



FreeZone® Triad™ Freeze Dry Systems

FEATURES & BENEFITS

FREEZONE TRIAD is an all-in-one benchtop cascade lyophilizer and stoppering tray dryer. Just add a vacuum pump and glassware and begin pre-freezing, freeze drying and stoppering under vacuum.

One large processing shelf may be used to pre-freeze samples in containers or bulk to -75°C . Dual refrigeration

systems cool to -85°C to freeze dry low eutectic point samples on the shelf or on four sample valves mounted to the left-hand side. After freeze drying, serum bottles on the processing shelf may be stoppered under vacuum using a pneumatic mechanism that does not require compressed gas.

Four sample valves increase the capacity and flexibility of the freeze dryer. Four valves allow connection of flasks and other freeze dry glassware. Samples in the flasks and in the tray dryer may be lyophilized simultaneously.

❖ **Hot gas defrost.** Hot gas from the compressor is circulated through the collector coil and automatically shuts off when the refrigerant reaches $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$) or after 3 hours.

Large clear acrylic door provides complete visibility of the processing shelf.

Automatic control of temperature enhances consistency and convenience of repetitive protocols. A microprocessor-based controller permits up to five different temperature programs to be stored and repeated, each using a timed pre-freezing segment plus as many as five different ramping and holding segments.

Rear-mounted RS-232 port may be used to transmit data to a user-supplied computer.

Rear-mounted electrical receptacle allows connection of the vacuum pump (sold separately).



❖ **Vacuum control/break valve maintains set point vacuum level to speed the freeze dry process.** At the same time, it protects the system from oil backstreaming by bleeding air into the system when power to the freeze dryer or vacuum pump is shut off. If a brief power outage occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is longer and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted samples from being drawn into the vacuum pump.

❖ **Durable exterior of brushed stainless steel and glacier white powder-coated steel with blue accents.**

Stoppering control regulates the stoppering mechanism when the chamber is under vacuum.



ETL listed. The 230 volt, 60 Hz model carries the ETL mark signifying it is certified to UL and CAN/CSA standards for laboratory equipment.



CE marking. The 230 volt, 50 Hz model conforms to the CE (European Community) directives.

❖ **1/8" OD backfill port** introduces sterile air or inert gas from an outside source to the chamber, protecting samples from atmospheric moisture and contaminants.

❖ *Exclusive feature*



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❖ **Collector drain pan and hose.** A stainless steel drain pan (*above*) catches defrosted condensate, which may be conveniently emptied through the attached drain hose (*above, right*). The pan is removable for cleaning.



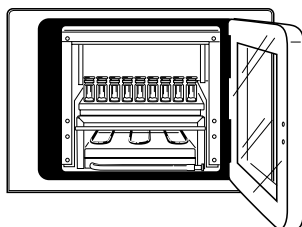
❖ **Built-in pneumatic mechanism stoppers containers on processing shelf.** Containers are stoppered while the chamber is under vacuum and **without the use of compressed gas.**

HCFC/CFC-free refrigeration system ensures environmentally-safe cooling.

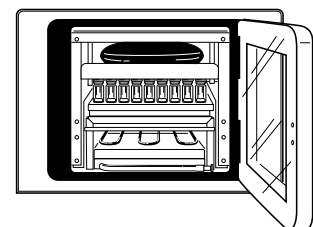
Two refrigeration modules, used in series, cool the collector coil to **-85° C (-121° F)**, ideal for freeze drying samples with low eutectic points including acetonitrile. The same refrigeration system and a 1000-watt heater efficiently cool and heat the shelf. Temperature of the fluid circulating through channels in the shelf may be set to a pre-freeze temperature of **-75° C (-103° F)** or between **-55° C to +50° C (-67 to +122° F)** for freeze drying and is maintained within 1° C of set point. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

One sensor probe monitors sample temperature, which is digitally displayed on the LCD.

Chamber pre-freezes samples to save money and time. Samples may be frozen on the shelf, eliminating the need for a separate freezer and product transfer.



The shelf may be loaded with unstoppered serum bottles. Stoppers should be inserted in container openings in the raised position.



When the stoppering control is activated, atmospheric pressure causes the diaphragm to expand. Pressure from the expanding diaphragm forces the stoppering platen downward until it makes contact with the stoppers, forcing them into the containers.

Serum Bottle Capacity of the FreeZone Triad System

Size	Catalog Number	Shelf Capacity
2 ml	7575010	400
3 ml	7575210	441
5 ml	7573010	233
10 ml	7573210	196
20 ml	7573410	121
30 ml	7573610	86
50 ml	7573810	64
100 ml	7574010	42
125 ml	7574210	36

❖ *Exclusive feature*



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User-Friendly Control Panel

Green RUN/STOP indicator illuminates steadily while freeze drying is in progress and turns off when the RUN/STOP switch terminates a run. If a power failure occurs during processing, the indicator flashes when power is restored.

LCD prompts the user to set programming parameters and displays shelf, sample and collector temperatures in °C or °F; vacuum in mBar, Pa or Torr. When the automatic mode is selected, the display also indicates the program number selected, which segment of the program is in progress and the time remaining for that segment.

DISPLAY switch changes the screen format from SET UP to AUTO to MONITOR to MANUAL.

Red LED Alarm indicator flashes and beeper sounds to indicate that an abnormal system event has occurred. Alarm messages are displayed on the LCD. The beeper mutes after one minute.

Green display indicators glow to signify which display format is shown.



RUN/STOP switch initiates the start or stop of the lyophilization process.

MODE switch selects either manual or automatic operation.

ENTER switch is used in programming to enter a selected set point or program into memory.

“Up” and “down” arrows are used in programming to change a parameter set point or scroll through programs or choices.

DEFROST switch with LED indicator light controls the hot gas defrost function.

VACUUM switch with LED indicator light manually starts or stops the vacuum pump.



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SPECIFICATIONS & ORDERING INFORMATION

Specifications:

- ❖ Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- Large acrylic door, 1" thick, with neoprene gasket.
- Processing shelf, 12.4" w x 14.5" d (31.5 cm x 36.8 cm). Spacing between the shelf and top of the chamber accommodates containers with stoppers up to a maximum height of 148 mm and minimum height of 31 mm.
- ❖ Pneumatic stoppering mechanism that inflates the diaphragm and lowers the stoppering plate above the shelf. **No compressed gas is required.**
- One probe for monitoring sample temperature.
- Stainless steel collector coil capable of removing 1.84 liters of water in 24 hours and holding 2.5 liters of ice before defrosting.*
- ❖ Two 1/3 hp HCFC/CFC-free refrigeration systems, used in series, to cool the collector to **-85° C (-121° F)** and work in concert with a 1000-watt heater to cool and heat fluid medium circulating through channels in the shelf. Fluid temperature may be set from -55° C to +50° C (-67° to +122° F) or to pre-freeze shelf temperature of -75° C (-103° F). Microprocessor controls circulating fluid temperature to ±1° C of set point. For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- Four left-side mounted neoprene valve ports.
- LCD that displays shelf, sample and collector temperature in ° C or ° F, vacuum in mBar, Pa or Torr. When in Automatic mode, LCD also displays the program selected, the present segment that is ramping or holding, time remaining in present segment, and end of program.
- Microprocessor-controlled temperature programming from -55° C to +50° C (-67° to +122° F) during ramping and holding and -75° C (-103° F) during pre-freezing; and memory to store five programs, each with a pre-freeze segment plus five additional segments, for repetition of identical protocols.
- Control panel that includes Run/Stop, Mode, Enter, "Up" arrow, "Down" arrow, Vacuum, Defrost, and Display switches; green indicator lights for Run/Stop, Automatic and Manual mode, and Set Up, Automatic, Monitor and Manual display; red LED Alarm indicator; Stoppering control knob; Vacuum Release valve control knob; and 1/8" OD Back Fill port.
- ❖ Red LED Alarm indicator that flashes and beeper sounds to indicate that an abnormal system event has occurred, including: shelf temperature variation more than ±2° C as measured by the shelf temperature sensor, collector temperature above -40° C, vacuum pressure changes more than 0.500 mBar, shelf temperature outside of set point during ramping, power failure, unevenly loaded shelf during stoppering, and service vacuum pump (after 1000 hours of vacuum use). Alarm messages are displayed on the LCD. The beeper mutes after one minute.
- Vacuum control valve that maintains set point vacuum level.
- ❖ Vacuum break valve that bleeds air into the system when power to the freeze dryer or vacuum pump is shut off. If a brief power outage occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is longer and the collector warms above safe limits, the freeze dryer will not automatically restart.



FreeZone Triad Freeze Dry System 7400040 and miscellaneous glassware.



- Rear-mounted RS-232 port to transmit data to a user-supplied computer. Transmission intervals may be user-configured for 10, 30, 60, 300 or 600 seconds.
- ❖ Hot gas defrost with switch and automatic shut off when refrigerant reaches +65° C (+149° F) or after 3 hours.
- ❖ Stainless steel condensate pan with drain hose.
- Left side-mounted power switch and rear-mounted electrical receptacle for vacuum pump connection.
- Overall dimensions: 28.5" w x 29.5" d x 28.0" h (72.4 cm x 74.9 cm x 71.1 cm).

Models conform to the following standards:

- UL Standard 61010A-1 (230 volt, 60 Hz model).
- CAN/CSA C22.2 No. 1010.1 (230 volt, 60 Hz model).
- CE Conformity marking (230 volt, 50 Hz model).

Option includes:

- Domestic or international electrical configuration.

All models require (not included):

- Vacuum pump with a displacement of at least 98 liters per minute, 0.002 mBar ultimate pressure and fitting suitable for 3/4" ID vacuum hose. See pages 57-59.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See page 51 for FreeZone Triad accessories.

Catalog	Electrical	Receptacle & Plug	Shipping
7400040	208/230 volts, 60 Hz, 9.0 A	North America, 230 volts	450 lbs. (204 kg)
7400030*	230 volts, 50 Hz, 9.0 A	Schuko	450 lbs. (204 kg)
7400060*	230 volts, 50 Hz, 9.0 A	British (UK)	450 lbs. (204 kg)
7400070*	230 volts, 50 Hz, 9.0 A	China/Australia	450 lbs. (204 kg)

*Freeze drying rate will be lower for samples other than plain water. For optimum performance, room temperature should be 21° C (70° F) or colder.

** International electrical configuration

❖ Exclusive feature