially designed holders and with single-use set-ups (Figures 4 and 5). See specifications of our holders for Cadence SUTFF modules on page 6.

## Quality standards

- Manufactured in a controlled environment.
- Manufactured under a quality management system certified to ISO 9001 standards.
- Supplied with a certificate of quality confirming the quality standards and our quality control tests.
- The fluid path meets all regulatory requirements for:
  - Biological reactivity tests (*in vivo*) for class VI-70°C plastics, USP <88>.
  - Biological reactivity tests (*in vitro*) for cytotoxicity, USP <87>.



**Fig 3.** Cadence SUTFF modules with 186 cm<sup>2</sup>, 0.1 m<sup>2</sup> and 0.5 m<sup>2</sup> membrane area (from left to right).



**Fig 4.** Installation of the Cadence SUTFF module into its holder (vertically).



**Fig 5.** Cadence SUTFF module installed horizontally in its holder.

## Technical specifications

Cadence TFF modules are single-use and supplied after receiving a gamma irradiation dose of  $\geq 25$  kGy.

Module component	Material of construction
Membrane	Polyethersulfone
Support	Polyolefin
Screens	Polypropylene
Encapsulant	Polyurethane with white pigment (TiO <sub>2</sub> )
Seals	Platinum-cured silicone and thermoplastic elastomer
Manifold plates	Glass bead reinforced polypropylene with white pigment (TiO <sub>2</sub> )
Port caps	Polypropylene for luer lock connections, polyethylene for sanitary fittings
Covers	High impact polystyrene

### Operating parameters

Recommended maximum operating feed pressure	4 barg (58 psig)
Maximum transmembrane pressure (TMP)	4 barg (58 psig)
Temperature range during processing	4°C to 40°C
Temperature range during pre-use sanitization	18°C to 25°C
Recommended cross flow rate	5 to 7 L/min/m <sup>2</sup> (0.5 to 0.7 L/min/ft <sup>2</sup> )
Typical operating time	8 h

Cadence SUTFF modules must be used in an appropriate holder. They are integrated in SUTFF systems. The operating limits of the system should also be considered.

### Integrity testing

Parameter	Value
Test pressure	2 barg (30 psig)
Maximum air forward flow	$\leq 1600$ mL/min/m <sup>2</sup> ( $\leq 150$ mL/min/ft <sup>2</sup> ) at 20°C

## Nominal dimensions

Product code <sup>(1)</sup>		CSUMxxxT001	CSUMxxxT002	CSUMxxxT010	CSUMxxxT050	CSUMxxxT250
Reference drawing		<b>Drawing 1</b>	<b>Drawing 1</b>	<b>Drawing 2</b>	<b>Drawing 3</b>	<b>Drawing 3</b>
Nominal dimensions		<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>mm</b>
Length	A	212	212	212	218	218
Overall length	B	212	212	212	232	232
Thickness (for reference only)	C	44	44	55	74	130
Overall thickness (for reference only)	D	44	44	60	86	142
Width	E	62	62	62	186	186
Overall width	F	76	76	112	245	245
Feed/retentate fitting		Female luer	Female luer	½ in. sanitary flange	1 in. sanitary flange	1 in. sanitary flange
– Outer diameter	G	NA <sup>(2)</sup>	NA	25	50	50
– Inner diameter	H	NA	NA	11	22	22
Permeate fitting		Female luer	Female luer	½ in. sanitary flange	¾ in. sanitary flange	¾ in. sanitary flange
– Outer diameter	J	NA	NA	25	25	25
– Inner diameter	K	NA	NA	10	16	16
Retentate port location	L	175	175	177	182	182
	M	20	20	20	18	18
	N	11	11	9	13	13
Permeate port location	P	169	169	168	161	161
	Q	20	20	23	28	28
	R	11	11	9	15	15
Notch diameter	S	10	10	10	16	16
Notch locations	T	13	13	13	89	89
	U	24	24	24	49	49

<sup>(1)</sup> xxx is corresponding to the nominal molecular weight cutoff code: 010 for 10 kDa, 030 for 30 kDa, 100 for 100 kDa (see ordering information).

<sup>(2)</sup> NA = Not applicable.





## Ordering information

### Cadence SUTFF modules with Omega membrane

Format	Nominal molecular weight cutoff	Effective membrane filtration area	Product code
Centramate™	10 kDa	93 cm <sup>2</sup>	CSUM010T001
Centramate		186 cm <sup>2</sup>	CSUM010T002
Centramate		0.1 m <sup>2</sup>	CSUM010T010
Centrasette™		0.5 m <sup>2</sup>	CSUM010T050
Centrasette		2.5 m <sup>2</sup>	CSUM010T250
Centramate	30 kDa	93 cm <sup>2</sup>	CSUM030T001
Centramate		186 cm <sup>2</sup>	CSUM030T002
Centramate		0.1 m <sup>2</sup>	CSUM030T010
Centrasette		0.5 m <sup>2</sup>	CSUM030T050
Centrasette		2.5 m <sup>2</sup>	CSUM030T250
Centramate	100 kDa	93 cm <sup>2</sup>	CSUM100T001
Centramate		186 cm <sup>2</sup>	CSUM100T002
Centramate		0.1 m <sup>2</sup>	CSUM100T010
Centrasette		0.5 m <sup>2</sup>	CSUM100T050
Centrasette		2.5 m <sup>2</sup>	CSUM100T250

### Cadence SUTFF module holders

Holder product code	CSUH040	CSUH250SA
Format of compatible Cadence SUTFF modules	Centramate	Centrasette
Orientation: vertical or horizontal	Both	Horizontal
Product codes of compatible Cadence SUTFF module	CSUM010T001 CSUM010T002 CSUM010T010 CSUM030T001 CSUM030T002 CSUM030T010 CSUM100T001 CSUM100T002 CSUM100T010	CSUM010T050 CSUM010T250 CSUM030T050 CSUM030T250 CSUM100T050 CSUM100T250 - - -
Number of Cadence SUTFF modules that fit in holder	1	1

In addition to Cadence single-use cassette modules, our TFF module holders can also accommodate standard cassettes when used with single-use distribution manifolds as the end plates. Please contact your local representative for more information about the maximum number and types of cassettes that can be accommodated, or about the use of standard cassettes in our TFF module holders.

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