

FTS Systems LyoStar™ 3

Research and Development Tray Freeze Dryer



Key Features

- Unmatched process accuracy and reliability.
- Sophisticated instrumentation set.
- Advanced cycle development and optimization features.
- Robust 5.5 hp cascade refrigeration system.
- Ultra-reliable scroll compressors.
- Optional SMART Freeze Dryer™ technology.
- Optional ControlLyo™ ice nucleation temperature control for improved product uniformity and process efficiency (from Praxair, Inc.).

LyoStar™ 3 Electrical Requirements

Voltage [†]	208 / 230 VAC	400 VAC	480 VAC
Hertz [†]	50 Hz, 60 Hz	50 Hz	60 Hz
Phase [†]	1 Φ	3 Φ	3 Φ
Breaker Amperage	40 A	30 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 (Optional)

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

Performance 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	850 in ² (5481 cm ²)
Condenser Pull-Down from 20 °C to -75 °C	≤ 10 minutes
Number of Compressors	2
Compressor Horsepower (high-stage / low-stage)	3.5 hp / 2 hp
System Refrigerant (high-stage / low-stage)	R404A / R508B
Vacuum Time to 100 Millitorr	≤ 20 minutes
Vacuum Rate of Rise	≤ 30 mT/hour
Volume-Based Leak Rate	≤ .0019 mbar·L/sec
Lowest System Vacuum	≤ 10 mT
Vacuum Level Control Range	20 to 500 mT
Vacuum Level Control [‡]	± 5.0 mT
Temperature Uniformity [§]	± 1.0 °C

Note: Performance specifications are based on SP Scientific test data from clean, dry and empty (CDE) units operating at an ambient room temperature of approximately 20 °C. SP Scientific recommends an optimum operating range of ≤ 30 °C (86 °F) with an RH of ≤ 80 % at sea level.

Utility Requirements

Compressed Air	100 psig (6.89 bar)
Ambient Room Temperature	≤ 30 °C
Inert Gas for Backfilling	3-5 psig (.21-.34 bar)
Inert Gas for ControlLyo™	50-60 psig (3.45-4.14 bar)
Cooling Water (water-cooled units)**	2 - 4 gpm (8 - 15 Lpm)

Utility Considerations

Heat Output, Peak (air-cooled units)	25,000 BTU/h (7.33 kW)
Heat Output, Peak (water-cooled units)	10,000 BTU/h (2.93 kW)

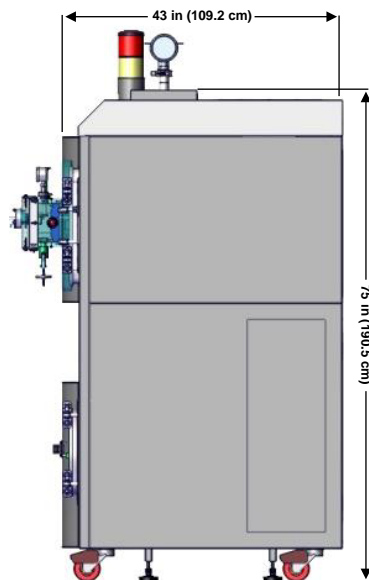
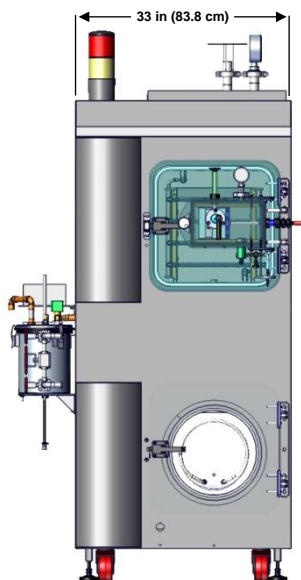
ControlLyo™ Requirements (Optional)

Volume to Vent percentage ratio (V _v /V _R) ^{††}	< 6.5%
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Note: Vent Volume (V_v) is the product chamber volume multiplied by 10. The volume of a standard LyoStar™ 3 chamber is 3.99 ft³ (0.113 m³). V_R is the volume of the room in which the lyophilizer is located.

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Dimensional Data

Shelf Configuration

		Number of Shelves	Shelf Area	Shelf Clearance	Shelf Clearance with Shelf Latching		
					1 Shelf Latched	2 Shelves Latched	3 Shelves Latched
Width	33 in (83.8 cm)						
Depth	43 in (109.2 cm)						
Height	75 in (190.5 cm)	1 Shelf	1.5 ft ² (1394 cm ²)	9.5 in (241.3 mm)	-	-	-
Maximum Weight	1500 lb (680 kg)	2 Shelves	3.1 ft ² (2880 cm ²)	4.5 in (114.3 mm)	9.3 in (236.2 mm)	-	-
Minimum Clearance on All Sides	24 in (60.7 cm)	3 Shelves	4.6 ft ² (4274 cm ²)	2.8 in (71.1 mm)	4.3 in (109.2 mm)	8.5 in (215.9 mm)	-
Note: SP Scientific recommends a 24-inch (60.7 cm) clearance around all sides of the unit for serviceability. If machines are placed side by side, increase the minimum clearance to 48 inches (121.9 cm).		4 Shelves	6.1 ft ² (5667 cm ²)	2 in (50.8 mm)	2.6 in (66 mm)	4 in (101.6 mm)	8 in (203.2 mm)

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

Additional Information

Construction	316L Stainless Steel Shelves, Product Chamber, Condenser Chamber and Condenser Coil	Isolation Valve	Butterfly Valve, Pneumatic
Vacuum Pump	Two-Stage Rotary Vane	Refrigerant Type	CFC-Free
Stoppering	Bottom-Up Hydraulic	Vapor Port Diameter	4 inches (3.9 inches ID)
Defrost Type	Hot Gas	Noise Level ^{††}	Noise from the equipment under normal operating conditions shall not exceed 85 dBA when measured at any point 3 feet (91 cm) away from the equipment.

Note: Layout drawing shown with optional Sample Extractor and optional Liquid Nitrogen Trap.

- * Shelf temperature is controlled to within ± 0.5 °C of the shelf temperature setpoint only when the setpoint is within the Shelf Temperature Control Range.
- † Sample Extractor Assembly voltage requirements apply to the vacuum pump used to operate the Sample Extractor Assembly. This vacuum pump is independent of the vacuum pump installed on the lyophilizer.
- ‡ Vacuum level is controlled to within ± 5 millitorr of the vacuum level setpoint when the setpoint is within the Vacuum level control range specification.
- § 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.
- ¶ LyoStar™ 3 units are highly customizable and SP Scientific can configure any unit to conform to the service requirements of a wide range of international voltage and phase configurations. Contact SP Scientific for more information.
- || The pneumatic isolation valve, a standard feature of The LyoStar™ 3, shall require the use of compressed air.
- ** Cooling water must be supplied at 5-25 °C and 30-60 psi (2.1-4.1 bar). Do not operate the LyoStar™ 3 with cooling water above 30 °C (86 °F).
- †† SP Scientific recommends an O₂ 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 depressurization. SP Scientific recommends the use of both hearing and eye protection during the ControLyo™ process.