LyoConstellation® S10

Production Lyophilizer

SP Hull

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 ControLyo® 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

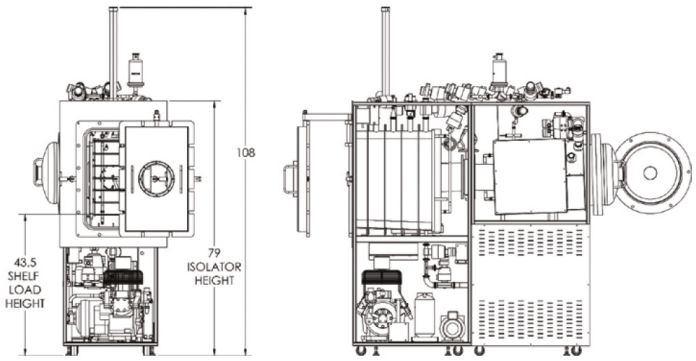
Compressed Air	5.5 barg (80 psig)
Cooling Water[4]	11-19 Lpm (3-5 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	290 L @ 1 ATM
Inert Gas For ControLyo®	3.45- 4.14 barg (50 - 60 psig)
Steam 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)

ControLyo® Requirements (Optional)

Volume To Vent Percentage Ratio (V_V/V_R)	< 6.5 %

Note: Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoConstellation S10 chamber is 0.178 m^3 (6.3 ft^3). VR is the volume of the room in which the lyophilizer is located.

LyoConstellation® S10



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 m² (9.2 ft²)	85 mm (3.35 in)
6 Shelves (1 Radiant) (W x L)	274.3 mm × 520.7 mm (10.75 in × 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_2e (tonnes)	6.2

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

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@scientificproducts.com

Part Number 100013605
Rev 004, 03/22

LyoConstellation™ S20

Production Lyophilizer

SP Hull

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 ControLyo® 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

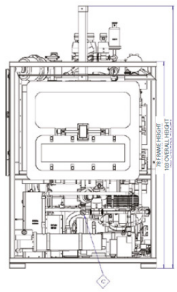
Compressed Air	5.5 barg (80 psig)
Cooling Water[4]	19-30 Lpm (5-8 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	860 L @ 1 ATM
Inert Gas For ControLyo®	3.45- 4.14 barg (50 - 60 psig)
Steam 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)

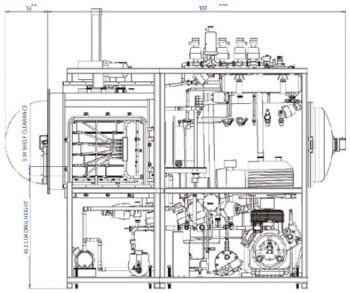
ControLyo® Requirements (Optional)

Volume To Vent Percentage Ratio (V_V/V_R)	< 6.5 %

Note: Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoConstellation S10 chamber is 0.178 m^3 (6.3 ft^3). VR is the volume of the room in which the lyophilizer is located.

LyoConstellation™ S20





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 m² (20.8 ft²)	85 mm (3.35 in)
Shelf Dimensions (W x L)	762 mm × 508 mm (30 in × 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_2e (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

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@scientificproducts.com

Part Number 100013606
Rev 004, 03/22

LyoConstellation™ S30

Production Lyophilizer

SP Hull

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 ControLyo® 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

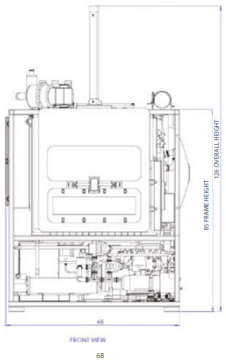
Compressed Air	5.5 barg (80 psig)
Cooling Water[4]	22-37 Lpm (6-10 gpm)
Inert Gas For Backfilling	0.21- 0.34 barg (3-5 psig)
Inert Gas For VLC/ Vacuum Release	0.21- 0.34 barg (3-5 psig)
Inert Gas Consumption (Full Vacuum Release)	1,500 L @ 1 ATM
Inert Gas For ControLyo®	3.45- 4.14 barg (50 - 60 psig)
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)

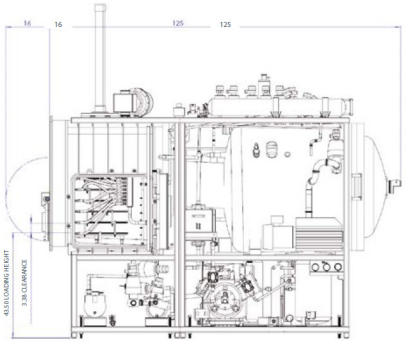
ControLyo® Requirements (Optional)

Volume To Vent Percentage Ratio (V_V/V_R)	< 6.5 %

Note: Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoConstellation S10 chamber is 0.178 m^3 (6.3 ft^3). VR is the volume of the room in which the lyophilizer is located.

LyoConstellation™ S30





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 × 508 mm (30 in × 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_2e (tonnes)	61.6

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

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@scientificproducts.com

Part Number 100013607
Rev 004, 03/22

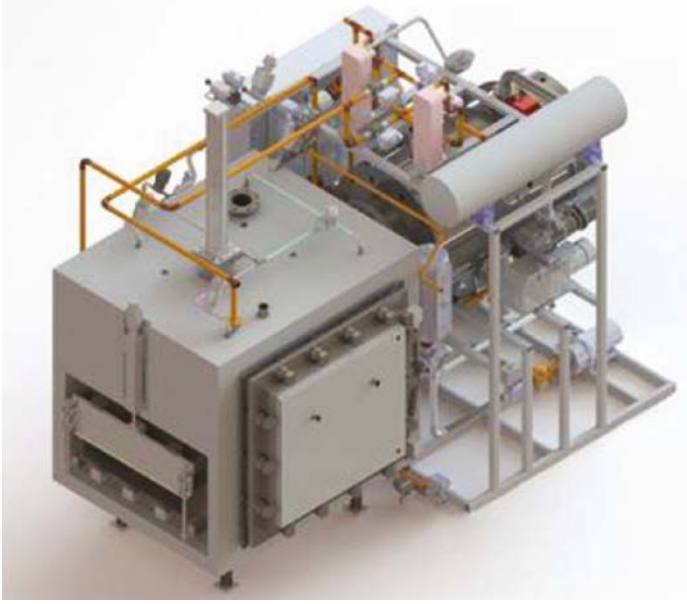
LyoConstellation™ S80

Production Lyophilizer

SP Hull®

Key Features

- Powerful, configurable, aseptic production freeze dryer with optional SP Hull Row-by-Row (RxR-36) loading system
- Range of telemetry options to fit Line of Sight™ approach enabling easy transfer of cycles
- Optional LyoFlux* 200 TDLAS instrument to measure vapor mass flow, mass flow, and infer critical process data
- Optional ControLyo® Nucleation Technology for improved product homogeneity and process efficiency
- Optional Tempris* for wireless temperature sensing



SP Hull LyoConstellation S80

Specifications

Lowest Shelf Temperature	-55 °C
Shelf Temperature Control Range	-50 °C to +50 °C
Shelf Temperature Control Accuracy At Shelf Inlet Manifold	-40 °C to +40 °C: ± 0.5 °C Outside this range: ± 1.0 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 60 minutes
Shelf Temperature Uniformity[1]	± 1.0°C
Lowest Condenser Temperature	-65 °C
Condenser Capacity	80 L
Condenser Pull-Down From 20 °C To -45 °C	≤ 60 minutes
Condenser Deposition Rate	100 L/24 hour
Compressor Horsepower	14.9 kW (20 hp)
System Refrigerant	R507b – GWP 3,985
Vacuum Rate Of Rise[2]	≤ 30 mTorr/hour
Volume-Based Leak Rate[2]	≤ 15 mTorr·L/sec (0.02 mbar·L/sec)
Lowest System Vacuum[2]	≤ 20 mTorr

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	275 A	150 A	125 A

ControLyo® Requirements (Optional)

Volume To Vent Percentage Ratio (V_V/V_R)	< 6.5 %

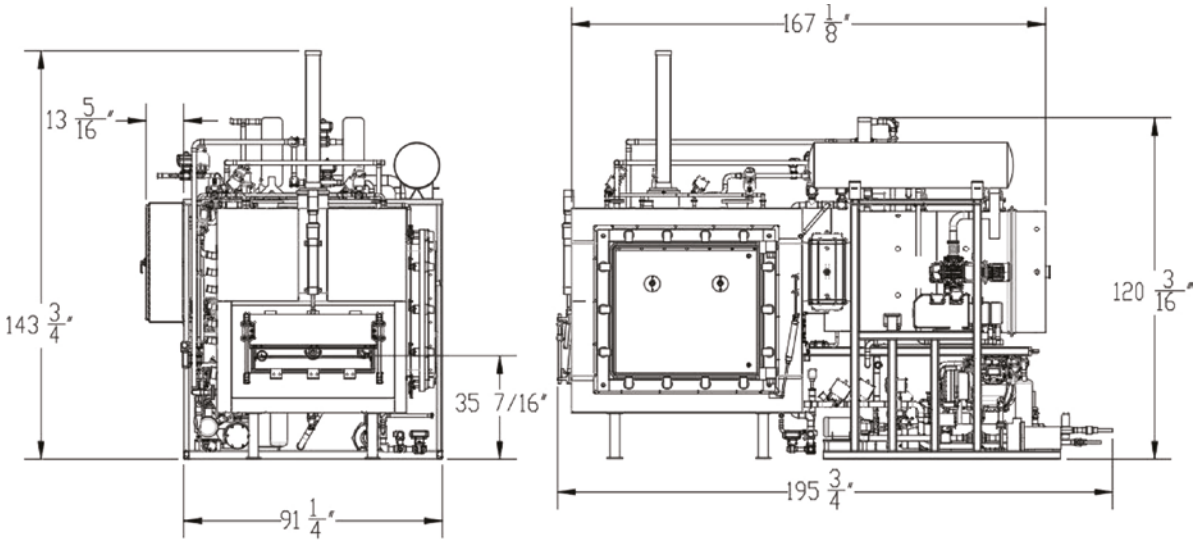
Note: *Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard LyoConstellation S80 chamber is 150 ft³ (4.24 m³). V_R is the volume of the room in which the lyophilizer is located.*

Utility Requirements

Compressed Air	5.52-6.89 barg (80–100 psig)
Cooling Water[3]	189.3 Lpm @ 26.6 °C (50 gpm max @ 80 °F)
Chamber Cooling Water	94.6-378.5 Lpm (25-100 gpm)
Inert Gas For Backfilling	9.3 Lpm @ 0.344-2.06 barg (0.33 scfm @ 5-30 psig)
Inert Gas For VLC / Vacuum Release	368 Lpm @ 0.344-2.06 barg (13 scfm @ 5-30 psig)
Inert Gas Consumption (Full Vacuum Release)	5,235 L @ 1 ATM
Inert Gas For ControLyo®	2.41-2.75 barg (35-40 psig)
Steam For Sterilization In Place (SIP)	204 kg/hour (450 lbs/hour) @ 1.38–1.72 barg (20-25 psig)
Clean In Place (CIP) Water/Media	189 Lpm (50 gpm) @ 2.75 barg (40 psig)
Heat Output (Machine Room), Peak	0.732 kW/hour (2,500 BTU)

LyoConstellation™ S80

Production Lyophilizer



Dimensional Data

Width	2.7 m (106.3 in)
Length	4.97 m (195.75 in)
Height	3.05 m (120.19 in)
Height Incl Stoppering Ram	3.65 m (143.75 in)
Maximum Weight	9,185 kg (20,250 lb)

Note: *LyoFlux* TDLAS installation increases overall length by 915 mm (36 in). SP recommends a 36 in (915 mm) clearance around all sides of the unit for serviceability.*

Materials 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)

Additional Information

Stoppering	Top-down hydraulic 15 psig (1.03 barg)
Condenser Defrost Type	Hot water / steam (optional)
Noise Level[4]	≤ 85 dB
Vapor Port Inner Diameter	20 in (508 mm)
Loading / Unloading Door To Cleanroom	Automatic / Autolocking
Chamber Inspection Door To Machine Room	Manual locking
Locking For Condenser Door	Manual locking
Protection Rating	IP2
CE Compliant	

Shelf Configuration

Number of Shelves	Shelf Area	Shelf Clearance
8 Shelves (7 Usable, 1 Radiant)	7.8 m^2 (84 ft^2)	121 mm (4.75 in)
Usable Shelf Dimensions (W × L)	914.4 mm × 1912.2 mm (36 in × 48 in)	—
Shelf Loading Height	900 mm (35 7/16 in)	—

Refrigeration Information

F Gas	R507b
Charge (Kg)	Approximatley 65 lbs
GWP	3,985
Total CO_2e (tonnes)	90.61

Options/Other Considerations

- Rotary Hull Isolation Valve
- ControLyo® Nucleation Technology
- N+1 Redundancy
- 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] 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)

[3] Cooling water temperatures should not exceed 26.6 °C (80 °F) supply; 32.2 °C (90 °F) return

[4] Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 91.5 cm (36 in) 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

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@spindustries.com

Part Number TBD
Rev 003, 12/21

LyoConstellation™ S100

Production Lyophilizer

SP Hull®

Key Features

- Powerful, configurable, aseptic production freeze dryer with optional SP Hull Row-by-Row (RxR-36) loading system
- Range of telemetry options to fit Line of Sight™ approach enabling easy transfer of cycles
- Optional LyoFlux* 200 TDLAS instrument to measure vapor mass flow, and infer critical process data
- Optional ControLyo® Nucleation Technology for improved product homogeneity and process efficiency
- Optional Tempris* for wireless temperature sensing

Specifications

Lowest Shelf Temperature	-55 °C
Shelf Temperature Control Range	-50 °C to +50 °C
Shelf Temperature Control Accuracy At Shelf Inlet Manifold	-40 °C to +40 °C: ± 0.5 °C Outside this range: ± 1.0 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 60 minutes
Shelf Temperature Uniformity[1]	± 1.0 °C
Lowest Condenser Temperature	-65 °C
Condenser Capacity	150 L
Condenser Pull-Down From 20 °C To -45 °C	≤ 60 minutes
Condenser Deposition Rate	150 L / 24 hour
Compressor Horsepower	22.4 kW (30 hp)
Vacuum Rate Of Rise[2]	≤ 30 mTorr/hour
Volume-Based Leak Rate[2]	≤ 15 mTorr·L/sec (0.02 mbar·L/sec)
Lowest System Vacuum[2]	≤ 20 mTorr

***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.*

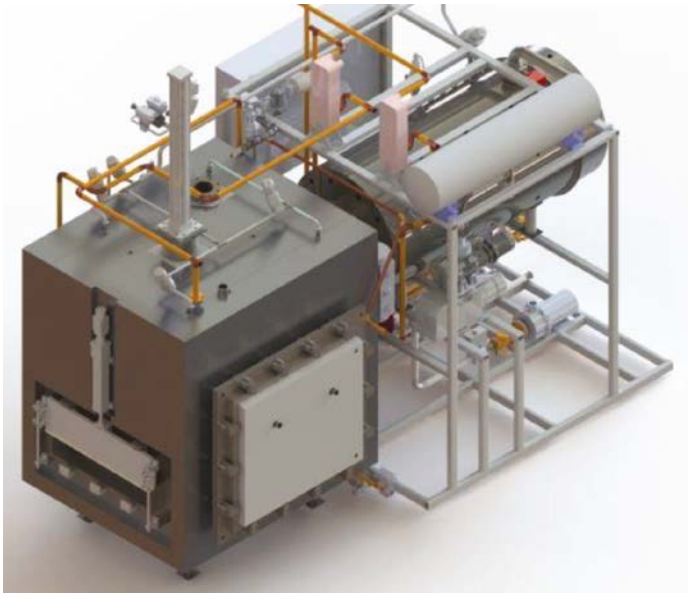
Electrical Requirements

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	275 A	150 A	125 A

ControLyo® Requirements (Optional)

Volume To Vent Percentage Ratio (V_V/V_R)	< 6.5 %

Note: *Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoConstellation S100 chamber is 4.99 m^3 (176.5 ft^3). V_R is the volume of the room in which the lyophilizer is located.*



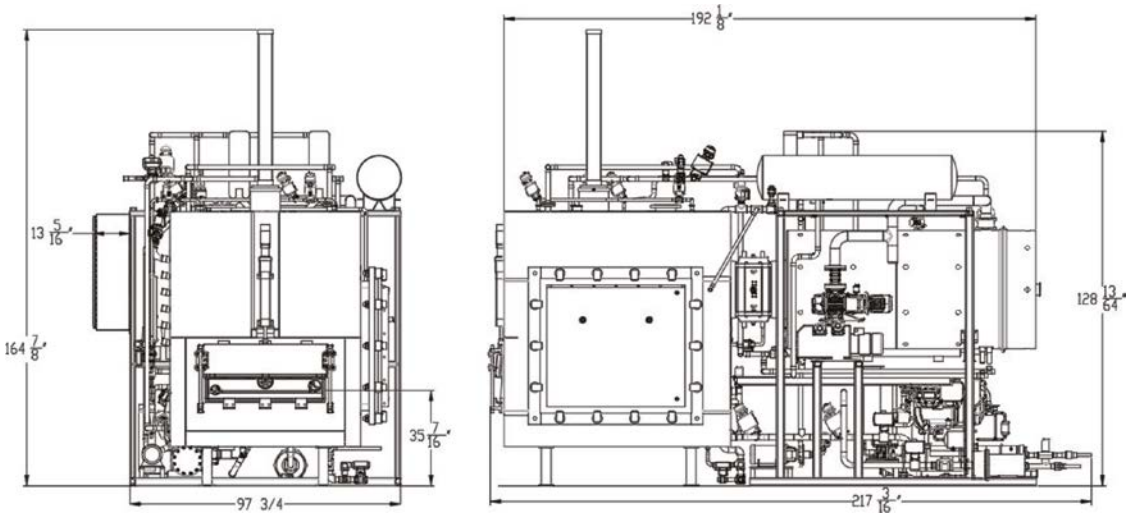
SP Hull LyoConstellation S100

Utility Requirements

Compressed Air	5.52–6.89 barg (80–100 psig)
Cooling Water[3]	189.3 Lpm @ 26.6 °C (50 gpm max @ 80 °F)
Chamber Cooling Water	94.6-378.5 Lpm (25-100 gpm)
Inert Gas For Backfilling	9.3 Lpm @ 0.344-2.06 barg (0.33 scfm @ 5-30 psig)
Inert Gas For VLC / Vacuum Release	368 Lpm @ 0.344-2.06 barg (13 scfm @ 5-30 psig)
Inert Gas Consumption (Full Vacuum Release)	5,235 L @ 1 ATM
Inert Gas For ControLyo®	2.41-2.75 barg (35-40 psig)
Steam For Sterilization In Place (SIP)	226 kg/hour (500 lbs/hour) @ 1.38–1.72 barg (20–25 psig)
Clean In Place (CIP) Water/Media	189 Lpm (50 gpm) @ 2.75 barg (40 psig)
Heat Output (Machine Room), Peak	0.846 kW/hour (2,890 BTU)

LyoConstellation™ S100

Production Lyophilizer



Dimensional Data

Width	2.82 m (111.1 in)
Length	5.51 m (217.2 in)
Height	3.25 m (128.2 in)
Height, Inc. Stoppering Ram	4.19 m (164.9 in)
Maximum Weight	10,228 kg (22,550 lb)

Note: *LyoFLux* 200 TDLAS installation increases overall length by 915 mm (36 in). SP recommends a 915 mm (36 in) clearance around all sides of the unit for serviceability.*

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

Additional Information

Stoppering	Top-down hydraulic 15 psig (1.03 barg)
Condenser Defrost Type	Hot water / steam (optional)
Noise Level[4]	≤ 85 dB
Vapor Port Inner Diameter	508 mm (20 in)
Loading / Unloading Door To Clean Room	Automatic / Autolocking
Chamber Inspection Door To Machine Room	Manual locking
Locking For Condenser Door	Manual locking
CE Compliant	

Shelf Configuration

Number of Shelves	Shelf Area	Shelf Clearance
10 Shelves (9 Usable, 1 Radiant)	10.03 m^2 (108 ft^2)	121 mm (4.75 in)
Usable Shelf Dimensions (W × L)	914.4 mm × 1219.2 mm (36 in × 48 in)	—
Shelf Loading Height	900 mm (35 7/16 in)	—

Refrigeration Information

F Gas	R507b
Charge (Kg)	Approximately 65 lbs
GWP	3,985
Total CO_2e	90.61

Options/Other Considerations

- Rotary Hull Isolation Valve
- ControLyo® Nucleation Technology
- N+1 Redundancy
- 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] 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)

[3] Cooling water temperatures should not exceed 26.6 °C. (80 °F) supply, 32.2 °C (90 °F) return

[4] Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 36 in (91.5 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

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@spindustries.com

Part Number 100013822
Rev 004, 12/21

LyoConstellation™ S130

Production Lyophilizer

SP Hull®

Key Features

- Powerful, configurable, aseptic production freeze dryer with optional SP Hull Row-by-Row (RxR-36) loading system
- Range of telemetry options to fit Line of Sight™ approach enabling easy transfer of cycles
- Optional LyoFlux* 200 TDLAS instrument to measure vapor mass flow, determine end points and infer critical process data
- Optional ControLyo® Nucleation Technology for improved product homogeneity and process efficiency
- Optional Tempris* for wireless temperature sensing

Specifications

Lowest Shelf Temperature	-55 °C
Shelf Temperature Control Range	-50 °C to +50 °C
Shelf Temperature Control Accuracy At Shelf Inlet	-40 °C to +40 °C: ± 0.5 °C Outside this range: ± 1.0 °C
Shelf Pull-Down From 20 °C To -40 °C	≤ 60 minutes
Shelf Temperature Uniformity[1]	± 1.0 °C
Lowest Condenser Temperature	-65 °C
Condenser Capacity	200 L
Condenser Pull-Down From 20°C To -45 °C	≤ 60 minutes
Condenser Deposition Rate	200L/24 hour
Compressor Horsepower	2, 20 hp (22.4 kW)
System Refrigerant	R507b – GWP 3,985
CO_2E	180,122 tonnes
Vacuum Rate Of Rise[2]	≤ 30 mTorr/hour
Volume-Based Leak Rate[2]	≤ 0.02 mbar·L/sec (15 mTorr·L/sec)
Lowest System Vacuum[2]	≤ 20 mTorr

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.*

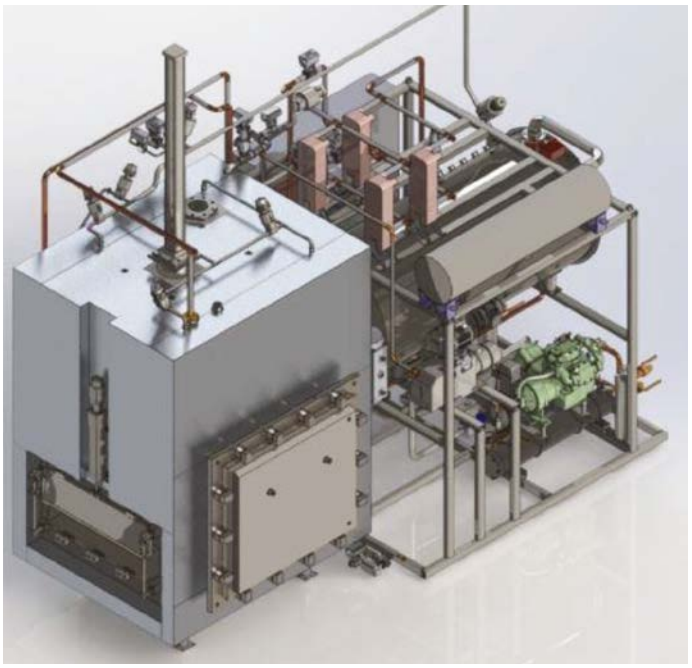
Electrical Requirements

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	300 A	200 A	150 A

ControLyo® Requirements (Optional)

Volume To Vent Percentage Ration (V_V/V_R)	< 6.5 %

Note: *Vent Volume (Vv) is the product chamber volume multiplied by 10. The volume of a standard SP Hull LyoConstellation S130 chamber is 227 ft³ (6.43 m³). V_R is the volume of the room in which the lyophilizer is located.*



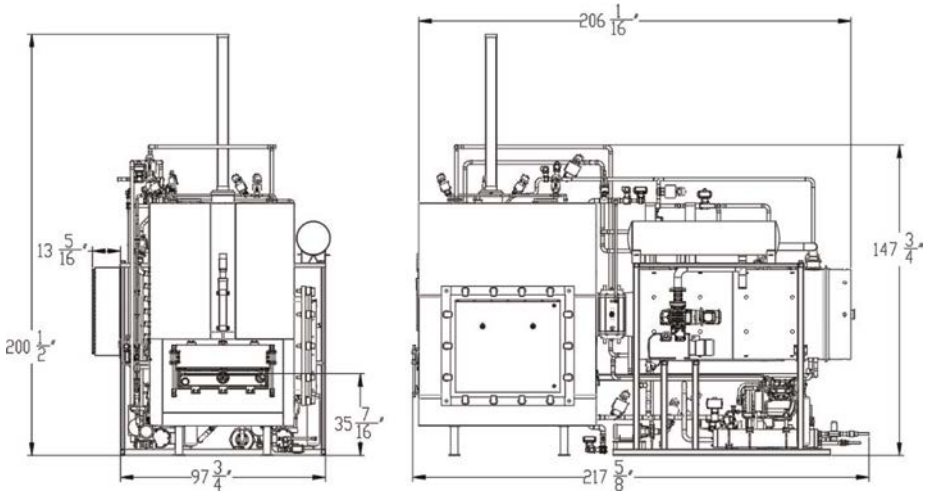
SP Hull LyoConstellation S130

Utility Requirements

Compressed Air	80–100 psig (5.52–6.89 barg)
Condensing Cooling Water Supply/ Return[3]	100 gpm max @ 80 °F (378.5 Lpm @ 26.6 °C)
Chamber Cooling Water	25-100 gpm (94.6-378.5 Lpm)
Inert Gas For Backfilling	0.33 scfm @ 5-30 psig (9.3 Lpm @ 0.344-2.06 barg)
Inert Gas For VLC / Vacuum Release	13 scfm @ 5-30 psig (368 Lpm @ 0.344-2.06 barg)
Inert Gas Consumption (Full Vacuum Release)	6048 L @ 1 ATM
Inert Gas For ControLyo®	35-40 psig (2.41-2.75 barg)
Steam For Sterilization In Place (SIP)	550 lbs/hour (226 kg/hour) @ 20–25 psig (1.38–1.72 barg)
Clean In Place (CIP) Water/Media	50 gpm (189 Lpm) @ 40 psig (2.75 barg)
Heat Output (Machine Room), Peak	3,225 BTU/hour (0.944 kW)

LyoConstellation™ S130

Production Lyophilizer



Dimensional Data

Width	2.82 m (111.1 in)
Length	5.52 m (217.63 in)
Height	3.75 m (147.75 in)
Height Incl Stoppering Ram	5.09 m (200.5 in)
Maximum Weight	12,927 kg (28,500 lb)

Note: *TDLAS installation increases overall length by 36 in (915 mm). SP recommends a 36 in (915 mm) clearance around all sides of the unit for serviceability.*

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

Additional Information

Stoppering	Top-down hydraulic 15 PSIG (1.03 barg)
Condenser Defrost Type	Hot water / steam (optional)
Noise Level[4]	≤ 85 dB
Vapor Port Inner Diameter	508 mm (20 in)
Loading / Unloading Door To Cleanroom	Automatic / Autolocking
Chamber Inspection Door To Machine Room	Manual locking
Locking For Condenser Door	Manual locking
Protection Rating	IP2
CE Compliant	

Shelf Configuration

Number of Shelves	Shelf Area	Shelf Clearance
13 Shelves, (12 Usable, 1 Radiant)	13.38 m^2 (144 ft^2)	121 mm (4.75 in)
Usable shelf dimensions (W × L)	914.4 mm × 1219.2 mm (36 in × 48 in)	—
Overall shelf dimensions (W × L)	977.9 mm × 1219.2 mm (38.5 in x 48 in)	—
Shelf Loading Height	900 mm (35 7/16 in)	—

Refrigeration Information

F Gas	R507b
Charge (Kg)	Approximately 65 lbs
GWP	3,985
Total CO_2e	90.61

Options/Other Considerations

- Rotary Hull Isolation Valve
- ControLyo® Controlled Ice Nucleation
- N+1 Redundancy
- 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] *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)*

[3] *Cooling water temperatures should not exceed 26.6 °C. (80 °F) supply, 32.2 °C (90 °F) return*

[4] *Noise from the equipment under normal operating conditions shall not exceed 85 dB when measured at any point 36 in (91.5 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*

935 Mearns Road, Warminster, PA 18974 USA | scientificproducts.com
+1-800.523.2327 | hello@spindustries.com

Part Number 100013823
Rev 004, 12/21