

Freeze Dryer / Lyophilizer

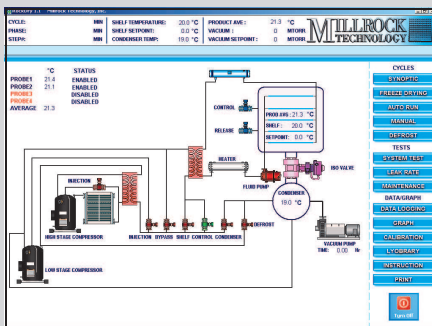


Research combines the latest hardware and software advancements of any laboratory research freeze dryer on the market today. Using the best components and design techniques combined with the most advanced PC/PLC control system, the Research is the perfect solution for both your protocol development and small scale production needs. The Research includes Millrock's Opti-Dry PC/PLC freeze drying control system and offers all the necessary options to meet your most demanding needs.

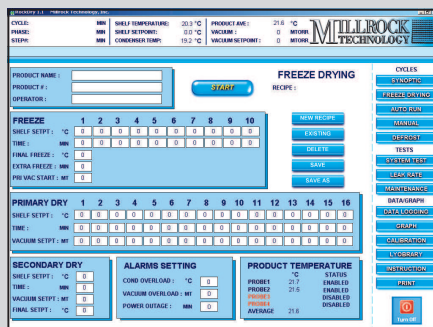
The Research Series offers the largest shelves and best shelf-to-shelf spacing of any system in its class, resulting in more product throughput in the same floor space.

The exposed coil condenser eliminates vapor bypass that is common with 'cold wall' style condensers. During the freeze drying run the condensing surface area increases making vapor trapping more efficient.

Opti-Dry Control Software



- Manual and Automatic Mode
- Graphic and Numeric Data Collection
- Automatic System and Leak Rate Testing
- Ethernet Based with Web Connectivity
- Optional Opti-Dry Pro provides the tools you need for protocol development

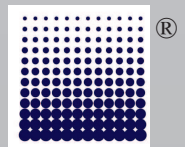


Standard Features

Control System	PC/PLC with Opti-Dry Software
Shelf Temperature Range	-45C or -70C to +65C
Shelf Heat Transfer	Hollow Fluid Filled
Shelf Size and Finish	12" x 24" , 316L, 20 Ra or better
Shelf Area	2 sq ft to 10 sq ft
Shelf Assembly	Bulk or Hydraulic Stopping
Condenser Temperature	-53C or -85C
Condenser Capacity	30L
Condensing Rate	20L in 24 hours
Condenser Style	Exposed Coil
Vapor Port	4" Standard, 6" or 8" Option
Compressors	Scroll
Defrost	Hot Gas
Vacuum Pump	375 LPM, Corrosion Resistant
Vacuum Control	Pirani w/Solenoid & Needle Valve
Gas Backfill	Included
Product Sensors	One per shelf
Trays	One per Shelf Included
Cabinet	35"W x 45"D x 72"H
Electrical	230V/60Hz or 200V/50Hz, 1PH

System Performance

- Shelf pull down from +20 to -40C in less than 30 minutes
- Vacuum pull down to 100 mT in less than 20 minutes
- Vacuum leak rate less than 30 mT per hour
- Vacuum level 5 mT in clean dry system (-85C)



Research Equipment Design Features

- PC/PLC controls standard—no proprietary microprocessors
- 316L on all wetted parts
- Large shelves for more product capacity—12" x 24" each
- High shelf fluid flow for the best temperature uniformity
- Hydraulic stoppering (10 PSI)—no bladders or cables
- Exposed coil condenser design to prevent vapor bypass which can destroy vacuum pumps (a common problem on externally wrapped condensers)
- High reliability scroll compressors
- CFC-Free, Non-proprietary refrigerants
- Hot gas defrost
- One product thermocouple per shelf with option for more
- Oversized air-cooled condenser to minimize the affect of changing ambient temperatures
- 375 LPM two stage corrosion resistant vacuum pump with easy access from the front of the unit
- Built-in validation port
- Vacuum control and gas backfill standard

NEW! Ask about hydrogen peroxide (H2O2) sterilization

Opti-Dry PC/PLC Control

The Research Series comes complete with PLC controls and a PC for programming and data collection. Our easy-to-use software provides automatic freeze-drying, defrost, system and leak rate testing. Data can be printed either numerically or graphically. This same control system can be used on industrial dryers, allowing scaling to production. An interactive maintenance screen simplifies component servicing.

Opti-Dry uses an Ethernet platform for hardware connectivity making data transmission extremely fast. It also provides web connectivity for those who want re-

Freeze Drying	10 Freezing Steps 16 Drying Steps with Pressure Control 1 Step Secondary Drying 1 Step Final Drying Alarms, Recipe Management, Data Logging
Manual	Individual switches for shelf, condenser, vacuum, isolation valve and release. Single set-points for shelf and set-point.
Defrost	Automatic timed hot gas.
System Test	Performance evaluation of shelf, condenser, vacuum, heating, and control.
Leak Rate	Automatic testing of leak rate.
Maintenance	Independent operation of components, with troubleshooting and calibration.

Available Options

6" and 8" Vapor Ports	H2O2 sterilization
Shelf Latching Plates	Isolation Valve
Advanced Vacuum Control	Additional Product Probes
Dewpoint Sensor	Capacitance Manometer
Clean Room Configuration	LN2 Trap
21CFR Part 11 Compliance	Acid Trap
IQ/OQ Workbook	Extended Warranty
FAT and SAT	Validation Documents
Resistivity Probe	Water Cooled
Stainless Steel Doors	Isolator Interface
	Sample Thief

Note: Specifications subject to change without notice.
All specifications based on 20C ambient on 60Hz

Shelves	Spacing	Area (sq ft/sqM)
1	11.5/292	2/.186
2	5.5/139	4/.373
3	3.5/89	6/.559
4	2.5/63	8/.746
5	1.9/48	10/.932

Vial Capacity

Vial ml	Dia mm	Ht mm	1	2	3	4	5
2	16	41	730	1460	2190	2920	3650
5	22	48	398	796	1194	1592	
10	24	58	336	672	1008	1344	
20	29	71	220	440	660		
50	43	81	91	182			
100	52	92	66	132			

Bulk Fill (liters)

	1	2	3	4	5
10mm deep	1.8	3.6	5.4	7.2	9.0
15mm deep	2.7	5.4	8.1	10.8	13.5
20mm deep	3.6	7.2	10.8	14.4	18.0

Opti-Dry Pro Upgrade

For R&D, Protocol Development, Cycle Automation and Optimization, Opti-Dry Pro offers all the tools you need.

Features:

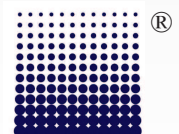
- Product temperature feedback optimizes the recipe, both freezing and primary drying, based on the product temperature average.
- Multiple methods for Primary Drying Endpoint Determination via:
 - Pirani/Capacitance Manometer Comparison
 - Barometric Endpoint Determination
- Automatic Cycles for Optimum Drying Performance

NEW! Ask about AUTO-DRY software

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Research Series



Rev 122807

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