EPIC™ Small Production Freeze Dryer

MILLROCK TECHNOLOGY

SYSTEM PERFORMANCE

- **10 Shelf pull down from +20 to –40C in less than 45 minutes**
- **Vacuum pull down to 100 mT in less than 25 minutes**
- **Vacuum leak rate less than 30 mT per hour**
- **Vacuum level 10 mT in clean dry system (-85C)**

We make freeze drying easy.

The **EPIC** Small Production Freeze Dryer offers up to 30 sq ft (2.787 sq M) of lyophilization shelf area with a condensing rate of 40 liters in 24 hours and a capacity of 50 liters. Millrock provides the most advanced PC/PLC controls with an intuitive user interface, as a standard feature, simplifying equipment operation and reporting.

Millrock equipment continues to be the standard by which other freeze dryer companies aspire. Decades of intelligent engineering have created the most robust and sophisticated freeze dryers on the market today. Paired with our world class customer and applications support teams, we are the "rock" of the lyophilization industry.

The EPIC is designed to eliminate the nuisance issues often experienced with our competitor's freeze dryers and provide the highest reliability components to ensure that your product is processed properly each and every run. Using more robust refrigeration components, such as scroll compressors, ensures the highest performance and reliability available.

Our new Opti-Dry® G2 software provides sophisticated and intelligent tools to easily develop and execute both simple and advanced freeze-drying cycles. Millrock Reporter is included with every system, providing full batch reporting, including recipe, graphs, data, and alarms in a single report. Predictive maintenance with advanced system monitoring delivers cost-savings and enables maximum uptime by tracking and monitoring the condition and performance of equipment during normal operation. This same control system is used on industrial freeze dryers, allowing scaling to production. All systems are remotely accessible, with customer approval, for troubleshooting process issues.

Advanced system options include Auto-Dry™ Protocol Optimization.

EPIC™ Features

CONTROL SYSTEM: Opti-Dry G2

- PC/PLC with ethernet and remote connectivity
- Cycle Assist Protocol Generator
- Manual and automatic operating modes
- Automatic system and leak rate testing
- Predictive maintenance
- User definable batch reporting – date, operator, recipe, data, graphic, and alarms graphic and numeric data collection

SHELF SYSTEM

- Up to 30 sq ft of shelf area
- 18" x 24" shelf size
- Bulk or hydraulic stoppering option
  12 PSI stoppering pressure for 2ml vials
- 316L stainless Steel on all wetted parts

CONDENSER

- Choke free design
- External condenser with 8" vapor port
- Exposed coil condensing surface to eliminate vapor bypass
- Hot gas defrost

REFRIGERATION

- Oversized and highly reliable scroll compressors
- CFC-free non-proprietary refrigerants

VACUUM

- Pirani vacuum sensor with solenoid control
- Gas backfill
- Corrosion resistant vacuum pump
- Option: Capacitance manometer with proportional control

FITTINGS

- Sanitary and KF fittings on all chamber access ports

See page 2 for options.

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EPIC™ Small Production Freeze Dryer

SPECIFICATIONS

EPIC STANDARD SPECIFICATIONS	
SHELF AREA	15 to 30 sq ft (1.394 to 2.787 sqM)
SHELF ASSEMBLY	Bulk or Hydraulic Stoppering
SHELF TEMPERATURE RANGE	-70C to +65C
SHELF HEAT TRANSFER	Hollow Fluid Filled
SHELF SIZE/FINISH	18" x 24", 316 L SS, 20 Ra or better
CONDENSER TEMPERATURE	-85C
CONDENSER CAPACITY	50L
CONDENSER RATE	40L in 24 hours
CONDENSER STYLE	Exposed Coil, 8" vapor port
DEFROST	Hot Gas
COMPRESSORS (SCROLL)	5 HP 1st stage 3.5 HP 2nd stage
PRODUCT SENSORS	4 Type T Thermocouples
VACUUM PUMP	Corrosion Resistant
VACUUM CONTROL	Pirani w/ Solenoid & Needle Valve Option: Capacitance manometer with proportional control
GAS BACKFILL	Included
CONTROL SYSTEM	Opti-Dry® G2: PC/PLC Control
TRAYS	Two per Shelf Included
CABINET	62"w x 44"d x 87.5"h
ELECTRICAL	230V/60Hz, 3ph, 60A 480V/60Hz, 3ph, 40A 230V/50Hz, 3ph, 60A 415V/50Hz, 3ph, 40A

* Vacuum specifications are based on a Leybold D25b vacuum pump or similar.
Please note that units operated at 50Hz have heat removal de-rated by 17%.

VIAL CAPACITY

VIAL (ml)	DIA (mm)	HGT (mm)	NUMBER OF SHELVES					
			5	6	7	8	9	10
2	16	41	5760	6912	8064	9216	10368	11520
5	22	48	2990	3588	4186	4782	5382	-
10	24	58	2410	2892	3374	3856	4338	-
20	29	71	1610	1932	2254	2576	-	-
50	43	81	660	792	924	1056	-	-
100	52	92	450	540	630	-	-	-

SHELF CONFIGURATION

SHELVES	SPACING (in/MM)	AREA (sq ft/sq M)
5	5.5/139	15/1.39
6	4.5/114	18/1.67
7	3.75/95	21/1.95
8	3.25/82	24/2.23
9	2.8/71	27/2.51
10	2.5/63	30/2.79

BULK FILL (LITERS)

DEPTH (mm)	NUMBER OF TRAYS					
	5	6	7	8	9	10
10mm	13.9	16.7	19.5	22.3	25	27.8
15mm	20.9	25	29.2	33.4	37.6	41.8
20mm	27.8	33.4	39	44.6	50.1	55.7

AVAILABLE OPTIONS

MECHANICAL
- Clean room configuration
- Butterfly isolation valve on condenser
- Shelf latching kit to change shelf inter-distance
- Isolator interface for connection to an isolator
- Stainless steel door when using solvents
- LN2 trap to protect your vacuum pump from solvents
- Clean in Place to wash between different products
- H2O2 integration for sterilization

INSTRUMENTATION AND CONTROLS
- Auto-Dry™
- Up to 16 thermocouples
- Resistivity probe
- 21 CFR Part 11 capable software

VACUUM
- Capacitance manometer to control the same as production systems
- Proportional vacuum control (+/-2mT control)
- Dry vacuum pump for use when processing solvents

SERVICES
- Startup and training
- Software Validation
- Electro-Mechanical Validation documentation
- IQOQ, FAT and SAT documentation and execution

OPTI-DRY G2: PC/PLC CONTROL

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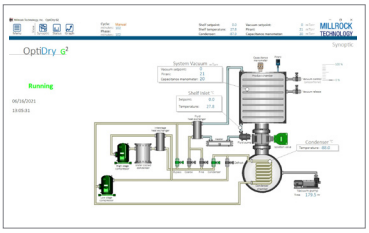

Popular Features:
- Simple and easy to use for both the novice and experienced operator
- Better graphics and more meaningful data
- Ability to perform basic and intelligent protocols, standard features
  - Pre-freeze loading step
  - End of primary drying determination—requires a capacitance manometer
- Cycle assist automatically generates a protocol based on your product critical temperature
- Full batch reporting—reports include recipe, run data, run graphs, alarms in a PDF format
- Predictive maintenance—Component life tracking
- System self-testing with reporting
- Internet ready for remote support from the factory

Maximum Ice Condensing Rate (24hrs) is based on freeze drying water as aggressively as possible. The actual ability to condense ice at a specific rate over time is application dependent.

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