STELLAR® Laboratory Freeze Dryer

MILLROCK TECHNOLOGY

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 (-85C)**

The **STELLAR® Laboratory Freeze Dryer** offers up to 6.25 sq ft (0.581 sq M) of lyophilization shelf area with a condensing rate of 12 liters in 24 hours and a capacity of 12 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 Stellar 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.

Our new Opti-Dry® Gen2 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.

STELLAR Features

CONTROL SYSTEM: Opti-Dry Gen2

- 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 6.25 sq ft of shelf area
- 10" x 18" shelf size
- Bulk or pneumatic stoppering option
  Option: Increased stoppering pressure for 2ml vials
- 316L stainless Steel on all wetted parts

CONDENSER

- Internal condenser with baffle
- Exposed coil condensing surface to eliminate vapor bypass
- Hot gas defrost

REFRIGERATION

- Hermetic 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

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STELLAR® Laboratory Freeze Dryer

SPECIFICATIONS

STELLAR STANDARD SPECIFICATIONS	
SHELF AREA	3.75 to 6.25 sq ft (0.348 to 0.581 sqM)
SHELF ASSEMBLY	Bulk or Pneumatic Stoppering
SHELF TEMPERATURE RANGE	-45C to +65C (-53C Condenser) -70C to +65C (-85C Condenser)
SHELF HEAT TRANSFER	Hollow Fluid Filled
SHELF SIZE/FINISH	10" x 18", 316 L SS, 20 Ra or better (254mm x 457mm)
CONDENSER TEMPERATURE	-53C or -85C
CONDENSER CAPACITY	12L
CONDENSER RATE	12L in 24 hours
CONDENSER STYLE	Internal Exposed Coil w/ Baffle
DEFROST	Hot Gas
COMPRESSORS (SCROLL)	(-53C) 2 HP (-85C) 2 HP 1st stage 2 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® Gen2: PC/PLC Control
TRAYS	One per Shelf Included
CABINET	35"w x 42"d x 64"h
ELECTRICAL FOR -53C UNITS	230V/60Hz, 1ph, 30A 220V/50Hz, 1ph, 30A 380V/50Hz, 3ph, 15A
ELECTRICAL FOR -85C UNITS	230V/60Hz, 1ph, 30A 220V/50Hz, 1ph, 30A 380V/50Hz, 3ph, 20A

* Vacuum specifications are based on a Leybold D8b vacuum pump or similar.
Please note that units operated at 50Hz have heat removal de-rated by 17%.

AVAILABLE OPTIONS

MECHANICAL
- Clean room configuration
- Hydraulic Stoppering (2ml vials)
- Water Cooled 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
- H2O2 integration for sterilization
- 12 or 24 Port Manifold

INSTRUMENTATION AND CONTROLS
- 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

VIAL CAPACITY

VIAL (ml)	DIA (mm)	HGT (mm)	NUMBER OF SHELVES				
			1	2	3	4	5
2	16	41	480	960	1440	1920	2400
5	22	48	241	482	723	964	1205
10	24	58	199	398	597	796	-
20	29	71	136	272	408	544	-
50	43	81	55	110	165	-	-

SHELF CONFIGURATION

SHELVES	SPACING (in/MM)	AREA (sq ft/sq M)
3	4.5/114	3.75/0.348
4	3.25/82	5.0/0.464
5	2.5/63	6.25/0.581

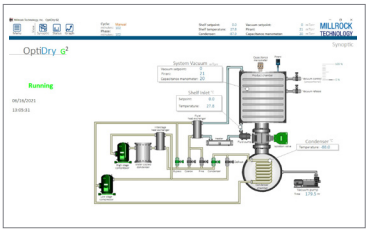
BULK FILL (LITERS)

DEPTH (mm)	NUMBER OF TRAYS				
	1	2	3	4	5
10mm	1.0	2.3	3.5	4.6	5.8
15mm	1.7	3.5	5.2	6.9	8.7
20mm	2.3	4.7	7.0	9.2	11.6

OPTI-DRY GEN2: PC/PLC CONTROL

Our new Opti-Dry Gen2 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.

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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