LyoPilot D Series

Pilot Freeze Dryer, 2-chamber system

Equipped with stainless steel shelf areas with synthetic silicone heat transfer fluid, the larger 8/12kg pilot systems meet the highest standards of the pharma and biotech industries.

The 2-chamber system is integrated with advanced PAT functions for optimized process.

- Freezing point determination
- Resistivity monitoring
- Pressure rise test
- Pressure comparison method (optional)
- Instantaneous nucleation (optional)

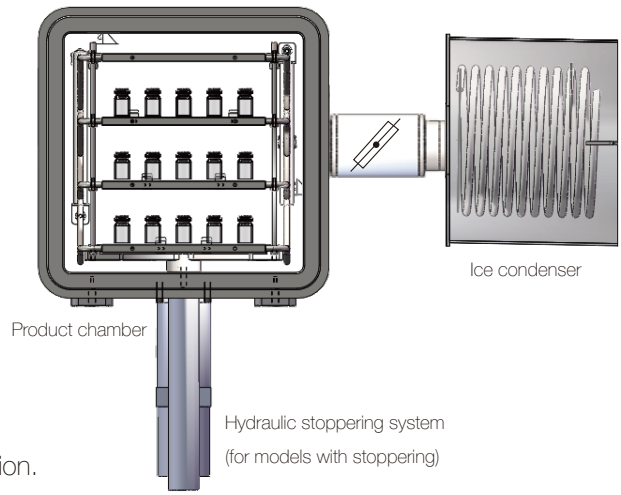
Choose the system fits your application best!

Model	Max.ice capacity	Ice condenser temp	Max. 2ml vials
LyoPilot D8S/D8	8 kg	-90 °C	1263/1611
LyoPilot D12S/D12	12 kg	-90 °C	2380/2952

Advanced system

2-chamber systems

- Optimal vapor transport.
- Side-opening ice condenser for easier observation and cleaning.
- Ultra-low pressure drop between the two chambers.
- Excellent drying rates for sensitive materials and products with low eutectic points or low collapse temperatures.
- Intermediate valve for pressure rise test.
- Compact design with highly efficient and economical operation.



Shelves

- Stainless steel shelf areas with silicone heat transfer fluid, providing excellent thermal conductivity.
- Pulse-type electronic expansion valve, featuring a wide regulation range, quick and precise control on shelf temperature, and low energy consumption.
- The uniformity of different layers and a same layer is within 1°C.
- Hydraulic stopper system, rising from bottom to top and easy for cleaning (available for LyoPilot D8S/D12S)

Refrigeration & ice condenser

- 2-compressor cascade system, ice condenser temperature reaches -90°C.
- Built-in ice condenser coils for higher efficiency.
- Hot gas defrosting, quickly proceed to the next freeze-drying process.
- Mechanism door lock of ice condenser, for convenient cleaning.

Vacuum control

The vacuum degree and duration of each step can be set and controlled at auto mode. Pirani vacuum gauge with accuracy 0.001mbar. Vacuum control reduced drying time by up to 40%.

Advanced Pirani vacuum gauge allows:

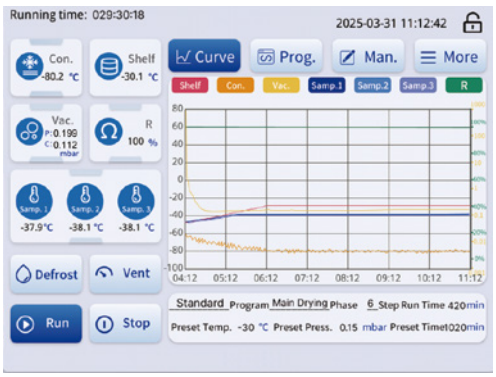
- Airtightness check: before freeze drying process, set a vacuum degree 600~950mbar to check airtightness.
- Gas backfill: after freeze-drying completed, set a vacuum degree 500~800mbar, to backfill inert gas, so that the vial can be plugged under a slightly negative pressure for a longer storage time.

Unique system LyoSMART+ controller

LyoSMART+ controller provides an easy-to-use and intuitive user interface.
All of the extensive accessories are also integrated. Reproducible results are assured by automatic process sequences.

Convenient and intuitive

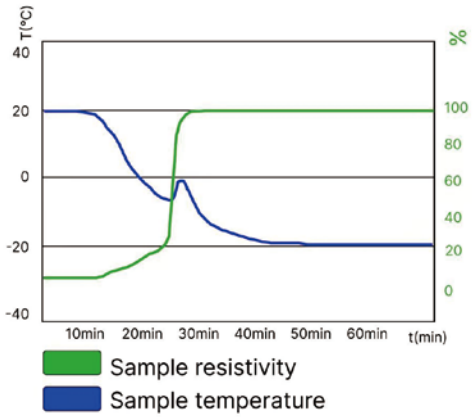
- Color touchscreen with clear display.
- Automatic or manual mode.
- Intuitive program entry, using various freeze-drying sequences and recipes.
- Memory space for 30 user-defined programs with 36 steps.
- Real-time freezing drying diagram display, selective parameter display, data query & export.
- Set safety values such as vacuum level and resistivity for process feedback control.
- Password protection for startup and lock screen protection.
- Equipped with USB port & RS232 port.



PAT(Process Analytical Technology) Tools

Freezing point determination

- The LyoTR sensor monitors both electrical resistance and product temperature. From the curves of both of these variables, operator can determine the eutectic point and freezing point of product.
- The LyoTR sensor allows automated control of the energy supply to the shelves during the main drying phase to avoid critical temperatures during the main drying phase, which reduces product defrost risk.



Product Temperature Measurement

The product temperature influences the form of the ice structure and the speed of the freeze drying process, and it can initiate a thawing process. The product temperature is monitored during the measurement process.

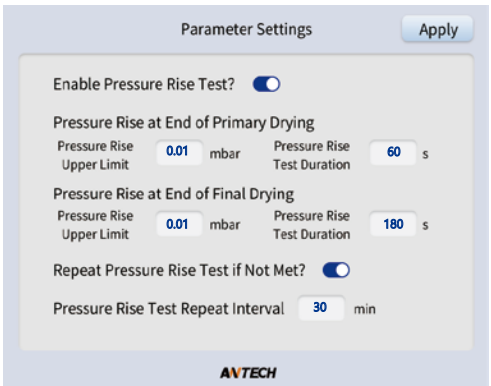
The ultra-fine Pt100 probe with flexible wire harness is compact, highly resistant to interference, corrosion-resistant, and easy to calibrate.

Pressure rise test

The pressure rise test is achieved through the design of the intermediate valve between the drying chamber and the ice condenser. During the drying process, this valve is closed to measure the pressure increase in the drying chamber over a defined time period, which serves as a key indicator for determining the freezing point.

Typically, the pressure rise rate at the end of main drying should within 0.01 mbar/min. The accurate vacuum control is critical for this function.

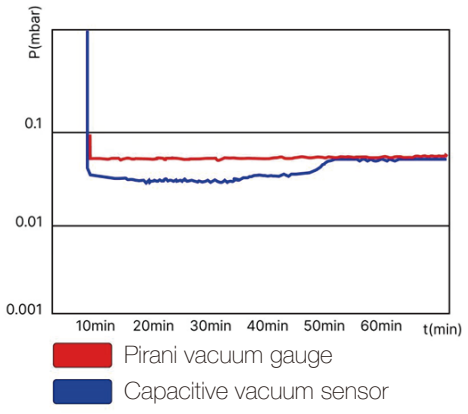
Thanks to ANTECH's ultra-high accurate ASV (Advanced Smart Valve) vacuum control, our pressure rise test delivers superior reliability.



Comparative pressure measurement (optional)

The end of the main drying phase can be detected by using two different vacuum measurement sensors: Pirani vacuum gauge and capacitive vacuum sensor.

When the difference between the pressure measurements falls below a preselected threshold, it indicates that main drying has concluded.



LyoIns-instantaneous nucleation (applicable for LyoPilot D8/D8S)

The LyoIns controlled freezing function ensures the simultaneous freezing of all vials.

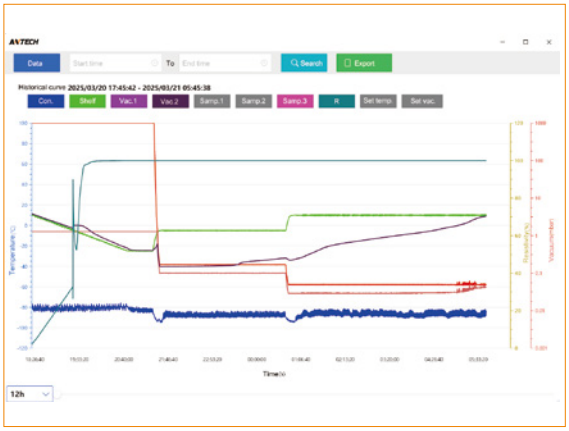
The instantaneous crystallization technology is achieved by controlling the vacuum differential between the product chamber and the ice condenser chamber.

- The ice fog is generated directly by the product, no external substances and additional accessories required.
- No release of gas (with potential product content) from the chamber
- No modification required, available for LyoPilot D8/D8S.

LyoSOFT: operate on PC

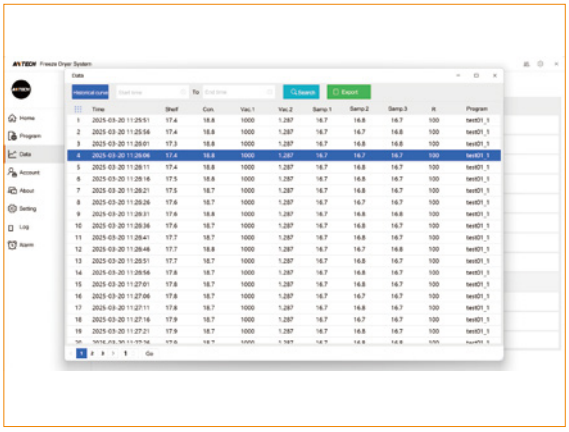
For precise documentation and evaluation

- Our experience shows that freeze-drying processes must be precisely monitored and documented. Regardless of the drying parameters or batch size, this is the only way to ensure accurate analysis.
- The optional LyoSOFT software (PC based) enables comprehensive recording and archiving of all process data. Installed on a separate computer, the software receives data directly from the freeze dryer via an RS232 interface.
- With LyoSOFT, programs for freeze drying can be developed and process data can be viewed in real time in graphical format. Operation is consistent and uniform across all unit sizes, as LyoSOFT is also used with larger production freeze drying systems.



Are you planning to scale up?

- Data recording on USB drive.
- Simple process documentation with LyoSOFT.
- LyoSOFT for process control and documentation.
- Process monitoring with the LyoTR sensor to avoid undesired defrosting effects.
- Automatic determination of the freezing point for reliable process control.
- High-precision temperature and vacuum control ensures the accuracy of the freeze-drying process.
- Scientific structural layout not only meets the convenience of operation, but also ensures the repeatability of the process.
- LyoSOFT software complies with current GAMP standards.



With stoppering

Specification

	Model	LyoPilot D8S	LyoPilot D12S
Type	Chamber	2-chamber	2-chamber
	Stopper	●	●
Ice condenser	Temperature (approx.) *	-90°C	-90°C
	Max. capacity	8 kg	12 kg
	Chamber volume (approx.)	18 L	30 L
	Performance	6 kg/24h	10 kg/24h
	Defrosting	Hot gas	Hot gas
Shelf	Type	Silicone heat transfer fluid	Silicone heat transfer fluid
	Dimensions(W x D)	240 x 410 mm	280 x 500 mm
	Number of shelves	3+1	4+1
	Area	0.3 m²	0.56 m²
	Spacing	80 mm	73 mm
	Hydraulic stoppering	Bottom to top	Bottom to top
	Temperature range	-55°C ~ +60°C	-60°C ~ +60°C
	Temperature accuracy	0.1 °C	0.1 °C
	Cooling rate (+20°C to –40°C)	1.3 °C /min	1.3 °C /min
Basic	Dimensions (W x D x H)	960 x 765 x 1320 mm	1065 x 860 x 1380 mm
	Weight	330 Kg	450 Kg
	Noise level (approx.)	56 dB(A)	60 dB(A)
Power	Electrical connection	220V/50Hz;220V/60Hz;120V/60Hz	380V/50Hz, 3-phase
	Rated power	3400 W	4500 W
Controller	Display	8" touch screen	8" touch screen
	Operating system	LyoSmart+	LyoSmart+
	Password protection	●	●
Vacuum	Pirani vacuum gauge	●	●
	Capacitive vacuum sensor	○	○
	Vacuum level	0.008 mbar	0.008 mbar
	Vacuum control accuracy	0.001 mbar	0.001 mbar
	Vacuum leakage rate	<0.005 mbar L / s	<0.005 mbar L / s
	Vacuum pump	●	●
Process control	Safety pressure	●	●
	LyoTR monitoring to prevent defrosting	●	●
	Temperature comparison	●	●
PAT tools	Freezing point determination	●	●
	Product temperature measurement	●	●
	Pressure rise test	●	●
	Comparative pressure measurement	○	○
	LyoIns (instantaneous nucleation)	○	–
Communication	Data record	●	●
	USB port	●	●
	RS 232 port	●	●
	LyoSOFT (software for process control and documentation)	○	○
Vial closure	Hydraulic stoppering	●	●
	Automatic gas backfill	●	●
	Automatic aeration	●	●

*: Tested at ambient temperature 24°C, with good ventilation

● Basic configuration ○ Optional - Not available

Without stoppering

Specification

	Model	LyoPilot D8	LyoPilot D12
Type	Chamber	2-chamber	2-chamber
	Stopper	●	●
Ice condenser	Temperature (approx.) *	-90°C	-90°C
	Max. capacity	8 kg	12 kg
	Chamber volume (approx.)	18 L	30 L
	Performance	6 kg/24h	10 kg/24h
	Defrosting	Hot gas	Hot gas
Shelf	Type	Silicone heat transfer fluid	Silicone heat transfer fluid
	Dimensions(W x D)	315 x 410 mm	350 x 500 mm
	Number of shelves	3+1	4+1
	Area	0.39 m²	0.7 m²
	Spacing	80 mm	73 mm
	Temperature range	-55°C ~ +60°C	-60°C ~ +60°C
	Temperature accuracy	0.1°C	0.1°C
	Cooling rate (+20°C to –40°C)	1.3 °C/min	1.3 °C/min
Basic	Dimensions (W x D x H)	960 x 765 x 1320 mm	1065 x 860 x 1380 mm
	Weight	300Kg	420Kg
	Noise level (approx.)	56 dB(A)	60 dB(A)
Power	Electrical connection	220V/50Hz; 220V/60Hz;120V/60Hz	380V/50Hz
	Rated power	3400W	4500W
Controller	Display	8" touch screen	8" touch screen
	Operating system	LyoSmart+	LyoSmart+
	Password protection	●	●
Vacuum	Pirani vacuum gauge	●	●
	Capacitive vacuum sensor	○	○
	Vacuum level	0.008 mbar	0.008 mbar
	Vacuum control accuracy	0.001 mbar	0.001 mbar
	Vacuum leakage rate	<0.005 mbar L / s	<0.005 mbar L / s
	Vacuum pump	●	●
Process control	Safety pressure	●	●
	LyoTR monitoring to prevent defrosting	●	●
	Temperature comparison	●	●
PAT tools	Freezing point determination	●	●
	Product temperature measurement	●	●
	Pressure rise test	●	●
	Comparative pressure measurement	○	○
	LyoIns (instantaneous nucleation)	○	–
Communication	Data record	●	●
	USB port	●	●
	RS 232 port	●	●
	LyoSOFT(software for process control and documentation)	○	○
Vial closure	Hydraulic stoppering	–	–
	Automatic gas backfill	●	●
	Automatic aeration	●	●

*: Tested at ambient temperature 24°C, with good ventilation

● Basic configuration ○ Optional - Not available

Specification

LyoPilot D8S (with stoppering)

Shelf dimensions (W x D): 240 x 410 mm								
Vial volume (total)			2 ml	6 ml	10 ml	20 ml	50 ml	100 ml
Number of shelves	Area (m^2)	Spacing (mm)	Max. number of vials *					
3(Standard)	0.30	80	1263	630	540	360	N/A	N/A
2(Customized)*	0.20	120	842	420	360	240	100	64

LyoPilot D12S (with stoppering)

Shelf dimensions (W x D): 280 x 500 mm								
Vial volume (total)			2 ml	6 ml	10 ml	20 ml	50 ml	100 ml
Number of shelves	Area (m^2)	Spacing (mm)	Max. number of vials *					
4(Standard)	0.56	73	2380	1200	1008	648	N/A	N/A
2(Adjustable)*	0.28	146	1190	600	504	324	160	100

LyoPilot D8 (without stoppering)

Shelf dimensions (W x D): 315 x 410 mm								
Vial volume (total)			2 ml	6 ml	10 ml	20 ml	50 ml	100 ml
Number of shelves	Area (m^2)	Spacing (mm)	Max. number of vials *					
3(Standard)	0.39	80	1611	852	714	429	N/A	N/A
2(Customized)*	0.26	120	1074	568	476	286	144	100

LyoPilot D12 (without stoppering)

Shelf dimensions (W x D): 350 x 500 mm								
Vial volume (total)			2 ml	6 ml	10 ml	20 ml	50 ml	100 ml
Number of shelves	Area (m^2)	Spacing (mm)	Max. number of vials *					
4(Standard)	0.70	73	2952	1508	1296	800	N/A	N/A
2(Adjustable)*	0.35	146	1476	754	648	400	196	122

*Adjustable: equipment is adjustable at user's site based on standard configuration.
*Customized: non-standard configuration to be manufactured at factory.
*Note: data for maximum load, qty will be less when using loading frames.

Vial size overview

Total vial volume	2 ml	6 ml	10 ml	20 ml	50 ml	100 ml
Vial type	2R	6R	10R	20R	50H	100H
↕mm vial only	35	40	45	55	73	95
↕mm with Lyo plug	45	50	55	65	83	105
ϕ mm	16	22	24	30	43	52
Net fill volume at 1 cm fill height (ml)	1.2	2.2	4.0	4.6	6.0	7.0

Subject to change without prior notice.

Our product range

With unique design and outstanding performance, we can provide freeze solutions for every applicaton.

1

2

3

1. Freeze drying systems for routine applications or research with ice condenser capacities from 4 to 12 kg.
2. Freeze dryer series for organic solvent with ice condenser capacity from 8 to 12 kg.
3. Pilot freeze dryer series for process research with ice condenser capacity from 8 to 12 kg.

ANTECH

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