

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)

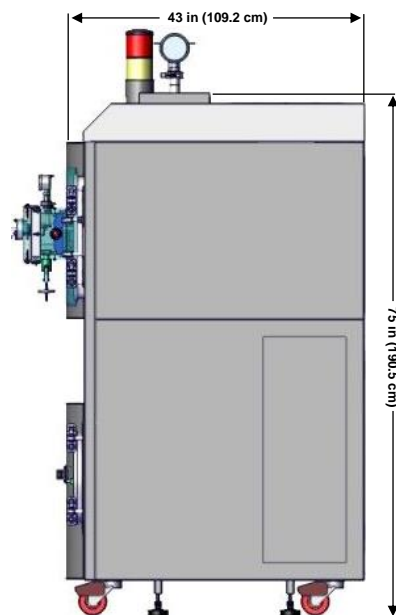
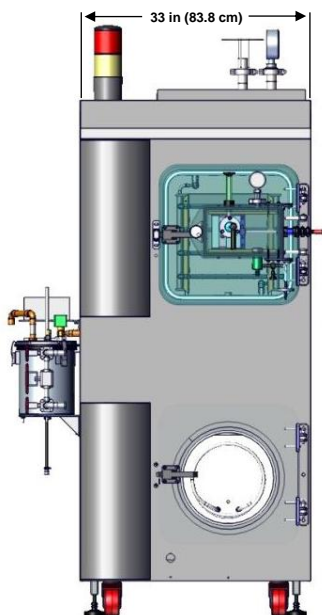
ControlLyo™ Requirements (Optional)

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

Width	33 in (83.8 cm)
Depth	43 in (109.2 cm)
Height	75 in (190.5 cm)
Maximum Weight	1500 lb (680 kg)
Minimum Clearance on All Sides	24 in (60.7 cm)

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).

Shelf Configuration

Number of Shelves	Shelf Area	Shelf Clearance	Shelf Clearance with Shelf Latching		
			1 Shelf Latched	2 Shelves Latched	3 Shelves Latched
1 Shelf	1.5 ft ² (1394 cm ²)	9.5 in (241.3 mm)	-	-	-
2 Shelves	3.1 ft ² (2880 cm ²)	4.5 in (114.3 mm)	9.3 in (236.2 mm)	-	-
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)	-
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 ControlLy™ 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 ControlLy™ process.