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 display amber then green to indicate when temperature and vacuum levels are right for adding samples.*

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*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 backstreaming 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® Freeze Dry Systems**

A N O V E R V I E W

Digital Control Panel Displays System Status

*FreeZone® 1 Liter Freeze Dry Systems*

**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).

**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.

Left: A built-in shell freezer may be ordered with selected models of FreeZone 6 Liter Freeze Dry Systems.

Right: A built-in mini vacuum drying chamber holds small samples and heats to +60°C (+140°F). The drying chamber may be ordered with selected models of FreeZone 6, 12 and 18 Liter Freeze Dry Systems.
FreeZone® 2.5–18 Liter Freeze Dry Systems

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.

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.

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.

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

MENU switch. Press to change screen display.

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.

FREEZER switch with LED indicator light. Controls the optional shelf 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.
<table>
<thead>
<tr>
<th>System Capacity</th>
<th>Style</th>
<th>Application Requirements and User Preferences</th>
<th>-50°C (-58°F) Collector/Refrigeration</th>
<th>-84°C (-119°F) Cascade Collector/Refrigeration</th>
</tr>
</thead>
</table>
| 1 Liter         | Benchtop | • Light sample loads  
• Limited floor space  
• Economical | • 1/3 hp refrigeration system  
• Removes 1 liter of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 2.2 liters of water in 24 hours* |
| 2.5 Liters      | Benchtop | • Light sample loads  
• Limited floor space | • 1/3 hp refrigeration system  
• Removes 2 liters of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 2.2 liters of water in 24 hours* |
| 2.5 Liters      | Console | • Light sample loads  
• Low eutectic point samples | • Two 1/3 hp refrigeration systems  
• Removes 2.2 liters of water in 24 hours* |   |
| 2.5 Liters      | Benchtop Triad™ | • Light sample loads  
• Low eutectic point samples  
• Stoppers samples in bottles under vacuum | • Two 1/3 hp refrigeration systems  
• Removes 1.8 liters of water in 24 hours* |   |
| 4.5 Liters      | Benchtop | • Light to moderate sample loads  
• Limited floor space | • 1/3 hp refrigeration system  
• Removes over 2 liters of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 4 liters of water in 24 hours* |
| 4.5 Liters      | Console | • Light to moderate sample loads | • 1/3 hp refrigeration system  
• Removes over 2 liters of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 4 liters of water in 24 hours* |
| 6 Liters        | Benchtop | • Moderate sample loads  
• Limited floor space  
• Available with Stoppering Tray Dryer | • 3/4 hp refrigeration system  
• Removes 4 liters of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 4 liters of water in 24 hours* |
| 6 Liters        | Console | • Moderate sample loads  
• Broadest range of options  
• Available with Stoppering Tray Dryer | • 3/4 hp refrigeration system  
• Removes 4 liters of water in 24 hours* | • Two 1/3 hp refrigeration systems  
• Removes 4 liters of water in 24 hours* |
| 12 Liters       | Console | • Sample loads of varying volumes  
• Available with Stoppering Tray Dryer | • 1 hp refrigeration system  
• Removes 8 liters of water in 24 hours* | • Two 3/4 hp refrigeration systems  
• Removes up to 4 liters of water in 24 hours* |
| 18 Liters       | Console | • Large volumes of material or numerous sample batches | • 1-1/2 hp refrigeration system  
• Removes 10 liters of water in 24 hours* |   |

*Freeze drying rate will be lower for samples other than shell-frozen plain water.
### BUILT-IN OPTIONS

<table>
<thead>
<tr>
<th>-105°C (-157°F)** Cascade Collector/Refrigeration</th>
<th>Purge Valve, Mini Vacuum Drying Chamber &amp; Shell Freezer</th>
<th>Drying Accessory</th>
<th>Vacuum Pump</th>
<th>Glassware</th>
</tr>
</thead>
<tbody>
<tr>
<td>For samples with very low eutectic points including acetonitrile and dilute methanol and ethanol</td>
<td>Available on some models</td>
<td>Tray Dryers, Drying Chambers and Manifolds that accommodate samples in containers or in bulk</td>
<td>See pages 57-59</td>
<td>See pages 60-63</td>
</tr>
</tbody>
</table>

- **REQUIRED—** See drying accessories on pages 52-54.
- **REQUIRED—** See drying accessories on pages 52-54.
- **REQUIRED—** See drying accessories on pages 52-54.
- **REQUIRED—** See drying accessories on pages 52-54.
- **REQUIRED—** See drying accessories on pages 46-54.
- **REQUIRED—** See drying accessories on pages 46-54.

- **REQUIRED—** 86 liters/minute or larger displacement
- **REQUIRED—** 86 liters/minute or larger displacement
- **REQUIRED—** 86 liters/minute or larger displacement
- **REQUIRED—** 86 liters/minute or larger displacement
- **REQUIRED—** 98 liters/minute or larger displacement†
- **REQUIRED—** 98 liters/minute or larger displacement†

- **RECOMMENDED—** unless bulk drying
- **RECOMMENDED—** unless bulk drying
- **RECOMMENDED—** unless bulk drying
- **RECOMMENDED—** unless bulk drying
- **RECOMMENDED—** unless bulk drying
- **RECOMMENDED—** unless bulk drying

| • Two 1/3 hp refrigeration systems | 144 liters/minute displacement is recommended. |
| • Removes 2.5 liters of water in 24 hours* |

- **Permanently installed**
- **One stoppering shelf**
- **4 ports**

- **Permanently installed or included†**
- **10 ports or 12 ports†**

- **Permanently installed or included†**
- **10 ports or 12 ports†**

- **Permanently installed or included†**
- **10 ports or 12 ports†**

- **Permanently installed or included†**
- **10 ports or 12 ports†**

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

- **Purge Valve available**
- **Mini Vacuum Drying Chamber available**

- **Purge Valve available**
- **Mini Vacuum Drying Chamber available**

- **Purge Valve available**
- **Mini Vacuum Drying Chamber available**

* Freeze drying rate will be lower for samples other than shell-frozen plain water.

** -105°C (-157°F) at 60 Hz, -102°C (-152°F) at 50 Hz

†† 144 liters/minute displacement is recommended.
**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.

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

- **Collector drain hose** is accessible from the left-hand side for convenient disposal of defrosted material. It extends about 9 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 (sold separately).

- **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.

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*Exclusive feature*
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 \(-50^\circ\text{C}\) \((-58^\circ\text{F})\). 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 57-59.
- Drying accessory. See pages 52-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

* Freeze drying rate will be lower for samples other than shell-frozen plain water. For optimum performance, room temperature should be 21°C (70°F) or colder.
FreeZone® 2.5 Liter Benchtop Freeze Dry Systems

**Features & Benefits**

- **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).
- **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 (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 9 inches and retracts within the cabinet when not in use.
- **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.
- **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.
- **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 samples from being drawn into the collector and liquid from harming the vacuum pump.
- **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.
- **CE marking.** All 230 volt, 50 Hz models conform to the CE (European Community) directives.

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**HFC/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).

**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.
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:

- 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 57-59.
- Drying accessory. See pages 52-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

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

FEATURES & BENEFITS

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 (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 9 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.

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 samples 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.

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.

Exclusive feature

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.

Exclusive feature
**FreeZone® Plus™ 2.5 Liter Cascade Benchtop Freeze Dry Systems**

### Specifications

**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 57-59.
- Drying accessory. See pages 52-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

**See ordering information on page 34.**

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

**Exclusive feature**
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 PTFE-coated collector chamber and coils for additional corrosion resistance.

Collector drain hose is accessible from the left-hand side for convenient disposal of defrosted material. It extends about 9 inches and retracts within the cabinet when not in use.

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 disposal of defrosted material. It extends about 9 inches and retracts within the cabinet when not in use.

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

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

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 not automatically restart, which prevents melted samples from being drawn into the collector and liquid from harming the vacuum pump.

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.

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 hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).

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

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.
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.
• 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 paused (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.

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

See ordering information on page 34.
**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 (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 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.

- **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.

- **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.

- **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 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 samples 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.

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

- **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.

- **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).

- **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.

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

Exclusive feature
FreeZone® 4.5 Liter Freeze Dry Systems

**Features & Benefits**

- **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.

- **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.

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

- **Rear-mounted electrical receptacle** allows connection of the vacuum 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.

- **HCFC/CFC-free refrigeration system** ensures rapid, environmentally-safe cooling. The condensing module cools the collector coil to \(-50^\circ C\) (\(-58^\circ F\)), 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 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 samples from being drawn into the collector and liquid from harming the vacuum pump.

- **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.
- **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.

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*Freeze drying rate will be lower for samples other than shell-frozen plain water. For optimum performance, room temperature should be 21° C (70° F) or colder.
**FreeZone® Plus™ 4.5 Liter Cascade 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** 10-273-19 is included. No additional drying accessory is required. Alternate drying accessories may be purchased separately.

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

- **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 (sold separately).

- **Collector drain hose** is accessible from the right-hand side for convenient disposal of defrosted material. It extends about 9 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 countertop or laboratory cart.

- **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 samples from being drawn into the collector and liquid from harming the vacuum pump.

- **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.

- **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.

- **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 electrical connection** extends vertically, requiring less space.

- **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 10-273-19 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 57-59.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 35.
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 10-273-19 is included. No additional drying accessory is required. Alternate drying accessories may be purchased separately.

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.

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

Collector drain hose is accessible from the right-hand side for convenient disposal of defrosted material. It extends about 9 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 (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 samples from being drawn into the collector and liquid from harming the vacuum pump.

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.

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.
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 10-273-19 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 57-59.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 35.
**FreeZone® -105° C 4.5 Liter Benchtop Freeze Dry Systems**

**Features & Benefits**

- **Moisture sensor** protects the vacuum pump by preventing refrigeration or vacuum startup 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.

- **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 (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.

- **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.

- **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 samples from being drawn into the collector and liquid from harming the vacuum pump.

- **12-Port Drying Chamber** 10-273-19 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) at 60 Hz or -102° C (-152° F) at 50 Hz, 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).

- **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.
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/CFC-free refrigeration systems to cool collector to -105° C (-157° F) at 60 Hz or -102° C (-152° F) at 50 Hz. For samples containing water, acetonitrile or dilute methanol or ethanol.
- 12-Port Drying Chamber 10-273-19 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.

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

**Exclusive feature**
**FreeZone® 6 Liter Benchtop Freeze Dry Systems**

**FEATURES & BENEFITS**

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

- **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 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.

- **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).

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

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

- **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.

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

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

- **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 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 samples from being drawn into the collector and liquid from harming the vacuum pump.

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

- **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.

- 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.
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.

* Freeze drying rate will be lower for samples other than shell-frozen plain water. For optimum performance, room temperature should be 21° C (70° F) or colder.
**Optional built-in mini vacuum drying chamber** holds small samples, either in bulk or in small containers such as serum bottles. 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.)

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

**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 by preventing refrigeration or vacuum startup when moisture is detected in the collector chamber area.

**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 (sold separately).

**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 samples from being drawn into the collector and liquid from harming the vacuum pump.

**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 include a 3-wire cord with 20 amp NEMA plug.

**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.

**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).

**Exhaust port** when the purge valve is closed.

FEATURAS & BENEFITS

**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.

**Exclusive feature**
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, 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 system 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.
- 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 (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).

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.)
- 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 57-59.
- 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.

*Freeze drying rate will be lower for samples other than shell-frozen plain water. For optimum performance, room temperature should be 21° C (70° F) or colder.
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, 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 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 (230 volts, 60 Hz models).
- CAN/CSA C22.2 No. 61010.1 (230 volts, 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.)
- 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 57-59.
- 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.

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

• Rear-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 57-59.

• Drying accessory. See pages 46-54.

• Freeze dry glassware if not bulk freeze drying. See pages 60-63.

See ordering information on page 41.

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

Exclusive feature
Optional built-in mini vacuum drying chamber holds small samples, either in bulk or in small containers such as serum bottles. 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.)

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.

HCF/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84° C (-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).

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.

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

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" casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (sold separately).

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).

Collector to collector coil and automatically shuts off when the refrigerant reaches +65° C (+149° F).

UV and CAN/CSA standards for signifying they are certified to 115 volts, 60 Hz carry the ETL mark on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark.

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.

Exclusive feature

Optional built-in mini vacuum drying chamber holds small samples, either in bulk or in small containers such as serum bottles. 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.)

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.

HCF/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84° C (-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).

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.

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

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" casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (sold separately).

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).

Collector to collector coil and automatically shuts off when the refrigerant reaches +65° C (+149° F).

UV and CAN/CSA standards for signifying they are certified to 115 volts, 60 Hz carry the ETL mark on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark.

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.

HCF/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84° C (-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).

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.

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

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" casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (sold separately).

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).

Collector to collector coil and automatically shuts off when the refrigerant reaches +65° C (+149° F).

UV and CAN/CSA standards for signifying they are certified to 115 volts, 60 Hz carry the ETL mark on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark.

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.

HCF/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84° C (-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).

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

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" casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (sold separately).

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).

Collector to collector coil and automatically shuts off when the refrigerant reaches +65° C (+149° F).

UV and CAN/CSA standards for signifying they are certified to 115 volts, 60 Hz carry the ETL mark on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark.

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.

HCF/CFC-free refrigeration systems ensure rapid, environmentally-safe cooling. Two refrigeration systems, used in series, cool the stainless steel collector to -84° C (-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).

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

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" casters, is powder-coated steel with a removable brushed stainless steel front panel. The roomy interior accommodates a vacuum pump (sold separately).

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).

Collector to collector coil and automatically shuts off when the refrigerant reaches +65° C (+149° F).

UV and CAN/CSA standards for signifying they are certified to 115 volts, 60 Hz carry the ETL mark on 115 volts, 60 Hz or 230 volts, 60 Hz carry the ETL mark.

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.
FreeZone® Plus™ 6 Liter Cascade Freeze Dry Systems

**SPECIFICATIONS**

**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.
- 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 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 57-59.
- Drying accessory. See pages 46-54.
- Freeze dry glassware if not bulk freeze drying. See pages 60-63.

**See ordering information on page 39.**

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

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FreeZone® Plus™ 12 Liter Cascade Freeze Dry Systems

SPECIFICATIONS

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 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 57-59.
- 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® Freeze Dry Systems
ORDERING INFORMATION

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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<tbody>
<tr>
<td>10-030-126</td>
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<td>115 volts, 20 amps</td>
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<td>85 lbs. (39 kg)</td>
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FreeZone® 2.5 Liter Benchtop Freeze Dry Systems. See specifications on page 9.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
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<th>Shipping Weight</th>
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Plug Configurations

115 volts, 20 amps  North America, 230 volts  Schuko

*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® 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>
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FreeZone® Plus® 2.5 Liter Cascade Console Freeze Dry Systems. See specifications on page 13.

<table>
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<th>Catalog Number</th>
<th>Electrical Requirements</th>
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FreeZone® 4.5 Liter Benchtop Freeze Dry Systems. See specifications on page 15.

<table>
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<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
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<td>North America, 230 volts</td>
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<td>102 lbs. (46 kg)</td>
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Plug Configurations

- 115 volts, 20 amps
- North America, 230 volts
- Schuko

*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 Console Freeze Dry Systems

See specifications on page 17.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
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<td>10-271-20</td>
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<td>North America, 230 volts</td>
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<td>North America, 230 volts</td>
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### FreeZone® Plus™ 4.5 Liter Cascade Benchtop Freeze Dry Systems

See specifications on page 19.

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<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>16-108-500</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>16-108-501</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>16-108-502</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>16-108-503</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>16-108-504*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
<tr>
<td>16-108-505*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>131 lbs. (59 kg)</td>
</tr>
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</table>

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

See specifications on page 21.

<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>16-108-506</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>16-108-507</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-108-508</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>16-108-509</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>16-108-510*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-108-511*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>181 lbs. (82 kg)</td>
</tr>
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</table>

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

See specifications on page 23.

<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>16-080-200</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>16-080-201</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-080-202</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>16-080-203</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>16-080-206*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-080-207*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>Schuko</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-080-204*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>British (UK)</td>
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<td>180 lbs. (82 kg)</td>
</tr>
<tr>
<td>16-080-205*</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>16-080-208*</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>16-080-209*</td>
<td>230 volts, 50 Hz, 10.0 A'</td>
<td>China/Australia</td>
<td></td>
<td>180 lbs. (82 kg)</td>
</tr>
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</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>10-271-22</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>10-271-23</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>10-271-26</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td>150 lbs. (68 kg)</td>
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<tr>
<td>10-271-27</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td>150 lbs. (68 kg)</td>
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<tr>
<td>10-271-24</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
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<td>150 lbs. (68 kg)</td>
</tr>
<tr>
<td>10-271-25</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td>150 lbs. (68 kg)</td>
</tr>
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</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>16-208-502</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)</td>
</tr>
<tr>
<td></td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>16-208-503</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)</td>
</tr>
<tr>
<td></td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-57</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg)</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A†**</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-58</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>572 lbs. (259 kg)</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A†**</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-55</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
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<td></td>
<td>572 lbs. (259 kg)</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A†**</td>
<td>Schuko</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-56</td>
<td>230 volts, 50 Hz, 8.0 A†**</td>
<td>Schuko</td>
<td></td>
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<td>572 lbs. (259 kg)</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A†**</td>
<td>Schuko</td>
<td></td>
<td></td>
<td>Shipped in two cartons</td>
</tr>
</tbody>
</table>

### Plug Configurations

115 volts, 20 amps  
North America, 230 volts  
Schuko

*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**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Receptacle &amp; Plug Type</th>
<th>PTFE-Coated Collector &amp; Chamber</th>
<th>Purge Valve</th>
<th>Mini Chamber</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-271-28</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>10-271-29</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>10-271-30</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>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-31</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-32</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>10-271-33</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>10-271-40</td>
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<td>North America, 230 volts</td>
<td></td>
<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>10-271-41</td>
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<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>254 lbs. (115 kg)</td>
</tr>
<tr>
<td>10-271-42</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-43</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-44</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<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>10-271-45</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>272 lbs. (123 kg)</td>
</tr>
<tr>
<td>10-271-34*</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>10-271-35*</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>10-271-36*</td>
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<td>Schuko</td>
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<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-37*</td>
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<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>257 lbs. (117 kg)</td>
</tr>
<tr>
<td>10-271-38*</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>10-271-39*</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>
</tbody>
</table>

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 &amp; Chamber</th>
<th>Purge Valve</th>
<th>Shell Freezer</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-208-504</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
</tr>
<tr>
<td>16-208-505</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
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<tr>
<td>10-271-50</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>10-271-51</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>10-271-48*</td>
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<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>324 lbs. (147 kg)</td>
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<tr>
<td>10-271-49*</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>
</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 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>
</tr>
</thead>
<tbody>
<tr>
<td>16-208-506</td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>16-208-507</td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>16-208-508</td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>115 volts, 60 Hz, 16.0 A&quot;</td>
<td>115 volts, 20 amps</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-67</td>
<td>230 volts, 60 Hz, 8.0 A'</td>
<td>North America, 230 volts</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 60 Hz, 9.0 A&quot;</td>
<td>North America, 230 volts</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-68</td>
<td>230 volts, 60 Hz, 8.0 A&quot;</td>
<td>North America, 230 volts</td>
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<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 60 Hz, 9.0 A&quot;</td>
<td>North America, 230 volts</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-69</td>
<td>230 volts, 60 Hz, 8.0 A&quot;</td>
<td>North America, 230 volts</td>
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<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 60 Hz, 9.0 A&quot;</td>
<td>North America, 230 volts</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
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<tr>
<td>10-274-70</td>
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<td>North America, 230 volts</td>
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<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
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<tr>
<td></td>
<td>230 volts, 60 Hz, 9.0 A&quot;</td>
<td>North America, 230 volts</td>
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<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
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<tr>
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<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A&quot;</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-64*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A&quot;</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>676 lbs. (307 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-65*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A&quot;</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td>10-274-66*</td>
<td>230 volts, 50 Hz, 8.0 A'</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
<tr>
<td></td>
<td>230 volts, 50 Hz, 9.0 A&quot;</td>
<td>Schuko</td>
<td>•</td>
<td></td>
<td>679 lbs. (308 kg)</td>
<td>Shipped in two cartons</td>
</tr>
</tbody>
</table>

---

**Plug Configurations**

- **115 volts, 20 amps**
- **North America, 230 volts**
- **Schuko**

---

*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® Plus® 6 Liter Cascade Console Freeze Dry Systems.** See specifications on page 31.

<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>
</tr>
</thead>
<tbody>
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<td>115 volts, 20 amps</td>
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<td></td>
<td>270 lbs. (122 kg)</td>
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<td>270 lbs. (122 kg)</td>
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<tr>
<td>16-208-5010</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>273 lbs. (124 kg)</td>
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<tr>
<td>10-271-55</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td>273 lbs. (124 kg)</td>
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<tr>
<td>16-208-5011</td>
<td>115 volts, 60 Hz, 16.0 A**</td>
<td>115 volts, 20 amps</td>
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<td></td>
<td>288 lbs. (131 kg)</td>
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<td>288 lbs. (131 kg)</td>
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<td>10-271-58*</td>
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<td>270 lbs. (122 kg)</td>
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<td>273 lbs. (124 kg)</td>
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<td>273 lbs. (124 kg)</td>
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<td></td>
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<td>288 lbs. (131 kg)</td>
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</table>

*International electrical configuration.*  † System amperage shown includes 4.5 amp maximum vacuum pump rating.

**FreeZone® 12 Liter Console Freeze Dry Systems.** See specifications on page 38.

<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>
</tr>
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<tbody>
<tr>
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<td>North America, 230 volts</td>
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<td>275 lbs. (125 kg)</td>
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<td>16-208-5013</td>
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<td>North America, 230 volts</td>
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<td></td>
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<td>275 lbs. (125 kg)</td>
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<td>10-271-78</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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<td>278 lbs. (126 kg)</td>
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<td>293 lbs. (133 kg)</td>
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<td>Schuko</td>
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<td>275 lbs. (125 kg)</td>
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<tr>
<td>10-271-71*</td>
<td>230 volts, 50 Hz, 9.0 A‘</td>
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<td></td>
<td></td>
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<td>275 lbs. (125 kg)</td>
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<tr>
<td>10-271-72*</td>
<td>230 volts, 50 Hz, 9.0 A‘</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>278 lbs. (126 kg)</td>
</tr>
<tr>
<td>10-271-73*</td>
<td>230 volts, 50 Hz, 9.0 A‘</td>
<td>Schuko</td>
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<td></td>
<td></td>
<td>278 lbs. (126 kg)</td>
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<tr>
<td>10-271-74*</td>
<td>230 volts, 50 Hz, 9.0 A‘</td>
<td>Schuko</td>
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<td>293 lbs. (133 kg)</td>
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<tr>
<td>10-271-75*</td>
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<td>293 lbs. (133 kg)</td>
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FreeZone® 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>
<td>16-208-5016</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td></td>
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<td>697 lbs. (316 kg)</td>
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<td>16-208-5017</td>
<td>230 volts, 60 Hz, 8.0 A†</td>
<td>North America, 230 volts</td>
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<td>697 lbs. (316 kg)</td>
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<tr>
<td>16-208-5018</td>
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<td>North America, 230 volts</td>
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<td>700 lbs. (318 kg)</td>
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<td>North America, 230 volts</td>
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<td></td>
<td></td>
<td>700 lbs. (318 kg)</td>
</tr>
<tr>
<td>10-274-71*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>697 lbs. (316 kg)</td>
</tr>
<tr>
<td>10-274-72*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>697 lbs. (316 kg)</td>
</tr>
<tr>
<td>10-274-73*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>700 lbs. (318 kg)</td>
</tr>
<tr>
<td>10-274-74*</td>
<td>230 volts, 50 Hz, 8.0 A†</td>
<td>Schuko</td>
<td></td>
<td></td>
<td></td>
<td>700 lbs. (318 kg)</td>
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FreeZone® FreeZone® Plus™ 12 Liter Cascade Freeze Dry Systems. See specifications on page 32.

<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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<td>319 lbs. (145 kg)</td>
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<td>10-271-90</td>
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<td>North America, 230 volts</td>
<td></td>
<td></td>
<td></td>
<td>322 lbs. (146 kg)</td>
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<tr>
<td>10-271-91</td>
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<td>North America, 230 volts</td>
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<td></td>
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<td>322 lbs. (146 kg)</td>
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<tr>
<td>10-271-93</td>
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<td>230 volts, 50 Hz, 9.0 A†</td>
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<td>319 lbs. (145 kg)</td>
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<td>230 volts, 50 Hz, 9.0 A†</td>
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<td>230 volts, 50 Hz, 9.0 A†</td>
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<td></td>
<td></td>
<td>322 lbs. (146 kg)</td>
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</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.
††Electrical requirements of the Stoppering Tray Dryer.
Dry Ice Benchtop Freeze Dry System

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.

10-273-18 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 57-59 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, serum bottles on the processing shelf may be stoppered under vacuum using a pneumatic mechanism that does not require compressed gas.

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

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

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

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.

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

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.

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

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.
**Features & Benefits**

**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 serum bottles. Stoppers should be inserted in container openings in the raised position.

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

**Serum Bottle Capacity of the FreeZone Triad System**

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalog Number</th>
<th>Shelf Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ml</td>
<td>7575010*</td>
<td>400</td>
</tr>
<tr>
<td>3 ml</td>
<td>7575210*</td>
<td>441</td>
</tr>
<tr>
<td>5 ml</td>
<td>06-406-50A</td>
<td>233</td>
</tr>
<tr>
<td>10 ml</td>
<td>06-406-50B</td>
<td>196</td>
</tr>
<tr>
<td>20 ml</td>
<td>22-365-742</td>
<td>121</td>
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<tr>
<td>30 ml</td>
<td>06-406-50C</td>
<td>86</td>
</tr>
<tr>
<td>50 ml</td>
<td>7573810*</td>
<td>64</td>
</tr>
<tr>
<td>100 ml</td>
<td>7574010*</td>
<td>42</td>
</tr>
<tr>
<td>125 ml</td>
<td>7574210*</td>
<td>36</td>
</tr>
</tbody>
</table>

* Contact Fisher Scientific for ordering information.
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.

**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.

**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.

**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.
Specifications:

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

Models conform to the following standards:

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

Option includes:

- Domestic or international electrical configuration.

All models require (not included):

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

See page 51 for FreeZone Triad accessories.

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

** International electrical configuration
FreeZone® Stoppering Tray Dryers

**Features & Benefits**

**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 opened to introduce inert gas into the chamber when the gas line is connected to the backfill port.

**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 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.

**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 or ampules. Samples may be lyophilized and then stoppered, if desired, on three large adjustable shelves. See the chart on page 47 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.

* Contact Fisher Scientific for ordering information.
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.

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

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

**“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.

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

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

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

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

**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.

### Built-in pneumatic mechanism stops containers on all three shelves.

The Stoppering Tray Dryer may be loaded with unstoppered serum bottles on all three shelves. Stoppers should be inserted in bottle openings in the raised position.

When the stoppering control is activated, atmospheric pressure causes the diaphragm to expand. Pressure from the expanding diaphragm causes the bottom shelf to rise until the loaded tray makes contact with the shelf above it.

The diaphragm continues to expand until all three shelves have made contact with each other allowing all serum bottles to be stoppered under vacuum.

### Serum Bottle Capacity of the Stoppering Tray Dryer

<table>
<thead>
<tr>
<th>Size</th>
<th>Catalog Number</th>
<th>Shelf 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>06-406-50A</td>
<td>228</td>
<td>3</td>
<td>684</td>
</tr>
<tr>
<td>10 ml</td>
<td>06-406-50B</td>
<td>195</td>
<td>3</td>
<td>585</td>
</tr>
<tr>
<td>20 ml</td>
<td>22-365-742</td>
<td>132</td>
<td>3</td>
<td>396</td>
</tr>
<tr>
<td>30 ml</td>
<td>06-406-50C</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>

* Contact Fisher Scientific for ordering information.
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.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Requirements</th>
<th>Plug Type</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-274-50</td>
<td>115 volts, 60 Hz, 16.0 A</td>
<td>115 volts, 20 amps</td>
<td>422 lbs. (191 kg)</td>
</tr>
<tr>
<td>10-274-52</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>10-274-51*</td>
<td>230 volts, 50 Hz, 9.0 A</td>
<td>Schuko</td>
<td>422 lbs. (191 kg)</td>
</tr>
</tbody>
</table>

See page 51 for Stopping Tray Dryer accessories.
FreeZone® Bulk Tray Dryers

**FEATURES & BENEFITS**

**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 user-supplied PC. 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.

**Three shelves, each with a 200-watt heater**, provide ample room for bulk samples or samples in serum bottles. 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.

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

**Six-Port Manifold** (**models 16-317-92 and 16-317-94**) 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.

**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.
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 PC. 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 10-273-33.
- 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 57-59.
- 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>16-317-91</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>16-317-92</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>16-208-5022</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>780604**</td>
<td>230 volts, 60 Hz, 4.0 A</td>
<td>North America, 230 volts</td>
<td></td>
<td>262 lbs. (119 kg)</td>
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<tr>
<td>16-317-93*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>Schuko</td>
<td></td>
<td>262 lbs. (119 kg)</td>
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<tr>
<td>16-317-94*</td>
<td>230 volts, 50 Hz, 4.0 A</td>
<td>Schuko</td>
<td></td>
<td>262 lbs. (119 kg)</td>
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</tbody>
</table>

See page 51 for Bulk Tray Dryer accessories.
**FreeZone® Triad™ Stoppering Tray Dryers & Bulk Tray Dryers**

**ACCESSORIES**

- **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 16-317-91, 16-208-5022 and 16-317-93 and Bulk Tray Dryers 7806060** and 7806070**. The Isolation Valve and 6-Port Tray Dryer Manifold 10-273-33 may not be field installed together.* Shipping weight 5 lbs. (2.3 kg)

- **51 Catalog Description Shipping Number**
  - **10-269-104** Heated Shelf with Sensor for 115 volt, 50/60 Hz operation
  - **10-269-105** Heated Shelf with Sensor for 230 volt, 50/60 Hz operation
  - **7754100** Sensor only

- **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 17 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)

- **10-273-36 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 serum bottles. One pair. Shipping weight 3 lbs. (1.4 kg)

**For FreeZone Stoppering Tray Dryers**

- **10-273-33 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 16-317-92, 7806041, 16-317-94, 7806061** and 7806071**. Shipping weight 19 lbs. (8.6 kg)

**For FreeZone Bulk Tray Dryers**

- **10-269-106 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)

- **10-273-35 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)

- **7754100** 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 17 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)

*Contact Labconco for ordering information on models with factory-installed 6-Port Tray Dryer Manifold and Isolation Valve.

** Contact Fisher Scientific for ordering information.
Use the key below to select the drying chamber or manifold that will fit the FreeZone System you have selected.

1 = Fits any FreeZone 1 Liter Freeze Dry System
2.5 = Fits any FreeZone 2.5 Liter Freeze Dry System
4.5 = Fits any FreeZone 4.5 Liter Freeze Dry System
4.5A = Fits any FreeZone 4.5 Liter Freeze Dry System with Attachment Port Lid Accessory 10-271-G attached (sold separately)
4.5P = Fits any FreeZone Plus 4.5 Liter Cascade Freeze Dry System
6 = Fits any FreeZone 6 Liter Freeze Dry System
12 = Fits any FreeZone 12 Liter Freeze Dry System
18 = Fits any FreeZone 18 Liter Freeze Dry System

10-273-19 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

10-273-20 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.

Catalog Dimensions Accommodate For use with: Shipping Wt.
10-030-155 9.25” dia. x 9.75” h (23.5 cm x 24.4 cm) Product Shelves 10-030-152, Heated Product Shelves 10-273-6, 10-273-7, 10-030-150 and 10-030-151 1, 2.5, 4.5, 6, 12, 18 13.5 lbs. (5.9 kg)

10-030-156 12.0” dia. x 12.6” h (30.5 cm x 38.0 cm) Product Shelves 10-030-152, and 10-030-153, Heated Product Shelves 10-030-130, 10-030-151, 10-273-10, 10-273-11, 10-273-6 and 10-273-7 6, 12, 18 15 lbs. (6.8 kg)

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.

Catalog Dimensions Accommodate For use with: Shipping Wt.
10-030-154 9.25” dia. x 9.75” h (23.5 cm x 24.4 cm) Product Shelves 10-030-152, Heated Product Shelves 10-030-150, 10-030-151, 10-273-6 and 10-273-7 1, 2.5, 4.5, 6, 12, 18 13.5 lbs. (5.9 kg)

10-271-1A 12.0” dia. x 12.6” h (30.5 cm x 36.6 cm) Product Shelves 10-030-152, and 10-030-153, Heated Product Shelves 10-030-130, 10-030-151, 10-273-10, 10-273-11, 10-273-6 and 10-273-7 6, 12, 18 15 lbs. (6.8 kg)

Catalog Dimensions Accommodate For use with: Shipping Wt.
10-030-153 10.3” dia. x 13.1” h (26.2 cm x 33.3 cm) Product Shelves 10-030-152, and 10-030-153, Heated Product Shelves 10-030-130, 10-030-151, 10-273-10, 10-273-11, 10-273-6 and 10-273-7 6, 12, 18 (5.9 kg)
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 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.

10-269-825 Mini Stoppering Chamber

Ideal for lyophilizing sample in small serum bottles with split stoppers. Mini Stoppering Chamber attaches to a neoprene valve on any Labconco Drying Chamber or Manifold. Once the samples are lyophilized, the bottles can be stoppered while still under vacuum. Accommodates up to forty-eight 2 milliliter serum bottles or eight 30 milliliter serum bottles. Stoppering travel distance is 0.5” (12.7 mm). Using zero, one or two of the spacers provided, the chamber can accommodate bottles that range in height from 1.38” (35 mm) to 2.48” (63 mm). Includes one tray, two spacers; 1” OD and 1/2” ID PVC tubing, 36” long; two hose clamps; and 1/2” diameter stainless steel connector. Shipping weight 15 lbs. (6.8 kg)

Product Shelves

Accommodate bulk samples, microtiter plates or serum bottles.

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.

---

**Catalog Shelves**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Shelves Dimensions</th>
<th>For use with Chambers</th>
<th>Shipping Weight</th>
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<tr>
<td>10-030-152</td>
<td>9.4” h. x 6.25” dia. (23.9 cm x 15.9 cm)</td>
<td>10-273-20, 10-030-154, 10-030-155, 10-030-156, 10-273-19 and 10-271-1A</td>
<td>1.5 lbs. (0.7 kg)</td>
</tr>
<tr>
<td>10-030-153</td>
<td>12.2” h. x 9.9” dia. (31.0 cm x 25.1 cm)</td>
<td>10-273-20, 10-030-156 and 10-271-1A</td>
<td>2.0 lbs. (0.9 kg)</td>
</tr>
</tbody>
</table>

**Heated Product Shelves with Variable Heat Control**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Shelves Dimensions</th>
<th>Electrical Requirements</th>
<th>For use with Chambers</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-273-6</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>10-273-19, 10-273-20, 10-030-155, 10-030-156, 10-030-154 and 10-271-1A</td>
<td>13 lbs. (5.9 kg)</td>
</tr>
<tr>
<td>10-030-150</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>10-273-20, 10-030-153, 10-030-156, 10-030-154 and 10-271-1A</td>
<td>14 lbs. (6.4 kg)</td>
</tr>
<tr>
<td>10-273-10</td>
<td>10.0” dia. x 11.75” h (24.3 cm x 29.8 cm)</td>
<td>115 volts, 50/60 Hz</td>
<td>10-273-20, 10-030-156 and 10-271-1A</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
<tr>
<td>10-273-7*</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>10-273-19, 10-273-20, 10-030-155, 10-030-156, 10-030-154 and 10-271-1A</td>
<td>13 lbs. (5.9 kg)</td>
</tr>
<tr>
<td>10-030-151*</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>10-273-20, 10-030-153, 10-030-156, 10-030-154 and 10-271-1A</td>
<td>14 lbs. (6.4 kg)</td>
</tr>
<tr>
<td>10-273-11*</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>10-273-20, 10-030-156 and 10-271-1A</td>
<td>15 lbs. (6.8 kg)</td>
</tr>
</tbody>
</table>

* International electrical configuration
## Drying Accessories

**10-030-157 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)

**10-273-14 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. (7 kg)

**10-273-15 10-Port Manifold with Support Shelf**
10.0” h x 29.6” w x 14.6” d (25.4 cm x 75.2 cm x 37.1 cm). Type 304 stainless steel, complete with ten neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters and adjustable aluminum support shelf with stainless steel rods. Shipping weight 11 lbs. (5 kg)

**10-273-14 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. (7 kg)

**10-273-15 10-Port Manifold with Support Shelf**
10.0” h x 29.6” w x 14.6” d (25.4 cm x 75.2 cm x 37.1 cm). Type 304 stainless steel, complete with ten neoprene valves with molded plastic knobs that accommodate both 1/2” and 3/4” adapters and adjustable aluminum support shelf with stainless steel rods. Shipping weight 11 lbs. (5 kg)

**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 kg)

**10-273-16 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. (7 kg)

**10-273-2 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 kg)

**10-271-G 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 10-030-157, 20-Port Manifold 10-273-14, 48-Port Manifold 10-273-2 or Clear Chamber 10-271-1A. 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 lbs. (1 kg)

**Contact Fisher Scientific for ordering information.**
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)

16-316-14 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 16-316-14
Shipping weight 4 lbs. (1.8 kg)

16-109-458 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>10-269-46A</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>10-269-46B*</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>10-269-46C*</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.
** Contact Fisher Scientific for ordering information.
PrimeMate Oil Change System reduces the hassle and mess of changing the oil in your rotary vane or hybrid pump. Depending on your pump, the PrimeMate performs up to four oil changes before the clean oil container must be replaced or refilled and the used oil container emptied. In less than 13 minutes, the used oil is drained and the pump filled with clean oil. A quick connect coupler attached to your pump’s drain port provides easy tube attachment.

Specifications:
Components include powder-coated housing with lift off cover; one empty 1 gallon (3.8 L) plastic used oil container; one empty 1 gallon (3.8 L) plastic clean oil container; two peristaltic pumps (one fill and one drain); 6’ (1.83 meters) drain/fill flexible tubing with connectors; power switch; drain switch; fill switch; and indicator lights for ‘power’, ‘draining’, ‘filling’ and ‘waste full’. Also includes 12 volt DC power supply, power cord with plug, and male 1/4 NPT coupler for connection to a user-supplied rotary vane vacuum pump. Note: the coupler fits rotary vane vacuum pumps sold by Labconco Corporation. If user-supplied pump has a drain port not compatible with a 1/4 NPT coupling connection, a suitable adapter will be required. See accessories. Dimensions: 16.4” w x 13.4” d x 15.75” h (41.6 x 33.9 x 40.0 cm). Shipping weight 32 lbs. (14.5 kg)

Battery Packs. For providing up to 8 hours of power to the PrimeMate when electricity is not accessible. Pack mounts to the back of the PrimeMate. Battery, bracket, charger and fasteners are provided. Installation is required. Shipping weight 7 lbs. (3.2 kg)

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Battery Pack for use with</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-269-735</td>
<td>PrimeMate 10-269-730 &amp; 10-269-734</td>
</tr>
<tr>
<td>10-269-736*</td>
<td>PrimeMate 10-269-731</td>
</tr>
<tr>
<td>10-269-737*</td>
<td>PrimeMate 10-269-732</td>
</tr>
<tr>
<td>10-269-738*</td>
<td>PrimeMate 10-269-733</td>
</tr>
</tbody>
</table>

10-269-742 Coupler. Quick connecting. For attaching the drain/fill tubing to vacuum pumps with 1/4 NPT plug threads. Useful when PrimeMate is servicing multiple vacuum pumps (One per pump is required). One is supplied with each PrimeMate. Shipping weight 0.5 lb. (0.2 kg)

10-269-741 Adapter. For attaching the drain/fill coupler to vacuum pumps with 7/8-14 drain plug threads. Requires 10-269-742 Coupler (one included with each PrimeMate). Shipping weight 0.5 lb. (0.2 kg)

See page 64 for an accessory Utility Cart.* International electrical configuration
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)</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Liter Benchtop</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>10-030-126, 10-030-127</td>
<td></td>
<td>10-269-60</td>
<td>58</td>
</tr>
<tr>
<td>7740060*, 7740061*, 7740070*, 7740071*</td>
<td>Aqueous and/or Solvents</td>
<td>16-108-436</td>
<td>59</td>
</tr>
<tr>
<td>58 Liter Benchtop &amp; Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>2.5 Liter Cascade Benchtop &amp; Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>10-030-161, 10-030-162, 7400060*, 7400061*, 7400070*, 7400071*</td>
<td>Aqueous and/or Solvents</td>
<td>16-108-436</td>
<td>59</td>
</tr>
<tr>
<td>58 Liter Console &amp; Cascade Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>10-030-171, 10-030-170, 7400060*, 7400070*</td>
<td>Aqueous and/or Solvents</td>
<td>10-030-182</td>
<td>58</td>
</tr>
<tr>
<td>4.5 Liter Benchtop &amp; Console, Cascade Benchtop &amp; Console, -10° C Benchtop</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>58 Liter Console &amp; Cascade Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>58 Liter Console &amp; Cascade Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
<tr>
<td>58 Liter Console &amp; Cascade Console</td>
<td>Aqueous</td>
<td>01-096-21</td>
<td>59</td>
</tr>
</tbody>
</table>

* Contact Fisher Scientific for ordering information.
**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 FreezeZone 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 x 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.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Electrical Configuration</th>
<th>Displacement At 60 Hz (50 Hz)</th>
<th>Dimensions w x d x h inches (cm)</th>
<th>Shipping Weight lbs. (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-269-60</td>
<td>115 volts, 60 Hz, 5.1 A</td>
<td>115 liters/minute</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>10-030-182</td>
<td>230 volts, 50/60 Hz, 2.7 A</td>
<td>115 liters/minute</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>
</tbody>
</table>

*VACUUBRAND HYBRID™ is a trademark of VACUUBRAND GMBH + CO KG.*
Vacuum Pump Accessories


<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Volume</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988000**</td>
<td>One liter</td>
<td>2 lbs. (1 kg)</td>
</tr>
<tr>
<td>10-269-739</td>
<td>One gallon (3.8 L)</td>
<td>12 lbs. (5 kg)</td>
</tr>
</tbody>
</table>

1472200** Inlet Filter. For General Purpose Vacuum Pumps 01-096-21, 16-315-51, 16-108-436, 10-962-0, 16-315-52 and 10-030-180. 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 01-096-21, 16-315-51, 16-108-436, 10-962-0, 16-315-52 and 10-030-180. 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)

10-030-181 VACUUBRAND B-Oil. One liter. Replacement oil for VACUUBRAND HYBRID Vacuum Pumps 10-269-60 and 10-030-182. Shipping weight 2 lbs. (1 kg)

10-269-740 Vacuum Pump Oil. One gallon (3.8 L) synthetic hydrocarbon oil. Shipping weight 12 lbs. (5 kg)

* VACUUBRAND® and VACUUBRAND HYBRID® are trademarks 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). Cast aluminum casing and rubber feet.
- 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.
- 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 01-096-21, 16-315-51 and 16-108-436).
- Lifting bracket (Models 10-962-0, 16-315-52 and 10-030-180).

* Not for direct electrical connection to FreeZone Systems in this catalog.
** Contact Fisher Scientific for ordering information.
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.

<table>
<thead>
<tr>
<th>Flask Size</th>
<th>Complete Flask</th>
<th>Flask Bottom</th>
<th>Flask Top</th>
<th>Flask Top Adapter Diameter*</th>
<th>Dimensions/ Flask Bottom D x H</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 ml</td>
<td>10-269-50</td>
<td>10-269-50B</td>
<td>10-269-50A</td>
<td>1/2&quot;</td>
<td>76 mm x 34 mm</td>
</tr>
<tr>
<td>80 ml</td>
<td>10-269-51</td>
<td>10-269-51B</td>
<td>10-269-51A</td>
<td>1/2&quot;</td>
<td>115 mm x 34 mm</td>
</tr>
<tr>
<td>120 ml</td>
<td>10-269-62</td>
<td>10-269-62A</td>
<td>10-269-52A</td>
<td>3/4&quot;</td>
<td>68 mm x 59.2 mm</td>
</tr>
<tr>
<td>150 ml</td>
<td>10-269-52</td>
<td>10-269-52B</td>
<td>10-269-52A</td>
<td>3/4&quot;</td>
<td>85 mm x 59.2 mm</td>
</tr>
<tr>
<td>300 ml</td>
<td>10-269-53</td>
<td>10-269-53A</td>
<td>10-269-52A</td>
<td>3/4&quot;</td>
<td>145 mm x 59.2 mm</td>
</tr>
<tr>
<td>600 ml</td>
<td>10-269-54</td>
<td>10-269-54A</td>
<td>10-269-54A</td>
<td>3/4&quot;</td>
<td>135 mm x 90.2 mm</td>
</tr>
<tr>
<td>750 ml</td>
<td>10-272-06</td>
<td>7542700**</td>
<td>10-269-54A</td>
<td>3/4&quot;</td>
<td>162 mm x 90.2 mm</td>
</tr>
<tr>
<td>900 ml</td>
<td>10-269-63</td>
<td>10-269-63A</td>
<td>10-269-54A</td>
<td>3/4&quot;</td>
<td>190 mm x 90.2 mm</td>
</tr>
<tr>
<td>1200 ml</td>
<td>10-269-55</td>
<td>10-269-55B</td>
<td>10-269-54A</td>
<td>3/4&quot;</td>
<td>240 mm x 90.2 mm</td>
</tr>
<tr>
<td>2000 ml</td>
<td>10-269-56</td>
<td>10-269-56B</td>
<td>10-269-54A</td>
<td>3/4&quot;</td>
<td>380 mm x 90.2 mm</td>
</tr>
</tbody>
</table>

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
--- | ---
10-269-601 | Small Flask Holder. Compatible with inner flasks 10-269-30B (40 ml) and 10-269-51B (80 ml) and outer flasks 10-272-06 (750 ml) and 10-269-63 (900 ml).
10-269-600 | Large Flask Holder. Compatible with inner flasks 10-269-62A (120 ml), 10-269-52B (150 ml) and 10-269-53B (300 ml) and outer flasks 10-272-06 (750 ml) and 10-269-55 (1200 ml).

7540100** FreeZone Freeze Dry Glassware Kit
Includes one each 600 ml Complete Fast-Freeze Flask (10-269-54), one each 300 ml Complete Fast-Freeze Flask (10-269-53), one each 3/4" dia. Stainless Steel Straight Adapter (10-269-61A), and one each 3/4" dia. Stainless Steel 45° Bend Adapter. Shipping weight 5 lbs. (2 kg)

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.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Straight Adapter</th>
<th>45° Bend Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>10-269-58A</td>
<td>10-269-58B</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>10-269-59A</td>
<td>10-269-59B</td>
</tr>
</tbody>
</table>

Borosilicate Glass
1/2" flask top to 1/2" valve* 10-269-57A 10-269-57B
3/4" flask top to 3/4" valve* 10-269-58A 10-269-58B
1/2" flask top to 1/2" valve* 10-269-59A 10-269-59B
3/4" flask top to 1/2" valve* 10-269-59A 10-269-59B

Stainless Steel
1/2" flask top to 1/2" valve* 10-269-60A 10-269-60B
3/4" flask top to 3/4" valve* 10-269-61A 10-269-61B

10-269-64 Replacement Filter Paper
1000 (10 packages of 100). 1" diameter (28 mm). Pore size 17 microns. Shipping weight 0.5 lb. (0.2 kg)

*Valves on the freeze dry systems, drying chambers and manifolds offered in this catalog fit adapters of both 1/2" and 3/4" sizes. Size information is provided for selecting adapters for older Labconco models and other freeze dryers.

** Contact Fisher Scientific for ordering information.

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>Flask Bottom</th>
<th>Flask Bottom</th>
<th>Dimensions</th>
<th>Flasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 ml</td>
<td>10-269-67A 10-269-68A</td>
<td>7552000** 7556000** 7559000** 7557000**</td>
<td>37 mm x 34 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>10-269-67B 10-269-68B</td>
<td>7552000** 7556000** 7559000** 7557200**</td>
<td>67 mm x 34 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 ml</td>
<td>10-269-67C 10-269-68C</td>
<td>7552200** 7556200** 7559200** 7557400**</td>
<td>50 mm x 59.2 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 ml</td>
<td>10-269-67D 10-269-68D</td>
<td>7552200** 7556200** 7559200** 7557600**</td>
<td>110 mm x 59.2 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 ml</td>
<td>10-269-67E 10-269-68E</td>
<td>7552400** 7556400** 7559400** 7557800**</td>
<td>103 mm x 90.2 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750 ml</td>
<td>10-269-67F 10-269-68F</td>
<td>7552400** 7556400** 7559400** 7558000**</td>
<td>145 mm x 90.2 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000 ml</td>
<td>10-269-67G 10-269-68G</td>
<td>7552400** 7556400** 7559400** 7558000**</td>
<td>187 mm x 90.2 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

Adapters

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

**90° Bend Adapter**

**Description**

- 10-269-69A Connects 19/38 STJ Flask Top to 1/2" valve*
- 10-269-69B Connects 19/38 STJ Flask Top to 3/4" valve*
- 10-269-69C Connects 24/40 STJ Flask Top to 1/2" valve*
- 10-269-69D Connects 24/40 STJ Flask Top to 3/4" valve*

*Valves on the freeze dry systems, drying chambers and manifolds offered in this catalog fit adapters of both 1/2" and 3/4" sizes. Size information is provided for selecting adapters for older Labconco models and other freeze dryers.

** Contact Fisher Scientific for ordering information.
Serum Bottles

Perfect for long term storage of freeze dried samples. Labconco Serum Bottles are specifically designed for lyophilization applications. Their uniform thin wall construction ensures even freezing and drying. Serum Bottles 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.

<table>
<thead>
<tr>
<th>Size</th>
<th>20 mm Corkage</th>
<th>13 mm Corkage</th>
<th>Split Stoppers</th>
<th>Aluminum Seals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ml</td>
<td>757510**</td>
<td>7576010**</td>
<td>7577010**</td>
<td></td>
</tr>
<tr>
<td>3 ml</td>
<td>7575210**</td>
<td>7576010**</td>
<td>7577010**</td>
<td></td>
</tr>
<tr>
<td>5 ml</td>
<td>06-406-50A</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>10 ml</td>
<td>06-406-50B</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>20 ml</td>
<td>22-365-742</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>30 ml</td>
<td>06-406-50C</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>50 ml</td>
<td>7573810**</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>100 ml</td>
<td>7574010**</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
<tr>
<td>125 ml</td>
<td>7574210**</td>
<td>10-269-81B</td>
<td>06-406-51</td>
<td></td>
</tr>
</tbody>
</table>

** Contact Fisher Scientific for ordering information.
Ampules & Miscellaneous Accessories

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Straight</th>
<th>Pre-Scored Flat Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ml</td>
<td>7572710**</td>
<td>10-269-77A</td>
</tr>
<tr>
<td>2 ml</td>
<td>7572710**</td>
<td>10-269-77B</td>
</tr>
<tr>
<td>5 ml</td>
<td>7572710**</td>
<td>10-269-77C</td>
</tr>
<tr>
<td>10 ml</td>
<td>7571210**</td>
<td></td>
</tr>
</tbody>
</table>

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, 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)

10-269-82 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)

10-269-80 Ampule Valve Adapters. Connect ampules to valve ports or stainless steel stems. Ten per package. Shipping weight 0.5 lb. (0.2 kg)

7762700** 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)

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. (0.5 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>

* International electrical configuration

16-315-60 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. (0.2 kg)

10-273-12 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. (0.5 kg)

** Contact Fisher Scientific for ordering information.
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 a user-supplied PC. An RS-232 Cable may also be connected to the RS-232 port on the FreeZone Stopping Tray Dryer connected to a computer; however, the Interconnect Cable 7353403* included with the Stopping Tray Dryer is recommended since it allows the Stopping Tray Dryer to communicate with the Freeze Dry System. See page 46 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>

7645900* Replacement Neoprene Tubing
For Dry Ice Benchtop Freeze Dry System connections, 5/16” ID, 3’ length. Shipping weight 5 lbs. (2 kg)

16-109-453 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)

10-030-163 Support Shelves
Attach easily without tools to the sides of the FreeZone 1, 2.5 or 4.5 Liter Freeze Dry System or left-hand side of the FreeZone Triad System cabinet to provide support for large flasks attached to the drying chamber or manifold. Multiple rows of perforations on the sides of the FreeZone cabinet allow for height adjustment of the shelves to support various sizes of flasks. One pair. Glacier white powder-coated steel. Each shelf is 7.4” w x 12.0” d (18.7 cm x 30.5 cm). Shipping weight 2 lbs. (1 kg)

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 10-269-683, 10-269-684 and 10-030-160 are glass. Lid 16-081-003 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>10-269-683</td>
<td>FreeZone 4.5 Liter Systems</td>
<td>10.12”</td>
<td>2.5 lbs. (1.1 kg)</td>
</tr>
<tr>
<td>10-269-684</td>
<td>FreeZone 6, 12 &amp; 18 Liter Systems 16-Port Drying Chamber</td>
<td>14.0”</td>
<td>3.5 lbs. (1.6 kg)</td>
</tr>
<tr>
<td>10-030-160</td>
<td>12-Port Drying Chamber</td>
<td>9.25”</td>
<td>2.0 lbs. (0.9 kg)</td>
</tr>
<tr>
<td>16-081-003</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”</td>
<td>5.0 lbs. (2.3 kg)</td>
</tr>
</tbody>
</table>

* Contact Fisher Scientific for 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.

### 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>

*International electrical configuration*
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HEPA-Filtered Biological Safety Cabinets, Enclosures & Clean Benches
Fume Hoods & Ductless Enclosures
Balance & Bulk Powder Enclosures
Laboratory Animal Research Stations
Nanotechnology Enclosures

Forensic Enclosures
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Glassware Washers
Water Purification Systems
Vacuum Concentrators & Cold Traps

Multiple Sample Evaporation Systems
Laboratory Carts & Benches
Blood Drawing Chairs
Vacuum Desiccator

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