Instruction For Use

F241.5P Rotor

Used in the Beckman Coulter Microfuge 18 and 22R Centrifuges
Revision Status

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

Issue KA, 08/2019
Changes or additions were made to: Replacement Rotor Parts

Note: Changes that are part of the most recent revision are indicated in text by a bar in the margin of the amended page.
Safety Notice

Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to use this equipment. 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 your Beckman Coulter Representative.

This safety notice summarizes information basic to the safe use of the rotor described in this manual. The international symbol displayed to the left is a reminder to the user that all safety instructions should be read and understood before operation or maintenance of this equipment is attempted. When you see the symbol on other pages of this publication, pay special attention to the safety information presented. Observance of safety precautions will also help to avoid actions that could damage or adversely affect the performance of the rotor.

Alerts for Caution & Note

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 installation, use, or servicing of this equipment.

Safety Information for the F241.5P Rotor

Handle body fluids with care because they can transmit disease. No known test offers complete assurance that such fluids are free of micro-organisms. Some of the most virulent — Hepatitis (B and C) viruses, HIV (I–V), atypical mycobacteria, and certain systemic fungi — further emphasize the need for aerosol protection. Handle other infectious samples according to good laboratory procedures and methods to prevent spread of disease. Because spills may generate aerosols, observe proper safety precautions for aerosol containment. Do not run toxic, pathogenic, or radioactive materials in this rotor without taking appropriate safety precautions. Biosafe containment should be used when Risk Group II materials (as identified in the World Health Organization Laboratory Biosafety Manual) are handled; materials of a higher group require more than one level of protection.

The rotor and accessories are not designed for use with materials capable of developing flammable or explosive vapors. Do not centrifuge such materials in nor handle or store them near the centrifuge.
This rotor was developed, manufactured, and tested for safety and reliability as part of a Beckman Coulter centrifuge/rotor system. Its safety or reliability cannot be assured if used in a non-Beckman Coulter centrifuge or in a Beckman Coulter centrifuge that has been modified without Beckman Coulter’s approval.

Although rotor components and accessories made by other manufacturers may fit in the F241.5P rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers’ components or accessories in the F241.5P rotor may void the rotor warranty and should be prohibited by your laboratory safety officer. Only the components and accessories listed in this publication should be used in this rotor.

Make sure that filled containers are loaded symmetrically into the rotor and that opposing tubes are filled to the same level with liquid of the same density.

If disassembly reveals evidence of leakage, you should assume that some fluid escaped the rotor. Apply all appropriate safety and decontamination procedures to the centrifuge and accessories as required.

Never exceed the maximum rated speed of the rotor and labware in use. Refer to the section on Run Speeds.

Do not use sharp tools on the rotor that could cause scratches in the rotor surface. Corrosion begins in scratches and may open fissures in the rotor with continued use.
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Beckman Coulter, Inc.
Benchtop Rotor Warranty

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Specifications

Maximum speed ............................................. 14,000 rpm
Density rating at maximum speed .......................... 1.2 g/mL
Critical speed range\textsuperscript{a} .......................... 600 to 800 rpm
Relative Centrifugal Field\textsuperscript{b} at maximum speed
At \( r_{\text{max}} \) (82.5 mm) .................................. 17,500 \( \times \) g
Conditions requiring speed reductions ................. see Run Speeds
Maximum imbalance of opposing loads .................. 5 grams
Number of tube cavities ..................................... 24
Available bottles and tubes ................................. see Table 1
Nominal tube dimensions ................................. 10 \( \times \) 31 mm
Nominal tube capacity (largest tube) ....................... 2 mL
Nominal rotor capacity ..................................... 48 mL
Approximate acceleration time to maximum speed
(fully loaded) ............................................... 18 sec
Approximate deceleration time from maximum speed
(fully loaded) ............................................... 19 sec
Weight of fully loaded rotor .............................. 0.57 kg (1.26 lb)
Rotor material ................................................. polypropylene
Lid material .................................................. polyphenylsulfone

\textsuperscript{a} The critical speed range is the range of speeds over which the rotor shifts so as to rotate about its center of mass. Passing through the critical speed range is characterized by some vibration.

\textsuperscript{b} Relative Centrifugal Field (RCF) is the ratio of the centrifugal acceleration at a specified radius and speed \((r\omega^2)\) to the standard acceleration of gravity \((g)\) according to the following formula: \( RCF = \frac{r\omega^2}{g} \) — where \( r \) is the radius in millimeters, \( \omega \) is the angular velocity in radians per second \((2 \pi \text{ RPM} / 60)\), and \( g \) is the standard acceleration of gravity \((9807 \text{ mm/s}^2)\). After substitution: \( RCF = \frac{1.12r \text{ RPM}^2}{1000g^2} \)
Description

The F241.5P, rated for 14,000 rpm, is a fixed angle rotor with a tube angle of 45 degrees from the axis of rotation. Used in the Beckman Coulter Microfuge 18 and 22R centrifuges, the rotor can centrifuge up to twenty-four 1.5 to 2.0-mL reaction-vials, as well as 50 to 750-mL vials. This rotor develops centrifugal forces that can efficiently pellet subcellular organelles, viruses, bacteria, mitochondria, chloroplasts, or algae.

The rotor is made of high-impact thermoplastic. The polyphenylsulfone snap-on lid will contain most liquids and broken tube particles, reducing the need to clean the centrifuge chamber, and allowing you to take appropriate precautions before opening the lid in the event of spillage. A lubricated O-ring in the rotor lid maintains atmospheric pressure in the rotor during centrifugation. A tie-down screw is used to secure the rotor to the drive shaft during centrifugation.

The rotor is warranted for one year (see the Beckman Coulter, Inc. Benchtop Rotor Warranty).

Preparation and Use

Specific information about the F241.5P rotor is given here. Information about the centrifuge is contained in the centrifuge manual, which should be used together with this manual for complete centrifuge, rotor, and accessory operation.

NOTE Although rotor components and accessories made by other manufacturers may fit in the F241.5P rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the F241.5P rotor may void the rotor warranty and should be prohibited by your laboratory safety officer. Only the components and accessories listed in this publication should be used in this rotor.

Prerun Safety Checks

Read the Safety Notice section at the front of this manual before using the rotor.

1 Make sure that the rotor, lid, and all tubes and accessories are clean and show no signs of corrosion or cracking.
2 If fluid containment is required, use capped tubes. All containers carrying physiological fluids should be capped, and not overfilled, to prevent leakage. Verify that the tubes being used are listed in Table 1.

3 Check the chemical compatibilities of all materials used (refer to Chemical Resistances, publication IN-175).

Rotor Preparation

For runs at other than room temperature, refrigerate or warm the rotor beforehand for fast equilibration.

1 Be sure that the metal threads in the rotor are clean and lightly but evenly coated with Spinkote lubricant (306812).

2 Load the filled and sealed tubes symmetrically into the rotor (see Tubes, page 5, for tube information).
   - If fewer than 24 tubes are being run, they must be arranged symmetrically in the rotor.
   - Opposing tubes must be filled to the same level with liquid of the same density.

3 Pull up on the snap-on lock and set the lid in place on the rotor. Release the lock, then make sure that the lid is firmly in place. Press down on the lock to ensure engagement.

![Snap-On Lock](image)

1. Snap-On Lock

**NOTE** If using alternate lid assembly (367207), put the lid in place and tighten it by hand.
Operation

Precool the rotor in the centrifuge or in a refrigerator before use —especially before short runs — to ensure that the rotor reaches the set temperature. A suggested precooling cycle is a minimum of 30 minutes at 2,000 rpm with the temperature set to 0°C.

NOTE Temperatures may vary slightly between centrifuges. If sample temperature is crucial, test temperature settings on your instrument using water samples. For runs at other than room temperature, refrigerate or warm the rotor beforehand for fast equilibration.

1 Ensure that the rotor tie-down screw (365969) is in good condition and the threads are free of foreign matter.

⚠️ CAUTION Do not drop the rotor onto the drive shaft. The shaft can be bent or damaged if the rotor is forced sideways or dropped onto the shaft.

2 Center the rotor over the drive shaft and carefully lower it straight down.

3 Secure the rotor to the drive shaft with the tie-down screw. Tighten the screw by turning it to the right (clockwise) with the T-handle rotor wrench (361371).

4 Refer to the instrument instruction manual for centrifuge operation. See Run Speeds, page 6, for information about speed limitations.

Removal and Sample Recovery

⚠️ CAUTION If disassembly reveals evidence of leakage, you should assume that some fluid escaped the rotor. Apply appropriate decontamination procedures to the centrifuge and accessories.

1 Using the T-handle rotor wrench, turn the tie-down screw to the left (counterclockwise) to release the rotor.

2 Remove the rotor by lifting it straight up and off the drive shaft.
3 Pull up on the snap-on lock to remove the lid and remove tubes from the rotor. You can leave the rotor in the centrifuge for subsequent runs.

**Tubes**

The F241.5P rotor holds up to twenty-four 1.5 to 2.0-mL reaction-vials, listed in Table 1. The rotor also holds 250 to 750-mL vials in adapters.

Refer to *Chemical Resistances* (publication IN-175) for information on the chemical compatibilities of labware materials.

**Table 1** Available Tubes for the F241.5P Rotor

<table>
<thead>
<tr>
<th>Description</th>
<th>Dimensions</th>
<th>Volume</th>
<th>Part Number</th>
<th>Adaptera</th>
<th>Max Speed (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>polyethylene tube with attached cap</td>
<td>11 × 45 mm</td>
<td>1.8 mL</td>
<td>340196 (pkg/500)</td>
<td>none</td>
<td>10,000</td>
</tr>
<tr>
<td>polyallomer tube with attached cap (natural)</td>
<td>11 × 40 mm</td>
<td>1.5 mL</td>
<td>357448 (pkg/500)</td>
<td>none</td>
<td>14,000</td>
</tr>
<tr>
<td>polypropylene tube with attached cap</td>
<td>11 × 40 mm</td>
<td>1.5 mL</td>
<td>343169 (pkg/500)</td>
<td>none</td>
<td>14,000</td>
</tr>
<tr>
<td>polyethylene tube, plain</td>
<td>7 × 40 mm</td>
<td>400 mL</td>
<td>314326 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
<tr>
<td>polyethylene tube, Heparin-Lithium Fluoride coated</td>
<td>7 × 40 mm</td>
<td>400 mL</td>
<td>652824 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
<tr>
<td>polyethylene tube, Heparin-Lithium coated</td>
<td>7 × 40 mm</td>
<td>400 mL</td>
<td>652825 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
<tr>
<td>polyethylene tube, Heparin-Lithium Fluoride coated</td>
<td>5 × 45 mm</td>
<td>250 mL</td>
<td>652821 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
<tr>
<td>polyethylene tube, Heparin-Lithium coated</td>
<td>5 × 45 mm</td>
<td>250 mL</td>
<td>652822 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
<tr>
<td>polyethylene tube, plain</td>
<td>5 × 45 mm</td>
<td>250 mL</td>
<td>652823 (pkg/1000)</td>
<td>361247 (pkg/12)</td>
<td>11,500</td>
</tr>
</tbody>
</table>

a. Adapter (364690) is available to hold commercially available 750-mL tubes.

**Temperature Limits**

- Plastic containers have been centrifuge tested for use at temperatures between 2 and 25°C. For centrifugation at other temperatures, pretest containers under anticipated run conditions.
- If plastic containers are frozen before use, make sure that they are thawed to at least 2°C before centrifugation.
Run Speeds

The centrifugal force at a given radius in a rotor is a function of speed. Comparisons of forces between different rotors are made by comparing the rotors’ relative centrifugal fields (RCF). When rotational speed is adjusted so that identical samples are subjected to the same RCF in two different rotors, the samples are subjected to the same force. The RCF at each speed is automatically calculated by the centrifuge software; if the RCF is entered, the centrifuge calculates the equivalent revolutions per minute (rpm).

The maximum run speed listed in the rotor specifications is for operation when all conditions are within the standard specifications. Speeds must be reduced under the following circumstances:

- If nonprecipitating solutions more dense than 1.2 g/mL are centrifuged, the maximum allowable run speed must be reduced according to the following equation:

\[
\text{reduced maximum speed} = (14,000 \text{ rpm}) \sqrt{\frac{1.2 \text{ g/mL}}{\rho}}
\]

where \( \rho \) is the density of the tube contents. This speed reduction will protect the rotor from excessive stresses due to the added tube load. *Note, however, that the use of this formula may still produce maximum speed figures that are higher than the limitations imposed by the use of certain tubes or adapters.* In such cases, use the lower of the two figures.

- Further speed limits must be imposed when self-forming-gradient salts are centrifuged, as the equation does not predict concentration limits/speeds that are required to avoid precipitation of salt crystals.

Care and Maintenance

Maintenance

- Do not use sharp tools on the rotor, as they can scratch the rotor surface.

- Periodically (at least monthly) inspect the rotor, especially inside cavities, for damage. If damage is evident, do not run the rotor. Contact your Beckman Coulter representative for information about the Field Rotor Inspection Program and the rotor repair center.
Before using the tie-down screw, check it for damage such as stripped threads. Replace it if it is damaged.

Check the O-ring for nicks, abrasions, or other damage. Do not use a rotor with damaged components. Lightly but evenly apply silicone vacuum grease (335148) to the O-ring before use.

Refer to Chemical Resistances for the chemical compatibilities of rotor and accessory materials. Your Beckman Coulter representative provides contact with the Field Rotor Inspection Program and the rotor repair center.

Cleaning

Wash the rotor and rotor components immediately if salts or other corrosive materials are used or if spillage has occurred. Do not allow corrosive materials to dry on the rotor.

Under normal use, wash the rotor frequently (at least weekly) to prevent buildup of residues. If the rotor is left in the centrifuge for long periods of time, remove it at least once a month for cleaning and lubrication.

1. Remove the O-ring and wash the rotor, lid, and O-ring in a mild detergent, such as Beckman Solution 555 (339555), that won’t damage the rotor. The Rotor Cleaning Kit (339558) contains two plastic-coated brushes and two quarts of Solution 555 for use with rotors and accessories. Dilute the detergent 10 to 1 with water.

2. Rinse the cleaned rotor and components with distilled water.

3. Air-dry the rotor and lid upside down. Do not use acetone to dry the rotor.

4. Apply a thin, even coat of silicone vacuum grease (335148) to the O-ring, then replace it in the groove in the outer rim of the rotor.

NOTE Do not wash the rotor components or accessories in a dishwasher. Do not soak components in detergent solution for long periods of time, such as overnight.
Decontamination

If the rotor (and/or accessories) becomes contaminated with toxic, pathogenic, or radioactive materials, follow appropriate decontamination procedures as outlined by your laboratory safety officer.

Sterilization and Disinfection

- The rotor and all rotor components can be autoclaved at 118°C for up to 30 minutes. Remove the lid from the rotor and place the rotor, lid, and O-ring in the autoclave upside down.
- Ethanol (70%) or hydrogen peroxide (6%) may be used on all rotor components, including those made of plastic. Bleach (sodium hypochlorite) may be used, but may cause discoloration of anodized surfaces. Use the minimum immersion time for each solution, per laboratory standards.

While Beckman Coulter has tested these methods and found that they do not damage the rotor or components, no guarantee of sterility or disinfection is expressed or implied. When sterilization or disinfection is a concern, consult your laboratory safety officer regarding proper methods to use. Refer to publication IN-192, included in each box of tubes or bottles, for tube sterilization and disinfection procedures.

Storage

When the rotor is not in use, store it in a dry environment (not in the centrifuge) with the rotor lid removed to allow air circulation so moisture will not collect in the tube cavities.

Returning a Rotor

Before returning a rotor or accessory for any reason, prior permission (a Returned Goods Authorization form) must be obtained from Beckman Coulter, Inc. This RGA form, which may be obtained from your local Beckman Coulter sales office, should contain the following information:

- rotor serial number,
- history of use (approximate frequency of use),
- reason for the return,
- original purchase order number, billing number, and shipping number, if possible,
- name and phone number of the person to be notified upon receipt of the rotor or accessory at the factory, and
- name and phone number of the person to be notified about repair costs, etc.

* Flammability hazard. Do not use in or near operating centrifuges.
To protect our personnel, it is the customer’s responsibility to ensure that the parts are free from pathogens and/or radioactivity. Sterilization and decontamination must be done before returning the parts. Smaller items (such as tubes, bottles, etc.) should be enclosed in a sealed plastic bag.

_All parts must be accompanied by a note, plainly visible on the outside of the box or bag, stating that they are safe to handle and that they are not contaminated with pathogens or radioactivity. Failure to attach this notification will result in return or disposal of the items without review of the reported problem._

Use the address label printed on the RGA form when mailing the rotor and/or accessories.

Customers located outside the United States should contact their local Beckman Coulter office.

### Supply List

Call Beckman Coulter Sales (1-800-742-2345 in the United States; worldwide offices are listed on the back cover of this manual) for detailed information on ordering parts and supplies. For your convenience, a partial list is given below.

#### Replacement Rotor Parts

- F241.5P rotor assembly .......................................................... 367187
- Snap-on lid ................................................................. 369547
- Screw on lid o-ring .......................................................... 368896
- Tie-down screw ........................................................... 369554
- Polycarbonate lid assembly ............................................. 367207
- Rotor o-ring ............................................................... 368990

#### Supplies

- Tubes and accessories ...................................................... see Table 1
- Adapter for 750-mL vials (pkg/12) ..................................... 364690
- Silicone vacuum grease (1 oz) ......................................... 335148
- Rotor Cleaning Kit ....................................................... 339558
- Beckman Solution 555 (1 qt) ......................................... 339555
F241.5P Rotor
Supply List
Subject to the conditions specified below and the warranty clause of the Beckman Coulter, Inc., terms and conditions in effect at the time of sale, Beckman Coulter agrees to correct either by repair or, at its election, by replacement, any defects of material or workmanship which develop within seven (7) years after delivery of a benchtop centrifuge rotor to the original buyer by Beckman Coulter or by an authorized representative, provided that investigation and factory inspection by Beckman Coulter discloses that such defect developed under normal and proper use. Should a Beckman Coulter centrifuge be damaged due to a failure of a rotor covered by this warranty, Beckman Coulter will supply free of charge all centrifuge parts required for repair.

Conditions
1. Except as otherwise specifically provided herein, this warranty covers the rotor only and Beckman Coulter shall not be liable for damage to accessories or ancillary supplies including but not limited to (i) tubes, (ii) tube caps, (iii) tube adapters, or (iv) tube contents.
2. This warranty is void if the rotor has been subjected to customer misuse such as operation or maintenance contrary to the instructions in the Beckman Coulter rotor or centrifuge manual.
3. This warranty is void if the rotor is operated with a rotor drive unit or in a centrifuge unmatched to the rotor characteristics or operated in a Beckman Coulter centrifuge that has been improperly disassembled, repaired, or modified.
4. Thermoplastic rotors or components used in some benchtop centrifuges are warranted for one (1) year from date of purchase.

Disclaimer
IT IS EXPRESSLY AGREED THAT THE ABOVE WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND OF THE WARRANTY OF MERCHANTABILITY AND THAT BECKMAN COULTER, INC. SHALL HAVE NO LIABILITY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER ARISING OUT OF THE MANUFACTURE, USE, SALE, HANDLING, REPAIR, MAINTENANCE, OR REPLACEMENT OF THE PRODUCT.
Related Documents

**Microfuge 18 Centrifuge**
*Instruction Manual*
PN MM-IM-10

**Microfuge 22R Centrifuge**
*Instruction Manual*
PN MMR-IM-5

**Chemical Resistances for Beckman Coulter Centrifugation Products**
PN IN-175

**International Rotor Safety Booklet**
PN IN-197

**Use and Care of Centrifuge Tubes and Bottles**
PN IN-192

Available through electronic PDF at [www.beckman.com](http://www.beckman.com) or in hard copy by request.