LyoStar® 4.0

Research and Development Tray Freeze Dryer

biopharma group

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Specifications

Lowest Shelf Temperature	≤ -70°C
Shelf Temperature Control Range	-70 to 60°C
Shelf Temperature Control Range Tolerance	± 0.5°C
Shelf Pull-Down from 25°C to -40°C	≤ 25 minutes
Lowest Condenser Temperature	≤ -85°C
Maximum Condenser Capacity	≥ 30 L
Condenser Surface Area	0.548 m^2 (850 in^2)
Condenser Pull-Down from 20°C to -45°C	≤ 10 minutes
Number of Compressors	2
Compressor Horsepower (high-stage / low-stage)	3.5 hp / 2 hp
System Refrigerant (high-stage / low-stage)	R449A / R508B
Vacuum Time to 100 Millitorr	≤ 25 minutes
Vacuum Rate of Rise (per hour)	≤ 40 µbar (30 mT)
Volume-Based Leak Rate	0.0019 mbar-L/sec (0.0014 Torr-L/sec)
Lowest System Vacuum	≤ 13 µbar (10 mT)
Vacuum Level Control Range	26 to 667 µbar (20 to 500 mT)
Vacuum Level Control	± 7 µbar (± 5.0 mT)
Temperature Uniformity§	± 1.0°C

Note: Performance specifications are based on SP test data from clean, dry and empty (CDE) units operating at an ambient room temperature of approximately 20°C. SP recommends an optimum operating range of 16-25°C (60-77°F).

Utility Requirements

Compressed Air†	6.9 bar (100 psig)
Ambient Room Temperature	16-25°C (60-77°F)
Inert Gas for Backfilling	0.2-0.35 bar (3-5 psig)
Inert Gas for ControLyo®	3.5-4.1 bar (50-60 psig)
Cooling Water (water-cooled units)	15-22 Lpm (4-6 gpm) 5-25°C, 2-4 bar (30-60 psi)

Utility Considerations

Heat Output Room, Peak (air-cooled units)	21,000 BTU/h (6.15 kW)
Heat Output Room, Peak (water-cooled units)	4,200 BTU/h (2.93 kW)

ControLyo® Requirements (Optional)

Volume to Vent percentage ratio (V_V/V_R)‡	< 6.5%

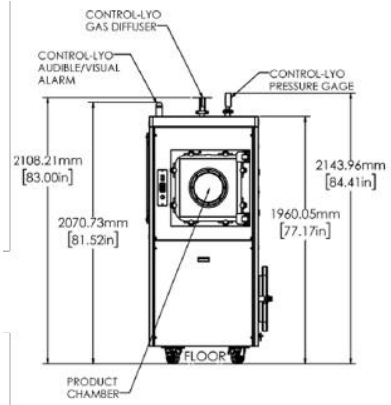
Note: Vent Volume (V_V) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoStar® 4.0 chamber is 0.113 m^3 (3.99 ft^3). V_R is the volume of the room in which the lyophilizer is located.

LINE OF SIGHT ENABLED

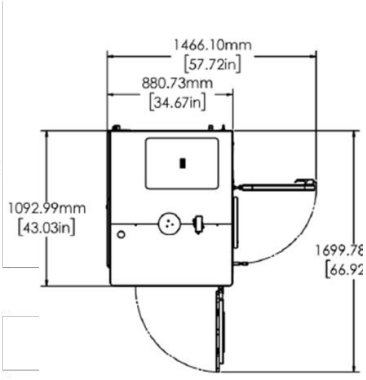


Key Features

- Unmatched process accuracy and reliability
- Sophisticated instrumentation set
- Advanced cycle development and optimization features
- SMART™ Freeze Dryer technology
- Clean room or isolator integrable
- Solvent package available
- ControLyo® Controlled Nucleation Technology ready, which allows for adding ControLyo® at any time
- Optional LyoFlux* TDLAS and Tempris*
- 4 shelf configuration available



Front View



Top View

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Dimensional Data

	Dimensions	Move In Dimensions
Width	994 mm (39.1 in)	994 mm (39.1 in)
Depth	1208.5 mm (47.6 in)	1208.5 mm (47.6 in)
Height	2144.0 mm (84.4 in)	1960.1 mm (77.2 in)
Maximum Weight (estimated)	680 kg (1500lbs)	680 kg (1500lbs)
Minimum Clearance on All Sides	610 mm (24 in)	-

Note: SP recommends a 60 cm clearance around all sides of the unit for serviceability. If machines are placed side by side, increase the minimum clearance to 1.2 m.

Electrical Requirements

Voltage	208 VAC	230 VAC	400 VAC (5 wire)
Hertz	60 Hz	50 Hz	50 Hz
Phase	1 Φ	1 Φ	3 Φ
Breaker Amperage	40 A	40 A	30 A

Workstation Electrical Requirements

Voltage (VAC)	115 VAC	230 VAC
Hertz	60 Hz	50 Hz
Phase	1 Φ	1 Φ

Sample Extractor Electrical Requirements

(For Vacuum Pump)

Voltage (VAC)	115 VAC	230 VAC
Hertz	60 Hz	50 Hz
Phase	1 Φ	1 Φ

Vial Capacity

Vial Size	2R	6R	10R	20R	30R
# Per Shelf	594	312	267	162	162
Total # of Vials	1,782	936	801	486	486

Based on a 3 shelf configuration (estimated)

Shelf Configuration

Number of Shelves	Shelf Area	Shelf Clearance	Shelf Clearance with Shelf Latching		
			1 Shelf Latched	2 Shelves Latched	3 Shelves Latched
3 Shelves	0.427 m^2 (4.6 ft^2)	71.1 mm (2.8 in)	109.2 mm (4.3 in)	215.9 mm (8.5 in)	-
4 Shelves	0.567 m^2 (6.1 ft^2)	50.8 mm (2 in)	66 mm (2.6 in)	101.6 mm (4 in)	203.2 mm (8 in)

Shelf Size (W x L x H): 279.4 x 508 x 12.7 mm (11 x 20 x .5 in)

Refrigerant Information

	Gas 1	Gas 2
F gas	R449A	R508B
Charge (Kg)	1.2	0.95
GWP	1397	13396
EPA SNAP	IPR	IPR/VLTR
Safety Class	A1	A1
Total CO_2e (t)	14.402	

Additional Information

Construction	316L Stainless Steel Shelves, Product Chamber, Condenser Chamber and Condenser Coil
Vacuum Pump	Two-Stage Rotary Vane, Dry Pump Optional
Stoppering	Bottom-Up Hydraulic
Defrost Type	Hot Gas
Isolation Valve	Butterfly Valve, Pneumatic
Refrigerant Type	CFC-Free
Vapor Port Diameter	101.6 mm (4 in - 3.9 in ID)
Noise Level¶	Noise from the equipment under normal operating conditions shall not exceed 70-75 dBa when measured at any point 1 m away from the equipment.

§ When testing shelf temperature uniformities within a range of -40°C to 40°C, shelf temperature deviations shall not exceed the specification relative to the mean of the highest and lowest temperature readings.
† The pneumatic isolation valve, a standard feature of SP Hull® LyoStar® 4.0, shall require the use of compressed air.
‡ SP recommends an O_2 sensor to monitor that the oxygen concentration in the room does not drop below acceptable levels.
¶ Lyophilizers equipped with ControLyo® shall exceed the specified noise level rating for approximately 3 to 5 seconds during de-pressurization. SP recommends the use of both hearing and eye protection during the ControLyo® process.

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