Instructions for Use

Allegra C-24R Centrifuge

For Research Use Only. Not for use in diagnostic procedures.

D23800AA
June 2025

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BECKMAN COULTER

Allegra C-24R Centrifuge
PN D23800AA (June 2025)

Contact Us
If you have any questions, contact our Customer Support Center.

- Worldwide, find us via our website at www.beckman.com/support/technical.

Glossary of Symbols is available at beckman.com/techdocs (PN C24689).

May be covered by one or more pat. - see www.beckman.com/patents

Original Instructions

Revision History

Initial Issue AA, 06/2025

Software Version 1.0

This document applies to the latest software listed and higher versions. When a subsequent software version affects the information in this document, a new issue will be released to the Beckman Coulter Web site. For labeling updates, go to www.beckman.com and download the latest version of the manual or system help for your instrument.

Safety Notices

Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to operate the instrument. Do not attempt to perform any procedure before carefully reading all instructions. Always follow product labeling and manufacturer's recommendations. If in doubt as to how to proceed in any situation, contact us.

Beckman Coulter, Inc. urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but it is not limited to, protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this or any other automated laboratory analyzer.

Alerts for Danger, Warning, Caution, Note, and Important

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTE NOTE is used to call attention to notable information that should be followed during use, or maintenance of this equipment.

IMPORTANT IMPORTANT is used for comments that add value to the step or procedure being performed. Following the advice in the IMPORTANT adds benefit to the performance of a piece of equipment or to a process.

Installation and/or Maintenance Precautions

⚠ WARNING

Risk of personal injury or instrument damage. The Allegra C-24R centrifuge weighs 31 kg. Do not attempt to lift or move the centrifuge without assistance.

⚠ WARNING

Risk of personal injury or instrument damage. Vapors of flammable reagents or liquids may enter the centrifuge air system and be ignited by the electrical machinery. Do not use the centrifuge in areas close to flammable liquids or vapors. Do not use this instrument to operate such materials.

Maintain only as described in this *Allegra C-24R Centrifuge Instructions for Use* Manual. Other maintenance not specified in this manual can only be performed by a Beckman Coulter representative.

IMPORTANT It is the user's responsibility to decontaminate the components of the instrument before requesting service from a Beckman Coulter representative or returning components to Beckman Coulter for repair. Beckman Coulter will not accept any instrument or components that should have been decontaminated but did not. If any components are returned, they must be packaged in sealed plastic bags, indicating that the contents can be safely handled and are not contaminated.

Opening any cover during any maintenance of this equipment may expose components to risks of electrical shock or personal injury. Make sure the power switch is turned off and the power plug is unplugged from the power outlet to disconnect the main power supply of the centrifuge before allowing qualified personnel to perform such service operation.

Do not replace any components of the centrifuge with those that are not indicated for use in this instrument.

Safety Precautions

⚠ WARNING

Risk of operator injury if:

- **All doors, covers and panels are not closed and secured in place prior to and during instrument operation.**
- **The integrity of safety interlocks and sensors is compromised.**
- **Instrument alarms and error messages are not acknowledged and acted upon.**
- **You contact moving parts.**
- **You mishandle broken parts.**
- **Doors, covers and panels are not opened, closed, removed and/or replaced with care.**
- **Improper tools are used for troubleshooting.**

To avoid injury:

- **Keep doors, covers and panels closed and secured in place while the instrument is in use.**
- **Take full advantage of the safety features of the instrument.**
- **Acknowledge and act upon instrument alarms and error messages.**
- **Keep away from moving parts.**
- **Report any broken parts to your Beckman Coulter Representative.**
- **Open/remove and close/replace doors, covers and panels with care.**
- **Use the proper tools when troubleshooting.**

⚠ CAUTION

Failure to use this equipment in the manner specified may compromise the integrity of the system and may result in a running failure. Operate the instrument as described in the product manual.

⚠ DANGER

Risk of personal injury or instrument damage. Do not extend any object into the centrifuge while the centrifuge is running. Do not force the centrifuge rotor to decelerate or stop by hand.

⚠ CAUTION

If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, if it is not presently under a Beckman Coulter service maintenance agreement, Beckman Coulter cannot guarantee that the product is fitted with the most current mandatory engineering revisions or that you will receive the most current information bulletins concerning the product. If you purchased this product from a third party and would like further information concerning this topic, contact us.

⚠ CAUTION

Risk of instrument damage. This device is intended for indoor use only. To avoid device damage, do not install the instrument outdoors.

⚠ WARNING

Risk of personal injury. Safety protection can be impaired if used in a manner not specified by the manufacturer. To avoid personal injury, use the instrument according to the manufacturer's instructions only.

Cleaning

⚠ WARNING

Risk of personal injury. Contact the chemical and biosafety specialist before cleaning the instrument that is exposed to hazardous materials. Always wear suitable personal protective equipment (PPE) when cleaning the centrifuge.

Follow the Allegra C-24R centrifuge cleaning procedure as described in this manual. Before cleaning an instrument exposed to hazardous materials, Beckman Coulter recommends the following actions:

- Contact the appropriate chemical and biosafety specialist.
- Refer to Chemical and Biosafety Precautions for detailed instructions.

Electrical Safety Precautions

To avoid electrical-related injuries and property loss, properly inspect all electrical equipment before use and report all electrical defects promptly. If you need to remove any equipment covers or panels, contact us.

DANGER

To avoid the risk of electrical shock, the instrument is designed to use a three-wire cord and a grounded plug. Make sure the paired wall outlet is wired and grounded correctly.

- **Check that the line voltage is consistent with the rated voltage of the nameplate affixed to the centrifuge.**
- **Do not use a three-wire to two-wire plug adapter.**
- **Do not use two-wire extension wires or two-wire ungrounded multi-socket panels.**
- **Do not place a container with liquid on or near the chamber cover. If a leak occurs, the liquid may enter the centrifuge and damage the electrical components.**
- **The power cord of the Allegra C-24R is a disconnecting device used to cut off the appliance inlet. Ensure that there is a proper space around the centrifuge so that the power cord can be connected.**
- **To reduce the risk of electrical shock, the centrifuge is equipped with a 1.8 m (8 ft) three-wire cord and plug to achieve centrifuge grounding.**

IMPORTANT Only use the power cord provided with the instrument.

Power Plugs and Outlets Applicable for Allegra C-24R

Part Number	Instrument Rating	Applicable Plug	Applicable Outlet
D11232	220-230 VAC (+/-10%), 50 Hz, 10 A		

Refer to CHAPTER 1, Performance Characteristics for detailed information on electrical specifications.

IMPORTANT If you have any doubt about the voltage, ask qualified facility personnel to measure the load voltage while the drive is running.

Fire Precautions

Risk of personal injury or instrument damage. This centrifuge shall not be used to centrifuge materials producing flammable or explosive vapors or hazardous chemical reactions.

The centrifuge shall not be operated if the following substances, such as chloroform or ethanol, are placed in the centrifuge or stored at a distance of 30 cm from the centrifuge

Chemical and Biosafety Precautions

⚠ WARNING

Risk of chemical injury from bleach. To avoid contact with the bleach, use barrier protection, including protective eyewear, gloves, and suitable laboratory attire. Refer to the Safety Data Sheet for details about chemical exposure before using the chemical.

If a hazardous substance, such as blood, is spilled on the surface or inside of the instrument, rotor, or accessories, clean the spill with a high-quality, fragrance-free, gel-free bleach (5 to 6% solution of sodium hypochlorite - available chlorine), ethanol solution, or laboratory decontamination solution. Then dispose of it according to your laboratory's hazardous materials disposal procedures. If the instrument, rotor, or accessories need to be decontaminated, contact us.

Common operations may include the use of pathogenic, toxic, or radioactive solutions and test samples. Such materials should not be used in this centrifuge unless all necessary safety precautions have been taken.

- Follow all warning instructions marked on the original solution container before using the solution.
- Be careful when handling them as body fluids may spread disease. There are no known tests to fully ensure that such liquids are free of microorganisms. The need for aerosol protection is further emphasized by some of the most virulent microorganisms, such as hepatitis B and C viruses, HIV (I-V) viruses, atypical mycobacteria, and certain deep-seated fungi. Follow proper laboratory procedures and methods for handling other infectious samples to prevent the spread of disease. Given the potential for aerosols from spills, take appropriate aerosol containment safety precautions.
- Use universal precautions when working with pathogenic materials. Means must be available to decontaminate the instrument and to dispose of biohazardous waste.

- Do not use toxic, pathogenic, or radioactive materials in this centrifuge unless proper safety precautions have been taken. Biosafety containment should be used when handling "Class II Risk Group" materials (as specified in the *Laboratory Biosafety Manual* by the World Health Organization); higher groups of materials require more than one level of protection.
- Dispose of all liquid waste in accordance with environmental health and safety guidelines.

You are responsible for decontaminating the centrifuge and its accessories before requesting service from Beckman Coulter.

Mechanical Safety

This equipment is for indoor use only. Safety protection may be compromised if not used in the manner specified by the manufacturer.

⚠ WARNING

Risk of mechanical injury or risk of personal injury. The centrifuge chamber cover is supported by a spring. Regularly check that the centrifuge chamber cover remains in the fully open position until it is manually closed. A worn-out spring may cause the chamber cover not to fully open. If the spring cannot hold the chamber cover in the fully open position, it must be replaced immediately.

⚠ WARNING

Risk of instrument damage or risk of personal injury. To ensure the safe running of this equipment, observe the following precautions:

- **Only use rotors and accessories that are described in this manual.**
- **Ensure that the fixed screws of the rotor are tightened before starting the centrifuge.**
- **The rotor must not exceed the maximum rated speed when in use.**
- **Do not attempt to decelerate or stop the rotor by hand.**
- **Do not lift or move the centrifuge while the rotor is rotating.**
- **Do not attempt to disengage the chamber cover interlock system while the rotor is rotating.**
- **Maintain a 30 cm space around the centrifuge while it is running. This area can only be accessed when the instrument controls need to be adjusted while it is running.**
- **Do not bring combustible items within 30 cm of the centrifuge.**
- **Do not lean on the instrument or place items on it while the centrifuge is running.**

Precautions for Use Environment

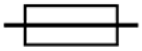
To ensure that the centrifuge operates stably and reliably and functions normally, the following conditions should be met:

- Ambient temperature: 5°C-35°C
- Relative humidity: ≤80%
- Atmospheric pressure: 860 hPa-1060 hPa (below 2,000 m altitude)
- Power supply: AC 220-230 VAC (+/-10%), 50 Hz, 10 A
- Good ventilation, and no dust, floccules, metal chips, and other debris intruding into the instrument.
- The work environment shall provide adequate ventilation free of particulates and corrosive gases.
- Place the instrument on a stable horizontal workbench when used, and all the machine legs are firmly supported.

Symbol Explanations

Symbol	Warning Condition	Meaning of Symbol from Standard
	Caution	To indicate that caution is necessary when operating the device or control close to where the symbol is placed, or to indicate that the current situation needs operator awareness or operator action in order to avoid undesirable consequences. Must consult IFU.
	Biohazard Symbol	Consider all materials (specimens, reagents, controls, and monoclonal antibodies) and areas these materials come into contact with as being potentially infectious. Wear appropriate barrier protection and follow safe laboratory procedures when handling any material in the laboratory.
	Caution, Risk of Electric Shock	To indicate hazards arising from dangerous voltages.
	Off (power)	To indicate disconnection from the mains, at least for mains switches or their positions, and all those cases where safety is involved.
	On (power)	To indicate connection to the mains, at least for mains switches or their positions, and all those cases where safety is involved.

Symbol	Warning Condition	Meaning of Symbol from Standard
	RoHS Caution Symbol	This label indicates that the electronic information product contains certain toxic or hazardous substances. The center number is the Environmentally Friendly Use Period (EFUP) date, and indicates the number of calendar years the product can be in operation. Upon the expiration of the EFUP, the product must be immediately recycled. The circling arrows indicate the product is recyclable. The date code on the label or product indicates the date of manufacture.
	Protective Earth; Protective Ground	To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.
	Packaging Recycling	This symbol indicates that the cardboard packaging is recyclable.
	Rotation Symbol	Represents the direction of rotation of the rotor. The rotor of the Allegra C-24R centrifuge rotates in a counterclockwise direction.
	Beckman Coulter	Company name
	Warning, Crushing of Hands	To warn of a closing motion of mechanical parts of equipment.
	Caution, Risk of Electric Shock	To indicate hazards arising from dangerous voltages.
	Caution, Refrigeration	The host has a cooling function, and there is frost on the surface of the chamber at low temperatures.
	Caution, Emergency Door Opening	Emergency door opening through here.
	Caution Drain	Condensate collection sink.

Symbol	Warning Condition	Meaning of Symbol from Standard
	Consult the Instructions for Use Symbol	Indicates the need for the user to consult the instructions for use.
	Serial Number	Indicates the manufacturer's serial number so that specific medical device can be identified.
	Manufacturer	Indicates the medical device manufacturer, as defined in EU Regulation 2017/746.
	Date of Manufacture	Indicates the date when the medical device was manufactured.
	Fuse	To identify fuse boxes or their location.
	Country of Origin	Indicates the country of origin of the product.
	Catalog Number	Indicates the manufacturer's catalogue number so that the medical device can be identified.
	Model Number	To identify the model number or type number of a product.

Electromagnetic Compatibility (EMC)

This device complies with the emissions and immunity requirements as specified in the EN/IEC 61326 series of Product Family Standards for a "basic electromagnetic environment." Such equipment is supplied directly at low voltage from public mains network. This equipment is not intended for residential use.

⚠ CAUTION

This device generates, uses, and can radiate unintentional radio-frequency (RF) energy. If this device is not installed and operated correctly, this RF energy can cause interference with other equipment. It is the responsibility of the end user to be sure that a compatible electromagnetic environment for the device can be maintained so that the device operates as intended.

In addition, other equipment can radiate RF energy to which this device is sensitive. If one suspects interference between this device and other equipment, Beckman Coulter recommends the following actions to correct the interference:

1. **Evaluate the electromagnetic environment before installation and operation of this device.**
2. **Do not operate this device close to sources of strong electromagnetic radiation (for example: unshielded intentional RF sources), as these can interfere with proper operation. Examples of unshielded intentional radiators are handheld radio transmitters, cordless phones, and cellular phones.**
3. **Do not place this device near medical electrical equipment that can be susceptible to malfunctions caused by close-proximity to electromagnetic fields.**
4. **This device has been designed and tested to CISPR 11, Class A emission limits. In a domestic environment, this device may cause radio interference, in which case, you may need to take measures to mitigate the interference.**

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Certification

The Beckman Coulter Allegra C-24R centrifuge is manufactured by a factory that is ISO 9001 and ISO 13485 certified. The design of each centrifuge has been tested to comply (when used with the Beckman Coulter rotor) with the laboratory equipment regulations of the relevant regulators. The certificates of compliance can be found at www.beckman.com.

Scope of Manual

The instruction manual helps you to familiarize yourself with the functions, specifications, operation, routine operational care, and maintenance of the Beckman Coulter Allegra C-24R refrigeration centrifuge. Before the operation or maintenance of this centrifuge, Beckman Coulter suggests that you read through this manual, Safety Notices especially all information related to safety.

NOTE The safety and performance of this equipment may be impaired if the centrifuge is not used in the manner specified in this manual. In addition, any other equipment not recommended by Beckman Coulter has not been evaluated for safety. Use of any equipment in a manner not expressly recommended in this manual is the sole responsibility of the user.

- CHAPTER 1, System Overview contains a brief description of the technical specifications of the system and the physics and functions of the centrifuge, including operating controls and indicating devices.
- CHAPTER 2, Operation and Use contains centrifuge operating procedures.
- CHAPTER 3, Common Fault Analysis and Troubleshooting lists the diagnostic messages and other possible faults, as well as possible causes and recommended corrective actions.
- CHAPTER 4, Centrifuge Maintenance includes routine operational care and maintenance procedures, as well as a brief list of consumables and replacement components.
- APPENDIX A, Unpacking and Installing provides information on unpacking the centrifuge and installation requirements for the centrifuge in order to prepare the laboratory facility for installation.
- APPENDIX B, User Management Permission provides instructions for user management permission for the Allegra C-24R centrifuge control system.
- APPENDIX C, Storage and Transportation provides the storage requirements for the Allegra C-24R centrifuge and information on the preparations required to transport the centrifuge.

- APPENDIX D, Allegra C-24R Rotor Description provides information on the specifications for all available rotors, including the list of adapters and replacement parts.
- APPENDIX E, Table of Hazardous Substances provides the hazardous substance names and concentrations.

CFC-Free Centrifugation

To minimize environmental impact, CFCs are not used in the manufacture or operation of Allegra C-24R refrigeration centrifuges.

CHAPTER 1

System Overview

Overview

This chapter briefly describes the form and function of the Beckman Coulter Allegra C-24R refrigerated centrifuge. This chapter also describes the operating controls and indicators. Refer to CHAPTER 2, Operation and Use for instructions on the controls and indicators. The chemical compatibility of the materials listed in this manual can be found in the publication Chemical Resistances (publication IN -175).

For rotor instructions, refer to APPENDIX D, Allegra C-24R Rotor Description.

This chapter contains information on:

- Product Description
- Centrifuge Principles and Safety Features
- Centrifuge Chassis
- Performance Characteristics
- Available Rotors
- Schematic Diagram of Centrifuge
- Centrifuge Electrical System

Product Description

The Beckman Coulter Allegra C-24R refrigerated centrifuge (Figure 1.1) is a benchtop centrifuge that separates components by using relative centrifugal force. The Allegra C-24R refrigerated centrifuge is controlled by a microprocessor and uses interactive operating technology. The design of the instrument incorporates a quiet-running brushless variable frequency speed-control asynchronous motor, an automatic rotor recognition system, a program memory capable of reproducing operating conditions. The Allegra C-24R also includes a temperature control system that alerts the operator to conditions that may require attention through audible and visual indicators. For research use only. Not for use in diagnostic procedures.

Figure 1.1 Allegra C-24R Centrifuge

When used with the Allegra C-24R rotor designed for this centrifuge, applications that can be performed with this centrifuge include:

- Nucleic acid preps and protein preps using common kits and columns.
- Routine processing such as sample preparations, pelleting, extractions, purifications, concentrations, phase separations, and receptor binding.
- Rapid sedimentation of protein precipitates, particulates, and cell debris.

Centrifuge Principles and Safety Features

Centrifuge Principles

Centrifugation refers to the process of separating a heterogeneous mixture (suspension, emulsion or gas mixture) into its components. The mixture rotates in a circular orbit and is subjected to a centrifugal acceleration several times greater than the gravitational acceleration.

Centrifuges utilize mass inertia inside the rotor chamber to separate substances. The denser particles or media move outward due to their greater inertia. During such an operation, they are separated from the less dense components that move towards the center.

The centrifugal acceleration of an object in a centrifuge, as well as the centrifugal force, depends on the distance between the object and the axis of rotation and the angular velocity. It increases linearly with the distance from the axis of rotation and quadratically with the angular velocity. The larger the radius of the rotor chamber and the faster the rotational speed, the greater the centrifugal acceleration produced. It also increases the force acting on the rotor.

In centrifugal operation, centrifugal containers (such as centrifugal vials and centrifugal test tubes) containing equal amounts of test solutions are symmetrically placed in the centrifugal holes around the rotor head, and the centrifugal force generated by the high-speed rotation of the motor-driven rotor is used to separate the substances with different densities in the test solutions.

Calculation Formula of Relative Centrifugal Force (RCF)

The magnitude of relative centrifugal force (RCF) depends on the radius r of rotation of the specimen during centrifugation, and the rotational speed n, and is calculated as follows:

$$RCF = 1.12 \times 10^{-5} \times n^2 \times r \quad (\times g)$$

Where

n — Rotational speed (r/min)

r — Rotation radius (cm)

g — Gravitational acceleration unit (9.8 N/kg)

According to the formula, the larger the radius of the rotor, the higher the velocity, and the greater the RCF on the material.

Calculation Formula of Time Required for Particle Separation and Precipitation (T)

The time (T) required for particle separation and precipitation in the mixed solution is calculated by the following formula:

$$T = \frac{27.4 \times (\ln R_{max} - \ln R_{min})\mu}{n^2 \times r^2(\sigma - \rho)} \quad (min)$$

Where

ρ — Density of mixed solution (g/cm^3)

μ — Mixture viscosity (P)

n — Rotational speed (r/min)

r — Rotor radius (cm)

σ — Particle density (g/cm^3)

R_{max} — Horizontal distance from the bottom surface of the centrifugal test solution to the axis (cm)

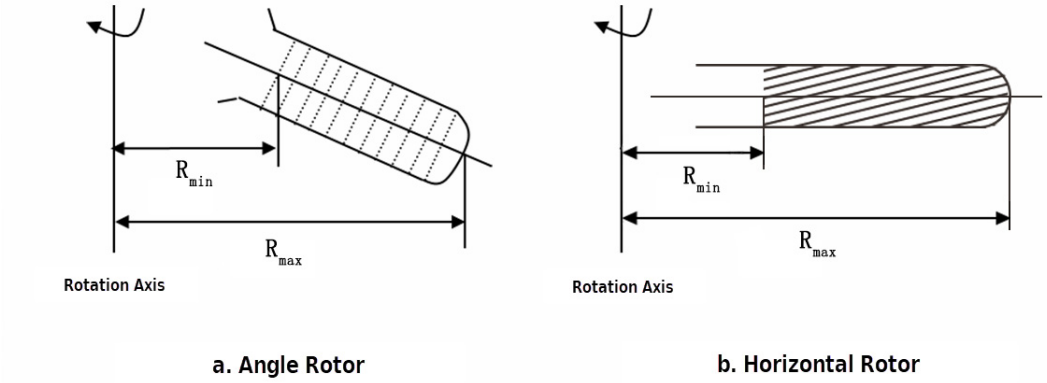
R_{min} — Horizontal distance from the liquid level of the centrifugal test solution to the axis (cm)

Rotor

Due to the different test tube states in the rotor during centrifugation, the centrifugal time of the two commonly used rotors may be different even if they have the same solution, centrifugal force and other conditions.

Refer to Figure 1.2 for the test tube conditions of the angular and horizontal rotors during centrifugation.

Figure 1.2 Schematic Diagram of the Centrifugal State of the Test Tube



a. Angle Rotor **b. Horizontal Rotor**

Safety Protection Features

The Allegra C-24R refrigerated centrifuge has been designed and tested to run safely indoors at altitudes up to 2,000 m (6,562 ft). The security features are as follows:

- The electromechanical door lock system prevents the operator from accessing the spinning rotor and prevents the machine from starting running when the chamber cover is not properly closed and locked. The chamber cover is locked during the running of the instrument and can only be opened by pressing  after the rotor stops. In the event of a power outage, the chamber cover can be unlocked manually to remove the sample.
- The steel isolator enclosing the rotor chamber provides adequate protection for the operator.
- The rotor model identification system prevents the mounted rotor from running at speeds higher than their maximum rated rotational speed. When mounting the rotor, the microprocessor checks whether the identified rotor is supported. The rotational speed is limited to the maximum safe rotational speed of the identified rotor.

IMPORTANT If a rotor different from the set one is detected, the automatic rotor identification system will also be activated and a warning issued.

- The imbalance detector monitors the rotor during running, and the system will automatically shut down with a warning if the rotor load is grossly imbalanced. At low rotational speeds, incorrectly loaded rotors may cause an imbalance. Rotor instability can also occur if the centrifuge is moved during running, or if it is not placed on a level and stable surface, the system will automatically shut down with a warning.
- The centrifuge feet are made of rubber and are designed to minimize the probability of possible rotation in the event of a rotor accident.

Centrifuge Chassis

Housing

The centrifuge housing consists of a stainless steel plate with an outer layer of amino coating and ABS+PC injection molding. The control panel is equipped with a user control interface and the system information and warnings are displayed.

Covers and Doors

The chamber cover consists of an ABS+PC injection molded part and a steel plate, and is fixed to the housing by a sturdy hinge. A window in the center is used to view the chamber. The locking mechanism is activated when the chamber cover is closed.

An electromechanical door locking system prevents the operator from accessing the spinning rotor and prevents the machine from starting running without the chamber cover being closed and locked. The chamber cover will be locked during the running of the instrument and can only be opened when the rotor is stopped. When the rotor stops,  will light up, indicating that the chamber cover can be opened by pressing it. The chamber cover can be unlocked manually to retrieve the sample in the event of a power outage.

Rotor Chamber

The rotor chamber is made of stainless steel and sealed with a foam gasket.

Temperature Sensing and Control

When the power is on, the temperature control system will be activated when the chamber cover is closed and locked. Sensors in the rotor chamber continuously monitor the chamber temperature. The microcontroller regulates the chamber temperature to a user-entered temperature level. Temperature can be set to be between -11°C and +40°C.

NOTE To avoid freezing of the chamber, the refrigeration is turned off when the chamber cover is opened. The centrifuge chamber cover will be automatically locked when closed, and the refrigeration system will start working.

Power Saving Mode

When power saving mode is enabled, the compressor will provide continuous cooling, but the temperature inside the centrifugal chamber will not drop below 4°C regardless of the set temperature to avoid freezing of the chamber and sample, which could lead to the information of more condensate inside the device. The power saving mode can be set in 30-minute increments up to 12 hours, and the compressor will provide continuous cooling for more than 12 hours. This mode will turn off the temperature control system after a user-selected period of time has elapsed, or when the cover is open, reducing energy consumption.

Drive

Variable frequency speed-control asynchronous motors driven by variable frequency drives can achieve different speeds and torques to suit different load requirements while maintaining quiet and smooth operation. A tie-down screw is used to attach the rotor to the drive shaft. The elastic suspension device ensures that the vibration does not affect the load and prevents damage to the drive shaft in the event of an imbalance during centrifugation. Maximum acceleration and deceleration rates can be selected for fast sample processing. Alternatively, slower acceleration and deceleration rates can be used to obtain precise gradients.

Compressor

The variable frequency compressor adopts hermetic reciprocating variable speed, combining ultra-high performance and superior electrical system to realize low noise and high performance refrigeration requirements. Charge quantitative refrigerant can adapt to the different environmental conditions of fast and accurate refrigeration requirements.

Performance Characteristics

Performance Characteristics

Specification		Allegra C-24R
Rotational speed	**Set rotational speed**	300 to 16,000 rpm in increments of 1 rpm
	Set RCF	10 to 24,027 *x g* in 1 *x g* increments
	Rotational speed display	Actual rotational speed in 1 rpm increments, or actual RCF in 1 *x g* increments
	Rotational speed accuracy	Set rotational speed to be (300 to 16,000 rpm) ± 10 rpm
Time	**Set time**	1 sec to 99 hrs 59 min 59 sec or continuous (hold)
	Display HH:MM when the time ≥ 1 hour Display MM:SS when the time < 1 hour	Scheduled run: Indicates remaining run time Hold run: Indicates elapsed time Pulse run: Indicates elapsed time (less than 2 minutes)
Temperature	**Set temperature**	-11 to +40°C in increments of 1°C
	Temperature display	Estimated sample temperature in 1°C increments
	Temperature accuracy[a]	Set temperature (after equilibrium) to be ± 2°C; suitable for temperature range of 4 to 25°C
	Over temperature shutdown[b]	> 45°C
Acceleration	**Acceleration curves**	2 acceleration rates (fast and slow), including maximum torque

Specification		Allegra C-24R
Deceleration	**Deceleration curve**	2 deceleration rates (fast and slow), including maximum torque
Dimensions	**Height**	28.0 cm
	Height when chamber cover is opened	53.0 cm
	Width	30.0 cm
	Depth	55.0 cm
Weight (excluding rotor)	31 kg	
Ventilation clearance	**Side**	30 cm (1 ft)
	Rear	30 cm (1 ft)
Electrical	220-230 VAC (+/-10%), 10 A, 50 Hz	
	Power supply	Class 1
	Installation (overvoltage) category	II
	Fuse rating	T10 AL, AC 250 V
Ambient	**Maximum noise output** (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)	≤ 52 dBA
	Refrigerant	R134a (0.13 kg, 24 bar)
	Maximum heat dissipation at steady state	220-230 VAC (+/-10%), 50 Hz: 1,365 Btu/h (0.4 kW)
	Ambient temperature range	5°C to 35°C
	Pollution level	2
	Maximum altitude	2,000 m (6,561 ft) above sea level
	Humidity	The maximum allowable air relative humidity from 5°C to 35°C is 80%

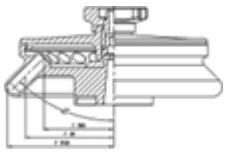
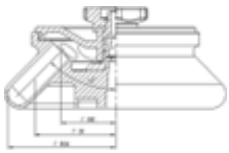
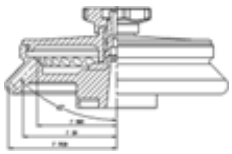
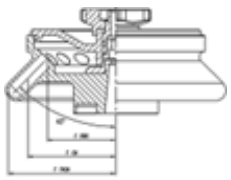
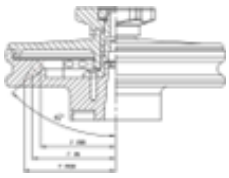
a. In order to reach temperatures above ambient, the centrifuge relies on the frictional heat generated inside the chamber during operation. At low running speeds or low ambient temperatures, the centrifuge may not be able to reach some higher temperatures. At high running speeds or high ambient temperatures, the centrifuge may not be able to reach some lower temperatures.

b. If the system reaches such a temperature, a diagnostic and a maximum deceleration stop will be used.

Available Rotors

The following Beckman Coulter rotors are available for the Allegra C-24R centrifuge. Refer to APPENDIX D, Allegra C-24R Rotor Description for detailed specifications of each rotor Table 1.1 listed.

Table 1.1 Available Rotors for Allegra C-24R

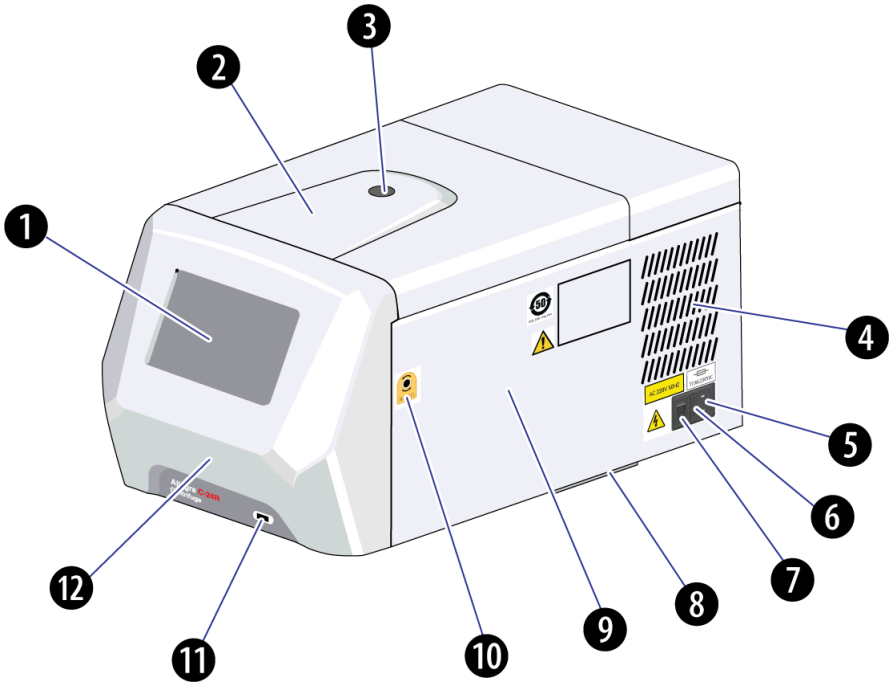
Rotor profile	Description	Maximum rotational speed[a]	Maximum relative centrifugal force[b]	Quantity x Rated capacity	Part number
	CF-24×2-24R Fixed angle rotor r_{max} = 45	16,000 rpm (Reachable at 4°C)	24,027 *x g*	24 × 1.5/2.0 mL	D19694
	CF-12×5-24R Fixed angle rotor r_{max} = 45	15,000 rpm (Reachable at 4°C)	20,916 *x g*	12 × 5 mL	D19695
	CF-36×0.5-24R Fixed angle rotor r_{max} = 45	13,500 rpm (Reachable at 4°C)	17,105 *x g*	36 × 0.5 mL	D19696
	CF-18×2-24R Fixed angle rotor r_{max} = 45	16,000 rpm (Reachable at 4°C)	22,507 *x g*	18 × 2.0 mL - spin column	D19697
	CF-32×0.2-PCR-24R Fixed angle rotor r_{max} = 45	16,000 rpm (Reachable at 4°C)	20,070 *x g*	4 × 8 × 0.2 mL	D19698

a. The maximum rotational speed is based on the solution density of 1.2 g/mL.

b. The relative centrifugal force field (RCF) is the ratio of centrifugal acceleration to standard gravitational acceleration (g) at a specified radius and velocity ($r\omega^2$), calculated as RCF = $r\omega^2/g$, where r is the radius, in millimeters, ω is the angular velocity, in radians per second (2 π rpm/60), and g is the standard gravitational acceleration (9,807 mm/s^2). After substitution: RCF = 1.12 r $(rpm/1,000)^2$.

Schematic Diagram of Centrifuge

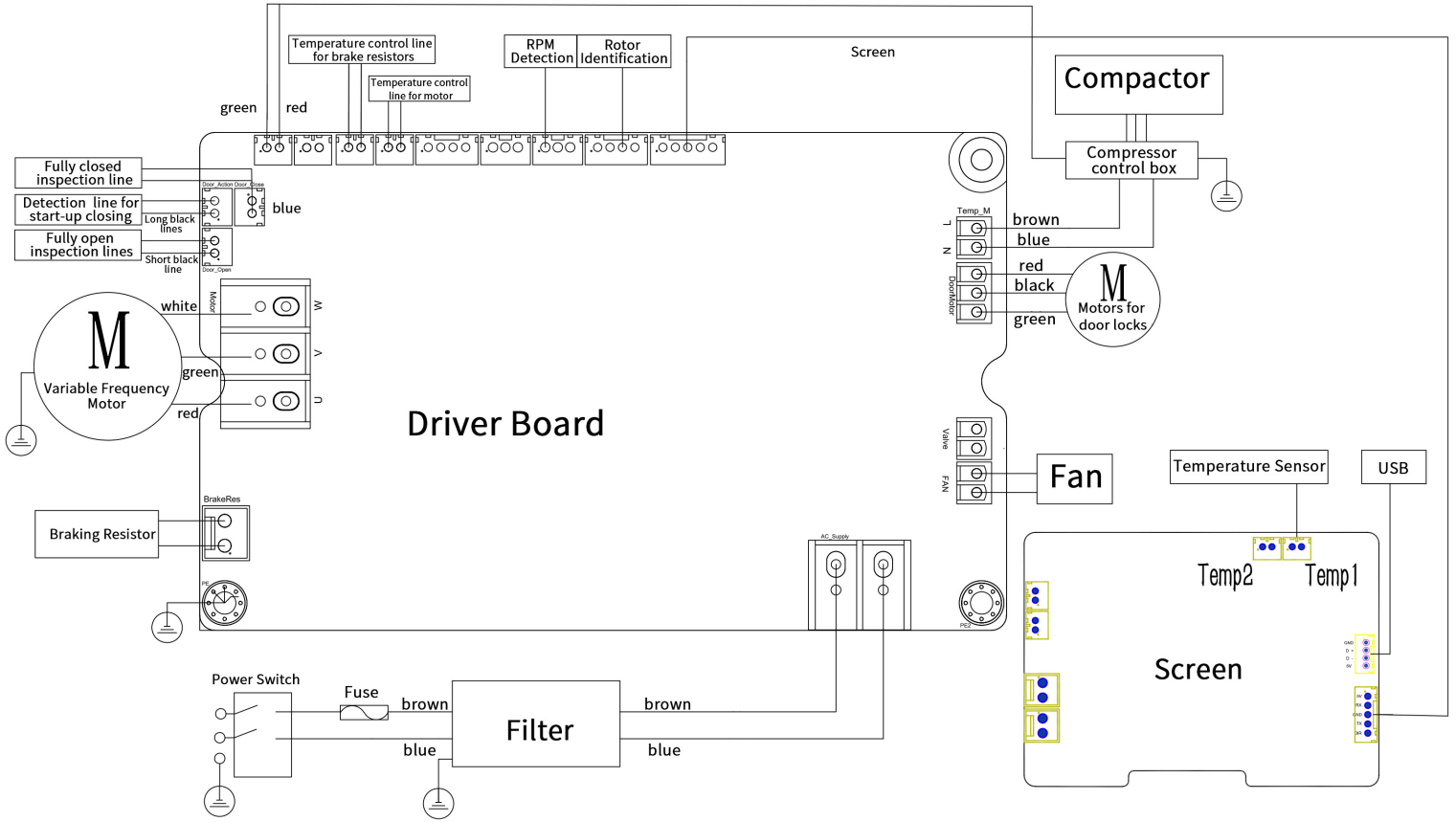
Figure 1.3 Schematic Diagram of Centrifuge



1. Display
2. Centrifuge cover
3. Glass viewing window
4. Air outlet
5. Power connector
6. Fuse in the appliance inlet
7. Power switch
8. Condensate collection box
9. Centrifuge body
10. Emergency door opening
11. USB interface
12. Front panel

Centrifuge Electrical System

Figure 1.4 Circuit Wiring Diagram



CHAPTER 2

Operation and Use

Overview

This chapter describes the operation steps of the centrifuge. For rotor instructions, refer to APPENDIX D, Allegra C-24R Rotor Description.

This chapter contains information on:

- Basic Operation and Commissioning
- Control System Main Interface
- Menu
- Parameter Settings

Basic Operation and Commissioning

⚠ WARNING

- **Do not power on the centrifuge until the chamber has been cleaned, as this may damage the equipment.**
- **Over-speeding of the rotor is strictly prohibited. The user is responsible for the loss caused by over-speeding.**
- **Do not lift or move the centrifuge while it is running.**
- **Do not open the door cover while the rotor is rotating.**
- **Wait for more than 5 minutes to power on the centrifuge after powering it off to avoid compressor blockage, which will affect the service life of the compressor.**
- **After use, dry the centrifuge chamber with a soft rag and open the door cover to dry the remaining moisture.**
- **Components such as rotors and should be kept clean to prevent corrosion or accelerated aging.**

Manual Operation

Before operating the centrifuge, you should know the type of rotor used, the rotational speed/centrifugal force required, the running time, and the running temperature. Refer to Parameter Settings for detailed instructions on parameter settings. The basic operation process of the centrifuge is as follows:

1. Turn on the power switch. The display lights up. The centrifuge is now ready for running.
2. Press  to open the door cover and turn over the door cover.
3. Install the rotor. Refer to APPENDIX A, Rotor Installation/Removal and APPENDIX A, Accessories Installation. Finish loading the sample and close the door cover.
4. Set the operation parameters: Select the rotor model used (models with recognition function do not need to be set manually), and set the rotational speed/centrifugal force, running time, running temperature, and acceleration/deceleration. Refer to Parameter Settings.
5. Check that all parameters are correct. Ensure that the chamber cover is properly locked.
6. Press **Run** to start the centrifugation.
7. Wait until the time is up, or press **Stop** to stop the running.
8. When the rotor stops and the beep is heard, press  to open the door cover. After hearing the door open, turn over the door cover, remove the sample, and clean the chamber.
9. After use, power off the centrifuge.

Commissioning

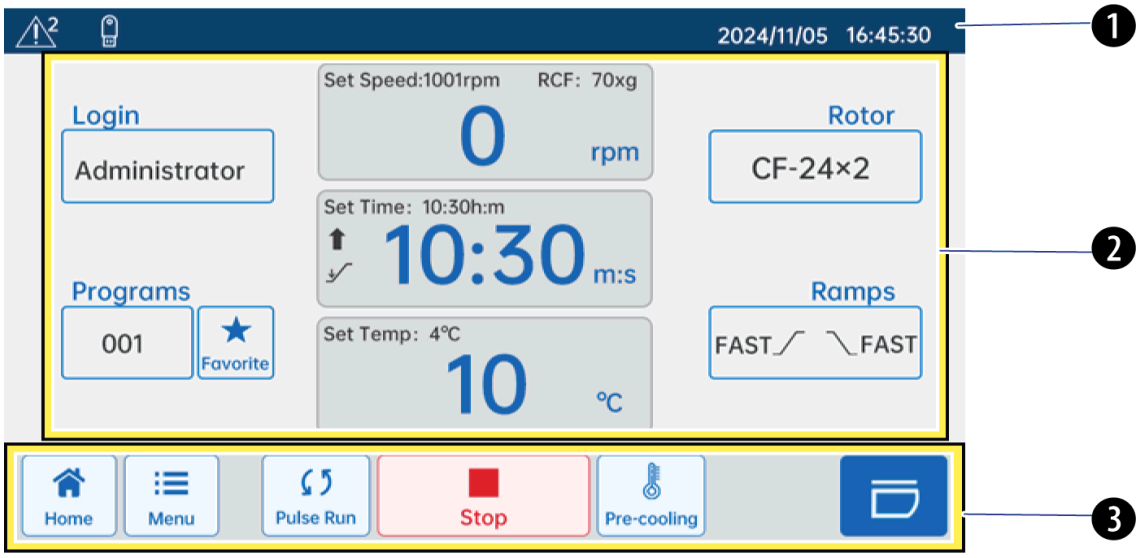
Complete the installation of the host and rotor (refer to APPENDIX A, Host Installation and APPENDIX A, Rotor Installation/Removal) and run the centrifuge (refer to Manual Operation). First, select low-speed (2,000 rpm) running, and gradually increase (2,000 rpm each time) to the maximum speed running. The commissioning is successful if there is no abnormality.

Control System Main Interface

Main Interface

The main interface is first displayed after the system is started (Figure 2.1). There are three areas on the interface from top to bottom: the equipment status prompt area, the parameter settings and display area, and the function operation area.

Figure 2.1 Main Interface



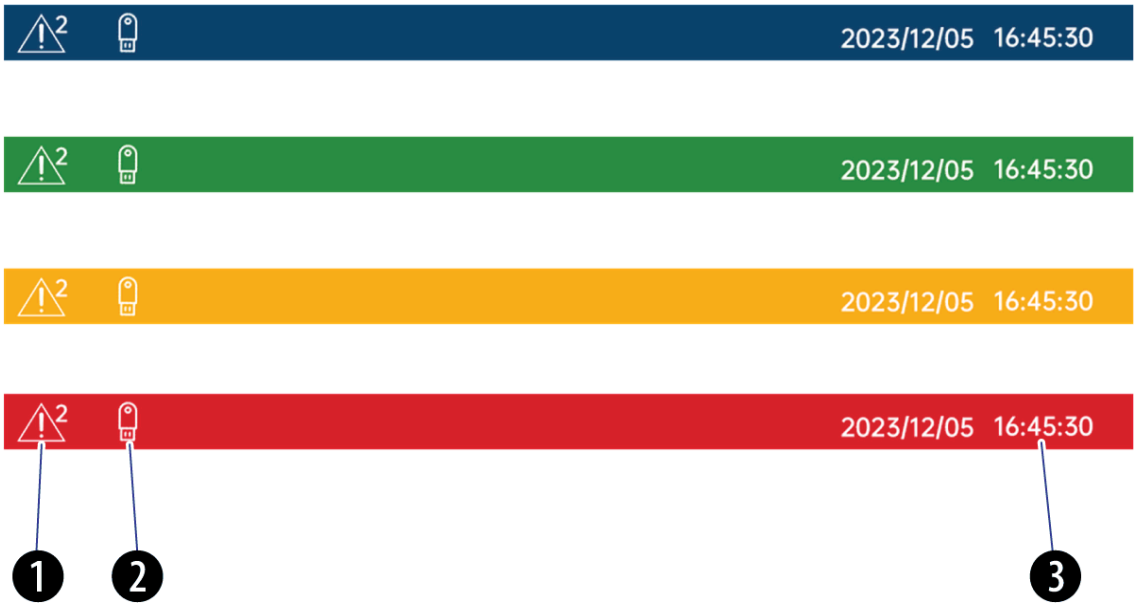
1. Equipment status prompt area
2. Parameter settings and display area
3. Function operation area

Equipment Status Prompt Area

The state of the current equipment is prompted with colors. States represented by different colors are as follows (Figure 2.2).

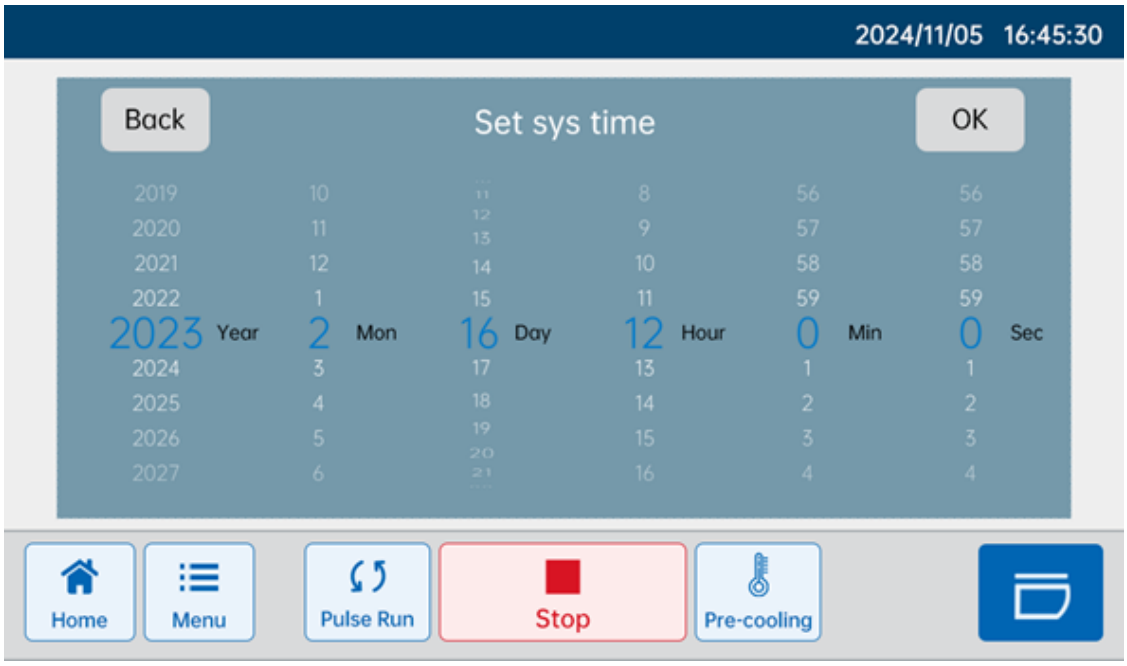
- Blue: Standby
- Green: Running
- Yellow: Warning
- Red: Fault

Figure 2.2 Equipment Status Prompt Area



1. **Warning:** Indicates that there is a fault or warning on the system. If a number appears on the warning icon, it means that there are multiple prompts in the current system, and the number is the number of prompts. Press the warning icon to check detailed prompts. This icon will disappear when the fault or warning is cleared.
2. **USB**: Indicates USB device is accessed. The export function is only available when a USB device is accessed.
3. **System time:** Displays the system time. Press system time to enter the system time setting interface (Figure 2.3), and the system time can be manually calibrated.

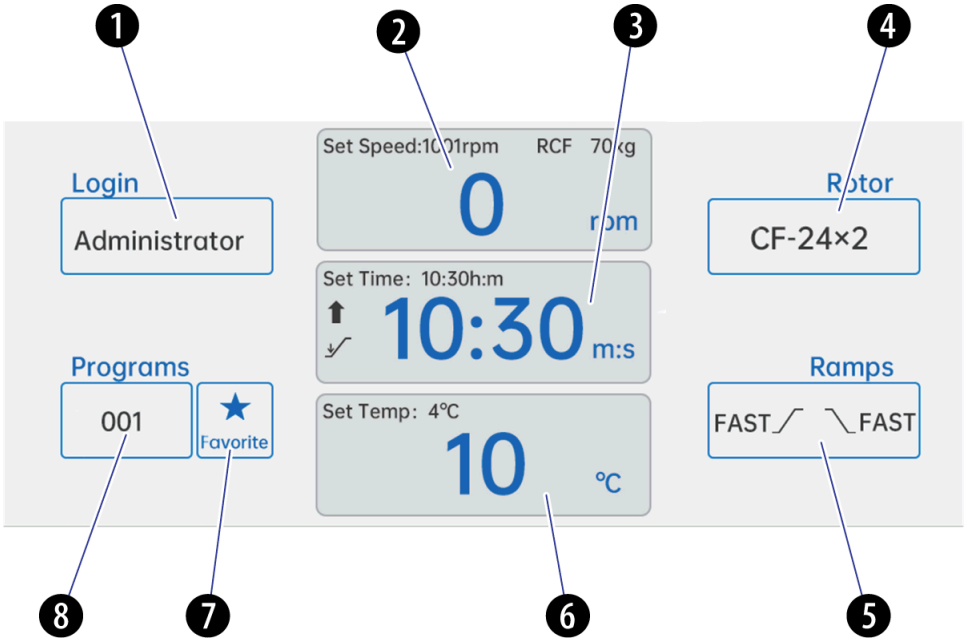
Figure 2.3 System Time Settings Interface



Parameter Settings and Display Area

The set centrifugal parameters and the running real-time parameters are displayed in this area (Figure 2.4). For detailed instructions on parameter settings, refer to Parameter Settings.

Figure 2.4 Parameter Settings and Display Area

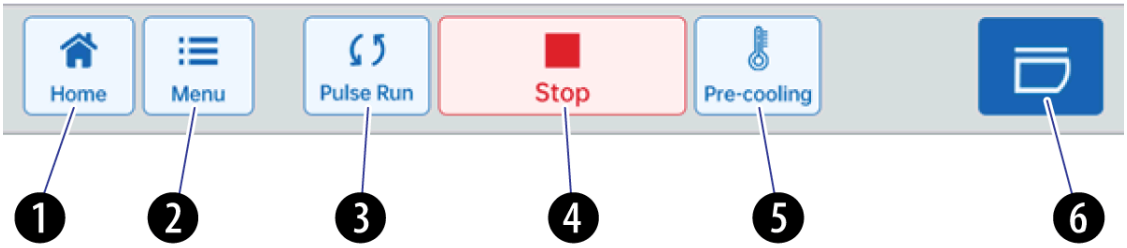


1. **Login:** Displays the name of the currently logged-in user. Double click to log out.
2. **Rotational speed/RCF:** The blue font in the display box is the current real-time rotational speed or centrifugal force, and the top value is the set rotational speed and centrifugal force. Press the display box to enter the interface of the rotational speed/centrifugal force setting. If the centrifugal force/speed is switched on the setting interface, the display will be switched synchronously.
3. **Timing display box:** The blue font is the current running time, and the top value is the setting time. Press the display box to enter the time setting interface. The running mode and timing display mode are selected in the settings interface. ↓ indicates start timing; ↑ indicates start timing when reaching the set speed; ⬆ indicates the timing, ⬇ indicates the countdown timing, and ∞ indicates the current holding mode.
4. **Rotor information:** After loading the rotor, the rotor number of the current loading is displayed. Press the display box to enter the rotor information interface to view the rotor library configured by this equipment and the parameters and use information of the current loading rotor.
5. **Acceleration and deceleration:** Displays the current acceleration and deceleration gear. ↗ indicates the acceleration gear, and ↘ indicates the deceleration gear. Press the display box to enter the gear setting interface.
6. **Temperature display box:** The blue font is the current temperature in the chamber, and the top value is the setting temperature. Press the display box to enter the temperature setting interface.
7. **Favorite:** Call the Favorites button to quickly call the program parameters of the currently logged-in user.
8. **Programs:** Displays the group number and name of the currently called program. Press the display box to enter the program group setting interface. This is blank when the program group is not called.

Function Operation Area

There are buttons (Figure 2.5) for common functions such as running, stopping, opening the door cover, etc. in the bottom bar.

Figure 2.5 Function Operation Area



1. **Home:** Press **Home** on any interface to return to the main interface.
2. **Menu:** Press **Menu** on any interface to enter the function menu interface.
3. **Pulse Run:** The system will be centrifuged immediately by pressing and holding this button. It will then accelerate to the set speed in the maximum acceleration gear and release the button to immediately decelerate and stop in the maximum deceleration gear. Instantaneous centrifugation runs for up to 2 minutes.
4. **Run/Stop:** It is displayed as a **Run** when the equipment is shut down. Press **Run** to start the centrifugal program immediately, and this button becomes **Stop**; in any case, press **Stop** and the system immediately executes the shutdown program.
5. **Pre-cooling:** Press **Pre-cooling** and the system will run at 5,000 rpm and be cooled at maximum power. The system will automatically stop and prompt when the set temperature is reached. The chamber temperature will decrease to 4 ℃ within seven minutes when the ambient temperature is 15-25 ℃ after enabling the **Pre-cooling**.

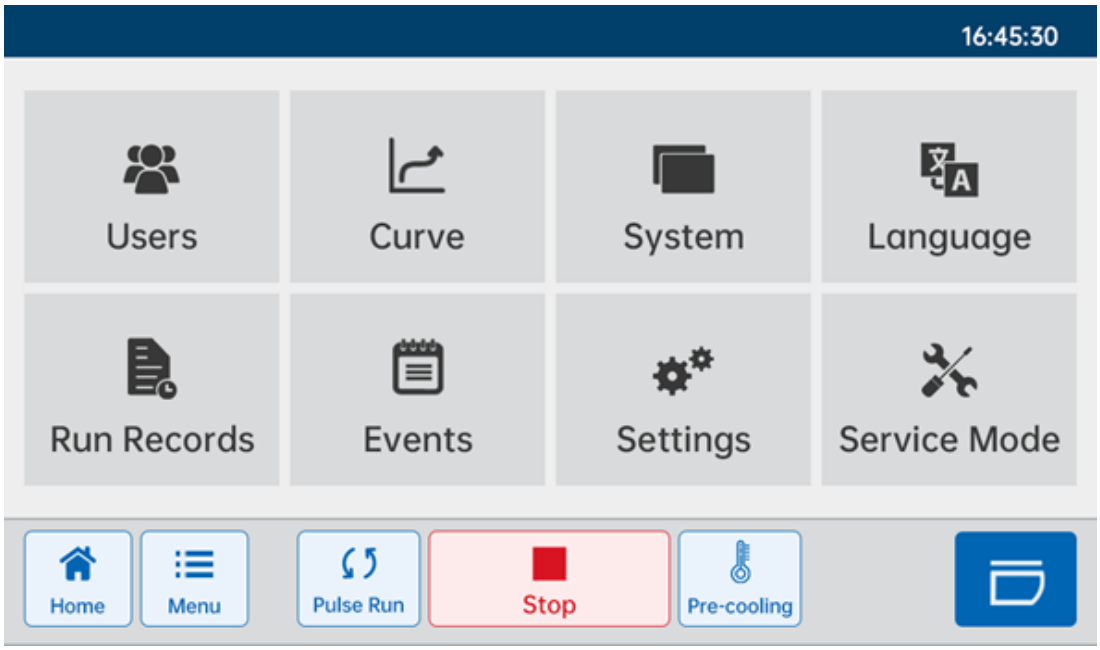
IMPORTANT Make sure the rotor is properly installed before enabling this function.

6. **Door Cover:** Indicates the current door cover status.  indicates that the door cover is closed, press  to open the door cover;  indicates that the door cover is open, and the equipment cannot run when it is open.

Menu

Press **Menu** on the left side of the bottom bar of the main interface to enter the menu interface (Figure 2.6). On this interface, you can enable/disable user management function, modify system settings, view running records and event logs, etc.

Figure 2.6 Menu



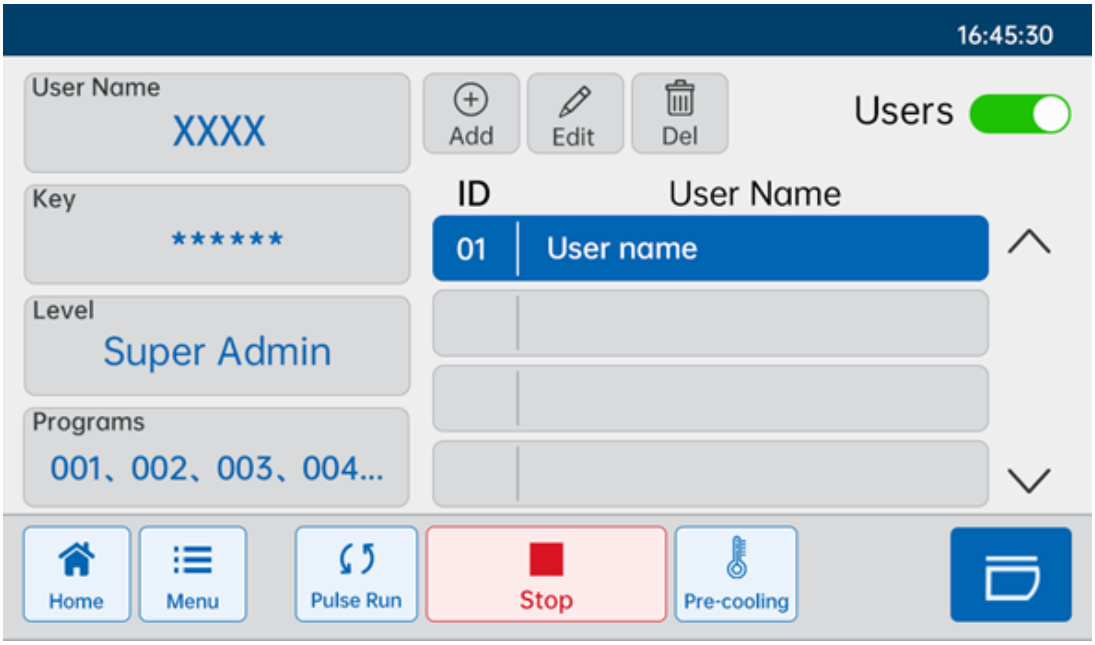
Users

In the menu interface, press **Users** to enter the user management interface (Figure 2.7). Users can be added, edited, or deleted on this interface.

The system is equipped with three levels of permissions, namely operator, super-user and administrator. Different permissions are limited to the use of different systems, refer to APPENDIX B, User Management Permission for details.

NOTE Account passwords are between 4 and 9 characters.

Figure 2.7 User Management Interface



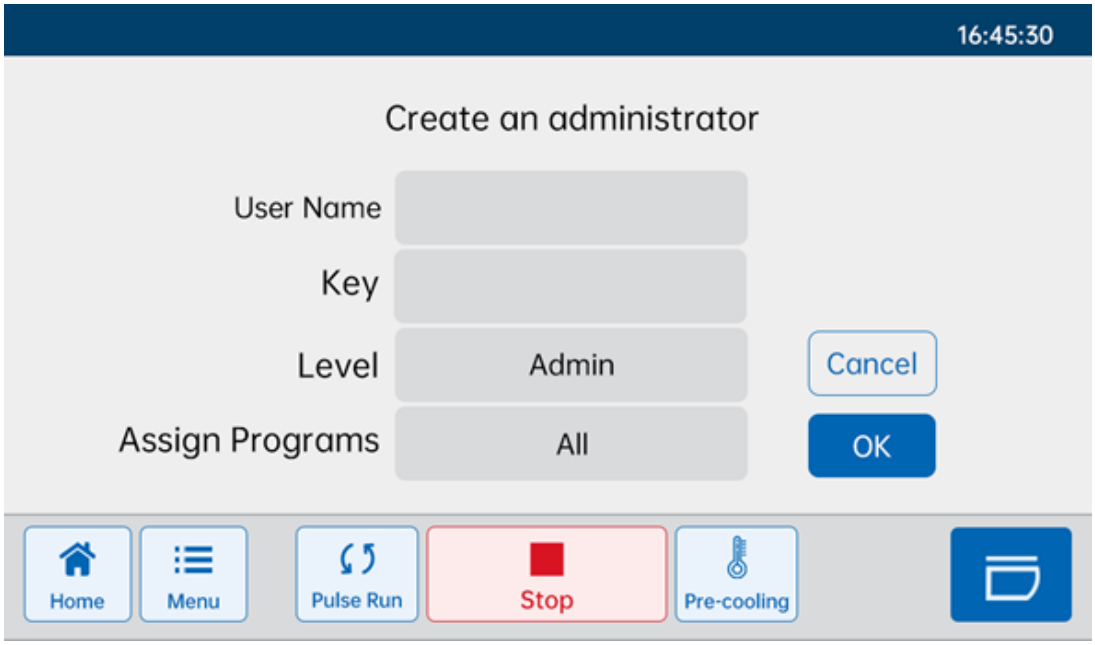
Enable/Disable User Management Function

Press  to enable/disable user management function.

NOTE Only the administrator can enable or disable the user management function.

NOTE When the user management is enabled for the first time, the **Create an administrator** interface (Figure 2.8) may pop up for creating an administrator account.

Figure 2.8 Create an Administrator Interface



NOTE After the user management is disabled, accounts and passwords are no longer required to be entered when accessing the system.

Add User

Press Add. A pop-up window will display the new user name, password, assigned permissions, and program group.

Modify User

Press the user to be modified, press Edit, and edit the data to be modified in the pop-up window.

Delete User

Press the user to be deleted and press Del to delete this user.

Curve

In the menu interface, press **Curve** to enter the curve display interface (Figure 2.9). The coordinate system shows the relationship between the rotational speed, temperature and time. The system can store 1,000 hours of historical running curve data, after which it is overwritten from the first one.

Figure 2.9 Curve Display Interface

System

In the menu interface, press **System** to enter the equipment information interface (Figure 2.10). Information about the host, including the equipment model, maximum capacity, maximum rotational speed, maximum centrifugal force, maximum power, hardware version number, software version number, and drive number can be viewed on this interface.

Figure 2.10 Equipment Information Interface

Language

In the menu interface, press **Language** to enter the language switch interface. Press **Language** to switch the system language. The system supports Chinese and English.

Run Records

In the menu interface, press **Run Records** to enter the running record interface. The stored running records can be viewed in this interface. The system can store up to 1,000 running records. The recorded information includes the start time and end time of the run, the running results, the parameters, the events during the run, the user ID, the running curve, and the equipment information.

The homepage of the running interface displays general information about the record, such as the record date, the program group used, and the operation parameters (Figure 2.11). Press the record to jump to the detail page of this record to view the detailed running record (Figure 2.12). On the detailed running record page, press **Curve** to call the running curve for that record. On the detailed running record page, press × to return to the previous page.

Figure 2.11 Homepage of Running Record

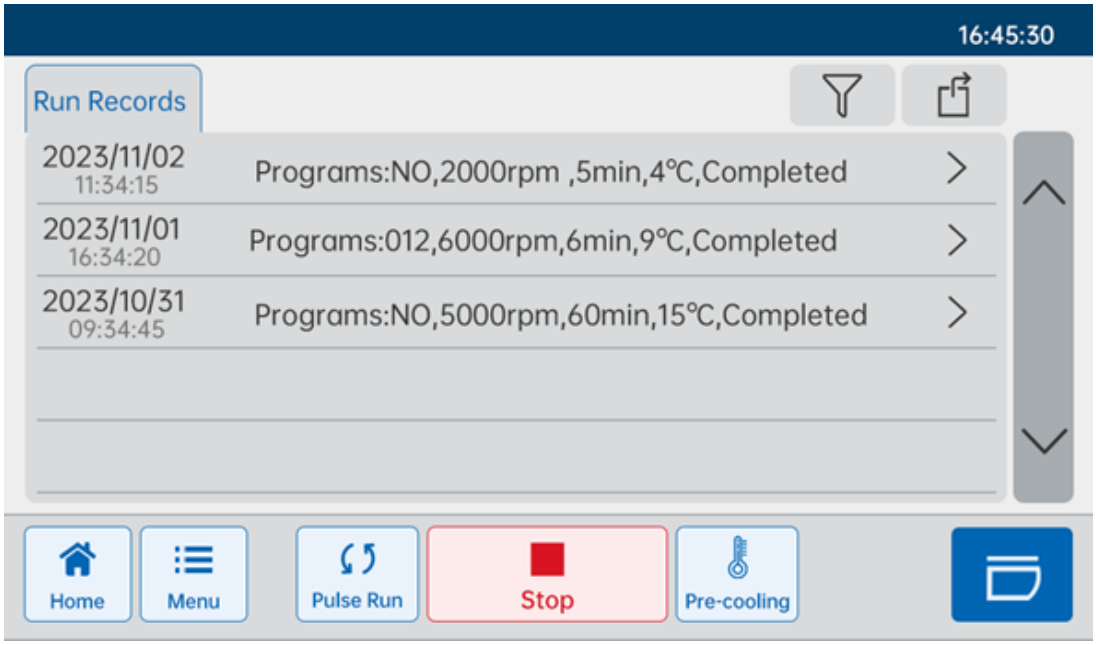
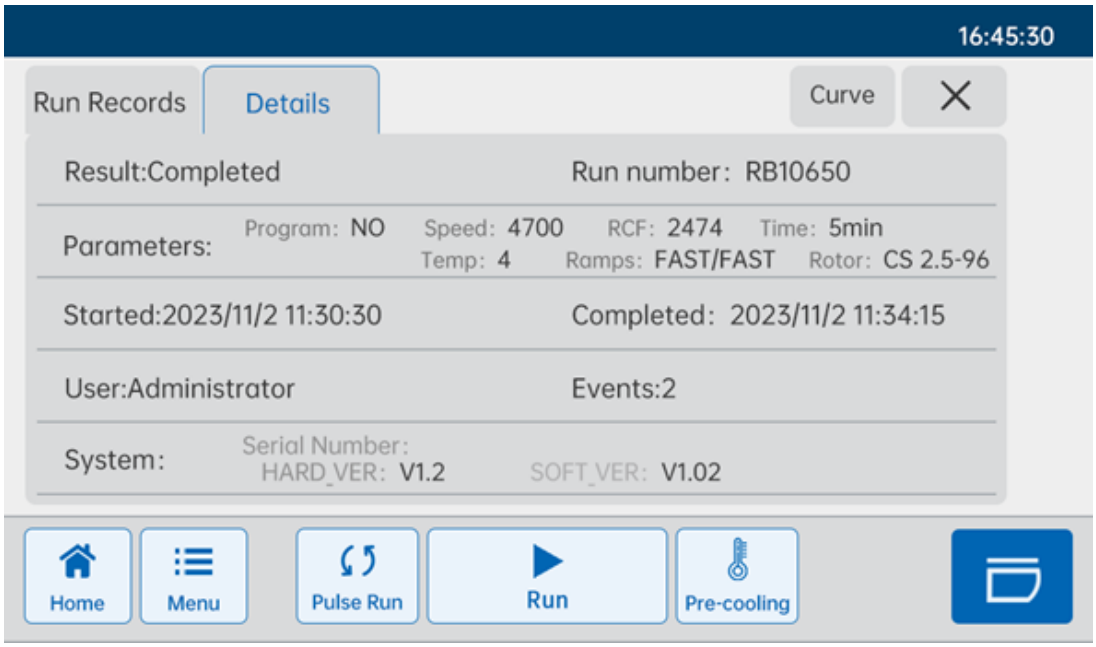


Figure 2.12 Detailed Running Record Page

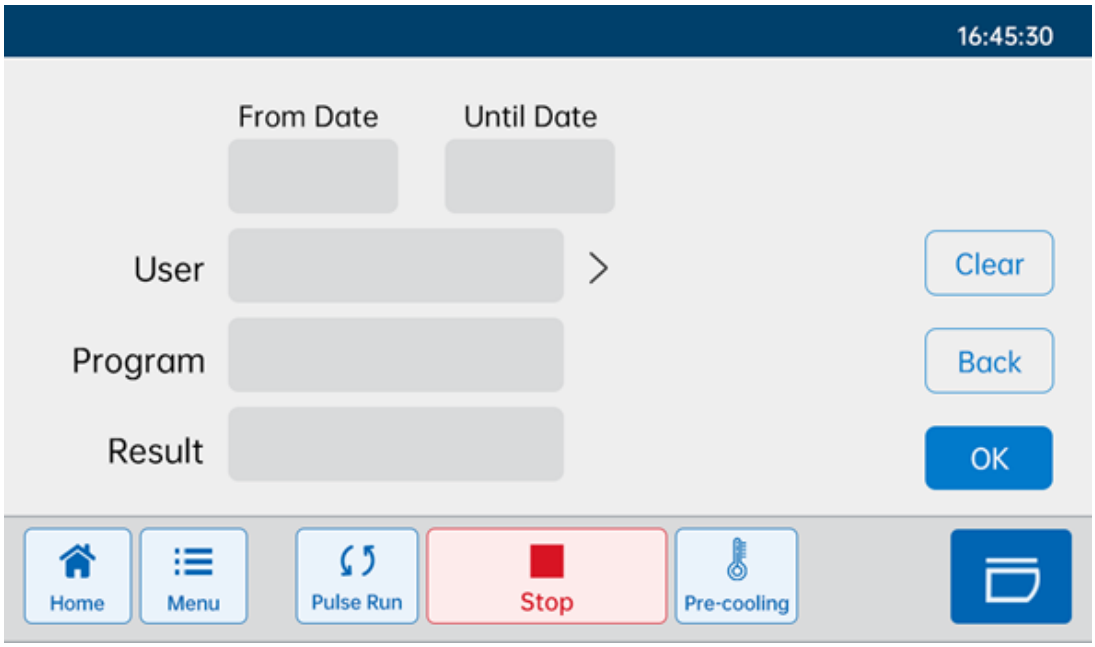


Filter Running Records

On the homepage of the running interface, press  to enter the filter page (Figure 2.13). Filtering can be performed based on start/end date, user ID, program number, and running results (stop for error, manual stop, and timing stop). After selecting the filter criteria, press **OK** to start filtering and

return to the homepage of the running record to list the filtering results. Press **Clear** to reset the filters. Press **Back** to return to the homepage of the running record.

Figure 2.13 Filter Page



Export Running Records

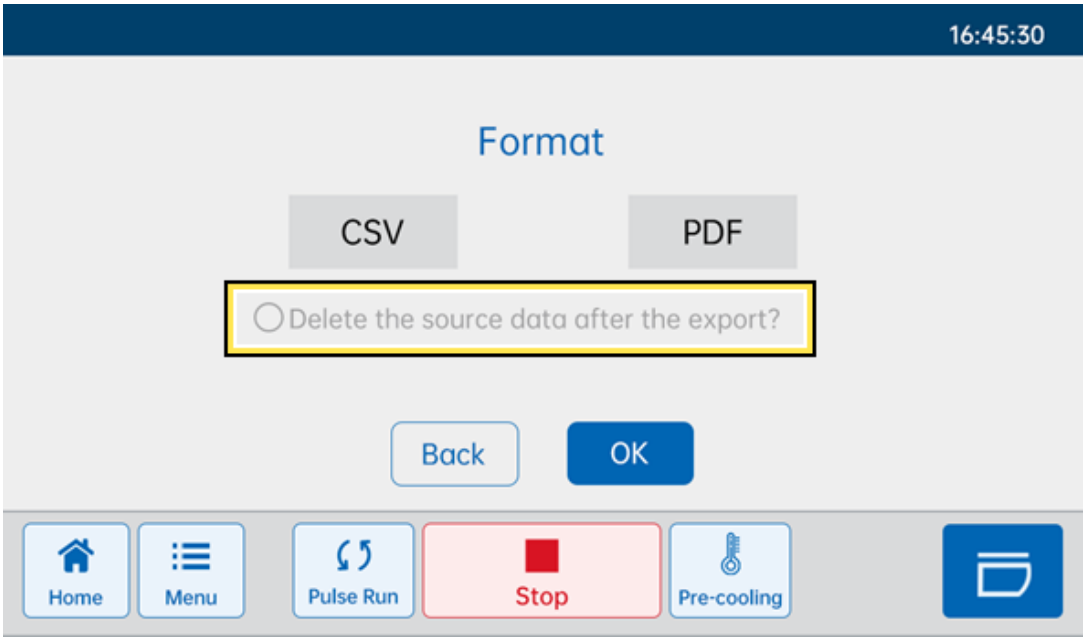
IMPORTANT Data can only be exported by accessing a USB storage device. When a USB storage device is accessed, the icon will appear in the top bar of the system.

IMPORTANT Do not disconnect the USB storage device during data export in case of data loss.

On the homepage of the running interface, press to export the running records. If you click **Export** after filtering, the filtered running records will be exported. If not filtered, all running records are exported. The export format can be selected as CSV or PDF. E-signatures can be added when selecting PDF format for export, and the exported file contains an e-signature.

NOTE "**Delete the source data after the export?**" may be selected to delete all running records from the system when the administrator user is exporting the running records (Figure 2.14).

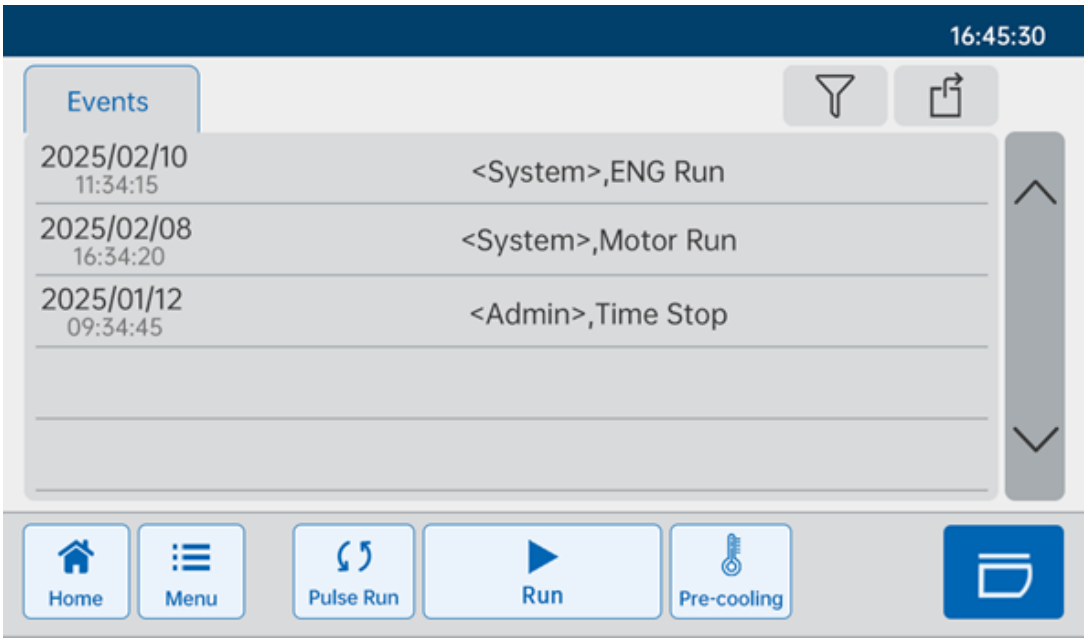
Figure 2.14 Selection of Deleting Running Records



Events

In the menu interface, press **Events** to enter the events interface (Figure 2.15). The event log can be viewed in the event log interface. The system can store up to 100,000 event records, including settings changes, alarms, fault codes, user logins and logouts, and event occurrence time.

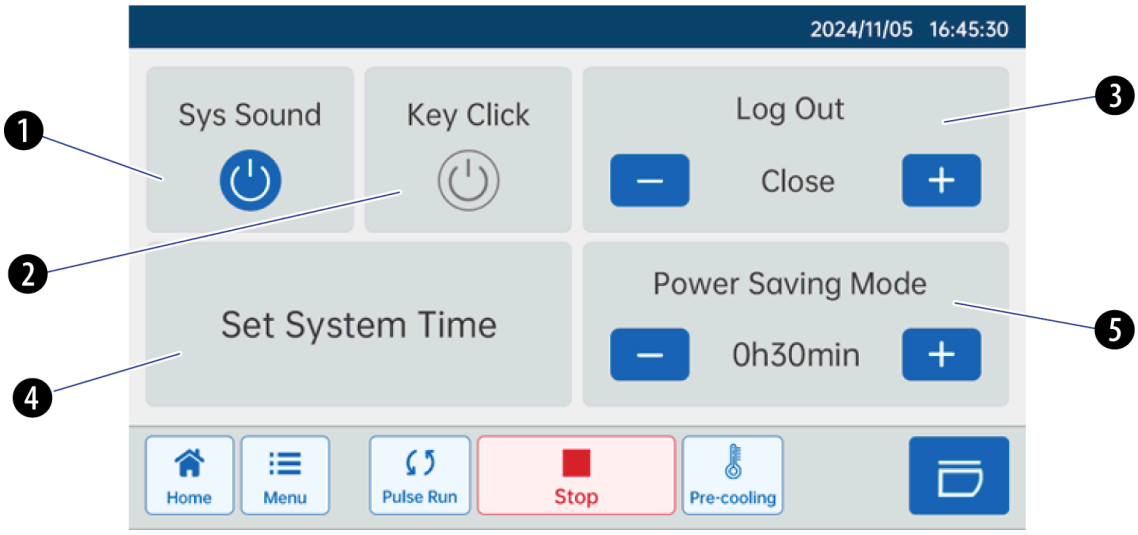
Figure 2.15 Events Interface



Settings

On the menu interface, press **Settings** to enter the system settings interface (Figure 2.16). On the system settings interface, the system settings can be edited, and the locking screen and the temperature control stop time can be adjusted.

Figure 2.16 System Settings Interface

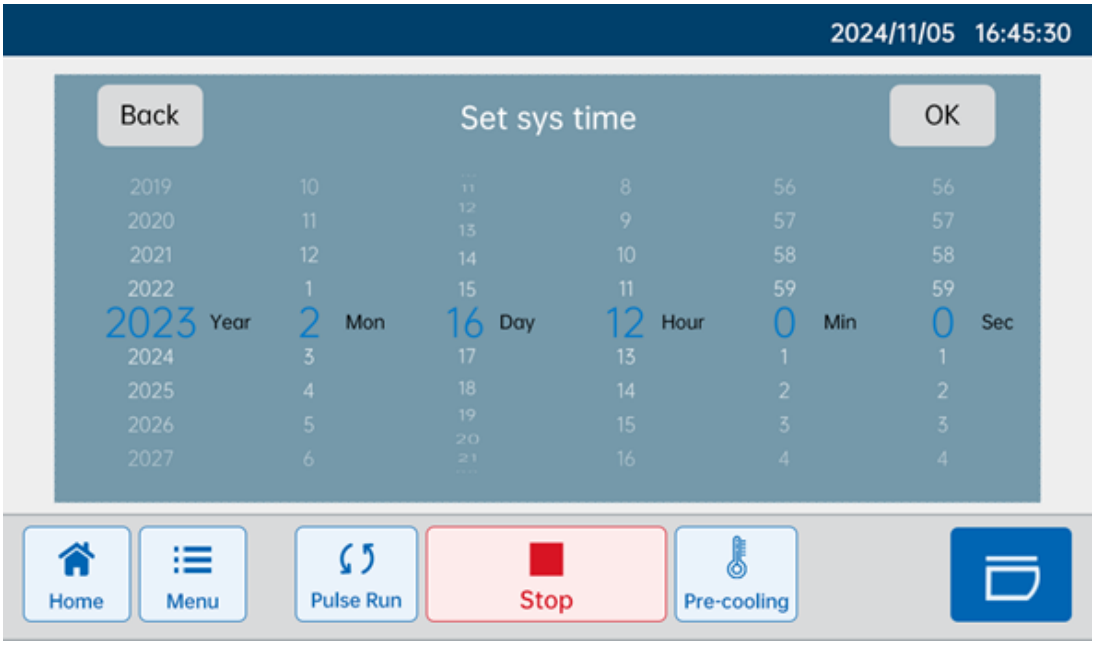


1. **Sys Sound:** Turn the system sounds on or off.

   NOTE indicates that the system sound is on, and indicates that the system sound is off.

2. **Key Click:** Turn the touch sounds on or off.
3. **Log Out:** Press + or − to adjust the auto lock screen after no operation. The adjustment amplitude is 10 seconds, and the maximum setting time is 240 seconds.
4. **Set System Time**: Press **Set System Time** to enter the system time setting interface (Figure 2.17) for manually calibrate the system time.
5. **Power Saving Mode:** "Close" indicates the power saving mode is disabled. Press + to enable the power saving mode and adjust the time to conserve energy. After the power saving mode is enabled, if the set temperature is < 6 ℃, the temperature inside the chamber will be maintained at 6 ℃ after running to avoid icing of the rotor chamber and samples, and to avoid the formation of more condensate inside the device; if the set temperature is ≥ 6 ℃, the temperature inside the chamber will be maintained with the set temperature. The temperature control system will not be turned off until the cover is opened or the set time of the power saving mode is reached. If the time is within 12 hours, it will be in 30-minute increments; if the time is over 12 hours, it will continuously reduce energy consumption and ∞ will be displayed and the temperature control system will be turned off until the door cover is opened.

Figure 2.17 Set System Time



Parameter Settings

NOTE During running, the user can change the rotational speed, time and temperature parameters without stopping the running. After the new parameters are set successfully, the centrifuge will immediately run according to the new parameters. The previous centrifugation time will be zeroed out and the timing will restart.

Rotational Speed and Centrifugal Force Settings

Press the rotational speed/centrifugal force display box on the main interface (Figure 2.18) to enter the rotational speed/centrifugal force setting interface (Figure 2.19). Enter the centrifugal parameters on the numeric keypad, press **OK** to confirm the settings and return to the previous interface. Press **RPM** and **RCF** to switch to set the rotational speed or centrifugal force, and the value of the main interface display box will be switched accordingly.

⚠ CAUTION

The set rotational speed or centrifugal force cannot exceed the upper limit of the currently installed rotor, otherwise, the OK button will turn red and the settings cannot be saved.

Figure 2.18 Rotational Speed/Centrifugal Force Display Box

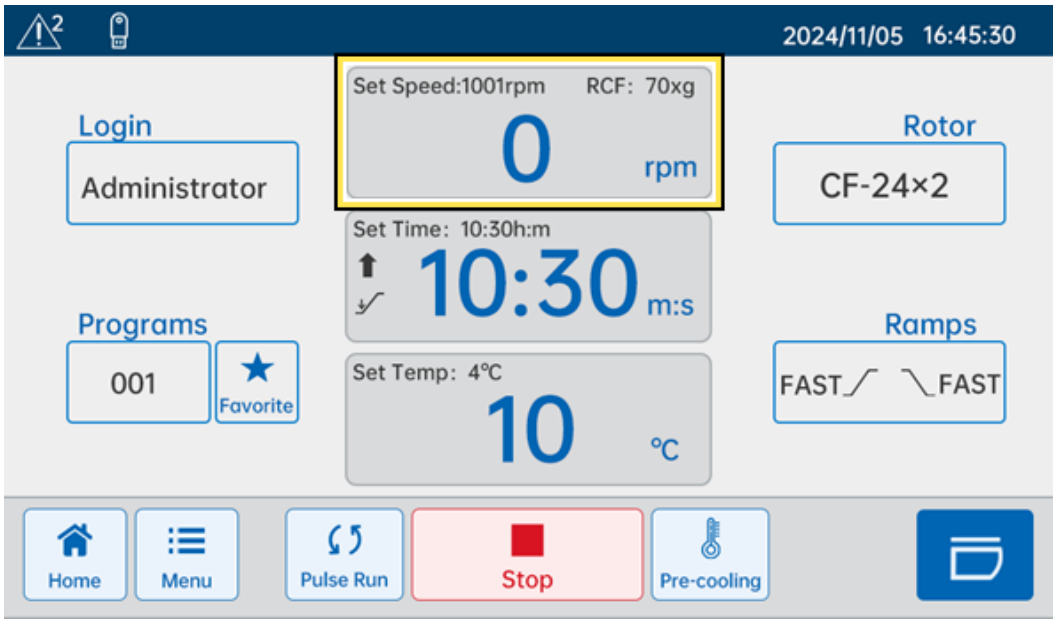
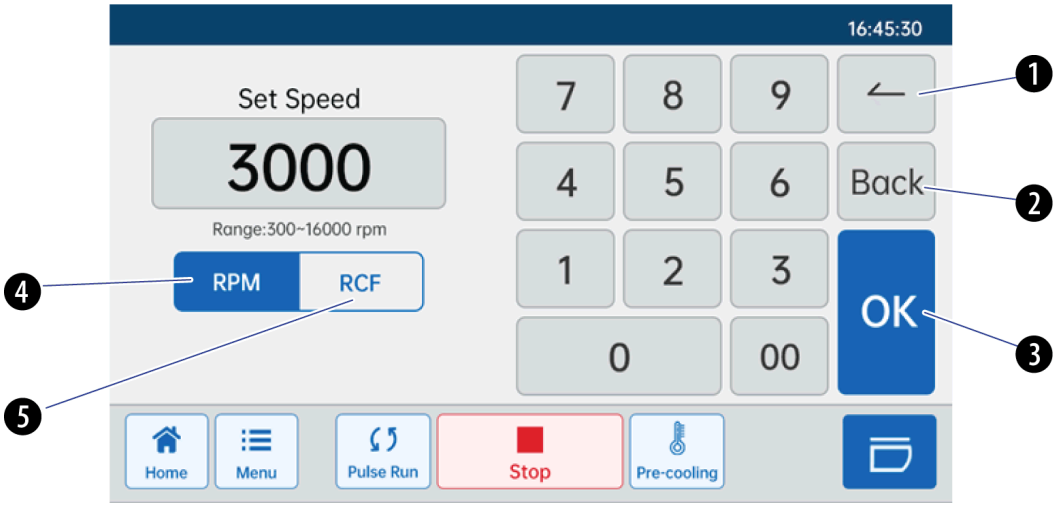


Figure 2.19 Rotational Speed and Centrifugal Force Setting Interface



1. **Delete:** Deletes the numbers in the input box one by one.
2. **Back:** Returns to the previous interface.
3. **OK:** Saves the parameter value of the setting.
4. **RPM:** Switches the current setting to the rotational speed.
5. **RCF:** Switches the current setting to the centrifugal force.

Time Settings

Press the time display box in the main interface (Figure 2.20), and the interface will jump to the time setting interface (Figure 2.21). Enter a value on the numeric keypad and press the button below the input box to set the timing mode. When the setting is complete, press **OK** to confirm the settings and return to the previous interface. The time setting ranges from 1 second to 99 hours 59 minutes 59 seconds.

If the time to be displayed is ≥ 1 hour, the timing unit on the main interface automatically displays hours: minutes (h:m); if it is < 1 hour, the timing unit on the main interface automatically displays minutes: seconds (m:s).

Figure 2.20 Time Display Box

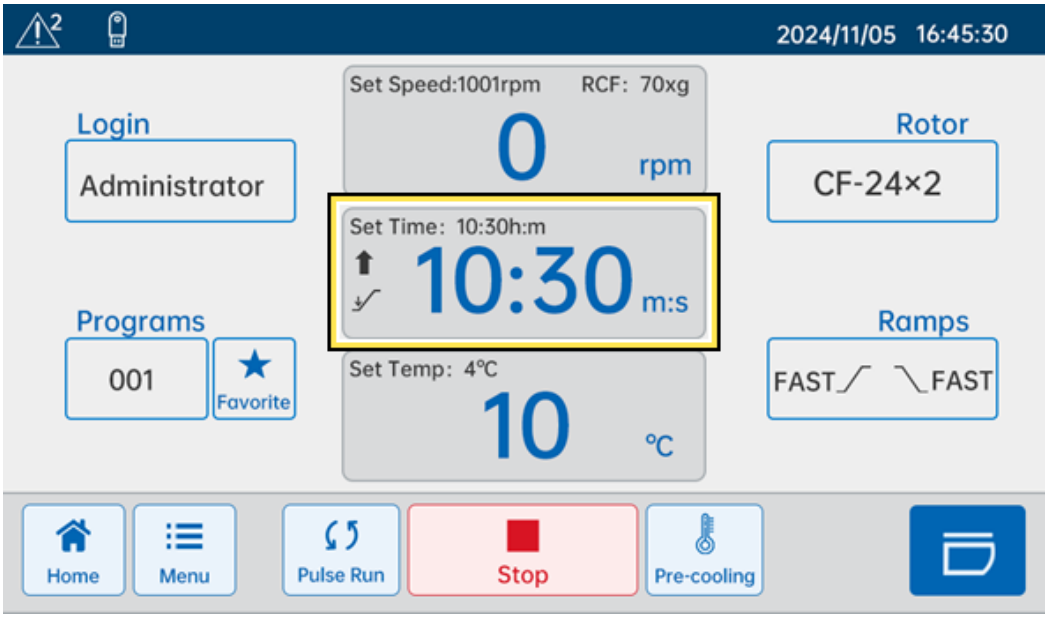
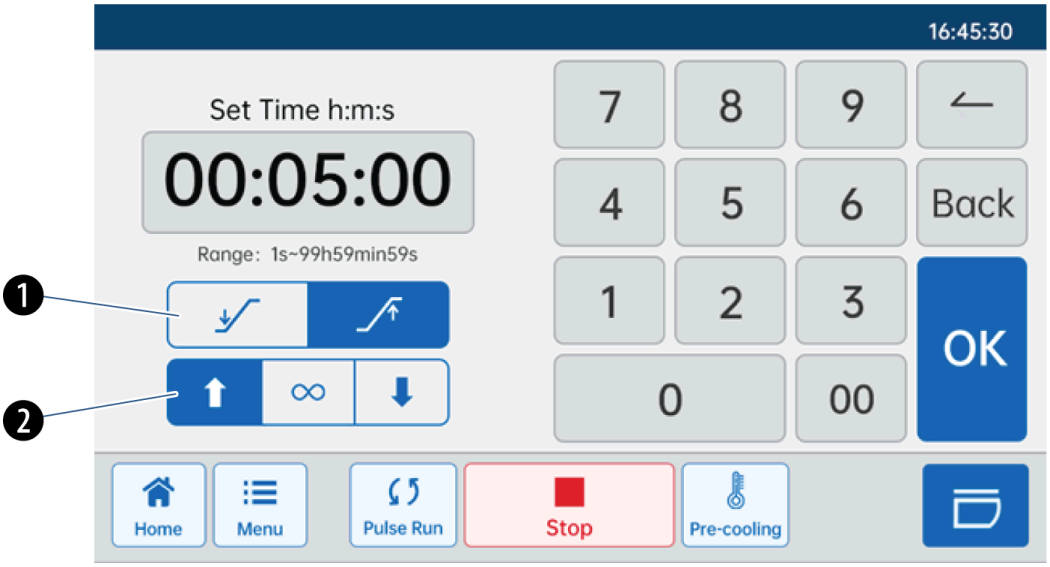


Figure 2.21 Parameter Settings and Display Area



1. **Speed timing/start timing:** Timing mode can be switched to start timing when reaching the set speed or simultaneous timing when starting running.  indicates start timing;  indicates speed timing.
2. **Timing/hold mode/countdown:** The running mode can be switched.  indicates timing (shows the elapsed running time),  indicates a countdown (shows the remaining running time), and  indicates a hold mode (keeps running until the maximum running time is reached, and shows timing).

Temperature Settings

Press the temperature display box on the main interface (Figure 2.22) to enter the temperature settings interface (Figure 2.23). Temperature settings range from -11°C to 40°C. If the temperature setting is out of range, the **OK** button will turn red, and the temperature settings cannot be saved.

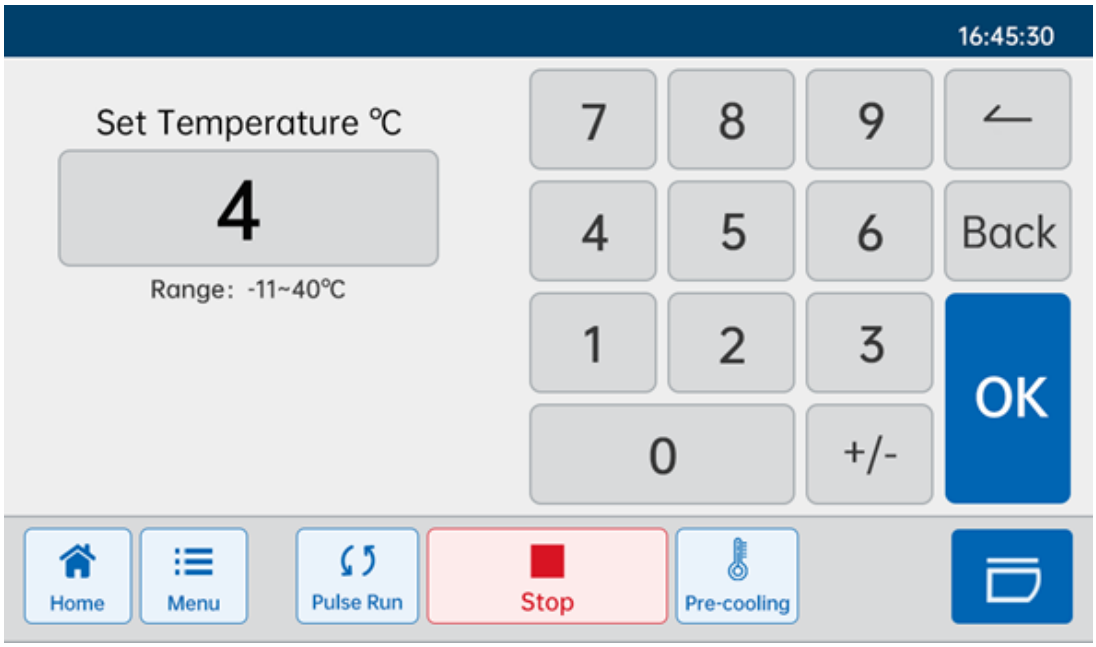
NOTE The rate of cooling or heating may vary depending on the use environment and parameters. When the released commissioning ambient temperature is ≤ 25°C, the equipped rotor can reach 4°C within 15 minutes at the maximum rotational speed.

NOTE Each rotor has a different minimum or maximum temperature that the chamber can reach during centrifugation, depending on the size of the rotor and the use environment.

1. When the temperature is set to < 0°C, if the display temperature is stable at a certain temperature and no longer decreases, the refrigeration system reaches the maximum refrigeration capacity. Users may adjust the parameters according to the actual situation. If the chamber temperature does not reach the set temperature value after 15 minutes, an error message will pop up by the system (EC31-temperature control abnormality). Refer to CHAPTER 3, System Fault Code Table.
2. This equipment generates heat through the high-speed running of the rotor to raise the temperature inside the centrifuge chamber. When the set temperature is greater than the ambient temperature and the rotor speed is set too low, the display temperature rises slowly. This indicates that the heat generated by the rotor rotation cannot support the temperature rise at the current rotational speed setting. Users may increase the rotational speed to preheat the rotor and the chamber before centrifuging. If the chamber temperature does not reach the set temperature value after 15 minutes, an error message will pop up by the system (EC31-temperature control abnormality). Refer to CHAPTER 3, System Fault Code Table.

Figure 2.22 Temperature Display Box

Figure 2.23 Temperature Settings Interface



1. **Above-zero temperature setting**: Use the numeric keypad, enter the required value, and press **OK** to confirm the setting; or press **Back** to cancel the setting and return to the previous interface.

2. **Sub-zero temperature setting**: Use the numeric keypad to enter a value, and then press - (below zero). When the setting is complete, press **OK** to confirm the setting; or press **Back** to cancel the setting and return to the previous screen.

Acceleration/Deceleration Settings

Press the acceleration/deceleration display box in the main interface (Figure 2.24), and the interface will jump to the acceleration/deceleration setting interface (Figure 2.25). Press acceleration or deceleration gear and the button will turn blue. When the setting is complete, press **OK** to save the settings or press **Back** to cancel the setting and return to the previous interface.

Acceleration and deceleration have fast and slow gears. The larger the capacity of the rotor, the longer the lift time, and the smaller the capacity of the rotor, the faster the lift time. Refer to Table 2.1 for acceleration and deceleration rate of Allegra C-24R rotors.

NOTE

1. The data listed in Table 2.1 is measured under the condition of 220-230 VAC (+/-10%), 50 HZ power supply and no-load operation of the rotor.
2. The actual acceleration and deceleration time vary depending on the rotor load, run speed, and voltage fluctuations.

Table 2.1 Acceleration and Deceleration Rate for Allegra C-24R Rotors

Rotor	Acceleration		Deceleration	
	Fast	Slow	Fast	Slow
CF-24×2-24R	15.0 s	42.5 s	16.5 s	47.0 s
CF-12×5-24R	15.5 s	43.0 s	17.5 s	47.0 s
CF-36×0.5-24R	13.0 s	40.0 s	14.5 s	45.0 s
CF-18×2-24R	14.5s	41.5 s	15.0 s	46.5 s
CF-32×0.2-PCR-24R	13.0 s	41.0 s	15.5 s	45.5 s

Figure 2.24 Acceleration/Deceleration Display Box

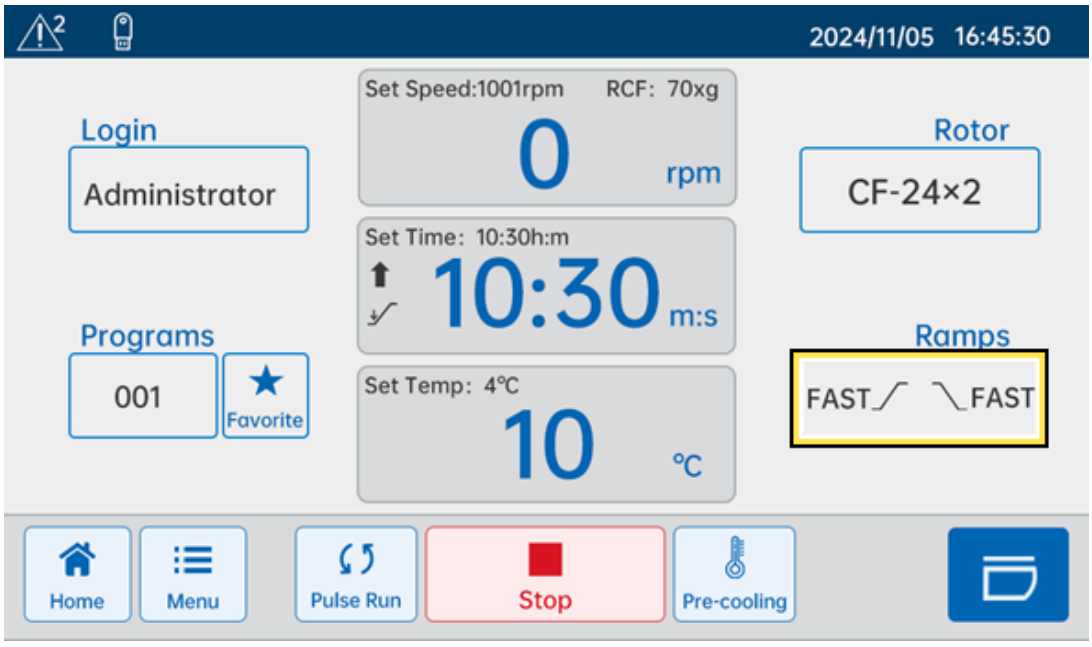
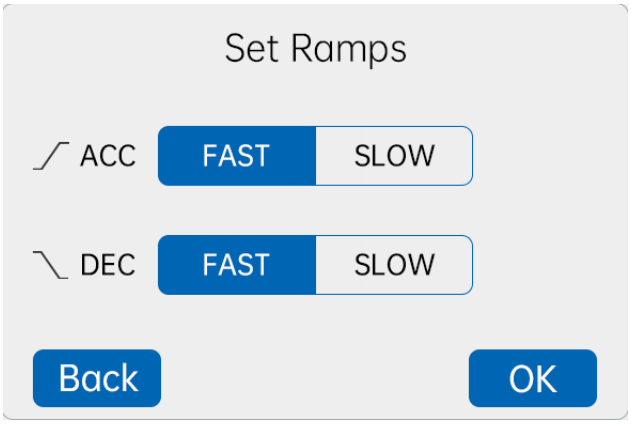


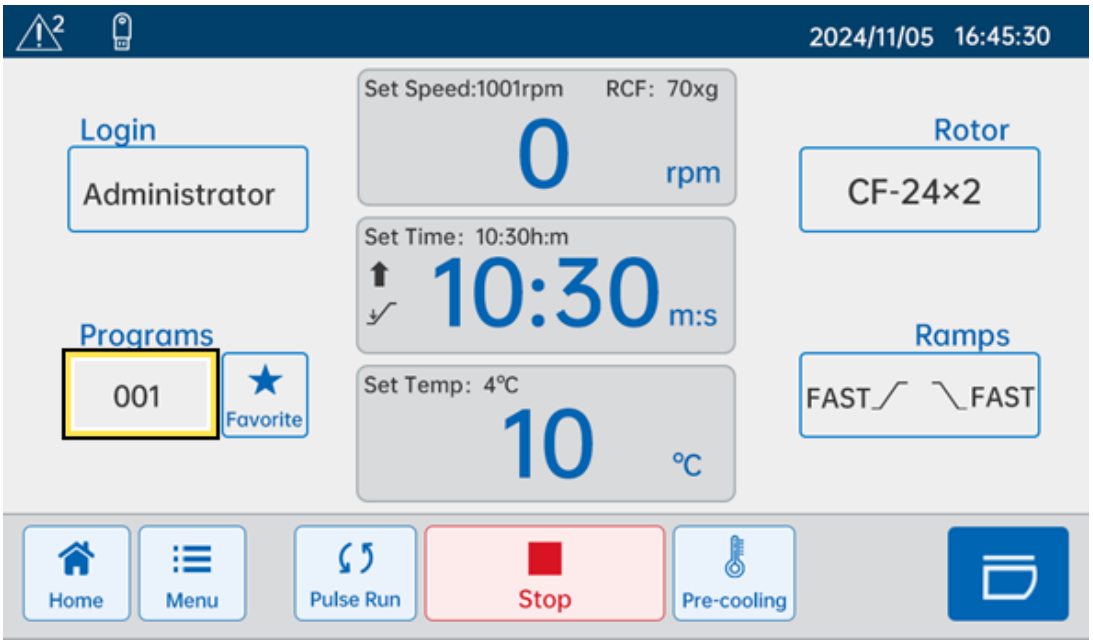
Figure 2.25 Acceleration/Deceleration Setting Interface



Program Groups and Multi-Stage Centrifugation

Press **Programs** display box on the main interface (Figure 2.26), and 100 program groups may be stored. Each program group can be set up as a multi-stage centrifugation (Figure 2.28 and Figure 2.28).

Figure 2.26 Programs Display Box



Program Group

Figure 2.27 Program Group Interface 1

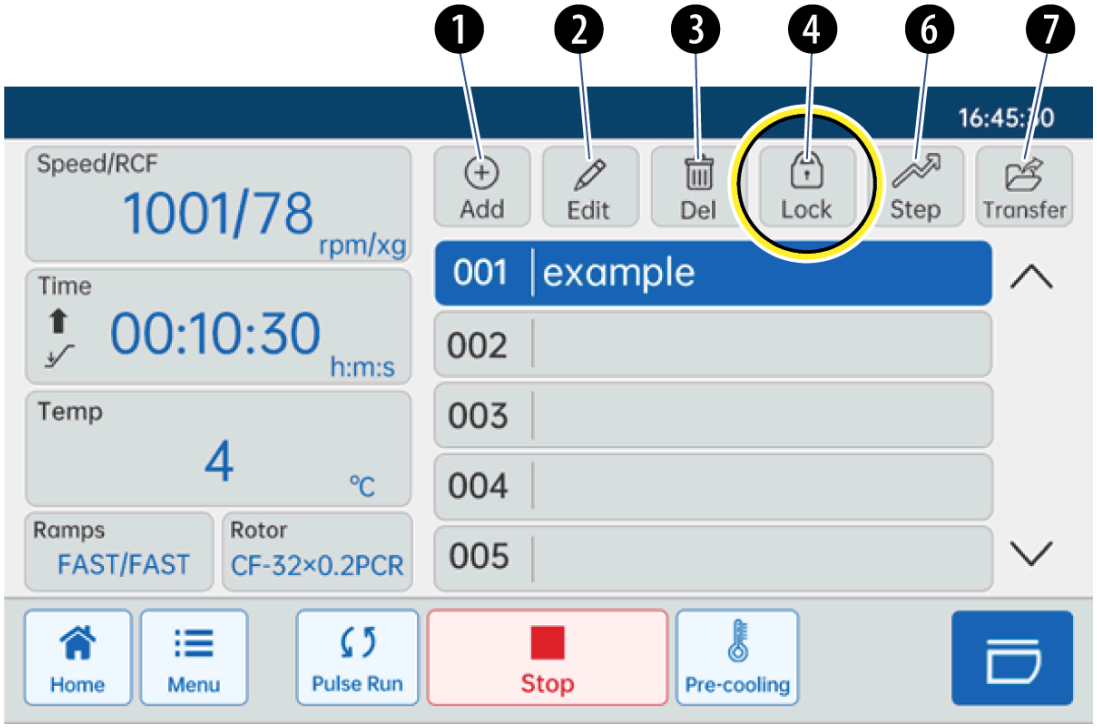
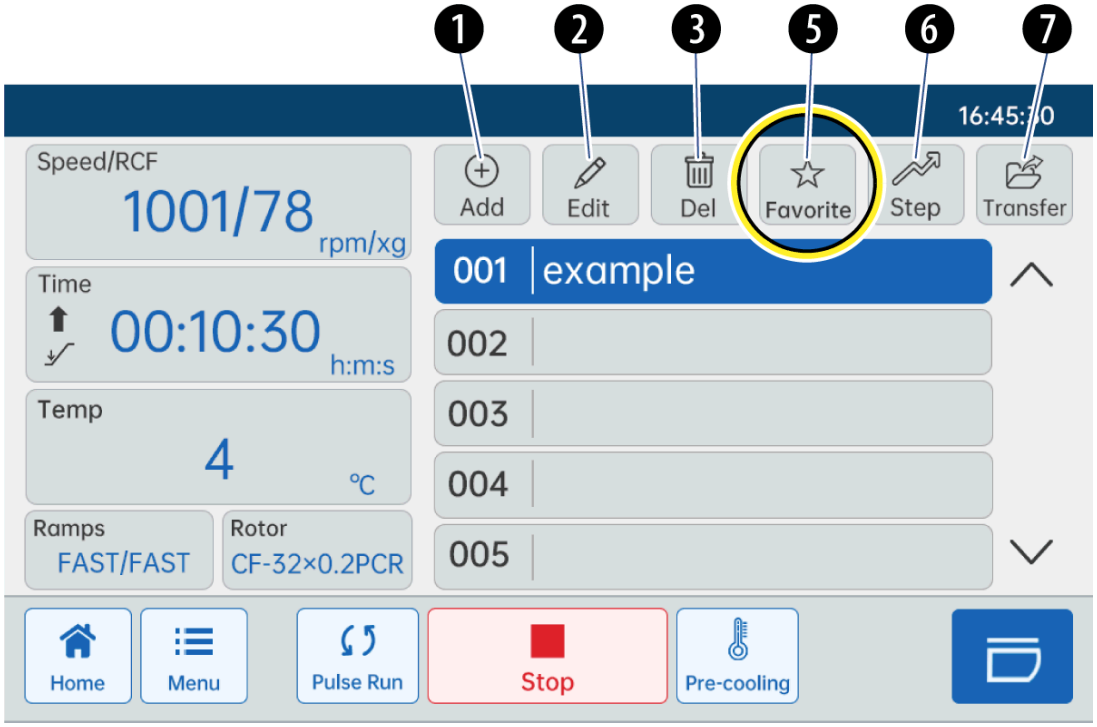


Figure 2.28 Program Group Interface 2



1. **Add:** Press **Add** to add a program group.
2. Edit: Press the program group to be modified, and press **Edit** to modify this program group parameter and group name.
3. **Del**: The administrator and super-user can delete the program group. Press the program group to be deleted and press **Del** to delete it. The deleted program group number will no longer to display.
4. **Lock**: Press the program group to be locked, press **Lock** to set the unlock password and lock this program group.

   NOTE **Lock** only appears in the program group interface when the user management function is disabled, to prevent the set parameters from being modified.

   NOTE  will appear behind the locked program group name.

   NOTE After the program is locked, the program group parameters cannot be modified. To modify the program parameters, you need to press the program group again, and press 

, enter the password set when locking to unlock.

5. **Favorite**: Press the program group to be favorite, and press **Favorite** to favorite parameters of this group.

   NOTE **Favorite** only appears in the program group interface when the user management function is enabled.

   NOTE  will appear behind the favorite program group name.

   NOTE Only one set of parameters can be favorite by the user. To modify the favorite parameters, users may:

   1. Select the original favorite program group, and select **Favorite** to cancel. Select the program group to be favorite and select **Favorite**.
   2. Or select the program group to be favorite and select **Favorite** to replace the favorite parameters.

   NOTE This program group parameter can be called directly by pressing **Favorite** on the main interface.

6. **Step:** Press a program group and press **Step** to enter the multi-stage centrifugation editing interface.

   NOTE For detailed instructions on multi-stage centrifugation parameter settings, refer to Multi-Stage Centrifugation.

   NOTE  Will appear behind the program group name that is set to multi-stage centrifugation.

7. **Transfer:** Press the program group to be called, press **Transfer** to call the parameters and return to the main interface.

   NOTE The loaded rotor should be consistent with the rotor in the called program group. Otherwise, an alarm will be triggered.

   NOTE If the parameters are modified in the main interface after calling the program group, the modified parameter group will be automatically saved to the temporary program group. The parameters within the original numbered program group will not change. The parameters in the program group should be modified in the program group interface.

NOTE The current rotor used and the rotor in the called program group requires to be consistent. If they are inconsistent, the system will pop up the diagnosis pending interface with the alarm "**EC14.rotornot match**" (Figure 2.29). The user requires to replace rotor used with a consistent one, or modify the program group parameters.

Press "**OK**" in the diagnosis pending interface, the system will pop up the interface with the notification "**The rotor is inconsistent with the calling program. Click "OK" to modify the program parameters.**" (Figure 2.30) Press "**OK**" to jump to the program group interface and locate the current called program group. Press the equipment status prompt bar to access the diagnosis pending interface after modifying the parameters and calling the program group. Then press "**OK**" in diagnosis pending interface to eliminate the diagnosis pending interface.

Figure 2.29 Diagnosis Pending Interface

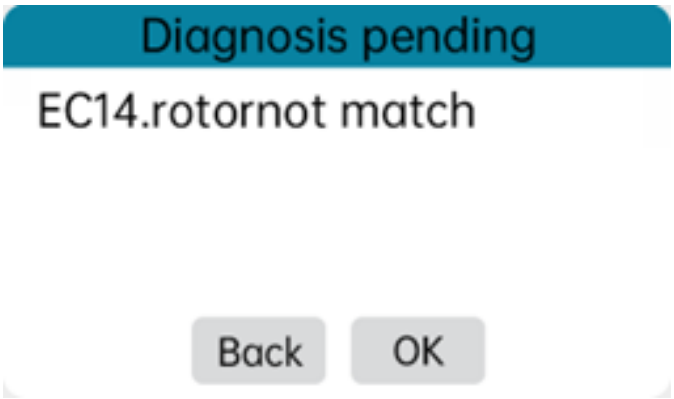
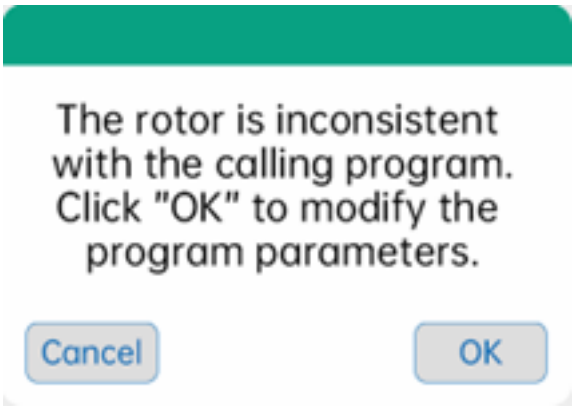


Figure 2.30 Notification Interface

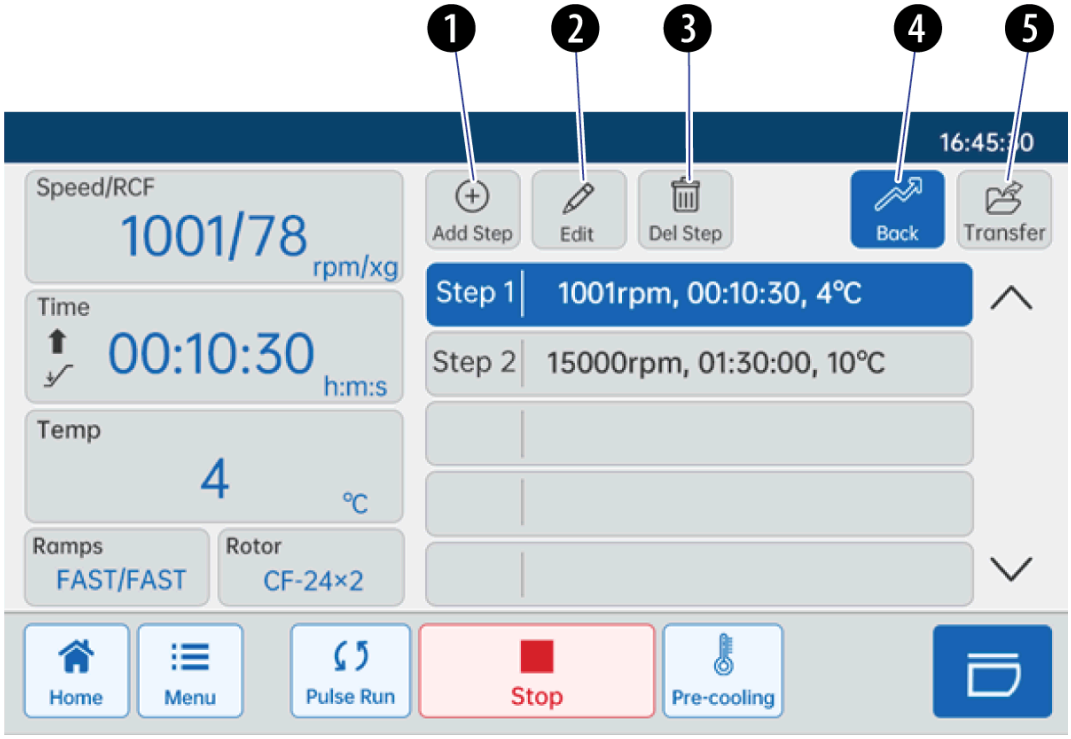


Multi-Stage Centrifugation

Multi-stage centrifugal running mode is to combine multiple stages with different parameters. Up to 5 stages of centrifuges can be set for this system.

The system first runs according to the parameters of the first stage, after the running time of the first stage parameter is up, it automatically continues to run by adjusting the rotational speed and temperature according to the parameters of the next stage. There will be no stoppage in the middle of the running, and there is no need for personnel to operate. The system will not stop automatically until all staged centrifuges have been completed.

Figure 2.31 Multi-stage Centrifugation Interface



1. **Add Step**: Press **Add Step** to edit the parameters of the new centrifugation stage.
2. **Edit:** Press the centrifugation stage to be modified, and press **Edit** to modify the centrifugation parameters of this stage.
3. **Del Step**: Press the centrifugation stage to be deleted, press **Del Step** to delete the selected stage, and the centrifugation stage below will automatically move up.
4. **Cancel:** Press **Cancel** to return to the program group interface.
5. **Transfer**: Press the program group to be called, press **Transfer** to call the parameters and return to the main interface.

NOTE The loaded rotor should be consistent with the rotor in the called program group. Otherwise, an alarm will be triggered.

NOTE If the parameters are modified in the main interface after calling the program group, the modified parameter group will be automatically saved to the temporary program group. The parameters within the original numbered program group will not change. The parameters in the program group should be modified in the program group interface.

NOTE The current rotor used and the rotor in the called program group requires to be consistent. If they are inconsistent, the system will pop up the diagnosis pending interface with the alarm "**EC14.rotornot match**" (Figure 2.32). The user requires to replace rotor used with a consistent one, or modify the program group parameters.

Press "**OK**" in the diagnosis pending interface, the system will pop up the interface with the notification "**The rotor is inconsistent with the calling program. Click "OK" to modify the program parameters.**" (Figure 2.33) Press "**OK**" to jump to the program group interface and locate the current called program group. Press the equipment status prompt bar to access the diagnosis pending interface after modifying the parameters and calling the program group. Then press "**OK**" in diagnosis pending interface to eliminate the diagnosis pending interface.

Figure 2.32 Diagnosis Pending Interface

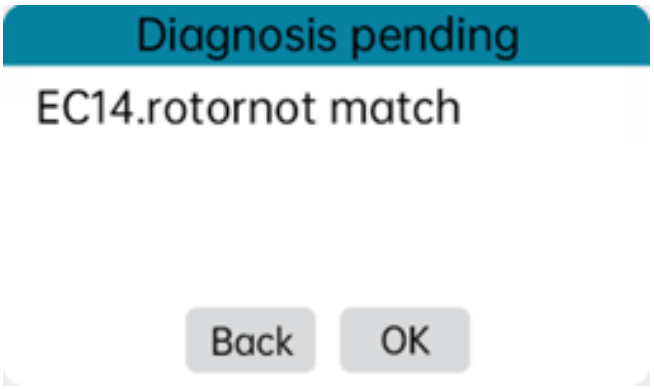
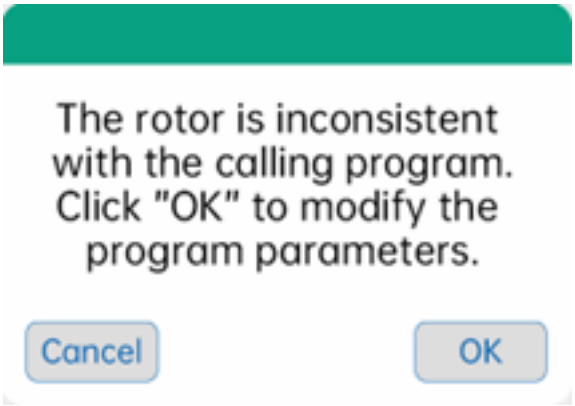


Figure 2.33 Notification Interface



CHAPTER 3

Common Fault Analysis and Troubleshooting

Overview

This chapter introduces common faults and recommended corrective actions. It also provides solutions to some other possible problems. If the problem persists after you have taken the recommended action, contact us.

This chapter contains information on:

- System Fault Code Table
- Other Possible Problems and Solutions
- Emergency Door Opening
- Touch Screen Calibration

System Fault Code Table

If the problem persists after you have taken the recommended action, contact us. To facilitate the on-site service representative's diagnosis and correction of the problem, collect as much information as possible about the status of the problem.

Table 3.1 System Fault Prompts and Solutions

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC01	Communication fault	Fault reported when the control panel loses contact with the main control board	1. To confirm that the rotor has stopped; 2. To disconnect the power supply. 3. If the fault is not addressed, contact us.
EC02	Drive overheating	IPM temperature is detected by ADC, inverter overheating, or motor driver overheating	1. To confirm that the rotor has stopped; 2. To wait for cooling; 3. If the fault is not addressed, contact us.

Table 3.1 System Fault Prompts and Solutions *(Continued)*

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC03	Drive overcurrent	Hardware overcurrent such as IPM fault pin output signal, inverter overcurrent, or motor drive overcurrent	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply. **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC04	Overvoltage	Refers to IPM, inverter, electrical machinery driver over voltage	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply. **3.** To turn on the power and start the equipment; **4.** If the fault is not addressed, contact us.
EC05	Undervoltage	Refers to IPM, inverter, electrical machinery driver undervoltage	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply. **3.** To turn on the power and start the equipment; **4.** If the fault is not addressed, contact us.
EC06	Electrical machinery overcurrent	Sampling resistor detects overcurrent, software overcurrent, or electrical machinery overload	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply. **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC07	Speed abnormality	Sudden change in speed from one moment to the next	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.

Table 3.1 System Fault Prompts and Solutions *(Continued)*

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC08	Speed does not return to zero	Click to run when the speed is not zero	**1.** To wait for the rotor to stop; **2.** If the fault is not addressed, contact us.
EC09	Door unlocked	Open the door cover while the rotor is rotating.	**1.** To close the door cover; **2.** To open the door cover until the rotor stops; **3.** If the fault is not addressed, contact us.
EC10	Overspeed warning	The rotational speed during running exceeds the set rotational speed of 500 rpm	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** If the fault is not addressed, contact us.
EC11	No rotational speed	No rotational speed is detected in 5 seconds after running	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** Manually rotate the rotor to check if the motor is stuck; **4.** To turn on the power and start the equipment; **5.** If the fault is not addressed, contact us.
EC12	The door cover is not locked properly	Run when the door cover is not locked	**1.** Re-lock the door cover; **2.** If the fault is not addressed, contact us.
EC13	Rotor not detected	Rotor is not recognized by the rotor head	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** Re-install the rotor; **4.** If the fault is not addressed, contact us.
EC14	Rotor mismatch	Rotor is mismatched with the set rotor	**1.** To confirm that the rotor has stopped; **2.** Modify the rotor type in the particular program, then re-call the modified program; **3.** Disconnect the power supply and replace it with a set rotor; **4.** If the fault is not addressed, contact us.

Table 3.1 System Fault Prompts and Solutions *(Continued)*

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC15	Recognition fault	Recognition problem (rotor head not recognized three consecutive times)	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC16	Imbalance communication	Imbalance communication fault or imbalance board not connected	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment; **4.** If the fault is not addressed, contact us.
EC17	Rotor imbalance	Imbalance detection exceeds the threshold	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** Check whether the rotor or sample loading is balanced; **4.** If the fault is not addressed, contact us.
EC18	Rotational speed limit exceeded	The set rotational speed exceeds the recognized rotor speed limit	**1.** To reset the rotor speed; **2.** If the fault is not addressed, contact us.
EC19	Rotor expiration date approaching	Rotor life insufficient	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** Remove the old rotor as soon as possible and replace it with a new one; **4.** If the fault is not addressed, contact us.
EC20	Rotor life expiration	Rotor life expiration	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** Remove the old rotor and replace it with a new one; **4.** If the fault is not addressed, contact us.

Table 3.1 System Fault Prompts and Solutions *(Continued)*

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC21	Electrical machinery overheat	Electrical machinery overheat	**1.** To confirm that the rotor has stopped; **2.** Wait for the electrical machinery to cool down; **3.** If the fault is not addressed, contact us.
EC22	Other faults	Other errors	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC23	Communication congestion	Refers to the control panel; when the sent data is full, new commands cannot be recorded and sent, so a fault is prompted	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC24	Secondary communication faults	Frequency converter, mounted secondary communication equipment, and additional secondary fault	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** To turn on the power and start the equipment after 5 minutes; **4.** If the fault is not addressed, contact us.
EC25	Temperature acquisition abnormal	Temperature acquisition abnormal	**1.** To confirm that the rotor has stopped; **2.** To disconnect the power supply; **3.** If the fault is not addressed, contact us.
EC26	Temperature over limit	Temperature exceeds the equipment's upper limit of 45°C	**1.** If the fault is not addressed, contact us.

Table 3.1 System Fault Prompts and Solutions *(Continued)*

Fault Code	On-screen Content	Fault Meaning	Recommended Action
EC31	Temperature control abnormal	• The temperature is set too low, exceeding the lower cooling limit of the current load; • Insufficient refrigerant. The cooling capacity is weakened and cannot reach the set temperature; • Temperature sensor fault. The collected temperature is inaccurate.	1. To confirm that the set temperature is too low (below 0 °C) and exceeds the lower cooling limit of the current load; 2. To adjust the set temperature and rotational speed; 3. If the fault is not addressed, contact us.
EC32	Abnormal shutdown	Sudden shutdown of the equipment due to power failure or accidental touching of the switch	1. To confirm the supply power is normal; 2. Turn the equipment switch back on; 3. If the fault is not addressed, contact us.

Other Possible Problems and Solutions

Table 3.2 System Fault and Solutions

Faults	Fault Description	Fault Details	Recommended Action
Power supply	No display on the LCD screen after turning on the power switch.	Fuse burned out	Replace fuse
		Poor power cord contact/damage to the power cord	Reconnect/replace supply cord
		No power from supply outlet	Try a different supply outlet
		Internal circuit fault	Contact us.
Door lock	The door cover cannot be open	Electrical machinery of the door lock is faulty	Open door using Emergency Door Opening procedure
	Door cover cannot be locked	Electrical machinery of door lock cannot be returned	Press more times to open, and then lock the door
Cannot enter the main interface after powering on	The display does not light up after powering on, or cannot enter the main interface normally after lighting up.	Display fault	Contact us.

Table 3.2 System Fault and Solutions *(Continued)*

Faults	Fault Description	Fault Details	Recommended Action
Imbalance fault	Machine vibration at startup	n/a	Re-power on after powering it off
	Imbalance sensor damage	n/a	Contact us.
Temperature	Slow cooling down	Refrigerant leakage	Contact us.
		Refrigeration system clogged	Contact us.
	No cooling	Refrigeration system fault	Contact us.
Unable to start	Set the rotational speed to 0	n/a	Set the correct rotational speed
	Time set to be 0	n/a	Set time
	The door cover is not closed	n/a	Close the door cover

Emergency Door Opening

The centrifuge cover can be opened manually in the event of a power failure or a door lock fault.

⚠ WARNING

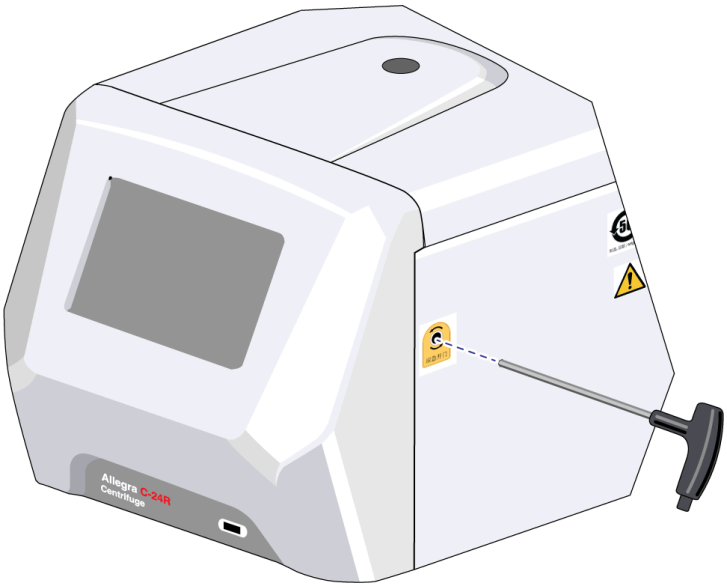
Risk of personal injury or mechanical injury. Do not use this method to open the door under normal circumstances.

⚠ WARNING

Risk of personal injury or mechanical injury. Use the viewing window to ensure the rotor rotation has stopped before performing this operation.

1 Turn off the power switch and unplug the power cord from the outlet.

2 Align and insert a 5 mm T-handle Allen wrench into the small hole on the left side of the door cover marked with the emergency door opener symbol.



3 Open the door cover by turning the 5 mm T-handle Allen wrench counterclockwise with half a circle.

Touch Screen Calibration

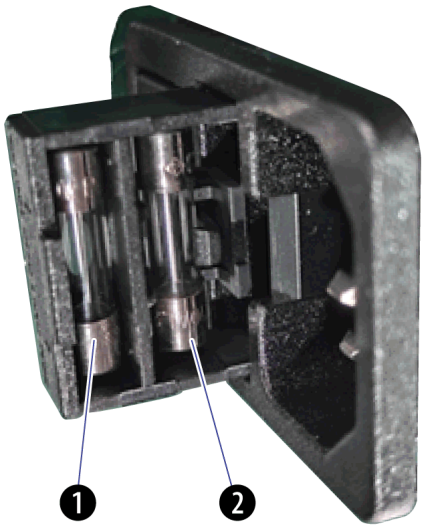
The touch screen calibration function can be used to set up the system when the touch screen is clicked at an incorrect position.

During the state of the power switch of the instrument turned off, keep pressing on the display screen while the power switch is turned on and wait for the system restarts until the main interface appears to release. Then, click the blank space of the page based on beeps. When the first beep appears, click in the blank space of the page until the second beep appears to release. When the third beep appears, click in the blank space of the page again until the fourth beep appears to release and the system will enter the touch calibration state. According to the instructions on the page, click on the four corners in order to complete the calibration.

Fuse Replacement

Fuses are locating in the appliance inlet (Figure 3.1) and can be replaced if a fuse opened using the following steps.

Figure 3.1 Fuse Replacement



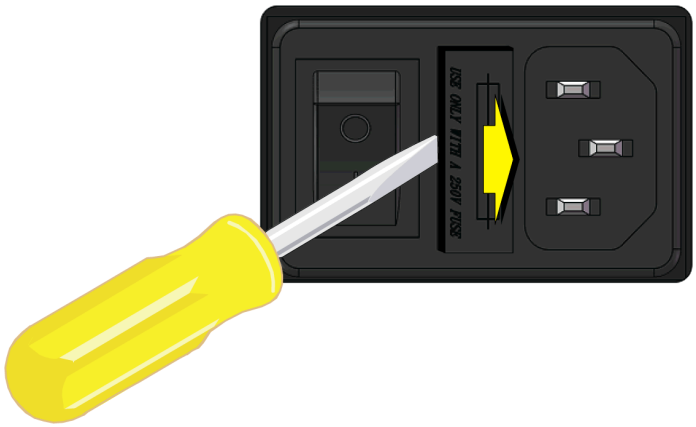
1. Fuse in use
2. Spare fuse

⚠ WARNING

Risk of electric shock, disconnect power. Make sure the power cord is removed from the appliance inlet before proceeding.

1 Turn off the power supply, unplug the power cord from the external power source, and then unplug it from the instrument.

2 A fuse holder is provided under the appliance inlet on the right rear lower side of the instrument, marked with a fuse symbol.



1. Fuse holder cover

3 Locate the V-groove in the fuse holder, insert a slotted screwdriver, and pull it outward. Pull the fuse holder from the back of the centrifuge.

4 Remove and discard damaged fuses in use.

5 Replace the damaged fuse with a 5x20 mm type fuse rated T10A, 250V (a spare is provided in the fuse holder).

6 Plug the fuse holder into the instrument appliance inlet.

CHAPTER 4

Centrifuge Maintenance

Overview

This chapter contains the care and maintenance steps that should be performed regularly. For maintenance not covered by this manual, contact us for assistance. For error codes, user messages, and suggested actions, refer to CHAPTER 3, Common Fault Analysis and Troubleshooting.

NOTE You are responsible for decontaminating the centrifuge, rotor, and/or accessories before requesting repairs from Beckman Coulter's on-site service.

This chapter contains information on:

- Instrument Maintenance
  - Host
  - Rotor
  - Accessories
- Cleaning and Disinfection
  - Equipment Cleaning and Disinfection
  - Rotor Cleaning and Disinfection
  - Broken Glass Tube
- Consumable List

Instrument Maintenance

The centrifuge, rotor, and accessories are subject to high mechanical stress. Thorough maintenance by the user helps extend the service life and prevents premature damage.

⚠ DANGER

Any maintenance operation requiring the removal of the panels will expose the operator to the risk of electrical shock and mechanical injury. Turn off the power switch, and disconnect the centrifuge from the main power supply, and such maintenance should be performed by a professional.

IMPORTANT The manufacturer is not responsible or liable for any warranty claims for corrosion or other damage due to improper maintenance.

The following points should be always observed in the maintenance of the Allegra C-24R instrument:

- Wash centrifuges and accessories with a mild detergent or other mildly water-soluble cleaning solution with a pH between 6 and 8.
- Do not use solvents.
- Do not use detergent with abrasive particles.
- Do not expose centrifuges and rotors to intense ultraviolet radiation or thermal stresses (such as heat generators).

Host

⚠ WARNING

Risk of injury. The centrifuge chamber cover is supported by a spring. Regularly check that the centrifuge chamber cover remains in the fully open position until it is manually closed. A worn-out spring may cause the chamber cover not to fully open. If the spring cannot hold the chamber cover in the fully open position, it must be replaced immediately. It is recommended to replace every 20,000 cycles. Contact us for replacement.

Rotor

Do not collide with the rotor with sharp hard objects. Prevent bumping during moving and dismantling. Prevent cracking of the rotor heads in use due to scratches or trauma. Regularly check the rotor for any corrosion spots, grooves, small cracks, etc.

⚠ WARNING

Do not use the rotor beyond its service life. Refer to Table 4.1 for instructions on the rotor service life.

⚠ CAUTION

If any abnormalities such as corrosion spots, grooves, or small cracks are found on the rotor head, stop using it immediately and contact the manufacturer.

Table 4.1 Rotor Service Life

Rotor Type	Service Life	Total Using Cycles[a]	Cumulative Use Time/Hours
Fixed angle rotor	8 years	50000	15000

a. Each centrifugation separation process in which the rotor is accelerated and decelerated is considered a cycle, independent of the centrifugation separation speed and duration.

Accessories

⚠ CAUTION

Do not use accessories that are beyond their maximum service life. If the service life is beyond, it is no longer guaranteed that the material of the rotor and accessories can withstand the load of centrifugation separation. Refer to Table 4.2 for detailed instructions on the accessories service life.

Table 4.2 Rotor Service Life

Accessories	Maximum Service Life since First Use
Airtight rotor cover with replaceable seal	3 years **IMPORTANT** Replace the seal after 50 high-temperature and high-pressure sterilization cycles.
Adapter	1 year **IMPORTANT** Replace the adapter after 50 high-temperature and high-pressure sterilization.

Cleaning and Disinfection

⚠ CAUTION

Risk of instrument damage. Do not use any corrosive chemicals on this equipment and accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenols. If it is contaminated with corrosive chemicals, clean the equipment with a neutral cleaner immediately.

⚠ CAUTION

Risk of instrument damage. Corrosive cleaner and disinfectants may cause corrosion. Do not use corrosive cleaner, irritating solvents, or abrasive polishes. Do not immerse accessories in corrosive cleaner or disinfectants for a long period of time.

⚠ CAUTION

Risk of instrument damage. Ultraviolet rays or other high-energy rays may cause damage. Do not disinfect with ultraviolet rays, beta and gamma rays or other high-energy rays. Avoid exposing equipment and accessories to areas with intense ultraviolet radiation.

⚠ DANGER

Risk of injury. Deformed or brittle centrifuge tubes may pose a hazard. When sterilizing plastic centrifuge tubes at high temperatures, excessive temperatures may cause brittleness and deformation of the centrifuge tubes. Damage to equipment and accessories and loss of samples can result. Observe the temperatures specified by the manufacturer when sterilizing centrifugal tubes at high temperatures and pressures. Do not use deformed or brittle centrifuge tubes.

The following points should be always observed in the cleaning and disinfection of the Allegra C-24R instrument:

- Clean accessible surfaces of equipment and accessories at least once a week in case of severe dirt.
- Clean the rotor regularly. This protects the rotor and extends its service life.
- If the equipment is sent to an authorized technical service for repair, instructions on decontamination must be followed. Refer to Cleaning and Disinfection.
- Observe the cleaning, disinfection, and decontamination process. Refer to Cleaning and Disinfection.

Equipment Cleaning and Disinfection

⚠ WARNING

- **Do not allow any liquids to enter the inside of this equipment.**
- **Do not spray cleaning/spray disinfection on the housing.**
- **Reconnect the power supply only when the inside and outside of the equipment are completely dry.**

⚠ DANGER

Risk of injury or biohazardous, radioactive, or chemical contamination. Consult your laboratory safety specialist or refer to the laboratory guidelines if there is a risk of toxic, radioactive, or pathogenic contamination. Make sure always to wear suitable personal protective equipment (PPE).

- **Clean the rotor chamber immediately with a proper detergent if the centrifuge is contaminated with toxic, radioactive, or pathogenic substances.**

Regularly perform the following procedures to ensure continuous running and extend the centrifuge service life:

1 Open the cover. Turn the equipment off by pressing the power switch. Disconnect the power plug.

2 Loosen the rotor counterclockwise with a rotor wrench.

3 Remove the rotor.

4 Check the centrifuge chamber for samples, dust collection, or glass debris from damaged sampling tubes. Clean as needed.

5 Check the drain and air vent for blockages. Keep the drain open and clean.

⚠ CAUTION

Risk of instrument damage. Corrosive cleaner and disinfectants may cause corrosion. Do not use corrosive cleaner, irritating solvents, or abrasive polishes. Do not immerse accessories in corrosive cleaner or disinfectants for a long period of time.

6 Clean and disinfect all accessible surfaces of the equipment, including the power cord, with a soft rag and 555 solution (recommended).

NOTE Use a mild detergent when cleaning accessible surfaces of the equipment and its components. 70% 555 solutions can be used on the host surface. 70% ethanol, 6% hydrogen peroxide, 5.25% sodium hypochlorite, and 555 solutions can be used for the rotor and adapter.

a. Wipe the rotor chamber with a mild detergent such as 555 solution to clean it thoroughly (refer to Consumable List).

b. Dilute the detergent with water (10:1 for water to detergent ratio).

c. Clean it thoroughly and dry it completely.

d. If cleaning agent other than 555 solution is used, refer to the Chemical Resistances (publication IN-175) or contact the detergent supplier to confirm that the solution will not damage the centrifuge.

7 Wipe the condensate in the rotor chamber with a sponge or clean rag during the running interval to prevent the chamber from freezing.

8 Apply grease on the dry sealing elements to prevent brittle.

9 Clean the electrical machinery shaft with a dry, dust-free, and soft rag.

10 Check the electrical machinery shaft for damage.

11 Check equipment for corrosion or damage.

12 Open the centrifuge cover for evaporation of moisture when the centrifuge is not in use. Reconnect the power supply only when the inside and outside of the equipment are completely dry.

13 **Optional:** Check and clean the condensate sink at the bottom of the host regularly.

14 **Optional:** If the chamber is frosted, defrost the system and wipe the produced moisture before use.

- **a.** When defrosting the system, open the centrifuge cover or briefly raise the temperature in the rotor chamber to 30°C to defrost and remove ice from the rotor chamber.
- **b.** Use a water-absorbent soft rag to remove condensate from the rotor chamber.

IMPORTANT The centrifuge must first be turned off and unplugged.

15 **Optional:** Use a brush to remove dust from the centrifuge vent every 6 months.

Rotor Cleaning and Disinfection

High-Temperature and High-Pressure Sterilization

The rotors, rotor covers, and adapters can be sterilized at high temperatures (121 °C for 40 minutes).

It is limited to the airtight rotor covers with replaceable seals only. Seals must be replaced after a maximum of 50 high-temperature sterilization.

IMPORTANT Apply a thin coat of grease on the rotor O-ring after each high-temperature and high-pressure sterilization, to prevent the seal from cracking and losing its sealing effect.

Remove old grease from the groove and journal before cleaning the rotor. Ensure that the journal and groove are cleaned. After cleaning, apply a thin coat of grease to the rotor journal.

Cleaning and Disinfection

⚠ WARNING

Risk of personal injury or infection. Contact the chemical and biosafety specialist before cleaning the instrument that is exposed to hazardous materials. Make sure always to wear suitable personal protective equipment (PPE) when cleaning the centrifuge.

⚠ WARNING

Risk of personal injury. If the glass test tube breaks, debris may splash out of the rotor. Be careful when checking or cleaning the chamber and the chamber gaskets, as sharp glass debris may be embedded in their surfaces. Make sure always to wear suitable personal protective equipment (PPE) when cleaning the centrifuge.

Regularly perform the following procedures to extend the rotor service life.

IMPORTANT Do not use damaged rotors and accessories.

1 Check rotor accessories for corrosion or damage.

2 Clean and disinfect the rotor and accessories with the recommended detergent.

3 Clean and disinfect the rotor holes with a bottle brush.

4 Clean and disinfect the rotor lid. Remove the sealing O-ring to thoroughly clean the groove.

5 Thoroughly rinse the rotor and accessories with distilled water. Thoroughly rinse the holes of the fixed angle rotor.

6 Put the rotor in the washer or replace the rotor. Otherwise, the liquid may enter the chamber.

7 Put the rotor and accessories on a piece of rag for air drying. Place the fixed angle rotor with the rotor holes facing down so that the holes can be air-dried.

8 Put the rotor lid sealing O-ring correctly into a clean and dry groove and apply a thin coat of grease on O-ring.

9 After the rotor lid is clean and dry, apply grease to the rotor core (where it meets the rotor body) in the rotor lid bore.

10 Clean the rotor taper pin with a dry, dust-free, soft rag. Do not grease the taper pin.

11 Thread the dried rotor into the electrical machinery shaft.

12 Tighten the rotor nut clockwise with the rotor wrench.

13 If required, load a clean adapter in the fixed angle rotor.

14 If no rotor is used, open the rotor cover.

Broken Glass Tube

⚠ CAUTION

Too great a relative centrifugal force may break the glass centrifuge tube in the rotor chamber. It will cause damage to rotors and accessories and contamination of samples. Note the centrifugation separation parameters recommended by the centrifuge tube manufacturer, refer to CHAPTER 1, Performance Characteristics.

⚠ WARNING

Risk of personal injury. If the glass test tube breaks, debris may splash out of the rotor. Be careful when checking or cleaning the chamber and the chamber gaskets, as sharp glass debris may be embedded in their surfaces. Make sure always to wear suitable personal protective equipment (PPE) when cleaning the centrifuge.

When using glass centrifuge tubes, the glass may crack inside the rotor chamber. During centrifugation separation, the produced glass debris will agitate in the rotor chamber, spraying the rotor and accessories in the form of sand jets. Fine glass particles will be adhered to rubber parts (e.g. motor collars, rotor chamber seals, and adapter rubber pads).

Glass debris in the rotor chamber may result in the following problems:

- Fine dark metal debris in the rotor chamber.
- Scratch the rotor chamber and accessory surfaces.
- Reduce the chemical resistance of the rotor chamber.

- Contaminate samples.
- Wear of rubber parts.

Perform the following steps to thoroughly remove the glass debris from the rotor chamber:

1. Remove glass debris in the rotor chamber and on the accessories.
2. Thoroughly clean the rotor and rotor chamber. Thoroughly clean the holes of the fixed angle rotor.
3. If necessary, replace the rubber pads and adapters to prevent other damage.
4. Regularly check the rotor chamber for glass debris and damage.

Consumable List

Contact us for information on consumables. The following is a list of some of the spare parts for your reference.

Table 4.3 Consumable List

Description	Part number
T-handle Allen wrench	D27871
555 detergent solution (1 qt)	339555
Spinkote lubricant (2 oz)	306812
Silicone vacuum grease (1 oz)	335148

APPENDIX A

Unpacking and Installing

Overview

This appendix provides information on unpacking the centrifuge and installation requirements for the centrifuge in order to prepare the laboratory facility for installation.

⚠ WARNING

Personal injury or equipment damage may result. The Allegra C-24R centrifuge weighs 31 kg. Do not attempt to lift or move the centrifuge without assistance.

This chapter contains information on:

- Host Installation
- Rotor Installation/Removal
- Accessories Installation

Host Installation

Installation Requirements

Installation Environment Requirements

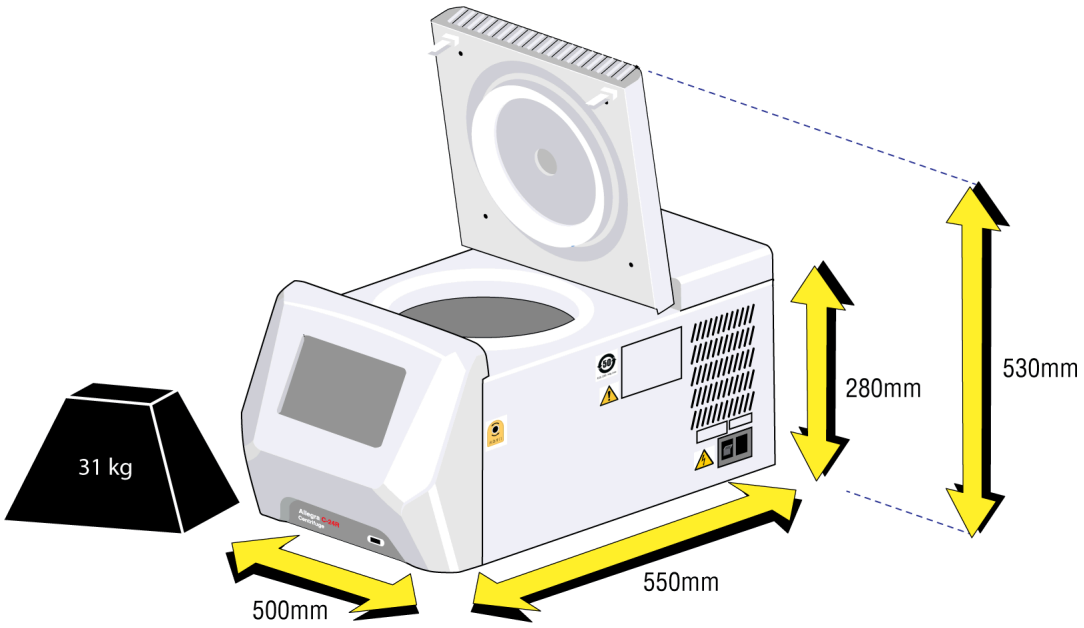
The installation should be performed indoors. The workbench should be flat and rigid, and the load bearing should be ≥ 85 kg. The air is free of conductive dust, corrosive or damaging gases, and there are no other strong sources of vibration nearby.

Installation Space Requirements

After installation, there must be a 30 cm safety space around, and no other objects may be placed in this space while the equipment is in use.

Refer to Figure A.1 for centrifuge dimensions.

Figure A.1 Centrifuge Weight/Dimensions



Installation Power Requirements

⚠ WARNING

To reduce the risk of electrical shock, this instrument uses a three-wire electrical cord and plug to connect this equipment to earth-ground. Make sure that the matching wall outlet receptacle is properly wired and earth-grounded.

The single-phase AC power is used for power supply, AC 220-230 VAC (±10%), 50 Hz, 10 A. GB plug.

Unpacking

IMPORTANT If the following cases occur, promptly negotiate with the shipper and contact us.

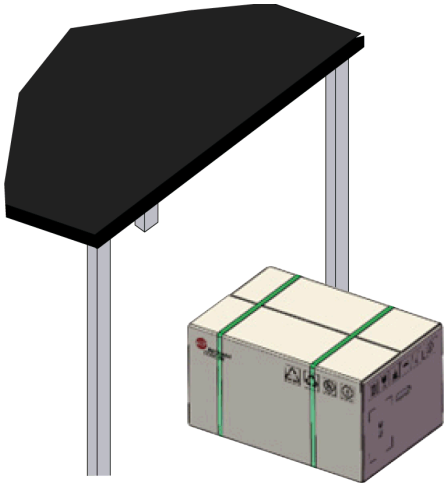
1 The user should check the packaging for any evidence of damage when receiving the goods.

⚠ WARNING

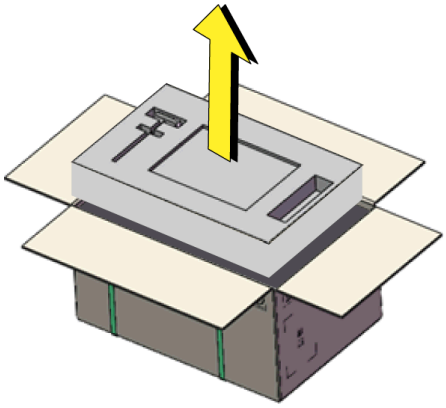
Personal injury or equipment damage may result. The Allegra C-24R centrifuge weighs 31 kg. Do not attempt to lift or move the centrifuge without assistance.

2 Remove the upper cover of the packaging box, and remove the rotor, adapter, and other accessories in the box, before unpacking the box. The host may be removed from the box by using a lifting device or with multi-person handling.

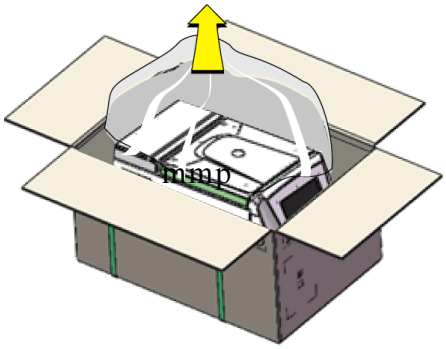
a. Move it to the designated location with the packaging.



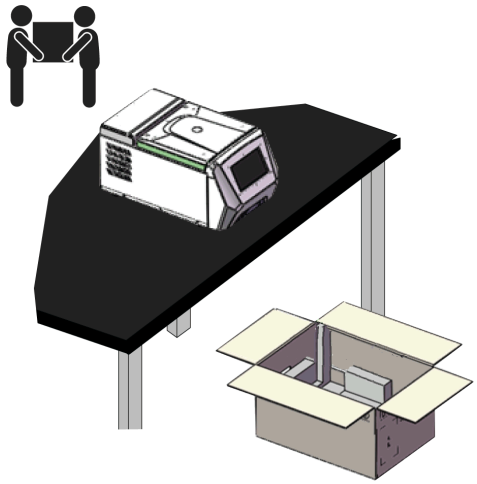
b. Cut the tape and open the lid of the box. Remove the upper buffer and other accessories.



c. Remove the plastic bag.



d. Lift the instrument with two people from the gap between left and right sides and carry the instrument to the workbench.



3 After the installation is completed, the packaging box and packing filling should be disposed of properly to avoid environmental contamination.

Installation

1 After removing the instrument from the packaging box, place it on a prepared horizontal workbench or floor.

2 After placement, the four rubber feet of the base plate of the instrument should be adjusted evenly.

⚠ CAUTION

Risk of personal injury. The centrifuge is transported and left to stand for 2 hours or more before being connected to the power supply.

3 Open the door cover with the emergency door opening device (refer to CHAPTER 3, Emergency Door Opening) and remove all accessories or packing materials (if any) from the centrifuge chamber.

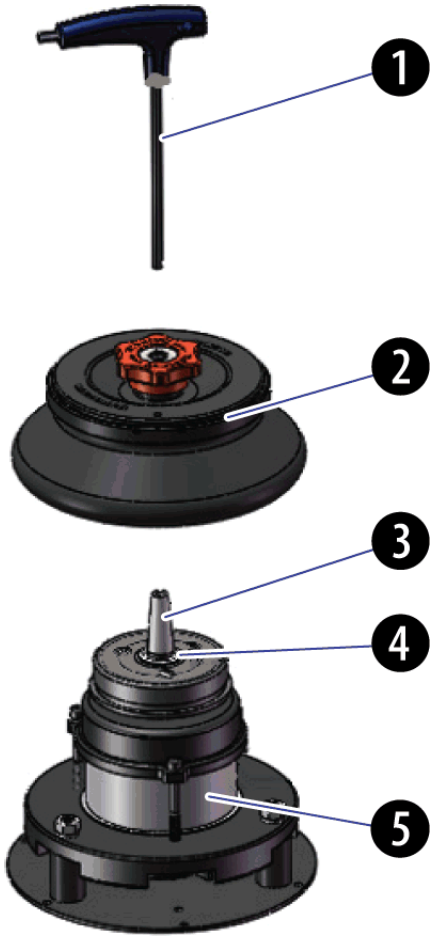
Rotor Installation/Removal

⚠ CAUTION

Use the rotors and accessories designed for this centrifuge.

For the convenience of reading the rotor installation and removal steps, refer to Figure A.2 for the names and locations of the components.

Figure A.2 Components Name



1. 5 mm T-handle Allen wrench
2. Rotor assembly
3. Electrical machinery shaft
4. Electrical machinery ring
5. Electrical machinery

Rotor Assembly Installation

1 Place the tapered hole at the bottom of the rotor in the electrical machinery shaft.

2 Insert a 5 mm T-handle Allen wrench into the centered circle hole of the rotor cover, and tighten the Allen screw in a clockwise direction (about 5 rotations).

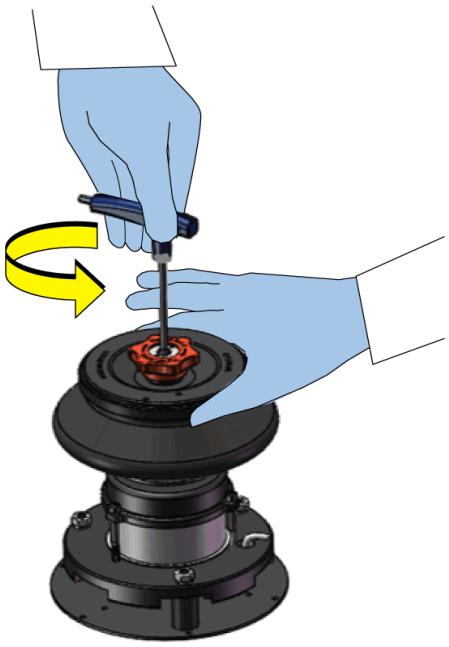
NOTE The angle rotor cover is turned counterclockwise to loosen and clockwise to tighten.

3 Remove the wrench to complete the rotor installation.

Rotor Removal

1 Insert a 5 mm T-handle Allen wrench through the rotor hole into the inner Allen screw hole in the rotor.

2 Hold the rotor assembly with one hand, and turn the wrench counterclockwise with the other hand to loosen the Allen screw (about 5 rotations).



3 Remove the Allen wrench, and lift the rotor assembly upward. Removal is finished.

Accessories Installation

- Load adapters with the same number of containers and the same weight to avoid imbalance.
- The test tube is filled with liquid about 75% of the nominal capacity of the tube, and the tube fittings are installed axially symmetrically to facilitate rotor balance.

Figure A.3 Correct Loading of Angle Rotor

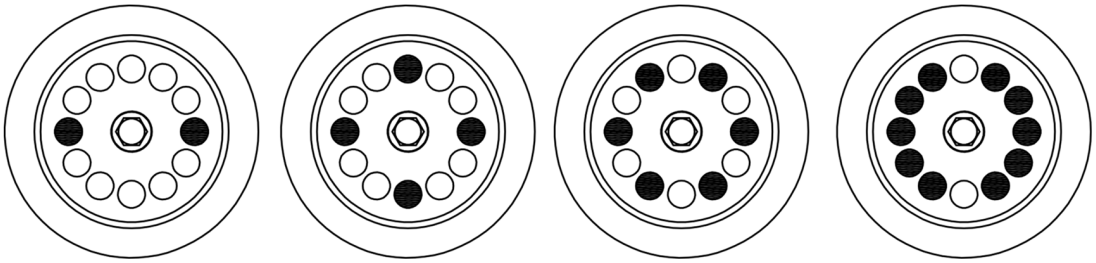
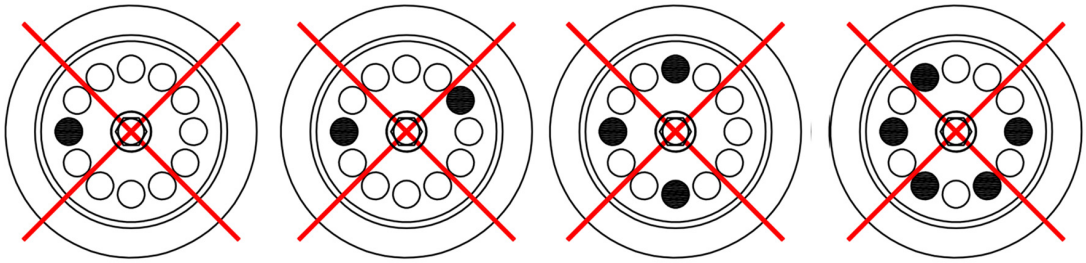


Figure A.4 Wrong Loading of Angle Rotor



APPENDIX B

User Management Permission

Instruction of User Management Permission

Table B.1 Instruction of User Management Permission for Control System

	Task	Operator	Super User	Administrator
Basic run	Start centrifugation	√	√	√
	Stop centrifugation	√	√	√
	Rapid pre-cooling	√	√	√
	Instantaneous centrifugation function	√	√	√
	Open centrifuge chamber cover	√	√	√
Information clear	Pop-up warning clear	√	√	√
	Pop-up alarm clear	×	√	√
	Pop-up error clear	×	√	√
Function menu - Favorites	Access and preview the Favorites menu	√	√	√
	Use favorites menu	√	√	√
Function menu - Program	Access program functions	√	√	√
	Show program information	×	√	√
	Run program	√ **NOTE** Program group specified by the superuser or administrator.	√	√
	Create and modify programs	×	√	√
	Rename program	×	√	√
	Delete program	×	×	√
Function menu - Running Record	View the full running record	√	√	√
	Filter running records	√	√	√
	Export running records	×	√	√

Table B.1 Instruction of User Management Permission for Control System *(Continued)*

	Task	Operator	Super User	Administrator
Function menu - Event Record	View full event record	√	√	√
	Filter event records	√	√	√
	Export event records	×	√	√
	Export and delete event records	×	×	√
User management	Add user	×	×	√
	Delete user	×	×	√
	Change your username	×	×	√
	Change other's username	×	×	√
	User ID login	√	√	√
	Auto logout	√	√	√
	Change your login password	√	√	√
	Change other's login password	×	×	√
	Program authorization	×	√	√
General settings	Rotor management	×	√	√
	System information reading	√	√	√
	Access to system settings	×	×	√
	System settings - system date and time adjustment	×	×	√
	System settings - user management program visible	×	×	√
	Enter service mode	×	×	×

APPENDIX C

Storage and Transportation

Overview

This appendix provides the storage requirements for the Allegra C-24R centrifuge and information on the preparations required to transport the centrifuge

⚠ WARNING

Personal injury or equipment damage may result. Do not attempt to lift or move the centrifuge without assistance.

This chapter contains information on:

- Transport Precautions
- Storage Conditions

Transport Precautions

To ensure that the centrifuge is not damaged, contact us for specific guidance and/or assistance when preparing the equipment for transport or long-term storage.

⚠ WARNING

It is strictly prohibited to collide, invert, roll and soak in rain or snow during transportation.

⚠ CAUTION

Lifting and moving the equipment may result in back injuries. The equipment is heavy, so you should transport and lift it with a sufficient number of assistants. Use a transport auxiliary device when transporting.

The following recommendations should be followed for transporting centrifuges:

- During long-distance transportation, it is necessary to use wooden or paper packaging boxes, put the centrifuge into the box with a dust cover, and fill the box with foam shock-absorbing materials up and down and all around.
- Short-range indoor moving can be carried out directly, but intense shocks, collisions, and inversions should be avoided.
- Remove the rotor from the centrifuge when transporting.
- Keep original packaging when transporting.

The following conditions should be met for general transportation:

- Air temperature: - 5 - 45℃
- Air relative humidity: 10% - 80%
- Air pressure: 30 kPa - 106 kPa

Storage Conditions

If the centrifuge is not used for a long time, the door cover should be opened. It should be stored in a ventilated, dry and clean room. The storage site should be free of corrosive substances and flammable and explosive substances.

- Air temperature: - 5 - 45℃
- Air relative humidity: 10% - 80%
- Air pressure: 70 kPa - 106 kPa

APPENDIX D

Allegra C-24R Rotor Description

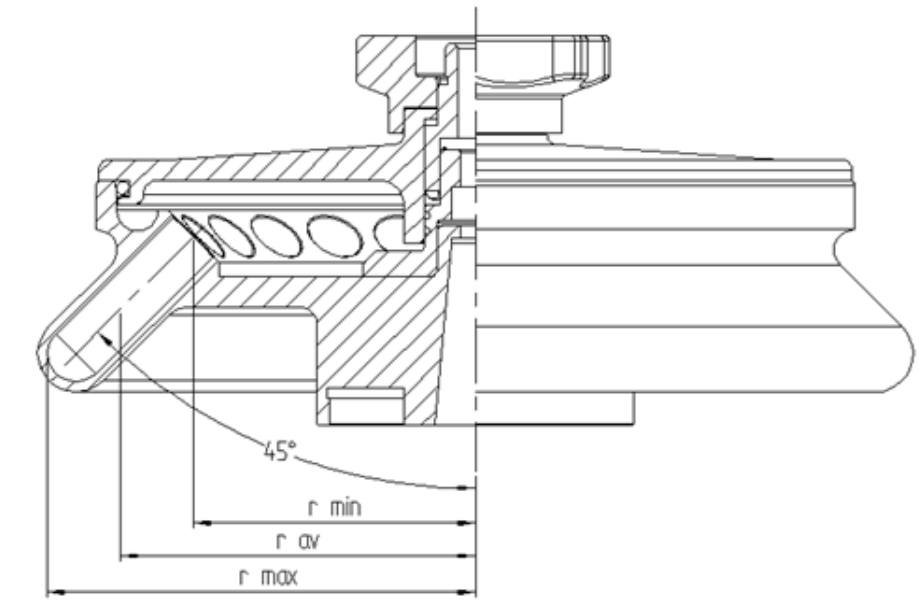
Overview

The Allegra C-24R centrifuge has a rotor library comprised five fixed-angle rotors. Specifications and a brief technical description of each are given in this appendix. The rotors with their specifications that are available for the Allegra C-24R centrifuge are as follows:

IMPORTANT Only specified rotors may be used for Allegra C-24R centrifuge.

- CF-24×2-24R Fixed-Angle Rotor Specifications
- CF-12×5-24R Fixed-Angle Rotor Specifications
- CF-36×0.5-24R Fixed-Angle Rotor Specifications
- CF-18×2-24R Fixed-Angle Rotor Specifications
- CF-32×0.2-PCR-24R Fixed-Angle Rotor Specifications

CF-24×2-24R Fixed-Angle Rotor Specifications



Maximum speed	16000 rpm
Minimum speed	300 rpm
Maximum speed for 4°C operation	16000 rpm
Density rating at maximum speed	1.2 g/mL

Maximum noise output (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)		45.7 dBA
Axis of rotation		45°
Relative centrifugal field at maximum speed at	r_{min} (50 mm)	14336 × g
	r_{av} (66.9 mm)	19182 × g
	r_{max} (83.8 mm)	24027 × g
Tube size		10.6×41.5 mm
Volume per tube		0.2/0.5/1.5/2 mL
Number of tubes		24
Approximate acceleration time to maximum speed		15.1 s
Approximate deceleration time from maximum speed		16.3 s
Maximum allowable rotor imbalance	100% maximum speed	3.3 g
	75% maximum speed	3.2 g
	50% maximum speed	3.1 g
	25% maximum speed	3.1 g

CF 24×2-24R Rotor Description

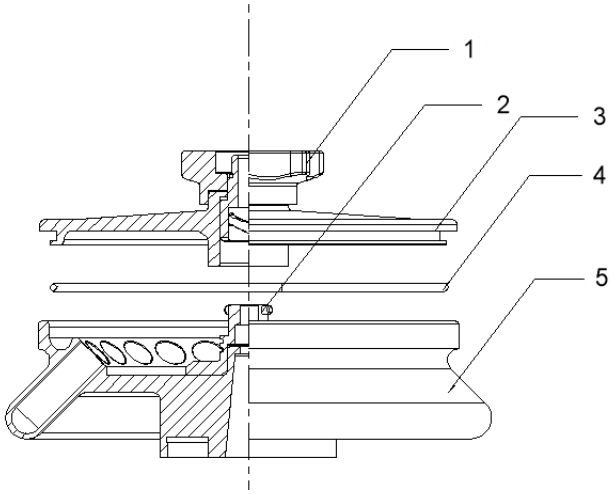
The Beckman Coulter CF 24×2-24R fixed-angle rotor is used for Beckman Coulter Allegra C-24R centrifuge. This rotor is intended for indoor use only.

Figure D.1 CF 24×2-24R Fixed-Angle Rotor

The CF 24×2-24R is a fixed-angle rotor designed to centrifuge up to twenty-four 2 mL tubes at a 45° angle to the axis of rotation. Applications for this rotor include general pelleting of bacteria, subcellular organelles, viruses, mitochondria, chloroplasts, and algae. Up to 48 mL of sample volume can be centrifuged per run.

The lid knob is used to secure the lid to the rotor body. The rotor body and the lid are made of aluminum and are anodized for corrosion resistance. The rotor body is black. The O-ring inside the rotor maintains atmosphere pressure inside the rotor during the centrifuge process.

Figure D.2 CF 24×2-24R Fixed-Angle Rotor Diagram



1. Knob
2. Rotor Core
3. Lid Assembly
4. Lid O-Ring
5. Rotor Body

CF 24×2-24R Adapters

Table D.1 lists adapters and the specifications for each that can be used with the CF 24×2-24R rotor.

Table D.1 Beckman Coulter Adapters for the CF 24×2-24R Rotor

Part Number	Adapter Volume	Adapter Diameter	Tubes per Adapter	Package Quantity	Adapter Material
D11487	0.5 mL	8 mm	1	24	PP
D11488	0.2 mL	6 mm	1	24	PP

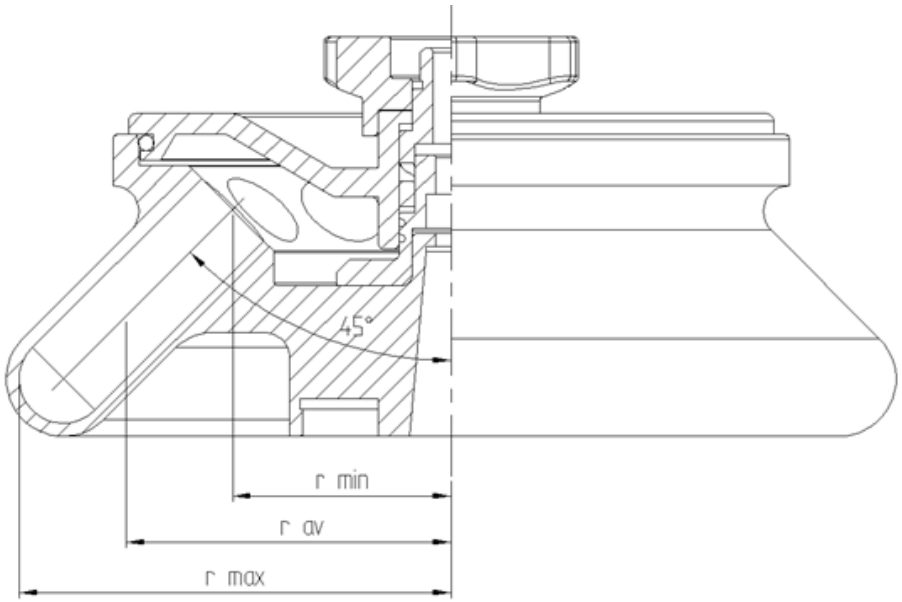
CF 24×2-24R Replacement Parts

Table D.2 lists the replacement parts currently available for the CF 24×2-24R rotor.

Table D.2 Beckman Coulter Replacement Parts for the CF 24×2-24R Rotor

Part Number	Description
D19694	CF 24×2-24R Rotor Assembly
D23699	CF 24×2-24R Lid O-Ring
D23702	CF 24×2-24R Rotor Lid

CF-12×5-24R Fixed-Angle Rotor Specifications



Maximum speed		15000 rpm
Minimum speed		300 rpm
Maximum speed for 4°C operation		15000 rpm
Density rating at maximum speed		1.2 g/mL
Maximum noise output (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)		46.1 dBA
Axis of rotation		45°
Relative centrifugal field at maximum speed at	r_{min} (50 mm)	10584 × g
	r_{av} (66.9 mm)	15750 × g
	r_{max} (83.8 mm)	20916 × g
Tube size		16.5×59.4 mm
Volume per tube		1.5/2/5 mL
Number of tubes		12
Approximate acceleration time to maximum speed		15.5 s
Approximate deceleration time from maximum speed		16.3 s
Maximum allowable rotor imbalance	100% maximum speed	4.3 g
	75% maximum speed	4.2 g
	50% maximum speed	4.1 g
	25% maximum speed	4.1 g

CF 12×5-24R Rotor Description

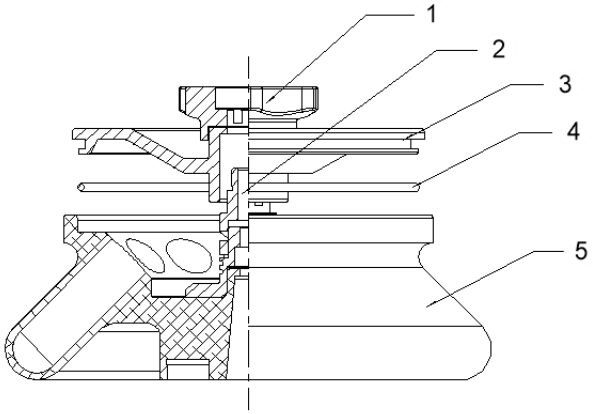
The Beckman Coulter CF 12×5-24R fixed-angle rotor is used for Beckman Coulter Allegra C-24R centrifuge. This rotor is intended for indoor use only.

Figure D.3 CF 12×5-24R Fixed-Angle Rotor

The CF 12×5-24R is a fixed-angle rotor designed to centrifuge up to twelve 5 mL tubes at a 45° angle to the axis of rotation. Applications for this rotor include general pelleting of bacteria, subcellular organelles, viruses, mitochondria, chloroplasts, and algae. Up to 60 mL of sample volume can be centrifuged per run.

The lid knob is used to secure the lid to the rotor body. The rotor body and the lid are made of aluminum and are anodized for corrosion resistance. The rotor body is black. The O-ring inside the rotor maintains atmosphere pressure inside the rotor during the centrifuge process.

Figure D.4 CF 12×5-24R Fixed-Angle Rotor Diagram



1. Knob
2. Rotor Core
3. Lid Assembly
4. Lid O-Ring
5. Rotor Body

CF 12×5-24R Adapters

⚠ CAUTION

If HPLC sample tubes are used, it is recommended to set the speed no more than 1,2000rmp, otherwise tubes potentially crack.

Table D.3 lists adapters and the specifications for each that can be used with the CF 12×5-24R rotor.

Table D.3 Beckman Coulter Adapters for the CF 12×5-24R Rotor

Part Number	Adapter Volume	Adapter Diameter	Tubes per Adapter	Package Quantity	Adapter Material
D23705	2 mL (Centrifuge tube)	11 mm	1	12	PP
D23706	Cryogenic tube	13 mm	1	12	PP
D23707	HPLC tube	12.5 mm	1	12	PP

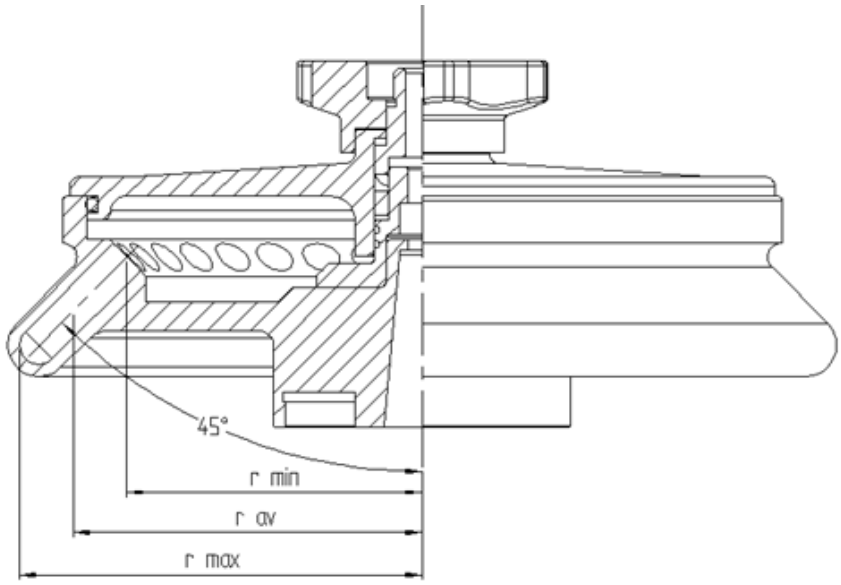
CF12×5-24R Replacement Parts

Table D.4 lists the replacement parts currently available for the CF 12×5-24R rotor.

Table D.4 Beckman Coulter Replacement Parts for the CF 12×5-24R Rotor

Part Number	Description
D19695	CF 12×5-24R Rotor Assembly
D23700	CF 12×5-24R Lid O-Ring
D23702	CF 12×5-24R Rotor Lid

CF-36×0.5-24R Fixed-Angle Rotor Specifications



Maximum speed		13500 rpm
Minimum speed		300 rpm
Maximum speed for 4°C operation		13500 rpm
Density rating at maximum speed		1.2 g/mL
Maximum noise output (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)		49.7 dBA
Axis of rotation		45°
Relative centrifugal field at maximum speed at	r_{min} (50 mm)	12553 × g
	r_{av} (66.9 mm)	14829 × g
	r_{max} (83.8 mm)	17105 × g
Tube size		7.9×32 mm
Volume per tube		0.5 mL
Number of tubes		36
Approximate acceleration time to maximum speed		12.5 s
Approximate deceleration time from maximum speed		13.6 s
Maximum allowable rotor imbalance	100% maximum speed	3.0 g
	75% maximum speed	3.0 g
	50% maximum speed	3.0 g
	25% maximum speed	3.2 g

CF 36×0.5-24R Rotor Description

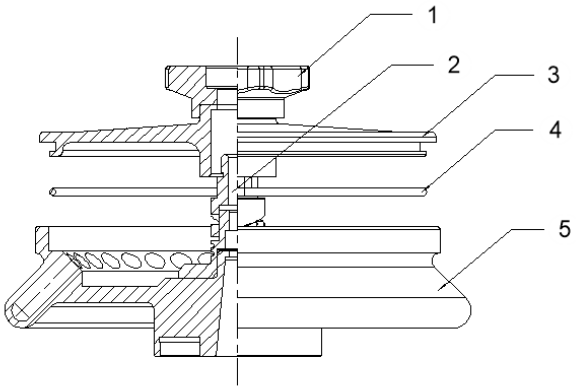
The Beckman Coulter CF 36×0.5-24R fixed-angle rotor is used for Beckman Coulter Allegra C-24R centrifuge. This rotor is intended for indoor use only.

Figure D.5 CF 36×0.5-24R Fixed-Angle Rotor

The CF 36×0.5-24R is a fixed-angle rotor designed to centrifuge up to thirty-six 0.5 mL tubes at a 45° angle to the axis of rotation. Applications for this rotor include general pelleting of bacteria, subcellular organelles, viruses, mitochondria, chloroplasts, and algae. Up to 18 mL of sample volume can be centrifuged per run.

The lid knob is used to secure the lid to the rotor body. The rotor body and the lid are made of aluminum and are anodized for corrosion resistance. The rotor body is black. The O-ring inside the rotor maintains atmosphere pressure inside the rotor during the centrifuge process.

Figure D.6 CF 36×0.5-24R Fixed-Angle Rotor Diagram



1. Knob
2. Rotor Core
3. Lid Assembly
4. Lid O-Ring
5. Rotor Body

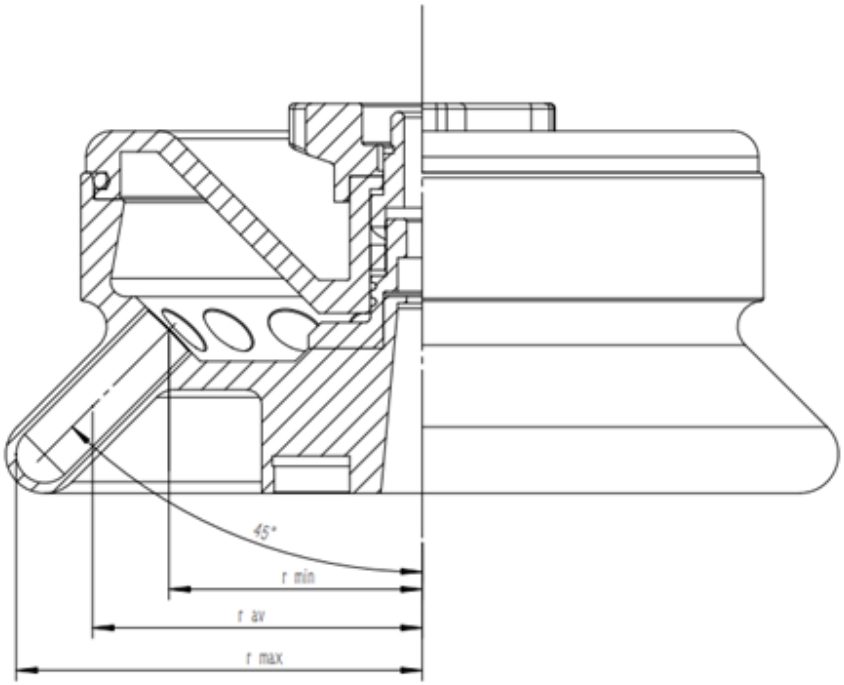
CF 36×0.5-24R Replacement Parts

Table D.5 lists the replacement parts currently available for the CF 36×0.5-24R rotor.

Table D.5 Beckman Coulter Replacement Parts for the CF 36×0.5-24R Rotor

Part Number	Description
D19696	CF 36×0.5-24R Rotor Assembly
D23699	CF 36×0.5-24R Lid O-Ring
D23702	CF 36×0.5-24R Rotor Lid

CF-18×2-24R Fixed-Angle Rotor Specifications



Maximum speed	16000 rpm
Minimum speed	300 rpm
Maximum speed for 4°C operation	16000 rpm
Density rating at maximum speed	1.2 g/mL
Maximum noise output (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)	45.2 dBA
Axis of rotation	45°

Relative centrifugal field at maximum speed at	r_{min} (50 mm)	14038 × g
	r_{av} (66.9 mm)	18273 × g
	r_{max} (83.8 mm)	22507 × g
Tube size		10.8×50 mm
Volume per tube		0.2/0.5/1.5/2 mL
Number of tubes		18
Approximate acceleration time to maximum speed		14.2 s
Approximate deceleration time from maximum speed		15.0 s
Maximum allowable rotor imbalance	100% maximum speed	4.2 g
	75% maximum speed	4.2 g
	50% maximum speed	4.2 g
	25% maximum speed	4.2 g

CF 18×2-24R Rotor Description

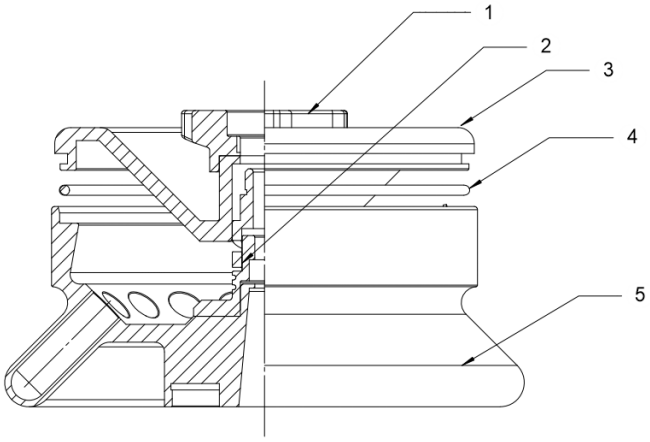
The Beckman Coulter CF 18×2-24R fixed-angle rotor is used for Beckman Coulter Allegra C-24R centrifuge. This rotor is intended for indoor use only.

Figure D.7 CF 18×2-24R Fixed-Angle Rotor

The CF 18×2-24R is a fixed-angle rotor designed to centrifuge up to eighteen 1.5/2 mL tubes or 2 mL spin column at a 45° angle to the axis of rotation. Applications for this rotor include DNA and RNA extraction. Up to 36 mL of sample volume can be centrifuged per run.

The lid knob is used to secure the lid to the rotor body. The rotor body and the lid are made of aluminum and are anodized for corrosion resistance. The rotor body is black. The O-ring inside the rotor maintains atmosphere pressure inside the rotor during the centrifuge process.

Figure D.8 CF 18×2-24R Fixed-Angle Rotor Diagram



1. Knob
2. Rotor Core
3. Lid Assembly
4. Lid O-Ring
5. Rotor Body

CF 18×2-24R Adapters

Table D.6 lists adapters and the specifications for each that can be used with the CF 18×2-24R rotor.

Table D.6 Beckman Coulter Adapters for the CF 18×2-24R Rotor

Part Number	Adapter Volume	Adapter Diameter	Tubes per Adapter	Package Quantity	Adapter Material
D11487	0.5 mL	6.5 mm	1	36	PP
D11488	0.2 mL	7.5 mm	1	36	PP

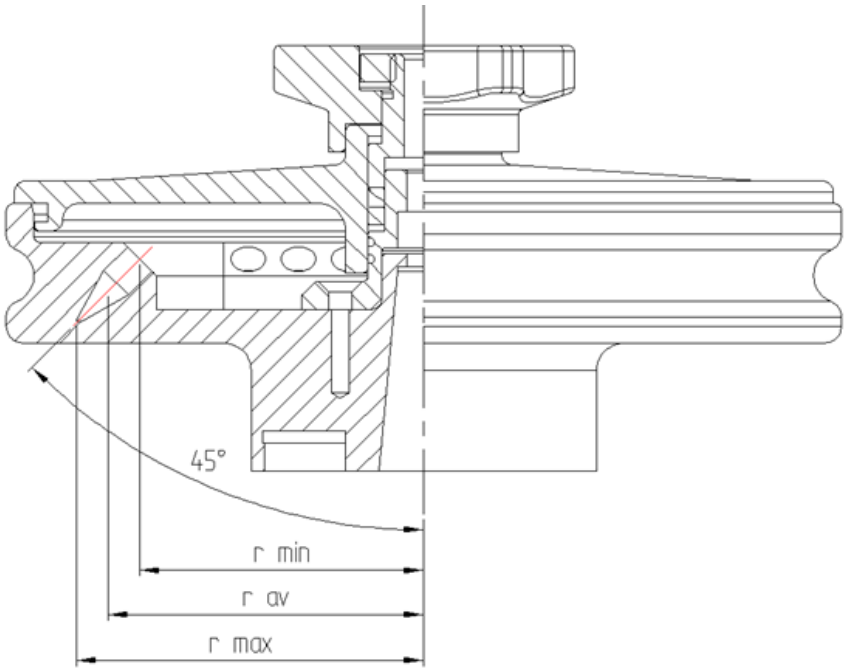
CF 18×2-24R Replacement Parts

Table D.7 lists the replacement parts currently available for the CF 18×2-24R rotor.

Table D.7 Beckman Coulter Replacement Parts for the CF 18×2-24R Rotor

Part Number	Description
D19697	CF 18×2-24R Rotor Assembly
D23701	CF 18×2-24R Lid O-Ring
D23704	CF 18×2-24R Rotor Lid

CF-32×0.2-PCR-24R Fixed-Angle Rotor Specifications



Maximum speed		16000 rpm
Minimum speed		300 rpm
Maximum speed for 4°C operation		16000 rpm
Density rating at maximum speed		1.2 g/mL
Maximum noise output (1 m in front of the instrument and 1.5 m above the floor at instrument rated speed)		48.5 dBA
Axis of rotation		45°
Relative centrifugal field at maximum speed at	r_{min} (50 mm)	14680 × g
	r_{av} (66.9 mm)	17433 × g
	r_{max} (83.8 mm)	20070 × g
Tube size		6×22.2 mm
Volume per tube		0.2 mL
Number of tubes		32
Approximate acceleration time to maximum speed		13.4 s
Approximate deceleration time from maximum speed		15.0 s
Maximum allowable rotor imbalance	100% maximum speed	3.0 g
	75% maximum speed	3.0 g
	50% maximum speed	3.0 g
	25% maximum speed	3.2 g

CF 32×0.2-PCR-24R Rotor Description

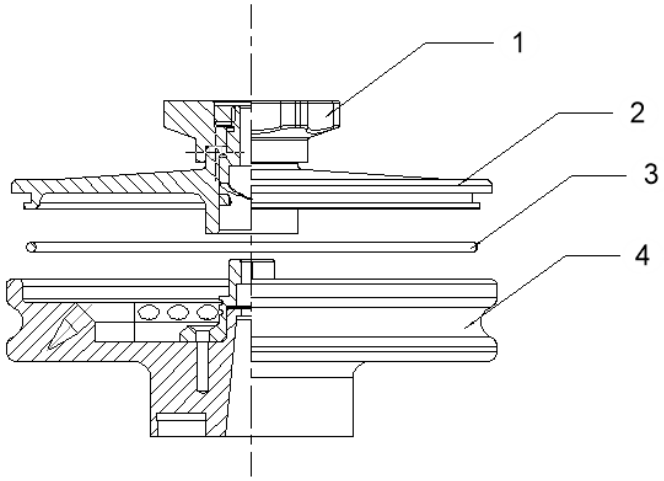
The Beckman Coulter CF 32×0.2-PCR-24R fixed-angle rotor is used for Beckman Coulter Allegra C-24R centrifuge. This rotor is intended for indoor use only.

Figure D.9 CF 32×0.2-PC-24R Fixed-Angle Rotor

The CF 32×0.2-PCR-24R is a fixed-angle rotor designed to centrifuge up to thirty-two 0.2 mL tubes at a 45° angle to the axis of rotation. Applications for this rotor include accommodating and processing small volume samples, typically in 0.2 mL microcentrifuge tubes or PCR tubes or strips. Up to 6.4 mL of sample volume can be centrifuged per run.

The lid knob is used to secure the lid to the rotor body. The rotor body and the lid are made of aluminum and are anodized for corrosion resistance. The rotor body is black. The O-ring inside the rotor maintains atmosphere pressure inside the rotor during the centrifuge process.

Figure D.10 CF 32×0.2-PC-24R Fixed-Angle Rotor Diagram



1. Knob
2. Lid Assembly
3. Rotor O-Ring
4. Rotor Body

CF 32×0.2-PCR-24R Replacement Parts

Table D.7 lists the replacement parts currently available for the CF 32×0.2-PCR-24R rotor.

Table D.8 Beckman Coulter Replacement Parts for the CF 32×0.2-PCR-24R Rotor

Part Number	Description
D19698	CF 32×0.2-PC-24R Rotor Assembly
D23699	CF 32×0.2-PC-24R Lid O-Ring
D23702	CF 32×0.2-PC-24R Rotor Lid

APPENDIX E

Table of Hazardous Substances

Table of Hazardous Substances

The Hazardous Substances Names and Concentration are shown in Table E.1.

Table E.1 有毒有害物质名称及含量的标识格式 Table of Hazardous Substances Name and Concentration

电子电气产品号码 **EEP Part Number: D19693**	产品名称 **Product Name:** 小型台式高速冷冻离心机 **Compact desktop high-speed refrigeration centrifuge** 产品型号 **Product Model Number: Allegra C-24R**					
部件名称 Component Name	有毒有害物质或元素 Hazardous Substances Name					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组件 Circuit Boards	O	O	X	O	O	O
电源组件 Power Supplies	O	O	O	O	O	O
电机 Electrical Machinery	O	O	O	O	O	O
压缩机 Compactors	X	O	O	O	O	O
显示屏 Display	O	O	O	O	O	O
电磁阀 Solenoids	X	O	O	O	O	O
金属机架 Metal Racks	X	O	O	O	O	O
橡胶/硅胶 Rubber/Silica	O	O	O	O	O	O
塑料部件 Plastic	O	O	O	O	O	O
线束 Harness	O	O	O	O	O	O
轴流风机 Axial Fans	O	O	O	O	O	O
连接部件 Connector	X	O	O	O	O	O
包装材料 Packing Material	O	O	O	O	O	O
转子 Rotor	O	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364

O：表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求

（企业可在此处，根据实际情况对上表中打“×”的技术原因进行进一步说明）

O: Indicates that the toxic or hazardous substances contained in all of the homogenous materials for this part is below the limit requirements in GB/T 26572.

X: Indicates that the toxic or hazardous substance contained in at least one of the homogenous materials used for this part in above the limit requirement in GB/T 26572.

(Enterprise may further provide in this box technical explanation for marking “×” based on their actual conditions)

Abbreviations

The following list is a composite of the symbols, abbreviations, acronyms, and reference designators either used in this manual or related to the information in it. When the same abbreviation (or reference designator) is used for more than one word (or type of component), all meanings relevant to this manual are included, separated by semicolons.

' — Foot

“ — Inch

% — Percentage

°C — Celsius

°F — Degrees Fahrenheit

± — Plus or minus sign

< — Less than

> — More than

≤ — Less than or equal to

AC — Alternating current

A — Ampere

bps — Bits per second

Btu — British thermal units

cm — Centimeter

dBA — Decibel

EMC — Electromagnetic compatibility compliance

ft — Foot

g — Gram

Hz — Hertz

H — Humidity

ID — Identification

IEC — International Electrotechnical Commission

IR — Infrared ray

kg — Kilogram

lb — Pound

L — Liter

MB — Megabytes

MHz — Megahertz

min — Minute

mL — Milliliter

mm — Millimeter

mW — Milliwatts

m — Meter

nm — Nanometer

PN — Part number

RCF — Relative centrifugal force

RH — Relative humidity

RF — Radio frequency

r_{max} — Maximum radius

RoHS — Restriction order of hazardous substances

Rpm — Rotational speed per minute

VAC — Voltage alternating current

VA — Volt-ampere

V — Voltage

µL — Microliter

µm — Micrometer

µ — Micrometer

W — Watt

Index

Symbols

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T

U

V

W

Beckman Coulter, Inc.
Allegra C-24R Centrifuge Warranty

Except as otherwise provided, and subject to the conditions set forth below and the warranty provisions of Beckman Coulter, Inc.'s terms and conditions in effect at the time of sale, Beckman Coulter agrees that Beckman Coulter or an authorized representative may correct defects in materials or workmanship which occur within two (2) years after delivery of the Allegra C-24R compact multifunctional desktop refrigeration centrifuge (the product) for the original purchaser by means of repair or replacement, as determined by Beckman Coulter in its sole discretion, provided that Beckman Coulter verifies, after investigation and factory inspection, that such defects occurred during normal and proper use.

Some components and accessories are not designed to and cannot be used continuously for two (2) years due to their nature. A complete list of such components or accessories is available at the factory and each Beckman Coulter regional sales department. The list applicable to the marketed products shall be deemed as an integral part of this Warranty. If any such component or accessory fails to perform a proper function within a reasonable period of time, Beckman Coulter will repair or, at its discretion, replace the component or accessory. Proper service and reasonable use terms are independently determined by Beckman Coulter.

Replacement

Any product claimed to be defective, if requested by Beckman Coulter, must be returned to the factory at prepaid freight cost and will be shipped to the purchaser at the purchaser's expense, unless the product is verified to be defective; in this case, Beckman Coulter, Inc. will bear full freight cost.

Conditions

Beckman Coulter does not warrant products or accessories that are not manufactured by Beckman Coulter. In the event of failure of any such products or accessories, reasonable remedies shall be obtained in accordance with the warranties of the respective manufacturers, and Beckman Coulter will provide reasonable assistance to the purchaser.

Beckman Coulter will be discharged from all obligations under any warranty, express or implied, if repairs or modifications are made to the warranted product by persons other than its authorized service personnel unless Beckman Coulter unilaterally determines that such repairs are minor or unless such modifications consist of nothing more than the installation of a new Beckman Coulter add-on for such products.

Disclaimer

The parties involved have expressly agreed that the foregoing warranty shall supersede all warranties of fitness for a particular purpose and merchantability and that Beckman Coulter, Inc. shall not be liable for special or consequential damages of any kind arising out of the manufacture, use, sale, moving, repair, maintenance, or replacement of the product.

Related Documents

Allegra C-24R Centrifuge Instructions for Use
PN D23800

Chemical Resistances for Beckman Coulter Centrifugation Products
PN IN-175

www.beckman.com