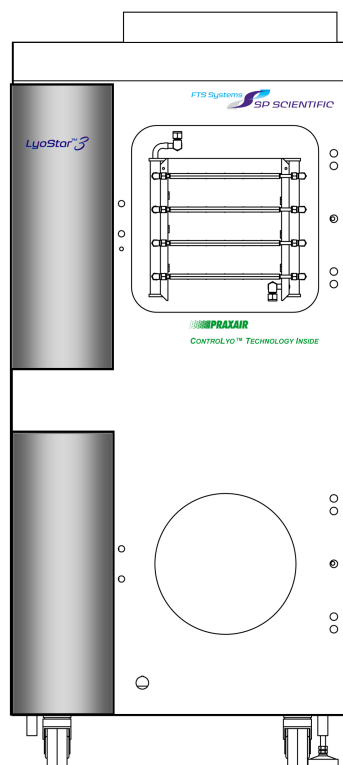


# FTS LyoStar™ 3

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 ControlLy™ ice nucleation temperature control for improved product uniformity and process efficiency (from Praxair, Inc.).

## Performance Specifications

Lowest Shelf Temperature (°C)	≤ -70
Shelf Temperature Control Range (°C) <sup>†</sup>	-70 to 60
Shelf Temperature Control Range Tolerance (°C) <sup>†</sup>	± 0.5
Shelf Pull-Down from 25 °C to -40 °C (minutes)	≤ 25
Lowest Condenser Temperature (°C)	≤ -85
Maximum Condenser Capacity (L)	≥ 30
Condenser Surface Area (in <sup>2</sup> / cm <sup>2</sup> )	850 / 5481
Maximum Ice Condensing Capacity in 24 hours (L) <sup>‡</sup>	≥ 20
Condenser Pull-Down from 20 °C to -75 °C (minutes)	≤ 10
Number of Compressors	2
Compressor Horsepower	3.5 , 2
System Refrigerant	R404A (high-stage) R508B (low-stage)
Vacuum Time to 100 Millitorr (minutes)	≤ 20
Vacuum Rate of Rise (mT/hour)	≤ 30
Volume-Based Leak Rate (mbar-L/sec)	≤ .0019
Lowest System Vacuum (mT)	≤ 10
Vacuum Level Control Range (mT)	20 to 500
Vacuum Level Control (mT) <sup>††</sup>	± 5.0
Temperature Uniformity (°C) <sup>§</sup>	± 1.0

**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.

## Electrical Requirements

Voltage (VAC)*	208/230	240	400
Hertz*	50/60	50	50
Phase*	1	1	3
Breaker Amperage	40	40	30

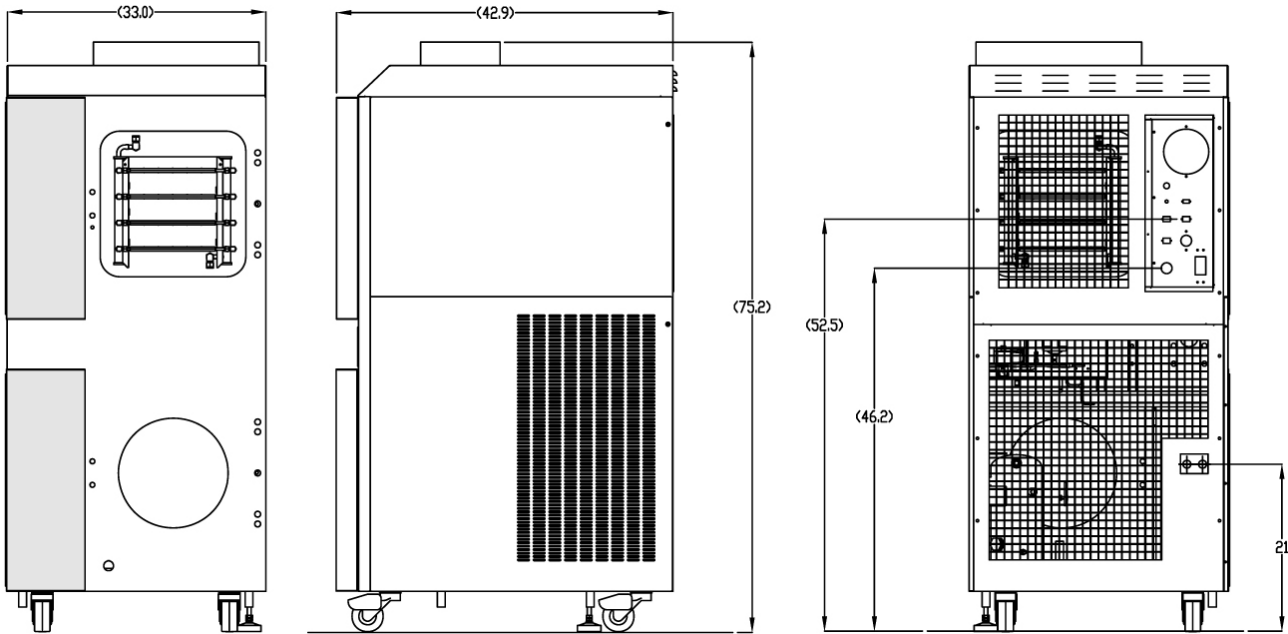
## Utility Requirements

Compressed Air (psig)	100
Ambient Room Temperature (°C)	≤ 30
Inert Gas for Backfilling (psig)	3-5
Inert Gas for ControlLy™ (psig)	50-60
Cooling Water (water-cooled units) (gpm / lpm) <sup>  </sup>	2-4 / 8-15

## Utility Considerations

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

## Standard Configuration



### Dimensional Data

Width (in / cm)	33 / 84
Depth (in / cm)	43 / 109
Height (in / cm)	75 / 190
Maximum Weight (lb / kg)	1500 / 680
Minimum Clearance on All Sides (ft / cm)	2 / 61

### Shelf Configuration

Number of Shelves	Shelf Area (ft <sup>2</sup> / cm <sup>2</sup> )	Shelf Clearance (in / mm)	Shelf Clearance with Optional Shelf Latching	
			1 Shelf Latched (in / mm)	2 Shelves Latched (in / mm)
1 Shelf	1.5 / 1394	9.5 / 241	-	-
2 Shelves	3.1 / 2880	4.5 / 114	9.25 / 235	-
3 Shelves	4.6 / 4274	2.8 / 71	4.25 / 108	8.5 / 216
4 Shelves	6.1 / 5667	2.0 / 51	2.6 / 66	4.0 / 102

Shelf Size (W x L x H, in / mm): 11 x 20 x .5 / 300 x 510 x 12.7

### Additional Information

Construction	316L Stainless Steel Shelves, Product Chamber, Condenser Chamber and Condenser Coil
Vacuum Pump	Two-Stage Rotary Vane
Stoppering (optional)	Bottom-Up Hydraulic
Defrost Type	Hot Gas
Isolation Valve	Butterfly Valve, Pneumatic
Refrigerant Type	CFC-Free
Vapor Port Diameter	4 inches (3.87 inches ID)

\* Do not operate your equipment outside of the specified service ranges.

<sup>†</sup> Shelf temperature is controlled to within  $\pm 0.5$  °C of the shelf temperature setpoint only when the setpoint is within the Shelf Temperature Control Range.

<sup>‡</sup> The specified Maximum Ice Condensing Capacity in 24 Hours and Maximum Deposition Rate are based on the process of freeze-drying water as aggressively as possible. The freeze dryer's ability to collect ice at an hourly rate or over a specified period will always be application dependent.

<sup>§</sup> 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.

<sup>||</sup> Cooling water must be supplied at 5-25 °C and 30-60 psi.

<sup>††</sup> Vacuum level is controlled to within  $\pm 5$  millitorr of the vacuum level setpoint when the setpoint is within the Vacuum level control range specification.