

HyPerforma Single-Use Mixer with Touchscreen Console

The next generation of efficiency and performance

The Thermo Scientific™ HyPerforma™ Single-Use Mixer (S.U.M.) with Touchscreen Console offers enhanced functionality, ease of use, and efficiency. The complete HyPerforma S.U.M. system consists of a mixer tank, available in 50, 100, 200, 500, 1,000, and 2,000 L sizes with the Touchscreen Console. The HyPerforma S.U.M. has a 5:1 turndown mixing ratio and maintains traditional stirred-tank mixer design principles with a directly coupled motor impeller drive assembly and a cylindrical tank with a specific height-to-diameter ratio. This allows quick turnaround times for both liquid-to-liquid mixing and powder-to-liquid mixing.

2,000 L HyPerforma S.U.M. standard configurations

- AC motor
- 3x load cell weighing system
- Touchscreen Console

Critical upstream application steps

- Media preparation
- Final formulation steps
- Buffer preparation
- Large-volume mixing

Critical downstream application steps

- Pooling and liquid transfer
- Product suspension
- Mixing and storing multiple batches
- Buffer preparation
- Viral inactivation



Touchscreen Console capabilities

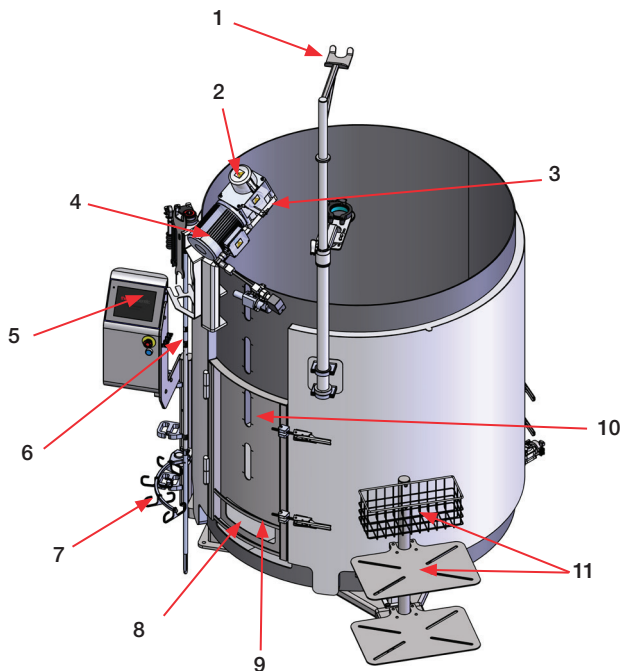
The Touchscreen Console offers state-of-the-art in-process monitoring and automation capability for the HyPerforma S.U.M. Its modular design allows for an easy-to-use custom user interface. Capabilities include: control of agitation speed, pumps, pinch clamps, and temperature control unit. Users can easily view measurements from load cells, pH sensors, conductivity sensors, resistance temperature detectors (RTDs), and pressure sensors.

Simple, routine processes can be automated by utilizing measurement values to control the pumps, temperature control unit (TCU), and agitation motor. The Touchscreen Console can help users semi-automate their formulation, pH, or saline titrations, and viral inactivation processes. This allows users to program their HyPerforma S.U.M. for a process and trust that the measurements are accurate, precise, and controlled. The data measured during a process can be exported remotely via Ethernet, Profibus, or Modbus remote terminal unit (RTU), and can also be accessed locally with a USB flash drive.

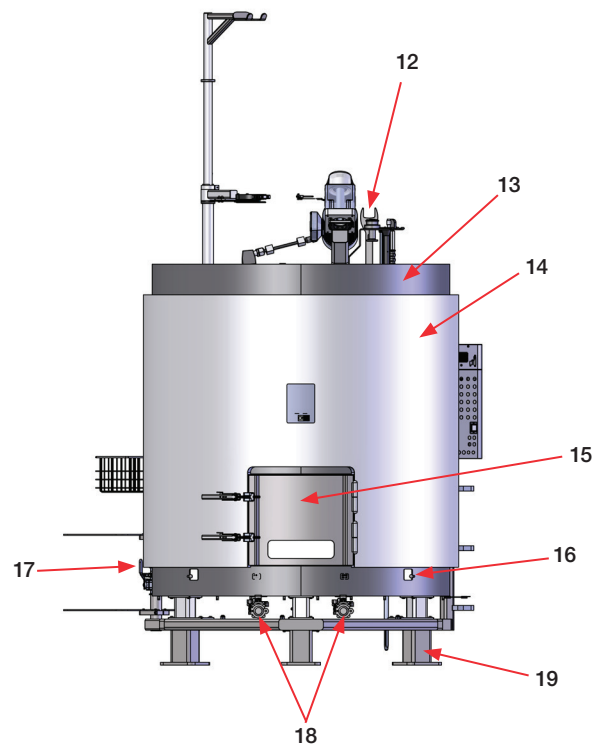
HyPerforma S.U.M. design features and options

1. Powder hanger for 1 kg, 5 kg, and 25 kg Thermo Scientific™ Powdertainer™ BioProcess Containers (BPCs)
2. Mixing assembly with shield
3. Bearing port receiver with clamp
4. Mixer motor
5. Touchscreen Console
6. Drive shaft, stored
7. Cable management hooks
8. Probe access windows
9. Probe clip hangers
10. Liquid sight window
11. Shelves and basket (optional)
12. Standard tool set: 10 mm (3/8 in.) x 16.9 Nm (150 in.-lb.) square torque wrench, load cell and motor cap lockout wrench
13. 0.95 cm (3/8 in.) dimpled jacket
14. Stainless steel outer support container
15. Rear door (for BPC loading), with sight window
16. Bottom cutouts/pins for BPC attachment and alignment
17. Bleed valve (jacketed models only)
18. 3.81 cm (1.5 in.) tri-clamp connection ports for water inlet/outlet (jacketed models only)
19. Leveling feet (3)

Front view

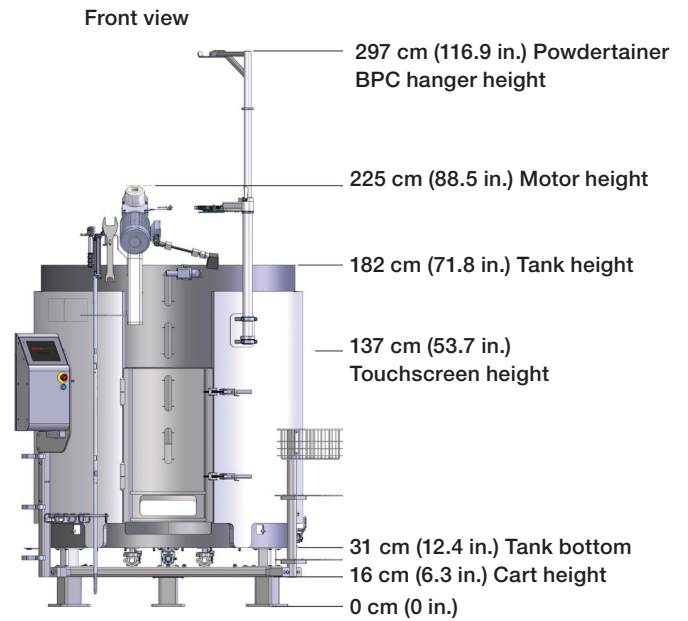
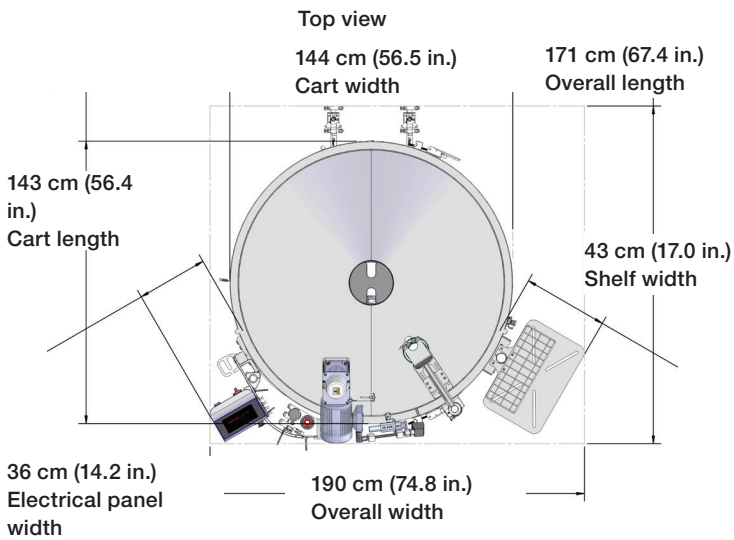


Back view



Note: Models without water jackets include the same features as the water-jacketed models shown here, but without the jacket and inlet/outlet ports. Optional load cells and cable management system are not shown. See the accessories section for more information about these items.

HyPerforma S.U.M. design specifications



Touchscreen Console measurement options and specifications

	Load cell	Temperature	pH	Conductivity	BPC and in-line liquid pressure
Accuracy after calibration	±0.5% of full scale	0.2°C	±0.05 pH unit	±5%	±3.5% of full scale (30 psi)
Calibration	1 to 3 points and zero/tare function	1 to 3 points	1 to 3 points	1 to 3 points	1 point; zero/tare function
Resolution	0.1 kg	0.01°C	0.01 pH unit	1 µS/cm	0.01 psi
Sensor range	0 to 3,300 kg	0 to 200°C	0 to 14	20 to 20,000 µS/cm	0 to 30 psi
Measurement units	kg	°C	pH units	µS/cm	psi
Probe type	3 x Mettler Toledo 0745A load cells	RTD	Electrochemical with 225 mm S8 connector	Two-pole conductivity sensor	Single-use sensor part of the BPC and/or fluid transfer assembly design

Accessories

Sensors and pinch valves

Reusable pH and conductivity probes as well as single-use pressure sensors have been approved and qualified for use with the Touchscreen Console. pH and conductivity measurements can be used to control titration pumps, which enable automatic titration capabilities. The pressure sensors are used in the BPC or line sets to monitor the BPC or liquid pressure, respectively. The BPC can be filled with the proper amount of air when using the pressure sensor in the BPC. The liquid pressure module in the Touchscreen Console is used to control a transfer pump, based on the liquid pressure. Optional pneumatic pinch valves can be used on the fill and harvest line. These valves automatically open and shut when using the fill and/or harvest modules in the Touchscreen Console.

Ordering information

Standards	Manufacturer	Cat. No.
pH sensor	Thermo Fisher Scientific	SV51147.02
	Mettler Toledo	SV51147.01
	Broadley James	SV51147.03
Conductivity sensor	JUMO	SV51148.01
	Mettler Toledo	SV51148.02
Pressure sensor (single use, included in BPC and/or fluid transfer assembly)	PendoTECH 3/8 in. ID tubing	SV20826.05
	PendoTECH 1/2 in. ID tubing	SV20826.01
Pinch valve, harvest line	Thermo Fisher Scientific	SV51108.08
Pinch valve, fill line	Thermo Fisher Scientific	SV51108.05

Heavy-duty tubing clamps

Heavy-duty clamps are used to pinch off line sets that are not in use, to prevent process fluids from escaping. Prior to sterile probe insertion, tubing clamps must be in place to close off probe ports.



Ordering information

Description	Cat. No.
Heavy-duty tubing clamp (single)	SV20664.01
Heavy-duty tubing clamp (10 pack)	SV20664.04

Load cells

Load cells are typically radially mounted in sets of three. The mounting location varies slightly for each size in order to allow easy access to the bottom drain or sparging mechanisms and tubing.



Probe clips

Probe clips are used to hold the probes in place on the S.U.M. tank. The independently movable probe clips hang on a thin brace above the probe port tank cutout.



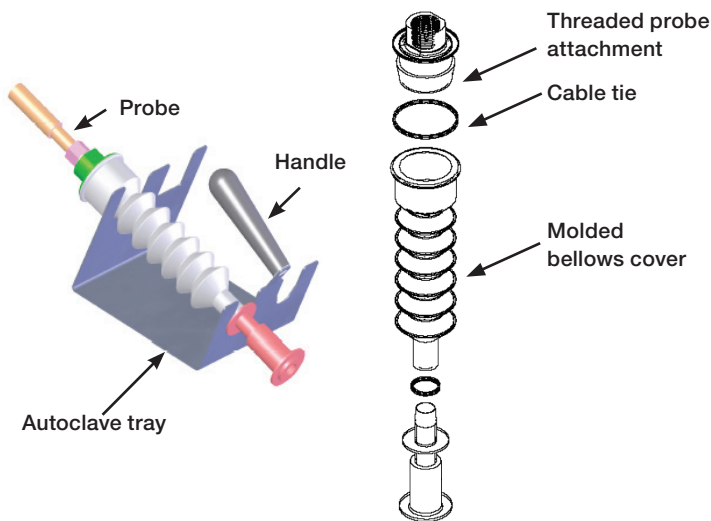
Ordering information

Description	Cat. No.
4 plastic probe clips	SV50177P.01

Autoclave tray and probe assembly

The autoclave tray holds the electrochemical probes and bellows in place during the autoclave sterilization process. Design elements include the following:

- Fabricated from stainless steel
- Plastic handle provides for easy transport right out of the autoclave
- Positions probes on 15% incline for greater probe and membrane longevity
- Prevents probe bellows from collapsing during sterilization
- Probe holder accommodates two probes



Ordering information

Description	Cat. No.
Autoclave tray (stainless steel with plastic carrying handle)	SV50177.01

Cable management system

The optional cable management system connects to the left side of the S.U.M. and is used to properly route tubing and cables along the side of the S.U.M.

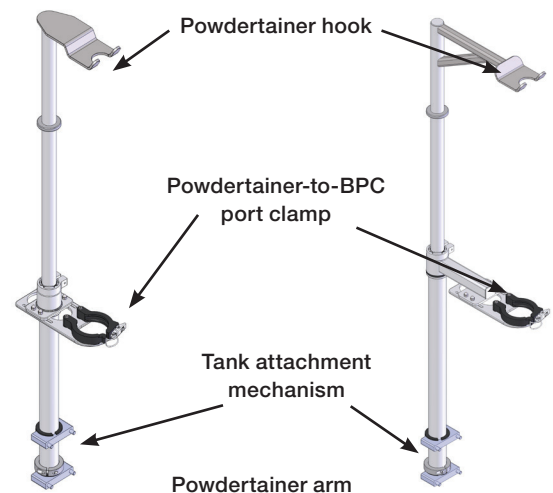


Ordering information

Description	Cat. No.
Cable management system (500 L–2,000 L)	SV50992.03

Powdertainer arm

A Powdertainer arm is available as an option for powder-to-liquid applications. It holds the container of powder above the mixer and attaches it to the BPC with a clamp. The arm adjusts vertically and swivels to enable convenient lifting of the Powdertainer BPC onto the hanger.



Ordering information

Description	Cat. No.
Powdertainer arm (2,000 L)	SV51002.02

Standard 2,000 L S.U.M. hardware

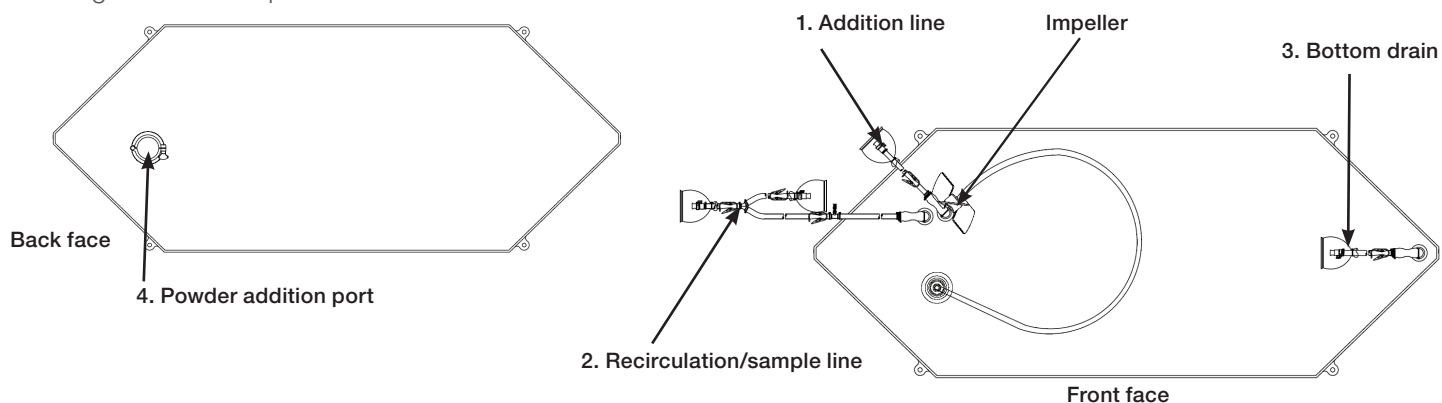
2,000 L S.U.M. specifications		Jacketed and non-jacketed
Mixer geometry	Rated liquid working volume	2,000 L
	Minimum liquid working volume	400 L (complete impeller coverage)
	Total chamber volume (liquid and gas)	2,700 L
	BPC chamber diameter	135 cm (53 in.)
	BPC chamber shoulder height	185 cm (73 in.)
	Liquid height at rated working volume	140 cm (55 in.)
	Fluid geometry at working volume (height:diameter ratio)	1:1
	Hold-up volume	<1 L
	Overall mixer geometry (height:diameter ratio)	1.2:1
	Tank baffles	None
Impeller	Impeller (quantity x blade count)	1 x 3
	Impeller scaling (impeller diameter:tank diameter)	1:5
	Impeller blade pitch (angle)	45°
	Impeller diameter	25.02 cm (9.85 in.)
Agitation	Mixing rate range	20–356 rpm
	Tip speed	39.4–459.7 cm/sec (77.6–904.8 ft/min)
	Counterclockwise mixing flow direction	Down-pumping
	Agitation shaft resolved angle	27°
	Agitation shaft centerline offset	17.8 cm (7 in.)
	Overall drive shaft length	192.5 cm (75.78 in.)
	Drive shaft diameter	1.9 cm (0.75 in.)
	Drive shaft poly-sheath outside diameter	2.54 cm (1 in.)
Motor	Impeller clearance from tank bottom	5.08 cm (2 in.)
	Agitation motor drive (type, voltage, phase)	Induction, 208 VAC, 3 phase
	Motor power rating	745.7 W (1 hp) Motor: 208 VAC, 3.2 A
	Motor torque rating	18 Nm (159 in.-lb.)
	Gear reduction	5:1
Motor communication methods	Via Touchscreen Console through communication ports	
General	Ceiling height required for drive shaft loading	292.1 cm (115 in.)
	Electrical power rating	100–120 VAC, 50/60 Hz, single, 15 A 220–240 VAC, 50/60 Hz, single, 10.4 A
	pH & DO probe—autoclavable type (Applisens, Broadley James, Mettler Toledo)	12 mm diameter x 215–235 mm insertion length x 13.5 PG (pipe) thread
	Noise level	<70 dB at 1.5 m
	Storage temperature	–25°C to 65°C
	Relative humidity	20–80% non-condensing AC motor: 100% max. (without any dew condensation)
Recommended operating parameters	Operating temperature range	S.U.M.: 2–40 ± 0.1°C (36–104 ± 0.2°F) AC motor: 0–40°C (32–104°F)
	Motor speed	30–350 rpm
	Volume range	500–2,000 L
	Maximum static BPC pressure	0.03 bar (0.5 psi)
	Maximum BPC pressure during operation	0.007 bar (0.1 psi)
	Continuous operating time	21 days mixing at nominal volume only

Standard 2,000 L S.U.M. hardware

2,000 L S.U.M. specifications			
		Jacketed	Non-jacketed
Fluid jacket	Jacket area: full/half volume	5.3 m ² /3.3 m ² (57.3 ft ² /35.5 ft ²)	–
	Jacket volume	26 L (6.9 gal)	–
	Jacket flow rate at 3.4 bar (50 psi)	93 L/min (24.5 gal/min)	–
	Process connection	1 in. sanitary tri-clamp	–
Temperature control	TCU model: maximum heating/cooling	TF24000: 22,500/24,000 W	–
	Approximate liquid heat-up time (5–37°C)	2.7 hr	–
	Approximate liquid cool-down time (37–5°C)	3.9 hr	–
	RTD or thermocouple, 3.18 mm (1/8 in.) OD	Pt-100 (standard)	Pt-100 (standard)
Support container (without shelves/basket)	Overall width	180 cm (70.7 in.)	180 cm (70.7 in.)
	Overall length	171 cm (67.4 in.)	171 cm (67.4 in.)
	Overall height (without Powdertainer arm)	225 cm (88.5 in.)	225 cm (88.5 in.)
	Dry skid weight (mass)	755.1 kg (1,664.8 lb.)	551.1 kg (1,214.8 lb.)
	Wet skid weight—rated working volume (mass)	2,755.1 kg (6,073.8 lb.)	2,551.1 kg (5,623.8 lb.)
Touchscreen Console	Dimensions (W x H x D)	250 x 520 x 234 mm (9.9 x 20.5 x 9.3 in.)	
	Construction material	AISI 304 (stainless steel)	
	Pumps	Supports various pumps with 4–20 mA signal control	
	Load cells	Mettler Toledo MTB	
	pH sensors supported	Thermo Scientific, Mettler Toledo, and Bradley James	
	Conductivity sensors	JUMO, Mettler Toledo	
	Pinch valves	Bimba ACRO 935 pinch valve, 3/4 in. (19 mm) OD x 1/8 in. (3.175 mm) wall tubing	
	HMI	8.4 in. LCD panel with capacitive touchscreen	
	Alarms	Factory-set and user-defined	
	Communication ports	USB, Ethernet, Profibus, Modbus RTU	
	E-stop	Integrated safety circuit for entire system; external E-stop also available	
	Data recording	User-defined data record transfer via Ethernet, Profibus, or Modbus RTU. 72-hour data storage exportable via USB	
	File formats	CSV	
	Data exporting	Local via USB flash drive Remote via PC and network with Ethernet, Profibus, or Modbus RTU	

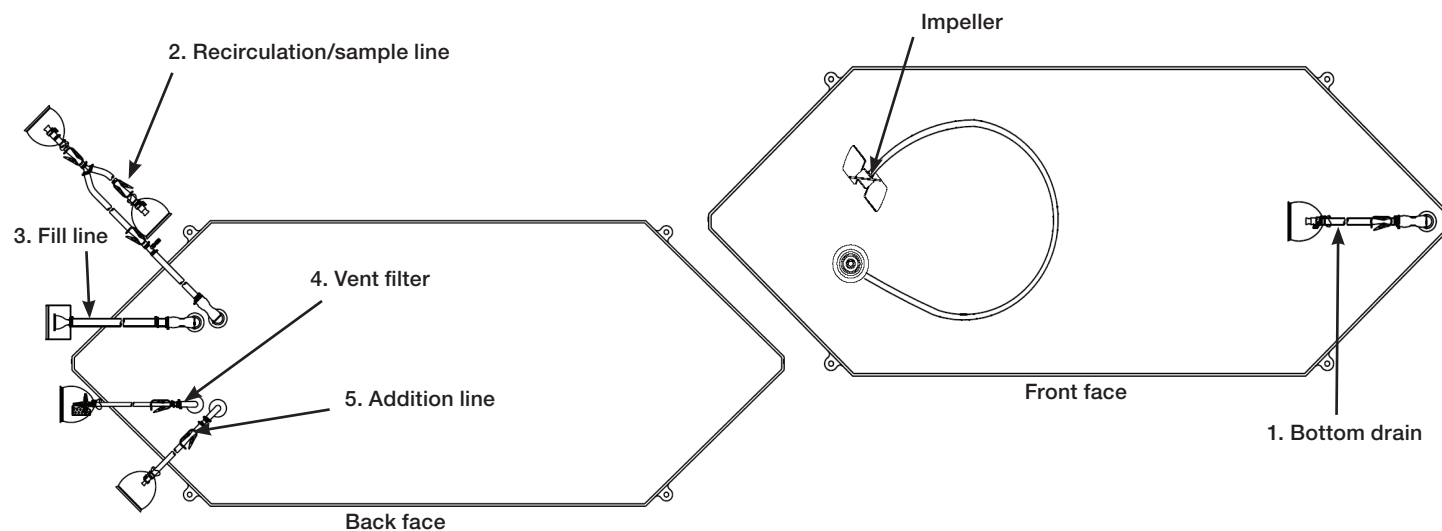
HyPerforma S.U.M. BPCs

Open-top or closed-top Thermo Scientific™ BPC designs are available with Thermo Scientific™ CX5-14 and Aegis™ 5-14 film options.



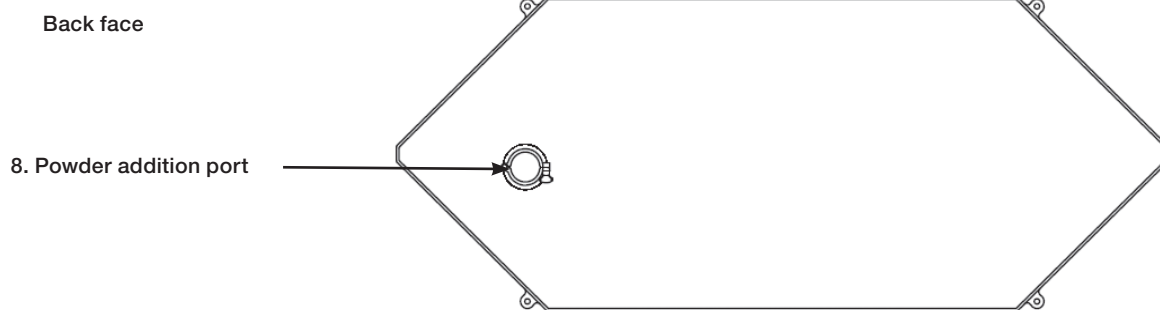
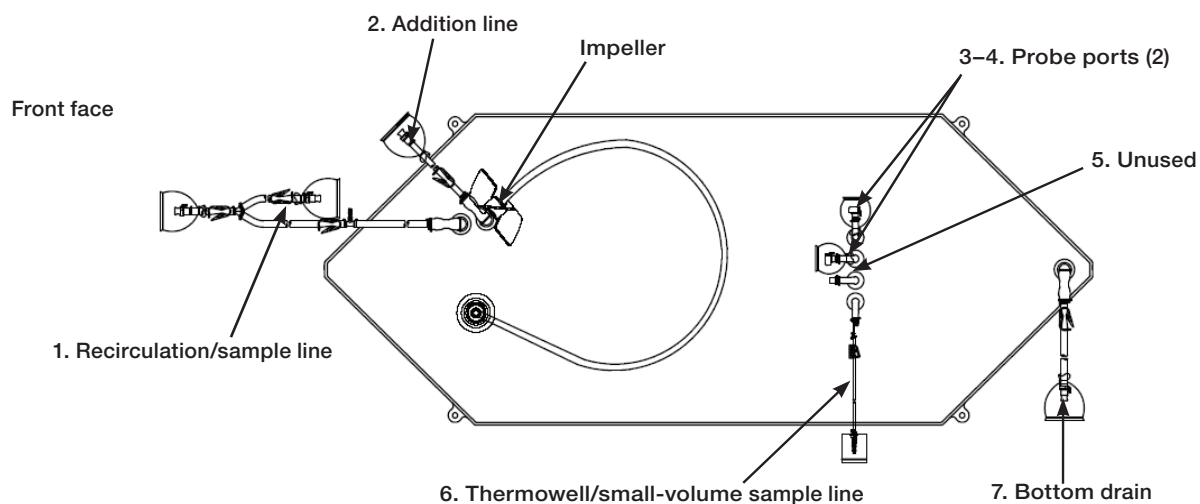
Standard 2,000 L BPC for powder-to-liquid applications without probe ports

Line	Description	Tubing set (inner diameter x outer diameter x length)	End treatment
1	Addition line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 183 cm (72 in.)	Plugged 12.7 mm (1/2 in.) MPX body
2	Recirculation/sample line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 198 cm (78 in.) splits to 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 61 cm (24 in.) and 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 30 cm (12 in.)	Capped 12.7 mm (1/2 in.) MPX insert Plugged 12.7 mm (1/2 in.) MPX body
3	Bottom drain	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 122 cm (48 in.)	Plugged 12.7 mm (1/2 in.) MPX insert
4	Powder addition port	7.6 mm (3 in.) sanitary fitting, tri-clamp	Cap with gasket



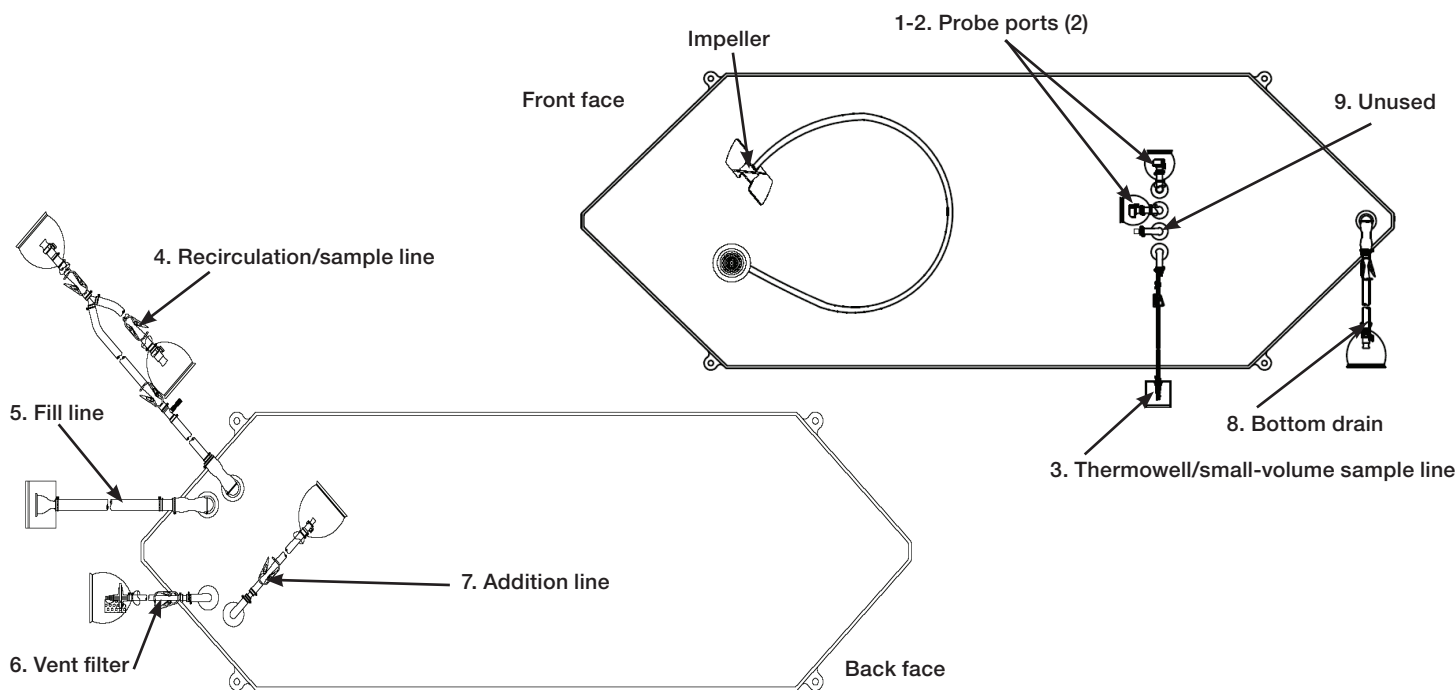
Standard 2,000 L BPC for liquid-to-liquid applications without probe ports

Line	Description	Tubing set (inner diameter x outer diameter x length)	End treatment
1	Bottom drain	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 122 cm (48 in.)	Capped 12.7 mm (1/2 in.) MPX insert
2	Recirculation/sample line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 198 cm (78 in.) splits to 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 61 cm (24 in.) and 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 30 cm (12 in.)	Capped 12.7 mm (1/2 in.) MPX insert Plugged 12.7 mm (1/2 in.) MPX body
3	Fill line	19.1 mm (3/4 in.) x 25.4 mm (1 in.) C-Flex x 183 cm (72 in.)	38.1 mm (1 1/2 in.) tri-clamp (SterilEnz™)
4	Vent filter	6.4 mm (1/4 in.) x 12.7 mm (1/2 in.) C-Flex x 10.2 cm (4 in.)	Sterile hydrophobic vent filter (0.2 µm PVDF, Acro™ 50)
5	Addition line	9.5 mm (3/8 in.) x 15.9 mm (5/8 in.) C-Flex x 61 cm (24 in.)	Plugged 9.5 mm (3/8 in.) MPX body



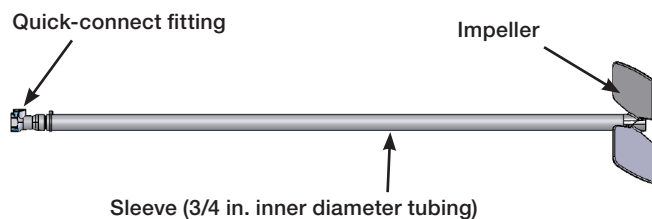
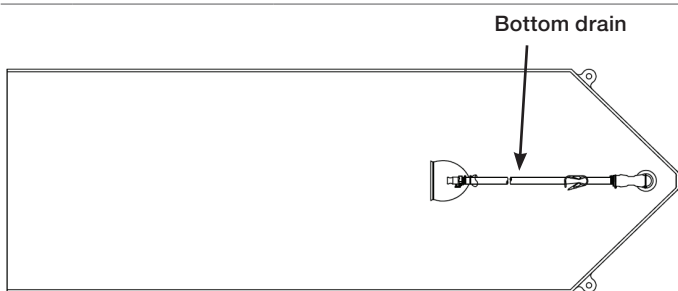
Standard 2,000 L BPC for powder-to-liquid applications with probe ports

Line	Description	Tubing set (inner diameter x outer diameter x length)	End treatment
1	Recirculation line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 198 cm (78 in.) splits to 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 61 cm (24 in.) and 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 30 cm (12 in.)	Capped 12.7 mm (1/2 in.) MPX insert Plugged 12.7 mm (1/2 in.) MPX body
2	Addition line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 122 cm (48 in.)	Plugged 12.7 mm (1/2 in.) MPX insert
3-4	Probe ports (2)	None	Kleenpak™ aseptic connector KPCHT series (female)
5	Unused	None	Plug
6	Thermowell/ small-volume sample line	Thermowell adapter for 3.2 mm (1/8 in.) diameter 3.2 mm (1/8 in.) x 6.4 mm (1/4 in.) x 30 cm (12 in.)	Luer and SmartSite™ valve port
7	Bottom drain	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 122 cm (48 in.)	Capped 12.7 mm (1/2 in.) MPX body
8	Powder addition port	7.6 mm (3 in.) sanitary fitting, tri-clamp	Cap with gasket



Standard 2,000 L BPC for liquid-liquid applications with probe ports

Line	Description	Tubing set (inner diameter x outer diameter x length)	End treatment
1-2	Probe ports (2)	None	Kleenpak aseptic connector KPCHT series (female)
3	Thermowell/ small-volume sample line	Thermowell adapter for 3.2 mm (1/8 in.) diameter 3.2 mm (1/8 in.) x 6.4 cm (1/4 in.) C-Flex x 30 cm (1/2 in.)	Luer and SmartSite valve port
4	Recirculation line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 198 cm (78 in.) splits to 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 61 cm (24 in.) and 12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 30 cm (12 in.)	Capped 12.7 mm (1/2 in.) MPX insert Plugged 12.7 mm (1/2 in.) MPX body
5	Fill line	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 183 cm (72 in.)	38.1 mm (1 1/2 in.) tri-clamp (SterilEnz)
6	Vent filter	6.4 mm (1/4 in.) x 12.7 mm (1/2 in.) C-Flex x 10.2 cm (4 in.)	Sterile hydrophobic vent filter (0.2 µm PVDF, Acro 50)
7	Addition line	9.5 mm (3/8 in.) x 15.9 mm (5/8 in.) C-Flex x 61 cm (24 in.)	Plugged 9.5 mm (3/8 in.) MPX insert
8	Bottom drain	12.7 mm (1/2 in.) x 19.1 mm (3/4 in.) C-Flex x 122 cm (48 in.)	Plugged 12.7 mm (1/2 in.) MPX body
9	Unused	None	Plug



Standard open-top liners

Description	Cat. No.
1,000 L standard open-top liner, 0 probes, CX3-9 film	SH30762.05

Standard impeller sleeve

Description	Cat. No.
2,000 L impeller sleeve for open-top mixing*	SH30772.01

* The bearing hub needed for open-top mixing is automatically supplied with the tank hardware.

Custom BPC products

Category	Options/capability	Notes
Tubing type	C-Flex, platinum-cured silicone, PVC, PharMed™, PharmaPure™	More information is available in the tubing selection guide
Tubing size	Ranges from 3.18 mm (1/8 in.) to 25.4 mm (1 in.) inner diameter in various lengths	More information is available in the tubing selection guide
Connectors	Luer, Colder Products Company™ (CPC) quick connects, SIP connectors, tri-clamp, Kleenpak, SmartSite, Clave™, Lynx™ steam-thru, CPC steam-thru, Gore™ steam valve, Gore™ Mini TC, BioQuate™, SterilEnz, end plug	More information is available in the connection system selection guide. Note: the only option for probe port connections is Kleenpak connectors
Probe ports/ line addition ports	Ports may be added if they are compatible with the hardware	The reusable probe port connection uses a Kleenpak connector
Disposable sensors	Pressure sensor: PendoTECH™ and Finesse Solutions (PendoTECH comes standard on 500 L and 1,000 L S.U.M.); DO and pH sensor: Finesse Solutions and PreSens™; pH sensor: Mettler Toledo	Choice of qualified vendors available
Port sizes	Limited engineer-to-order customization only	Dependent on location in BPC and fit with hardware (e.g., 1 in. ID port on harvest line)
Rearrangement of lines on existing ports	Limited customization possible, such as moving sample/thermowell port to a probe tube port, or swapping exhaust outlet line with liquid lines	Dependent on location in BPC and fit with hardware
Dip tube lines	Limited customization possible	Length cannot interfere with impeller and shaft
Filters on media and supplement inlets	Limited engineer-to-order customization only. Choice of filters used to sterilize incoming media or supplements are available	

Note: Not all options are available for all ports. It is not possible to customize port type, port location, chamber dimensions, or mixing assembly. For additional information, please see the selection guides in the product catalog.

BPC packaging

Description	Details
Outer packaging	Supplied flat-packed with two polyethylene outer layers
Label	Description, product code, lot number, and expiry date on outer packaging and shipping container
Sterilization	Irradiation (25 to 40 kGy) inside outer packaging
Shipping container	Durable cardboard carton
Documentation	Certificate of Analysis provided with each lot for each delivery

Ordering information

2,000 L S.U.M. hardware	Cat. No.
Non-jacketed, AC motor, Touchscreen Console, 240 V, with load cells	SUM2000.9003
Jacketed, AC motor, Touchscreen Console, 240 V, with load cells	SUM2000.9004

Models without water jackets may have slightly different dimensions than the water-jacketed model shown in this data sheet. See the drawings provided with your unit for exact dimensions for non-jacketed models. Non-jacketed models do not have the capability to heat or cool the liquid inside the tank.

2,000 L S.U.M. BPC	Size	Probe ports*	Film type	Cat. No.
Standard powder-to-liquid BPC	2,000 L	0	CX5-14	SH30770.01
	2,000 L	0	Aegis 5-14	SH30973.05
Standard liquid-to-liquid BPC	2,000 L	0	CX5-14	SH30769.01
	2,000 L	0	Aegis 5-14	SH30983.05
Standard powder-to-liquid BPC*	2,000 L	3	CX5-14	SH30770.02
	2,000 L	3	Aegis 5-14	SH30974.05
Standard liquid-to-liquid BPC*	2,000 L	3	CX5-14	SH30769.02
	2,000 L	3	Aegis 5-14	SH30982.05

* All 2,000 L BPCs with probe ports are designed to allow probes to work properly at 5:1 turndown levels. These BPCs are only compatible with the HyPerforma hardware shown in this document. If you are using an older version of the S.U.M. hardware, do not use these items; instead refer to the legacy S.U.M. user manual or data sheets.

Find out more at thermofisher.com/sum

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