Labconco has been designing and manufacturing laboratory freeze drying equipment since 1974. Since the beginning, Labconco has strived to incorporate features that enhance environmental safety, ease-of-use and durability.

Environmental Safety. All refrigeration systems found in FreeZone Freeze Dry Systems, FreeZone Plus Cascade Freeze Dry Systems and FreeZone Stoppering Tray Dryers use environmentally-friendly HCFC/CFC-free refrigerants.

Ease of use. FreeZone Freeze Dry Systems were designed to provide simplicity of use and convenience.

• With automatic start up, pressing one button initiates collector refrigeration and vacuum. Vacuum pull down is delayed to allow sufficient time for the collector to cool ensuring that moisture is trapped by the collector to protect the pump from contamination.

• Lighted “wave” graphs are visible from a distance, display amber then green, to indicate when temperature and vacuum levels are right for adding samples.*

FreeZone Freeze Dry Systems in console models are available in 2.5, 4.5, 6, 12 and 18 liter collector capacities.

* Not included on FreeZone 1 Liter Systems
FreeZone® Freeze Dry Systems

AN OVERVIEW

- The LCD provides easy-to-read digital readouts of vacuum in mBar, Pa or Torr and temperature in °F or °C. It also displays service information such as total number of hours of refrigeration and vacuum pump operation and total number of hours since the refrigeration and vacuum pump were serviced.

- The vacuum control valve helps to speed evaporation of solvent samples by maintaining the vacuum level.*

- The audible/visual alarm alerts the user to abnormal system events. Alarm messages are displayed on the LCD.*

- The upright collector chamber makes defrosting easy. All models may be manually defrosted by pouring water into the upright chamber to melt the collected ice. Some models include a built-in hot gas defrost that melts the collected ice. When the defrost function is selected, hot gas from the compressor is circulated through the collector coil. The defrost feature automatically shuts off when the refrigerant leaving the collector coil reaches +65° C (+149° F). A collector drain hose allows convenient emptying of the melted ice.

- The rear-mounted RS-232 port simplifies connection to a personal computer for operation verification. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.*

DURABILITY. FreeZone Systems have several features designed to protect the system and vacuum pump.

- The patented moisture sensor protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber.*

- The vacuum break valve protects the system from oil back-streaming during power outages.*

- Models are available that include a PTFE*-coated collector chamber and coil for processes involving corrosive compounds.

- The purge valve, available on FreeZone 6, 12 and 18 Liter Console Systems, allows the vacuum pump to be run after freeze drying is complete so that contaminants may be purged from the oil.

* Not included on FreeZone 1 Liter Systems
** Polytetrafluoroethylene

FreeZone 1 Liter Benchtop Freeze Dry Systems offer an economical solution for processing light sample loads or dedicated use by one researcher.

FreeZone Plus 2.5 Liter Cascade Freeze Dry Systems reach -84° C for processing samples with low eutectic points. Dual refrigeration cascade models also come in 6 and 12 liter collector capacities.
FreeZone® Freeze Dry Systems

Digital Control Panel Displays System Status

**FreeZone® 1 Liter Freeze Dry Systems**

- **MENU switch.** Changes the display from operating system parameters to set-up parameters.
- **SELECT switch.** Press to select between manual or automatic vacuum pump start-up, desired vacuum or temperature unit of measure.
- **VACUUM MANUAL ON/OFF switch.** Press to start the vacuum pump manually or to stop the vacuum pump when operating in either the auto or manual start-up mode.

**LCD.** Displays system set-up and operating parameters. The user may configure the display to show vacuum in mBar, Pa or Torr and temperature in °C or °F. Other displays include: total duration of refrigeration operation, total duration since the refrigeration system was last serviced, total duration of vacuum operation and total duration since the vacuum pump was last serviced (in hours).
**FreeZone® 2.5–18 Liter Freeze Dry Systems**

**DEFROST** switch with LED indicator light. Controls the hot gas chamber defrost function found on all FreeZone 6, 12 and 18 Liter Console Systems.

**VACUUM** switch with LED indicator light. Starts or stops the vacuum pump.

**PURGE** switch with LED indicator light. Controls the optional purge valve available on FreeZone 6, 12 and 18 Liter Console Systems. The green LED illuminates when the purge valve is closed, isolating the pump from the collector chamber.

**MANUAL** refrigeration switch with LED indicator light. Press to start the refrigeration only.

**AUTO** mode switch with LED indicator light. Controls refrigeration and the automatic mode process. In the automatic mode, the system activates the vacuum pump when the collector temperature reaches -40° C.

**REFRIGERATION** switch with LED indicator light. Press to change screen display.

**SELECT** switch. Press to select desired vacuum or temperature unit of measure or set-up parameters.

**MENU** switch. Press to change screen display.

**SHELL FREEZER** switch with LED indicator light. Controls the optional shell freezer rollers and refrigeration module available on FreeZone 6 Liter Console Freeze Dry Systems.

**VACUUM CHAMBER** switch with LED indicator light. Controls the optional mini vacuum drying chamber available on FreeZone 6, 12 and 18 Liter Console Freeze Dry Systems.

**TEMPERATURE GRAPH DISPLAY.** Provides at-a-glance monitoring of the collector temperature. The highest LED illuminates amber to indicate that the temperature is warmer than +10° C. The indicators sequence down when the temperature reaches +10, 0, -10, -20, -30 and -40° C. When the collector temperature reaches -40° C, the lowest LED illuminates green, indicating temperature is right to add samples.

**ALARM** light. LED flashes red to indicate that a system alarm event has occurred. Events that trigger the audible/visual alarm are: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.

**VACUUM GRAPH DISPLAY.** Provides at-a-glance monitoring of relative system vacuum level. The highest LED illuminates amber to indicate that the vacuum level is above 2.0 mBar. The indicators sequence down when the vacuum level reaches 2.0, 1.0, 0.8, 0.6, 0.45 and 0.12 mBar. When the vacuum level is between 0.45 and 0.12, the lowest LED flashes green. Below 0.12 mBar, the lowest LED illuminates green steadily, indicating samples may be attached to the freeze dry system.

**LCD.** Displays system set-up and operating parameters and alarm messages. The user may configure the display to show vacuum in mBar, Pa or Torr and temperature in ° F or ° C. Other displays include: total duration of refrigeration operation and total duration since the refrigeration system was last serviced (in hours); total duration of vacuum operation and total duration since the vacuum pump was last serviced (in hours); time between RS-232 transmissions (10, 30, 60, 300 or 600 second intervals); and alarm messages: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use) and moisture in collector.
# FreeZone® Freeze Dry Systems

## Selection Guide

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<td>1/3 hp refrigeration system</td>
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<td>• Removes 2.2 liters of water in 24 hours*</td>
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<tr>
<td>2.5 Liters</td>
<td>Benchtop</td>
<td>• Light sample loads</td>
<td>Two 1/3 hp refrigeration systems</td>
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<tr>
<td></td>
<td>Benchtop Triad™</td>
<td>• Light sample loads</td>
<td>• Removes 2.2 liters of water in 24 hours*</td>
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<tr>
<td></td>
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<tr>
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<td>• Removes 4 liters of water in 24 hours*</td>
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<td>6 Liters</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.
### FreeZone® Freeze Dry Systems

#### Built-In Options

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- **-105°C (-157°F) Cascade Collector/ Refrigeration**
  - Two 1/3 hp refrigeration systems
  - Removes 2.5 liters of water in 24 hours

- **Purge Valve, Mini Vacuum Drying Chamber & Shell Freezer**
  - Permanently installed
  - One stoppering shelf
  - 4 ports

- **Drying Accessory**
  - Permanently installed or included
  - 10 ports or 12 ports

- **Vacuum Pump**
  - Permanently installed or included
  - 86 liters/minute or larger displacement

- **Glassware**
  - Purge Valve available
  - Mini Vacuum Drying Chamber available
  - Shell Freezer available with -50°C models

### Notes

- The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

- FreeZone 4.5 Liter Freeze Dry Systems include a permanently-installed 10-port drying chamber. FreeZone Plus 4.5 Liter Cascade Freeze Dry Systems and FreeZone -105°C 4.5 Liter Freeze Dry Systems include a 12-Port Drying Chamber 7522800, which requires attachment.

- 144 liters/minute displacement is recommended.

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*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.*

**FreeZone 4.5 Liter Freeze Dry Systems include a permanently-installed 10-port drying chamber. FreeZone Plus 4.5 Liter Cascade Freeze Dry Systems and FreeZone -105°C 4.5 Liter Freeze Dry Systems include a 12-Port Drying Chamber 7522800, which requires attachment.**
FreeZone® 1 Liter Benchtop Freeze Dry Systems

**Features & Benefits**

**Benchtop cabinet** has small footprint. Compact cabinet of durable powder-coated steel with brushed stainless steel front panel and four rubber feet fits easily atop a countertop or laboratory cart.

**Attachment lid** makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).

**Rear-mounted 3/4" vacuum connection** extends vertically, requiring less space.

**HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to -50° C (-58° F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

**LCD** displays system set-up and operating parameters.

**Collector drain hose** is accessible from the left-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

**Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

**Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

**Automatic start-up** is quick and easy to use. Turning on the main power switch, located on the right-hand side, initiates the collector cool-down and vacuum pull-down sequence if automatic mode is selected. If manual mode is selected, turning on the main power switch initiates collector cool-down, but the vacuum pump must be turned on by pressing the vacuum switch.

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

**ETL listed.**

**Exclusive feature**

**CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.
**All models feature:**

- Upright stainless steel collector coil capable of removing 1 liter of water in 24 hours and holding 1 liter of ice before defrosting.*
- 1/3 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Compact benchtop design with a small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD for display of set-up and operating parameters. It may be user-configured to select either automatic or manual mode operation and to display vacuum in mBar, Pa or Torr and temperature in °F or °C. It also displays total duration of refrigeration system operation and time since the refrigeration system was serviced, and the duration of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Automatic start-up for collector cool-down and vacuum pull-down when programmed for automatic mode.
- Side-mounted, retractable, 9” collector drain hose.
- Clear acrylic lid, 3/4” thick, with 3” diameter attachment port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4” OD vacuum connector, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 12.6” w x 17.9” d x 16.9” h (32.0 cm x 45.4 cm x 42.9 cm).

**Models conform to the following standards:**

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

**Options include:**

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

**All models require (not included):**

- Vacuum pump with a displacement of at least 86 liters per minute, 0.002 mBar ultimate pressure and fitting suitable for 3/4” ID vacuum hose. See pages 56-58.
- Drying accessory. See pages 52-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

See ordering information on page 33.
FreeZone® 2.5 Liter Benchtop Freeze Dry Systems

**Features & Benefits**

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to -50°C (-58°F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

- **Rear-mounted 3/4” vacuum connection** extends vertically, requiring less space.

- **Attachment lid** makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).

- **Easy-to-follow operating instructions** are printed on the right-hand side.

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

- **Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

- **Collector drain hose** is accessible from the left-hand side for convenient defrost. It extends about nine inches and retracts within the cabinet when not in use.

- **Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

- **Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

- **Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

- **Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **Vacuum break valve** 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.

- **Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

- **Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

- **ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CAN standards for laboratory equipment.

- **CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.
FreeZone® 2.5 Liter Benchtop Freeze Dry Systems

**Specifications**

**All models feature:**
- Upright stainless steel collector coil capable of removing 2 liters of water in 24 hours and holding 2.5 liters of ice before defrosting.*
- 1/3 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Compact benchtop design with a small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature "waves" for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage lasts less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9" collector drain hose.
- Clear acrylic lid, 3/4" thick, with 3" diameter port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4" OD vacuum connection, three feet of 3/4" ID vacuum hose and two clamps.
- Overall dimensions: 12.6" w x 17.9" d x 16.9" h (32.0 cm x 45.4 cm x 42.9 cm).

**Models conform to the following standards:**
- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

**Options include:**
- Powder-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

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* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

**Exclusive feature**
HCFC/CFC-free refrigeration system ensures rapid, environmentally-safe cooling. Two condensing modules, used in series, cool the collector coil to -84°C (-119°F), ideal for freeze drying samples with low eutectic points including acetonitrile. The systems use a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

LCD displays system set-up and operating parameters and alarm messages.

Easy-to-follow operating instructions are printed on the right-hand side.

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

Automatic start-up is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

Collector drain hose is accessible from the left-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

Rear-mounted 3/4" vacuum connection extends vertically, requiring less space.

Attachment lid makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).

Upright, stainless steel collector chamber speeds and simplifies defrost. A baffle maximizes ice loading capabilities by evenly distributing collected ice over the entire collector coil. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

Vacuum and temperature graphs display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

Red alarm light flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

Vacuum control valve maintains setpoint vacuum level to speed the freeze dry process.

Moisture sensor protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

Benchtop cabinet has small footprint. Compact cabinet of durable powder-coated steel with brushed stainless steel front panel and four rubber feet fits easily atop a countertop or laboratory cart.

Factory wired. All models include a 3-wire cord with 20 amp NEMA plug.

ETL listed. Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

CE marking. All 230 volt, 50 Hz models conform to the CE (European Community) directives.

Vacuum break valve 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safety limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.
All models feature:

- Upright stainless steel collector coil capable of removing 2.2 liters of water in 24 hours and holding 2.5 liters of ice before defrosting.*
- Dual 1/3 HCFC/CFC-free refrigeration systems to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- Compact benchtop cabinet with small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced, and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9" collector drain hose.
- Clear acrylic lid, 3/4" thick, with 3" diameter port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4" OD vacuum connector, three feet of 3/4" ID vacuum hose and two clamps.
- Overall dimensions: 15.1" w x 23.2" d x 16.9" h (38.3 cm x 59.0 cm x 42.9 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

All models require (not included):

- Vacuum pump with a displacement of at least 86 liters per minute, 0.002 mBar ultimate pressure and fitting suitable for 3/4" ID vacuum hose. See pages 56-58.
- Drying accessory. See pages 52-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 34.
**FreeZone® Plus™ 2.5 Liter Cascade Freeze Dry Systems**

**Features & Benefits**

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

- **Attachment lid** makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. A baffle maximizes ice loading capabilities by evenly distributing collected ice over the entire collector coil. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with Powder-coated collector chamber and coils for additional corrosion resistance.

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **Collector drain hose** is accessible from the left-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

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

- **Compact console cabinet.** Cabinet, mounted on 3” diameter casters, is powder-coated steel with removable brushed stainless steel front panel. The interior accommodates a vacuum pump (pump sold separately.)

- **Easy-to-follow operating instructions** are printed on the right hand side.

- **Vacuum break valve** 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. A baffle maximizes ice loading capabilities by evenly distributing collected ice over the entire collector coil. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with Powder-coated collector chamber and coils for additional corrosion resistance.

- **Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. Two condensing modules, used in series, cool the collector coil to -84°C (-119°F), ideal for freeze drying samples with low eutectic points including acetonitrile. The systems use a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

- **ETL listed. Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.**

- **CE marking. All 230 volt, 50 Hz models conform to the CE (European Community) directives.**

- **Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

- **Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.
All models feature:

- Upright stainless steel collector coil capable of removing 2.2 liters of water in 24 hours and holding 2.5 liters of ice before defrosting.*
- Dual 1/3 hp HCFC/CFC-free refrigeration systems to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- Compact console cabinet with 3” diameter casters.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced, and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature "waves" for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- Clear acrylic lid, 3/4” thick, with 3” diameter port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4” OD vacuum connector, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 18.6” w x 23.2” d x 37.4” h (47.2 cm x 59.0 cm x 95.0 cm).
- Usable interior space: 14.0” w x 18.5” d x 16.0” h (35.6 cm x 47.0 cm x 40.6 cm).

Models conform to the following standards:
- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:
- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.
FreeZone® 4.5 Liter Benchtop Freeze Dry Systems

**Features & Benefits**

- **Permanently-installed drying chamber** facilitates sample connection. The stainless steel chamber includes ten valves to allow connection of serum bottles, ampules or freeze dry flasks with 1/2” or 3/4” adapters. Each valve has a beveled edge to provide at-a-glance indication of whether the valve is open or closed. The clear acrylic lid permits easy monitoring of ice build-up on the collector.

- **Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.

- **LCD** displays system set-up and operating parameters and alarm messages.

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

- **Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

- **Collector drain hose** is accessible from the left-hand side for convenient defrost. It extends about nine inches and retracts within the cabinet when not in use.

- **Rear-mounted 3/4” vacuum connection** extends vertically, requiring less space.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to -50°C (-58°F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

- **Easy-to-follow operating instructions** are printed on the right-hand side.

- **Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED ‘waves’ illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

- **Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

- **Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

- **Vacuum break valve** 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.

- **Benchtop cabinet has small footprint.** Compact cabinet of durable powder-coated steel with brushed stainless steel front panel and four rubber feet fits easily atop a counter-top or laboratory cart.

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

- **CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.
All models feature:

- Upright stainless steel collector coil capable of removing 2 liters of water in 24 hours and holding 4.5 liters of ice before defrosting.*
- 1/3 hp HCFC/CFC-free refrigeration system to cool collector to -50°C (-58°F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Permanently-installed 10-port stainless steel drying chamber with 1/2" thick, clear acrylic lid with neoprene gasket.
- Compact benchtop design with a small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in °F or °C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40°C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 18.6” w x 18.5” d x 22.5” h (47.2 cm x 47 cm x 57.2 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

See ordering information on page 34.
Automatic start-up is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

Moisture sensor protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

Rear-mounted 3/4” vacuum connection extends vertically, requiring less space.

LCD displays system set-up and operating parameters and alarm messages.

Collector drain hose is accessible from the left-hand side for convenient defrost. It extends about nine inches and retracts within the cabinet when not in use.

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

Compact console cabinet. Cabinet, mounted on 3” diameter casters, is powder-coated steel with a removable brushed stainless steel front panel. The interior accommodates a vacuum pump (sold separately).

Easy-to-follow operating instructions are printed on the right-hand side.

Factory wired. All models include a 3-wire cord with 20 amp NEMA plug.

ETL listed. Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

CE marking. All 230 volt, 50 Hz models conform to the CE (European Community) directives.

Upright, stainless steel collector chamber speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector chamber and coils for additional corrosion resistance.

HCFC/CFC-free refrigeration system ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to -50° C (-58° F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

Permanently-installed drying chamber facilitates sample connection. The stainless steel chamber includes ten valves to allow connection of serum bottles, ampules or freeze dry flasks with 1/2” or 3/4” adapters. Each valve has a beveled edge to provide at-a-glance indication of whether the valve is open or closed. The clear acrylic lid permits easy monitoring of ice build-up on the collector.

Vacuum and temperature graphs display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

Red alarm light flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

Vacuum control valve maintains setpoint vacuum level to speed the freeze dry process.

Rear-mounted RS-232 port may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

Vacuum break valve protects the system from oil back-streaming by bleeding air into the system when power to the freeze dryer or vacuum pump is shut off. If a brief power outage occurs (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.
All models feature:

- Upright stainless steel collector coil capable of removing 2 liters of water in 24 hours and holding 4.5 liters of ice before defrosting.*
- 1/3 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Permanently-installed 10-port stainless steel drying chamber with 1/2” thick, clear acrylic lid with neoprene gasket.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in °F or °C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 18.6” w x 24.0” d x 48.1” h (47.2 cm x 61.0 cm x 122.2 cm).
- Usable interior space: 14.0” w x 18.5” d x 21.0” h (35.6 cm x 47.0 cm x 53.3 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

See ordering information on page 34.
### Features & Benefits

**Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

**Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

**12-Port Drying Chamber 7522800** is included. No additional drying accessory is required. Alternate drying accessories may be purchased separately.

**Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector chamber and coils for additional corrosion resistance.

**Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

**Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

**Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

**ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

**CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

**Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.

**Benchtop cabinet has small footprint.** Compact cabinet of durable powder-coated steel with brushed stainless steel front panel and four rubber feet fits easily atop a countertop or laboratory cart.

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

**Collector drain hose** is accessible from the right-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

**Rear-mounted 3/4” vacuum connection** extends vertically, requiring less space.

**Rear-mounted 3/4” vacuum connection** extends vertically, requiring less space.

**Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector chamber and coils for additional corrosion resistance.

**Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

**ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

**CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

**Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.

**Exclusive feature**
All models feature:

- Upright stainless steel collector coil capable of removing 4 liters of water in 24 hours and holding 4.5 liters of ice before defrosting.*
- Dual 1/3 hp HCFC/CFC-free refrigeration systems to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- 12-Port Drying Chamber 7522800 included (requires attachment).
- Compact benchtop design with a small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint vacuum level.
- Vacuum break valve that bleeds air into the system when power to the freeze dryer or vacuum pump is shut off.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9" collector drain hose.
- Clear acrylic lid, 3/4" thick, with 3" diameter port for connection of drying chamber (included).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4" OD vacuum connection, three feet of 3/4" ID vacuum hose and two clamps.
- Overall dimensions: 22.5" w x 24.2" d x 15.0" h (without drying chamber) (57.2 cm x 61.5 cm x 38.1 cm).
- Overall dimensions: 22.5" w x 24.2" d x 25.4" h (with drying chamber) (57.2 cm x 61.5 cm x 64.5 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

All models require (not included):

- Vacuum pump with a displacement of at least 86 liters per minute, 0.002 mBar ultimate pressure and fitting suitable for 3/4" ID vacuum hose. See pages 56-58.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 35.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.
**FreeZone® Plus™ 4.5 Liter Cascade Freeze Dry Systems**

**Features & Benefits**

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

- **Rear-mounted 3/4" vacuum connection** extends vertically, requiring less space.

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

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

- **Collector drain hose** is accessible from the right-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

- **Compact console cabinet.**
  - Cabinet, mounted on 3" diameter casters, is powder-coated steel with removable brushed stainless steel front panel. The interior accommodates a vacuum pump (pump sold separately.)

- **Easy-to-follow operating instructions** are printed on the right-hand side.

- **Vacuum break valve** 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.

- **12-Port Drying Chamber 7522800 is included.** No additional drying accessory is required. Alternate drying accessories may be purchased separately.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector chamber and coils for additional corrosion resistance.

- **Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

- **Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. Two condensing modules, used in series, cool the collector coil to -84°C (-119°F), ideal for freeze drying samples with low eutectic points including acetonitrile. The systems use a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbon (HCFCs) or chlorofluorocarbons (CFCs).

- **Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

- **Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

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**Exclusive feature**

- **ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

- **CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

- **Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.
**All models feature:**

- Upright stainless steel collector capable of removing 4 liters of water in 24 hours and holding 4.5 liters of ice before defrosting.*
- Dual 1/3 hp CFC-free refrigeration systems to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- 12-Port Drying Chamber 7522800 included (requires attachment).
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- Clear acrylic lid, 3/4” thick, with 3” diameter port for connection of drying chamber (included).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 22.5” w x 24.2” d x 36.5” h (without drying chamber) (57.2 cm x 61.5 cm x 92.7 cm).
- Overall dimensions: 22.5” w x 24.2” d x 46.9” h (with drying chamber) (57.2 cm x 61.5 cm x 119.1 cm).

**Models conform to the following standards:**

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

**Options include:**

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

**All models require (not included):**

- Vacuum pump with a displacement of at least 86 liters per minute, 0.002 mBar ultimate pressure and fitting suitable for 3/4” ID vacuum hose. See pages 56-58.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 35.

*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

\[21\] Exclusive feature
**FreeZone® -105° C 4.5 Liter Benchtop Freeze Dry Systems**

**Features & Benefits**

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

- **Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

- **12-Port Drying Chamber 7522800** is included. No additional drying accessory is required. Alternate drying accessories may be purchased separately.

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. Two condensing modules, used in series, cool the collector coil to -105° C (-157° F), ideal for freeze drying samples with very low eutectic points, including ones containing dilute methanol or ethanol. The systems use a refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

- **Vacuum control valve** maintains setpoint vacuum level to speed the freeze dry process.

- **Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector chamber and coils for additional corrosion resistance.

- **Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

- **Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

- **Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

- **ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

- **CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

- **Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

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

- **Collectors depresses** is accessible from the right-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

- **Collector drain hose** is accessible from the right-hand side for convenient disposal of defrosted material. It extends about nine inches and retracts within the cabinet when not in use.

- **Benchtop cabinet has small footprint.** Compact cabinet of durable powder-coated steel with brushed stainless steel front panel and four rubber feet fits easily atop a counter-top or laboratory cart.

- **Rear-mounted 3/4” vacuum connection** extends vertically, requiring less space.
**FreeZone® -105° C 4.5 Liter Cascade Benchtop Freeze Dry Systems**

**Specifications**

**All models feature:**

- Upright stainless steel collector coil capable of removing 2.5 liters of water in 24 hours and holding 4.5 liters of ice before defrosting.*
- Dual 1/3 hp HCFC/CF-C-free refrigeration systems to cool collector to -105° C (-157° F). For samples containing water, acetonitrile or dilute methanol or ethanol.
- 12-Port Drying Chamber 7522800 included (requires attachment).
- Compact benchtop design with a small footprint.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint vacuum level.
- Vacuum break valve that bleeds air into the system when power to the freeze dryer or vacuum pump is shut off.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- Clear acrylic lid, 3/4” thick, with 3” diameter port for connection of drying chamber (included).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 23.2” w x 25.2” d x 16.0” h (without drying chamber) (58.7 cm x 64.0 cm x 40.6 cm).
- Overall dimensions: 23.2” w x 25.2” d x 26.4” h (with drying chamber) (58.7 cm x 64.0 cm x 67.1 cm).

**Models conform to the following standards:**

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

**Options include:**

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Domestic or international electrical configuration.

*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

**Exclusive feature**
**Durable benchtop cabinet.**
Cabinet is powder-coated steel with a brushed stainless steel front panel and four rubber feet and fits easily atop a countertop or laboratory cart.

**Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

**Collector drain hose** is accessible from the right-hand side for convenient defrost. It extends about nine inches and retracts within the cabinet when not in use.

**Vacuum control valve** maintains setpoint vacuum level to speed the freeze drying process.

**Rear-mounted 3/4” vacuum connection** extends parallel to the back requiring less space.

**Attachment port** makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).

**Upright, stainless steel collector chamber** speeds and simplifies defrost. Hot water may be poured into the chamber, or collected ice may be allowed to melt overnight. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.

**Durable benchtop cabinet.**
Cabinet is powder-coated steel with a brushed stainless steel front panel and four rubber feet and fits easily atop a countertop or laboratory cart.

**Automatic start-up** is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

**Collector drain hose** is accessible from the right-hand side for convenient defrost. It extends about nine inches and retracts within the cabinet when not in use.

**Vacuum control valve** maintains setpoint vacuum level to speed the freeze drying process.

**Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

**Vacuum break valve** 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.

**Easy-to-follow operating instructions** are printed on the right-hand side.

**Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.

**Vacuum and temperature graphs** display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.

**Red alarm light** flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.

**CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

**ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

**HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to -50°C (-58°F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbon (HCFCs) or chlorofluorocarbons (CFCs).

**Factory wired.** All models include a 3-wire cord with 20 amp NEMA plug.

**Rear-mounted electrical receptacle** allows connection of the vacuum pump (pump sold separately).
All models feature:

- Upright stainless steel collector coil capable of removing 4 liters of water in 24 hours and holding 6 liters of ice before defrosting.*
- 3/4 hp HCFC/CFC-free refrigeration system to cool collector to -50°C (-58°F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40°C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Side-mounted, retractable, 9” collector drain hose.
- 3” diameter port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 31.8” w x 28.1” d x 14.5” h (80.8 cm x 71.4 cm x 36.8 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Stoppering Tray Dryer, 32.0” w x 24.6” d x 27.1” h (81.3 cm x 62.4 cm x 68.8 cm). Overall dimensions with Stoppering Tray Dryer: 32.0” w x 31.1” d x 40.6” h (81.3 cm x 79.0 cm x 103.1 cm). See specifications on pages 38-40.
- 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 56-58.
- Drying accessory (except models with Stoppering Tray Dryer). See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 36.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

© Exclusive feature
Optional built-in mini vacuum drying chamber holds small samples, either in bulk or in small containers such as vials. It is used in conjunction with other drying accessories mounted on the attachment port. A separate drying accessory is required (sold separately). Its 50-watt heater is microprocessor-controlled from the front panel to +60°C (+140°F). (The chamber is not cooled. The only cooling is from the frozen sample.)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear-mounted electrical receptacle</td>
<td>Allows connection of the vacuum pump (pump sold separately).</td>
</tr>
<tr>
<td>Attachment port</td>
<td>Makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).</td>
</tr>
<tr>
<td>Upright, stainless steel collector chamber</td>
<td>Speeds and simplifies defrost. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.</td>
</tr>
<tr>
<td>Vacuum and temperature graphs</td>
<td>Display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.</td>
</tr>
<tr>
<td>Red alarm light</td>
<td>Flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.</td>
</tr>
<tr>
<td>Moisture sensor</td>
<td>Protects the vacuum pump by preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.</td>
</tr>
<tr>
<td>Durable console cabinet</td>
<td>Cabinet, mounted on 3” diameter casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (pump sold separately).</td>
</tr>
<tr>
<td>Vacuum control valve</td>
<td>Maintains setpoint vacuum level to speed the freeze drying process.</td>
</tr>
<tr>
<td>Vacuum break valve</td>
<td>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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.</td>
</tr>
</tbody>
</table>

**Exclusive feature**

**CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

**ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

**Cooling.** The FreeZone features an environmentally-safe cooling system. The bath’s separate collector coil to -50°C (-58°F) ensures rapid pre-freezing. The condensing module cools the collector coil to -50°C (-58°F), ideal for freeze drying aqueous samples. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

**Vacuum control valve.** All models feature a 3-wire cord with 20 amp NEMA plug. Optional built-in shell freezer (6 liter models only) permits sample preparation while other samples lyophilize. The bath has two rollers to rotate flasks up to 1200 ml in size in heat transfer solution. The bath’s separate CFC-free refrigeration system ensures rapid pre-freezing. A drain hose is accessible from the front for easy disposal of the heat transfer solution.

**Rear-mounted RS-232 port** may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.

**Hot gas defrost.** Hot gas from the compressor is circulated through the collector coil and automatically shuts off when the refrigerant reaches +65°C (+149°F).
All models feature:

- Upright stainless steel collector coil capable of removing 4 liters of water in 24 hours and holding 6 liters of ice before defrosting.*
- 3/4 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetone, methanol or ethanol.
- Clear acrylic chamber lid, 3/4” thick, with neoprene gasket.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, setup parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in °F or °C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage lasts less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Hot gas defrost and switch.
- Front-mounted, retractable, 9” collector drain hose.
- 3” diameter stainless steel port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 32.2” w x 28.0” d x 36.3” h (81.8 cm x 71.1 cm x 92.1 cm).
- Usable interior space: 15.0” w x 24.5” d x 22.0” h (38.1 cm x 62.2 cm x 55.9 cm). Usable interior space on models with built-in shell freezer: 11.5” w x 24.5” d x 12.0” h (29.2 cm x 62.2 cm x 30.5 cm).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Purge valve with switch for isolating the vacuum pump from the freeze dry system.
- Built-in stainless steel mini vacuum drying chamber, 5.1” w x 13.0” d x 2.5” h (12.9 cm x 33.0 cm x 6.4 cm), that includes 50-watt heater with microprocessor control to +60° C (+140° F), 3/4” thick clear acrylic lid and neoprene gasket. (Chamber is not cooled. The only cooling is from the frozen sample.)
- Built-in shell freezer with stainless steel bath, 5.5” w x 12.5” d x 7.5” h (30.5 cm x 14.0 cm x 19.0 cm), that includes 1/3 hp CFC-free refrigeration system with microprocessor control to -40° C (-40° F), 3/4” thick high-density polyethylene lid, neoprene gasket and drain hose.
- Stoppering Tray Dryer, 32.0” w x 24.6” d x 27.1” h (81.3 cm x 62.4 cm x 68.8 cm). Overall dimensions with Stoppering Tray Dryer: 32.0” w x 31.0” d x 63.4” h (81.3 cm x 78.7 cm x 160.9 cm). See specifications on pages 46-48.
- 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 56-58.
- Drying accessory (except for models with Stoppering Tray Dryer). See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on pages 37-38.

*The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.
All models feature:

- Upright stainless steel collector coil capable of removing 8 liters of water in 24 hours and holding 12 liters of ice before defrosting.*
- 1 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Clear acrylic chamber lid, 3/4" thick, with neoprene gasket.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Hot gas defrost and switch.
- Front-mounted, retractable, 9" collector drain hose.
- 3" diameter stainless steel port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3" diameter casters.
- 3/4" OD vacuum connection, three feet of 3/4" ID vacuum hose and two clamps.
- Overall dimensions: 32.2" w x 28.0" d x 36.3" h (84.8 cm x 71.1 cm x 92.1 cm).
- Usable interior space: 14.0" w x 24.5" d x 22.0" h (35.6 cm x 62.2 cm x 55.9 cm).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Purge valve with switch for isolating the vacuum pump from the freeze dry system.
- Built-in stainless steel mini vacuum drying chamber, 5.1" w x 13.0" d x 2.5" h (12.9 cm x 33.0 cm x 6.4 cm), that includes 50-watt heater with microprocessor control to +60° C (+140° F), 3/4" thick clear acrylic lid and neoprene gasket. (Chamber is not cooled. The only cooling is from the frozen sample.)
- Stoppering Tray Dryer, 32.0" w x 24.6" d x 27.1" h (81.3 cm x 62.4 cm x 68.8 cm). Overall dimensions with Stoppering Tray Dryer: 32.0' w x 31.0" d x 63.4" h (81.3 cm x 78.7 cm x 160.9 cm). See specifications on pages 46-48.
- 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, reverse IEC plug and fitting suitable for 3/4" ID vacuum hose. See pages 56-58.
- Drying accessory (except models with Stoppering Tray Dryer). See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on pages 39-40.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.
All models feature:

- Upright stainless steel collector coil capable of removing 10 liters of water in 24 hours and holding 18 liters of ice before defrosting.*
- 1-1/2 hp HCFC/CFC-free refrigeration system to cool collector to -50° C (-58° F). For aqueous samples. Not for use with samples containing acetonitrile, methanol or ethanol.
- Clear acrylic chamber lid, 3/4” thick, with neoprene gasket.
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration system was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Hot gas defrost and switch.
- Front-mounted, retractable, 9” collector drain hose.
- 3” diameter stainless steel port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 32.2” w x 28.0” d x 36.3” h (84.8 cm x 71.1 cm x 92.1 cm).
- Usable interior space: 14.0” w x 24.5” d x 22.0” h (35.6 cm x 62.2 cm x 55.9 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Purge valve with switch for isolating the vacuum pump from the freeze dry system.
- Built-in stainless steel mini vacuum drying chamber, 5.1” w x 13.0” d x 2.5” h (12.9 cm x 33.0 cm x 6.4 cm), that includes 50-watt heater with microprocessor control to +60° C (+140° F), 3/4” thick clear acrylic lid and neoprene gasket. (Chamber is not cooled. The only cooling is from the frozen sample.)
- 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 56-58.
- Drying accessory. See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 41.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

Excluding feature
Optional built-in mini vacuum drying chamber holds small samples, either in bulk or in small containers such as vials. It is used in conjunction with other drying accessories mounted on the attachment port. A separate drying accessory is required (sold separately). Its 50-watt heater is microprocessor-controlled from the front panel to +60°F (+140°F). (The chamber is not cooled. The only cooling is from the frozen sample.)

Easy-to-follow operating instructions are printed on the left-hand side.

Automatic start-up is quick and easy to use. Pressing one button initiates the collector cool-down and vacuum pull-down sequence. Or, manually override this feature at any time using the separate switches for manual refrigeration and vacuum.

Collector drain hose is accessible from the front for convenient defrost. It extends about 9 inches and retracts within the cabinet when not in use.

Factory wired. All models require a 3-wire cord with 20 amp NEMA plug.

* CE marking. All 230 volt, 50 Hz models conform to the CE (European Community) directives.

* ETL listed. Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

** LCD displays system set-up and operating parameters and alarm messages.**

** Attachment port makes connection of accessories easy. Select from accessory drying chambers and manifolds (sold separately).**

** Upright, stainless steel collector chamber speeds and simplifies defrost. Models are available with PTFE-coated collector coil and chamber for additional corrosion resistance.**

** Vacuum and temperature graphs display relative system vacuum and collector temperature. Amber LED “waves” illuminate when vacuum and temperature levels are out of range for adding samples. Green LED lights indicate that conditions are right to add samples.**

** Red alarm light flashes and beeper sounds to indicate that an abnormal system event has occurred. Pressing the Menu Switch displays the alarm message on the LCD.**

** Moisture sensor protects the vacuum pump from preventing refrigeration or vacuum start-up when moisture is detected in the collector chamber area.**

** Vacuum control valve maintains setpoint vacuum level to speed the freeze drying process.**

** Vacuum break valve 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 (approximately 5 minutes), the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is long (approximately 5 minutes) and the collector warms above safe limits, the freeze dryer will not automatically restart, which prevents melted sample from being drawn into the collector and liquid from harming the vacuum pump.**

** Stainless steel baffle maximizes ice loading capabilities by evenly distributing collected ice over the entire collector coil.**

** HCFC/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84°F (-119°F) making this system ideal for freeze drying samples with low eutectic points including acetonitrile. The systems use a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbon (HCFCs) or chlorofluorocarbons (CFCs).**

** Optional purge valve isolates the vacuum pump from the freeze dry system. The pump starts and warms the oil, while the collector cools, before pulling vacuum on the system. Pump life may be extended by purging small amounts of contaminants from the vacuum pump oil. Green indicator lights when the purge valve is closed.**

** Durable console cabinet.**

Cabinet, mounted on 3” diameter casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (pump sold separately).

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

** Rear-mounted RS-232 port may be used to transmit data to a user-supplied computer. The time between data transmissions may be set to occur at 10, 30, 60, 300 or 600 second intervals.**

** Hot gas defrost.** Hot gas from the compressor is circulated through the collector coil and automatically shuts off when the refrigerant reaches +65°F (+149°F).
All models feature:

- Upright stainless steel collector coil and chamber with stainless steel baffle capable of removing 4 liters of water in 24 hours and holding 6 liters of ice before defrosting.*
- Two 1/3 hp HCFC/CFC-free refrigeration systems, used in series, to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- Clear acrylic chamber lid, 3/4” thick, with neoprene gasket.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Hot gas defrost and switch.
- Front-mounted, retractable, 9” collector drain hose.
- 3” diameter stainless steel port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 32.2” w x 28.0” d x 36.3” h (84.8 cm x 71.1 cm x 92.1 cm).
- Usable interior space: 14.0” w x 24.5” d x 22.0” h (35.6 cm x 62.2 cm x 55.9 cm)

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Purge valve with switch for isolating the vacuum pump from the freeze dry system.
- Built-in stainless steel mini vacuum drying chamber, 5.1” w x 13.0” d x 2.5” h (12.9 cm x 33.0 cm x 6.4 cm), that includes 50-watt heater with microprocessor control to +60° C (+140° F), 3/4” thick clear acrylic lid and neoprene gasket. (Chamber is not cooled. The only cooling is from the frozen sample.)
- 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 56-58.
- Drying accessory. See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 39.

* The stated capacity rating represents the maximum achievable and is based on freeze drying plain water under ideal conditions. Individual results will vary depending on application and, in most cases, be less than the stated maximum.

Exclusive feature
All models feature:

- Upright stainless steel collector coil and chamber with stainless steel baffle capable of removing 4 liters of water in 24 hours and holding 12 liters of ice before defrosting.*
- Two 3/4 hp HCFC/CFC-free refrigeration systems, used in series, to cool collector to -84° C (-119° F). For samples containing water or acetonitrile. Not for use with samples containing methanol or ethanol.
- Clear acrylic chamber lid, 3/4” thick, with neoprene gasket.
- Brushed stainless steel lid and glacier white, powder-coated steel exterior with blue accents.
- LCD that displays system operating parameters, set-up parameters and alarm messages. It may be user-configured to display vacuum in mBar, Pa or Torr and temperature in ° F or ° C. It also displays total number of hours of refrigeration system operation and time since the refrigeration was serviced and the total number of hours of vacuum pump operation and time since the vacuum pump was serviced (in hours).
- Red alarm light that flashes and beeper that sounds to indicate that an abnormal system event has occurred, including: power failure, improper line voltage supply, collector temperature rise above -40° C, service vacuum pump (after 1000 hours of vacuum use), and moisture in collector. Pressing the Menu Switch displays the alarm message on the LCD.
- LED vacuum and temperature “waves” for at-a-glance display of relative system vacuum and collector temperature.
- Moisture sensor that prevents refrigeration or vacuum start-up when moisture is detected in the collector chamber area.
- Vacuum control valve that maintains setpoint 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 power outage less than approximately 5 minutes occurs, the freeze dryer will restart and the refrigeration and vacuum system will resume operation once power is restored. If the power failure is more than approximately 5 minutes and the collector warms above safe limits, the freeze dryer will not automatically restart.
- 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.
- Automatic start-up switch for collector cool-down and vacuum pull-down with manual override switches.
- Hot gas defrost and switch.
- Front-mounted, retractable, 9” collector drain hose.
- 3” diameter stainless steel port for connection of drying accessories (sold separately).
- Side-mounted power switch, rear-mounted electrical receptacle (for vacuum pump connection) and 3-wire cord with 20 amp plug.
- 3” diameter casters.
- 3/4” OD vacuum connection, three feet of 3/4” ID vacuum hose and two clamps.
- Overall dimensions: 32.2” w x 28.0” d x 36.3” h (84.8 cm x 71.1 cm x 92.1 cm).
- Usable interior space: 11.5” w x 24.5” d x 16.5” h (29.2 cm x 62.2 cm x 41.9 cm)

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Options include:

- PTFE-coated collector coil and chamber for processes involving corrosive compounds.
- Purge valve with switch for isolating the vacuum pump from the freeze dry system.
- Built-in stainless steel mini vacuum drying chamber, 5.1” w x 13.0” d x 2.5” h (12.9 cm x 33.0 cm x 6.4 cm), that includes 50-watt heater with microprocessor control to +60° C (+140° F), 3/4” thick clear acrylic lid and neoprene gasket. (Chamber is not cooled. The only cooling is from the frozen sample.)
- 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 56-58.
- Drying accessory. See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 40.
FreeZone® FreeZone® 1 Liter Benchtop Freeze Dry Systems. See specifications on page 7.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
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FreeZone® 2.5 Liter Benchtop Freeze Dry Systems. See specifications on page 9.

<table>
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Electrical Receptacle & Plug Configurations

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<th>British (UK)</th>
<th>China/Australia</th>
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* International electrical configuration.
** System amperage shown includes 8 amp maximum vacuum pump rating.
† System amperage shown includes 4.5 amp maximum vacuum pump rating.
### FreeZone® Plus® 2.5 Liter Cascade Benchtop Freeze Dry Systems
See specifications on page 11.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
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### FreeZone® Plus® 2.5 Liter Cascade Console Freeze Dry Systems
See specifications on page 13.

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### FreeZone® 4.5 Liter Benchtop Freeze Dry Systems
See specifications on page 15.

<table>
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<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
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<td>China/Australia</td>
<td></td>
<td>102 lbs. (46 kg)</td>
</tr>
</tbody>
</table>

### Electrical Receptacle & Plug Configurations

- 115 volts, 20 amps
- North America, 230 volts
- Schuko
- British (UK)
- China/Australia

---

*International electrical configuration. **System amperage shown includes 8 amp maximum vacuum pump rating. †System amperage shown includes 4.5 amp maximum vacuum pump rating.
### FreeZone® 4.5 Liter Cascade Benchtop Freeze Dry Systems

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7751020</td>
<td>115 volts, 60 Hz, 14.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751021</td>
<td>115 volts, 60 Hz, 14.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751040</td>
<td>230 volts, 60 Hz, 7.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751041</td>
<td>230 volts, 60 Hz, 7.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751030*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>Schuko</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751031*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>Schuko</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751060*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751061*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751070*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
<tr>
<td>7751071*</td>
<td>230 volts, 50 Hz, 7.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>162 lbs. (73 kg)</td>
</tr>
</tbody>
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### FreeZone® Plus® 4.5 Liter Cascade Benchtop Freeze Dry Systems

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7386020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386040</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386041</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386030*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386031*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386060*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386061*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386070*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>7386071*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
</tbody>
</table>

### FreeZone® Plus® 4.5 Liter Cascade Console Freeze Dry Systems

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7387020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387040</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387041</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387030*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387031*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387060*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387061*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387070*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>7387071*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
</tbody>
</table>

### FreeZone® -105°C 4.5 Liter Cascade Benchtop Freeze Dry Systems

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7382020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382040</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382041</td>
<td>230 volts, 60 Hz, 10.0 A’</td>
<td>North America, 230 volts</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382030*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382031*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>Schuko</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382032*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382033*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>British (UK)</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382034*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>7382035*</td>
<td>230 volts, 50 Hz, 10.0 A’</td>
<td>China/Australia</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
</tbody>
</table>

*International electrical configuration. **System amperage shown includes 8 amp maximum vacuum pump rating. †System amperage shown includes 4.5 amp maximum vacuum pump rating.
### FreeZone® 6 Liter Benchtop Freeze Dry Systems

See specifications on page 25.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7752020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752040</td>
<td>230 volts, 60 Hz, 8.0 A'</td>
<td>North America, 230 volts</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752041</td>
<td>230 volts, 60 Hz, 8.0 A'</td>
<td>North America, 230 volts</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752030*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752031*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752060*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>British (UK)</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752061*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>British (UK)</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752070*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>China/Australia</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>7752071*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>China/Australia</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
</tbody>
</table>

### FreeZone® 6 Liter Benchtop Freeze Dry Systems with Stoppering Tray Dryers

See specifications on page 25.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Stoppering Tray</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7758020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758040</td>
<td>230 volts, 60 Hz, 8.0 A'</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758041</td>
<td>230 volts, 60 Hz, 8.0 A'</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758030*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758031*</td>
<td>230 volts, 50 Hz, 9.0 A'</td>
<td>Schuko</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758060*</td>
<td>230 volts, 50 Hz, 9.0 A'</td>
<td>British (UK)</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758061*</td>
<td>230 volts, 50 Hz, 9.0 A'</td>
<td>British (UK)</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758070*</td>
<td>230 volts, 50 Hz, 9.0 A'</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
<tr>
<td>7758071*</td>
<td>230 volts, 50 Hz, 9.0 A'</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg) Shipped in two cartons</td>
</tr>
</tbody>
</table>

### Electrical Receptacle & Plug Configurations

- 115 volts, 20 amps
- North America, 230 volts
- Schuko
- British (UK)
- China/Australia

*International electrical configuration. **System amperage shown includes 8 amp maximum vacuum pump rating. †System amperage shown includes 4.5 amp maximum vacuum pump rating. ‡Electrical requirements of the Stoppering Tray Dryer.
### FreeZone® Freeze Dry Systems

**ORDERING INFORMATION**

#### FreeZone® 6 Liter Console Freeze Dry Systems

See specifications on page 27.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Mini Chamber</th>
<th>Shipping Weight</th>
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</thead>
<tbody>
<tr>
<td>7753020</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753021</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753022</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td>257 lbs. (117 kg)</td>
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<tr>
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<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>7753026</td>
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<td>115 volts, 20 amps</td>
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<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
</tr>
<tr>
<td>7753027</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
</tr>
<tr>
<td>7753040</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
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<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753041</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td></td>
<td></td>
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<tr>
<td>7753042</td>
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<td>North America, 230 volts</td>
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<td></td>
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<tr>
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<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>7753046</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td></td>
<td>272 lbs. (123 kg)</td>
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<tr>
<td>7753047</td>
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<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
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<tr>
<td>7753030*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753031*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
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<td>7753032*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>7753034*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>7753036*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
</tr>
<tr>
<td>7753037*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
</tr>
<tr>
<td>7753060*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>British (UK)</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753061*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>British (UK)</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753062*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>British (UK)</td>
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<td>7753067*</td>
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<td></td>
<td></td>
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<td>272 lbs. (123 kg)</td>
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<tr>
<td>7753070*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>7753071*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
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<td>254 lbs. (115 kg)</td>
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<tr>
<td>7753072*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
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<tr>
<td>7753074*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
<td></td>
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<td>257 lbs. (117 kg)</td>
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<tr>
<td>7753076*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
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<tr>
<td>7753077*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
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#### FreeZone® 6 Liter Console Freeze Dry Systems with Purge Valves and Shell Freezers

See specifications on page 27.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Shell Freezer</th>
<th>Shipping Weight</th>
</tr>
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<tbody>
<tr>
<td>7753522</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td></td>
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<td>324 lbs. (147 kg)</td>
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<tr>
<td>7753524</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>7753542</td>
<td>230 volts, 60 Hz, 10.0 A**</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>7753544</td>
<td>230 volts, 60 Hz, 10.0 A**</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>7753532*</td>
<td>230 volts, 50 Hz, 10.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>7753534*</td>
<td>230 volts, 50 Hz, 10.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>7753562*</td>
<td>230 volts, 50 Hz, 10.0 A†</td>
<td>British (UK)</td>
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<td>324 lbs. (147 kg)</td>
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<tr>
<td>7753564*</td>
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<td></td>
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<td>China/Australia</td>
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<td>324 lbs. (147 kg)</td>
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<tr>
<td>7753574*</td>
<td>230 volts, 50 Hz, 10.0 A†</td>
<td>China/Australia</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
</tbody>
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* International electrical configuration. ** System amperage shown includes 8 amp maximum vacuum pump rating. † System amperage shown includes 4.5 amp maximum vacuum pump rating.
# FreeZone® Freeze Dry Systems

**Ordering Information**

### FreeZone® 6 Liter Console Freeze Dry Systems with Stoppering Tray Dryers. See specifications on page 27.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Stoppering Tray Dryer</th>
<th>Shipping Weight</th>
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<td>676 lbs. (307 kg)</td>
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<td>7758542</td>
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<td>679 lbs. (308 kg)</td>
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<tr>
<td>7758544</td>
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<tr>
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<td>676 lbs. (307 kg)</td>
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<tr>
<td>7758531*</td>
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<td>676 lbs. (307 kg)</td>
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<td>North America, 230 volts&lt;br&gt;Schuko</td>
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<td>676 lbs. (307 kg)</td>
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<tr>
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<td>676 lbs. (307 kg)</td>
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<tr>
<td>7758560*</td>
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<td>North America, 230 volts&lt;br&gt;British (UK)</td>
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<td>676 lbs. (307 kg)</td>
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<td>7758561*</td>
<td>230 volts, 50 Hz, 8.0 A†&lt;br&gt;230 volts, 60 Hz, 9.0 A††</td>
<td>North America, 230 volts&lt;br&gt;British (UK)</td>
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<td>676 lbs. (307 kg)</td>
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<tr>
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<td>230 volts, 50 Hz, 8.0 A†&lt;br&gt;230 volts, 60 Hz, 9.0 A††</td>
<td>North America, 230 volts&lt;br&gt;British (UK)</td>
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<td>676 lbs. (307 kg)</td>
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<td>676 lbs. (307 kg)</td>
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<tr>
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<td>North America, 230 volts&lt;br&gt;China/Australia</td>
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<td>676 lbs. (307 kg)</td>
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<td>7758571*</td>
<td>230 volts, 50 Hz, 8.0 A†&lt;br&gt;230 volts, 60 Hz, 9.0 A††</td>
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<td>676 lbs. (307 kg)</td>
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<td>North America, 230 volts&lt;br&gt;China/Australia</td>
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<td></td>
<td>676 lbs. (307 kg)</td>
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<tr>
<td>7758574*</td>
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<td>North America, 230 volts&lt;br&gt;China/Australia</td>
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<td>676 lbs. (307 kg)</td>
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**Electrical Receptacle & Plug Configurations**

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<th>North America, 230 volts</th>
<th>Schuko</th>
<th>British (UK)</th>
<th>China/Australia</th>
</tr>
</thead>
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*International electrical configuration. ** System amperage shown includes 8 amp maximum vacuum pump rating. † System amperage shown includes 4.5 amp maximum vacuum pump rating. †† Electrical requirements of the Stoppering Tray Dryer.
### FreeZone® 12 Liter Console Freeze Dry Systems

**See specifications on page 28.**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Mini Chamber</th>
<th>Shipping Weight</th>
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<tbody>
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<td>7754040</td>
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<td>North America, 230 volts</td>
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<td>275 lbs. (125 kg)</td>
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<tr>
<td>7754041</td>
<td>230 volts, 60 Hz, 9.0 A’</td>
<td>North America, 230 volts</td>
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<td></td>
<td>275 lbs. (125 kg)</td>
</tr>
<tr>
<td>7754042</td>
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<td>North America, 230 volts</td>
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<td>278 lbs. (126 kg)</td>
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<tr>
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<td>North America, 230 volts</td>
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<td>278 lbs. (126 kg)</td>
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<td>North America, 230 volts</td>
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<td>293 lbs. (133 kg)</td>
</tr>
<tr>
<td>7754047</td>
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<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>293 lbs. (133 kg)</td>
</tr>
<tr>
<td>7754030*</td>
<td>230 volts, 50 Hz, 9.0 A’</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td></td>
<td>275 lbs. (125 kg)</td>
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<tr>
<td>7754031*</td>
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<td>Schuko</td>
<td>•</td>
<td></td>
<td></td>
<td>275 lbs. (125 kg)</td>
</tr>
<tr>
<td>7754032*</td>
<td>230 volts, 50 Hz, 9.0 A’</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td></td>
<td>275 lbs. (125 kg)</td>
</tr>
<tr>
<td>7754034*</td>
<td>230 volts, 50 Hz, 9.0 A’</td>
<td>Schuko</td>
<td>•</td>
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<td></td>
<td>275 lbs. (125 kg)</td>
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<td>British (UK)</td>
<td>•</td>
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<td>British (UK)</td>
<td>•</td>
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<td>278 lbs. (126 kg)</td>
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<td>British (UK)</td>
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<tr>
<td>7754064*</td>
<td>230 volts, 50 Hz, 9.0 A’</td>
<td>British (UK)</td>
<td>•</td>
<td></td>
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<td>293 lbs. (133 kg)</td>
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<td>7754070*</td>
<td>230 volts, 50 Hz, 9.0 A’</td>
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<td>China/Australia</td>
<td>•</td>
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<tr>
<td>7754072*</td>
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<td>China/Australia</td>
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<td>275 lbs. (125 kg)</td>
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<td>China/Australia</td>
<td>•</td>
<td></td>
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<td>275 lbs. (125 kg)</td>
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*International electrical configuration.  †System amperage shown includes 4.5 amp maximum vacuum pump rating.
### FreeZone® Freeze Dry Systems

**Ordering Information**

#### FreeZone® 12 Liter Console Freeze Dry Systems with Stoppering Tray Dryers. See specifications on page 28.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Stoppering Tray Dryer</th>
<th>Shipping Weight</th>
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<tbody>
<tr>
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<td>North America, 230 volts</td>
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<td>7759030*</td>
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<td>British (UK)</td>
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<td>China/Australia</td>
<td>•</td>
<td></td>
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</tr>
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#### FreeZone® Plus® 12 Liter Cascade Freeze Dry Systems. See specifications on page 32.

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<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Mini Chamber</th>
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*International electrical configuration. **System amperage shown includes 8 amp maximum vacuum pump rating. † System amperage shown includes 4.5 amp maximum vacuum pump rating. †† Electrical requirements of the Stoppering Tray Dryer.
FreeZone® 18 Liter Console Freeze Dry Systems. See specifications on page 29.

### Electrical Receptacle & Plug Configurations

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<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector Coil &amp; Chamber</th>
<th>Purge Valve</th>
<th>Mini Chamber</th>
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* International electrical configuration. † System amperage shown includes 4.5 amp maximum vacuum pump rating.

### Dry Ice Benchtop Freeze Dry System

#### Specifications & Ordering Information

For the laboratory with occasional lyophilization requirements, the Dry Ice Benchtop Freeze Dry System provides a simple, economical means of freeze drying. Since dry ice cools alcohol or other heat transfer solutions to approximately -75°C (-103°F), the Dry Ice Benchtop Freeze Dry System is ideal for processing materials with low eutectic points.

The Dry Ice Benchtop Freeze Dry System is equipped with a center well for dry ice and solvent that serves as a water vapor collector and doubles as a convenient pre-freezing bath. Flasks, serum bottles and ampules may be frozen by dipping and rotating them in the well.

**7522700 Dry Ice Benchtop Freeze Dry System.** Chamber, 9.8” h x 8.8” diameter (24.8 cm x 22.2 cm), type 304 stainless steel with twelve valves and single run capacity of 1 liter. Valves accommodate either 1/2” or 3/4” flask adapters. Includes dry ice/solvent center well with 1.92 liter capacity and cover, 1/2” OD port for connection to vacuum pump and 3/8” OD port for connection to vacuum gauge. **Dry ice, vacuum pump, vacuum gauge, tubing and glassware are required (not included).** See pages 56-58 for vacuum pumps and accessories. See pages 60-63 for glassware. Shipping weight 11 lbs. (5 kg)
**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, vials or serum bottles on the processing shelf may be stoppering under vacuum using a pneumatic mechanism that does not require compressed gas.

---

**Features & Benefits**

- **Large clear acrylic door** provides complete visibility of the processing shelf.
- **Hot gas defrost.** Hot gas from the compressor is circulated through the collector coil and automatically shuts off when the refrigerant reaches +60°C (+140°F) or after 3 hours.
- **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.
- **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 (pump sold separately).
- **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.
- **Hot gas defrost.** Hot gas from the compressor is circulated through the collector coil and automatically shuts off when the refrigerant reaches +60°C (+140°F) or after 3 hours.
- **Rear-mounted electrical receptacle** allows connection of the vacuum pump (pump sold separately).
- **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**

**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 sample from being drawn into the vacuum pump.
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.

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.

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.

The shelf may be loaded with unstoppered vials or 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

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Exclusive feature
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.

**Green display indicators**
Glow to signify which display format is shown.

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

**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.

**MODE switch**
Selects either manual or automatic operation.

**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.

**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.

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Exclusive feature
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 platen 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°F 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.
- 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°F 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.

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*Freeze drying capacity rating will be lower for samples other than plain water.
**International electrical configuration
FreeZone® Stoppering Tray Dryers

FEATURES & BENEFITS

**Power switch** turns all power to the Tray Dryer on or off.

**Stoppering control** regulates the up and down movement of the shelves while the chamber is under vacuum. See description on page 39.

**Three sensor probes** monitor sample temperature, which is digitally displayed on the LCD.

**Clear acrylic viewing door** provides complete visibility of the three process shelves.

**Three large shelves**, each with 196 square inches of space, accommodate bulk trays or batches of serum bottles, vials or ampules. Samples may be lyophilized and then stoppered, if desired, on three large adjustable shelves. See the chart on page 39 for serum bottle capacities.

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

**Separate 1 hp HCFC/CFC-free refrigeration system and 1000-watt heater** ensure efficient cooling and heating of the shelves. Temperature of fluid circulating through channels in the shelves may be set between -40° C and +40° C (-40° F and +104° F). A microprocessor maintains system temperature within 1° C of set point. The system uses a non-flammable refrigerant that contains no ozone-damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

**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 as many as five different segments. For each segment, the length of time the temperature should hold and rate at which the temperature should be increased or decreased may be programmed.

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

**ETL listed.** Models for operation on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

---

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.

**Optional Isolation Valve 7761500** isolates the Stoppering Tray Dryer from the Freeze Dry System to shorten time necessary to reestablish working vacuum levels and to provide a means for checking end point. While the researcher loads and pre-freezes samples on the shelves, the Isolation Valve may be closed allowing the Freeze Dry System’s vacuum and collector to reach working levels. At the end of lyophilization, the valve may be closed to test the rate of vacuum decay in the Tray Dryer. Rapid decay indicates end point has not been reached. See page 40 for ordering information.

**RS-232 cable connection port**, located on the back, allows communication of the Stoppering Tray Dryer with the microprocessor of the Freeze Dry System when connected via the interconnect Cable 7353403 included. This communication permits 1) automatic start up of the vacuum pump to occur after time has elapsed in Segment 1 when the Stoppering Tray Dryer is used in the AUTO mode; 2) use of one computer to accept data from both the Stoppering Tray Dryer and the Freeze Dry System.

**Support stand** simplifies connection to FreeZone 6, 12 or 18 Liter Freeze Dry System. Support stand completes the connection between the Tray Dryer attachment port and the Freeze Dry System of your choice. The stand elevates the Tray Dryer above the work surface of the Freeze Dry System to allow unobstructed access to the collector compartment or optional built-in vacuum drying chamber or shell freezer.

**Vacuum release valve control** vents the chamber so the chamber door may be opened. This control may also be used to introduce inert gas into the chamber when the gas line is connected to the backfill port.
User-Friendly Control Panel

Green RUN/STOP indicator illuminates steadily while freeze drying is in progress and turns off when the programmed cycle is completed or if the process is terminated in mid-cycle.

LCD prompts the user to set programming parameters and displays system and probe temperatures in °C or °F and vacuum in mBar, Pa or Torr. When the automatic mode is selected, the display also indicates which segment of the program is in progress.

Red LED Alarm indicator flashes and beeper sounds to indicate that an abnormal system event has occurred, including: system temperature variation more than ±2 °C as measured by the system temperature sensor, vacuum pressure changes more than 0.500 mBar, system temperature outside of set point during ramping, power failure, improper line voltage supply, and faulty temperature probe. Alarm messages are displayed on the LCD. The beeper mutes after one minute.

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

“Up” arrow is used in programming to increase a parameter set point or scroll through programs or choices.

“Down” arrow is used in programming to decrease a parameter set point or scroll through programs or choices.

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

Green display indicators glow to signify which display format is shown. If a power failure occurs during processing, the indicator flashes when power is restored.

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

MODE switch selects either manual or automatic operation.

Green display indicators stoppers containers on all three shelves.

Serum Bottle & Vial Capacity of the Stoppering Tray Dryer

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalog Number</th>
<th>Shell Capacity</th>
<th>No. of Shelves</th>
<th>Total Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ml</td>
<td>7575010</td>
<td>430</td>
<td>3</td>
<td>1290</td>
</tr>
<tr>
<td>3 ml</td>
<td>7575210</td>
<td>483</td>
<td>3</td>
<td>1449</td>
</tr>
<tr>
<td>5 ml</td>
<td>7573010</td>
<td>255</td>
<td>3</td>
<td>765</td>
</tr>
<tr>
<td>5 ml</td>
<td>7762300</td>
<td>255</td>
<td>3</td>
<td>765</td>
</tr>
<tr>
<td>10 ml</td>
<td>7573210</td>
<td>195</td>
<td>3</td>
<td>585</td>
</tr>
<tr>
<td>10 ml</td>
<td>7762600</td>
<td>255</td>
<td>3</td>
<td>765</td>
</tr>
<tr>
<td>20 ml</td>
<td>7573410</td>
<td>132</td>
<td>3</td>
<td>396</td>
</tr>
<tr>
<td>30 ml</td>
<td>7573610</td>
<td>86</td>
<td>3</td>
<td>258</td>
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<tr>
<td>50 ml</td>
<td>7573810</td>
<td>72</td>
<td>2</td>
<td>144</td>
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<tr>
<td>100 ml</td>
<td>7574010</td>
<td>42</td>
<td>2</td>
<td>84</td>
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<tr>
<td>125 ml</td>
<td>7574210</td>
<td>36</td>
<td>1</td>
<td>36</td>
</tr>
</tbody>
</table>
Specifications:

- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- Acrylic door, 1” thick.
- Three processing shelves, each 16.5” w x 12” d (41.9 cm x 30.5 cm) with 196 square inches of area. Spacing between the shelves accommodates containers with stoppers up to a maximum height of 75 mm and minimum height of 38 mm when three shelves are used, a maximum height of 107 mm and minimum height of 56 mm when two shelves are used, and a maximum height of 196 mm and minimum height of 114 mm when one shelf is used.
- Three probes for monitoring sample or shelf temperature.
- 3” diameter outlet, located on the bottom of the tray dryer cabinet, for connection to a FreeZone 6, 12 or 18 Liter Freeze Dry System (freeze dryer is required and not included).
- 1 hp HCFC/CFC-free refrigeration system and 1000-watt electric heater for cooling and heating fluid medium circulating through channels in the shelves from -40° C to +40° C (-40° to +104° F). Microprocessor controls circulating fluid temperature to ±1° C of set point.
- LCD that displays system and probe temperatures in ° C or ° F, vacuum in mBar, Pa or Torr, when in Monitor mode; and additionally, when in Auto mode, the segment of the program that is in progress, time remaining in present segment, and end of program.
- Microprocessor-controlled temperature ramp and hold programming from -40° C to +40° C (-40° to +104° F) and memory to store five programs and repetition of identical protocols.
- Control panel that includes Run/Stop, Mode, “Up” arrow, “Down” arrow, Enter 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; Stopping control knob; Vacuum Release valve control knob; and 1/8” OD Back Fill port.
- Red LED Alarm indicator that flashes to indicate that an abnormal system event has occurred, including: system temperature variation more than ±2° C as measured by the system temperature sensor, vacuum pressure changes more than 0.500 mBar, system temperature outside of set point during ramping, power failure, improper line voltage supply, and faulty temperature probe. Alarm messages are displayed on the LCD. The beeper mutes after one minute.
- Rear-mounted RS-232 cable connection port and interconnect cable for communication of the Tray Dryer with the Freeze Dry System.
- Side-mounted power switch.
- Overall dimensions: 33.3” w x 24.6” d x 27.1” h (82.0 cm x 62.4 cm x 68.8 cm).

Models conform to the following standards:

- UL Standard 61010-1 (60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (60 Hz models).
- CE Conformity marking (230 volts, 50 Hz models).

Option includes:

- Domestic or international electrical configuration.

FreeZone® Stoppering Tray Dryers

Specifications & Ordering Information

All models require (not included):

- FreeZone 6, 12 or 18 Liter Freeze Dry System. The FreeZone Stoppering Tray Dryer and Freeze Dry System may be ordered as separate components or together as one catalog number on selected models of FreeZone 6 Liter Benchtop Freeze Dry Systems or FreeZone 6 or 12 Liter Freeze Dry Systems. See pages 24-32.
- 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 56-58.
- Freeze dry glassware if not bulk freeze drying. See pages 62-63.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Plug Type</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7948020</td>
<td>115 volts, 60 Hz, 16.0 A</td>
<td>115 volts, 20amps</td>
<td>422 lbs. (191 kg)</td>
</tr>
<tr>
<td>7948040</td>
<td>230 volts, 60 Hz, 9.0 A</td>
<td>North America, 230 volts</td>
<td>422 lbs. (191 kg)</td>
</tr>
<tr>
<td>7948030*</td>
<td>230 volts, 50 Hz, 9.0 A</td>
<td>Schuko</td>
<td>422 lbs. (191 kg)</td>
</tr>
<tr>
<td>7948060*</td>
<td>230 volts, 50 Hz, 9.0 A</td>
<td>British (UK)</td>
<td>422 lbs. (191 kg)</td>
</tr>
<tr>
<td>7948070*</td>
<td>230 volts, 50 Hz, 9.0 A</td>
<td>China/Australia</td>
<td>422 lbs. (191 kg)</td>
</tr>
</tbody>
</table>

See page 51 for Stoppering Tray Dryer accessories.
Power switch turns all power to the Tray Dryer on or off.

RS-232 cable connection port, located on the back, allows communication of the Bulk Tray Dryer with an IBM-compatible, user-supplied computer. Parameters that may be monitored include shelf set point temperature, actual temperature of each shelf, run time and operating status. RS-232 Cable is required (not included). See page 64.

Support stand simplifies connection to FreeZone 6, 12 or 18 Liter Freeze Dry System. Support stand completes the connection between the Tray Dryer attachment port and the Freeze Dry System of your choice. The stand elevates the Tray Dryer above the work surface of the Freeze Dry System to allow unobstructed access to the collector compartment or optional built-in vacuum drying chamber or shell freezer.

ETL Listed. All 115 volt models carry the ETL mark signifying they are certified to UL and CAN/CSA standards for laboratory equipment.

Three shelves, each with a 200-watt heater, provide ample room for bulk samples or samples in serum bottles or vials. Each shelf is 12.7” w x 16.6” d (32.2 cm x 42.2 cm) to provide 210 square inches of area. Each shelf may be set above sample temperature up to +60° C (+140° F). A microprocessor maintains system temperature within 3° C of set point. (Shelves are not cooled. The only cooling is from the frozen sample.) The chamber can accommodate two additional shelves. See page 51 for ordering information.

Three sensor probes monitor sample temperature, which is digitally displayed on the LCD. Connections are provided for two additional sensor probes (Additional sensors are sold separately and as a component to Heated Shelves with Sensors).

CE marking. All 230 volt models conform to the CE (European Community) directives.

LCD displays set point temperature, actual temperatures and Run (“R”) or Stop (“S”) mode.

RUN/STOP switch initiates the Bulk Tray Dryer to control the temperature of the shelves at the set point temperature.

“Up” and “down” arrows are used in programming to change the set point temperature above sample temperature to +60° C (+140° F). The chamber is not cooled. The only cooling is from the frozen sample.

Three sensor probes monitor sample temperature, which is digitally displayed on the LCD. Connections are provided for two additional sensor probes (Additional sensors are sold separately and as a component to Heated Shelves with Sensors).

CE marking. All 230 volt models conform to the CE (European Community) directives.

Six-Port Manifold (models 7806021 and 7806031) increases flexibility and capacity of the FreeZone System. Six valves, which accommodate either 1/2” or 3/4” flask adapters, allow connection of flasks and other freeze dry glassware so that samples attached to the manifold and in the Tray Dryer may be lyophilized simultaneously.
Specifications:
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- Acrylic door, 1" thick.
- Three shelves, each 12.7" w x 16.6" d (32.2 cm x 42.2 cm) to provide 210 square inches of area. Chamber may accommodate two additional shelves (sold separately).
- 200-watt heater on each shelf for heating to +60° C (+140° F). A microprocessor maintains system temperature within 3° C of set point. (Shelves are not cooled by the Bulk Tray Dryer. The only cooling is from the frozen sample.)
- Three sensor probes for monitoring sample or shelf temperature. Connections for two additional sensors are provided (additional sensors sold separately).
- LCD that displays set point and temperature (°C) of each shelf and "R" for Run mode or "S" for Stop mode.
- Control panel with Run/Stop, “Up” arrow and “Down” arrow switches.
- Vacuum release valve for venting the chamber so the chamber door may be opened.
- Rear-mounted RS-232 cable connection port for communication with a user-supplied IBM-compatible computer. Monitored parameters are shelf set point temperature, actual temperature of each shelf, run time and operating status. RS-232 Cable is required (not included). See page 64.
- Side-mounted power switch.
- Integral Support Stand completes the connection between the Tray Dryer attachment port and the FreeZone 6, 12 or 18 Liter Freeze Dry System of your choice. The stand elevates the Tray Dryer above the work surface of the Freeze Dry System to allow unobstructed access to the collector compartment.
- Overall dimensions: 27.1" h x 32.2" w x 21.5" d (69 cm x 82 cm x 55 cm).

Models conform to the following standards:
- UL Standard 61010-1 (115 volt models).
- CAN/CSA C22.2 No. 61010.1 (115 volt models).
- CE Conformity marking (230 volt models).

Options include:
- Pre-installed 6-Port Tray Dryer Manifold 7726500.
- Domestic or international electrical configuration.

All models require (not included):
- FreeZone 6, 12 or 18 Liter Freeze Dry System. See pages 24-32.
- 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 56-58.
- Freeze dry glassware if not bulk freeze drying. See pages 62-63.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Plug Type</th>
<th>6-Port Manifold</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7806020</td>
<td>115 volts, 60 Hz, 8.0 A</td>
<td>115 volts, 15 amps</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806021</td>
<td>115 volts, 60 Hz, 8.0 A</td>
<td>115 volts, 15 amps</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806040</td>
<td>230 volts, 60 Hz, 4.0 A</td>
<td>North America, 230 volts</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806041</td>
<td>230 volts, 60 Hz, 4.0 A</td>
<td>North America, 230 volts</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806030*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>Schuko</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806031*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>Schuko</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806060*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>British (UK)</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806061*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>British (UK)</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806070*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>China/Australia</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
<tr>
<td>7806071*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>China/Australia</td>
<td>•</td>
<td>262 lbs. (119 kg)</td>
</tr>
</tbody>
</table>

See page 51 for Bulk Tray Dryer accessories.
7516200 Support Grid
7.0” w x 7.0” d (17.8 cm x 17.8 cm), has stainless steel tray with removable plastic grid to provide support for Stoppering Ampules and other small specimen containers. Grid holds 144 containers of 12 mm diameter. Shipping weight 2.5 lbs. (1.1 kg)

7756200 Bulk Tray
11.5” w x 15.0” d x 0.8” h (29.2 cm x 38.1 cm x 2.0 cm). Stainless steel tray contains liquids for pre-freezing and bulk drying. Shipping weight 3 lbs. (1.4 kg)

7761500 Isolation Valve
Isolates the Tray Dryer from the Freeze Dry System to shorten the time necessary to reestablish working vacuum levels and to provide a means for determining end point. Consists of a valve, valve handle, clamps, couplings and installation instructions. Mounts underneath the support stand included with the Tray Dryer. May be installed before or after the Tray Dryer is installed on the Freeze Dry System. For use with Stoppering Tray Dryers 7806020, 7806040 and Bulk Tray Dryers 7806060 and 7806070. The Isolation Valve and 6-Port Tray Dryer Manifold 7726500 may not be field installed together.* Shipping weight 5 lbs. (2.3 kg)

7726500 6-Port Tray Dryer Manifold
30.0” w x 16.5” d x 7.0” h (76.2 cm x 41.9 cm x 17.8 cm). Six valves provide the flexibility to connect flasks and other freeze dry glassware to the Freeze Dry System with Tray Dryer. Valves accommodate either 1/2” or 3/4” flask adapters. Mounts to the support stand included with the FreeZone Stoppering and Bulk Tray Dryer. May be field installed before or after the Tray Dryer is installed on the Freeze Dry System. The 6-Port Tray Dryer Manifold and Isolation Valve 7761500 may not be field installed together.* Included with Bulk Tray Dryer 7806021, 7806041, 7806031, 7806061 and 7806071. Shipping weight 19 lbs. (8.6 kg)

7756100 Tray with Slide-Out Bottom
12.0” w x 14” d (30.5 cm x 35.6 cm). Stainless steel tray has separate bottom that slides out to allow glassware containers direct contact with shelf. Shipping weight 5 lbs. (2.3 kg)

7439300 Microcentrifuge Tube Holder
3.0” w x 2.25” d x 1.0” h (7.6 cm x 5.7 cm x 2.5 cm), anodized aluminum block with twelve bore holes that accommodate 1.7 ml microcentrifuge tubes. Holder may be placed on any flat freeze drying surface such as inside Clear Chambers or the built-in vacuum drying chamber of FreeZone Console Systems; or on FreeZone Stoppering or Bulk Tray Dryer Shelves, Product Shelves, or Heated Product Shelves. One each. Microcentrifuge tubes are not included. Shipping weight 0.6 lb. (0.3 kg)

For FreeZone Stoppering Tray Dryers
7756300 Shelf Spacers
9.0” w x 13.0” d x 2.5” h (22.9 cm x 33.0 cm x 6.4 cm). Stainless steel spacers placed on one or two empty shelves assist stoppering of partial loads of small vials or bottles. One pair. Shipping weight 3 lbs. (1.4 kg)

For FreeZone Bulk Tray Dryers
Heated Shelves with Sensors
12.7” w x 16.6” d (32.2 cm x 42.2 cm). Stainless steel shelves include 200-watt heater and sensor probe. FreeZone Bulk Tray Dryers include three and can accommodate two additional Heated Shelves with Sensors. The Sensor, included with the Heated

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Description</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7760800</td>
<td>Heated Shelf with Sensor for 115 volt, 50/60 Hz operation</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
<tr>
<td>7760801</td>
<td>Heated Shelf with Sensor for 230 volt, 50/60 Hz operation</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
<tr>
<td>7754100</td>
<td>Sensor only</td>
<td>0.5 lb. (0.2 kg)</td>
</tr>
</tbody>
</table>

*Contact Labconco for ordering information on models with factory-installed 6-Port Tray Dryer Manifold and Isolation Valve.
Use the key below to select the drying chamber or manifold that will fit the FreeZone System you have selected.

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fits any FreeZone 1 Liter Freeze Dry System</td>
</tr>
<tr>
<td>2.5</td>
<td>Fits any FreeZone 2.5 Liter Freeze Dry System</td>
</tr>
<tr>
<td>4.5</td>
<td>Fits any FreeZone 4.5 Liter Freeze Dry System</td>
</tr>
<tr>
<td>4.5A</td>
<td>Fits any FreeZone 4.5 Liter Freeze Dry System with Attachment Port Lid Accessory 7762800 attached (sold separately)</td>
</tr>
<tr>
<td>4.5P</td>
<td>Fits any FreeZone Plus 4.5 Liter Cascade Freeze Dry System</td>
</tr>
<tr>
<td>6</td>
<td>Fits any FreeZone 6 Liter Freeze Dry System</td>
</tr>
<tr>
<td>12</td>
<td>Fits any FreeZone 12 Liter Freeze Dry System</td>
</tr>
<tr>
<td>18</td>
<td>Fits any FreeZone 18 Liter Freeze Dry System</td>
</tr>
</tbody>
</table>

7522800 12-Port Drying Chamber
9.75” h x 8.0” diameter (24.8 cm x 20.3 cm), type 304 stainless steel, 1/2” thick acrylic lid with neoprene gasket, complete with 12 neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 11 lbs. (5 kg) 1, 2.5, 4.5P, 6, 12, 18

7522900 16-Port Drying Chamber
13.0” h x 13.0” diameter (33 cm x 33 cm), type 304 stainless steel, 3/4” thick acrylic lid with neoprene gasket, complete with 16 neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 21 lbs. (9.5 kg) 4.5P, 6, 12, 18

Clear Chambers with Valves
Provide visibility into the acrylic chamber during bulk drying as well as accommodate connection of freeze dry glassware to eight valves. Include clear acrylic cylinder, anodized aluminum lid; eight neoprene valves with molded plastic knobs for use with both 1/2” and 3/4” adapters; clear acrylic attachment port lid with 3” diameter opening and neoprene gasket.

Clear Chambers
Provide visibility into the chamber during bulk drying. Include clear acrylic lid with neoprene gasket, vacuum release valves and pass-through for electrical transformer cords, clear acrylic attachment port lid with 3” diameter opening and neoprene gasket.
Clear Stoppering Chambers

23.0” h x 13.5” diameter (58.4 cm x 34.3 cm). Provide an economical means of stoppering serum bottles under original vacuum. Consists of clear acrylic cylinder, stainless steel top plate, two 10.0” diameter aluminum shelves and low voltage transformer with variable heat control to +40°C (+104°F) and electrical cord with plug. Clear, 3/4” thick acrylic lid has neoprene gasket, vacuum release valve and stoppering handle. Also include 3/4” thick, clear acrylic attachment port lid with 3” diameter opening; neoprene gasket and pass-through for electrical transformer cord. Serum bottles or vials with stoppers in the raised position may be loaded on the two shelves. After freeze drying is complete, the stoppering handle may be turned, slowly moving the top plate downward until it makes contact with the sample containers on the top shelf and the sample containers on the bottom shelf make contact with the top shelf. Pressure from the top plate and shelf push the stoppers into the containers, stoppering them under vacuum. Accommodate small containers from 2 to 5 milliliters.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>For use with:</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7868020</td>
<td>115 volts, 50/60 Hz</td>
<td>6, 12, 18</td>
<td>30 lbs. (13.6 kg)</td>
</tr>
<tr>
<td>7868030</td>
<td>230 volts, 50/60 Hz</td>
<td>6, 12, 18</td>
<td>30 lbs. (13.6 kg)</td>
</tr>
</tbody>
</table>

Product Shelves

Accommodate bulk samples, microtiter plates, vials or serum bottles.

Product Shelves

Consist of three aluminum shelves with 1/4” rims, three stainless steel support rods, nine clips for shelf height adjustment, and three rubber feet.

Catalog Shelves

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Shelves Dimensions</th>
<th>For use with:</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7442100</td>
<td>9.4” h. x 6.25” dia. (23.9 cm x 15.9 cm)</td>
<td>Chambers 7522900, 7442900, 7443500, 7444000, 7522800 and 7867000</td>
<td>1.5 lbs. (0.7 kg)</td>
</tr>
<tr>
<td>7441700</td>
<td>12.2” h. x 9.9” dia. (31.0 cm x 25.1 cm)</td>
<td>Chambers 7522900, 7444000 and 7867000</td>
<td>2.0 lbs. (0.9 kg)</td>
</tr>
</tbody>
</table>

Heated Product Shelves with Variable Heat Control

Consist of three aluminum shelves with 1/4” rims, three stainless steel support rods, nine clips for shelf height adjustment, low voltage transformer with variable heat control to +40°C (+104°F), and three rubber feet.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Shelves Dimensions</th>
<th>Electrical Requirements</th>
<th>For use with:</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7509200</td>
<td>6.5” dia. x 9.0” h (15.9 cm x 22.9 cm)</td>
<td>115 volts, 50/60 Hz</td>
<td>Chambers 7522800, 7522900, 7443500, 7444000 and 7867000</td>
<td>13 lbs. (5.9 kg)</td>
</tr>
<tr>
<td>7418000</td>
<td>7.25” dia. x 9.4” h (18.1 cm x 23.9 cm)</td>
<td>115 volts, 50/60 Hz</td>
<td>Chambers 7522900, 7443500, 7444000 and 7867000</td>
<td>14 lbs. (6.4 kg)</td>
</tr>
<tr>
<td>7509400</td>
<td>10.0” dia. x 11.75” h (24.5 cm x 29.8 cm)</td>
<td>115 volts, 50/60 Hz</td>
<td>Chambers 7522900, 7444000 and 7867000</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
<tr>
<td>7509201*</td>
<td>6.5” dia. x 9.0” h (15.9 cm x 22.9 cm)</td>
<td>230 volts, 50/60 Hz</td>
<td>Chambers 7522800, 7522900, 7443500, 7444000, 7442900 and 7867000</td>
<td>13 lbs. (5.9 kg)</td>
</tr>
<tr>
<td>7418001*</td>
<td>7.25” dia. x 9.4” h (18.1 cm x 23.9 cm)</td>
<td>230 volts, 50/60 Hz</td>
<td>Chambers 7522900, 7443500, 7444000, 7442900 and 7867000</td>
<td>14 lbs. (6.4 kg)</td>
</tr>
<tr>
<td>7509401*</td>
<td>10.0” dia. x 11.75” h (24.5 cm x 29.8 cm)</td>
<td>230 volts, 50/60 Hz</td>
<td>Chambers 7522900, 7444000 and 7867000</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
</tbody>
</table>

* International electrical configuration
Drying Accessories

7522200 4-Port Manifold
9.0” h x 8.7” w x 8.7” d (22.9 cm x 22.1 cm x 22.1 cm), type 304 stainless steel, complete with four neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 2 lbs. (1 kg) 1, 2.5, 4.5A, 4.5P

7522500 20-Port Manifold with Support Shelves
10.0” h x 29.6” w x 24.2” d (25.4 cm x 75.2 cm x 61.5 cm), type 304 stainless steel, complete with twenty neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters and two adjustable aluminum support shelves with stainless steel rods. Shipping weight 15 lbs. (6.8 kg) 6, 12, 18

7522300 20-Port Manifold
11.0” h x 27.4” w x 8.7” d (27.9 cm x 68.5 cm x 22.1 cm), type 304 stainless steel, complete with 20 neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 15 lbs. (6.8 kg) 1, 2.5, 4.5A, 4.5P, 6, 12, 18

7522000 4-Port Manifold
9.0” h x 8.7” w x 8.7” d (22.9 cm x 22.1 cm x 22.1 cm), type 304 stainless steel, complete with four neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 2 lbs. (1 kg) 1, 2.5, 4.5A, 4.5P

7548000 24-Port Two-Tier Manifold
20.0” h x 26.4” w x 10.6” d (50.8 cm x 67.1 cm x 26.9 cm), type 304 stainless steel, complete with 24 neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters for connection of flasks. Shipping weight 20 lbs. (9.1 kg) 6, 12, 18

7868500 48-Port Ampule Manifold
28.6” h x 5.0” w x 5.0” d (72.7 cm x 12.7 cm x 12.7 cm), type 304 stainless steel, tree-type, with 48 each 1/4” OD pipe stems that accommodate gum rubber or similar tubing to fit over any Labconco Ampule. Tubing is not included. Shipping weight 12 lbs. (5.4 kg) 1, 2.5, 4.5P, 6, 12, 18

7762800 Attachment Port Lid
10.38” diameter (26.4 cm), replaces the lid to the drying chamber on FreeZone 4.5 Liter Systems, to permit use of the 4-Port Manifold 7522200, 20-Port Manifold 7522300, 48-Port Manifold 7868500 or Clear Chamber 7867000. Includes 3/4” thick, clear acrylic cover with 3” diameter opening and gasket and acrylic plug with gasket (for periods of non-use). Shipping weight 2.0 lbs. (0.9 kg)
Secondary Traps

7394800 Liquid Nitrogen Secondary Trap
For processing samples with ultra low eutectic points. Secondary Trap connects in series with a freeze dry system and vacuum pump to prevent contaminants from migrating into the vacuum pump. After pulling a vacuum, liquid nitrogen may be introduced via the liquid nitrogen port. Liquid nitrogen cools to -196° C (-321° F) to trap contaminants with low eutectic points. The well may be defrosted and the liquid drained from the drain hose. Glacier white powder-coated steel construction. Two valves may be opened (trap) or closed (by-pass). Opened valves allow gaseous contaminants to be trapped in the liquid nitrogen well. Closed valves allow gaseous contaminants to by-pass the well during defrosting and draining. 3/4" OD inlet and outlet connections. Includes an insulated filler tube for connection to a user-supplied liquid nitrogen tank; 20” wire-reinforced PVC tubing. 3/4” ID; and two clamps. **Liquid nitrogen is required (not included).** Shipping weight 24 lbs. (10.9 kg)

7772000 Soda Acid Trap
Secondary trap connects in series with freeze dry system and vacuum pump to prevent migration of corrosive chemicals into pump interior. Clear acrylonitrile body allows visual check of color indicating media. Media changes from white to blue when exhausted. 3/4” OD inlet and outlet connections. Includes 20” wire-reinforced PVC tubing, 3/4” ID, and one clamp. Shipping weight 12 lbs. (5.4 kg)

7772100 Replacement Cartridge for Soda Acid Trap 7772000
Shipping weight 4 lbs. (1.8 kg)

7772500 Activated Carbon Solvent Trap
Secondary trap connects in series with freeze dry system and vacuum pump to prevent migration of organic solvents into pump interior. Cartridge contains 11 ounces of activated carbon media. 3/4” OD inlet and outlet connections. Includes 20” wire-reinforced PVC tubing, 3/4” ID, and one clamp. Shipping weight 12 lbs. (5.4 kg)

7772600 Replacement Cartridge for Activated Carbon Solvent Trap
Shipping weight 4 lbs. (1.8 kg)

Dry Ice Secondary Traps
For processing samples with low eutectic points. Traps connect in series with a freeze dry system and vacuum pump to prevent contaminants from migrating into the vacuum pump. An insulated well, when dry ice and solvent are added, cools to approximately -75° C (-103° F). When used alone, Dry Ice Secondary Traps may serve as an inexpensive collector. Simply connect a sample directly to the incoming port and add a vacuum pump to the outgoing port. **Dry ice and solvent, such as alcohol, are required (not included).**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Dimensions (h x diameter)</th>
<th>Inlet/Outlet Connections</th>
<th>Well Volume</th>
<th>Ice Trapping Capacity</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7538000</td>
<td>9.75” x 7.8” (24.8 x 19.8 cm)</td>
<td>3/4” OD</td>
<td>3.10 liters</td>
<td>900 ml</td>
<td>9 lbs. (4.1 kg)</td>
</tr>
<tr>
<td>7538200*</td>
<td>9.75” x 7.8” (24.8 x 19.8 cm)</td>
<td>1/2” OD</td>
<td>3.10 liters</td>
<td>900 ml</td>
<td>9 lbs. (4.1 kg)</td>
</tr>
<tr>
<td>7538400*</td>
<td>7.8” x 6.6” (19.8 x 16.8 cm)</td>
<td>1/2” OD</td>
<td>1.92 liters</td>
<td>200 ml</td>
<td>5 lbs. (2.3 kg)</td>
</tr>
</tbody>
</table>

*Not for use with FreeZone Systems in this catalog.*
Rotary Vane Vacuum Pumps provide the performance required for good freeze drying results and fit easily into the cabinets of FreeZone console models. Belt driven pumps of equivalent performance are also suitable; however, due to the large size of these pumps, they may not fit into the FreeZone System's cabinet.

Use the Selection Guide below to find the recommended Combination Rotary Vane/Diaphragm Pump or General Purpose Rotary Vane Vacuum Pump based on your sample type and FreeZone System's electrical configuration.

## Selection Guide

<table>
<thead>
<tr>
<th>FreeZone Freeze Dry System</th>
<th>Sample Type</th>
<th>Recommended Vacuum Pump(s) With 115 volt plug</th>
<th>With 230 volt reverse IEC plug</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Liter Benchtop</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7740020, 7740021</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7740030, 7740031, 7740040, 7740041, 7740060, 7740061, 7740070, 7740071</td>
<td>Aqueous</td>
<td>1472100</td>
<td>7584000</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>2.5 Liter Benchtop, Cascade Benchtop &amp; Console</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7420020, 7420021, 7670020, 7670021, 7670520, 7670521</td>
<td>Aqueous</td>
<td>1472100</td>
<td>7584000</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqueous and/or Solvents</td>
<td>7739402</td>
<td>7584002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 Liter Cascade Triad</td>
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</tr>
<tr>
<td>7400030, 7400040, 7400060, 7400070</td>
<td>Aqueous</td>
<td>7739402</td>
<td>7584002</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>4.5 Liter Benchtop &amp; Console, Cascade Benchtop &amp; Console, -105° C Benchtop</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>7382020, 7382021, 7386020, 7386021, 7387020, 7387021, 7750020, 7750021, 7751020, 7751021</td>
<td>Aqueous</td>
<td>1472100</td>
<td>7584000</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqueous and/or Solvents</td>
<td>7739402</td>
<td>7584002</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>6 Liter Benchtop &amp; Console</td>
<td></td>
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<td></td>
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<tr>
<td>7752020, 7752021, 7753020, 7753021, 7753522, 7753524, 7755020, 7755021, 7755022, 7755024, 734020, 734021, 7934022, 7934024, 7934027</td>
<td>Aqueous</td>
<td>1467700</td>
<td>7584000</td>
<td>58</td>
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<tr>
<td></td>
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<td></td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aqueous and/or Solvents</td>
<td>7739402</td>
<td>7584002</td>
</tr>
<tr>
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</tr>
<tr>
<td>12 Liter Console &amp; Cascade Console</td>
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</tr>
<tr>
<td>7754030, 7754031, 7754032, 7754034, 7754036, 7754037, 7754040, 7754041, 7754042, 7754044, 7754046, 7754066, 7754067, 7754070, 7754071, 7754072, 7754074, 7754076, 7754077</td>
<td>Aqueous</td>
<td>7739403</td>
<td>7584002</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>18 Liter Console</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7755030, 7755031, 7755032, 7755034, 7755036, 7755037, 7755040, 7755041, 7755042, 7755044, 7755046, 7755047, 7755060, 7755061, 7755062, 7755064, 7755066, 7755067, 7755070, 7755071, 7755072, 7755074, 7755076, 7755077</td>
<td>Aqueous</td>
<td>7739403</td>
<td>7584002</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
</tbody>
</table>
**VACUUBRAND HYBRID™ Vacuum Pumps**

- Designed for use with acids and other harsh chemicals including TFA, TFA by-products, acetonitrile, HBe and HNO₃ present in samples such as HPLC-prepared and peptide purified materials.

- Compatible with FreeZone Freeze Dry Systems and CentriVap® Centrifugal Concentrators.

- Combination pump system consists of a two-stage rotary vane pump and two-stage, chemical-resistant diaphragm pump. The rotary vane pump provides the deep vacuum required for good freeze drying results and other evaporation needs. These pumps have the vacuum capabilities of a rotary vane pump and, in combination with the diaphragm pump, have improved solvent and acid handling capabilities.

- Low maintenance, longer lasting. The diaphragm pump, made of PTFE and other chemical-resistant fluoropolymer components, removes the condensable vapors in the rotary vane pump before they can contaminate the oil, thus extending the life of the oil and ultimately the life of the pump.

- Environmentally-friendly. Pump oil lasts up to 10 times longer than in conventional rotary vane pumps under virtually all conditions. Fewer oil changes conserves resources.

- Ultimate vacuum (partial pressure) $2 \times 10^{-3}$ mBar (1.5 micron)

- Pressure control valve compensates for the different volumes displaced by the two pumps.

- Glass separator captures downstream condensate vapors.

- 3/4" OD inlet adapter.

- Include one liter bottle of vacuum pump oil, power switch, power cord and plug.

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<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Configuration</th>
<th>Displacement At 60 Hz (50 Hz) liter/minute</th>
<th>Dimensions w x d x h inches (cm)</th>
<th>Shipping Weight lbs. (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7584000</td>
<td>115 volts, 60 Hz, 5.1 A</td>
<td>115</td>
<td>20.0 x 12.0 x 9.1 (51.0 x 30.5 x 23.0)</td>
<td>66 (30 kg)</td>
</tr>
<tr>
<td></td>
<td>Includes 115 volt NEMA 5-15P plug.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7584002</td>
<td>230 volts, 50/60 Hz, 2.7 A</td>
<td>115</td>
<td>20.0 x 12.0 x 9.1 (51.0 x 30.5 x 23.0)</td>
<td>66 (30 kg)</td>
</tr>
<tr>
<td></td>
<td>Includes 230 volt reverse IEC plug.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*VACUUBRAND HYBRID™ is a trademark of VACUUBRAND GMBH + CO KG.*
General Purpose Rotary Vane Vacuum Pumps

- Designed for use with aqueous samples.
- Compatible with FreeZone Freeze Dry Systems, CentriVap Centrifugal Concentrators and Protector+ Controlled Atmosphere Glove Boxes.
- Ultimate vacuum (total pressure) 2 x 10⁻³ mBar (1.5 micron).
- On/off switch.
- Two inlet adapters (1/2” and 3/4” OD).
- Mode selector with two positions: High Vacuum and High Throughput.
- Gas ballast with three positions: Closed, Low Flow and High Flow.
- Single phase direct drive motor, totally enclosed and fan cooled. Should the motor overheat, the thermal overload device switches off the pump. When the pump cools down, the motor automatically restarts.
- Isolation valve seals the inlet to prevent oil and air contamination of the system in the event of power failure.
- Cast aluminum casing and rubber feet.

- Include four each one liter bottles of vacuum pump oil and one exhaust filter with oil mist and odor filter elements.
- Retractable lifting handle (Models 1472100, 7739400 and 7739402).
- Lifting bracket (Models 1467700, 7739401 and 7739403).

Vacuum Pump Accessories

1988000 Vacuum Pump Oil. One liter bottle. Replacement oil for General Purpose Vacuum Pumps 1472100, 7739400, 7739402, 1467700, 7739401 and 7739403. Shipping weight 2 lbs. (1 kg)

1472200 Inlet Filter. For General Purpose Vacuum Pumps 1472100, 7739400, 7739402, 1467700, 7739401 and 7739403. Prevents oil back streaming from the pump and protects the pump from damage from submicron particles. Includes filter assembly and one filter cartridge. Life approximately 1000 hours at 1.33 x 10⁻² mBar (10 microns) vacuum. Shipping weight 1 lb. (0.5 kg)

1472500 Replacement Inlet Filter Cartridge. For 1472200. Shipping weight 0.5 lb. (0.2 kg)

1473400 Replacement Exhaust Filter. For General Purpose Vacuum Pumps 1472100, 7739400, 7739402, 1467700, 7739401 and 7739403. Removes oil mist and odor from pump exhaust. Ducting to outside not required. Includes filter assembly, one oil mist filter cartridge and one odor filter cartridge. Oil mist filter cartridge life is approximately one year and odor filter cartridge life is approximately six months at 1.33 x 10⁻² mBar (10 microns) vacuum. Shipping weight 1 lb. (0.5 kg)

1473200 Replacement Oil Mist Exhaust Filter Cartridge. For 1473400. Life is approximately one year at 1.33 x 10⁻² mBar (10 microns) vacuum. Shipping weight 0.5 lb. (0.2 kg)

1473300 Replacement Odor Exhaust Filter Cartridge. For 1473400. Life is approximately one year at 1.33 x 10⁻² mBar (10 microns) vacuum. Package of five. Shipping weight 0.5 lb. (0.2 kg)

7584300 VACUUBRAND† B-Oil. One liter. Replacement oil for VACUUBRAND HYBRID† Vacuum Pumps 7584000 and 7584002. Shipping weight 2 lbs. (1 kg)

† VACUUBRAND™ and VACUUBRAND HYBRID™ are trademarks of VACUUBRAND GMBH + CO KG.

Rotary Vane Vacuum Pumps & Vacuum Pump Accessories

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Configuration</th>
<th>Displacement At 60 Hz (50 Hz) liter/minute</th>
<th>Dimensions w x d x h inches (cm)</th>
<th>Shipping Weight lbs. (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1472100</td>
<td>115 volts, 50/60 Hz, 4.6 A Includes 115 volt NEMA 5-15P plug.</td>
<td>117</td>
<td>6.5 x 17.0 x 10.4 (15.8 x 43.0 x 26.1)</td>
<td>62 (28)</td>
</tr>
<tr>
<td>7739400*</td>
<td>230 volts, 50/60 Hz, 2.4 A Includes 220 volt NEMA 6-15P plug.</td>
<td>117</td>
<td>6.5 x 17.0 x 10.4 (15.8 x 43.0 x 26.1)</td>
<td>62 (28)</td>
</tr>
<tr>
<td>7739402</td>
<td>230 volts, 50/60 Hz, 2.4 A Includes 230 volt reverse IEC plug.</td>
<td>117</td>
<td>6.5 x 17.0 x 10.4 (15.8 x 43.0 x 26.1)</td>
<td>62 (28)</td>
</tr>
<tr>
<td>1467700</td>
<td>115 volts, 50/60 Hz, 7.8 A Includes 115 volt NEMA 5-15P plug.</td>
<td>195</td>
<td>6.5 x 18.5 x 10.4 (15.8 x 47.0 x 26.1)</td>
<td>65 (30)</td>
</tr>
<tr>
<td>7739401*</td>
<td>230 volts, 50/60 Hz, 4.0 A Includes 220 volt NEMA 6-15P plug.</td>
<td>195</td>
<td>6.5 x 18.5 x 10.4 (15.8 x 47.0 x 26.1)</td>
<td>65 (30)</td>
</tr>
<tr>
<td>7739403</td>
<td>230 volts, 50/60 Hz, 4.0 A Includes 230 volt reverse IEC plug.</td>
<td>195</td>
<td>6.5 x 18.5 x 10.4 (15.8 x 47.0 x 26.1)</td>
<td>65 (30)</td>
</tr>
</tbody>
</table>

* Not for direct electrical connection to FreeZone Systems in this catalog.
FreeZone® Benchtop Shell Freezers

Specifications & Ordering Information

FreeZone Benchtop Shell Freezers provide a compact system for pre-freezing samples for lyophilization. The stainless steel bath has two rollers that rotate Fast-Freeze Flasks in a low temperature heat transfer solution, such as methanol or ethanol, so that a uniform thin coating of sample freezes to the interior surface of the container. Shell freezing increases the surface area to volume ratio, which facilitates efficient vapor flow from the sample to the collector during lyophilization.

All models feature:
- Brushed stainless steel and glacier white, powder-coated steel exterior with blue accents.
- 1/2 hp HCFC/CFC-free refrigeration system capable to cool the heat transfer solution to -40° C (-40° F).
- Stainless steel bath, 5.5” w x 12.0” d x 6.5” h (14.0 cm x 30.5 cm x 16.5 cm), surrounded by urethane foam insulation with white high-density polyethylene cover. Two chain-driven rollers, powered by a sparkless induction motor, rotate flasks up to 1200 ml.
- Approximately two liters of transfer solution are required (not included).
- LED temperature “wave” for at-a-glance display of bath temperature from -20 to -42° C. LEDs illuminate amber as the system cools. When the system reaches operating temperature, the bottom LED illuminates green.
- Right-side mounted power switch.
- Left-side mounted retractable bath drain hose.
- 8-foot, 3-wire cord with plug.
- Overall dimensions: 15.1” w x 22.1” d x 19.7” h (38.4 cm x 56.1 cm x 50.0 cm).

Models conform to the following standards:
- UL Standard 61010-1 (115 and 230 volt, 60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (115 and 230 volt, 60 Hz models).
- CE Conformity marking (230 volt, 50 Hz model).

Option includes:
- Domestic or international electrical configuration.

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Fast-Freeze Flask Capacity of Benchtop Shell Freezer

<table>
<thead>
<tr>
<th>Flask Size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 ml</td>
<td>2</td>
</tr>
<tr>
<td>80 ml</td>
<td>2</td>
</tr>
<tr>
<td>120 ml</td>
<td>2</td>
</tr>
<tr>
<td>150 ml</td>
<td>2</td>
</tr>
<tr>
<td>300 ml</td>
<td>1</td>
</tr>
<tr>
<td>600 ml</td>
<td>1</td>
</tr>
<tr>
<td>750 ml</td>
<td>1</td>
</tr>
<tr>
<td>900 ml</td>
<td>1</td>
</tr>
<tr>
<td>1200 ml</td>
<td>1</td>
</tr>
</tbody>
</table>

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*International electrical configuration
Fast-Freeze® Flasks

Select Fast-Freeze Flasks based on your sample sizes. Flasks should be filled to no more than one-third of their volume so that maximum surface area is achieved and efficient lyophilization is assured. A complete Fast-Freeze Flask includes a rubber top, glass bottom and a supply of filter paper. Tops, bottoms and filter paper are available separately as replacement components. Adapters are required to attach flasks to freeze dry valve ports.

Adapters

Add the Adapters for connecting the Fast-Freeze Flasks to the valve ports on your drying chamber or manifold. Choose borosilicate glass or stainless steel adapters in 1/2” and 3/4” diameters.

Compatible with all major brands of laboratory freeze dry apparatus.

No complex filter retainer is necessary. For those who use filters, they are easily inserted between the adapter and top of the flask. One hundred filters are supplied with each flask.

Flask Holders

Help to prevent sample melt back. They allow a small Fast-Freeze Flask Bottom containing the sample to be placed inside a larger Fast-Freeze Flask so that the vacuum surrounding the sample insulates it from the room atmosphere. Stainless steel. Flasks not included. Shipping weight 1 lb. (0.5 kg)

Catalog Number Description
754300 Small Flask Holder. Compatible with inner flasks 7542000 (40 ml) and 7542200 (80 ml) and outer flasks 7541100 (750 ml) and 7540900 (900 ml).
7543400 Large Flask Holder. Compatible with inner flasks 7542300 (120 ml), 7542400 (150 ml) and 7542600 (300 ml) and outer flasks 7541100 (750 ml) and 7541000 (1200 ml).

Flask Holders

See Tube Holder accessories on page 61.

Adapters

Add the Adapters for connecting the Fast-Freeze Flasks to the valve ports on your drying chamber or manifold. Choose borosilicate glass or stainless steel adapters in 1/2” and 3/4” diameters.

Compatible with all major brands of laboratory freeze dry apparatus.

No complex filter retainer is necessary. For those who use filters, they are easily inserted between the adapter and top of the flask. One hundred filters are supplied with each flask.

Flask Holders

See Tube Holder accessories on page 61.

Adapters

Add the Adapters for connecting the Fast-Freeze Flasks to the valve ports on your drying chamber or manifold. Choose borosilicate glass or stainless steel adapters in 1/2” and 3/4” diameters.

Compatible with all major brands of laboratory freeze dry apparatus.

No complex filter retainer is necessary. For those who use filters, they are easily inserted between the adapter and top of the flask. One hundred filters are supplied with each flask.

Flask Holders

See Tube Holder accessories on page 61.

Adapters

Add the Adapters for connecting the Fast-Freeze Flasks to the valve ports on your drying chamber or manifold. Choose borosilicate glass or stainless steel adapters in 1/2” and 3/4” diameters.

Compatible with all major brands of laboratory freeze dry apparatus.

No complex filter retainer is necessary. For those who use filters, they are easily inserted between the adapter and top of the flask. One hundred filters are supplied with each flask.

Flask Holders

See Tube Holder accessories on page 61.
Lyph-Lock® Flasks

Select the Lyph-Lock Flasks based on your sample sizes. Flasks should be filled to no more than one-third of their volume so that maximum surface area is achieved and efficient lyophilization is ensured. A complete Lyph-Lock Flask includes a glass top and bottom and a rubber ring seal. Tops, bottoms and seals are available separately as replacement components. Adapters are required to attach flasks to freeze dry valve ports.

<table>
<thead>
<tr>
<th>Flask Size</th>
<th>Complete Flask</th>
<th>Complete Flask</th>
<th>Flask Top</th>
<th>Flask Top</th>
<th>Lyph-Lock Seal</th>
<th>Flask Bottom</th>
<th>Dimensions</th>
<th>Flask Bottom</th>
<th>H x ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 ml</td>
<td>7550000</td>
<td>7554000</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>37 mm x 34 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>7550200</td>
<td>7554200</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>67 mm x 34 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 ml</td>
<td>7550400</td>
<td>7554400</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>50 mm x 59.2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 ml</td>
<td>7550600</td>
<td>7554600</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>103 mm x 90.2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 ml</td>
<td>7550800</td>
<td>7554800</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>145 mm x 90.2 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750 ml</td>
<td>7551000</td>
<td>7555000</td>
<td>7552000</td>
<td>7552000</td>
<td>7559000</td>
<td>7557000</td>
<td>187 mm x 90.2 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapters

Add the Adapters for connecting the Lyph-Lock Flasks to the valve ports on your drying chamber or manifold.

<table>
<thead>
<tr>
<th>90° Bend Adapter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>75568000</td>
<td>Connects 19/38 STJ Flask Top to 1/2” valve*</td>
</tr>
<tr>
<td>75568200</td>
<td>Connects 19/38 STJ Flask Top to 3/4” valve*</td>
</tr>
<tr>
<td>75568400</td>
<td>Connects 24/40 STJ Flask Top to 1/2” valve*</td>
</tr>
<tr>
<td>75568600</td>
<td>Connects 24/40 STJ Flask Top to 3/4” valve*</td>
</tr>
</tbody>
</table>

*Borosilicate glass adapters with either 19/38 or 24/40 standard taper joints have 90° bend. (Required — order separately.)

Compatible with all major brands of laboratory freeze dry apparatus.

Only three pieces per flask — no hooks or springs. The complete Lyph-Lock Flask includes:
- a flask top of high strength borosilicate glass
- a flexible, non-contaminating silicone rubber seal
- a flask bottom of borosilicate glass to withstand extreme temperatures and high vacuum.

Available in seven convenient sizes.
Entire flask may be autoclaved.
Provides a high vacuum seal for efficient lyophilization.

Borosilicate glass adapters with either 19/38 or 24/40 standard taper joints have 90° bend. (Required — order separately.)

Flat bottom reduces spills, provides better balance.
Serum Bottles & Vials

Serum Bottles

Perfect for long term storage of freeze dried samples. Labconco Serum Bottles and Threaded Vials are specifically designed for lyophilization applications. Their uniform thin wall construction ensures even freezing and drying. Bottles and vials are ideal containers for use in the FreeZone Stoppering Tray Dryer. Serum bottles also connect to valve ports on drying chambers and manifolds. Serum Bottles, Stoppers and Seals are supplied in packages of 100.

Threaded Vials

Stoppers and Threaded Vials with Screw Caps are supplied in packages of 200.

<table>
<thead>
<tr>
<th>Size</th>
<th>Vials with Screw Caps</th>
<th>Stoppers</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ml</td>
<td>7762300</td>
<td>7762200</td>
</tr>
<tr>
<td>10 ml</td>
<td>7762600</td>
<td>7762200</td>
</tr>
</tbody>
</table>

Accessories

Seal Crimpers

Secure tear-away Aluminum Seals.

7578000 Seal Crimper. For 13 mm corkage. Shipping weight 3 lbs. (1.4 kg)

7578100 Seal Crimper. For 20 mm corkage. Shipping weight 3 lbs. (1.4 kg)

7593000 Vacuum Stoppering Adapter. Connects to a valve port for manual stoppering of a 20 mm corkage serum bottle under original vacuum. The stopper and serum bottle are inserted into the adapter body and lyophilization begins. After the process is completed, the researcher slides the stopper into position so when the valve is turned from vacuum to vent the serum bottle is tightly sealed by the stopper. The ejector tube is then used to force the serum bottle out of the adapter. Shipping weight 1 lb. (0.4 kg)
Ampules & Miscellaneous Accessories

**Ampules**

Labconco Ampules are fabricated of highest quality borosilicate glass for strength and durability. Ampules are supplied in packages of 100.

- **7572710** Ampule Valve Adapters. Connect ampules to valve ports or stainless steel stems. Ten per package. Shipping weight 0.5 lb. (0.2 kg)
- **7570810** Three Way Adapter. Permits attachment of three ampules to a single valve port. Ampules are attached using Ampule Valve Adapters or 1/8” surgical tubing (not provided). Cavity in adapter body can be filled with cotton fiber media to help prevent contamination between samples. Shipping weight 3 oz. (0.1 kg)
- **7571010** Flat Bottom Pre-Scored Straight 1 ml
- **7570610** Flat Bottom Pre-Scored Straight 2 ml
- **7571210** Flat Bottom Pre-Scored Straight 10 ml

**7578500 Oxygen/Natural Gas Sealing Torch.** Specifically designed for flame sealing freeze dry ampules. Seals all types of heat-resistant glass. Connects to natural gas, butane or propane and oxygen with 1/4” ID hose connectors. Shipping weight 3 lbs. (1.4 kg)

**7543800 29/32 Stainless Steel Adapter.** Allows connection of 29/32 round bottom flasks to valve ports on drying chambers and manifolds. Shipping weight 1 lb. (0.45 kg)

**7439300 Microcentrifuge Tube Holder.** 30’’ w x 2.25” d x 1.0” h (7.6 cm x 5.7 cm x 2.5 cm), anodized aluminum block with twelve bore holes that accommodate 1.7 ml microcentrifuge tubes. Holder may be placed on any flat freeze drying surface such as inside Clear Chambers, the built-in vacuum drying chamber of FreeZone Console Systems; or on FreeZone Stoppering or Bulk Tray Dryer Shelves, Product Shelves, or Heated Product Shelves. One each. Microcentrifuge tubes are not included. Shipping weight 0.6 lb. (0.3 kg)

**7814300 Bleed Valve**

Bleeds vacuum when all valves are in use on the Dry Ice Freeze Dry System. 1/2” OD connections. Shipping weight 0.5 lb. (0.3 kg)

**7509600 Replacement Valve**

For drying chambers and manifolds manufactured after March, 1996. Consists of neoprene body and gaskets, molded plastic knob and fittings. Accommodates both 1/2” and 3/4” adapters. Shipping weight 1 lb. (0.4 kg)

**Digital Electronic Vacuum Gauges**

Provide a LCD display of vacuum measurement in mBar, Pa or Torr. Range is 0.02 mBar to 5 mBar. Stainless steel and glacier white powder-coated steel casing, 8.1” w x 4.1” d x 6.4” h. Include a cord with 3/8” to 1/2” OD adapter for connection to either vacuum tubing or a valve on a drying chamber. All FreeZone Freeze Dry Systems include a digital vacuum gauge. The Dry Ice Benchtop Freeze Dry System or other freeze dryers may use the Digital Electronic Vacuum Gauge as an accessory.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7395000</td>
<td>115 volts, 60 Hz, 0.4 A</td>
<td>10 lbs. (4.5 kg)</td>
</tr>
<tr>
<td>7395001*</td>
<td>230 volts, 50 Hz, 0.2 A</td>
<td>10 lbs. (4.5 kg)</td>
</tr>
</tbody>
</table>
**RS-232 Cables**
Provide connection from the RS-232 port on any FreeZone 2.5, 4.5, 6, 12 or 18 Liter Freeze Dry System or FreeZone Bulk Tray Dryer to an IBM-compatible, user-supplied computer. An RS-232 Cable may also be connected to the RS-232 port on the FreeZone Stoppering Tray Dryer connected to a computer; however, the Interconnect Cable 7353403 included with the Stoppering Tray Dryer is recommended since it allows the Stoppering Tray Dryer to communicate with the Freeze Dry System. See page 38 for more information.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>RS-232 Cable</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7537800</td>
<td>For connection to computer with 9-pin serial data port</td>
<td>0.5 lb. (0.2 kg)</td>
</tr>
<tr>
<td>7537801</td>
<td>For connection to computer with 25-pin serial data port</td>
<td>0.5 lb. (0.2 kg)</td>
</tr>
</tbody>
</table>

**Corrosion-resistant Lids**
Replace the acrylic lids included with FreeZone Freeze Dry Systems and Drying Chambers. Provide additional protection from solvents and corrosives that attack acrylic, such as acetonitrile. Lids 7439903, 7439902 and 7439900 are glass. Lid 7386800 is stainless steel. Include neoprene gasket.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>For Use With:</th>
<th>Diameter</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7439903</td>
<td>FreeZone 4.5 Liter Systems</td>
<td>10.12&quot;</td>
<td>2.5 lbs. (1.1 kg)</td>
</tr>
<tr>
<td>7439902</td>
<td>FreeZone 6, 12 &amp; 18 Liter Systems 16-Port Drying Chamber</td>
<td>14.00&quot;</td>
<td>3.5 lbs. (1.6 kg)</td>
</tr>
<tr>
<td>7439900</td>
<td>12-Port Drying Chamber</td>
<td>9.25&quot;</td>
<td>2.0 lbs. (0.9 kg)</td>
</tr>
<tr>
<td>7386800</td>
<td>FreeZone 1 &amp; 2.5 Liter Systems FreeZone Plus 4.5 Liter Systems FreeZone -105° C 4.5 Liter Systems</td>
<td>10.12&quot;</td>
<td>5.0 lbs. (2.3 kg)</td>
</tr>
</tbody>
</table>

**Miscellaneous Accessories**

**7645900 Replacement Neoprene Tubing**
For Dry Ice Benchtop Freeze Dry System connections, 5/16” ID, 3’ length. Shipping weight 5 lbs. (2.3 kg)

**7373436 Vacuum Tubing**
For vacuum pump connection to the Freeze Dry System, 3/4’ ID, 3’ length. Wire-reinforced PVC. Shipping weight 5 lbs. (2.3 kg)

**7579000 Rubber Tubing Clamp**
Clamp completely seals heavy wall vacuum tubing up to 3/4’ ID for use in leak detection. Shipping weight 5 lbs. (2.3 kg)

**8025000 Portable Table**
May be used to support FreeZone 1, 2.5 or 4.5 Liter Benchtop Freeze Dry System on the top shelf while supporting a Rotary Vane or Combination Rotary Vane/ Diaphragm Vacuum Pump on the lower shelf. Glacier white powder-coated tubular steel. 4” diameter casters, two with toe locks. Extruded rubber handle grips. Supports loads up to 400 pounds. Lifetime guarantee. Dimensions: 34.9” x 19.0” x 36.4” h. (37.4 cm x 48.3 cm x 92.5 cm). Shipping weight 44 lbs. (20 kg)

**8075000 Variable Height Bench**
May be used to support a FreeZone 6 Liter Benchtop Freeze Dry System with any drying accessory except the Stoppering Tray Dryer mounted on top. Glacier white powder-coated tubular steel. Phenolic board with melamine high-pressure laminate surface. Height is adjustable from 29.6” to 37.4” (75.1 cm to 94.9 cm) using steel pins with nuts inserted in vertical frame members. 5” diameter, non-marking, toe-locking casters with bearings. Supports loads up to 540 pounds. Lifetime guarantee. Work surface dimensions: 38.0” x 28.0” x 1.1” thick (96.5 cm x 71.1 cm x 2.8 cm). Shipping weight 111 lbs. (50 kg)
Contact Labconco for more information about these quality products for your laboratory.

HEPA-Filtered Biological Safety Cabinets, Enclosures & Clean Benches
Fume Hoods & Ductless Enclosures
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Laboratory Animal Research Stations
Nanotechnology Enclosures
Forensic Enclosures
Glove Boxes
Glassware Washers
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Vacuum Concentrators & Cold Traps
Bio-Concentrators
Multiple Sample Evaporation Systems
Laboratory Carts & Benches
Blood Drawing Chairs
Vacuum Desiccator

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