Cadence™

INLINE CONCENTRATOR

The Cadence™ inline concentrator (ILC) was designed to help easily implement single-pass tangential flow filtration (SPTFF) into your processes. The Cadence ILC allows direct flow through in-process volume reduction and can be implemented into a process system or operated as a stand-alone unit.

The preassembled Cadence ILC modules do not need a holder. Once the feed port is connected to a pressurized feed source, the module is ready for use. The built-in resistor in the retentate manifold eliminates the need for downstream instrumentation and allows volume reduction of 2× to 4× (or higher), depending on the application.

Like other Cadence SPTFF devices, the Cadence ILC utilizes T-series cassettes as the building blocks for the module. These modules are offered with either Delta regenerated cellulose or Omega™ polyethersulfone (PES) 10 kDa or 30 kDa membranes, which provide high flux, high selectivity, and low protein binding characteristics. A range of size formats are available to accommodate various processing volumes.

Fig 1. Cadence inline concentrator modules.

The Cadence ILC:

- **Enhances downstream processing to increase capacity and reduce costs:** Cadence ILC modules can help to eliminate or reduce the size of intermediate storage tanks and associated cleaning of tanks when used for in-process volume reduction before or after existing steps.
- **Enables in-process volume reduction:** Depending on the initial concentration and product characteristics, a volume reduction of 2× to 4× (or higher) can be achieved with minimal instrumentation or system requirements.
- **Optimizes the processing of highly shear-sensitive products:** Processing with the Cadence ILC results in only one pass through the pump and module, reducing shear exposure. For products sensitive to pumping, the pump can now be eliminated by using pressurized vessels to flow the process fluid through the module. Further benefits are achieved by eliminating any mixing or foaming issues associated with the feed tank.
- **Simplifies set up:** Cadence ILC modules are provided assembled, and the cassettes and manifolds are pre-torqued between two end plates so that no extra holder is required.

The benefits of the Cadence ILC include:

- Ability to couple the concentration of product before or after other downstream processing (DSP) steps, consequently optimizing other steps and reducing in-process pool tank volumes.
- Easy connection to a pressure source, like a pump or pressure vessel.
- Easy integration of the assembled module, allowing plug-and-play.
- Potential reduction of product damage or aggregation due to reduced residence time and shear exposure.
- Simplified in-process volume reduction.
- Continuous processing enabled by process coupling.
- The module feed, retentate and permeate ports are easily connected to the appropriate outlets using clearly marked ports.

Applications

The Cadence ILC is designed for both continuous processing and in-process volume reduction in various steps for a wide range of biopharmaceutical applications. These include recovery of antibodies or recombinant proteins and preparation of samples (concentrating, desalting) before or after column chromatography, and can be implemented in existing facilities facing tank capacity issues or to other process optimization opportunities.

Technical specifications

Performance

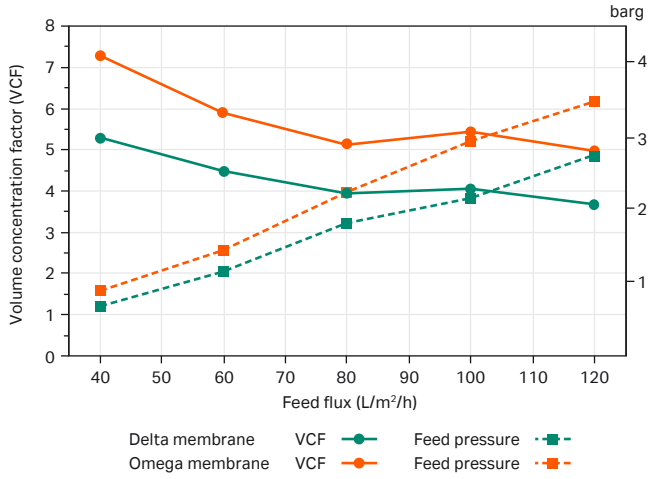

Fig 2. Feed flux excursion test results: volume concentration factor (VCF), feed pressure as function of feed flux, 10 g/L human IgG feed solution, T01 (0.065 m^2) Cadence ILC module.

The range of operating VCF can be determined for a specific feed solution by doing a feed flux excursion.

Operating parameters

The operating conditions for any SPTFF process must be established by performing trials and analyzing results. For assistance in conducting trials to achieve your desired process objectives, contact our technical service group at Cytiva.

Maximum pressure	4.1 barg (60 psig)
Maximum transmembrane pressure	4.1 barg (60 psig)
Processing temperature range	20°C to 25°C for extended use Up to 40°C for 4 hour cleaning
pH range	2 to 13

Materials of construction

Cassette	• Delta regenerated cellulose or Omega PES membrane • 10 kDa or 30 kDa with polypropylene (PP) screens • Polyurethane encapsulant with white pigment (TiO_2) • Medical grade silicone for the permeate seals
Gaskets	Medical grade platinum-cured silicone
Manifold plates	Ultra-high molecular weight polyethylene
Tubing	Pharmaceutical grade platinum-cured silicone
T01 and T02 connectors	Female luer connection and cap: PP
T12 connector	MPC quick disconnector and plug (polysulfone [PS])
T06 connector	MPX quick disconnect connector and plug (PS)

Typical feed flow rates

Module format	Membrane area (m^2)	Feed flow rate (L/min)
T01	0.065	0.05 to 0.30
T02	0.130	0.10 to 0.70
T12	0.700	0.60 to 3.50
T06	3.500	2.90 to 17.5

Integrity test

Delta membrane module	< 538 sccm/m^2 (< 50 sccm/ft^2) at 4.1 barg (60 psig)
Omega membrane module	< 1600 sccm/m^2 (< 150 sccm/ft^2) at 2.1 barg (30 psig)

Shelf life

The shelf life of Cadence inline concentrator packaged in preservative is 3 years from the date of manufacture, when the modules are stored unopened, in the original packaging, at temperature up to 25°C, and protected from direct light.

Biological safety

The materials of construction for Cadence ILC modules have been tested and meet the requirements for the Biological Reactivity Tests listed in the United States Pharmacopeia (USP) under USP <88> for Class VI-70°C Plastics.

Documentation

There is comprehensive documentation, available on request, to ensure the Cadence ILC module is operated successfully including:

- Care and use manual
- Validation guide
- Application notes

Each module is shipped with a certificate of quality. A material and safety data sheet (MSDS) for the module preservative solution is available on request, Additional services include:

- Validation service for your specific tests such as compatibility testing with your product fluid
- Training and technical support to optimize your process using Cadence ILC modules

Please contact Cytiva for further information.

Ordering information

MWCO (kDa)	Cassette format	Membrane area (m^2)	Product code	
			Delta membrane	Omega membrane
10	T01	0.065	ILD010T010407	ILOS010T010407
	T02	0.130	ILD010T020407	ILOS010T020407
	T12	0.700	ILD010T120407	ILOS010T120407
	T06	3.500	ILD010T060407	ILOS010T060407
30	T01	0.065	ILD030T010407	ILOS030T010407
	T02	0.130	ILD030T020407	ILOS030T020407
	T12	0.700	ILD030T120407	ILOS030T120407
	T06	3.500	ILD030T060407	ILOS030T060407

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For local office contact information, visit cytiva.com/contact

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