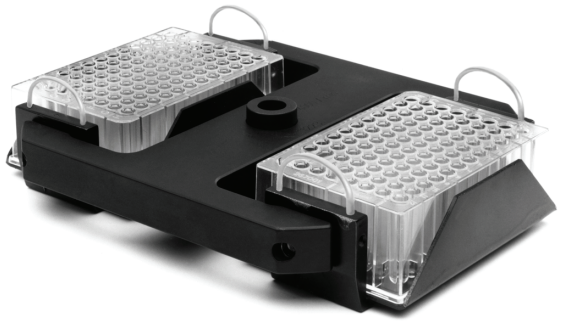
Instructions For Use

S2096 Swinging-Bucket Rotor

For Use in the Beckman Coulter
Allegra X-22 Series,
Allegra 21 Series,
GS-15 Series,
Spinchron 15 Series, and
Allegra X-30 Series Centrifuges



CE

GS-TB-005GA
April 2011

Beckman Coulter, Inc.
250 S. Kraemer Blvd.
Brea, CA 92821

BECKMAN COULTER

S2096 Swinging-Bucket Rotor

GS-TB-005GA (April 2011)

Find us on the World Wide Web at:
www.beckmancoulter.com

EC REP
Beckman Coulter Ireland, Inc.
Mervue Business Park, Mervue Galway, Ireland 353 91 774068

Beckman Coulter do Brasil Com e Imp de Prod de Lab Ltda
Estr dos Romeiros, 220 - Galpao G3 - Km 38.5
06501-001 - Sao Paulo - SP - Brasil
CNPJ: 42.160.812/0001-44

製造販売元 : ベックマン･コールター株式会社
東京都江東区有明三丁目 5 番 7 号
TOC 有明ウエストタワー

贝克曼库尔特有限公司，
美国加利福尼亚州，Brea 市，S. Kraemer 大街 250 号，
邮编：92821 电话：(001) 714-993-5321

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 Warning, Caution, and Note

⚠ 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 installation, use, or servicing of this equipment.

Safety Information for the S2096 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 S2096 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the S2096 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.

Hook both carriers to the rotor for every run. Make sure that filled containers are loaded symmetrically into the rotor and that opposing labware is 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*, and derate the run speed as appropriate.

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.

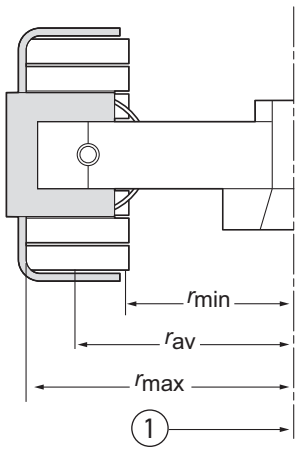
Contents

Illustrations

Tables

S2096 Swinging-Bucket Rotor

Specifications



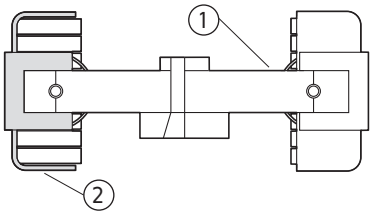
1. Axis of Rotation

Maximum speed	3000 rpm
Critical speed range[a]	500 to 1300 rpm
Density rating at maximum speed	1.2 g/mL
Relative Centrifugal Field[b] at maximum speed	
r_{max} (110-mm deepwell plates)	
Allegra X-30 series	1109 × *g*
Allegra X-22 series, Allegra 21 series/GS-15 series, Spinchron series	1107 × *g*
Conditions requiring speed reductions	see *Run Speeds*
Maximum allowable imbalance of opposing loads	10 grams
Maximum load per bucket	320 grams
Number of buckets	2
Available labware	see Table 1
Approximate acceleration time to maximum speed (fully loaded)	21 sec
Approximate deceleration time from maximum speed (fully loaded)	20 sec
Weight of fully loaded rotor	2.06 kg (4.54 lb)
Rotor and lid material	aluminum

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 or running at the critical speed range is characterized by some vibration.

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 = $r\omega^2/g$ — where r is the radius in millimeters, ω is the angular velocity in radians per second (2π RPM /60), and g is the standard acceleration of gravity (9807 mm/s^2). After substitution: RCF = $1.12r$ (RPM/1000)^2

Description



1. Yoke
2. Carrier

This Beckman Coulter rotor has been manufactured in an ISO 9001 or 13485 facility for use with the specified Beckman Coulter centrifuges.

The S2096 is a two-place swinging-bucket rotor. Each carrier can hold standard microplates used in the serial dilution of small liquid volumes—up to three stacked multiwell plates (not to exceed 40.6 mm/1.6 in. deep) or one deepwell or square-well plate.

The rotor yoke is made of aluminum and is black-anodized for corrosion protection. Black-anodized aluminum carriers can be run by placing them over pivot pins on the arms of the yoke; they swing out to horizontal position during centrifugation. A tie-down screw is used to secure the rotor to the drive shaft during centrifugation.

The centrifuge identifies rotor speed during the run by means of a magnetic speed sensor system in the centrifuge rotor chamber and magnets imbedded in the rotor. The overspeed system ensures that the rotor does not exceed its permitted speed.

Refer to the Warranty at the back of this manual for warranty information.

Preparation and Use

Specific information about the S2096 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 S2096 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the S2096 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 and carriers are clean and show no signs of corrosion or cracking.

- If any evidence of damage is present, do not centrifuge the rotor.

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

3 Verify that the labware being used is listed in Table 1.

Installing the Rotor Yoke

NOTE Refer to the centrifuge manual for proper installation and removal instructions. Failure to follow printed instructions may result in damage to the rotor and the centrifuge.

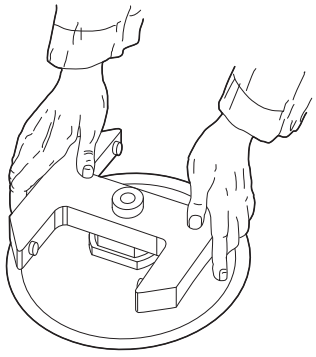
1 Before installing the yoke in the centrifuge, lightly lubricate the drive hole with a lubricant such as Anti-Seize (see instructions under *Maintenance*).

⚠ CAUTION

Never drop the rotor yoke onto the centrifuge drive shaft. The drive shaft can be damaged if the rotor is forced sideways or dropped onto it.

2 Carefully lower the yoke straight down onto the centrifuge drive shaft.

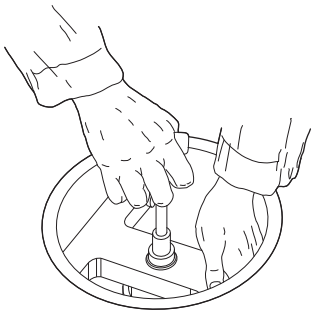
- Be sure the yoke is properly seated on the shaft.



3 Fasten the tie-down screw (361367) onto the drive shaft.

- Use the T-handle rotor wrench (361371) to tighten the tie-down screw firmly on the shaft.

NOTE If the rotor yoke is left in the centrifuge between runs, before each run make sure it is properly seated on the drive shaft, and that the tie-down screw is tight.



Loading the Carrier

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

⚠ WARNING

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 other hazardous materials in this rotor without taking all 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.

Symmetrical and Balanced Loading

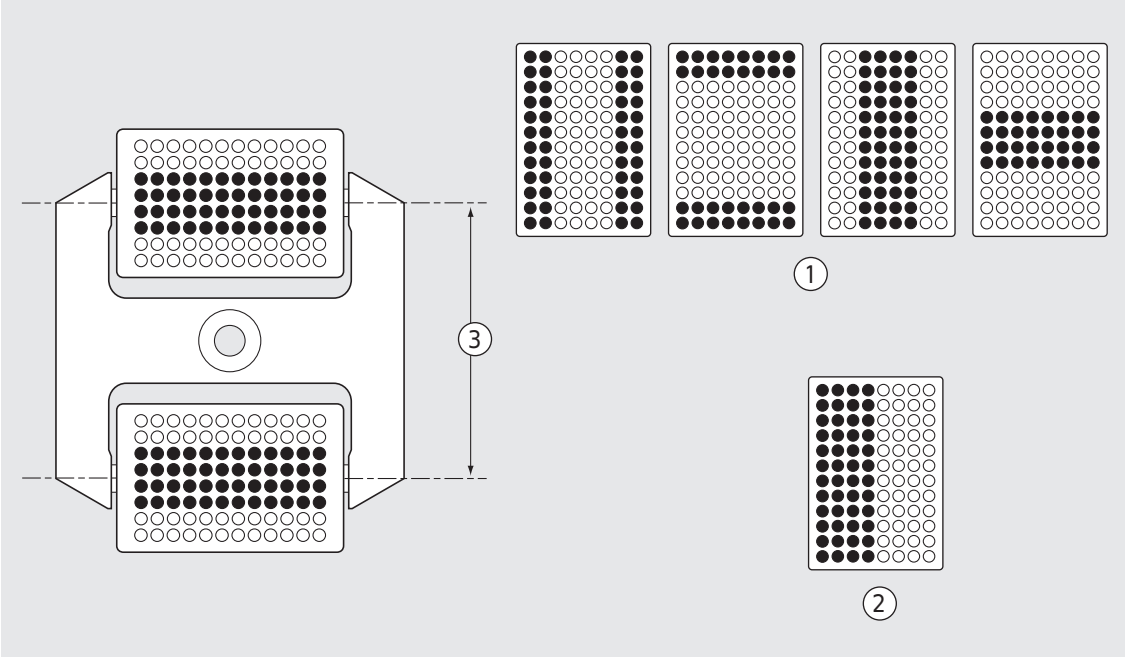
To ensure optimal performance and stability, the rotor must be loaded symmetrically. Two factors affect symmetric loading:

1. The carriers must be loaded symmetrically with respect to their pivotal axes.
2. The rotor should be loaded symmetrically with respect to its center of rotation.

For best results, load opposing carriers with the same type of labware containing the same amounts of fluid of equal density. Additionally, opposing carriers and their contents should weigh approximately the same (within 10 grams). The rated maximum load for carriers is 320 grams each.

In multiwell plates, samples should be loaded into the wells symmetrically with respect to the pivotal axis of the carrier (the pivotal axis runs parallel to the crossbar), and opposing buckets should contain similar loads (see Figure 1).

Figure 1 Symmetrical and Balanced Loading



1. Examples of Symmetrically Loaded Trays (load opposite trays the same way)
2. Example of Nonsymmetrically Loaded Tray
3. Pivotal Axis

Using Carriers

1 Insert the filled labware into the carrier.

- (See *Labware*, page 7 for labware information.)
- If using more than one plate per carrier, place a cap strip between the plates to prevent breakage during centrifugation.

2 Attach each carrier to the yoke by aligning the grooves in the bucket sides with the pivot pins, then sliding the buckets down until the pivot pins are seated in the bucket pockets.

- *Always run both carriers.*

3 Gently swing the carriers to ensure that they are properly seated on the pivot pins.

NOTE Both positions must have a carrier attached for every run.

Operation

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 Refer to the instrument instruction manual for centrifuge operation.

2 See Run Speeds, page 8, 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 Remove the carriers from the centrifuge.

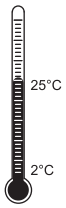
2 Remove the labware from the carriers.

3 If removing the rotor yoke, turn the T-handle wrench (361367) to the left (counterclockwise) to loosen the tie-down screw.

- Lift the yoke straight up and off the drive shaft.

NOTE Refer to the centrifuge manual for proper installation and removal instructions. Failure to follow printed instructions may result in damage to the rotor and the centrifuge.

Labware



Temperature Limits

- Beckman Coulter plastic labware has 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 prior to centrifugation.

Labware

Use the labware listed in Table 1.

Table 1 Beckman Coulter Labware Used in the S2096 Rotor

Description	Volume	Part Number	Accessory Description[a]	Part Number
multiwell polystyrene plate, 96-well, nonsterile	300 µL/well	609844 (pkg/100)	cap strip, nonsterile[b]	267002 (pkg/12)
			cap strip, sterile[b]	267005 (pkg/12)
			aluminum foil lid[c]	538619 (pkg/100)
deep-well polystyrene plate, 96-well, nonsterile	1 mL/well	267001 (pkg/24)	cap strip, nonsterile[b]	267002 (pkg/12)
			cap strip, sterile[b]	267005 (pkg/12)
			aluminum foil lid[c]	538619 (pkg/100)
deep-well polystyrene plate, 96-well, sterile	1 mL/well	267004 (pkg/24)	cap strip, nonsterile[b]	267002 (pkg/12)
			cap strip, sterile[b]	267005 (pkg/12)
			aluminum foil lid[c]	538619 (pkg/12)
deep-well polypropylene plate, 96-well, nonsterile	1 mL/well	267006 (pkg/24)	cap strip, nonsterile[b]	267002 (pkg/12)
			cap strip, sterile[b]	267005 (pkg/12)
			aluminum foil lid[c]	538619 (pkg/100)
deep-well polypropylene plate, 96-well, sterile	1 mL/well	267007 (pkg/24)	cap strip, nonsterile[b]	267002 (pkg/102)
			cap strip, sterile[b]	267005 (pkg/12)
			aluminum foil lid[c]	538619 (pkg/100)
square-well polypropylene plate	2 mL/well	140504 (pkg/24)	aluminum foil lid[c]	538619 (pkg/100)

a. When stacking multiwell plates, place a cap strip between the plates to prevent breakage during centrifugation.
b. Caps are optional.
c. Requires 4-inch soft-rubber roller (538618) for installation.

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 rpm (revolutions per minute).

If the weight of the load *in a carrier* exceeds 320 grams, or if the solution density is greater than 1.2 g/mL, reduce the maximum allowable run speed according to the following equation:

$$\text{reduced maximum speed} = (3000\ \text{rpm}) \sqrt{\frac{320\ \text{grams}}{\text{heaviest load in grams}}}$$

Do not select rotational speeds in excess of 3000 rpm.

Care and Maintenance

Maintenance

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.

1. Periodically (at least monthly) inspect the rotor yoke and carriers, especially inside cavities, for rough spots or pitting, white powder deposits—frequently aluminum oxide—or heavy discoloration.
   - If any of these signs are evident, do not run the rotor.
   - Contact your Beckman Coulter representative for information about the Field Rotor Inspection Program and the rotor repair center.
2. Before using the tie-down screw (361367), check it for damage such as distortion, splitting, or stripped threads.
   - Replace it if it is damaged.
3. Store the rotor in a dry environment (not in the centrifuge).

Refer to *Chemical Resistances* (publication IN-175) 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 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.

1 Wash the rotor yoke and microplate carriers 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.

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.

2 Thoroughly rinse the cleaned rotor components with distilled water.

3 Air-dry the rotor components upside down.

- *Do not use acetone to dry the rotor.*

Before reinstalling the rotor yoke, lightly lubricate the drive hole with Anti-Seize (961660) to prevent the rotor from sticking, as follows:

1 Apply the lubricant onto a swab.

2 Draw the coated swab through a paper towel to remove excess lubricant.

3 Lightly coat the inside of the drive hole with the lubricant remaining on the swab.

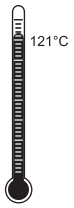
Decontamination

If aluminum rotor components become contaminated with radioactive material, decontaminate them using a solution that will not damage the anodized surfaces. Beckman Coulter has tested a number of solutions and found two that do not harm anodized aluminum: RadCon Surface Spray or IsoClean Solution (for soaking),* and Radiacwash.†

While Beckman Coulter has tested these materials and found that they do not damage components, no guarantee of decontamination is expressed or implied. Follow appropriate decontamination procedures as directed by your laboratory safety officer.

If the rotor or other components are contaminated with toxic or pathogenic materials, follow appropriate decontamination procedures as directed by your laboratory safety officer.

Sterilization and Disinfection



- The rotor can be autoclaved at 121°C for up to an hour. Plastic parts can be autoclaved at 121°C for up to 30 minutes. Place the rotor yoke and microplate carriers 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.

Storage

When it is not in use, store the rotor in a dry environment (not in the centrifuge).

---

* In U.S., contact Nuclear Associates (New York); in Eastern Europe and Commonwealth States, contact Victoreen GmbH (Munich); in South Pacific, contact Gammasonics Pty. Ltd. (Australia); in Japan, contact Toyo Medic Co. Ltd. (Tokyo).

† In U.S., contact Biodex Medical Systems (Shirley, New York); internationally, contact the U.S. office to find the dealer closest to you.

‡ Flammability hazard. Do not use in or near operating ultracentrifuges.

Returning a Rotor

Before returning a rotor or accessory for any reason, prior permission must be obtained from Beckman Coulter, Inc. This form may be obtained from your local Beckman Coulter sales office. The form, entitled *Returned Material Authorization* (RMA) for United States returns or *Returned Goods Authorization* (RGA) for international returns, should contain the following information:

- rotor type and 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 email address of the person to be notified upon receipt of the rotor or accessory at the factory,
- name and email address of the person to be notified about repair costs, etc.

To protect our personnel, it is the customer's responsibility to ensure that all 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/RMA form when mailing the rotor and/or accessories.

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

Supply List

NOTE Publications referenced in this manual can be obtained at www.beckmancoulter.com or by calling Beckman Coulter at 1-800-742-2345 in the United States, or by contacting your local Beckman Coulter office.

Call Beckman Coulter Sales (1-800-742-2345 in the United States) for detailed information on ordering parts and supplies. For your convenience, a partial list is given below.

Replacement Rotor Parts

S2096 rotor assembly	361111
Tie-down screw	361367
T-handle rotor wrench	361371

Other

Labware	see Table 1
Rubber roller, 4-in., for sealing foil microplate lids	538618
Rotor Cleaning Kit	339558
Beckman Solution 555 (1 qt)	339555
Rotor cleaning brush	339379
Anti-Seize (1 1/2 oz)	961660
Spinkote lubricant (2 oz)	306812

Beckman Coulter, Inc.
Benchtop Rotor Warranty

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

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.

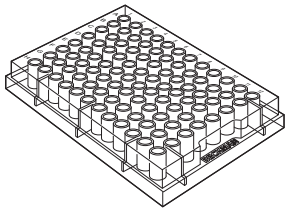
This warranty is void if the rotor has been subjected to customer misuse such as operation or maintenance contrary to the instructions in the Beckman Coulter rotor or centrifuge manual.

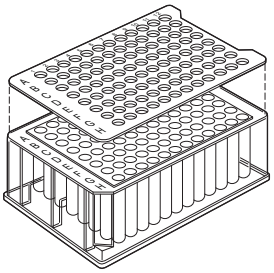
This warranty is void if the rotor is operated with a rotor drive unit or in a centrifuge unmatched to the rotor characteristics or operated in a Beckman Coulter centrifuge that has been improperly disassembled, repaired, or modified.

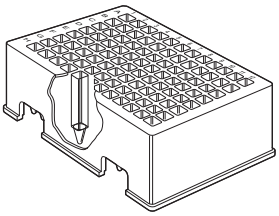
Thermoplastic rotors or components used in some benchtop centrifuges are warranted for one (1) year from date of purchase.

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 NEITHER BECKMAN COULTER, INC. NOR ITS SUPPLIERS SHALL HAVE ANY 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

Allegra X-22 Series (GS22-IM-6)

- Description
- Installation
- Operation
- Troubleshooting
- Care and Maintenance

Allegra 21 Series, GS-15 Series, and Spinchron 15 Series (GS15-IM-8)

- Description
- Installation
- Operation
- Troubleshooting
- Care and Maintenance
- Program Library

Allegra X-30 Series (B01145)

- Safety
- Introduction
- Description
- Installation
- Operation
- Troubleshooting
- Care and Maintenance

Available in hard copy or electronic pdf by request.

Additional References

- Chemical Resistances for Beckman Coulter Centrifugation Products (IN-175)

Available in hard copy or electronic pdf by request.

Available at www.beckmancoulter.com

www.beckmancoulter.com

BECKMAN COULTER