

Vivaflow[®]

Unique, Plug and Play Laboratory Crossflow Cassettes

Benefits

- Rapid sample processing, with ready-to-use cassettes operated by a standard peristaltic pump
- Plug and play simplicity, thanks to the unique flip-flow channels that ensure optimal flux
- Flexible and modular scalability, with a broad choice of membrane, MWCO and single or multi use options for samples up to 5 L



Product Overview

Vivaflow[®] brings the benefits of tangential flow filtration to research and development laboratories. Operated with a standard peristaltic pump, these ready-to-use cassettes eliminate the cost and complexity of process-scale systems. Ideal for the ultrafiltration and diafiltration of 0.1 to 5 L samples, the unique flip-flow channel design provides plug and play convenience, ensuring optimal crossflow velocities for fast concentration

Product Information

The Vivaflow® range offers a choice of crossflow devices for scientists who need to reliably concentrate or re-buffer aqueous samples with initial volumes of up to 5 L. Unlike other crossflow cassettes on the market, Vivaflow® is a dedicated laboratory product that meets the demand for ease of use without requiring additional, non-standard equipment or significant process optimization. A choice of devices, operated with a standard peristaltic pump, achieve optimal results for every ultrafiltration need:

Vivaflow® 50 is a modular, single use cassette. With its unique interlocking design and optional stand, up to 6 cassettes are conveniently connected in series and parallel to suit the sample volume and achieve the desired processing speed. With no requirement for cleaning, Vivaflow® 50 is ready-to-use and eliminates the risk of sample cross-contamination. This is the ideal choice for the concentration or buffer exchange of 0.1 to 3 L samples.

Vivaflow® 50R is the most compact crossflow cassette to feature Sartorius' unique, low-binding Hydrosart® membrane. Therefore, it is the ideal choice for the concentration of high value samples, such as viruses and antibodies. For sample volumes up to 1 L, two cassettes may be operated in parallel, and with a robust cleaning procedure, can be reused multiple times.

Vivaflow® 200, like Vivaflow® 50R, is a multi-use cassette. It is offered with a choice of PES or Hydrosart® membranes and a broad range of MWCO options. This enables convenient scale up from the smaller Vivaflow® 50 and 50R cassettes, whilst ensuring suitability for all target molecule types. For sample volumes up to 5 L, two cassettes may be operated in parallel.

Applications

Vivaflow® cassettes lend themselves to a multitude of ultrafiltration applications whenever larger sample volumes need to be concentrated, desalinated or buffer exchanged in a research or process development laboratory environment.

Typical applications include:

- Recombinant protein (e.g. mAb) concentration or diafiltration in biopharmaceutical research
- Virus and virus-like particle (VLP) clarification, concentration or diafiltration from cell culture and environmental samples
- Isolation and concentration of viruses and viral nucleic acids from wastewater
- Concentration, diafiltration or free drug removal in nanoparticle research
- Concentration of environmental samples prior to trace metals analysis

Technical Data

	Vivaflow® 50	Vivaflow® 50R	Vivaflow® 200
Materials of construction			
Main housing	Polycarbonate	Acrylic	Acrylic
Flow channel	TPX (PMP)	Acrylic	Acrylic
Membrane support	TPX (PMP)	Polypropylene	Polypropylene
Membrane seals and O rings	Silicone	Silicone	Silicone
Pressure indicator	Not included*	Polypropylene, SS** spring	Polypropylene, SS** spring
Flow restrictor	Polypropylene	Polypropylene	Polypropylene
Fittings	Nylon	Nylon	Nylon
Tubing	PVC (medical grade)	PVC (medical grade)	PVC (medical grade)

Dimensions			
Overall L H W	107 84 25 mm	100 100 24 mm	126 138 38 mm
Channel W H	15 mm 0.3 mm	7.5 0.4 mm	10 mm 0.4 mm
Active membrane area	50 cm ²	50 cm ²	200 cm ²
Min. recirculation volume	< 10 mL	< 10 mL	< 20 mL
Hold-up volume, cassette	1.5 mL	1.7 mL	5.3 mL
Non-recoverable hold-up	< 0.5 mL	< 0.5 mL	< 1 mL

Operating Conditions			
Pump flow rate	200–400 mL/min	200–400 mL/min	200–400 mL/min
Maximum pressure	3 bar (45 psi)	4 bar (60 psi)**	4 bar (60 psi)**
Maximum temperature	60°C	60°C	60°C

* Pressure indicator is available separately (Order no. VFA020) as an optional accessory for Vivaflow® 50

** SS = stainless steel

*** Pressure drop across inlet | outlet = 0.5 bar (7 psi)

Working Principle

Vivaflow® cassettes contain an ultrafiltration membrane over which a sample is recirculated using a peristaltic pump (Figure 1). The thin channel flip-flow path provides high crossflow velocities with minimal pump speed requirements of 200 – 400 mL/min. A flow restrictor included with each cassette generates the optimal transmembrane pressure for concentration | diafiltration of the sample, whilst the filtrate is collected in a separate vessel. Ultrafiltration can be stopped as soon as the desired volume is reached by simply turning off the pump.

A single 50 cm² cassette typically reduces 500 mL to 15 mL in less than 50 min. Virtual total recovery of the retentate is achieved with a single rinse.

Convenient Diafiltration

The optional diafiltration reservoir (order number VFA006) makes both concentration and diafiltration with Vivaflow® exceptionally convenient. A sample is first concentrated to the desired volume, then a length of tubing placed into a separate vessel containing the exchange buffer is connected to the reservoir (Figure 2). Airtight sealing in the lid of the diafiltration reservoir enables constant volume buffer exchange. As the original buffer continues to permeate the ultrafiltration membrane, it is replaced with an equal volume of the exchange buffer, thereby limiting the need for large buffer volumes, and avoiding sample dilution.

Figure 1

Ultrafiltration with Vivaflow®

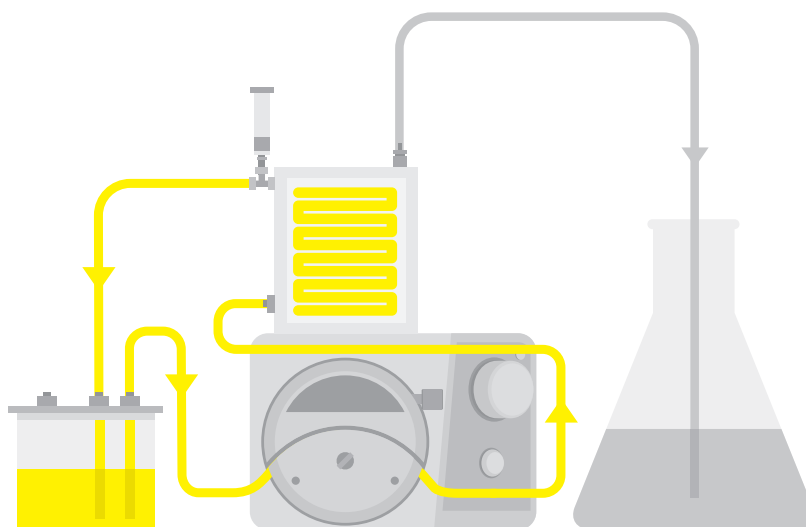
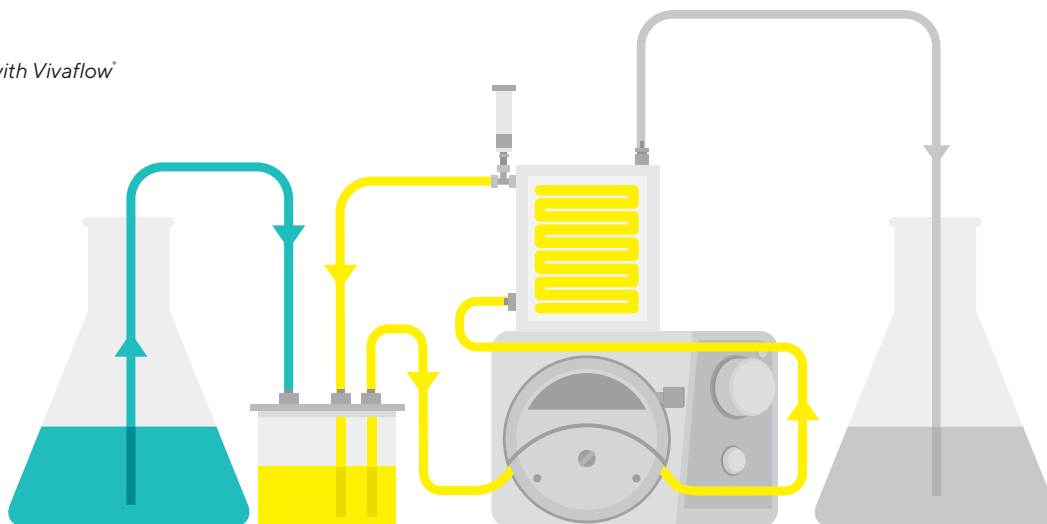


Figure 2

Diafiltration with Vivaflow®



Components for Operating One to Six Vivaflow® 50 Cassettes

The modular design of Vivaflow® 50 enables the operation of multiple cassettes in series and parallel (Figure 3 and Table 1). This increases the maximum throughput to up to 3 L and accelerates processing speed in proportion to the membrane area (Figure 4).

Figure 4

Precise scale-up in process speed when using one to four Vivaflow® 50 cassettes.

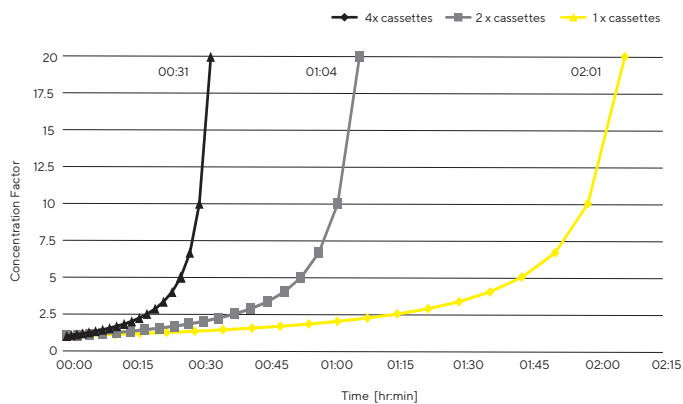


Figure 3

System components for operating multiple Vivaflow® 50 cassettes.

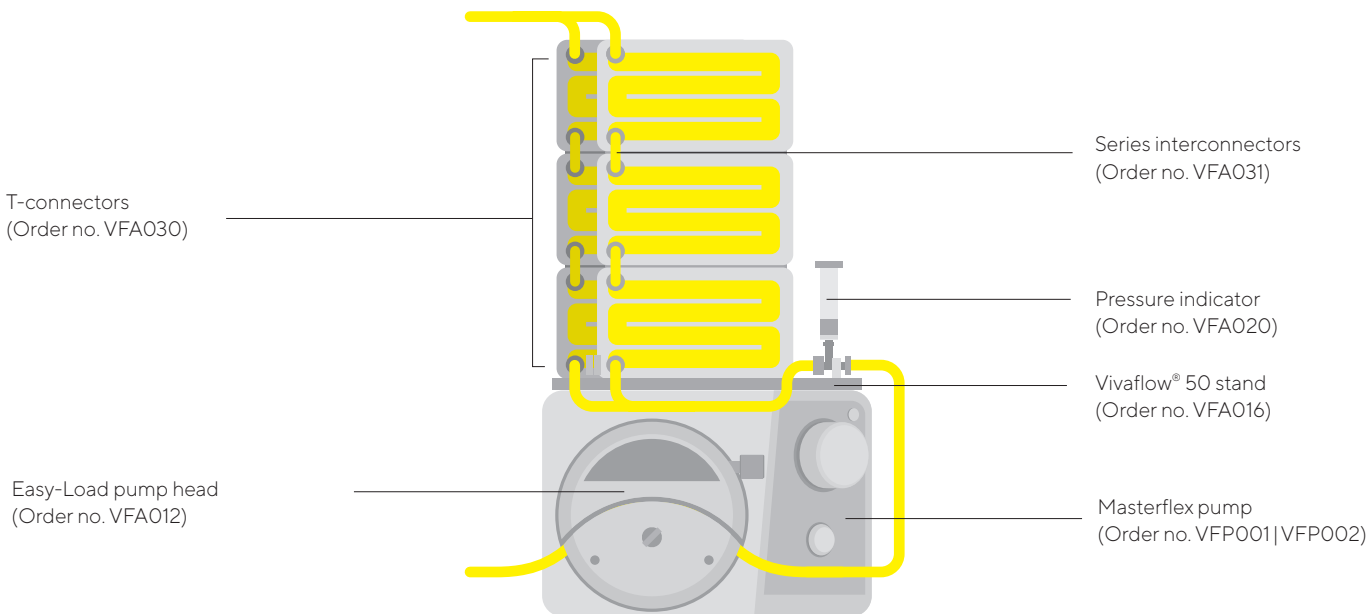


Table 1

Sample capacities and system components for operating Vivaflow® 50 cassettes

		1x VF 50	2x VF 50	3x VF 50	4x VF 50	5x VF 50	6x VF 50
Operating Mode		Single	Series	Series	Series and parallel	Series and parallel	Series and parallel
Sample Volume		0.1 – 0.5 L	0.5 – 1 L	1 – 1.5 L	1.5 – 2 L	2 – 2.5 L	2.5 – 3 L
Masterflex pump	VFP001 VFP002*	1	1	1	1	1	1
Easy-Load pump head - size 16	VFA012	1	1	1	1	1	1
Pressure indicator	VFA020	optional	1	1	1	1	1
Series interconnectors	VFA031	-	(1)**	(2)**	(2)**	(3)**	(3)** + 1
T-connectors (x2)	VFA030	-	-	-	1	1	1
Vivaflow® 50 stand	VFA016	optional	1	1	1	1	1

* VFP001 line voltage = 240 V; VFP002 line voltage = 115 V

** One series interconnector is supplied with each pack of 2x cassettes

Components for Operating One or Two Vivaflow® 50R | 200 Cassettes

The maximum throughput of Vivaflow® 50R | 200 can also be increased and processing time reduced by adding a second cassette to the setup (Figure 5 and Table 2).

Figure 5

System components for operating two Vivaflow® 50R | 200 cassettes

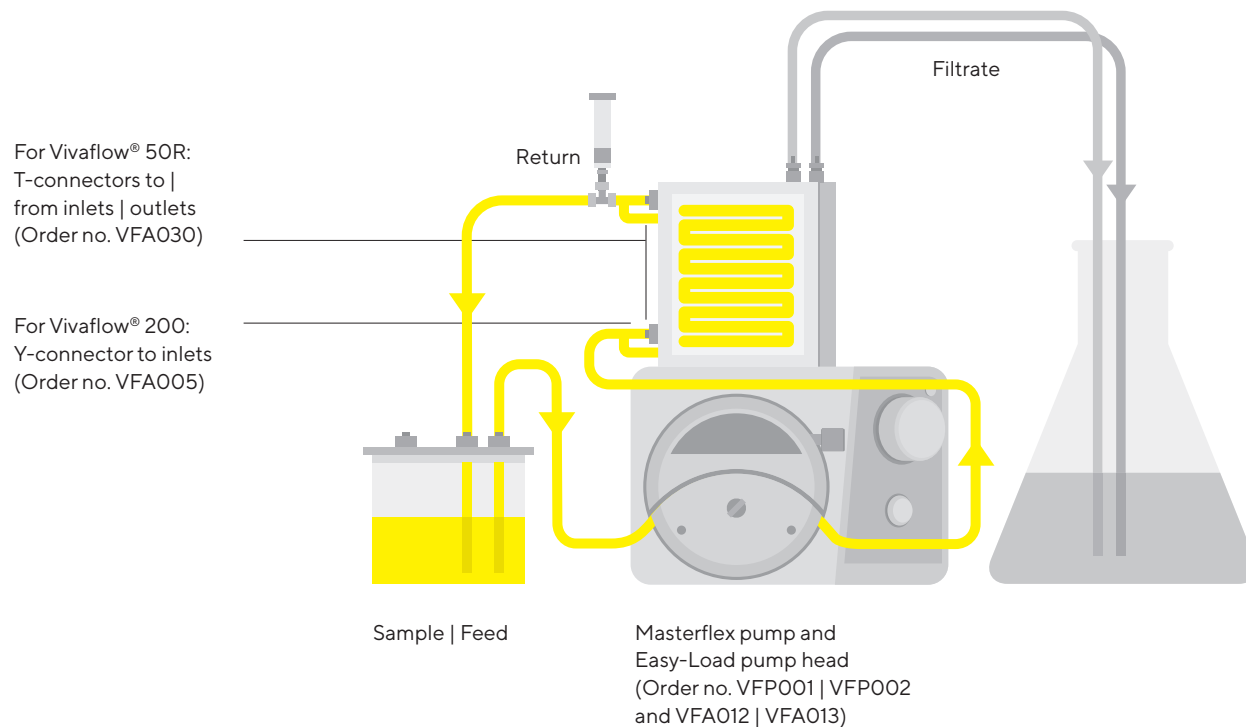


Table 2

Sample capacities and system components for operating Vivaflow® 50R | 200 cassettes

		1x VF 50R	2x VF 50R	1x VF 200	2x VF 200
Operating Mode		Single	Parallel	Single	Parallel
Sample Volume		0.1 – 0.5 L	0.5 – 1 L	0.5 – 2.5 L	2.5 – 5 L
Masterflex pump	VFP001 VFP002 *	1	1	1	1
Easy-Load pump head - size 16	VFA012	1	1	1	-
Easy-Load pump head - size 15	VFA013	-	-	-	1
Pressure indicator	VFA020	(1)**	(1)**	(1)**	(1)**
Y-connector	VFA005	-	-	-	1
T-connectors (x2)	VFA030	-	1	-	-

* VFP001 line voltage = 240 V; VFP002 line voltage = 115 V

** One pressure indicator is supplied with each pack of 1x cassette



Performance

Performance Characteristics for Vivaflow® 50

	Time to concentrate up to 20x at 3 bar inlet pressure, 20°C			
	One Cassette	Three Cassettes		
	250 mL Initial Volume	1 L Initial Volume	Recovery (Direct)	Recovery (10 mL Rinse)
BSA, 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	34 min	49 min	96%	> 99%
10,000 MWCO PES	22 min	32 min	94%	> 99%
30,000 MWCO PES	22 min	32 min	92%	99%
50,000 MWCO PES	20 min	29 min	92%	98%
γ Globulins, 1.0 mg/mL (150,000 MW)				
100,000 MWCO PES	43 min	62 min	92%	98%
Yeast, 1.0 mg/mL (<i>S. cerevisiae</i>)				
0.2 μm PES	33 min	47 min	92%	98%

Performance Characteristics for Vivaflow® 50R

	Time to concentrate up to 20x at 3 bar inlet pressure, 20°C			
	250 mL Initial Volume	Average Flux	Recovery (Direct)	Recovery (25 mL Rinse)
Lysozyme, 0.25 mg/mL (14,000 MW)				
5,000 MWCO Hydrosart®	70 min	3.4 mL/min	96%	98%
10,000 MWCO Hydrosart®	23 min	10.3 mL/min	94%	96%
BSA, 1.0 mg/mL (66,000 MW)				
10,000 MWCO Hydrosart®	24 min	9.9 mL/min	98%	> 99%
30,000 MWCO Hydrosart®	15 min	15.8 mL/min	97%	> 99%
γ Globulins, 1.0 mg/mL (150,000 MW)				
100,000 MWCO Hydrosart®	46 min	5.2 mL/min	97%	> 99%
Time to concentrate 1 L BSA (1 mg/mL) at 3 bar inlet pressure with 10,000 MWCO Hydrosart®				
One Vivaflow® 50R Cassette	95 min	10.0 mL/min	98%	> 99%
Two Vivaflow® 50R Cassettes	48 min	19.8 mL/min	98%	> 99%

Performance Characteristics for Vivaflow® 200

	Time to concentrate up to 20x at 3 bar inlet pressure, 20°C			
	1 L Initial Volume	Average Flux	Recovery (Direct)	Recovery (25 mL Rinse)
Lysozyme, 0.25 mg/mL (14,000 MW)				
2,000 MWCO Hydrosart®	160 min	6 mL/min	97%	> 99%
3,000 MWCO PES	180 min	5 mL/min	97%	> 99%
BSA, 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	29 min	33 mL/min	98%	> 99%
5,000 MWCO Hydrosart®	70 min	14 mL/min	98%	> 99%
10,000 MWCO PES	23 min	41 mL/min	96%	> 99%
10,000 MWCO Hydrosart®	35 min	27 mL/min	98%	> 99%
30,000 MWCO PES	25 min	38 mL/min	96%	99%
30,000 MWCO Hydrosart®	20 min	48 mL/min	96%	> 99%
50,000 MWCO PES	22 min	43 mL/min	96%	98%
γ Globulins, 1.0 mg/mL (average 150,000 MW)				
100,000 MWCO PES	54 min	18 mL/min	96%	99%
100,000 MWCO Hydrosart®	45 min	21 mL/min	96%	99%
Yeast, 1.0 mg/mL (<i>S. cerevisiae</i>)				
0.2 μm PES	11 min	86 mL/min	92%	98%
Time to concentrate dilute solute from 1 L initial volume at 3 bar inlet pressure with 10,000 MWCO PES				
BSA, 0.001 mg/mL	18 min	52 mL/min	90%	98%
BSA, 0.01 mg/mL	20 min	47 mL/min	92%	98%
BSA, 0.1 mg/mL	21 min	45 mL/min	94%	99%
Time to concentrate BSA (1 mg/mL) from 5 L initial volume at 3 bar inlet pressure with 10,000 MWCO PES				
BSA, 1.0 mg/mL	67 min	70 mL/min	97%	> 99%

Ordering Information

	Quantity	Order No.
Vivaflow® 50 (includes 2x cassettes with filtrate tube, size 16 peristaltic tubing, flow restrictor and fittings, and 1x series interconnector)		
3,000 MWCO PES	2	VF05P9
5,000 MWCO PES	2	VF05P1
10,000 MWCO PES	2	VF05P0
30,000 MWCO PES	2	VF05P2
50,000 MWCO PES	2	VF05P3
100,000 MWCO PES	2	VF05P4
1,000,000 MWCO PES	2	VF05P6
0.2 µm PES	2	VF05P7
Vivaflow® 50 complete system		
Pump (240 V), Easy-Load pump head (size 16), tubing, 500 mL sample diafiltration reservoir, cassette stand, pressure indicator, T connectors and series interconnectors	1	VFS502
Pump (115 V), Easy-Load pump head (size 16), tubing, 500 mL sample diafiltration reservoir, cassette stand, pressure indicator, T-connectors and series interconnectors	1	VFS504
Vivaflow® 50R (includes 1x cassette, filtrate tube, size 16 peristaltic tubing, flow restrictor and fittings, and 1x pressure indicator)		
5,000 MWCO Hydrosart®	1	VF05H1
10,000 MWCO Hydrosart®	1	VF05H0
30,000 MWCO Hydrosart®	1	VF05H2
100,000 MWCO Hydrosart®	1	VF05H4
Vivaflow® 200 (includes 1x cassette, filtrate tube, size 16 peristaltic tubing, flow restrictor and fittings, and 1x pressure indicator)		
3,000 MWCO PES	1	VF20P9
5,000 MWCO PES	1	VF20P1
10,000 MWCO PES	1	VF20P0
30,000 MWCO PES	1	VF20P2
50,000 MWCO PES	1	VF20P3
100,000 MWCO PES	1	VF20P4
0.2 µm PES	1	VF20P7
2,000 MWCO Hydrosart®	1	VF20H9
5,000 MWCO Hydrosart®	1	VF20H1
10,000 MWCO Hydrosart®	1	VF20H0
30,000 MWCO Hydrosart®	1	VF20H2
100,000 MWCO Hydrosart®	1	VF20H4


	Quantity	Order No.
Vivaflow® 50R 200 complete system		
Pump (240 V), Easy-Load pump head (size 16), tubing and 500 mL sample diafiltration reservoir	1	VFS202
Pump (115 V), Easy-Load pump head (size 16), tubing and 500 mL sample diafiltration reservoir	1	VFS204
Vivaflow® accessories		
Masterflex Economy Drive variable speed peristaltic pump (230 V)		VFP001
Masterflex Economy Drive variable speed peristaltic pump (115 V)		VFP002
500 mL sample and/or diafiltration reservoir		VFA006
Masterflex Easy-Load pump head – size 16		VFA012
Masterflex Easy-Load pump head – size 15		VFA013
Vivaflow® 50 stand		VFA016
Pressure indicator (1 – 3 bar)		VFA020
Vivaflow® 50 accessories for operating 2-6 cassettes		
T-connectors for running 2 stacks	2	VFA030
Series interconnectors	6	VFA031
Pressure indicator (1 – 3 bar)	1	VFA020
Vivaflow® 50R accessories for operating 2 cassettes		
T-connector	2	VFA030
Vivaflow® 200 accessories for operating 2 cassettes		
Y-connector (size 15 to 2 x size 16, Luer fittings)	1	VFA005
Masterflex Easy-Load pump head – size 15	1	VFA013

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