

THE

# REVOLUTION SERIES

PREMIUM-QUALITY  
HIGH-CAPACITY  
CRYOGENIC  
FREEZERS



THE

# REVOLUTION SERIES

**The Revolution Series** provides a set of significant, innovative features that help your biorepository operate at a higher level of security and regulatory compliance.

Simple-to-use control features, ergonomic design and low operational costs make Revolution the safest choice for modern repositories.

The Revolution Series consists of two modes:



**Revolution**



**Revolution-SA**



IC Biomedical's Revolution Series is designed for present and future operational compliance in regulated environments:

- cGMP for Bio Pharmaceutical production
- Clinical trials
- Regulated storage of transplant cells or tissue

Full audit trail system records all actions undertaken by a signed-in individual, including time and date stamp.

## Revolution High-Capacity Freezers



High Level  
 Security.

Regulatory  
 Compliance.

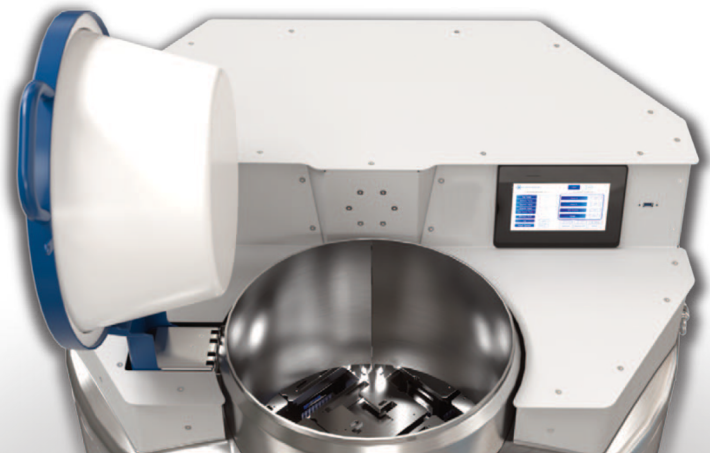
Easy to Use.

Low  
 Operational  
 Costs.

The Revolution series, is ideal for operations looking to upgrade to a higher performance freezer with many new, innovative features:

### Revolution Features:

- **Radiance Temperature Management System** (patent-pending): Enables the freezer to operate at any specific temperature between  $-20^{\circ}$  and  $-190^{\circ}\text{C}$ . In Radiance Mode, the freezer's temperature is controlled with IC Biomedical's exclusive atomization technology that evenly distributes microscopic nitrogen droplets to maintain the set temperature.  
 Radiance can also be used to assist cooling when the freezer is accessed or warm material is inserted. This feature may be used in both Radiance Mode or Level Control Mode.
- **RFID Badge Reader:** Users can be issued an individual RFID badge to avoid having to manually log into the system each time.
- **Enhanced External Communications Gateway:** Provides the ability for the freezer system to connect with local Wi-Fi or Ethernet networks and deliver text/email status or alarm notifications to users. Notifications are configurable. Also allows the set up of coordinated and/or timed filling.
- Operation at  $-190^{\circ}\text{C}$  vapor phase with extended temperature hold.
- Built-in extraction fan to clear fog and bright LED internal light for fast sample visibility when lid opens.
- Hinged, auto-locking lid with password-protected access control.
- Limited battery backup, gas bypass.
- Back-up level measurement systems for increased sample security (Discrete RTD level control plus differential pressure level control).
- Stabilized carousel with top and bottom bearings for easier manual rotation
- Plumbing manifold design that reduces maintenance.
- Fold-down full-sized stainless steel step (13 shelf models) and dual steps (15 shelf models).



## Revolution-SA High-Capacity Freezers



High Level  
 Security.

Regulatory  
 Compliance.

Semi-Automated  
 For Greater  
 Ease of Use.

Low  
 Operational  
 Costs.

**Revolution-SA** has all of the standard Revolution's features plus a motor-driven carousel that adds a level of automation to the sample retrieval and storage process.

### Revolution-SA Features:

- **Motor-Driven Carousel:** The motor drive rotates the carousel in a fully hands-free operational mode. The system aligns the required quadrant or rack directly below the lid. This ergonomically friendly option eliminates manually rotating a heavy carousel. In conjunction with individual user profiles, the motor drive enables the system administrator to restrict access to specific locations within the freezer, such as specific quadrants or racks. Rack learning technology allows the user to program the position of individual freezer racks.
- **Radiance Temperature Management System** (patent-pending): Enables the freezer to operate at any specific temperature between  $-20^{\circ}$  and  $-190^{\circ}\text{C}$ . In Radiance Mode, the freezer's temperature is controlled with IC Biomedical's exclusive atomization technology that evenly distributes microscopic nitrogen droplets to maintain the set temperature.  
 Radiance can also be used to assist cooling when the freezer is accessed or warm material is inserted. This feature may be used in both Radiance Mode or Level Control Mode.
- **RFID Badge Reader:** Users can be issued an individual RFID badge to avoid having to manually log into the system each time.
- **Enhanced External Communications Gateway:** Provides the ability for the freezer system to connect with local Wi-Fi or Ethernet networks and deliver text/email status or alarm notifications to users. Notifications are configurable. Also allows the set up of coordinated and/or timed filling.
- Operation at  $-190^{\circ}\text{C}$  vapor phase with extended temperature hold.
- Built-in extraction fan to clear fog and bright LED internal light for fast sample visibility when lid opens.
- Hinged, auto-locking lid with password-protected access control.
- Limited battery backup, gas bypass.
- Back-up level measurement systems for increased sample security (Discrete RTD level control plus differential pressure level control).
- Stabilized carousel with top and bottom bearings.
- Plumbing manifold design that reduces maintenance.
- Fold-down full-sized stainless steel step (13 shelf models) and dual steps (15 shelf models).

## Revolution Series Security & Compliance

A major benefit for Revolution Series users is the quality of the storage environment and the safety that its very extended hold time can provide. The risk of an overnight failure unnoticed by staff, a unit accidentally unplugged or turned off by a cleaning crew or an ignored alarm is almost eliminated, ensuring that samples always have the maximum protection in a uniform, stable environment.

### Sample Security

- Back-up level measurement systems for increased sample security. (Discrete RTD level control plus differential pressure level control).
- Coordinated filling.
- Hinged, auto-electronic locking lid with password access control. Auto-locks after pre-set time.
- In conjunction with individual user profiles, the motor drive carousel option enables the system administrator to restrict access to specific locations within the freezer, such as specific quadrants or racks.
- Configurable text and email notifications / web access.
- Operation at  $-190^{\circ}\text{C}$  vapor phase with extended hold.
- Patent-pending Radiance Temperature Management System (optional) enables the freezer to operate at any specific temperature between  $-20^{\circ}$  and  $-190^{\circ}\text{C}$ . With a motorized system, the tray rotation function is used to promote consistent convection within the sample space, yielding a very tight point-to-point temperature gradient with significantly less variation than mechanical compressor systems or other sacrificial refrigerant-based environments.

### Compliance

- User access to samples is password protected. The password can be entered manually on the touchscreen or with RFID badge reader.
- When a user unlocks the freezer lid, the Revolution system automatically begins audit tracking associated with the login. User management allows for creation of unlimited user profiles with individual permissions
- The full audit trail for each sample visit records all actions undertaken by a signed-in individual, including time and date stamps
- Revolution is designed to compliance standards, current and future, for cGMP for Bio Pharmaceutical production, clinical trials and regulated storage of transplant cells or tissue

Simplicity of use and low operational costs make the Revolution Series the safest choice for biorepositories!



## Radiance Temperature Management System



The Revolution Series is the world's first radiance-cooled liquid nitrogen-based cryogenic storage system

The Radiance Temperature Management System enables the freezer to operate at any specific temperature between  $-20^{\circ}$  and  $-190^{\circ}\text{C}$ . In Radiance Mode, the freezer's temperature is controlled with IC Biomedical's exclusive atomization technology that evenly distributes microscopic nitrogen droplets to maintain the set temperature.

Radiance can also be used to assist cooling when the freezer is accessed or warm material is inserted. This feature may be used in both Radiance Mode or Level Control Mode.

- AI-driven dynamic algorithms learn user behaviour to anticipate and finely control temperature within the system, including automatic compensation for the addition of warm material and long-term lid open operation.
- With a motor-driven carousel (Radiance-SA), the tray rotation function is used to promote even distribution within the sample space yielding a very tight point-to-point temperature gradient with significantly less variation than mechanical compressor systems or other sacrificial refrigerant-based environments.
- Low-maintenance, low-energy system with significantly lower running costs than all available alternatives.

## RFID Badge Reader



Revolution Series users can be issued with an individual RFID badge to avoid having to manually log in to the system each time.

The RFID login identifies the user and their associated permissions, unlocks the freezer lid and begins activity audit tracking associated with the login.

## Motor-Driven Carousel



The Revolution-SA motor-driven carousel rotates the sample tray in a fully hands-free operational mode, adding a greater level of automation and security. When prompted, the system aligns the required quadrant or rack directly below the lid. This ergonomically friendly option eliminates the issue of manually rotating a heavy carousel. It also reduces lid-open time and allows less heat into the tank.

- In conjunction with individual user profiles, the motor drive lets the system administrator restrict access to specific locations within the freezer, such as specific quadrants or racks.
- Rack learning technology allows the user to program the position of individual freezer racks. These racks can be selected with the freezer closed, and the tray will be rotated to the required position for easy identification within the illuminated sample space.
- With a motor-driven carousel (Radiance-SA), the tray rotation function is used to promote even LN<sub>2</sub> distribution within the sample space

Available only on the Revolution-SA.

## Enhanced External Communications Gateway



The Revolution Enhanced External Communications Gateway allows the freezer system to connect with local Wi-Fi or Ethernet networks and deliver text/email status or alarm notifications to users. Notifications are configurable.

This communications package can also create its own offline Wi-Fi network to accommodate synchronous operations.

**PROTECT YOUR ASSETS.**



**Control Features**

The Revolution Series control unit is designed to provide a simple, intuitive interface with an extremely robust, redundant control platform featuring state-of-the-art connectivity and simple user interaction.

- Large, intuitive touchscreen user panel.
- Industrial PLC controller providing robust control platform.
- Back-up level measurement systems for increased sample security (Discrete RTD level control plus differential pressure level control).
- Level- or temperature-based control.
- User management and audit-trail functions.

**Access Control**

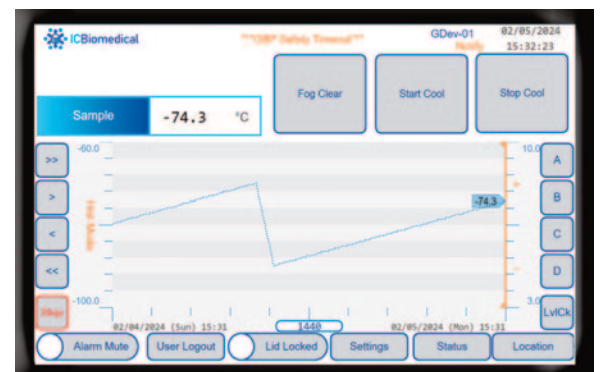
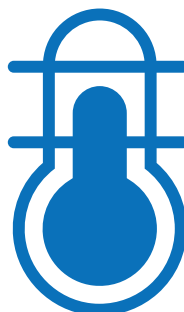
Limiting and recording access to the sample space is a key compliance requirement. The Revolution freezer offers multiple access levels and full audit trail options:

- Hinged, auto-electronic locking lid requires password or RFID badge access control. Auto-locks after pre-set time.
- Revolution-SA's motor-driven carousel can be used to restrict user access to specific quadrants or racks.
- User management allows for creation of unlimited user profiles with individual permissions.
- Full audit trail records all actions undertaken by a signed-in individual, including time and date stamps.



**Temperature Management**

- Revolution freezers can be operated in Level Control Mode or Radiance Mode.
- Radiance cooling can be used as a temperature setpoint for any specific temperature between -20° and -190°C) with no liquid nitrogen in the reservoir. Radiance can also be used to assist cooling when the freezer is accessed or warm material is inserted. This feature may be used in both Radiance Mode or Level Control Mode.



## Specifications

REVOLUTION 300 Series	313-P	315-P
1.2 and 2 ml Vials	16,900	19,500
Quantity of Large Racks	12	12
Quantity of Mini Racks	4	4
Number of Shelves Per Rack	13	15
Total LN2 Capacity Storage (L)	54.3	67.0
Total Inner Vessel Capacity (L)	460.9	530.4
Inside Diameter (in/mm)	29.9/759	29.9/759
Outside Diameter (in/mm)	32/813	32/813
Overall Height (in/mm)	57.7/1465	63.6/1615
Useable Height (in/mm)	30.8/783	35.8/911
Weight, Empty (lb/kg)	462/209.6	490/222.3
Weight, Full Without ICS (lb/kg)	553/250.8	1175/533
Neck Opening (in/mm)	11.8/300	11.8/300



REVOLUTION 400 Series	413-P	415-P	413-R	415-R
1.2 and 2 ml Vials	36,400	42,000	39,000	45,000
Quantity of Large Racks	24	24	26	26
Quantity of Mini Racks	16	16	16	16
Number of Shelves Per Rack	13	15	13	15
Total LN2 Capacity Storage (L)	133	102	133	102
Total Inner Vessel Capacity (L)	978	1139	978	1139
Inside Diameter (in/mm)	39.8/1012	39.8/1012	39.8/1012	39.8/1012
Outside Diameter (in/mm)	42/1068	42/1068	42/1068	42/1068
Overall Height (in/mm)	55.8/1419	61.9/1574	55.8/1419	61.9/1574
Useable Height (in/mm)	30/762	34.8/883	30/762	34.8/883
Weight, Empty (lb/kg)	677/307	737/334.5	677/307	737/334.5
Weight, Full Without ICS (lb/kg)	858/389.1	918/416.6	858/389.1	918/416.6
Neck Opening (in/mm)	16.7/426	16.7/426	16.7/426	16.7/426

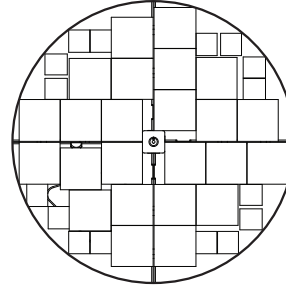
REVOLUTION 600 Series	613-P	615-P	613-R	615-R
1.2 and 2 ml Vials	85,475	98,625	83,200	96,000
Quantity of Large Racks	54	56	60	60
Quantity of Mini Racks	39	39	16	16
Number of Shelves Per Rack	13	15	13	15
Total LN2 Capacity Storage (L)	225	319	225	319
Total Inner Vessel Capacity (L)	1667	1900	1667	1900
Inside Diameter (in/mm)	57.9/1470	57.9/1470	57.9/1470	57.9/1470
Outside Diameter (in/mm)	60/1524	60/1524	60/1524	60/1524
Overall Height (in/mm)	57.8/1469	63.9/1625	57.8/1469	63.9/1625
Useable Height (in/mm)	31.1/789.9	35.6/904.2	31.1/789.9	35.6/904.2
Weight, Empty (lb/kg)	1271/576.6	1358/615.9	1271/576.6	1358/615.9
Weight, Full Without ICS (lb/kg)	1754/795.6	1841/834.9	1754/795.6	1841/834.9
Neck Opening (in/mm)	24.5/622	24.5/622	24.5/622	24.5/622

## Rack Capacities

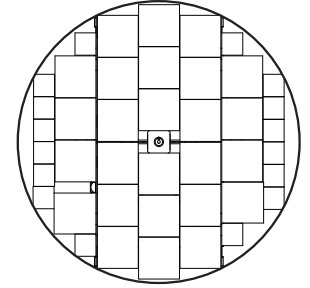


Note: Racks shown are for demonstration only.  
Revolution does not come with racks.

### 400 Series

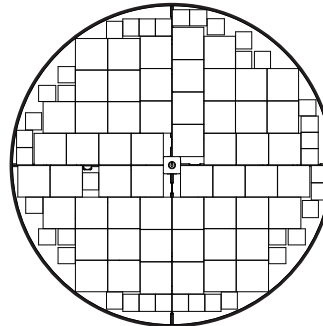


Large Racks  
100 Cell Boxes - 24  
Mini-Racks  
25 Cell Boxes - 16

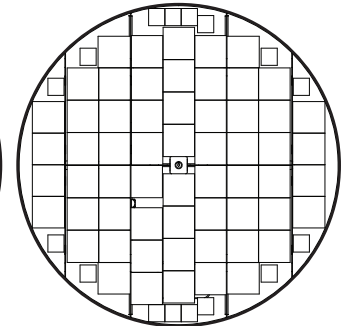


Large Racks  
100 Cell Boxes - 26  
Mini-Racks  
25 Cell Boxes - 16

### 600 Series



Large Racks  
100 Cell Boxes - 56  
Mini-Racks  
25 Cell Boxes - 39



Large Racks  
100 Cell Boxes - 60  
Mini-Racks  
25 Cell Boxes - 16

## Rack Learning Technology

With Revolution-SA's motorized carousel, Rack Learning Technology allows the user to program the position of individual freezer racks. These racks, selected while the freezer is closed, will be rotated to the required position for fast, easy identification and minimal open lid time. An automatic de-fogging fan and bright LED light, activated when the lid opens, provides faster sample viability.



All products are produced in our medical-grade, ISO 13485-certified manufacturing facility in Cartersville, Georgia USA.

## A trusted legacy in cold chain storage and transport technology

Capitalizing on a nearly century old legacy of cold chain storage and transport technology, IC Biomedical is bringing new life to the cryogenic equipment world. IC Biomedical builds the highest-quality cryogenic storage and transport systems for the global biomedical research and development, healthcare, biorepository, pharmaceutical, biotechnology, IVF and animal husbandry markets.