Cellbag™ bioreactors

WAVE BIOREACTOR™ SYSTEMS

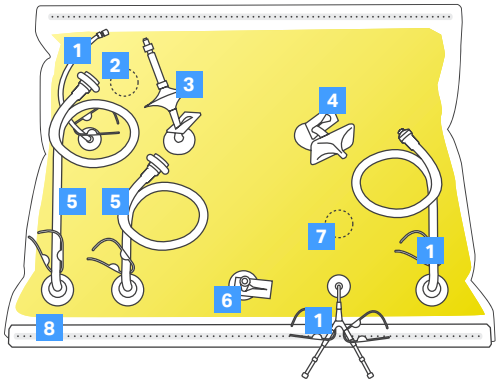
Designed for use with WAVE Bioreactor™ systems, Cellbag™ bioreactors are presterilized, single-use bags for noninvasive mixing of culture medium and cells (Fig 1). Use them during cultivation in research, development, and commercial manufacturing operations. You don't have to sterilize or clean Cellbag™ bioreactors, which are part of Cytiva's ReadyToProcess™ platform. Use them to grow cells and minimize the risk of cross-contamination. Easily couple Cellbag™ bioreactors to the full suite of ReadyToProcess™ products for cell culture, purification, and fluid handling.

Disposable Cellbag™ bioreactors deliver:

- Biocompatibility: These bioreactors are available in three films extensively tested to confirm biocompatibility. Fortem™ was designed specifically for bioprocessing. Bioclear™ 10 and Bioclear™ 11 were comprehensively evaluated to assess the complex interactions during bioprocessing.
- Ease-of-use: The bioreactors are presterilized and disposable. They don't require cleaning, which minimizes the risk of cross-contamination.
- Strength: Manufactured from multilayer films, Cellbag™ bioreactors provide mechanical strength for use in rocking bioreactors.
- Customization: Readily customize these bioreactors with connectors, tube sets, and special components that you specify.

Principles of operation

The Cellbag™ bioreactor is mounted onto the electric rocking base unit of a WAVE Bioreactor™ system and inflated. Culture medium and cells are loaded into the bag. The rocking motion of the base unit induces waves in the cell culture fluid to provide efficient mixing and gas transfer (Fig 2). The resulting environment within the bioreactor can easily support 1 × 10^7 cells/mL, allowing you to grow sufficient cells to produce cell concentrations suitable for clinical manufacture and commercial production.



1 Optional tubing
2 Optical DO sensor embedded in bag
3 Air outlet filter
4 Air inlet filter
5 Inoculation/harvest lines
6 Needleless sampling port
7 Optical pH sensor embedded in bag
8 Cellbag™ rod

Fig 1. Representation of typical Cellbag™ bioreactor fittings. DO = dissolved oxygen

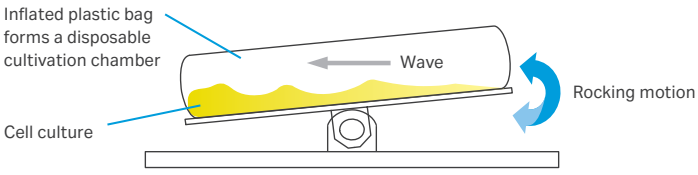


Fig 2. The wave action created by the rocking motion of the WAVE Bioreactor™ base unit sweeps up cells and prevents settling in the Cellbag™ bioreactor.

Components and materials of construction

See Table 1 for details. Data that demonstrates biocompatibility is available. Even with this data, we recommend that you perform validation for specific applications.

Table 1. Cellbag™ bioreactor components and materials

Component	Material
Fortem™ film	COC/LLDPE fluid contact surface; 10-layer co-extruded film
Bioclear™ 10 film	EVA fluid contact surface; 7-layer laminated film
Bioclear™ 11 film	EVA fluid contact surface; 7-layer laminated film
Barbed ports	Polyethylene
Luer connections	Polypropylene
MCP connectors	Polycarbonate
MCX connectors	Polycarbonate
Tubing adapters	Polypropylene
C-Flex®® tubing	Thermoplastic elastomer (medical grade)
Silicone tubing	Platinum-cured silicone
Screw cap port	Polyethylene
Internal perfusion filter	Polyethylene, polyester, polypropylene, EVA
y-connector	Polypropylene
pHOPT[1] sensor	Luminophore dye attached to a polycarbonate backing
DOOPT II[2] sensor	Luminophore disc attached to a polycarbonate backing with silicone adhesive
Tempwell	Polyurethane tubing, polypropylene plug
Vent filter	Hydrophobic membrane, acrylic housing
Clave™ connector	Polycarbonate, polyester housing, silicone
ReadyMate™ connector (Fig 3)	Polycarbonate, polyester, silicone

[1] pHOPT = optical pH

[2] DOOPT II = optical dissolved oxygen

Fig 3. Quickly connect aseptically to downstream operations with Cellbag™ bioreactors that have ReadyMate™ connectors.

The standard Cellbag™ bioreactor comprises the following components:

- Film: designed for bioinert fluid contact and high mechanical strength
- Ports: allow access into and out of the bag
- Tubing, connectors, and clamps: facilitate and modulate fluid handling
- Rigid bars: allow installation onto the WAVE Bioreactor™ base unit
- Air filters: allow gas to flow in and out of the bag

Cellbag™ bioreactor configurations, options, and hardware accessories

Cellbag™ in Fortem™ film

Cellbag™ bioreactors are now available in Fortem™ film for single-use bioprocessing. Fortem™ film is designed from the ground up for the bioprocess industry. It delivers an enhanced material science profile, application performance, and security of supply compared with legacy Bioclear™ films.

Material science

Fortem™ is a well-characterized film, with analytical work done to identify and control compounds known to impact cell culture performance. It has been tested for extractables in alignment with the BioPhorum Operations Group (BPOG) testing protocols, and extensively qualified against mechanical failure including testing for flexural fatigue, weldability, and abrasion resistance. Additionally, every lot of film is tested for antioxidant content and cell culture performance prior to release.

Security of supply

To ensure consistent performance and availability, security of supply was designed into Fortem™ film from its inception. Long-term contracts are in place to ensure safety stocks on both the raw materials and film. Details on Fortem™ raw materials can be provided down to the CAS number, and critical to quality attributes are tested and reviewed prior to lot release.

Optical sensing technologies

Cytiva offers sensors specifically designed to address industry needs for high accuracy and optimal process control. The optical pH (pHOPT) and DO (DOOPT II) sensors are single-use "spot" sensors embedded into the bottom of the bioreactor (Fig 4). Technical specifications for the sensors are shown in Tables 2 and 3. The sensors are supplied preinstalled in the sterilized Cellbag™ bioreactor. To measure pH and DO with these sensors, you'll need a ReadyToProcess™ CBCU gas mixer for ReadyToProcess WAVE™ 25. And you'll need specially-designed fiber-optic cables to connect to the bioreactor. pHOPT and DOOPT II modules are available for the larger WAVE Bioreactor™ 200 system. The optical sensors provide:

- High measurement accuracy with minimal drift over time
- Single-use formats
- Optimization for both minimum and maximum bioreactor working volumes
- Compatibility with internal perfusion filter

Fig 4. The optical sensor is embedded in the underside of the Cellbag™ bioreactor. Shown here is the bag adapter/optical fiber cable attached to the bag port.

Table 2. Optical pH sensor specifications

pH measurement range	pH 4.5 to 8.5
pH control range	pH 6.0 to 8.0
pH measurement accuracy	± 0.05 pH within ± 0.25 pH from offset calibration pH ± 0.1 pH within 0.25 to 0.5 pH from offset calibration pH
pH control accuracy (versus setpoint)	± 0.05 pH

Table 3. Optical DO sensor specifications

DO measurement range	0% to 250% air saturation
DO measurement accuracy	± 5% air saturation (excluding atmospheric pressure variations)
DO control range	0% to 100% air saturation

Perfusion solution

The Cellbag™ portfolio offers a line of perfusion solutions for applications in cell intensified seed train, small-scale production, and other processes. Perfusion bags are fitted with a porous polyethylene–based perfusion filter that floats on the medium and is used to retain cells in the bag during perfusion cultivation or medium exchange. The filter is connected to the wall of the bioreactor via a harvest tube. The outside port of this harvest tube ends in a Luer connector, allowing for the attachment of pump tubing and harvest vessel. Operating a peristaltic pump in the harvest line will create suction and draw liquid through the filter into the harvest vessel. Cells are retained by the filter that stays clear due to movement across the culture surface. Lateral movement of the filter delays cell/debris attachment to the filter, which reduces the rate of fouling. The large filter surface area also enables a high flow rate.

M*Bag mixing chambers

M*Bag mixing chambers are disposable presterilized sealed bags for sterile mixing of liquids in WAVE Mixer™ systems. Use the mixing chambers in various applications, including warming and thawing of materials and mixing prior to fill.

Operating specifications

Cellbag™ bioreactors are designed to the following specifications:

- Operating temperature range: 10°C to 50°C
- Maximum operating pressure: 0.1 bar (1.5 psig, 0.01 MPa)

Operating volumes and hardware compatibility details for Cellbag™ bioreactors and M*Bag mixing chambers are listed in Tables 4 and 5, respectively.

Table 4. Operating volumes and hardware compatibility for Cellbag™ bioreactors

System	Bag size	Min.	Max.	Tray
ReadyToProcess WAVE™ 25	1 L	200 mL	500 mL	N/A
	2 L	200 mL	1 L	Tray 10 or 20
	10 L	500 mL	5 L	Tray 10 or 20
	20 L	1 L	10 L	Tray 20
	22 L	1 L	11 L	Tray 50
	50 L	5 L	25 L	Tray 50
WAVE Bioreactor™ 200	100 L	5 L	50 L	N/A
	200 L	10 L	100 L	N/A

Table 5. Operating volumes and hardware compatibility for M*Bag mixing chambers.

System	Bag size	Maximum
Mixer 20/50 and Mixkit20	20 L	15 L
	50 L	35 L

Tube kits

Tube kits are designed for use with Cellbag™ and M*Bag mixing chambers. TK001 is a tube kit that uses a Clave™ connector, so you can use multiple sampling valves on a bag. TK003 features two T-connectors to maximize the number of connection ports. Connect the tube kits to Cellbag™ and M*Bag mixing chambers with Sterile Tube Fuser.

Regulatory conformance

Sterility and endotoxin

Cellbag™ bioreactor sizes 500 and 1000 L are sterilized by gamma irradiation at 27.5 to 40 kGy. All other sizes are subjected to 25 to 40 kGy. For all sizes, lot release requires detection of less than 0.125 EU endotoxin/mL per bag.

Biocompatibility

Testing is performed on gamma irradiated film (50 kGy), and biocompatibility meets USP Class VI Biological Tests for Plastics (USP88) and ISO 10993 requirements including:

- ISO 10993-4: hemolysis study in vivo, extraction method
- ISO 10993-5/USP87: cytotoxicity study using ISO elution method
- ISO 10993-6/USP88: muscle implantation study in rabbit
- ISO 10993-10/USP88: acute intracutaneous reactivity study in rabbit
- ISO 10993-11/USP88: acute systemic toxicity in mouse

Cellbag™ decoder

Use the Cellbag™ decoder to understand the product codes shown in the ordering information (Fig 5). See Table 4 for working volumes and ordering information for available combinations.

Sizes and options

See Table 6 for detailed information on standard sizes and options available for Cellbag™ bioreactors. You can also customize Cellbag™ bioreactors to suit your specific cell culture process needs. See Table 7 for M*Bag mixing chamber sizes and options.

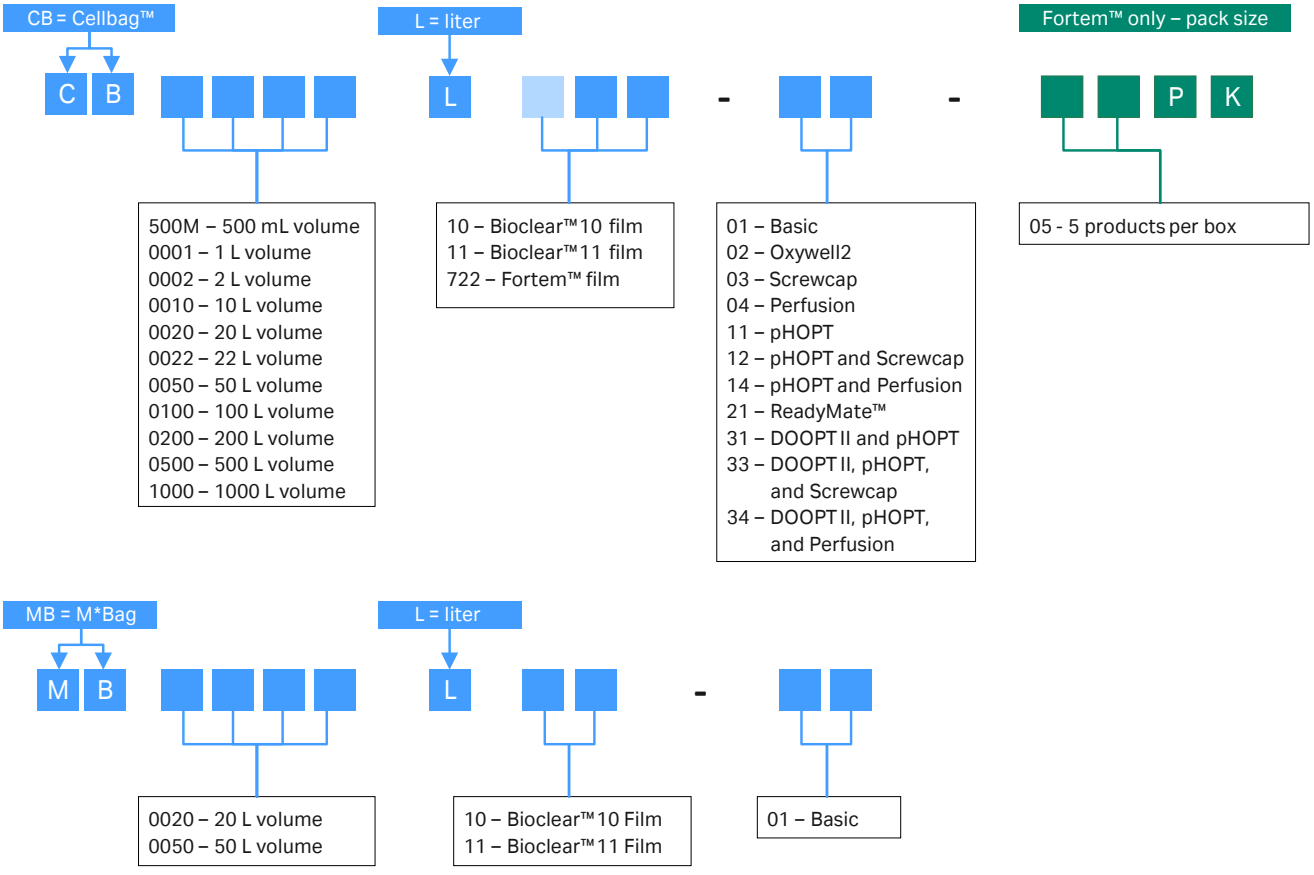
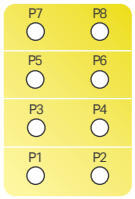
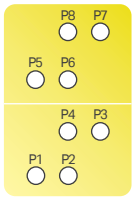
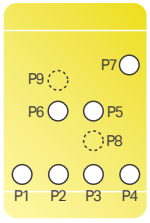


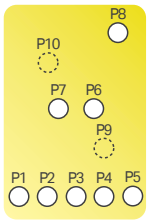
Fig 5. Cellbag™ decoder with explanations for product codes.

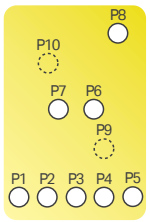
Table 6. Cellbag™ sizes and options.

Cellbag™	Version	Ports	Description
Cellbag™ 500 mL	Basic	1, 3, 5, 7	Air inlet filter
		2, 4, 6, 8	3/16 in × 3/8 in × 2 in silicone needleless sampling

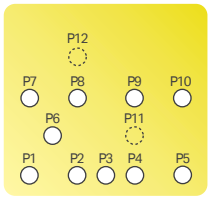
Cellbag™	Version	Ports	Description
Cellbag™ 1 L	Basic	1, 5	1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		2, 6	3/16 in × 3/8 in × 2 in silicone, needleless sampling
		3, 7	Air outlet filter, check valve
		4, 8	Air inlet filter

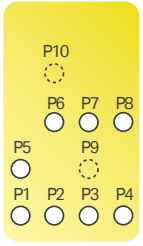
Cellbag™	Version	Ports	Description	Ports	Description
Cellbag™ 2 L	Basic	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	5	Air inlet filter
		2	N/A	6	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7–9	N/A
		4	N/A		
	Oxywell2	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	5	Air inlet filter
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	6	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	8, 9	N/A
	Screwcap	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	5	Air inlet filter
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	6	Air outlet filter, check valve
		3	Oxywell2, for DOOPT probe	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Screwcap, 38/400	8, 9	N/A
	Perfusion	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	6	Air outlet filter, check valve
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		3	Y-connection attached to perfusion filter	8, 9	N/A
		4	Oxywell2, for DOOPT probe	Int.	Perfusion filter
		5	Air inlet filter		
	pHOPT	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	6	Air outlet filter, check valve
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	8	pHOPT sensor body - bottom of bag
		4	Oxywell2, for DOOPT probe	9	N/A
		5	Air inlet filter		
	pHOPT and Screwcap	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	6	Air outlet filter, check valve
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		3	Oxywell2, for DOOPT probe	8	pHOPT sensor body - bottom of bag
		4	Screwcap, 38/400	9	N/A
		5	Air inlet filter		
	pHOPT and Perfusion	1	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	6	Air outlet filter, check valve
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		3	Y-connection attached to perfusion filter	8	pHOPT sensor body - bottom of bag
		4	Oxywell2, for DOOPT probe	9	N/A
		5	Air inlet filter		
	ReadyMate™	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	5	Air inlet filter
		2	3/16 in × 3/8 in × 2 in silicone, needleless sampling	6	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	8, 9	N/A
	DOOPT II and pHOPT	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	6	Air outlet filter, check valve
		2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	N/A
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	pHOPT sensor body – bottom of bag
		4	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	9	DOOPT II sensor body – bottom of bag
		5	Air inlet filter		

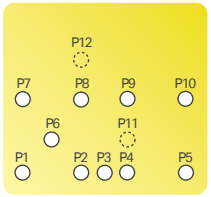
	DOOPT II, pHOPT, and Screwcap	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	6	Air outlet filter, check valve
		2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	pHOPT sensor body – bottom of bag
		4	Screwcap, 38/400	9	DOOPT II sensor body – bottom of bag
		5	Air inlet filter		
	DOOPT II, pHOPT, and Perfusion	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	6	Air outlet filter, check valve
		2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		3	Y-connection attached to perfusion filter	8	pHOPT sensor body – bottom of bag
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	DOOPT II sensor body – bottom of bag
		5	Air inlet filter		
Cellbag™ 10 L 	Basic	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8–10	N/A
		4, 5	N/A		
	Oxywell2	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	9, 10	N/A
		5	3/16 in × 3/8 in × 2 in silicone, female Luer		
	Screwcap	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	9, 10	N/A
		5	Screwcap, 38/400		
	Perfusion	1	3/16 in × 3/8 in × 2 in silicone, needleless sampling	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	Oxywell2, for DOOPT probe	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Y-connection attached to perfusion filter	9, 10	N/A
		5	3/16 in × 3/8 in × 2 in silicone, female Luer	Int.	Perfusion filter
	pHOPT	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	9	pHOPT sensor body - bottom of bag
		5	3/16 in × 3/8 in × 2 in silicone, female Luer	10	N/A
	pHOPT and screwcap	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	9	pHOPT sensor body - bottom of bag
		5	Screwcap, 38/400	10	N/A
	pHOPT and perfusion	1	3/16 in × 3/8 in × 2 in silicone, needleless sampling	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	Oxywell2, for DOOPT probe	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Y-connection attached to perfusion filter	9	pHOPT sensor body - bottom of bag
		5	3/16 in × 3/8 in × 2 in silicone, female Luer	10	N/A
	ReadyMate™	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	6	Air inlet filter
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/16 in × 3/8 in × 2 in silicone, female Luer
		4	Oxywell2, for DOOPT probe	9, 10	N/A
		5	3/16 in × 3/8 in × 2 in silicone, female Luer		



	DOOPT II and pHOPT	1, 2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	N/A
		4	1/8 in ×1/4 in × 2 in C-Flex®, y-connector 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	9	pHOPT sensor body-bottom of the bag
		5	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	10	DOOPT II sensor body- bottom of bag
		6	Air inlet filter		
	DOOPT II, pHOPT, and Screwcap	1, 2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		4	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	9	pHOPT sensor body – bottom of bag
		5	Screwcap, 38/400	10	DOOPT II sensor body – bottom of bag
		6	Air inlet filter		
	DOOPT II, pHOPT, and Perfusion	1, 2	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		4	Y-connection attached to perfusion filter	9	pHOPT sensor body – bottom of bag
		5	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	10	DOOPT II sensor body – bottom of bag
		6	Air inlet filter		
Cellbag™ 20 L	Basic	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	5–7	N/A
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	N/A	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	10–12	N/A
	Oxywell2	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	N/A	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer		
	Screwcap	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	Screwcap, 38/400	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer		
	Perfusion	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	Oxywell2, for DOOPT probe	10	Y-connection attached to perfusion filter
		5	N/A	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	Int.	Perfusion filter
	pHOPT	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	N/A	11	pHOPT sensor body - bottom of bag
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	12	N/A
	pHOPT and Screwcap	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	Screwcap, 38/400	11	pHOPT sensor body - bottom of bag
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	12	N/A



	pHOPT and Perfusion	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	Oxywell2, for DOOPT probe	10	Y-connection attached to perfusion filter
		5	N/A	11	pHOPT sensor body - bottom of bag
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	12	N/A
	ReadyMate™	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	N/A	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer		
	DOOPT II and pHOPT	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	10	N/A
		5	3/8 in × 5/8 in × 39 in C-Flex®, female MPC	12	DOOPT II sensor body – bottom of bag
		6	N/A		
		7	3/16 × 3/8 × 18 in silicone, female Luer		
	DOOPT II, pHOPT, and Screwcap	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/8 in × 5/8 in × 39 in C-Flex®, female MPC	10	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer
		5	Screwcap, 38/400	11	pHOPT sensor body – bottom of bag
		6	N/A	12	DOOPT II sensor body – bottom of bag
		7	3/16 × 3/8 × 18 in silicone, female Luer		
	DOOPT II, pHOPT, and Perfusion	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/8 in × 5/8 in × 39 in C-Flex®, female MPC	10	Y-connection attached to perfusion filter
		5	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	11	pHOPT sensor body – bottom of bag
		6	N/A	12	DOOPT II sensor body – bottom of bag
		7	3/16 × 3/8 × 18 in silicone, female Luer		
Cellbag™ 22 L 	Basic	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	5	Tempwell, for RTD probe
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	6	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	7	Air inlet filter
		4	N/A	8–10	N/A
	Oxywell2	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air outlet filter, check valve
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	Oxywell2, for DOOPT probe
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	9, 10	N/A
		5	Tempwell, for RTD probe		
	pHOPT	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	6	Air outlet filter, check valve
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	Oxywell2, for DOOPT probe
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	9	pHOPT sensor body - bottom of bag
		5	Tempwell, for RTD probe	10	N/A
	ReadyMate™	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	6	Air outlet filter, check valve
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	7	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	Oxywell2, for DOOPT probe
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	9, 10	N/A
		5	Tempwell, for RTD probe		

	DOOPT II and pHOPT	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	7	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	8	3/8 in × 5/8 in × 39 in C-Flex®, female MPC
		4	1/8 in × 1/4 in × 2 in C-Flex®, y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	9	pHOPT sensor body – bottom of bag
		5	Tempwell, for RTD probe	10	DOOPT II sensor body – bottom of bag
		6	Air inlet filter		
Cellbag™ 50 L 	Basic	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	8	Air outlet filter, check valve
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	9	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	10	N/A
		4–7	N/A		
	Oxywell2	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	N/A	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer		
	pHOPT	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	N/A	11	pHOPT sensor body - bottom of bag
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	12	N/A
	pHOPT and Perfusion	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	8	Air outlet filter, check valve
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	9	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	10	Y-connection attached to perfusion filter
		4	Oxywell2, for DOOPT probe	11	pHOPT sensor body - bottom of bag
		5	N/A	12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	Int.	Perfusion filter
		7	3/16 in × 3/8 in × 2 in silicone, female Luer		
	ReadyMate™	1	1/4 in × 7/16 in × 39 in C-Flex®, ReadyMate™	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Oxywell2, for DOOPT probe
		5	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer		
	Perfusion	1	1/4 in × 7/16 in × 39 in C-Flex®, female MPC	7	3/16 in × 3/8 in × 2 in silicone, female Luer
		2	1/8 in × 1/4 in × 39 in C-Flex®, female Luer	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	Oxywell2, for DOOPT probe	10	Y-connection attached to perfusion filter
		5	N/A	11, 12	N/A
		6	3/16 in × 3/8 in × 2 in silicone, female Luer	Int.	Perfusion filter
	DOOPT II and pHOPT	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	1/8 in × 1/4 in × 2 in C-Flex®, y-connector,	10	N/A
		5	3/8 in × 5/8 in × 39 in C-Flex®, female MPC	11	pHOPT sensor body – bottom of bag
		6	N/A	12	DOOPT II sensor body – bottom of bag
		7	3/16 × 3/8 × 18 in silicone, female Luer		
	DOOPT II, pHOPT, and Perfusion	1, 2	3/8 in × 5/8 in × 39 in C-Flex®, ReadyMate™	8	Air outlet filter, check valve
		3	3/16 in × 3/8 in × 2 in silicone, needleless sampling	9	Air inlet filter
		4	5/8 in × 39 in C-Flex®, female Luer	10	N/A
		5	1/8 in × 1/4 in × 2 in C-Flex®, Y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	11	pHOPT sensor body–bottom of bag
		6	N/A	12	DOOPT II sensor body–bottom of bag
		7	3/16 × 3/8 × 18 in silicone, female Luer	Int	Perfusion filter

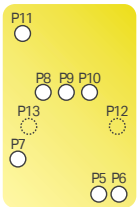
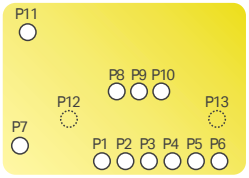
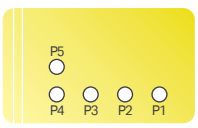
Cellbag™ 100 L 	Oxywell2	1	Oxywell2, for DOOPT probe	7	Tempwell, for RTD probe
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	8	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	9	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	10	Air outlet filter, wide bore, check valve
		5	1/4 in × 7/16 in × 78 in C-Flex®, male MPC	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	12, 13	N/A
	pHOPT	1	Oxywell2, for DOOPT probe	8	Air inlet filter
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	9	Air outlet filter, wide bore, check valve
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		5	1/4 in × 7/16 in × 78 in C-Flex®, male MPC	12	pHOPT sensor body - bottom of bag
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	13	N/A
		7	Tempwell, for RTD probe		
	DOOPT II and pHOPT	1	3/8 in × 5/8 in × 78 in C-Flex®, ReadyMate™	8	Air inlet filter
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	9	Air outlet filter, wide bore, check valve
		3	1/8 in × 1/4 in × 2 in C-Flex®, Y-connector	10	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in Silicone, needleless sampling	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		5	1/4 in × 7/16 in × 78 in, C-Flex®, male MPC	12	pHOPT sensor body – bottom of bag
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	13	DOOPT II sensor body – bottom of bag
		7	Tempwell, for RTD probe		
Cellbag™ 200 L 	Oxywell2	1	Oxywell2, for DOOPT probe	7	Tempwell, for RTD probe
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	8	Air inlet filter
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	9	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	10	Air outlet filter, wide bore, check valve
		5	1/4 in × 7/16 in × 78 in C-Flex®, male MPC	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	12, 13	N/A
	pHOPT	1	Oxywell2, for DOOPT probe	8	Air inlet filter
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	9	Air outlet filter, wide bore, check valve
		3	3/16 in × 3/8 in × 2 in silicone, female Luer	10	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in silicone, needleless sampling	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		5	1/4 in × 7/16 in × 78 in C-Flex®, male MPC	12	pHOPT sensor body - bottom of bag
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	13	N/A
		7	Tempwell, for RTD probe		
	DOOPT II and pHOPT	1	3/8 in × 5/8 in × 78 in C-Flex®, ReadyMate™	8	Air inlet filter
		2	3/8 in × 5/8 in × 78 in C-Flex®, male MPC	9	Air outlet filter, wide bore, check valve
		3	1/8 in × 1/4 in × 2 in C-Flex®, Y-connector, 2 of 1/8 in × 1/4 in × 39 in C-Flex®, female Luer	10	Air outlet filter, wide bore, check valve
		4	3/16 in × 3/8 in × 2 in Silicone, needleless sampling	11	3/8 in × 5/8 in × 78 in C-Flex®, male MPC, silicone diptube
		5	1/4 in × 7/16 in × 78 in, C-Flex®, male MPC	12	pHOPT sensor body – bottom of bag
		6	1/8 in × 1/4 in × 78 in C-Flex®, female Luer	13	DOOPT II sensor body – bottom of bag
		7	Tempwell, for RTD probe		

Table 7. M*Bag sizes and options

M*Bag mixing chamber	Version	Ports	Description
M*Bag 20/50 L 	Basic	1	¼ × 3/8 × 3 in C-Flex®, female MPC
		2	3/16 × 3/8 × 2 in silicone, female Luer
		3	3/16 × 3/8 × 2 in silicone, needleless sampling
		4	¼ × 3/8 × 3 in C-Flex®, male MPC
		5	Threaded plug

Ordering information

		Fortem™		Bioclear™ 10		Bioclear™ 11	
Product	**Version**	**Product code**	**Bags per package**	**Product code**	**Bags per package**	**Product code**	**Bags per package**
Cellbag™ 500 mL	Basic	CB500ML722-01-05PK	5	CB500ML10-01	1	–	–
Cellbag™ 1 L	Basic	CB0001L722-01-05PK	5	CB0001L10-01	1	–	–
Cellbag™ 2 L	Basic	CB0002L722-01-05PK	5	CB0002L10-01	1	CB0002L11-01	1
	Oxywell2	CB0002L722-02-05PK	5	CB0002L10-02	1	CB0002L11-02	1
	Screwcap	CB0002L722-03-05PK	5	CB0002L10-03	1	CB0002L11-03	1
	Perfusion	CB0002L722-04-05PK	5	CB0002L10-04	1	CB0002L11-04	1
	pHOPT	CB0002L722-11-05PK	5	CB0002L10-11	1	CB0002L11-11	1
	pHOPT and screwcap	–	–	CB0002L10-13	1	–	–
	pHOPT and perfusion	–	–	CB0002L10-14	1	–	–
	ReadyMate™	CB0002L722-21-05PK	5	CB0002L10-21	1	CB0002L11-21	1
	DOOPT II and pHOPT	CB0002L722-31-05PK	5	CB0002L10-31	1	CB0002L11-31	1
	DOOPT II, pHOPT, and screwcap	CB0002L722-33-05PK	5	CB0002L10-33	1	CB0002L11-33	1
	DOOPT II, pHOPT, and perfusion	CB0002L722-34-05PK	5	CB0002L10-34	1	CB0002L11-34	1
Cellbag™ 10 L	Basic	CB0010L722-01-05PK	5	CB0010L10-01	1	CB0010L11-01	1
	Oxywell2	CB0010L722-02-05PK	5	CB0010L10-02	1	CB0010L11-02	1
	Screwcap	CB0010L722-03-05PK	5	CB0010L10-03	1	CB0010L11-03	1
	Perfusion	CB0010L722-04-05PK	5	CB0010L10-04	1	CB0010L11-04	1
	pHOPT	CB0010L722-11-05PK	5	CB0010L10-11	1	CB0010L11-11	1
	pHOPT and screwcap	–	–	CB0010L10-13	1	–	–
	pHOPT and perfusion	–	–	CB0010L10-14	1	–	–
	ReadyMate™	CB0010L722-21-05PK	5	CB0010L10-21	1	CB0010L11-21	1
	DOOPT II and pHOPT	CB0010L722-31-05PK	5	CB0010L10-31	1	CB0010L11-31	1
	DOOPT II, pHOPT, and screwcap	CB0010L722-33-05PK	5	CB0010L10-33	1	CB0010L11-33	1
	DOOPT II, pHOPT, and perfusion	CB0010L722-34-05PK	5	CB0010L10-34	1	CB0010L11-34	1
Cellbag™ 20 L	Basic	CB0020L722-01-05PK	5	CB0020L10-01	1	CB0020L11-01	1
	Oxywell2	CB0020L722-02-05PK	5	CB0020L10-02	1	CB0020L11-02	1
	Screwcap	CB0020L722-03-05PK	5	CB0020L10-03	1	CB0020L11-03	1
	Perfusion	CB0020L722-04-05PK	5	CB0020L10-04	1	CB0020L11-04	1
	pHOPT	CB0020L722-11-05PK	5	CB0020L10-11	1	CB0020L11-11	1
	pHOPT and screwcap	–	–	CB0020L10-13	1	–	–
	pHOPT and perfusion	–	–	CB0020L10-14	1	–	–
	ReadyMate™	CB0020L722-21-05PK	5	CB0020L10-21	1	CB0020L11-21	1
	DOOPT II and pHOPT	CB0020L722-31-05PK	5	CB0020L10-31	1	CB0020L11-31	1
	DOOPT II, pHOPT, and screwcap	CB0020L722-33-05PK	5	CB0020L10-33	1	CB0020L11-33	1
	DOOPT II, pHOPT, and perfusion	CB0020L722-34-05PK	5	CB0020L10-34	1	CB0020L11-34	1
Cellbag™ 22 L	Basic	–	–	–	–	CB0022L11-01	1
	Oxywell2	CB0022L722-02-05PK	5	CB0022L10-02	1	CB0022L11-02	1
	pHOPT	CB0022L722-11-05PK	5	CB0022L10-11	1	CB0022L11-11	1
	ReadyMate™	CB0022L722-21-05PK	5	CB0022L10-21	1	CB0022L11-21	1
	DOOPT II and pHOPT	CB0022L722-31-05PK	5	CB0022L10-31	1	CB0022L11-31	1

Ordering information continued...

		Fortem™		Bioclear™ 10		Bioclear™ 11	
Product	**Version**	**Product code**	**Bags per package**	**Product code**	**Bags per package**	**Product code**	**Bags per package**
Cellbag™ 50 L	Basic	CB0050L722-01-05PK	5	CB0050L10-01	1	CB0050L11-01	1
	Oxywell2	CB0050L722-02-05PK	5	CB0050L10-02	1	CB0050L11-02	1
	pHOPT	CB0050L722-11-05PK	5	CB0050L10-11	1	CB0050L11-11	1
	pHOPT and perfusion	–	–	CB0050L10-14	1	–	–
	ReadyMate™	CB0050L722-21-05PK	5	CB0050L10-21	1	CB0050L11-21	1
	Perfusion	CB0050L722-24-05PK	5	CB0050L10-24	1	CB0050L11-24	1
	DOOPT II and pHOPT	CB0050L722-31-05PK	5	CB0050L10-31	1	CB0050L11-31	1
	DOOPT II, pHOPT, and perfusion	CB0050L722-34-05PK	5	CB0050L10-34	1	CB0050L11-34	1
Cellbag™ 100 L	Oxywell2	–	–	CB0100L10-02	1	–	–
	pHOPT	–	–	CB0100L10-11	1	–	–
	DOOPT II and pHOPT	–	–	CB0100L10-31	1	–	–
Cellbag™ 200 L	Oxywell2	–	–	CB0200L10-02	1	–	–
	pHOPT	–	–	CB0200L10-11	1	–	–
	DOOPT II and pHOPT	–	–	CB0200L10-31	1	–	–
M*Bag 20 L	Basic	–	–	MB0020L10-01	1	–	–
M*Bag 50 L	Basic	–	–	MB0050L10-01	1	–	–

Related literature

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