

Single-use bioprocessing equipment and automation

Speed to market and risk mitigation are top customer concerns, and Thermo Fisher Scientific offers expertise and solutions to address these concerns seamlessly. We manufacture single-use equipment to facilitate easy integration and customization across upstream and downstream bioprocessing workflows. Our control and hardware, utilizing Emerson DeltaV data management solutions create flexible operating systems with the integration of modular hardware, novel single-use sensors, and state-of-the-art bioreactors for strategic and streamlined bioprocess control.

Find out more at

thermofisher.com/sutequipment

You can now easily configure and standardize processes that employ Thermo Scientific Single-Use Bioreactors (S.U.B.s), Single-Use Fermentors (S.U.F.s), Single-Use Mixers (S.U.M.s), Integrity Testing Systems, Heat Exchangers, BioProcess Containers (BPCs), automation platforms, and other accessories for rapid scale-up—from process development to commercial manufacturing.

Intuitive, customized data management

The foundation of efficient data management is the usage of a robust platform that is consistent from R&D to production, easy-to-use, intuitive, and configurable. We have developed our TruBio software, G3 bioprocess controllers, and sensing technologies to enable users to optimize data acquisition, while maintaining full compliance with 21 CFR Part 11.



TruBio automation and control software solutions

The technology and data transfer during the lifecycle of drug development, from bench scale laboratory applications to large-scale production, is often challenging, time consuming, and involves many different user requirements. The Thermo Scientific™ TruBio™ software and automation platform improves tech transfer time and validation costs by running on a consistent data model from R&D to commercial production. With TruBio Bioprocess Control Software being powered by both DeltaV™ Discovery platform at lab scale and DeltaV Distributed Control platform (for pilot, clinical and production scale) both from Emerson, considerable savings have been achieved in risk mitigation including reduced training and validation costs. Standardizing with open architecture controllers simplifies data transfer and storage, resulting in introducing new products faster to market.



For research and process development solutions

Thermo Scientific™ TruBio™ Discovery software platform provides a simplified solution to meet the needs of research and process development labs. This platform supports research and discovery applications with automation technology that easily translates to commercial operations. A single, workstation-based controller is utilized to execute process control strategies.

- Transferability of software and speed to scale-up conversions when using TruBio software from research to clinical to commercial production processes
- Ability to integrate with most existing vessels (including third-party) currently in place
- Enables easy integration of process measurements and data sources powered by the DeltaV Discovery platform
- Reduced footprint
- Lower cost entry into the DeltaV control platform



For production scale solutions

TruBio software with the DeltaV platform and the TruLogic controller provides all the capabilities of TruBio Discovery software and adds flexible and reliable state-of-the-art control capability. With multiple sensor loops as well as gas and liquid addition capabilities, this software can be used with both HyPerforma S.U.B.s, S.U.M.s, and other third-party bioreactors to provide a process control platform from research through commercial manufacturing.

- Conforms to regulatory requirements for use in cGMP-compliant processes
- Enables building of sophisticated process control strategies without knowledge of DeltaV platform
- Intelligent alarm management
- Multifeed dosing functionality available to scale from small to large doses with high precision
- Ability to create batch recipes for media mixing and buffer preparation
- Redundant controller configurations can be accommodated

Bioprocess controllers

HyPerforma G3Lab Controller

The Thermo Scientific™ HyPerforma™ G3Lab Controller can control most brands of single-use or autoclavable bioreactors or fermentors that are ≤50 L, including stirred-tank and rocking models. The controller operates using TruBio automation platforms, which provide easy process scale-up or scale-down and the configurability to modify your control strategy along with your process. The enclosure contains state-of-the-art transmitters along with power supplies, pumps, input/output (I/O) modules, and the hardware required to connect to the control network, providing maximum control capability.

Key features

- Open architecture capabilities to integrate with vessels from other suppliers
- When coupled with TruBio software and DeltaV control platform, allows for data transfer and scalability from R&D, to production manufacturing
- Compatible with flexible upstream TruBio software
- The ability to build and manage complex, multifeed dosing strategies
- Allows for third-party peripheral integration as needed

Ordering information

HyPerforma G3Lab Controller*	Cat. No.
HyPerforma G3Lab Controller for use with DeltaV or DeltaV Discovery and TruBio software licenses with 4 Watson-Marlow series 114 pumps, suitable for glass and benchtop single-use bioreactors	ATO-G3Lab-Std
HyPerforma G3Lab Controller for use with DeltaV or DeltaV Discovery and TruBio software licenses, with 2 Watson-Marlow series 114 pumps, suitable for glass and benchtop single-use bioreactors	ATO-G3Lab-Discovery
HyPerforma G3Lab Controller for use with DeltaV or DeltaV Discovery and TruBio software licenses, with 4 Watson-Marlow series 114 pumps, suitable for glass, benchtop single-use, and rocker bioreactors	G3Lab-Full-Config

Note: All bioreactors listed are manufactured according to GMP. G3Lab controllers are available as a made-to-order (MTO) product.

* Each HyPerforma G3Lab Controller needs to be operated using the TruFlow Mass Flow Controller and appropriate automation platform.

Please contact your Thermo Fisher Scientific sales representative for more information on standard package options suitable for your requirements.



Bioprocess controllers

HyPerforma G3Lite and G3Pro Controllers

The Thermo Scientific™ HyPerforma™ G3Lite Controller is an open architecture control system that can be integrated with most S.U.B.s and S.U.F.s. The system consists of a control tower that leverages intelligent transmitters, mass flow controllers (MFCs), pumps, sensors, and TruBio software that facilitates easy, reliable, and repeatable process development and commercial cell culture processes. HyPerforma G3Lite Controllers are fully self-contained, movable units that can be operated alone (for one vessel) or networked for multiple vessels. They are engineered to optimize capital cost for use in non-GMP and cGMP-certified production facilities.



Features

- Scalability: transfer any process from 30 L to 2,000 L
- Modularity: predefined configurations available for 50, 100, 250, 500, 1,000, and 2,000 L bioreactors and 30 and 300 L fermentors
- Touchscreen interface for easy data entry and control
- Stand-alone or networked (for multiple vessels)—enabled by distribution control system (DCS)
- Flexible upstream TruBio software powered by the Emerson DeltaV system
- Includes up to six MFCs with air, O₂, N₂, CO₂ for drilled-hole spargers (DHS); air for direct sparge, cross flow, and overlay



HyPerforma G3Pro Controller

The Thermo Scientific™ HyPerforma™ G3Pro controller is a universal controller used to control S.U.B.s (50 L to 2,000 L) and S.U.F.s (30 and 300 L). It is an engineered-to-order product that bring versatility to manage, monitor, and control any third-party vessels. These controllers also allow mobility and flexibility in terms of any reconfiguration and application expansion.

Key features

- Open-architecture capabilities to integrate with vessels from other suppliers
- Single- or dual-cart mount option for easy mobility and reduced footprint
- Scalability: transfer any process from 30 L to 2,000 L
- Touchscreen interface by NEMA for easy data entry and control
- Probe configuration options—flexible to connect both electrochemical and single-use probes for pH and DO measurements
- Optional redundant sensor control mechanism
- Flexible upstream TruBio software powered by the Emerson DeltaV system
- Can be adapted for multiproduct applications

TruFlow gas mass flow controller (MFC)

The Thermo Scientific™ TruFlow™ gas MFC is designed to work with all of the HyPerforma Bioreactor control systems. Its compact assembly provides up to six standard mass flow controllers and three associated solenoid valves. When connected, the TruFlow gas MFC is instantly recognized by TruBio software to provide precise control of gas flow, without requiring any configuration, even at extremely low flow rates.

Key features

- Variety of flow rate options*
- Flow range configurability
- Plug-and-play connectivity



TruFlow gas MFC specifications	
Enclosure dimensions (H x W x D)	Six mass flow controllers: 9.1 x 7.4 x 6.2 in.
Rating	NEMA 1, IP 51 (liquid wipedown)
Maximum gas flow rate	Configurable up to 30 L/min*
Weight/shipping weight	5.8 kg/9.1 kg (12.8 lb/20 lb)
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	-25°C to 70°C (-15°F to 158°F)
Relative humidity	5% to 95% (noncondensing)
Certifications	CE: EN-61326 and EN-61010
Inlet pressure	1.6 to 2.3 bar/25 to 35 psig
Outlet pressure	0 to 1.38 bar/0 to 20 psig
Accuracy	±0.8% of flow rate and ±0.3% full scale (Burkert)
Repeatability	±0.1% full scale (Burkert)
Cable assembly	2 m (6 ft) standard

Volume	Glass				Rocker		
	1 L	3 L	7 L	15 L	10 L	20 L	50 L
Air-sparge	0.25	0.5	2	5	NA	NA	NA
Air-overlay	0.5	2	5	10	20		
O ₂	0.25	0.5	2	5	NA	NA	NA
CO ₂	0.1	0.25	0.5	2	10		
N ₂ -optical	0.1	0.25	0.5	2	NA	NA	NA

Range of operating parameters																		
Volume	50 L			100 L			250 L			500 L			1,000 L			2,000 L		
	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay
Air	5	5	5	10	9	9	25	13	13	50	25	25	100	40	40	200	60	60
O ₂	5	-	-	10	-	-	25	-	-	50	-	-	100	-	-	200	-	-
CO ₂	1	-	-	2	-	-	2	-	-	2	-	-	5	-	-	5	-	-
N ₂	1	-	-	2	-	-	5	-	-	5	-	-	10	-	-	10	-	-
Total	5	5	5	10	9	9	25	13	13	50	25	25	100	40	40	200	60	60
Exhaust load	20			20			90			90			180			360		

MFCs with flow rates higher than 50 L/min are mounted as individual units and are not part of the main MFC block.

* May require additional configuration for specific flow rate. Please consult with your local Thermo Fisher sales representative for more information.

Superior pump technology

Unrivalled precision for dosing, feeding, mixing, transferring or harvesting

Our pumps have been designed to meet high-precision liquid delivery requirements in upstream with controller and downstream (external pumps) for bioprocess applications. The pumps combines industry-known Watson Marlow™ pump heads with electronic boards. This pairing guarantees optimized control of dosing, feeding, product transfer/harvest, buffer mixing (gradient or step) or general liquid management.



Features

- Ability to switch the pump models (different flow rates)
- Auto-detection for the pump by the TruBio software

Unleash your controller

These pumps are standard in the G3 controller family and can be swapped out if the process flow rate requirements change or if the controller is used with a different size or type of vessel. In G3 controllers, all pumps communication is aggregated by a master communication board; this board reads process values from and sends instructions to the pumps.

Pump specifications			
Pump series	114	313	520
Power supply	24 V DC	24 V DC	24 V DC
Max current (at 25°C)	0.25 A	0.95 A	1.5 A
Average current (at 25°C)	0.2 A	0.75 A	1 A
Operating temperature	5°C to 50°C (41°F to 122°F)		
Storage temperature	-10°C to 70°C (14°F to 158°F)		
Humidity	10% to 90% (noncondensing)		
Speed	5 to 160 rpm	1 to 300 rpm	1 to 300 rpm
Accuracy	±2 rpm, or ±2% of set point	±1 rpm, or ±2% of set point	±1 rpm, or ±2% of set point
Certifications	CE: EN-60101 and EN-61326	CE: EN-60101 and EN-61326	CE: EN-60101 and EN-61326
Tubing (thickness, ID)	0.8 mm, 4.8 mm	0.8 mm, 8.0 mm	1.6 mm, 9.6 mm
Pump speed	Minimum/maximum flow rates		
1	0.16 mL/3 min (5 rpm)	0.05 mL/3.1 min	0.4 mL/10.6 min
10	0.3 mL/6 min	0.5 mL/31.4 min	4.2 mL/106.8 min
50	1.7 mL/30 min	3.2 mL/179.8 min	21.2 mL/536.9 min
100	3.4 mL/57.5 min	6.3 mL/335.4 min	42.6 mL/1,102.6 min
160	5.5 mL/104 min	NA	NA
250	NA	15 mL/630 min	105.6 mL/2,879.7 min
300	NA	17.7 mL/808.1 min	123.2 mL/3,400.0 min

HyPerforma Single-Use Bioreactor (S.U.B.)

The Thermo Scientific™ HyPerforma™ 5:1 Single-Use Bioreactor (S.U.B.) and BPC are designed using traditional stainless steel bioreactor principles to ensure optimal cell culture performance. The complete line of HyPerforma S.U.B.s includes 50, 100, 250, 500, 1,000, and 2,000 L sizes with a 5:1 turndown ratio that ensures consistent scalability from pilot-scale studies to preclinical and commercial production.

Ergonomic and elegant tank design

The S.U.B. is elegant in design while being extremely functional, and it is designed to meet cGMP requirements. The S.U.B. tank provides operator ergonomics, a small footprint, and easy cleaning capabilities associated with an open-cart frame.

- Helps save precious lab space with a minimized vessel footprint
- Easier access to harvest lines with the open-frame design
- Reduced hold-up volumes with the smartly designed tank floor
- Simple bag loading with a vertical access door (available on 500, 1,000, and 2,000 L sizes; electromechanical hoist provided on the 2,000 L S.U.B.)
- Pneumatic motor lift assembly for the 1,000 and 2,000 L sizes is used to lower the impeller for proper mixing when 20% of the fill volume is utilized

Efficient and fast

The water jacket design allows fast heat-up and cool-down times, reducing process cycle time. The bottom water-jacketed systems increase surface area, improving heat transfer from low-volume cultures.

- Optional precision load cells and standard sight-volume indicators allow you to keep your processes running efficiently.
- Optional brushless DC motor includes encoder feedback for improved rpm accuracy and is compatible with ground-fault circuit interrupters (GFCIs)
- 3/8 in. dimple jacket improves flow rate through the water jacket for higher-performance temperature control
- Graduated sight-volume indicators accommodate visual volume references at a glance



Applications

- Batch, fed-batch, and perfusion cultures
- Suspension and microcarrier cultures
- Proven for various cell lines such as CHO, Sp2/0 hybridoma, NS0, PER.C6, HEK293, Vero, and MDCK

HyPerforma 5:1 S.U.B. hardware specifications and options

5:1 S.U.B. hardware specifications

	50 L	100 L	250 L	500 L	1,000 L	2,000 L
Liquid working volume	50 L	100 L	250 L	500 L	1,000 L	2,000 L
Minimum liquid working volume	10 L	20 L	50 L	100 L	200 L	400 L
Total reactor volume (not working volume)	65.5 L	120 L	316 L	660 L	1,320 L	2,575 L
Fluid geometry at working volume (height:diameter ratio)	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
Overall reactor geometry (height:diameter ratio)	1.9:1	1.9:1	1.9:1	1.9:1	1.9:1	1.9:1
Impeller (quantity x blade count)	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3
Mixing rate range (rpm)	30–200	30–200	30–150	30–150	20–110	0–75* rpm, working volumes must stay above 50% during agitation

5:1 S.U.B. hardware dimensions and weights

	Tank overall (W x L x H)	Jacketed tank weight: dry/wet (at full working volume)
50 L	AC motor: 94 x 86 x 199 cm (37.1 x 34.0 x 78.2 in.) DC motor: 56.5 x 77 x 198.6 cm (22.2 x 30.3 x 78.2 in.)	115.7 kg (255 lb) 165.7 kg (365.2 lb)
100 L	AC motor: 100 x 95 x 202 cm (38.8 x 37.6 x 79.3 in.) DC motor: 56.5 x 85.8 x 201.5 cm (22.2 x 33.8 x 79.3 in.)	160.6 kg (354 lb) 260.6 kg (574.5 lb)
250 L	AC motor: 113 x 106 x 215 cm (44.4 x 41.7 x 85.0 in.) DC motor: 68.5 x 96.9 x 215.5 cm (27.0 x 38.1 x 84.8 in.)	223.6 kg (493 lb) 473.6 kg (1,044 lb)
500 L	AC motor: 129 x 126 x 251 cm (50.8 x 49.7 x 98.9 in.) DC motor: 86.4 x 116 x 251 cm (34.0 x 45.7 x 98.9 in.)	353.8 kg (780 lb) 853.8 kg (1,882.3 lb)
1,000 L	AC motor: 149 x 141 x 284 cm (58.7 x 55.5 x 111.5 in.)	655.01 kg (1,444 lb) 1,655.01 kg (3,649 lb)
2,000 L	AC motor: 163 x 157 x 343 cm (52.7 x 61.8 x 135 in.)	962.1 kg (2,121 lb) 2,962.1 kg (6,530 lb)

- Add 29.2 cm (11.5 in.) to overall system width if cable management tree is added.
- Filter bracket extends 56.9 cm (22.4 in.) above top of motor; height to top of filter bracket given.
- Electrical box adds 35 cm (13.8 in.) to system width; dimension with electrical box given in the table.
- All weights and dimensions are approximate measurements. Design request accruals will be presented.

* WARNING: Mixing speeds must stay within the recommended operating parameters. Higher speed operation compromises system reliability and will void standard Thermo Fisher warranties. Your control strategy should include governors that regulate rpm based on liquid volume as well as safety interlocks that disable mixing when the liquid drops below the recommended volume.

HyPerforma 5:1 S.U.B. hardware

Description	Size	Cat. No.
HyPerforma S.U.B. products		
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB0050.8100
Jacketed S.U.B., 5:1, AC motor, 120 VAC, e-box, analog load cells	50 L	SUB0050.8101
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells		SUB0050.8102
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB0100.8200
Jacketed S.U.B., 5:1, AC motor, 120 VAC, e-box, analog load cells	100 L	SUB0100.8201
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells		SUB0100.8202
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB0250.8300
Jacketed S.U.B., 5:1, AC motor, 120 VAC, e-box, analog load cells	250 L	SUB0250.8301
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells		SUB0250.8302
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB0500.8400
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells	500 L	SUB0500.8401
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB1000.9009
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells	1,000 L	SUB1000.9010
Jacketed S.U.B., 5:1, AC motor, no e-box, load cells without display		SUB2000.9009
Jacketed S.U.B., 5:1, AC motor, 240 VAC, e-box, analog load cells	2,000 L	SUB2000.9010
Additional products		
	50 L, 100 L	SV50992.01
	250 L	SV50992.02
Cable Management System	500 L	SV50992.03
	1,000 L	SV50992.04
Load cells		
	50 L	SV50988.01
Load cell with summing box, without display	100 L, 250 L	SV50988.02
	500 L	SV50988.03

HyPerforma 5:1 S.U.B. hardware accessories

	50 L	100 L	250 L	500 L	1,000 L	2,000 L
Bioreactor probe assembly with Kleenpak connector (nonsterile)	SH30720.01	SH30720.01	SH30720.01	SH30720.01	SH30720.01	SH30720.01
Bioreactor probe assembly with AseptiQuik connector (nonsterile)	SH30720.02	SH30720.02	SH30720.02	SH30720.02	SH30720.02	SH30720.02
Sterile sampling manifold, with Luer lock (individual)	SH30845.01	SH30845.01	SH30845.01	SH30845.01	SH30845.01	SH30845.01
Sterile sampling manifold, with Luer lock (10 count)	SH30845.02	SH30845.02	SH30845.02	SH30845.02	SH30845.02	SH30845.02
Heavy-duty tubing clamp (individual)	SV20664.01	SV20664.01	SV20664.01	SV20664.01	SV20664.01	SV20664.01
Heavy-duty tubing clamp (10 count)	SV20664.04	SV20664.04	SV20664.04	SV20664.04	SV20664.04	SV20664.04
S.U.B. temperature/sample port	SV20750.01	SV20750.01	SV20750.01	SV20750.01	SV20750.01	SV20750.01
Cable management tree	SV50992.01	SV50992.01	SV50992.02	SV50992.03	SV50992.04	NA
Autoclave tray	SV50177.01	SV50177.01	SV50177.01	SV50177.01	SV50177.01	SV50177.01
Sparge line support	SV50177B.19	SV50177B.19	SV50177B.19	SV50177B.19	SV50177.65	SV50177.65
PendoTech pressure sensor	SH31134.01	SH31134.01	SH31134.01	SH31134.01	SH31134.01	SH31134.01
Thermo Scientific pressure sensor	SH31134.02	SH31134.02	SH31134.02	SH31134.02	SH31134.02	SH31134.02
120 V condenser system	NA	NA	NA	NA	NA	SV50232.01
240 V condenser system	NA	NA	NA	NA	NA	SV50232.02

Note: All 5:1 S.U.B. BPCs are supplied with AseptiQuik connectors on the probe ports and need bioreactor probe assembly with an AseptiQuik connector, SH30720.02. All S.U.B. BPCs are supplied with AseptiQuik connectors on pressure sensor ports. Select tubing assembly with pressure sensor depending on the transmitter.

HyPerforma S.U.B. BPCs and accessories

5:1 S.U.B. BPCs

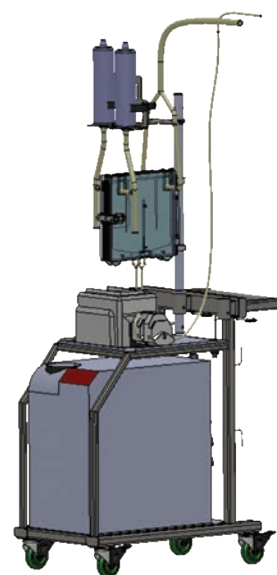
	50 L	100 L	250 L	500 L	1,000 L	2,000 L
S.U.B. BPC—CX5-14 Film						
DHS + crossflow sparger	SH31072.01	SH31102.01	SH31074.01	SH31076.01	SH31132.01	SH31138.01
DHS + crossflow sparger, with condenser	NA	NA	NA	NA	NA	SH31137.01
S.U.B. BPC—Aegis5-14 Film						
DHS + crossflow sparger	SH31073.01	SH31103.01	SH31075.01	SH31077.01	SH31133.01	SH31135.01
DHS + crossflow sparger, with condenser	NA	NA	NA	NA	NA	SH31136.01

2:1 S.U.B. BPCs

	50 L	100 L	250 L	500 L	1,000 L	2,000 L
S.U.B. BPC—CX5-14 Film						
Frit + OP	SH30774.01	SH30774.02	SH30774.03	SH30774.04	SH30774.05	SH30774.08
Frit + OP, with condenser	NA	NA	NA	NA	NA	SH30774.07
Frit + DHS	SH30985.01	SH30985.02	SH30985.03	SH30985.04	SH30985.05	SH30985.08
Frit + DHS, with condenser	NA	NA	NA	NA	NA	SH30985.07
S.U.B. BPC—Aegis5-14 Film						
Frit + OP	SH30972.01	SH30972.02	SH30972.03	SH30972.04	SH30972.05	SH30972.08
Frit + OP, with condenser	NA	NA	NA	NA	NA	SH30972.07
Frit + DHS	SH30999.01	SH30999.02	SH30999.03	SH30999.04	SH30999.05	SH30999.08
Frit + DHS, with condenser	NA	NA	NA	NA	NA	SH30999.07

HyPerforma S.U.B. condenser system

The Thermo Scientific™ HyPerforma™ Single-Use Bioreactor (S.U.B.) condenser system supports the effective use of the Thermo Scientific™ HyPerforma™ 2,000 L S.U.B. It is also available as an auxiliary product for all other S.U.B. systems. It efficiently condenses exhaust gases and transfers condensate back into the bioreactor, preventing potential vent filter blockage and reducing fluid loss due to evaporation. It is offered in both single and double chill-plate formats.



Specifications

The condenser system protects against filter blockage by condensing out moisture prior to exhaust gases reaching the vent filters. BPCs are not intended to operate under pressure, and fouled (blocked) exhaust filters lead to bag pressurization. While vent filter heaters may prevent condensate buildup in many instances, with larger bioreactors, such as the 2,000 L S.U.B., this becomes less effective, whereas condensing out the moisture first is a more reliable method for preventing liquid from reaching the filters.

The S.U.B. condenser system consists of the following components:

- **Cart and brackets**—convenient means of organizing and transporting working elements of the condenser system
- **Condenser (chill) plate**—disposable double chamber condenser bag is secured to the condenser plate to cool exhaust gases. Up to 2 plates can be used per system
- **Peristaltic pump**—returns condensate to bioreactor.
- **Temperature control unit (TCU or chiller)**—circulates water to cool the condenser plate
- **Condenser disposables**—the BPC (double-chambered bag), tubing, and exhaust filters through which the exhaust gases flow and are chilled, and in which the condensate collects and is returned to the bioreactor

Ordering information

Description	Cat. No.
Complete condenser system (120 V) including cart, chill plate and mounting post with filter brackets, TCU, and pump	SV50232.01
Complete condenser system (240 V) including cart, chill plate and mounting post with filter brackets, TCU, and pump	SV50232.02
Condenser assembly including chill plate and mounting post with filter brackets (option: allowing two chill plates per system)	SV50232.21
ThermoFlex 900 TCU (115 VAC/60 Hz) with necessary plumbing	SV50232.23
ThermoFlex 900 TCU (240 VAC/50 or 60 Hz) with necessary plumbing	SV50232.24
Masterflex™ Pump (115 VAC/50 or 60 Hz or 230 VAC/50 or 60 Hz)	SV50241.01

Disposable BPCs needing two "condenser assemblies" (SV50232.21) for high exhaust capacity will require the purchase of two condenser assembly "connection lines" (SV50177.270).

HyPerforma Rocker Bioreactor

The Thermo Scientific™ HyPerforma™ Rocker Bioreactor brings control and measurement to rocking bioreactor applications. The rocker is controlled by a HyPerforma G3Lab Controller and TruBio software, providing a complete solution for research, process development, or seed train production applications. The rocker uses BPCs with working volumes of 5, 10, and 25 L are available with or without the novel Thermo Scientific™ pH+dO₂ sensor and reader.



Key features

- Compatible with most cell culture applications
- Rocking motion is customizable to your specific workflow—from a smooth waveform that minimizes shear forces for sensitive cell lines, through four intermediate steps, to an aggressive motion that maximizes oxygen transfer for robust cells with high oxygen demands
- Quick, simple setup with G3Lab Controller and TruBio Software
- Optional tray adapter allows the use of 10 L and 20 L BPCs
- Each Rocker BPC is available in 10, 20, and 50 L sizes and is delivered with all relevant certificates, gamma-irradiated (25 to 40 kGy) and conforming to USP Class 6 specifications
- Standard service packages
- cGMP-compliant capabilities
- Load cell for weight control
- The pH+dO₂ sensor provides measurement and control of critical process parameters: pH, DO, and temperature

HyPerforma Rocker Bioreactors and BPCs	Cat. No.
HyPerforma Rocker Bioreactor, with load cells	F100-2683-001
HyPerforma Rocker Bioreactor, without load cells	F100-2683-002
10 L Rocker BPC, LDPE film, cGMP	F100-2544-001
20 L Rocker BPC, LDPE film, cGMP	F100-2545-001
50 L Rocker BPC, LDPE film, cGMP	F100-2546-001

HyPerforma Rocker Bioreactor specifications

HyPerforma Rocker Bioreactor and BPC specifications			
Rocker Bioreactor BPC sizes	10 L	20 L	50 L
Rocker BPC dimensions	549.4 x 330.2 mm (21.6 x 13.0 in.)	549.4 x 660.1 mm (21.6 x 26.0 in.)	711.2 x 723.9 mm (28.0 x 28.5 in.)
Working volume	5 L	10 L	25 L
HyPerforma Rocker	Rocker bioreactor assembly, load cell, GMP, stainless steel (includes rocker base, tray base, 50 L tray)		
Bag adapter	10 L/20 L BPC mounting adapter for 50 L rocker tray		
Heat only	BPC filter heater (quantity: 2)		
Dimensions (H x W x D)	264 x 782 x 701 mm (10.4 x 30.8 x 27.6 in.); 490 x 835 x 712 mm (19.3 x 32.9 x 28.0 in.) with cover		
Weight (base + tray)	38.5 kg (85 lb)		
Rocking angle	2° to 12° per side		
Rocking rate	2 to 40 cycles per minute		
Electrical power	110–120 V, 220–240 V, 50/60 Hz, powered by the G3Lab Controller		
Operating temperature	0°C to 45°C (32°F to 158°F)		
Storage temperature	–40°C to 70°C (–40°F to 158°F)		
Humidity	5% to 95%, noncondensing		
Acoustic noise level	<70 dBA		
pH sensor range	pH 5.5 to 8.5		
pH sensor relative accuracy	±0.1 pH units over calibration range after a 2-point calibration having 0.3 to 0.8 pH units of separation		
DO sensor range (percent saturation)	0% to 250%		
DO sensor limit of detection	0.03% O ₂		
DO accuracy	At 25°C: ±1.1% at 20.95% O ₂		
Temperature	10°C to 45°C (50°F to 113°F)		
Temperature accuracy	±0.15°C at 15°C to 40°C (±0.25°F at 59°F to 104°F)		



HyPerforma Glass Bioreactors

Thermo Scientific™ HyPerforma™ Glass Bioreactors are available in 1 L, 3 L, 7 L, and 15 L total volume sizes. They offer easy operation and rapid assembly and are manufactured with the highest standards for materials and surface finish. Developed using a computational fluid dynamics (CFD) simulator, the HyPerforma Glass Bioreactor impellers provide maximum mixing with minimum shear force, resulting in a higher average $k_L a$.

HyPerforma Glass Bioreactor key features

- The motor adapter uses coupling windows and an alignment marker for easy assembly
- Ergonomic head plate design provides easy assembly and disassembly of components for rapid reconfiguration

Accessories

- Kits to help enable the end user to configure the vessel according to the intended use
- Heating blanket: designed for rapid thermal transfer; a bimetallic temperature-limiting switch embedded in the blanket helps protect against overheating or fires
- Common accessories kit: includes blind stoppers for vessel reconfiguration



HyPerforma Glass Bioreactor*			
Size	Voltage	Description	Cat. No.
1 L	120 V	Heat only	F100-2684-002
		Heat and cool	F100-2684-004
	240 V	Heat only	F100-2684-102
		Heat and cool	F100-2684-104
3 L	120 V	Heat only	F100-2680-002
		Heat and cool	F100-2680-004
	240 V	Heat only	F100-2680-102
		Heat and cool	F100-2680-104
7 L	120 V	Heat only	F100-2681-002
		Heat and cool	F100-2681-004
	240 V	Heat only	F100-2681-102
		Heat and cool	F100-2681-104
15 L	120 V	Heat only	F100-2685-002
		Heat and cool	F100-2685-004
	240 V	Heat only	F100-2685-102
		Heat and cool	F100-2685-104

Note: All bioreactors listed are manufacturing according to GMP.

* Each lab-scale bioreactor needs to be operated using a HyPerforma G3Lab Controller and appropriate automation platform. Please contact your Thermo Fisher Scientific sales representative for more information on standard package options suitable for your requirements.

HyPerforma Glass Bioreactor specifications

HyPerforma Glass Bioreactor specifications				
Size	1 L	3 L	7 L	15 L
Inner tank height	200 mm (8.1 in.)	250 mm (9.8 in.)	380 mm (14.9 in.)	455 mm (17.9 in.)
Vessel stand + motor height	412 mm (16.2 in.)	473 mm (18.6 in.)	600 mm (23.6 in.)	720 mm (28.3 in.)
Inner tank diameter	100 mm (3.94 in.)	130 mm (5.1 in.)	160 mm (6.3 in.)	222 mm (8.7 in.)
Vessel stand diameter	160 mm (6.3 in.)	190 mm (7.5 in.)	240 mm (9.5 in.)	340 mm (13.4 in.)
Total volume	1.5 L	3.2 L	7.4 L	17.2 L
Total loaded volume (i.e. available volume = total volume minus installations)	1.3 L	2.9 L	7.2 L	16.8 L
Working volume	1 L	2 L	5 L	10 L
Minimal working volume	~0.3 L	~1.2 L	~2.8 L	~6.0 L
Weight	8.6 lb	11.6 lb	17.4 lb	51.4 lb
Drilled pipe sparger	5 holes (0.8 mm)	7 holes (0.8 mm)	13 holes (0.8 mm)	23 holes (0.8 mm)
Ring sparger	NA	18 holes (0.85 mm)	42 holes (0.85 mm)	90 holes (0.85 mm)
Frit pore sparger	Pore size: 12–15 µm Length: 7 mm Diameter: 7.9 mm	Pore size: 12–15 µm Length: 7 mm Diameter: 7.9 mm	Pore size: 12–15 µm Length: 18 mm Diameter: 7.9 mm	Pore size: 12–15 µm Length: 25.4 mm Diameter: 12.7 mm
Material	Borosilicate glass, 316L stainless steel, silicone			
Voltage	120 V/240 V			
Heat only	NA	110 W	250 W	500 W
Heat and cool	1.32 kW heat + 0.18 kW (at 20°C) water bath cool			1.32 kW heat + 0.3 kW (at 20°C) water bath cool
	Cooling loop solenoid valve cable assembly: 1 m (3 ft)			
Optional scale	Analog™ Benchtop, Combics™ Series, 15 kg x 0.5 g (16 bit) or 15 kg x 8 g (12 bit), 254 x 254 mm, CAPS1U-20CC-LU			Analog™ Benchtop, Combics™ Series, 30 kg x 1 g (16 bit) or x 15 g (12 bit), 457 x 457 mm, CAPS1U-50EE-LU
Indicator with optional scale	Midrics 2, IP65, display, MIS2UR-V2			
Resistance temperature detector (RTD)	Temperature sensor assembly, RTD to 5 pin, 3 ft (G3Lab Controller, glass)			
Foam sensor cable assembly	1 m (3 ft)			
Cable assembly with optional scale	Analog output: 6 m (19.6 ft), 1 cable per scale indicator			
Agitator kit	Triple-stack motor (adapter included)			
	Agitator assembly: Teknic™ NEMA 23 Single to HyPerforma Glass Bioreactor Cable assembly: 2 m (6 ft)			
Agitator speed	1,250 rpm (set as default); can be configured to lower values via TruBio software			

HyPerforma Single-Use Fermentor (S.U.F.)

The Thermo Scientific™ HyPerforma™ Single-Use Fermentor (S.U.F.) is designed to provide you with enhanced functionality, ease of use, and efficiency. The complete S.U.F. system consists of a fermentor tank and Thermo Scientific™ HyPerforma™ S.U.F. BPC, which is available in 30 L and 300 L sizes with a 5:1 turndown ratio.

The S.U.F. maintains traditional stirred-tank fermentation design principles, including specific height-to-diameter ratios (3:1), top-driven impeller location for optimum cell viability, and performance and scalability from process development through production.



Key features

- The S.U.F. is a fully functional fermentor vessel including single-use contact surfaces for mixing, venting, sparging, and temperature sensing. Additional ports are included to allow choice of aseptic connections for filling, emptying, and sampling
- Unique proprietary mixing system enables conventional overhead mixing while maintaining sterility and integrity of the S.U.F. BPC
- Minimized vessel footprint and reduced hold-up volumes
- Simplified bag loading with a front access door
- Tank includes baffles that enhance mixing and side and bottom jacket for effective heat transfer
- Cable management system offers greater organization for electrical cables, tubing, and line sets while making the unit easier to clean
- Dedicated adjustable tool holder keeps necessary tools available for convenience
- BPC utilizes three Rushton-style impellers and sparger configuration with a proprietary exhaust management system
- State-of-the-art foam sensor that helps prevent exhaust filter failure

Catalog S.U.F. Hardware

Size	Description	Cat. No.
30 L	Jacketed, AC motor, with 2-position vent filter bracket, no e-box	SUF0030.9001
30 L	Jacketed, AC motor, with 2-position vent filter bracket and 120 VAC electrical box	SUF0030.9002
30 L	Jacketed, AC motor, with 2-position vent filter bracket and 240 VAC electrical box	SUF0030.9003
300 L	Jacketed, AC motor, with 2-position center filter bracket	SUF0300.9001
300 L	Jacketed, AC motor, with 240 VAC electrical box and 2-position vent filter bracket	SUF0300.9002

HyPerforma S.U.F. hardware specifications

System specifications

Specification	30 L	300 L
Rated liquid working volume	30 L	300 L
Total reactor volume (liquid and gas)	43 L	435 L
Fluid geometry at working volume (height:diameter) ratio	~2:1	~2:1
Overall reactor geometry (height:diameter) ratio	3:1	3:1
Impeller (quantity x blade count)	3 x 6	3 x 6
Motor speed	55–598 rpm ± 5 rpm	35–375 rpm ± 5 rpm
Tank dimensions	91.6 x 54.3 x 218.44 cm (36.08 x 21.37 x 86 in.)	130.7 x 89.2 x 280.97 cm (51.44 x 35.11 x 110.62 in.)
Jacketed tank weight, dry/wet (at full working volume)	Dry skid weight: (mass) 524 lb (238 kg) Wet skid weight: (mass) 531 lb (241 kg)	Dry skid weight: (mass) 1,223 lb (555 kg) Wet skid weight: (mass) 1,257 lb (570 kg)
Max gas flow rates	60 slpm	600 slpm
Heating times	Approximate liquid heat-up time (2–37°C), full volume: 1.16 hr, half volume: 1 hr	Approximate liquid heat-up time (2–37°C), full volume: 1.8 hr, half volume: 1.3 hr

System overview

S.U.F. hardware unit - available in turnkey format

Complete mixing system with a water jacket for temperature control

Driveshaft inserts into the BPC through the mixing drive motor and locks into the BPC agitator assembly

S.U.F. BPC - supplied sterile and ready to use

Agitator assembly is a single-use (polyethylene) impeller with a bearing-and-seal assembly linked to an external mixer drive

Gas control with drilled-hole spargers

Exhaust management system with options for multiple vent filters based on gas flow needs

Integrally sealed ports in the S.U.F. BPC allow for sensor probes and addition of line sets

Available in Thermo Scientific CX5-14 and Aegis5-14 film options

System options - adaptable to your needs

Exhaust condenser unit

Exhaust gas vent filter heater

Integrated foam sensor

Load cells (3)

Cable management tree

Process control system

Optional electrical box for remote agitation control

- S.U.F.s require a separate external temperature control unit

Choose an open-architecture approach or a turnkey, ready-to-use S.U.F. system

HyPerforma S.U.F. BPCs and accessories

Catalog S.U.F. BPCs

Product	Film type	Cat. No.
30 L S.U.F. BPCs		
Mettler Toledo single-use pH and DO sensor, foam sensor, Meissner inlet and one 5 in. exhaust filters, condenser	Aegis5-14	SH31010.01
	CX5-14	SH31019.01
Mettler Toledo single-use pH and DO sensor, foam sensor, Meissner inlet and two 5 in. exhaust filters, condenser	Aegis5-14	SH31010.02
	CX5-14	SH31019.02
Traditional ports, foam sensor, ZenPure inlet and one 3 in. exhaust filters, condenser	CX5-14	SH31034.01
Traditional ports, foam sensor, ZenPure inlet and two 5 in. exhaust filters, condenser	CX5-14	SH31035.01
Traditional ports, foam sensor, Meissner inlet and one 5 in. exhaust filters, condenser	CX5-14	SH31036.01
Traditional ports, foam sensor, ZenPure inlet and one 5 in. exhaust filters, condenser	CX5-14	SH31037.01
Traditional ports, foam sensor, Meissner inlet and two 5 in. exhaust filters, condenser	CX5-14	SH31038.01
Traditional ports, ZenPure inlet and one 5 in. exhaust filters	CX5-14	SH31039.01
300 L S.U.F. BPCs		
Mettler Toledo single-use pH and DO sensor, foam sensor, Meissner inlet and two 10 in. exhaust filters, condenser	Aegis5-14	SH31009.02
	CX5-14	SH31017.02
Mettler Toledo single-use pH and DO sensor, foam sensor, Meissner inlet and four 10 in. exhaust filters, condenser	Aegis5-14	SH31009.03
	CX5-14	SH31017.03
Traditional ports, foam sensor, Meissner inlet and two 10 in. exhaust filters, condenser	CX5-14	SH31030.05
Traditional ports, foam sensor, Meissner inlet and four 10 in. exhaust filters, condenser	CX5-14	SH31030.06
Traditional ports, foam sensor, ZenPure inlet and one 10 in. exhaust filters, condenser	CX5-14	SH31030.01
Traditional ports, foam sensor, ZenPure inlet and two 10 in. exhaust filters, condenser	CX5-14	SH31030.02
Traditional ports, ZenPure inlet and one 10 in. exhaust filters	CX5-14	SH31030.04
Traditional ports, ZenPure inlet and two 10 in. exhaust filters	CX5-14	SH31030.03

HyPerforma S.U.F. accessories and options

S.U.F. Accessories

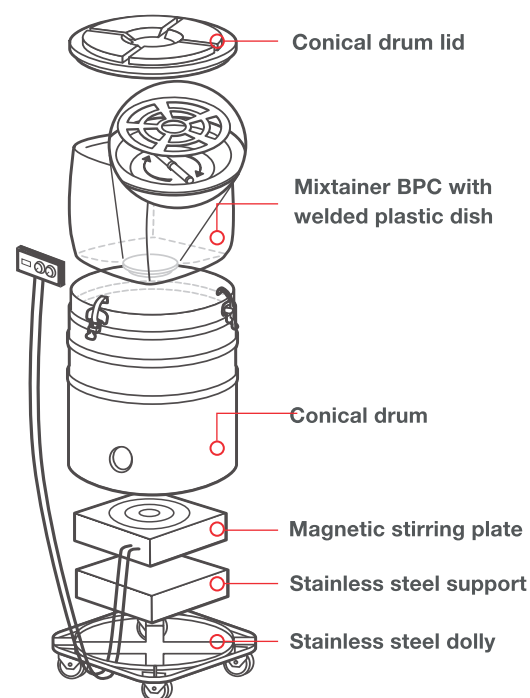
Product	30 L Cat. No.	300 L Cat. No.
Load cells and load cell displays		
3x load cell with summing box without display	SV50988.04	SV50988.03
Mettler Toledo IND331 display, harsh mount style with 120 VAC US line cord/plug Analog (STD) interface	SV50177.306	SV50177.306
Mettler Toledo IND331 display, harsh mount style with 120 VAC US line cord/plug Allen-Bradley™ RIO interface	SV50177.307	SV50177.307
Mettler Toledo IND331 display, harsh mount style with 120 VAC US line cord/plug DeviceNet interface	SV50177.308	SV50177.308
Mettler Toledo IND331 display, harsh mount style with 120 VAC US line cord/plug Ethernet/IP and ModBus TCP interface	SV50177.309	SV50177.309
Mettler Toledo IND331 display, harsh mount style with 120 VAC US line cord/plug Profibus interface	SV50177.310	SV50177.310
Autoclave tray and probe assemblies		
Autoclave tray	SV50177.01	SV50177.01
4 probe clips	SV50177.23	SV50177.23
Heavy-duty tubing clamp (single)	SV20664.01	SV20664.01
Heavy-duty tubing clamp (10-pack)	SV20664.04	SV20664.04
Exhaust filter pinch clamp	SV50177E.16	SV50177E.16
Probe holder, plastic molded	SV50177P.01	SV50177P.01
Condenser systems		
120 VAC complete condenser system (TCU for condenser included)	SV51009.02	NA
240 VAC complete condenser system (TCU for condenser included)	SV51009.03	SV51009.03
Cable management systems		
Cable management tree	SV50992.01	NA
Cable management system, left-hand configuration	NA	SV51006.02
Cable management system, right-hand configuration	NA	SV51006.03
Bottle management system	SV50992.10	SV50992.10
Feed bag management system	SV51006.03	SV51006.03

HyPerforma Mixtainer systems

Thermo Scientific™ Mixtainer™ system is an integrated, single-use unit designed for optimal mixing of cell culture media, process liquids, buffers, reagents, and bulk product.

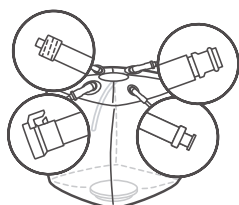
Key features

- The Mixtainer system utilizes a sophisticated BPC constructed of CX5-14 film with a plastic dish welded into the base.
- The plastic dish contains a magnetic stir bar that is held in the proper operating position using an integrated locking ring.
- Available in 50, 100, and 200 L unit volumes.
- BPCs available for liquid-to-liquid and powder-to-liquid mixing.
- Optimized supporting hardware allows for mixing, storage, transport, and discharge in a closed system to help minimize the risk of cross-contamination.



Mixtainer BPC

4 ports, top dispense, powder-to-liquid mixing



Line 1

9.5 mm (0.38 in.) quick-connect body with 16.5 cm (6.5 in.) dip tube
Tube length: 91 cm (36 in.)

Line 2 and 3

6.3 mm (0.25 in.) luer lock insert
Tube length: 91 cm (36 in.)

Line 4

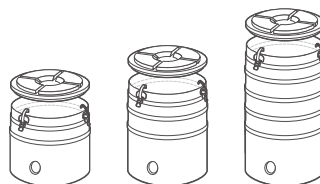
9.53 mm (.38 in.) quick-connect body
Tube length: 91 cm (36 in.)

Powder addition port: 38.1 mm (1.5 in.)
Tri-clamp port

Size	Cat. No.
50 L	SH30687.04
100 L	SH30687.05
200 L	SH30687.06

Conical drum

Top dispense, with clamps



Size	Cat. No.
50 L	SV50517.11
100 L	SV50517.12
200 L	SV50517.13

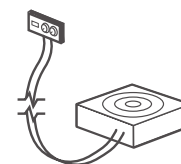
Stainless steel support



Area	Cat. No.
EU	SV30097.03
US	SV30097.04

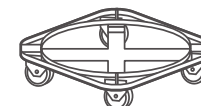
Magnetic stirring plate

IKAMAG™ motor and support required



Description	Cat. No.
EU, 230 V, 50/60 Hz, 0.5 A	SV30097.01
US, 115 V, 50/60 Hz, 1 A	SV30097.02

Universal stainless steel dolly



Dimensions (D x H)	Cat. No.
61.6 x 15.2 cm (24.38 x 6 in.)	SV50109.01

Mixtainer systems specifications and options

Custom BPC options

	Description
Dip tubes	<ul style="list-style-type: none"> • Specific lengths 6.36–12.7 mm (0.25–0.5 in.) ID
Tubing type	<ul style="list-style-type: none"> • C-Flex (clear or white) • Silicone • PVC
Tubing size	<ul style="list-style-type: none"> • Specific lengths of 3.18–19.05 mm (0.25–0.75 in.) ID
Connectors	<ul style="list-style-type: none"> • Luer ID: 3.18–6.35 mm (0.13–0.25 in.) • CPC ID: 6.35–19.05 mm (0.25–0.75 in.) • SIP tri-clamp ID: 6.35–19.05 mm (0.25–0.75 in.) • Mini tri-clamp ID: 6.35–19.05 mm (0.25–0.75 in.) • Hose barb
Others	<ul style="list-style-type: none"> • Injection port ID: 6.35–9.53 mm (0.25–0.38 in.) • Filling bell ID: 6.35 mm (0.25 in.) • Filter capsule: Millipore, Pall, Sartorius, Domnick Hunter



BPC presentation

	Description
Outer packaging	Supplied flat-packed—two polyethylene outer layers
Label	Description, product code, lot number, and expiry date on outer packaging and shipping container
Shipping container	Durable cardboard carton
Documentation	Certificate of analysis provided

System options

Thermo Scientific™ Powdertainer™ II powder feed BPC: Connect a Powdertainer II BPC to the Mixtainer system using a concentric reducer 7.6 cm (3 in.) tri-clamp to 3.8 cm (1.5 in.) tri-clamp. Ordering information for the reducer is shown.

	Description
304 stainless steel	Saint Patricks of Texas: Concentric reducer (3 x 1.5 in.)
304 stainless steel	RT Process: Cat. No. 31-14MP-3X1.5-304
316 stainless steel	RT Process: Cat. No. 31-14MP-3X1.5-316
Polypropylene	Saint-Gobain (Sani-Tech): Cat. No. TAD300-150
Kynar material (PVDF)	Saint-Gobain (Sani-Tech): Cat. No. KAD300-150

HyPerforma Single-Use Mixer (S.U.M.) DS 300

The Thermo Scientific™ HyPerforma™ Single-Use Mixer (S.U.M.) DS 300 is a modular mixing system consisting of a mixing station that mates to plastic drums containing single-use BPCs or tank liners, offering the user a cost-effective, docking station–style mixing platform with multiple mixing volume options.



HyPerforma S.U.M. DS 300 docking station

The docking station consists of a stainless steel base with locking casters, an adjustable handle, a tethered handheld control device, an electronic vertical lift mechanism with integrated height indicator, motor mount and motor, three sizes of driveshafts, and two adjustment tools—a spanner and a torque wrench. An adjustable-angle motor head and drum positioner are available as add-on options.

Key features

- Top-drain support containers are available in 50, 100, 200, and 300 L sizes; bottom-drain drums are available in 50, 100, and 200 L sizes.
- Top-drain tank liners are available in four sizes from 50 to 300 L.
- Tank liners with bottom access ports are available in three sizes from 50 to 200 L.
- Closed-top 3D BPCs, with both top and bottom drain access ports, are available in sizes 50, 100, and 200 L.
- Optional dollies are available for all drum sizes.

S.U.M. DS 300 specifications

Power	108–240 VAC, 50–60 Hz
Input amperage	15 A
Operating temperature range	Ambient to 40°C
Motor speed	30–350 RPM
Footprint (W x L)	76.2 x 86.4 cm (30 x 34 in.)
Height (lowest to tallest point)	122.4–162.3 cm (48.2–63.9 in.)
Weight	180 kg (398 lb)
Control box	Built to IP65 standards
Flow type	Radial/axial
Hardware material	304 stainless steel

S.U.M. DS 300 options

Description	Cat. No.
DS 300 standard unit	SUMDS0300.9000
DS 300 unit with drum positioner	SUMDS0300.9001
DS 300 unit with adjustable motor head	SUMDS0300.9002
DS 300 unit with drum positioner and adjustable motor head	SUMDS0300.9003

S.U.M. DS 300 hardware and BPC specifications and options

S.U.M. DS 300 drum options

Description	Volume range	Dimensions	Bottom drain	Cat. No.
50 L plastic drum with conical insert	10 L–50 L	60 x 58 cm (23.5 x 23 in.)	10.2 cm (4 in.)	SH30959.01
100 L plastic drum	20 L–100 L	60 x 76 cm (23.5 x 29.75 in.)	10.2 cm (4 in.)	SH30959.02
200 L plastic drum	40 L–200 L	60 x 114 cm (23.5 x 44.75 in.)	10.2 cm (4 in.)	SH30959.03
300 L plastic drum	60 L–300 L	61 x 122 cm (24 x 48 in.)	NA	SH30959.04
Optional support plate for bottom drain	50 L–200 L	12.7 cm (5 in.) diameter split	NA	SV50102.02

Typical open-type mixing with catalog impeller sizes

	50 L	100 L	200 L	300 L
Turndown ratio	5:1	5:1	5:1	4:1 [†]
Minimum working liquid volume	10 L	20 L	40 L	79 L
Minimum hold up	100 mL	100 mL	100 mL	500 mL
Maximum liquid fill	50 L	100 L	200 L	300 L
Left-to-right offset*	0	0	0	1.3 cm (0.5 in.) left
Front-to-back position*	2.5 cm (1 in.)	5.1 cm (2 in.)	5.4 cm (2.13 in.)	6.4 cm (2.5 in.)
Lift height*	0.48 cm (0.19 in.)	2.2 cm (0.88 in.)	30.64 cm (12.06 in.)	39.98 cm (15.74 in.)
Motor angle (fixed or adjustable motor head models)	10°	10°	10°	10°
Motor RPM	350	350	350	350

* All measurements listed in the above table are ±0.16 cm (0.06 in.). [†]For the 300 L drum, a 5:1 turndown ratio can be achieved using the adjustable-angle motor head.

S.U.M. DS 300 impeller specifications

Impeller material	USP class VI, HDPE
Impeller to BPC system/tank liner location	5:1 off center
Number of impeller blades	3
Closed-top BPC system	Qualified LDPE
Open-top BPC tank liner	Qualified LDPE

Impeller sleeve options

Drum size	Sleeve length	Description	Cat. No.
50 L	35.3 cm (13.9 in.)	Impeller, sleeve, and connector for 66 cm (26 in.) driveshaft	SH30749.11
100 L	53.1 cm (20.9 in.)	Impeller, sleeve, and connector for 83.8 cm (33 in.) driveshaft	SH30749.12
200 L	77 cm (30.3 in.)	Impeller, sleeve, and connector for 108 cm (42.5 in.) driveshaft	SH30749.13
300 L	96 cm (37.8 in.)	Impeller, sleeve, and connector for 129.5 cm (51 in.) driveshaft	SH30749.08

S.U.M. DS 300 hardware and BPC specifications and options

Reusable hub options

Size	Description	Cat. No.
50 L–300 L	Stainless steel bearing hub	SV50177.77

BPC system specifications

BPC system specifications	
Description	Bottom drain line
Tubing set (ID x OD x L)	1.27 x 1.91 x 122 cm (0.5 x 0.75 x 304.1 in.)
End treatment	Polycarbonate quick-connect 12.7 mm (0.5 in.) insert (MPX) and cap

Irradiated BPC tank liner options

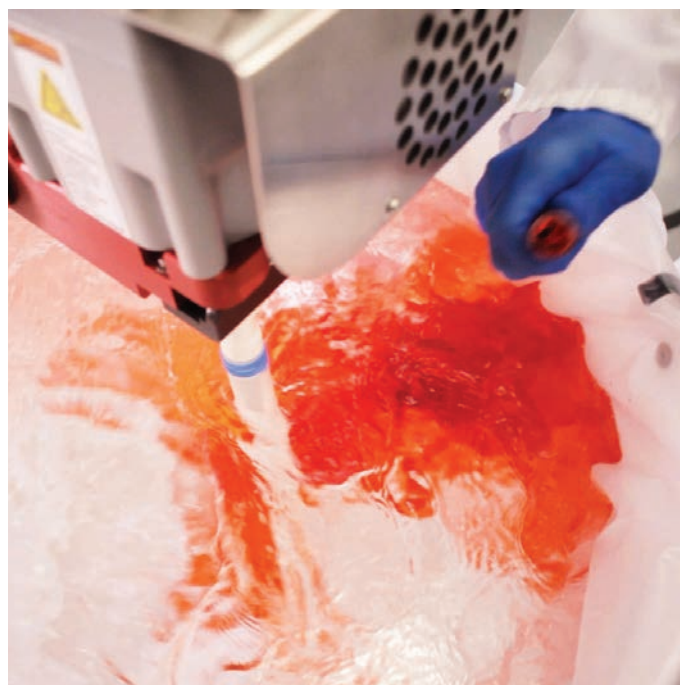
Size	Description	Cat. No.
50 L	Tank liner: Open-top, bottom drain, irradiated CX3-9 film	SH30646.01
50 L	BPC: Closed-top, bottom drain, irradiated CX3-9 film	SH30946.01
100 L	Tank liner: Open-top, bottom drain, irradiated CX3-9 film	SH30646.02
100 L	BPC: Closed-top, bottom drain, irradiated CX3-9 film	SH30946.02
200 L	Tank liner: Open-top, bottom drain, irradiated CX3-9 film	SH30646.03
200 L	BPC: Closed-top, bottom drain, irradiated CX3-9 film	SH30946.03
300 L	Tank liner: Open-top, top drain, irradiated CX3-9 film	SH30647.06

Dolly options

Description	Material	Quantity	Cat. No.
50–200 L plastic drum	Polyethylene	1	SH30958.01
		2	SH30958.02
Dolly for 300 L plastic drum	Zinc-plated	1	SH30958.03

Nonirradiated BPC tank liner options

Size	Description	Cat. No.
50 L	Open-top, bottom drain, nonirradiated CX3-9 film	SH30399.01
100 L	Open-top, bottom drain, nonirradiated CX3-9 film	SH30399.02
200 L	Open-top, bottom drain, nonirradiated CX3-9 film	SH30399.03



HyPerforma Single-Use Mixer (S.U.M.)

The Thermo Scientific™ HyPerforma™ Single-Use Mixer (S.U.M.) with Touchscreen Console provides 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.

Features and benefits

- Cable management system for improved ease of use with BPC process lines for system organization
- Access door for convenient BPC loading on the 500 L, 1,000 L, and 2,000 L mixing systems
- Water-jacketed (heating) and non-jacketed (no heat transfer) options; improved high-flow water jacket with side and bottom jacket to improve system heat transfer
- Adjustable powder hanger that fits 1 kg, 5 kg, and 25 kg Thermo Scientific™ Powdertainer™ BPCs
- Two swivel-locking casters and push handles for better maneuverability of the units (except 2,000 L)
- BPC tab holders for easy single-use container setup
- Dual-probe opening for redundancy and low-volume pH and conductivity monitoring
- Open-cart frame for easy cleaning

Applications

- Media preparation
- Final formulation steps
- Buffer preparation
- Large-volume mixing (up to 2,000 L)
- Pooling and liquid transfer
- Product suspension
- Mixing and storing multiple batches
- Harvest collection and bulk mixing
- Viral inactivation



Touchscreen Console and controllers

The Touchscreen Console provides 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: agitation, pumps, pinch valves, and temperature control. Users can easily visualize measurements from load cells, pH sensors, conductivity sensors, RTD, and pressure sensors.

As an engineered-to-order product, the HyPerforma S.U.M. with Touchscreen Console can be fully integrated with either HyPerforma G3 Bioprocess Controllers, or controllers from other manufacturers—providing an open-architecture mixing solution configured to your unique requirements. The Touchscreen Console can integrate TruBio automation software powered by Emerson's DeltaV Distributed Control platform, enabling users to optimize data acquisition while maintaining full compliance with 21 CFR Part 11.

HyPerforma S.U.M. hardware specifications and options

HyPerforma S.U.M. specifications

	50 L	100 L	200 L	500 L	1,000 L	2,000 L
Maximum liquid working volume	50 L	100 L	200 L	500 L	1,000 L	2,000 L
Minimum liquid working volume	10 L	20 L	40 L	100 L	200 L	400 L
Fluid geometry at working volume (height: diameter) ratio	1.5:1	1.5:1	1.5:1	1.5:1	1.1:1	1.0:1
Overall reactor geometry (height: diameter) ratio	1.9:1	1.9:1	1.95:1	1.7:1	1.2:1	1.2:1
Impeller (quality x blade count)	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3
Mixing rate range	30–350 rpm	30–350 rpm	30–350 rpm	30–350 rpm	30–350 rpm	30–350 rpm
Overall dimensions (W x L x H)	87 x 86 x 152 cm (34.1 x 33.9 x 59.8 in.)	87 x 92 x 153 cm (34.1 x 36.4 x 60.2 in.)	90 x 107 x 174 cm (35.4 x 42.0 x 68.5 in.)	118 x 132 x 197 cm (46.2 x 51.8 x 77.7 in.)	144 x 158 x 200 cm (56.4 x 62.3 x 76.7 in.)	180 x 171 x 225 cm (70.7 x 67.4 x 88.5 in.)

Note: Overall dimensions include the cable management system and Touchscreen Console. They do not include the pump shelves or Powdertainer arm accessories.

Ordering information

All SKUs listed below include the Touchscreen Console and load cells

Size	Description	Cat. No.
50 L	Non-jacketed, DC motor	SUM0050.9001
	Jacketed, DC motor	SUM0050.9002
100 L	Non-jacketed, DC motor	SUM0100.9001
	Jacketed, DC motor	SUM0100.9002
200 L	Non-jacketed, DC motor	SUM0200.9001
	Jacketed, DC motor	SUM0200.9002
500 L	Non-jacketed, DC motor	SUM0500.9001
	Jacketed, DC motor	SUM0500.9002
1,000 L	Non-jacketed, DC motor	SUM1000.9001
	Jacketed, DC motor	SUM1000.9002
2,000 L	Non-jacketed, AC motor, 240 V	SUM2000.9003
	Jacketed, AC motor, 240 V	SUM2000.9004



HyPerforma S.U.M. BPC specifications and options

HyPerforma S.U.M. catalog BPCs

Size	Probe ports	Film	Cat. No.
Powder-to-liquid BPC			
50 L	0	Aegis5-14	SH30973.01
		CX5-14	SH30768.01
	3	Aegis5-14	SH31051.02
		CX5-14	SH31055.02
100 L	0	Aegis5-14	SH31052.01
		CX5-14	SH31046.01
	3	Aegis5-14	SH31052.02
		CX5-14	SH31046.02
200 L	0	Aegis5-14	SH30973.02
		CX5-14	SH30750.01
	3	Aegis5-14	SH31053.02
		CX5-14	SH31054.02
500 L	0	Aegis5-14	SH30973.03
		CX5-14	SH30751.01
	3	Aegis5-14	SH30974.03
		CX5-14	SH30751.02
1,000 L	0	Aegis5-14	SH30973.04
		CX5-14	SH30752.01
	3	Aegis5-14	SH30974.04
		CX5-14	SH30752.02
2,000 L	0	Aegis5-14	SH30973.05
		CX5-14	SH30770.01
	3	Aegis5-14	SH30974.05
		CX5-14	SH30770.02

Size	Probe ports	Film	Cat. No.
Liquid-to-liquid BPC			
50 L	0	Aegis5-14	SH30983.01
		CX5-14	SH30767.01
	3	Aegis5-14	SH31051.04
		CX5-14	SH31055.04
100 L	0	Aegis5-14	SH31052.03
		CX5-14	SH31046.03
	3	Aegis5-14	SH31052.04
		CX5-14	SH31046.04
200 L	0	Aegis5-14	SH30983.02
		CX5-14	SH30753.01
	3	Aegis5-14	SH31053.04
		CX5-14	SH31054.04
500 L	0	Aegis5-14	SH30983.03
		CX5-14	SH30754.01
	3	Aegis5-14	SH30982.03
		CX5-14	SH30754.02
1,000 L	0	Aegis5-14	SH30983.04
		CX5-14	SH30755.01
	3	Aegis5-14	SH30982.04
		CX5-14	SH30755.02
2,000 L	0	Aegis5-14	SH30983.05
		CX5-14	SH30769.01
	3	Aegis5-14	SH30982.05
		CX5-14	SH30769.02

HyPerforma S.U.M. hardware and BPC accessories

Catalog open-top liners

Film	Size	Cat. No.
CX3-9	50 L, no port probes	SH30762.04
	100 L, no port probes	SH30762.06
	200 L, no port probes	SH30762.01
	500 L, no port probes	SH30762.02
	1,000 L, no port probes	SH30762.03
	2,000 L, no port probes	SH30762.05

Impeller sleeve for open-top mixing

Size	Cat. No.
50 L	SH30749.06
100 L	SH30749.14
200 L	SH30749.08
500 L	SH30749.10
1,000 L	SH30749.10
2,000 L	SH30772.01

HyPerforma S.U.M. accessories

	50 L	100 L	200 L	500 L	1,000 L	2,000 L
Cable management system	SV50992.12	SV50992.12	SV50992.12	SV50992.12	SV50992.12	SV50992.12
3 load cell with cables	SV51145.01	SV51145.01	SV51145.02	SV51145.03	SV51145.05	SV51145.04
Autoclave tray	SV50177.01	SV50177.01	SV50177.01	SV50177.01	SV50177.01	SV50177.01
Probe assembly (nonsterile for use in autoclave)	SH30720.01	SH30720.01	SH30720.01	SH30720.01	SH30720.01	SH30720.01
Heavy-duty tubing clamp (each)	SV20664.01	SV20664.01	SV20664.01	SV20664.01	SV20664.01	SV20664.01
Sampling manifold with Luer lock (each)	SH30845.01	SH30845.01	SH30845.01	SH30845.01	SH30845.01	SH30845.01
Sampling manifold with Luer lock (10 per pack)	SH30845.02	SH30845.02	SH30845.02	SH30845.02	SH30845.02	SH30845.02
Temperature/sample port	SV20750.01	SV20750.01	SV20750.01	SV20750.01	SV20750.01	SV20750.01
Reusable hub assembly with tri-clamp	NA	NA	NA	NA	NA	SV50177.78
Reusable hub assembly with quick connect	SV50177.77	SV50177.77	SV50177.77	SV50177.77	SV50177.77	NA
Powdertainer arm	SV51002.01	SV51002.01	SV51002.01	SV51002.01	SV51002.01	SV51002.02

imPULSE Single-Use Mixer (S.U.M.)

The Thermo Scientific™ imPULSE™ Single-Use Mixer (S.U.M.) can be utilized for many bioprocess mixing applications. The imPULSE design features include innovative disc mixing technology, configurable high-end controls, and monitors to fit specific process requirements. These features are designed to provide scalability from 30 L to 5,000 L.

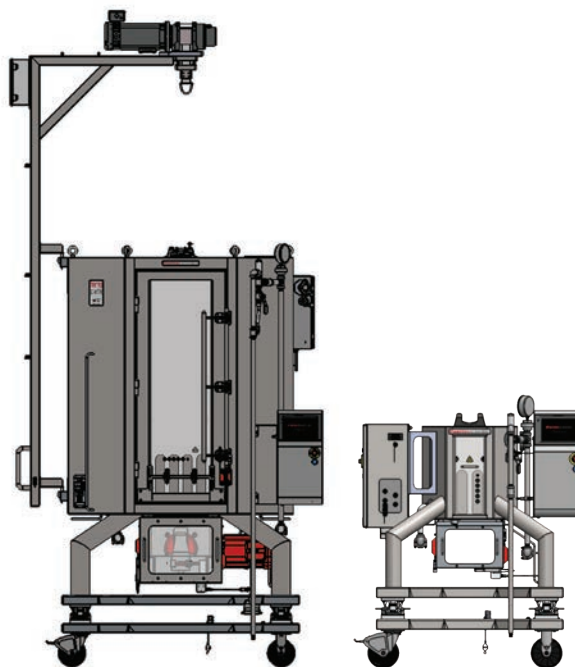
The Touchscreen Console for the imPULSE S.U.M. provides unsurpassed integrated sensor monitoring, and pump control for pH and saline titration and for automatic fill and harvest.

Efficient and customizable

The standard imPULSE Mixing BPCs are made of ASI 26/77 polyethylene two-layer film. These BPCs are available with four inlet/outlet lines and a powder addition port. The standard tube sets connect to the imPULSE Mixing BPC for liquid addition, powder addition, recirculation, inflation, and vent control. The tube sets are modular and can be customized to best suit your process.

Key features

- Touchscreen Console provides ease of use with multifunctional capabilities to monitor and control mixing parameters
- Integrated rolling diaphragm that provides the pumping action to the mixing disc; the diaphragm will not abrade the surfaces or produce particulates
- Mixing tank jacket and insulation
- Weighing systems that utilize load cells enable accurate batch weight monitoring
- Auto-inflate and vent control options
- Adjustable powder hanger for 1,000 L and higher mixers that fits 1, 5, and 25 kg Powdertainer BPCs
- Open cart frame for easier cleaning



Standard features

- 304L stainless steel vessel and sliding window or door and window
- Clean room–grade stainless steel non-marring casters available on 30 L–1,000 L systems
- Rolling diaphragm
- Touchscreen Console: IP 54 enclosure

Applications

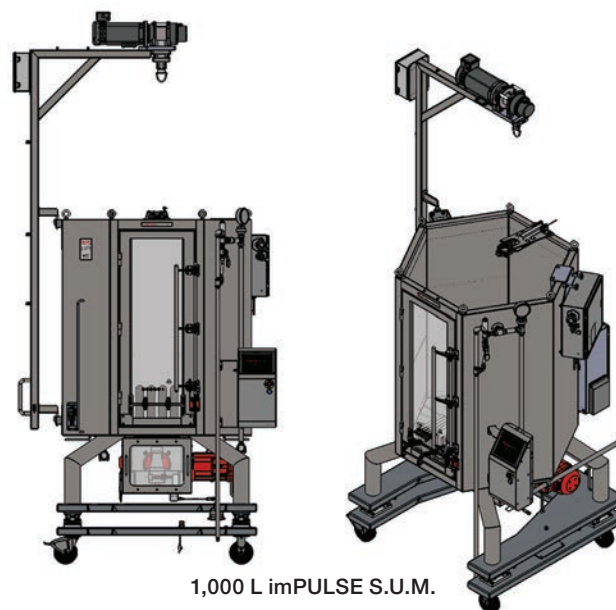
- Buffer and media preparation
- Final formulation
- High-viscosity mixing
- Heavy powder loads
- Suspension or resuspension
- Homogenization or rehomogenization
- Harvesting
- Storage
- Purification

imPULSE S.U.M. hardware and BPC specifications

imPULSE hardware

All products listed below are constructed with 304 stainless steel and include the touchscreen console and load cells.

Size	Description	Cat. No.
30 L	Jacketed, AC motor, sliding window	IM00030.9001
100 L	Jacketed, AC motor, sliding window	IM00100.9002
250 L	Jacketed, AC motor, swinging door	IM00250.9003
500 L	Jacketed, AC motor, swinging door	IM00500.9004
1,000 L	Jacketed, AC motor, auto-inflate	IM01000.9005
2,000 L	Jacketed, AC motor, auto-inflate	IM02000.9006
3,000 L	Jacketed, AC motor, auto-inflate	IM03000.9007
5,000 L	Jacketed, AC motor, auto-inflate	IM05000.9008



1,000 L imPULSE S.U.M.

imPULSE S.U.M. BPC specifications

All imPULSE BPCs are constructed of ASI 26/77 film and silicone tubing.

Description	Size	Cat. No.
1 inlet line: 1.5 in. tri-clover, 0.5 x 0.75 in. ID x OD	30 L	HM00285-I
1 inflate/vent line: 1.5 in. tri-clover, 0.5 x 0.75 in. ID x OD		
1 pressure sensing line: PendoTECH™ Pressure Sensor, 0.75 in. tri-clover, 0.5 x 0.75 in. ID x OD	100 L	HM00287-I
1 powder port: 3 in. tri-clover		
4 side probe ports: 0.5 in. AseptiQuik™ G Connector		
2 outlet/recirculation lines: MPX body with plug, 0.5 x 0.75 in. ID x OD	250 L	HM00288-I
1 inlet line: 1.5 in. tri-clover, 0.5 x 0.75 in. ID x OD		
1 inflate/vent line: 1.5 in. tri-clover, 0.75 x 1.125 in. ID x OD		
1 pressure sensing line: PendoTECH Pressure Sensor, 0.75 in. tri-clover, 0.5 x 0.75 in. ID x OD	500 L	HM00289-I
1 powder port: 3 in. tri-clover		
4 side probe ports: 0.5 in. AseptiQuik G Connector		
2 outlet/recirculation lines: MPX body with plug, 0.5 x 0.75 in. ID x OD		
1 inlet line: 1.5 in. tri-clover, 0.75 x 1.125 in. ID x OD	1,000 L	HM00291-I
1 inflate/vent line: 1.5 in. tri-clover, 0.75 x 1.125 in. ID x OD		
1 pressure sensing line: PendoTECH Pressure Sensor, 0.75 in. tri-clover, 0.5 x 0.75 in. ID x OD	2,000 L	HM00293-I
1 powder port: 3 in. tri-clover	3,000 L	HM00294-I
4 side probe ports: 0.5 in. AseptiQuik G Connector		
2 outlet/recirculation lines: MPU body with plug, 0.75 x 1.125 in. ID x OD	5,000 L	HM00295-I

Note: tubing lengths will vary according to each vessel size.

imPULSE S.U.M. hardware specifications

imPULSE S.U.M. hardware specifications

Working volume (L)			Unit dimensions*	Unit weight	
Nominal	Max.	Min.	(D x W x H)	Dry	Wet (Nominal working volume)
30	35	0	88.99 x 112.88 x 133.36 cm (35.04 x 44.44 x 52.50 in.)	245.9 kg (542.25 lb.)	279.62 kg (616.45 lb.)
100	107	0	104.77 x 121.12 x 160.83 cm (41.25 x 47.68 x 63.30 in.)	303.4 kg (668.9 lb.)	410.18 kg (904.29 lb.)
250	266	0	119.84 x 136.25 x 177.20 cm (47.18 x 53.64 x 69.76 in.)	513.8 kg (1,132.87 lb.)	776.77 kg (1,712.49 lb.)
500	549	0	136.26 x 141.03 x 202.30 cm (53.65 x 55.52 x 79.65 in.) With hoist: 136.26 x 150.41 x 327.37 cm (53.65 x 59.22 x 128.89 in.)	733.0 kg (1,616.7 lb.)	1,255.77 kg (2,768.48 lb.)
1,000	1,136	0	158.43 x 153.82 x 234.88 cm (62.37 x 60.56 x 92.47 in.) With hoist: 158.43 x 173.79 x 364.68 cm (62.37 x 68.42 x 143.57 in.)	928 kg (2,047.8 lb.)	1,960.43 kg (4,321.98 lb.)
2,000	2,038	0	189.58 x 162.42 x 259.92 cm (74.64 x 63.94 x 102.33 in.) With hoist: 189.58 x 190.05 x 384.43 cm (74.64 x 74.82 x 151.35 in.)	1,049 kg (2,411.9 lb.)	3,295.24 (7,264.72 lb.)
3,000	3,155	0	207.36 x 180.47 x 282.85 cm (81.64 x 71.05 x 111.36 in.) With hoist: 207.36 x 208.10 x 413.39 cm (81.64 x 81.92 x 162.75 in.)	1,730 kg (3814 lb.)	4,534.89 kg (9,997.75 lb.)
5,000	5,237	0	227.47 x 201.00 x 322.00 cm (89.56 x 79.13 x 126.77 in.) With hoist: 227.47 x 228.63 x 452.94 cm (89.56 x 228.63 x 178.32 in.)	3,251 kg (7167.2 lb.)	7,026.24 kg (15490.10 lb.)

* The unit dimensions listed are nominal and may vary depending on options selected.

Touchscreen Console for the HyPerforma and imPULSE S.U.M.s

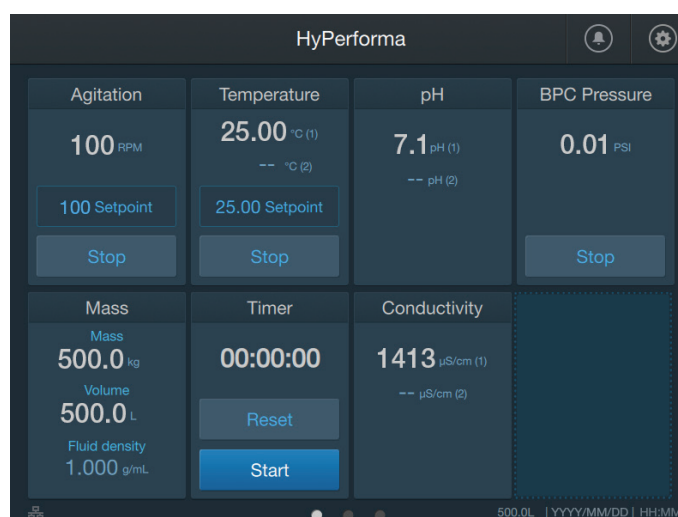
The Touchscreen Console provides state-of-the-art in-process monitoring and automation capability for the HyPerforma and imPULSE S.U.M.s. Its modular design allows for an easy-to-use custom user interface. Capabilities include: agitation, pumps, pinch valves, and temperature control. Users can easily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

Key advantages

To suit various processes, the user is able to semi-automate their formulation, pH or saline titrations, and viral inactivation processes with the Touchscreen Console. Additionally, the system's modular design allows for an ergonomic, custom user interface. Simple, routine processes can be automated by utilizing measurement values to control the pumps, temperature control unit (TCU), and agitation motor. The data measured during a process can be exported remotely via Ethernet, Profibus, Modbus RTU, or using a USB drive.

Touchscreen Console module functionalities

The main screen is populated with user-selectable modules, which allow for simple screen customization.

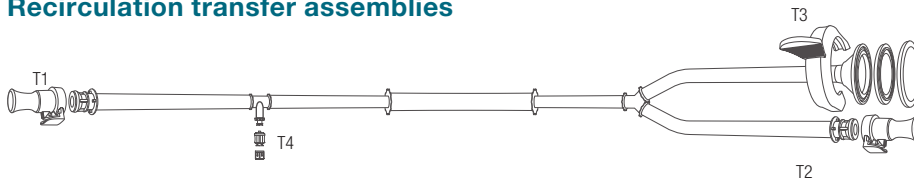


The interface above highlights the module functionalities for the HyPerforma S.U.M.

Modules	HyPerforma S.U.M.	imPULSE S.U.M.
Pump control	✓	✓
BPC pressure	✓	✓
Liquid pressure	✓	✓
Auxiliary output and input	✓	✓
Automated and metered fill and harvest	✓	✓
Agitation	✓	✓
Mass	✓	✓
Temperature	✓	✓
Timer	✓	✓
pH	✓	✓
Conductivity	✓	✓
Recipe function	✓	
PDC pressure		✓

imPULSE S.U.M. transfer assembly specifications

Recirculation transfer assemblies



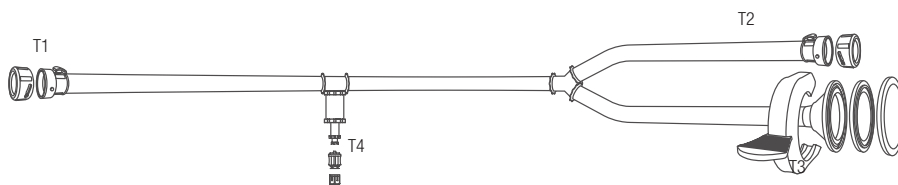
Tubing: silicone with size 90 PharMed BPT pump tubing, ID x OD: 1.27 x 1.91 cm (0.5 x 0.75 in.)

T1, T2: MPX insert with cap

T3: 3.8 cm (1.5 in.) sanitary x 1.27 cm (0.5 in.) barb with gasket, end cap, and push/pull clip

T4: Sample port

Description	Cat. No.
For less than 1,000 L 1.27 cm (0.5 in.) recirculation	HM00005-I



Tubing: silicone with size 90 PharMed BPT pump tubing, ID x OD: 1.91 x 2.86 cm (0.75 x 1.125 in.)

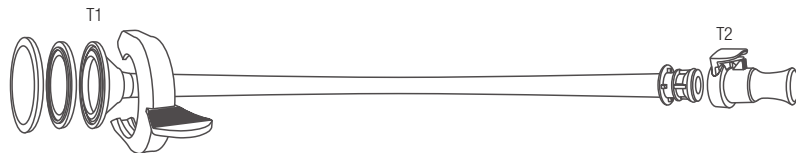
T1, T2: MPU insert with cap

T3: 3.8 cm (1.5 in.) sanitary x 1.91 cm (0.75 in.) barb with gasket, end cap, and push/pull clip

T4: Sample port

Description	Cat. No.
For 1,000 L and larger 1.91 cm (0.75 in.) recirculation	HM00006-I

Water fill transfer assemblies

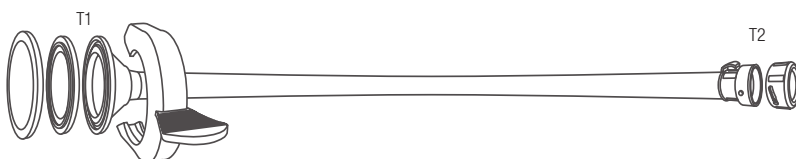


Tubing: silicone 182.9 cm (72 in.), ID x OD: 1.27 x 1.91 cm (0.5 x 0.75 in.)

T1: 3.8 cm (1.5 in.) sanitary x 1.27 cm (0.5 in.) barb with gasket, end cap, and push/pull clip

T2: MPX insert with cap

Description	Cat. No.
For less than 1,000 L 1.27 cm (0.5 in.) water fill	HM00015-I



Tubing: silicone 182.9 cm (72 in.), ID x OD: 1.27 x 1.91 cm (0.5 x 0.75 in.)

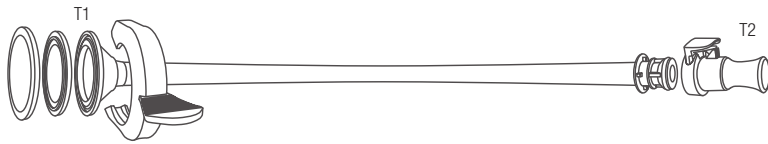
T1: 3.8 cm (1.5 in.) sanitary x 1.91 cm (0.75 in.) barb with gasket, end cap, and push/pull clip

T2: MPU insert with cap

Description	Cat. No.
For 1,000 L and larger 1.91 cm (0.75 in.) water fill	HM00016-I

imPULSE S.U.M. transfer assembly specifications

Inflation transfer assemblies

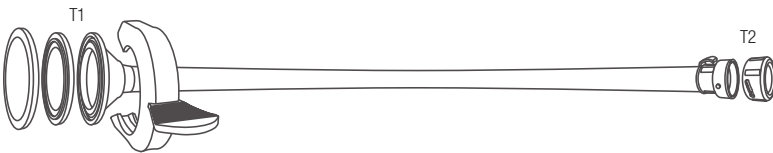


Tubing: silicone 365.8 cm (144 in.), ID x OD: 1.27 x 1.91 cm (0.5 x 0.75 in.)

T1: 3.8 cm (1.5 in.) sanitary x 1.27 cm (0.5 in.) barb with gasket, end cap, and push/pull clip

T2: MPX insert with cap

Description	Cat. No.
For less than 1,000 L 1.27 cm (0.5 in.) air inflate and purge	HM00017-I



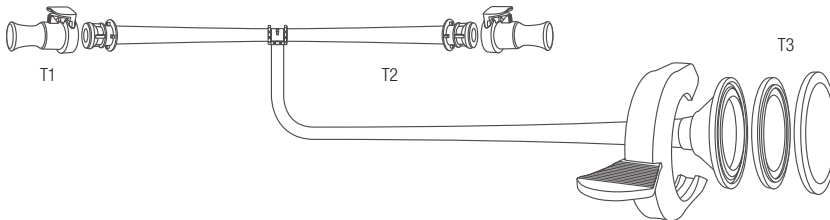
Tubing: silicone 396.2 cm (156 in.), ID x OD: 1.91 x 2.86 cm (0.75 x 1.125 in.)

T1: 3.8 cm (1.5 in.) sanitary x 1.91 cm (0.75 in.) barb with gasket, end cap, and push/pull clip

T2: MPU insert with cap

Description	Cat. No.
For 1,000 L and larger 1.91 cm (0.75 in.) air inflate and purge	HM00018-I

Vent transfer assemblies

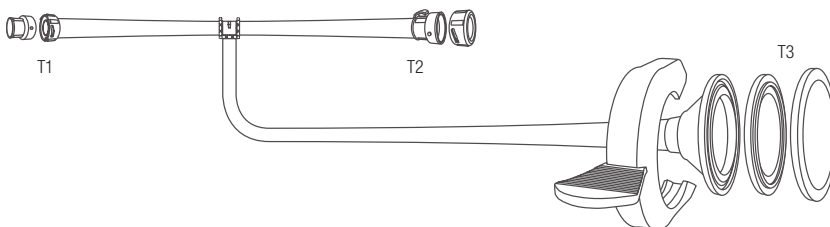


Tubing: silicone 15.2 x 15.2 x 152.4 cm (6 x 6 x 60 in.), ID x OD: 1.27 x 1.91 cm (0.5 x 0.75 in.)

T1: MPX body with cap **T2:** MPX insert with cap

T3: 3.8 cm (1.5 in.) sanitary x 1.27 cm (0.5 in.) barb with gasket, end cap, and push/pull clip

Description	Cat. No.
For less than 1,000 L 1.27 cm (0.5 in.) vent fill	HM00019-I



Tubing: silicone 22.9 x 22.9 x 182.9 cm (9 x 9 x 72 in.), ID x OD: 1.91 x 2.86 cm (0.75 x 1.125 in.)

T1: MPU body with cap **T2:** MPU insert with cap

T3: 3.8 cm (1.5 in.) sanitary x 1.91 cm (0.75 in.) barb with gasket, end cap, and push/pull clip

Description	Cat. No.
For 1,000 L and larger 1.91 cm (0.75 in.) vent fill	HM00020-I

DHX Heat Exchanger

The Thermo Scientific™ DHX™ Heat Exchanger is a modular heat exchanger system that uses single-use BPCs as the fluid path. The BPCs fit tightly between five stainless steel plates, efficiently transferring heat in a countercurrent flow path. The DHX exchanger provides efficient heat transfer that easily integrates into any process.



Key features

- Completely isolated flow paths for process fluid and heat transfer fluid.
- Counter-current, serpentine flow patterns.
- Dimpled jacketing on the plates to ensure turbulent flow.
- BPCs fill in place with no operator interaction.
- Modular design and small overall footprint allows for changing process needs.
- Helps reduce infrastructure requirements.
- Helps reduce processing time.
- Helps improve product consistency.

Applications

- cGMP commercial and clinical biotherapeutics, vaccines, and other biologic processes.
- Upstream applications include: media hold, fermentation, cell separation/protein harvest, harvest cooling, and harvest hold.
- Downstream applications include: harvest hold, buffers, protein purification, and bulk drug substance.

Technical specifications

- **Effective heat transfer area:** up to 27 square feet
- **Overall dimensions (W x D x H):** 50.8 x 73.66 x 68.58 cm (20 x 29 x 27 in.)
- **Number of plates:** 5
- **Number of BPCs:** up to 4
- **Dry weight:** 150 kg (330.7 lb)
- **Full weight (includes four BPCs):** 190 kg (418.9 lb)

DHX plate system

- **Material of construction:** 316L stainless steel
- **Pressure/temperature rating:** FV/140 psig at 150°F
- **Pressure vessel code:** ASME U-1
- **Connections:** 1/2 in. compression

Ordering information

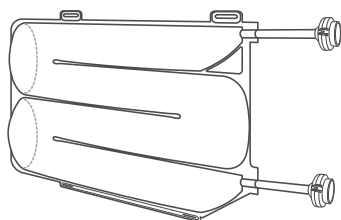
Description	Cat. No.
316 stainless steel DHX unit	DHX1001

DHX Heat Exchanger BPCs

Specifications

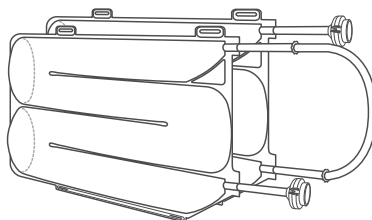
- Single-use BPC material: polyethylene, ASI 26/77 film
- Interconnecting tubing: C-Flex
- Pressure/temperature rating (installed in DHX plate system): 20 psig at 122°F (50°C)
- Connections: GE ReadyMate Disposable Aseptic Connector (DAC) 500 as standard—custom connections upon request
- Single BPC volume: 6 L
- Flow rate capacity: up to 15 liters per minute (LPM)

Single BPC



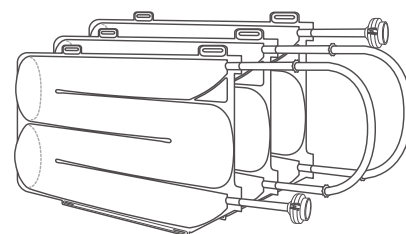
Description	Cat. No.
1 BPC with DAC connections	DX00006-I

2 BPCs



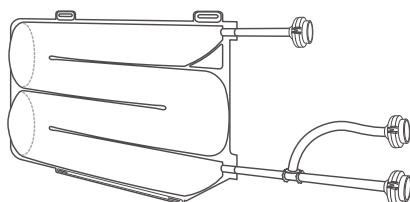
Description	Cat. No.
2 BPCs with DAC connections	DX00007-I

3 or 4 BPCs



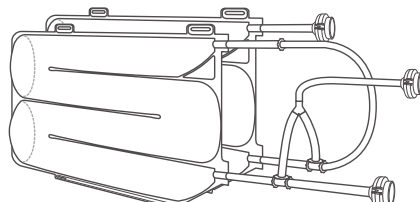
Description	Cat. No.
3 BPCs with DAC connections	DX00008-I
4 BPCs with DAC connections	DX00009-I

Single BPC



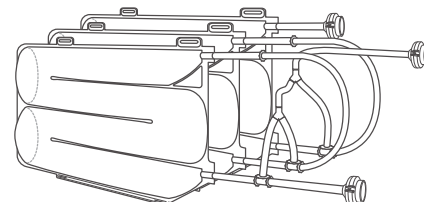
Description	Cat. No.
1 BPC with DAC connections and drain	DX00010-I

2 BPCs



Description	Cat. No.
2 BPCs with DAC connections and drain	DX00011-I

3 or 4 BPCs



Description	Cat. No.
3 BPCs with DAC connections and drain	DX00012-I
4 BPCs with DAC connections and drain	DX00013-I

inSITE Integrity Testing System

The Thermo Scientific™ inSITE™ Integrity Testing System helps protect single-use consumables from potential flaws by testing BPCs for damage that can occur during handling. The inSITE system detects leaks that can occur between the end-user's warehouse to the clean room floor, or from improper handling and loading procedures.

In addition to the long-term value that the integrity-testing functions provide, the inSITE system has additional features that ease the operator's tasks and manage the quality of the BPC all the way up to the liquid filling cycle.

Testing

- **Inflation cycle**—assists the operator in the loading of BPCs with minimal interaction and reduces the risk of flaws from handling
- **Gross leak detection**—quickly finds small leaks (100–1,000 μm) and confirms connection and setup of the BPC
- **Fine leak detection**—unique for each tank and BPC assembly; it is dependent on time allotment and environment
- **Liquid filling cycle**—moderates the internal pressure within the BPC while fluid is being introduced; the cycle is configured to regulate the open/close position of the coaxial valve mounted on the inSITE system



Key features

- Point-of-use integrity testing
- Gross and fine leak detection
- Guided validation setup tests BPCs up to 5,000 L
- Inflation procedure improves loading and placement in tanks
- Liquid filling cycle regulates internal pressure while fluid is being introduced
- Permanent and disposable pressure sensors provide comparative pressure data

Specifications

- **Maximum operating pressure:** Up to 125 mbar
- **Measuring ranges:**
 - **Test Pressure:** Up to 40 mbar
 - **Maximum Measurable Volume:** 5,000 L
 - **Gross Leak Flaw Sizes:** 100–1,000 μm
- **Operating conditions:**
 - **Room Temperature:** 18–24°C (65–75°F)
 - **Relative Humidity:** 5–95% Non-condensing

Ordering information

Description	Dimensions (W x D x H)	Weight	Electrical requirements	Cat. No.
Single channel	66 x 74 x 147 cm (26 x 29 x 58 in.)	175 kg (386 lb)	110–220 VAC, 50–60Hz	IN1009
Multichannel	66 x 74 x 147 cm (26 x 29 x 58 in.)	200 kg (440 lb)	110–220 VAC, 50–60Hz	IN1010

TruDO and TrupH sterilizable sensors

We provide reusable sensors with high reliability and superior performance for cell culture and fermentation process monitoring. Thermo Scientific™ TruDO™ and TrupH™ sensors have been specifically designed to minimize drift in bioprocess environments, undergo sterilization cycles, and help ensure measurement consistency from batch to batch. We also provide material certificates and lot traceability for cGMP applications.



Sensor specifications				
	TrupH K8	TrupH VP6	TruDO Optical	TruDO
Measurement	Electrochemical	Electrochemical	Optical phase shift	Polarographic
Range	pH 0–14	pH 0–14	4 ppb to 300% saturation	10 ppb to 200% saturation
Max precision range	pH 2–12	pH 2–12	–	–
Temperature	0°C to 135°C (32°F to 275°F)	0°C to 135°C (32°F to 275°F)	0°C to 130°C (32°F to 266°F)	0°C to 135°C (32°F to 275°F)
Pressure	6 bar (87 psi) max	6 bar (87 psi) max	12 bar (174 psi) max	4 bar (58 psi) max
Connection	PG 13.5	PG 13.5	PG 13.5	PG 13.5
Connector type	K8	VP6	VP8	D4, VP6
Sensor cable length (vessel size: 1 L)	120 mm (4.7 in.)	120 mm (4.7 in.)	120 mm (4.7 in.)	120 mm (4.7 in.)
Sensor cable length (vessel size: 3 L)	225 mm (8.9 in.)	225 mm (8.9 in.)	225 mm (8.9 in.)	225 mm (8.9 in.)
Sensor cable length (vessel size: 7 L)	325 mm (12.8 in.)	325 mm (12.8 in.)	325 mm (12.8 in.)	325 mm (12.8 in.)
Sensor cable length (vessel size: 15 L)	425 mm (16.7 in.)	425 mm (16.7 in.)	425 mm (16.7 in.)	425 mm (16.7 in.)
Wetted material	Glass	Glass	316L stainless steel USP Class VI silicone	316L stainless steel
Temperature compensation	NA	NA	22 Kohm thermistor	22 Kohm thermistor
Surface finish	NA	NA	Electropolish RA12	Electropolish RA12

TruTorr II single-use pressure sensor

High-accuracy single-use headspace pressure sensor

The Thermo Scientific™ TruTorr™ II single-use pressure sensor is a single-use solution for measuring headspace pressure and preventing rupture of a bioprocessing container. A TruTorr II loop consists of a disposable pressure sensor, a cable, and a transmitter blade that is seamlessly integrated into a bioreactor controller.



TruTorr II single-use pressure sensor specifications

Environmental

Operating temperature	10°C to 45°C (50°F to 113°F)
Maximum operating pressure	5.0 psi
Storage temperature	0°C to 60°C (32°F to 140°F)
Storage relative humidity	10% to 90% (noncondensing)
Altitude limit	12,192 m (40,000 ft)
Materials	USP Class VI

Performance

Measuring range	0 to 0.48 barg (0 to 7 psig)
Relative accuracy	3.5 mbarg (0.05 psig)
Accuracy	±0.1 psig @ 0–1 psi, ±0.2 psig @ 3–7 psi, ±0.35 psig @ 3–5 psi
Response time (T90 agitated)	<1 second
Drift (21 days)	13.6 mbarg
Calibration	Precalibrated (chip) 1-point standardization at gauge required
Gamma irradiation	25–40 kGy is the standard range (for radiation doses outside this range, contact Thermo Fisher Scientific)

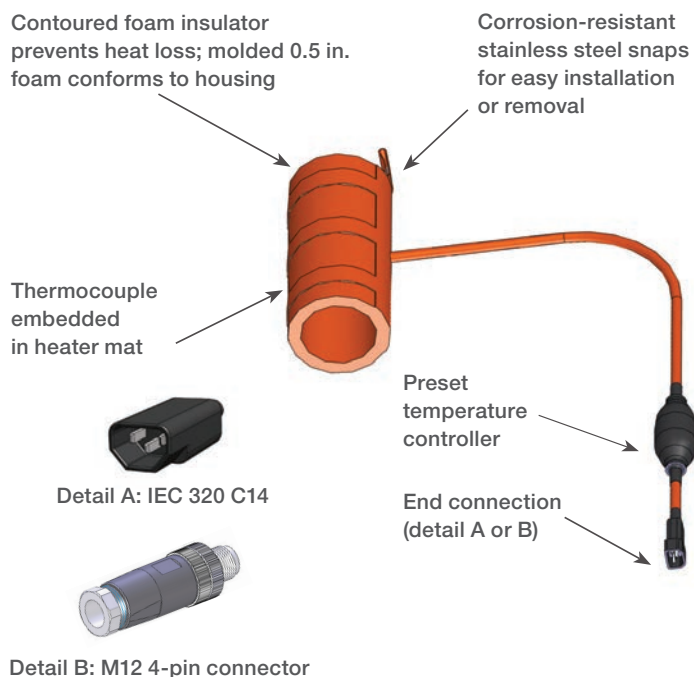
Compatibility and manufacturing

Biocompatibility	Materials in contact with process meet USP Class VI ISO 10993-5 standards, animal origin-free and BPA-free
Use case	Warranty valid for one gamma sterilization cycle and use
Manufacturing environment	ISO 14644-1, Class 10,000 clean room (ISO 7)

Vent filter heaters

For use with single-use bioreactors and fermentors

The Thermo Scientific™ vent filter heater system consists of a heater, preset temperature controller and a power cord. It also includes a fully insulated resistive heating element with molded silicone foam. It is secured around the filter by use of snap retainers and fully encapsulates the exhaust filters for consistent temperature regulation. The temperature controller is preset at 50°C. Vent filter heaters come standard with or without preset temperature control. Vent filter heaters without preset temperature controllers require integrated controls to operate the heating element. Refer to the vent filter heater user's manual included in the system equipment turnover package for more information. Vent filter heaters should not be operated above 50°C.



Ordering information

The required parts are sold as a kit that includes a vent filter heater, controller with a watertight closure, quick connects, and installation power cord.

Description	Voltage	Power	Controller	End connection	Manuf. No.	Cat. No.
S.U.F. vent filter heaters						
Suspended series 46	120 VAC	53 W	Preset	IEC 320 C14	9699-1463	SV50191.35
Suspended series 46	240 VAC	53 W	Preset	IEC 320 C14	9699-1464	SV50191.36
Suspended series 46*	120 VAC	53 W	Integrated	Flying lead	9699-0744	SV50191.41
Suspended series 46*	240 VAC	53 W	Integrated	Flying lead	9699-0745	SV50191.42
Suspended series 46	120 VAC	53 W	Integrated	M12 4-pin connector	9599-0764	SV50191.49
Suspended series 46	240 VAC	53 W	Integrated	M12 4-pin connector	9599-0765	SV50191.50
S.U.B. vent filter heaters						
Meissner 10 in. series 46	120 VAC	99.6 W	Preset	IEC 320 C14	9699-1461	SV50191.33
Meissner 10 in. series 46	240 VAC	99.6 W	Preset	IEC 320 C14	9699-1462	SV50191.34
Meissner 10 in. series 46	120 VAC	99.6 W	Integrated	M12 4-pin connector	9699-0762	SV50191.47
Meissner 10 in. series 46	240 VAC	99.6 W	Integrated	M12 4-pin connector	9599-0763	SV50191.48
Pall Kleenpak KA3 series 46	120 VAC	23.8 W	Preset	IEC 320 C14	9699-1459	SV50191.31
Pall Kleenpak KA3 series 46	240 VAC	30.3 W	Preset	IEC 320 C14	9699-1460	SV50191.32
Pall Kleenpak KA3 series 46	120 VAC	23.8 W	Integrated	M12 4-pin connector	9599-0760	SV50191.45
Pall Kleenpak KA3 series 46	240 VAC	30.3 W	Integrated	M12 4-pin connector	9599-0761	SV50191.46

* Information Not available for NEMA Standards. All other vent filters conform to NEMA standards