

# GENERAL PURPOSE FREEZE DRYERS

**FROM  
VIRTIS**



**THE THIRD GENERATION  
OF FREEZE-DRYING EXPERTISE**

## PERFORMANCE-MATCHING IS OUR SECRET TO INCREASED PRODUCTIVITY

Process performance-matching takes decades of hands-on experience to perfect. And in the technically demanding field of freeze-drying, no other maker can match VirTis' experience and skill. When it comes to selecting a general purpose freeze dryer that meets your processing needs and your budget, VirTis has to be your #1 choice.

Over forty years of hands-on experience in the highly competitive pharmaceutical and biotechnology research arena has honed our skills to the highest level. We apply the same level of knowledge and expertise to provide you with the exact general purpose freeze dryer for your needs. We'll ensure you get the precise combination of capacity, control and temperature options you need to maintain the highest product quality levels, at the lowest possible production costs.

Botanicals, books, archaeological artifacts — even many items of a size or shape not previously suited to conventional freeze dryer design — can be process-matched to a VirTis third generation general purpose freeze dryer.

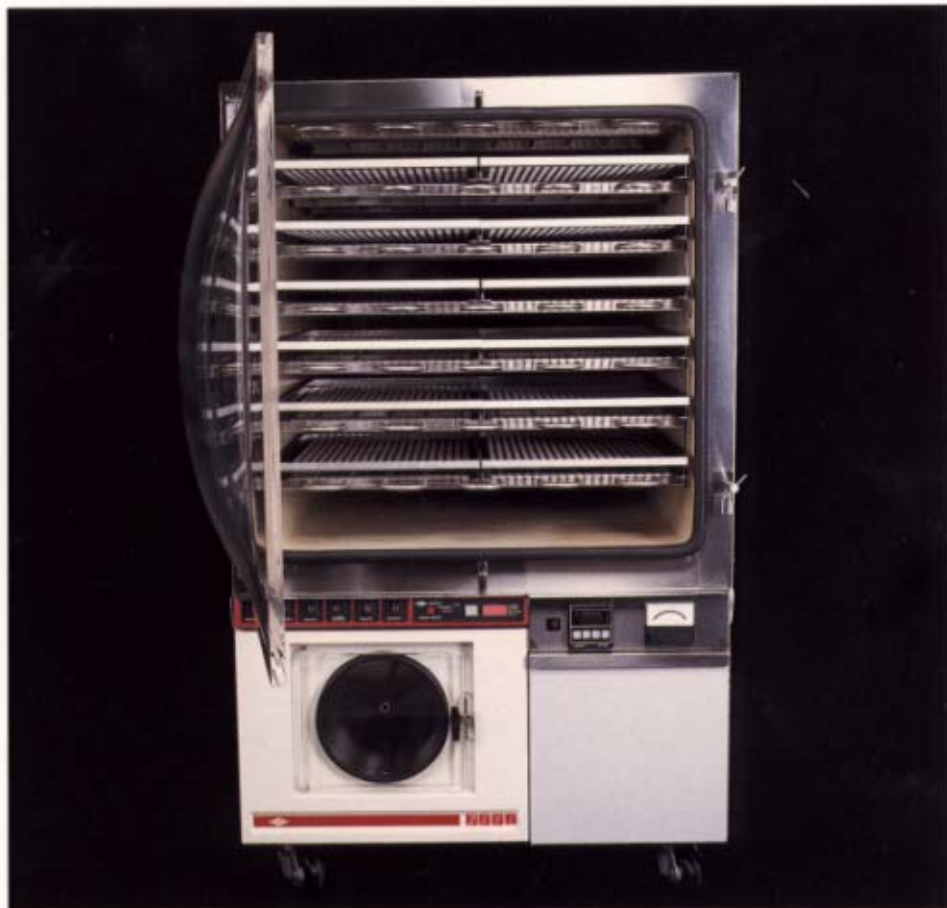


Left:  
Quick, Efficient Floral  
Freeze-Drying Cycles.

Below:  
Flexible Condenser  
Temperatures And  
Capacities To Match  
Your Application.



*VirTis' new square chambered freeze dryer represents the latest breakthrough in freeze-drying technology. With a maximum tray area of 136 square feet, 50 cubic feet volume and a 25 liter capacity, the 36DXD72 offers such extras as a product chamber isolation valve option, optional programmable heat transfer system, optional Wizard/GPC Full Cycle Programmer and electric defrost system. An optional high capacity condenser can be added to allow uninterrupted defrost free cycles.*



## WE'VE PERFECTED THE SCIENCE OF FREEZE-DRYING

- ◆ When you need to preserve a product without altering it, there is no replacement for freeze-drying. This gentle process removes moisture from an aqueous product, without affecting its biological, chemical or structural properties. Because a rigid ice matrix holds the solid components in place, the freeze-drying process maintains product integrity.

Compare this with conventional drying, which typically causes shrinkage or chemical reactions, damaging cells and rendering an end product useless for additional chemical analysis, or for final product display.

For many years, freeze-drying was as much guesswork and intuition as science. But thanks to advances pioneered by VirTis, you can now count on precise, repeatable results, time after time. While the chemistry involved in freeze-drying may be complex, the process itself can be divided into three basic process steps:

### 1. Freezing

In the first step, the product is frozen solid, which converts the water content of the material to ice. The final temperature must be below the product's eutectic, or collapse temperature, so that it maintains its structural soundness.

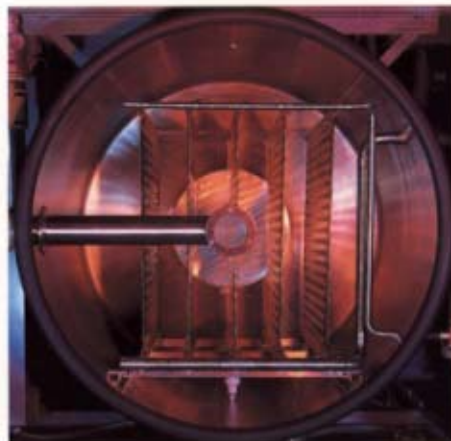
Once the product is frozen solid, the condenser and vacuum systems are energized for the next critical process step.

### 2. Primary Drying

In the second step, the objective is to remove the unbound, or easily removed ice from the product.



*Designed For Maximum Production.*



*High Capacity Condenser Systems With CFC-Free Refrigerants.*



*Model 48DX108 General Purpose Freeze Dryer.*

This water is now in the form of free ice, which is removed by converting it directly from a solid to a vapor, in a process called sublimation. To accomplish sublimation, a uniform source of heat energy is applied to the ice crystals, turning them directly into water vapor.

In the case of general purpose freeze dryers, the heat energy may be the result of the temperature gradient between the specimen chamber and the product, or it may be uniform radiant heat provided by a sophisticated heat transfer system. The actual level of heat energy is dictated by the characteristics of the product, and its ability to release water vapor while maintaining the desired end-product characteristics.

The product and condenser chambers are placed under vacuum to encourage the orderly migration of water vapor to the system's ice-collecting condenser, and to ensure that the pressure of the water vapor remains below its "triple point", as required for sublimation to occur.

### 3. Secondary Drying

Even after all the free ice is removed by the sublimation process, your product may still contain enough bound water to limit its structural integrity and shelf life.

During secondary drying, the sorbed water, or the water that was bound strongly to the solids in the product, is converted to vapor. This can be a slow process; the remaining bound water has a lower pressure than free liquid at the same temperature, which makes it difficult to remove. Secondary drying actually starts during the primary drying phase, but must be extended after the total removal of

the free ice to achieve low enough residual moisture levels.

Freeze-drying is complete when all the free and bound water has been removed, resulting in a residual moisture level that guarantees the desired biological and structural characteristics of the final product.

A general purpose freeze dryer may be defrosted during the drying cycle, or at its completion.

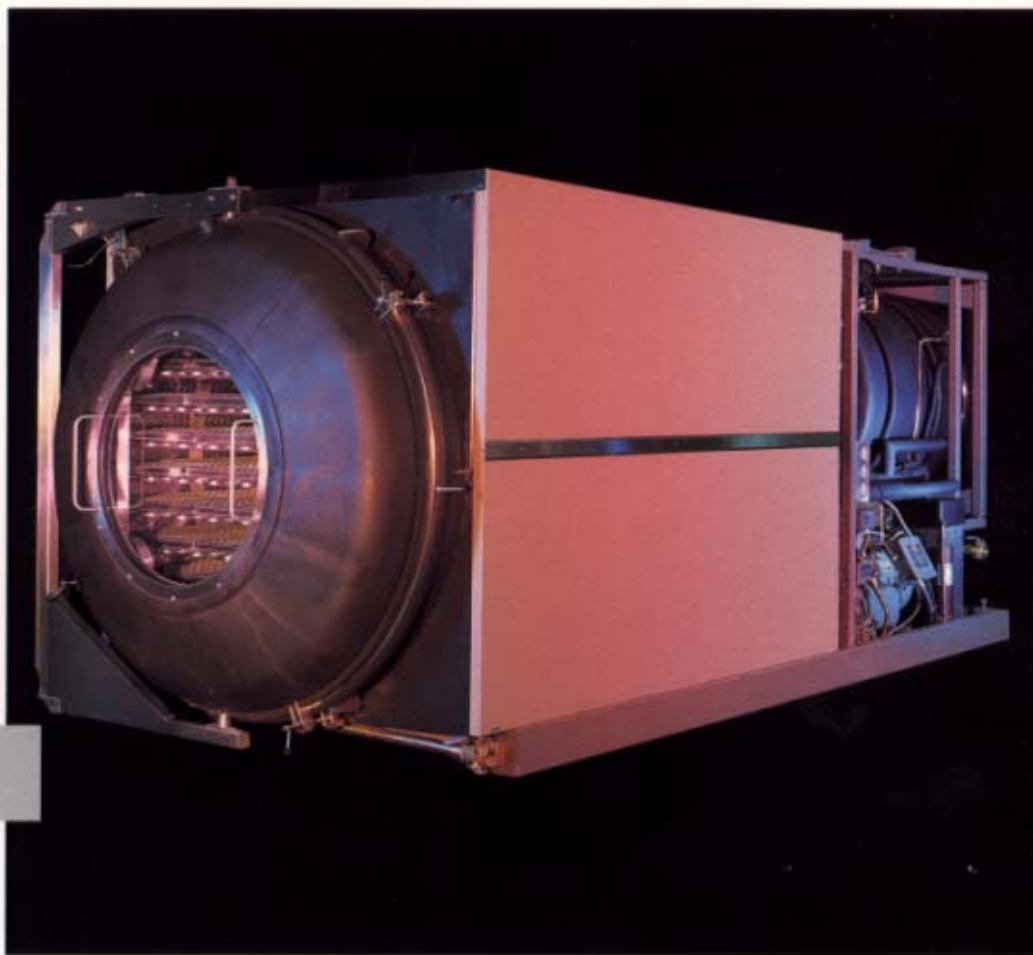
- ◆ VirTis engineers have spent years designing freeze dryers to meet your demanding requirements and hectic production schedules. What we have learned from the rigid current good manufacturing practices and ISO-9001 standards we apply in the manufacture of every general purpose freeze dryer. Even if your freeze dryer will not be used to process the latest life-saving drug, doesn't mean it shouldn't be manufactured to the same impeccable standards.

## WHAT TO LOOK FOR IN A FREEZE DRYER

- ◆ *Process Matching*  
We design our general purpose freeze dryers to meet your exact processing requirements, to help you achieve more productivity and higher product quality levels than ever before.
- ◆ *Reliability*  
We make every freeze dryer reliable enough to give you years of trouble-free performance, and back it with a warranty and support program that guarantees the protection of your investment.

- ◆ *Durability*  
Cycles typically utilized in a general purpose freeze dryer often extend beyond the 24-hour mark, so reliable designs, coupled with carefully selected components, are one of our most important considerations. We also construct every

- ◆ *Range Selection*  
Not every processor has the same shelf area requirements, so we developed our new third generation freeze dryers to cover the gamut, from model 15DX14 with a 0.87 square feet (0.82m<sup>2</sup>) capacity, to the model 62DX108, with its



*Model 62DX108 Provides 320 Square Feet Of Usable Shelf Area.*

- unit to allow for easy routine maintenance.
- ◆ *Flexibility*  
VirTis freeze dryers are flexible enough to allow easy modification to meet changing needs, and the incorporation of the latest freeze-drying technology.
- ◆ *Product Drying Chamber*  
Every VirTis product drying chamber is constructed of specially treated type 304 stainless steel, and equipped with easy-to-remove stainless steel product trays to allow complete flexibility in

generous 370 square feet (34.6m<sup>2</sup>) of usable mesh tray drying area. Complete detailed specifications are available for all models.

product loading and product height constraints.

To prevent unwanted heat transfer from outside the chamber, all models are insulated with closed-cell CFC-free foam. VirTis product drying chambers also feature an easy-opening door with a viewing window to facilitate observation of the drying process.

◆ *Condenser Systems And Capacities*

Every VirTis general purpose condenser is constructed of type 304 stainless steel and designed for rapid defrost turnaround. Numerous models feature a wide selection of condenser capacities, designed to match your exact processing requirements.

A wide range of process condenser temperatures is available through selection of refrigeration systems and standard or CFC-free refrigerants.

◆ *Heat Transfer Systems*

VirTis third generation general purpose freeze dryers start with a standard direct-expansion chamber temperature control, and extend to a fully programmable, silicone fluid-based heat transfer system that circulates fluid through an internal radiant coil and around the product chamber for even, uniform radiant heating. Such delicate products as botanicals benefit from our programmable heat transfer system, which allows the maximum drying rate and the quickest turn-around time.

◆ *Vacuum Systems*

All VirTis general purpose freeze dryers are provided with two-stage high capacity pumps designed for rapid pump-down initially or after mid-cycle defrosting. Standard or optional product chamber isolation valves allow you to hold chamber

vacuum during defrosting, and facilitate product dryness pressure rise studies.

◆ *Refrigeration Systems*

VirTis refrigeration systems are designed for long life and ease of service by local refrigeration ser-

vice companies. All components are selected for worldwide availability. Special processing temperatures are easily handled by our wide range of optional refrigeration systems.

you precise control of the drying rate until final completion of your sensitive and valuable end product. 24DX24 and larger general purpose freeze dryers are provided with an easily accessible manual control panel plus our Sentry™-based monitoring system for dis-



*Model 36DX84 With Seven Configurable Shelves.*

vice companies. All components are selected for worldwide availability. Special processing temperatures are easily handled by our wide range of optional refrigeration systems.

◆ *User-friendly instrumentation and controls eliminate guesswork and unpleasant surprises. VirTis gives*

**MANUAL AND AUTOMATIC CONTROL OPTIONS OPTIMIZE THE FREEZE-DRYING PROCESS**

playing your product chamber temperature, condenser temperature, system vacuum, run time, and optional product temperature probes.

Silicone-based heat transfer systems include a fully automatic time/temperature-based programmer

## PERFORMANCE GUARANTEED

to automatically change radiant heat levels as required for your special products.

For the ultimate in product protection and control, we offer our optional GPC-Wizard control system to automate the complete freeze-drying cycle.

- ◆ The people at VirTis are dedicated to making the right general purpose freeze dryer for your most demanding and difficult applications, utilizing the best materials available, engineered and tested to precise tolerances. We design all our products, from our most sophisticated controllers to our smallest accessories, to perform the designed function at the highest levels of efficiency, durability and performance.

And as much as we put into our equipment, we put even more behind it. Our post-sale assurance program includes:

- Comprehensive start-up and installation programs.
- A worldwide network of sales and service organizations.

## MAXIMUM SUPPORT YOU CAN LEAN ON

- Extended warranty programs.
  - 24-hour response team.
  - A qualified team of customer service field engineers.
- ◆ All VirTis general purpose freeze dryers assure your production success with extensive system quality control tests that guarantee accurate performance. We employ generously rated refrigeration, vacuum and heating systems, tailored to your specifications. We provide critical support throughout the life

of the equipment, including critical after-service support coupled with a toll-free, 24-hour response team. And we back every VirTis product with the most powerful, no-nonsense warranties in the business. We couldn't offer such unflinching guarantees if we

strated outstanding benefit in the following applications:

### Archaeological Artifacts

Only freeze-drying can ensure the long-term preservation of many archaeological items, such as waterlogged wood or leather. With an end



*Model 24DX24 With Programmable Radiant Heat Controller.*

weren't certain our equipment would live up to your expectations.

- ◆ To find out which of our many configurations would be best for your application, please consult the range specification chart on the following page.

In particular, VirTis general purpose freeze dryers have demon-

strated this irreplaceable, the reliability and sensitive program control of a VirTis general purpose freeze dryer is invaluable.

### Flowers

Freeze-dried flowers have become an exciting new industry. Our new third generation series was designed

## AN EXTENSIVE RANGE OF APPLICATIONS

not only to preserve the shape, color and fragrance of botanicals, but to dry them faster than our competitors while maintaining your high quality standards. Each load of rose heads or long stem roses requires a lot of pre- and post-drying labor, so why compromise your quality in the freeze-drying process?

### Taxidermy

VirTis general purpose freeze dryers are flexible enough to freeze dry large and small animals in their en-

tirety, with extremely lifelike results.

### Water Damaged Documents

Third generation general purpose freeze dryers dry and preserve water-soaked papers and books that would otherwise be unsalvageable.

### Biological Specimens

Organs and other biological specimens can be preserved for study, without the drawback of heavy chemical preservative smells.

### Irregular Shapes

If it doesn't fit neatly into a con-

ventional freeze dryer, or has an irregular shape or size, there's a good chance our new third generation line of general purpose freeze dryers may be your best answer to your biotechnology or general freeze-drying applications.

No matter what your product is, you'll get more out of freeze-drying with VirTis' customized technology: more product, more efficiently, more reliably, and more economically. Just ask anyone in the world.

## GENERAL PURPOSE FREEZE DRYERS RANGE SPECIFICATIONS

Series	15DX14	24DX24	24DX48	36DX66	36DXD72	36DX84	48DX108	62DX108
Tray Levels	1	2 thru 5	2 thru 5	2 thru 9	5 thru 8	2 thru 9	7 thru 11	11
Maximum Tray Area: ft <sup>2</sup> [m <sup>2</sup> ]	0.87 [0.82]	14.5 [1.36]	29.8 [2.78]	88.2 [8.24]	136.0 [12.6]	110.3 [9.21]	209.0 [19.5]	370 [34.6]
Shelf spacing with maximum shelf area in [mm]	11.3 [287]	3.86 [98]	3.86 [98]	3.36 [85]	2.75 [69]	3.36 [85]	3.44 [87]	3.75 [95]
Minimum Tray Area: ft <sup>2</sup> [m <sup>2</sup> ]	0.87 [0.82]	6.87 [0.64]	13.2 [1.23]	22.3 [2.08]	85.0 [7.89]	78.9 [7.38]	131.2 [12.3]	370 [34.6]
Shelf Spacing At Minimum Shelf Area	11.3 [287]	7.81 [198]	7.81 [198]	11.6 [295]	5.0 [127]	4.68 [117]	5.81 [147]	3.75 [95]
Chamber Volume Cubic Feet: [Type]	1.3 [Round]	6.3 [Round]	12.6 [Round]	37.5 [Round]	54.0 [Square]	55.3 [Round]	107.6 [Round]	178.1 [Round]
Optional Programmable Heat Transfer System	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product Chamber Isolation Valve Option	No	No	Yes	Yes	Standard	Standard	Standard	Standard
Standard Condenser System Capacity: Liters	3	12	12	25	25	25	48	120
Defrost System Type	None	Electric	Electric	Electric	Electric	Electric	Hot Gas	Hot Water Spray
Optional Wizard/GPC Full Cycle Programmer	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Heavy Duty Extra Capacity Condenser Refrigeration Option: Liters	No	No	Yes, 25	Yes, 35	Yes, 35	Yes, 35	Standard	Standard
Optional XL Autocascade Condenser System: -70 degrees C [-90 degrees F]	No	No	Yes	Yes	Yes	Yes	Yes	No
Optional EL Cascade Condenser System -85 degrees C [-120 degrees F]	No	No	Yes	Yes	Yes	Yes	No	No
Overall Dimensions Height: Inches [Centimeters]	33 [84]	62 [157]	62 [157]	75 [190]	75 [190]	75 [190]	96 [244]	73 [185]
Width: Inches [Centimeters]	20 [51]	34 [86]	34 [86]	44 [112]	44 [112]	44 [112]	68 [173]	73 [185]
Length: Inches [Centimeters]	24 [61]	28 [71]	52 [132]	70 [178]	88 [224]	88 [224]	144 [366]	196 [497]
Approximate Shipping Weight: Pounds [Kilograms]	240 [109]	570 [260]	950 [432]	1,800 [818]	2,200 [1,000]	2,200 [1,000]	2,850 [1,295]	11,000 [5,000]
Standard Voltage Requirements	115/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 220/50 Single Phase	230/60 240/50 3 Phase

Note: Contact VirTis or your local representative for expanded specifications on all models. All refrigeration specifications based upon an ambient temperature of 20 degrees C.



**Just ask anyone in the world.**

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