

LyoConstellation® S10

Production Lyophilizer



Key Features

- Unmatched process accuracy and reliability
- Deliver Line of Sight™ approach in cycle development and scale up using same technologies from R&D to production
- Designed to conform to good instrumentation practices
- Optional LyoFLux* TDLAS instrument with integrated communication with SP Hull LyoS™ 2.0 controls system software
- Optional ControlLyo® Nucleation Technology for improved product homogeneity and process efficiency

Specifications

Lowest Shelf Temperature (50 Hz / 60 Hz)	-60 °C
Shelf Temperature Control Range	-55 °C to 65 °C
Shelf Temperature Control Accuracy	± 0.5 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 25 minutes
Shelf Temperature Uniformity ¹	± 1.0 °C
Lowest Condenser Temperature	-65 °C
Condenser Surface Area	0.85 m ² (9.2 ft ²)
Condenser Pull-Down From 20 °C To -45 °C	≤ 20 minutes
Maximum Sublimation Rate ²	820 g/hour
Compressor Horsepower	4.85 kW (6.5 hp)
System Refrigerant	R449A (CFC free)
Vacuum Time To 100 mTorr ³	≤ 20 minutes
Vacuum Rate Of Rise ³	≤ 30 mTorr/hour
Volume-Based Leak Rate ³	≤ 2.33 mTorr • L/sec (.0031 mbar • L/sec)
Lowest System Vacuum ³	≤ 15 mTorr

Specifications 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 15-25 °C (59-77 °F) with an RH of ≤ 80 % at sea level.

Electrical Requirements

Voltage	208 VAC	400 VAC	480 VAC
Hertz	60 Hz	50 Hz	60 Hz
Phase	3 Φ (4 wire)	3 Φ (5 wire)	3 Φ (4 wire)
Breaker Amperage	50 A	30 A	30 A



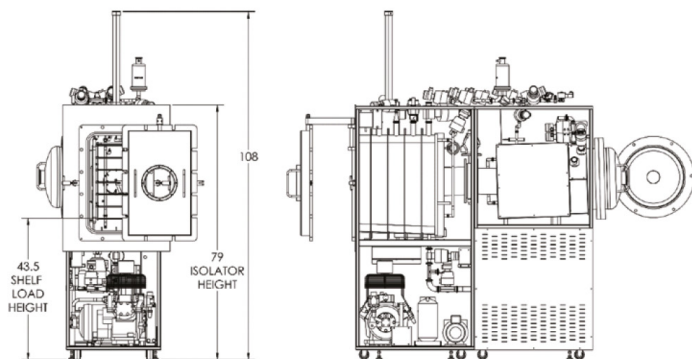
Utility Requirements

Compressed Air	5.5 barg (80 psig)
Cooling Water ⁴	11-19 Lpm (3-5 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	290 L @ 1 ATM
Inert Gas For ControlLyo®	3.45- 4.14 barg (50 - 60 psig)
Steam For Sterilization In Place (SIP)	18.14 kg/hour (40 lbs/hour) @ 1.23 -1.72 barg (20 -25 psig)
Clean In Place (CIP) Water / Media	150 Lpm (40 gpm) @ 4 barg (60 psig)
Cooling Water Heat Removal	26.08 kW/hr (89,000 BTU)
Heat Output (Room), Peak	26.08 kW/hr (89,000 BTU)

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 SP Hull LyoConstellation S10 chamber is 0.178 m³ (6.3 ft³). V_R is the volume of the room in which the lyophilizer is located.



Dimensional Data

Width	84 cm (33 in)
Length From End Of Chamber Door To End Of Condenser Door, Right Image	84 cm (33 in)
Height	236 cm (93 in)
Height Of Stoppering Ram	274 cm (108 in)
Maximum Weight	544 kg (1,200 lb)

Material of Construction

Product Chamber	AISI 316L stainless steel
Shelf	AISI 316L stainless steel
Condenser Chamber	AISI 316L stainless steel
Isolation Valve Disc	AISI 316L stainless steel

Surface Finish

Product Chamber Interior	Ra 0.635 micrometers (25 micro-inches)
Shelves	Ra 0.635 micrometers (25 micro-inches)
Condenser Chamber Interior	Ra 0.813 micrometers (32 micro-inches)

Shelf Configuration

	Shelf Area	Shelf Clearance
6 Shelves (1 Radiant)	0.85 m ² (9.2 ft ²)	85 mm (3.35 in)
6 Shelves (1 Radiant) (W x L)	274.3 mm x 520.7 mm (10.75 in x 20.5 in)	-
Shelf Loading Height	1105 mm (43.5 in)	-

Additional Information

Stoppering	Top-down hydraulic
Defrost Type	Hot water / steam (optional)
Noise Level ⁵	≤ 85 dB
Vapor Port Inner Diameter	20 cm (8 in)
Locking For Chamber Door	Automatic/Autolocking
Locking For Condenser Door	Manual locking
Protection Rating	IP20
CE Compliant	

Refrigeration Information

F Gas	R449A
GWP	1397
Total CO ₂ e (tonnes)	6.2

Options / Other Considerations

ControlLyo® Nucleation Technology
LyoFlux* 200 TDLAS Mass Flow Sensor
Independent CIP Skid
Tempris* Wireless Temperature Sensors
Virtual Servers & Thin Clients

¹ Shelf temperature deviations shall not exceed the specification relative to the mean of the highest and lowest temperature readings

² The specified Maximum Sublimation Rate at 40 °C, 100 mTorr using a 0.003" thickness plastic lined trays

³ Vacuum specifications are based on SP test data from similar units equipped with a two-stage rotary vane vacuum pump; units equipped with other vacuum pumps may yield different results (e.g; a dry pump shall yield a Lowest System Vacuum of ≤ 50 mTorr)

⁴ Cooling water temperatures should not exceed 24 °C

⁵ Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 3 feet (91 cm) away from the equipment.

Lyophilizers equipped with ControlLyo® shall exceed the specified noise level rating for approximately 3 to 5 seconds during depressurization and SP recommends the use of both hearing and eye protection during the ControlLyo® process

LyoConstellation™ S20

Production Lyophilizer



Key Features

- Unmatched process accuracy and reliability
- Deliver Line of Sight™ approach in cycle development &
- scale up using same technologies from R&D to production
- Designed to conform to good instrumentation practices
- Optional LyoFLux* TDLAS instrument with integrated communication with SP Hull LyoS™ 2.0 controls system software
- Optional ControlLyo® Nucleation Technology for improved product homogeneity and process efficiency

Specifications

Lowest Shelf Temperature (50 Hz / 60 Hz)	-60 °C
Shelf Temperature Control Range	-55 °C to 65 °C
Shelf Temperature Control Accuracy	± 0.5 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 25 minutes
Shelf Temperature Uniformity ¹	± 1.0 °C
Lowest Condenser Temperature	-65 °C
Condenser Surface Area	0.85 m ² (9.2 ft ²)
Condenser Pull-Down From 20 °C To -45 °C	≤ 20 minutes
Maximum Sublimation Rate ²	2,050 g/hour
Compressor Horsepower	2,050 g/hour
System Refrigerant	R410A (CFC free)
Vacuum Time To 100 mTorr ³	≤ 20 minutes
Vacuum Rate Of Rise ³	≤ 30 mTorr/hour
Volume-Based Leak Rate ³	≤ 0.010 mbar • L/sec (7.5 mTorr • L/sec)
Lowest System Vacuum ³	≤ 15 mTorr

Specifications 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 15-25 °C (59-77 °F) with an RH of ≤ 80 % at sea level.

Electrical Requirements

Voltage	200–250 VAC	360–440 VAC	420–500 VAC
Hertz	60 Hz	50 Hz	60 Hz
Phase	3 Φ (4 wire)	3 Φ (5 wire)	3 Φ (4 wire)
Breaker Amperage	70 A	40 A	40 A



Utility Requirements

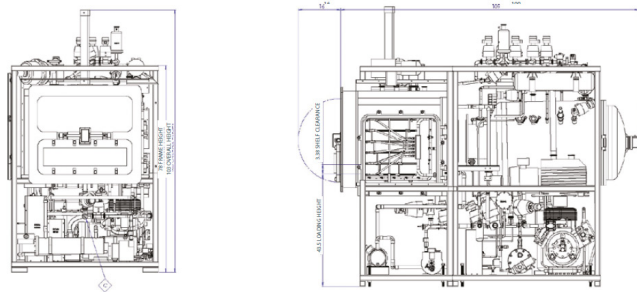
Compressed Air	5.5 barg (80 psig)
Cooling Water ⁴	19-30 Lpm (5-8 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	860 L @ 1 ATM
Inert Gas For ControlLyo®	3.45- 4.14 barg (50 - 60 psig)
Steam For Sterilization In Place (SIP)	40.82 kg/hour (90 lbs/hour) @ 1.38 -1.72 barg (20 -25 psig)
Clean In Place (CIP) Water / Media	150 Lpm (40 gpm) @ 4.14 barg (60 psig)
Cooling Water Heat Removal	41.03 kW/hr (140,000 BTU/hr)
Heat Output (Room), Peak	2.93 kW (10,000 BTU/hr)

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 SP Hull LyoConstellation S10 chamber is 0.178 m³ (6.3 ft³). V_R is the volume of the room in which the lyophilizer is located.





Dimensional Data

Width	147 cm (58 in)
Length From End Of Chamber Door To End Of Condenser Door, Right Image	277 cm (109 in)
Height	199 cm (78 in)
Height Of Stoppering Ram	262 cm (103 in)
Maximum Weight	3175.1 kg (7,000 lb)

Material of Construction

Product Chamber	AISI 316L stainless steel
Shelf	AISI 316L stainless steel
Condenser Chamber	AISI 316L stainless steel
Isolation Valve Disc	AISI 316L stainless steel

Surface Finish

Product Chamber Interior	Ra 0.635 micrometers (25 micro-inches)
Shelves	Ra 0.635 micrometers (25 micro-inches)
Condenser Chamber Interior	Ra 0.813 micrometers (32 micro-inches)

Shelf Configuration

	Shelf Area	Shelf Clearance
5 Shelves (1 Radiant)	1.93 m ² (20.8 ft ²)	85 mm (3.35 in)
Shelf Dimensions (W x L)	762 mm x 508 mm (30 in x 20 in)	-
Shelf Loading Height	1105 mm (43.5 in)	-

Additional Information

Stoppering	Top-down hydraulic
Defrost Type	Hot water / steam (optional)
Noise Level ⁵	≤ 85 dB
Vapor Port Inner Diameter	30.5 cm (12 in)
Loading / Unloading Door to Cleanroom	Automatic/Autolocking
Chamber Inspection Door to Machine Room	Manual locking
Locking For Condenser Door	Manual Locking
Protection Rating	IP20
CE Compliant	

Refrigeration Information

F Gas	R410A
Charge (Kg)	Approximately 20 lbs
GWP	2088
Total CO ₂ e (tonnes)	18.9

Options / Other Considerations

ControLyo® Nucleation Technology
LyoFlux* 200 TDLAS Mass Flow Sensor
Independent CIP Skid
Tempris* Wireless Temperature Sensors
Virtual Servers & Thin Clients

¹ Shelf temperature deviations shall not exceed the specification relative to the mean of the highest and lowest temperature readings

² The specified Maximum Sublimation Rate at 40 °C, 100 mTorr using a 0.003" thickness plastic lined trays

³ Vacuum specifications are based on SP test data from similar units equipped with a two-stage rotary vane vacuum pump; units equipped with other vacuum pumps may yield different results (e.g; a dry pump shall yield a Lowest System Vacuum of ≤ 50 mTorr)

⁴ Cooling water temperatures should not exceed 24 °C

⁵ Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 3 feet (91 cm) away from the equipment.

LyoPhilizers equipped with ControLyo® shall exceed the specified noise level rating for approximately 3 to 5 seconds during depressurization and SP recommends the use of both hearing and eye protection during the ControLyo® process

LyoConstellation™ S30

Production Lyophilizer



Key Features

- Unmatched process accuracy and reliability
- Deliver Line of Sight™ approach in cycle development & scale up using same technologies from R&D to production
- Designed to conform to good instrumentation practices
- Optional LyoFlux* TDLAS instrument with integrated communication with SP Hull LyoS™ 2.0 controls system software
- Optional ControlLyo® Nucleation Technology for improved product homogeneity and process efficiency

Specifications

Lowest Shelf Temperature (50 Hz / 60 Hz)	-60 °C
Shelf Temperature Control Range	-55 °C to 65 °C
Shelf Temperature Control Accuracy	± 0.5 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 25 minutes
Shelf Temperature Uniformity ¹	± 1.0 °C
Lowest Condenser Temperature	-65 °C
Condenser Surface Area	3.48 m ² (37.5 ft ²)
Condenser Pull-Down From 20 °C To -45 °C	≤ 20 minutes
Maximum Sublimation Rate ²	3,200 g/hour
Compressor Horsepower	14.9 kW (20 hp)
System Refrigerant	R410A (CFC free)
Vacuum Time To 100 mTorr ³	≤ 20 minutes
Vacuum Rate Of Rise ³	≤ 30 mTorr/hour
Volume-Based Leak Rate ³	≤ 12.75 mTorr • L/sec (0.017 mbar • L/sec)
Lowest System Vacuum ³	≤ 15 mTorr

Specifications 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 15-25 °C (59-77 °F) with an RH of ≤ 80 % at sea level.

Electrical Requirements

Voltage	200–250 VAC	360–440 VAC	420–500 VAC
Hertz	50 / 60 Hz	50 Hz	60 Hz
Phase	3 Φ (4 wire)	3 Φ (5 wire)	3 Φ (4 wire)
Breaker Amperage	125 A	80 A	60 A



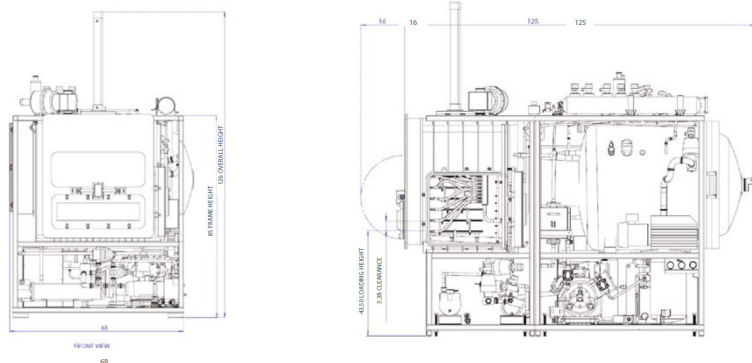
Utility Requirements

Compressed Air	5.5 barg (80 psig)
Cooling Water ⁴	22-37 Lpm (6-10 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	1,500 L @ 1 ATM
Inert Gas For ControlLyo®	3.45- 4.14 barg (50 - 60 psig)
Steam For Sterilization In Place (SIP)	54.43 kg/hour (120 lbs/hour) @ 1.38-1.72 barg (20 -25 psig)
Clean In Place (CIP) Water / Media	150 Lpm (40 gpm) @ 4.14 barg (60 psig)
Cooling Water Heat Removal	51.29 kW/hr (175,000 BTU/hr)
Heat Output (Room), Peak	3.37 kW/hr (11,500 BTU/hr)

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 SP Hull LyoConstellation S10 chamber is 0.178 m³ (6.3 ft³). V_R is the volume of the room in which the lyophilizer is located.



Dimensional Data

Width	173 cm (68 in)
Length	318 cm (125 in)
Height	229 cm (90 in)
Height Of Stoppering Ram	320 cm (126 in)
Maximum Weight	4989.5 kg (11,000 lb)

Note: LyoFlux* TDLAS installation increases overall length by 74 cm (29 in). SP recommends a 60.7 cm (24 in) clearance around all sides of the unit for serviceability.

Material of Construction

Product Chamber	AISI 316L stainless steel
Shelf	AISI 316L stainless steel
Condenser Chamber	AISI 316L stainless steel
Isolation Valve Disc	AISI 316L stainless steel

Surface Finish

Product Chamber Interior	Ra 0.635 micrometers (25 micro-inches)
Shelves	Ra 0.635 micrometers (25 micro-inches)
Condenser Chamber Interior	Ra 0.813 micrometers (32 micro-inches)

Shelf Configuration

	Shelf Area	Shelf Clearance
9 Shelves (8 Usable, 1 Radiant)	3.06 m ² (33 ft ²)	85 mm (3.35 in)
Shelf Dimensions (W x L)	762 mm x 508 mm (30 in x 20 in)	-
Shelf Loading Height	1105 mm (43.5 in)	-

Additional Information

Stoppering	Top-down hydraulic
Defrost Type	Hot water / steam (optional)
Noise Level ⁵	≤ 85 dB
Vapor Port Inner Diameter	40.6 cm (16 in)
Loading / Unloading Door to Cleanroom	Automatic/Autolocking
Chamber Inspection Door to Machine Room	Manual locking
Locking For Condenser Door	Manual Locking

Refrigeration Information

F Gas	R410A
Charge (Kg)	Approximately 65 lbs
GWP	2088
Total CO ₂ e (tonnes)	61.6

Options / Other Considerations

ControloLyo® Nucleation Technology

LyoFlux* 200 TDLAS Mass Flow Sensor

Independent CIP Skid

Tempris* Wireless Temperature Sensors

Virtual Servers & Thin Clients

¹ Shelf temperature deviations shall not exceed the specification relative to the mean of the highest and lowest temperature readings

² The specified Maximum Sublimation Rate at 40 °C, 100 mTorr using a 0.003" thickness plastic lined trays

³ Vacuum specifications are based on SP test data from similar units equipped with a two-stage rotary vane vacuum pump; units equipped with other vacuum pumps may yield different results (e.g; a dry pump shall yield a Lowest System Vacuum of ≤ 50 mTorr)

⁴ Cooling water temperatures should not exceed 24 °C

⁵ Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 3 feet (91 cm) away from the equipment.

Lyophilizers equipped with ControloLyo® shall exceed the specified noise level rating for approximately 3 to 5 seconds during depressurization and SP recommends the use of both hearing and eye protection during the ControloLyo® process