

# REVO®

## R&D Freeze Dryers

### APPLICATIONS

Cycle Development & Optimization  
Well Plates & Alternative Delivery Devices  
Product for Stability Studies  
Formulation Development  
Diagnostics  
Bulk Tray



The REVO® lyophilizer offers up to 10 sq ft (.929 sq M) of shelf area with a condensing capacity of 20 Liters in 24 hours. It has 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. Using the best components and design techniques combined with the most advanced PC/PLC control system, offering data collection and self-testing features. The REVO® freeze dryer is the perfect solution for both your important research and protocol development.

Our easy-to-use MCS software provides automatic freeze-drying, defrost, and system and leak rate testing. Data can be printed either numerically or graphically. This same control system is used on industrial dryers, allowing scaling to production with a familiar HMI. An interactive maintenance screen simplifies component servicing. All systems are remotely accessible, with customer approval, for troubleshooting process issues.

Advanced system options include: FreezeBooster® Controlled Nucleation, Auto-Dry™ Protocol Optimization, AccuFlux® and CIP. The combination provides the ideal platform for simplified and optimized lyophilization protocol development.

Unique design with features include: more accurate vacuum sensors; no rubber hoses; superior shelf temperature uniformity; reduced shelf temperature transition times; increased stoppering pressure; and more, to ensure that the equipment is not a limit to your freeze drying needs.

### SYSTEM PERFORMANCE

- 5 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 10 mT in clean dry system (-85)

### REVO Features

#### CONTROL SYSTEM

- MCS - PC/PLC with ethernet and remote internet connectivity
- Manual and automatic operating modes
- Graphic and numeric data collection
- Automatic system and leak rate testing
- Options for Protocol Optimization & Controlled Nucleation

#### SHELF SYSTEM

- Up to 10 sq ft (.989 sq M) of shelf area
- Larger shelves for more product capacity - 12" x 24" (304.8mm x 608mm)
- Increased stoppering pressure for hard to stopper systems
- 316L stainless steel on all wetted parts

#### CONDENSER

- 4" vapor port(6" optional)
- Exposed coil configuration for maximum efficiency

#### REFRIGERATION

- Highly reliable scroll compressors
- Oversized compressors for high performance
- CFC Free non-proprietary refrigerants

#### VACUUM

- Pirani vacuum sensor
- Vacuum control
- Gas backfill
- 375 lpm corrosion resistant vacuum pump

#### ADDITIONAL

- Sanitary style fittings on all sensor and vacuum ports
- Built in validation port

# REVO®

## R&D Freeze Dryers

MILLROCK  
TECHNOLOGY

millrocktech.com

## SPECIFICATIONS

### REVO® STANDARD SPECIFICATIONS

SHELF AREA	2 to 10 sq ft (0.186 to 0.929 sq M)
SHELF ASSEMBLY	Bulk or Hydraulic Stoppering
SHELF TEMPERATURE RANGE	-45C or -70C to +65C
SHELF HEAT TRANSFER	Hollow Fluid Filled
SHELF SIZE/FINISH	12"x 24", 316LSS, 20 Ra or better (304 x 608mm)
CONDENSER TEMPERATURE	-53C or -85C
CONDENSER CAPACITY	30L
CONDENSING RATE	20 L in 24 hours
CONDENSER STYLE	Exposed Coil, 4" port
DEFROST	Hot Gas
COMPRESSORS (SCROLL)	5 HP (-53C), 3.5 HP & 2 HP (-85C)
PRODUCT SENSORS	4, Type T Thermocouples
VACUUM PUMP	375 LPM corrosion resistant
VACUUM CONTROL	Pirani w/ Solenoid & Needle Valve
GAS BACKFILL	Included
CONTROL SYSTEM	PC/PLC with MCS Software
TRAYS	One per shelf included
CABINET	35" w x 46"d x 75"h
ELECTRICAL FOR -53C UNITS	230V/60Hz, 1 ph, 30 A 220V/50Hz, 1 ph, 30 A
ELECTRICAL FOR -85C UNITS	230V/60Hz, 1 ph, 40 A 220V/50Hz, 1 ph, 40 A 380V/50Hz, 3 ph, 25A

PLEASE NOTE THAT WHEN USING 50HZ HEAT REMOVAL IS DERATED BY 17%

### BULK FILL (LITERS)

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

### VIAL CAPACITY

VIAL ml	DIA (mm)	HEIGHT (mm)	NUMBER OF SHELVES				
			1	2	3	4	5
2	16	41	774	1548	2322	3096	3870
5	22	48	403	806	1209	1612	2015
10	24	58	322	644	966	1288	
20	29	71	218	436	654		
50	43	81	96	192			
100	52	92	65	130			

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Specifications subject to change without notification. All specifications based on 20C ambient and 60 Hz

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RE61016

# REVO®

## R&D Freeze Dryers

### AVAILABLE OPTIONS

- Up to 16 Product Probes
- Capacitance Manometer
- Isolation Valve
- Proportional Vacuum Control
- Dry Vacuum Pump
- Stainless Steel Door
- 4" vapor port (6" optional)
- Shelf Latching Kit
- Water Cooled Condenser
- Hydraulic Stoppering
- Resistivity Probe Clean Room Configuration
- Isolator Interface
- 12 or 24 port Manifold
- H2O2 Integration Kit
- 21 CFR Part 11 Software
- Validation Documentation
- IQ/OQ Workbook
- FAT/SAT
- LN2 Trap
- Clean in Place

### OPTI DRY- PC/PLC CONTROL

THE REVO® research and development lyophilizer comes complete with Opti Dry PLC controls and a PC for programming and data collection. Our easy-to-use software provides automatic freeze-drying, defrost, and system test. 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.



### SHELF CONFIGURATION

SHELVES	SPACING (in/mm)	AREA (sq ft/sq M)
1	14.5/368	2/0.186
2	7.0/177	4/0.373
3	4.5/114	6/0.559
4	3.25/82	8/0.746
5	2.5/63	10/0.929

OPTI DRY Uses an ethernet platform for hardware connectivity making data transmission extremely fast. It also provides web connectivity for those who want remote access to their systems.

The REVO has been designed and configured for daily freeze drying processing. The REVO®PRO has been designed and configured for protocol development, formulation studies, cycle optimization and transfer. More information is available about the LYO®PRO Protocol development freeze dryers on the Millrock Technology, Inc. website.

Millrock Technology, Inc

