TFF cassette holders

FOR CENTRAMATE™ AND CENTRASETTE™ CASSETTES

Designed for optimum performance and product recovery, our tangential flow filtration (TFF) cassette holders are available for Centramate™ and Centrasette™ cassettes in a variety of sizes to meet every application requirement.

Applications that are developed on a small system using a Centramate cassette and Centramate holder can be easily scaled up, either by adding additional cassettes to the holder or by scaling into a larger cassette format and holder configuration with an identical flow path, like the Centrasette or Centrastak holders. TFF cassette holders for medium and large-scale production environments have a small footprint, yet are still capable of holding large areas of membrane.

Sanitary stainless steel holders may be sterilized by steam or autoclaving without cassettes installed.

The benefits of our TFF cassette holders include:

- A specialized design to support Centramate and Centrasette cassettes for optimized process performance.
- Holders available to support from 0.1 m^2 to 74 m^2 of membrane area.
- Full traceability and material certification.
- Manual torque (MT) or auto-torque (AT) option.
- Fitting kits available to simplify installation.

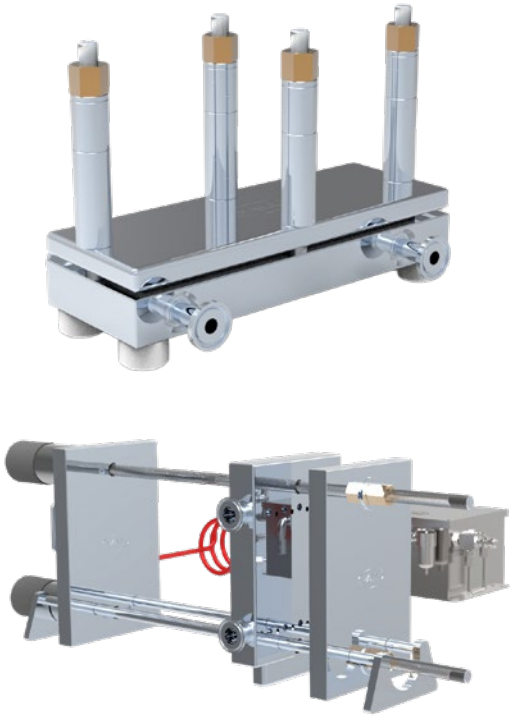


Fig 1. Centramate holder (top) and Centrasette 10AT holder (bottom)

Manual torque option

The manual torque hardware is an economical alternative to the auto-torque option. Operators must use calibrated torque wrenches (supplied with the holder) to effect required compression of cassettes and gaskets in a manual torque cassette holder.

Auto-torque option

To ensure ease of use, particularly when installing large numbers of cassettes, auto-torque hardware is equipped with hydraulic cylinders and a pump. Auto-torque cassette holders automatically compensate for cassette compression and temperature reduction. They also eliminate variability in technique between operators. Auto-torque cassette holders are recommended for process-scale validated processes.

Fitting kits

Complete fitting kits consisting of pressure gauges, valves, filtrate manifold, connectors, gaskets and clamps are available for most cassette holders. Ordering a complete fitting kit with the cassette holder simplifies installation into a system and avoids potential delays in starting your process due to missing parts.

Choosing a cassette holder

The following tables list cassette holders with relative area capacities and working volumes.

Lab and development scale
(scale-up and scale-down studies)

		Working volumes*	
Product	**Membrane area**	**Starting**	**Final**
Centramate LV	0.01 to 0.02 m^2	25 to 2000 mL	10 mL
Centramate PE	0.01 to 0.46 m^2	0.5 to 100 L	150 mL
Centramate	0.01 to 0.46 m^2	0.5 to 100 L	150 mL

Pilot scale
(process development)

		Working volumes*	
Product	**Membrane area**	**Starting**	**Final**
Centrasette LV	0.5 to 2.5 m^2	2.5 to 500 L	400 mL
Centrasette P	0.5 to 2.5 m^2	2.5 to 500 L	400 mL
Centrasette 5	0.5 to 5.0 m^2	2.5 to 1000 L	1000 mL
Centrasette 10	0.5 to 10.0 m^2	2.5 to 2000 L	2000 mL

Process scale
(production)

		Working volumes*	
Product	**Membrane area**	**Starting**	**Final**
Centrastak 100	1.0 to 20.0 m^2	10 to 4000 L	4 L
Centrastak 200	2.0 to 40.0 m^2	20 to 8000 L	10 L
Centrastak 300	3.0 to 60.0 m^2	30 to 12 000 L	15 L
Centrastak 400	4.0 to 80.0 m^2	40 to 16 000 L	20 L

* Working volumes are based on an average filtrate flux rate of about 50 L/m^2/h and process time of 5 hours. Starting range covers minimum to maximum area installed for screen channel cassettes. Final process volume represents final concentration volume or minimum working volume for the system. Actual volumes depend on system hold-up volume and operating parameters. Piping (tubing) lengths and internal diameters significantly affect the final volume.

Centramate LV holder

Centramate LV holders are manufactured using 316L stainless steel and designed with female luer fittings. They are to be used with 0.01 m^2 and 0.02 m^2 Centramate cassettes. The holders can accommodate up to 0.04 m^2 of screen channel or 0.02 m^2 of open channel Centramate cassettes at recommended cross flow rates. A range of luer fittings and valves are available, as well as pressure gauges or transducers to set up a complete TFF system.

Centramate PE holder

Centramate PE holders are recommended for use in applications where metal contact must be avoided. The holders have polyethylene manifolds with ¼ in. NPT threaded ports sandwiched between 304 stainless steel outer plates for support. They can accommodate up to four Centramate 0.1 m^2 cassettes. If only one cassette is installed, the use of several spacers on the tie rods makes it easy to apply and tighten the nuts with minimal threading. As additional cassettes are added, spacers can be removed. A plastic NPT threaded fitting kit with either two or three pressure gauges is also available.

Centramate holder

Centramate 316L stainless steel cassette holders come with ½ in. sanitary flanges on feed and filtrate ports and can accommodate up to five Centramate 0.1 m^2 cassettes. The holders are supplied with both 1 in. and 2 in. spacers on the tie rods to simplify cassette installation and to apply the required torque. Spacers can be removed to compensate for the height difference as additional cassettes are added to the holder. Sanitary fitting kits with either two or three pressure gauges are available. We also provide surface and weld certification.

Centrasette LV holder

Centrasette LV holders are manufactured using highly polished 316L stainless steel. These holders have ¾ in. sanitary fractional fitting on the feed/retentate and permeate ports which minimize the hold-up volume. They are optimized for use with Centrasette cassettes when the total membrane area will be less than 2.5 m^2 of Centrasette cassettes.

Centrasette P holder

Centrasette P holders, like Centramate PE holders, are recommended for use in applications where metal contact must be avoided; for example, when processing certain metal sensitive enzymes or oligonucleotides. They have a polypropylene center manifold and end plate, housed between stainless steel plates to supply the necessary rigidity when operating at higher pressures. Luer fittings on the ¾ in. sanitary polypropylene ports can connect to plastic pressure transducers for monitoring pressures without metal contact. The low-cost plastic manifold and end plate can be replaced to avoid cleaning validation or dedicated to a specific application, along with a set of cassettes, to prevent any risk of cross-contamination. The Centrasette P holder is intended for use with Centrasette cassettes when total membrane area will be less than 2.5 m^2.

Centrasette 5 and Centrasette 10 holders

Centrasette 5 and Centrasette 10 316L stainless steel holders have ports designed for 1 in. sanitary connectors. Both are intended for use in pilot and process scale applications; Centrasette 5 with up to 5 m^2 Centrasette or Centrasette II cassettes and Centrasette 10 with up to 10 m^2 Centrasette or Centrasette II cassettes. Their feed/retentate channels have tapered bores engineered to maintain uniform cross flow and pressure drops across the membrane cassettes. Two permeate ports, one near the feed and the other near the retentate, are designed to reduce backpressure on the permeate side of the membrane, which is especially important when operating at high flux rates. Pressure on the permeate side effectively reduces transmembrane pressure and lowers filtrate flux rates. As with other manual torque holders, a calibrated torque wrench and socket is supplied with the holder.

Centrastak holders

Using a Centrastak system, processes developed at bench scale on Centramate and Centrasette cassettes can be scaled up to process volumes in excess of 10 000 L. The Centrastak range of cassette holders has been designed for optimal performance in a large-scale production environment. The small footprint makes them ideal for use in process skids and manufacturing suites where space is at a premium. Each level in a Centrastak holder can hold up to 10 m^2 of Centrasette cassettes on each side of a central manifold or effectively 20 m^2 per level. A single center-manifold significantly reduces hold-up volumes. Feed flow direction is from bottom to top, allowing air to be easily expelled from the system. Four Centrastak holders are available:

- Centrastak 100AT – 20 m^2 capacity
- Centrastak 200AT – 40 m^2 capacity
- Centrastak 300AT – 60 m^2 capacity
- Centrastak 400AT – 80 m^2 capacity

All Centrastak holders are available in auto-torque format with a hydraulic system, including stainless steel pistons and pump, for maintaining optimal and uniform compression on the installed cassettes. A pressurized air supply is required to operate the hydraulic pump (4.1 bar [60 psi] minimum, 8.6 bar [125 psi] maximum). All wetted surfaces are electropolished, 316L stainless steel. The holder is supplied with surface and weld certification to support I/Q validation.

Technical specifications

Centramate cassette holders

Cassette holder	Centramate LV	Centramate PE	Centramate
Feed and retentate ports	Female luer SS	¼ in. NPT fitting (female)	½ in. sanitary 9.6 mm (0.38 in.) bore
Filtrate port	Female luer SS	¼ in. NPT fitting (female)	½ in. sanitary 8.1 mm (0.32 in.) bore
Maximum membrane area			
Screen	0.04 m^2	0.37 m^2	0.46 m^2
Suspended screen	0.02 m^2	0.28 m^2	0.37 m^2
Nominal dimensions (width × length × depth)	12 × 23 × 6.6 cm	9.4 × 24 × 19 cm	13 × 23 × 16 cm
Weight	4.0 kg	8.6 kg	6.4 kg
Maximum operating temperature	50°C	80°C	80°C
Maximum operating pressure	5 bar (75 psi)	6 bar (90 psi)	6 bar (90 psi)

Centrasette cassette holders

Cassette holder	Centrasette LV	Centrasette P	Centrasette 5, 5AT†	Centrasette 10, 10AT
Feed and retentate ports	¾ in. sanitary SS	¾ in. sanitary PP	1 in. sanitary SS	1 in. sanitary SS
Filtrate port	¾ in. sanitary SS	¾ in. sanitary PP	1 in. sanitary SS	1 in. sanitary SS
Maximum membrane area				
Screen	2.0 m^2	2.0 m^2	5.0 m^2	10.0 m^2
Suspended screen	1.5 m^2	1.5 m^2	4.0 m^2	8.0 m^2
Nominal dimensions (width × length × depth)	26 × 25 × 21 cm	30 × 20 × 34 cm	26 × 25 × 27 cm	25 × 34 × 74 cm
Weight	28 kg	25 kg	30 kg	63 kg
Maximum operating temperature	80°C	50°C	60°C	60°C
Maximum operating pressure	6 bar (87 psi)	5 bar (75 psi)	6 bar (87 psi)	6 bar (87 psi)

† Extended tie rods available to increase membrane capacity to 5 m^2 for suspended screen channel cassettes.

Centrastak cassette holders

Cassette holder	Centrastak 100	Centrastak 200	Centrastak 300	Centrastak 400
Feed and retentate ports	2 in. sanitary	2 in. sanitary	2 in. sanitary	2 in. sanitary
Filtrate port	1 in. sanitary	1 in. sanitary	1 in. sanitary	1 in. sanitary
Maximum membrane area[1]				
Screen	20 m^2	40 m^2	60 m^2	80 m^2
Suspended screen	15 m^2	30 m^2	45 m^2	60 m^2
Nominal dimensions (width × length × depth)	39 × 91 × 59 cm	39 × 91 × 95 cm	39 × 91 × 107 cm	39 × 91 × 120 cm
Weight	155 kg	255 kg	314 kg	409 kg
Maximum operating temperature[2,3]	80°C	80°C	80°C	80°C
Maximum operating pressure	6 bar (90 psi)	6 bar (90 psi)	6 bar (90 psi)	6 bar (90 psi)

[1] Cassette blocks (2 m^2 or 2.5 m^2) are recommended. If 0.5 m^2 cassettes are used, stabilizer plates must be used between every 5 cassettes (fine/medium screen) or 3 cassettes (suspended screen).
[2] Maximum operating temperature may be restricted by cassette operating temperature limit.
[3] Holder may be steamed with compatible cassettes, or without cassettes at up to 142°C.

Materials of construction for wetted parts

Cassette holder	Centramate PE	Centramate LV	Centramate	Centrasette P	Centrasette
Plates	UHMW polyethylene	316L stainless steel	316L stainless steel	Polypropylene	316L stainless steel
Flow distribution manifold	UHMW polyethylene	316L stainless steel	316L stainless steel	Polypropylene	316L stainless steel
Other components	–	EPDM O-ring on SS threaded luer connector	–	EPDM sanitary gaskets	–

UHMW: ultra high molecular weight
EPDM: ethylene-propylene-diene monomer

Ordering information

Range	Description	Product code
Centramate	PE holder	FS002K10
	LV holder	CM018LV
	SS holder	FS001K10
Centrasette	P holder	FS039K05
	LV holder	FS044K05
	5 holder	FS001K05
	5AT holder	FS020K05
	10 holder	FS028K05
	10AT holder	FS025K05
Centrastak	100 AT	FS050K05
	200 AT	FS034K05
	300 AT	FS036K05
	400 AT	FS038K05

Fitting kits

	Description	Includes	Product code
Centramate	SS fitting package	One diaphragm valve and two pressure gauges	FS005K10
	SS steel fitting package	Two diaphragm valves and three pressure gauges	FS006K10
	PE fitting package	Two pressure gauges	FS007K10
	PE fitting package	Three pressure gauges	FS008K10
Centrasette	5 fitting package	Two diaphragm valves and two pressure gauges	FS005K05
	5 fitting package	Two diaphragm valves and three pressure gauges	FS006K05
	LV fitting package	Two diaphragm valves and three pressure gauges	FS047K05

Combination packages

Range	Description	includes	Product code
Centramate	PE holder and fittings package	Three pressure gauges	FS013K10
	SS holder and fittings package	Three pressure gauges and two diaphragm valves	FS011K10
Centrasette	LV holder and fittings package	Three pressure gauges and two diaphragm valves	FS046K05
	5 holder and fittings package	Three pressure gauges and two diaphragm valves	FS014K05
	5AT holder and fittings package	Three pressure gauges and two diaphragm valves	FS022K05

Holder spares

Description	Product code
Centrasette 5 tie rod assembly	FS005X05
Centrasette nut/washer (pack of 4)	FS006X05
Centramate nut/washer (pack of 4)	FS007X01
Centrasette 1 in. spacer (pack of 2)	FS007X05
Centrasette 2 in. spacer (pack of 2)	FS008X05
Centrasette torque wrench	FS010X05
Centrasette socket	FS011X05
Centramate torque wrench	FS014X01
Centramate socket	FS015X01
Auto-torque cylinder	FS029X50
Auto-torque pump	FS032K05
Centrasette top plate	FS038X05
Centramate footpad/screw (pack of 4)	FS138X01
Centramate PE manifold	FS153X01
Centramate PE top plate	FS154X01

Fitting kit spares

Description	Product code
1½ in. sanitary clamp 6.9 bar (100 psi) pressure gauge	FS021X05
1½ in. sanitary clamp tee	FS022X05
1½ in. sanitary clamp	FS023X05
½ in. sanitary clamp × ¼ in. hose barb (pack of 2)	FS024X01
½ in. sanitary clamp	FS025X01
1 in. sanitary clamp × ½ in. hose barb	FS025X05
1 in. sanitary clamp diaphragm valve	FS026X05
¼ in. MNPT PP tee (pack of 10)	FS031X01
¼ in. NPT PP tee (pack of 4)	FS032X01
¼ in. MNPT × ¼ in. PP elbow	FS051X01
¼ in. NPT × ¼ in. hose barb	FS052X01
4.1 bar (60 psi) pressure gauge	FS054X01
1 in. sanitary clamp filtrate branch	FS054X05
1 in. sanitary clamp elbow	FS062X05
¾ in. sanitary clamp × ½ in. barb	FS063X01
½ in. sanitary clamp filtrate manifold	FS070X01
½ in. sanitary clamp diaphragm valve	FS076X01
½ in. sanitary clamp tee × 1½ in. sanitary clamp branch	FS083X01
¾ in. sanitary clamp elbow	FS094X01
12 mm hose barb (pack of 3)	FS121X01
Fitting flange	FS124X05

Miscellaneous spares

Description	Product code
2 in. EPDM sanitary clamp gasket (pack of 13)	FS007X50
1 in. EPDM sanitary clamp gasket (pack of 13)	FS024X05
½ in. EPDM sanitary clamp gasket (pack of 10)	FS026X01
Multi-slot stabilizing plate	FS030X50
Multi-slot clean in place spacer	FS032X50
1½ in. EPDM sanitary clamp gasket (pack of 13)	FS065X05
Centrasette clean in place plate	FS079X05
Centrastak stabilizing plate	FS086X05
EPDM sanitary clamp gasket (pack of 10)	FS090X01
Centramate clean in place plate	FS159X01
Multi-manifold clean in place plate	FS160X01
Centrastak figure 8 gasket (pack of 2)	FS301X05
Sterile pressure transducer	FS700X14
Sterile pressure transducer (pack of 12)	FS700X15
Pressure gauge assembly	FS710M01

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