

**THE REVO** offers up to 10 sq ft of shelf area with a **condensing rate 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** is the perfect solution for both your protocol development and small scale production needs.

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 is used on industrial dryers, allowing scaling to production. An interactive maintenance screen simplifies component servicing. All systems are **remotely accessible**, with customer approval, for trouble-shooting process issues.

**Advanced system options** include **FreezeBooster® Controlled Nucleation** and **Auto-Dry™ Protocol Optimization, AccuFlux™, and LyoPAT™ In-Process, Process Analytical Technology**. The combination provides the ideal platform for simplified and optimized protocol development.

**THE REVO** has been developed from over 50 years of experience in the freeze drying world. The standard system design provides a highly reliable platform for your freeze drying needs. Using more robust refrigeration components ensures the **highest performance and reliability** available. In addition, the system is designed to be **more tolerant of fluctuations in room temperature and supply voltage**, which are common issues with lower end systems.

Unique design with features include: more accurate vacuum sensors; no rubber hoses; no vapor flow choke points; 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 HIGHLIGHTS

### CONTROL SYSTEM

- 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 and Controlled Nucleation

### SHELF SYSTEM

- Up to 10 sq. ft. of shelf area
- Large shelves for more product capacity – 12" x 24"
- Increased Stoppering Pressure – for 2ml vials
- 316L on all wetted parts

### CONDENSER

- 4" vapor port standard
- Exposed coil condenser for maximum efficiency
- Hot gas defrost

### REFRIGERATION

- High reliability scroll compressors
- Oversized refrigeration components for high reliability
- CFC-Free, non-proprietary refrigerants

### VACUUM

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

### OTHER

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

### APPLICATIONS

- Cycle Optimization
- Formulation Development/Stability Studies
- Tissue Bank
- R&D / Small Scale Production
- Diagnostics Well Plates
- Vials
- Bulk Applications / Trays



## FEATURES & SPECIFICATIONS

### REVO™ STANDARD FEATURES

SHELF AREA	2 sq. ft. to 10 sq. ft.
SHELF ASSEMBLY	Bulk or Hydraulic Stoppering
SHELF TEMPERATURE RANGE	-45°C or -70° to + 65°C
SHELF HEAT TRANSFER	Hollow Fluid Filled
SHELF SIZE/FINISH	12"x24", 316L, 20 Ra or better
VAPOR PORT	4" Standard, 6" Option
CONDENSER TEMP	-53°C or -85°C
CONDENSER CAPACITY	30L
CONDENSING RATE	20L in 24 hours
CONDENSER STYLE	Exposed Coil
DEFROST	Hot Gas
COMPRESSORS (SCROLL)	3.5hp (-53°C), 3.5hp & 2hp (-85°C)
PRODUCT SENSORS	4, Type T
VACUUM PUMP	375 LPM, Corrosion Resistant
VACUUM CONTROL	Pirani w/ Solenoid & Needle Valve
GAS BACKFILL	included
CONTROL SYSTEM	PC/PLC with Opt-Dry Software
TRAYS	One per shelf included
CABINET	35"W x 46"D x 75"H
ELECTRICAL	230V/1ph/60Hz/30A (-53°C)

### BULK FILL (LITERS)

DEPTH	1	2	3	4	5
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

\* Patented and Patent Pending technology.

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

## SHELF CONFIGURATION

SHELVES	SPACING (in/mm)	AREA (sq ft/sq M)
1	14.5/368	2/.186
2	7.0/177	4/.373
3	4.5/114	6/.559
4	3.25/82	8/.746
5	2.5/63	10/.932

## AVAILABLE OPTIONS

- **FreezeBooster®** Controlled Nucleation\*
- **LyoPAT®** Determines vial heat transfer coefficient(Kv), defines process design space in a single run & develops transferrable protocols\*
- **Auto-Dry™** Protocol Development Software\*
- Water Defrost
- Up to 18 Product Probes
- Capacitance Manometer
- Proportional Vacuum Control
- Dry Vacuum Pump
- Isolation Valve
- Stainless Steel Doors
- Shelf Latching Kit
- LN2 Trap
- Water Cooled Condenser
- 6" Vapor Port
- Resistivity Probe
- CIP
- Clean Room Configuration
- Isolator Interface
- H2O2 Integration Kit
- 21 CFR Part 11 Software
- Validation Documentation
- IQ/OQ Workbook
- FAT/SAT

## VIAL CAPACITY

VIAL ml	DIA (mm)	HT (mm)	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			

## OPTI-DRY® PC/PLC CONTROL

**THE REVO** Series comes complete with 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.

**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.

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

### BUILT-IN 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 (requires capacitance manometer)
- Pressure Rise Testing (requires isolation valve).

