Instruction For Use

S0410 Horizontal Rotor

For Use In the
Beckman Coulter Avanti 30 Centrifuge

GS30-TB-005AC
August 2022

Beckman Coulter, Inc.
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BECKMAN COULTER

S0410 Horizontal Rotor
For Use in the Avanti 30 Centrifuge
PN GS30-TB-005AC (August 2022)

Original Instructions

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

- Worldwide, find us via our website at *www.beckman.com/support/technical*
- In the USA and Canada, call us at 1-800-369-0333.
- In Austria, call us at 0810 300484
- In Germany, call us at 02151 333999
- In Sweden, call us at +46 (0)8 564 859 14
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- In Ireland, call us at +353 (01) 4073082
- In Italy, call us at +39 0295392 456
- In other locales, contact your local Beckman Coulter Representative.

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

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

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

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Revision History

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

Initial Issue, 08/1993

Issue AA, 11/2014
The following sections have changed subsequent to the initial issue:

- added Safety Notice
- Table 1
- Returning a Rotor

Issue AB, 09/2016
Changes were made to the following section:

- Tubes and Bottles

Issue AC, 08/2022
Changes were made to the following section:

- Table 1, Available Beckman Coulter Tubes for the S-0410 Rotor

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.

Alerts for Danger, Warning, Caution, Important, 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.

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.

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 S0410 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.

Although rotor components and accessories made by other manufacturers may fit in the S0410 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the S0410 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 all four buckets, loaded or empty, to the rotor for every run. 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. Make sure that buckets containing Quick-Seal tubes have the proper floating spacers inserted (if applicable) before installing the bucket cap.

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

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.

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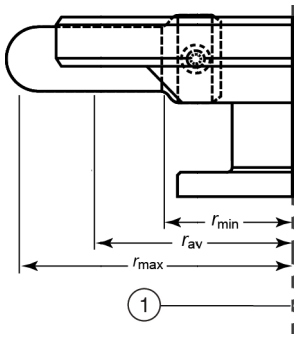


1. Axis of Rotation

Maximum speed	10,000 RPM
Critical speed range[a]	400 to 800 rpm
Density rating at maximum speed	1.2 g/mL
Relative Centrifugal Field[b] at maximum speed	
At r_{max} (96 mm)	$10{,}733 \times g$
At r_{av} (61 mm)	$6{,}832 \times g$
At r_{min} (26 mm)	$2{,}812 \times g$
Conditions requiring speed reductions	see *Run Speeds*
Number of buckets	4
Nominal volume (largest tube)	10 mL
Maximum rotor capacity	40mL
Maximum load allowed in each bucket at rated speed	
(excluding weight of bucket)	12 grams
Approximate acceleration time to maximum speed	
(rotor fully loaded, accel curve 9)	23 sec
Approximate deceleration time from maximum speed	
(rotor fully loaded, decel curve 9)	23 sec
Weight of fully loaded rotor	1.6 kg (3.6 lb)
Rotor yoke material	anodized aluminum
Bucket material	anodized aluminum

a. The critical speed range is the range of spees 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.

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 ($2\ \pi$ RPM /60), and g is the standard acceleration of gravity (9807 mm/s^2). After substitution: RCF = 1.12r (RPM/1000)^2

Description

Beckman Coulter S0410 rotors are manufactured in a facility that maintains certifications to both ISO 9001:2008 and ISO 13485:2003. They are for use with the specified Beckman Coulter ultracentrifuges. The rotors were developed, manufactured, and tested for safety and reliability as part of a Beckman Coulter ultracentrifuge/rotor system. Their safety or reliability cannot be assured if used in an ultracentrifuge not of Beckman Coulter's manufacture or in a Beckman Coulter ultracentrifuge that has been modified without Beckman Coulter's approval.

The S0410, rated for 10,000 rpm, is a four-place horizontal (swinging bucket) rotor used in the Beckman Coulter Avanti 30 centrifuge. This rotor can centrifuge up to four 10-mL tubes. The S0410 rotor develops centrifugal forces that are suitable for rapidly sedimenting protein precipitates, large particles, cells, and cell debris, and for separations using gradients.

The rotor yoke and buckets are made of aluminum and are black-anodized for corrosion protection. The buckets, with pivot pins that fit into pin pockets in the rotor yoke, swing out to a horizontal position during centrifugation. A tie-down screw is used to secure the rotor to the drive shaft.

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.

The rotor is warranted for one year (see the Warranty).

Preparation and Use

Specific information about the S0410 horizontal rotor is given here. Use the appropriate instrument instruction manual together with this document for complete rotor and instrument operation information.

⚠ WARNING

Normal operation may involve the use of solutions and test samples that are pathogenic, toxic, or radioactive. Operator error or tube failure may generate aerosols. Do not run toxic, pathogenic, or other hazardous materials in this rotor unless you take all appropriate safety precautions. Ask your laboratory safety officer to advise you about the level of containment required for your application and the proper decontamination or sterilization procedures to follow if fluids escape from containers.

Tubes and Bottles

The S0410 rotor holds four tubes or bottles, listed in Table 1. Labware should be pretested under anticipated run conditions (using water instead of valuable samples) if operating below 2°C or above 25°C. Refer to *Chemical Resistances (IN-175)*, for information on the chemical resistances of tube materials.

Table 1 Available Beckman Coulter Tubes for the S-0410 Rotor

Description	Dimension	Volume	Part Number	Max Speed
polycarbonate bottle with cap assembly	16 x 80 mm	10 mL	355672(pkg/25)	10,000 rpm
polypropylene bottle with screw cap	16.1 x 81.1 mm	10 mL	364695(pkg/10)	10,000 rpm
Teflon bottle with screw cap	16.1 x 81.1 mm	10 mL	364693(pkg/10)	10,000 rpm
Ultra-Clear tube	16 x 76 mm	10 mL	344085(pkg/50)	10,000 rpm
polycarbonate tube	16 x 76 mm	10 mL	355630(pkg/25)	10,000 rpm
polypropylene tube	16 x 76 mm	13.5 mL	355640 (pkg/25)	10,000 rpm
polypropylene tube	16 x 64 mm	8 mL	355646 (pkg/25)	10,000 rpm
polycarbonate tube	16 x 64 mm	8 mL	355647(pkg/25)	10,000 rpm

Installing the Rotor Yoke

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

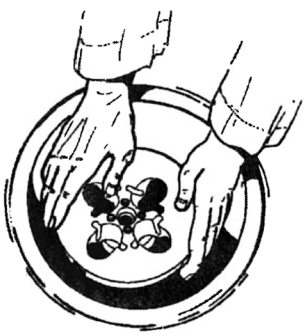
1 Inspect the yoke and buckets for any signs or corrosion or damage; if any evidence of damage is present, do not centrifuge the rotor.

⚠ CAUTION

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

2 Carefully lower the yoke straight down onto the drive shaft (Figure 1). Be sure the yoke is properly seated on the shaft.

Figure 1 Installing the Rotor Yoke on the Centrifuge Drive Shaft



Lower the yoke onto the drive shaft.

Tighten the tie-down screw with the T-handle wrench

3 Fasten the tie-down screw clockwise onto the centrifuge drive shaft. Use the T-handle rotor wrench 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 Buckets

⚠ WARNING

Handle body fluids with care because they can transmit disease. No known test offers complete assurance that they 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.

Beckman Coulter supplies buckets in weight-matched sets to make balancing easier. To prevent accidental imbalance it is important to keep matched sets of buckets together. To ensure optimal performance and stability, the rotor must be loaded symmetrically. Two factors affect symmetric loading:

- The buckets must be loaded symmetrically with respect to their pivotal axes.
- The rotor should be loaded symmetrically with respect to its center of rotation.

This means that for best results you should load opposing buckets with the same type of labware containing the same amounts of fluid of equal density. Additionally, opposing buckets and their contents should weigh approximately the same (within 6 grams). Do not exceed the rated maximum load for buckets (12 grams, including labware and sample.

1 Load the filled tubes into the buckets.

NOTE Tubes placed in opposing buckets must be filled to the same level with liquid of the same density.

2 Attach each bucket to the yoke by aligning the pivot pins on the bucket sides with the pin pockets in the rotor yoke, then sliding the buckets down until the pivot pins are seated in the bucket pockets (Figure 2).

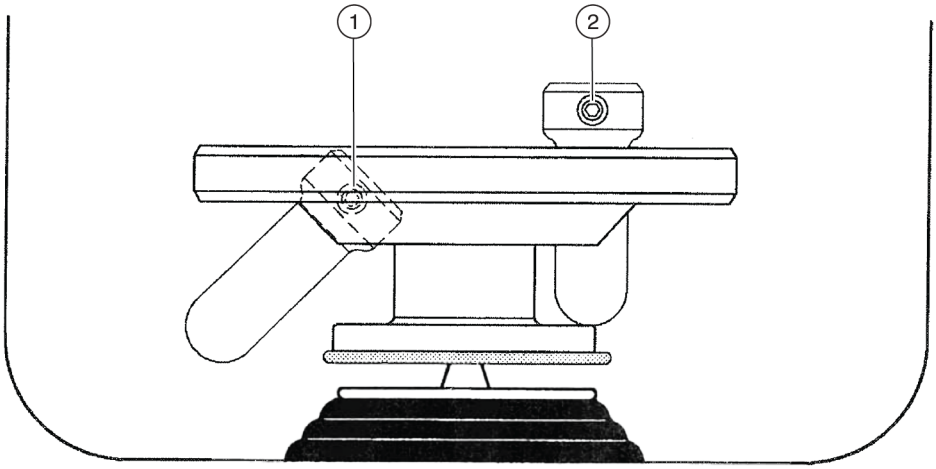
⚠ CAUTION

Attach all four buckets, loaded or empty, to the rotor. If only two buckets are filled, place them in opposite positions on the rotor yoke. All four positions on the rotor yoke must contain buckets during a run. Never run the rotor with only two positions filled.

3 Make sure bucket pivot pins are properly seated in the rotor yoke pin pockets as shown in Figure 2.

IMPORTANT Buckets must be inserted at an angle, or the bucket bottom will rest on the rotor base and the pivot pins will not seat in the pin pockets.

Figure 2 Seating Bucket Pivot Pins in the Yoke.



1. Correct — Pivot pins are seated in bucket pockets.
2. Incorrect — Pivot pins not seated in bucket pockets

Operation

Refer to the instrument instruction manual for centrifuge operation.

Removal and Sample Recovery

⚠ CAUTION

If disassembly reveals evidence of leakage, and pathogenic or radioactive materials are involved, the operator should assume that some fluid escaped the rotor. Appropriate decontamination procedures should be applied to the centrifuge and accessories.

⚠ CAUTION

If glass tubes break, remove the glass very carefully from the adapter and bucket. If all the glass particles are not contained in the bucket or adapter, be careful when examining or cleaning the centrifuge gasket and chamber as glass particles may be embedded in their surfaces.

1 Remove the buckets from the instrument.

2 If removing the rotor yoke, use the rotor wrench to loosen the tie-down screw (counterclockwise).

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). Do not select rotational speeds that exceed 10,000 rpm.

Speed Derating

The maximum run speed (10,000 rpm) listed in the rotor specifications is for operation when all conditions are within the standard specifications. Maximum allowable run speed for the rotor must be reduced in some circumstances.

- The rotor can process solutions at the maximum rated speed if the solution density is 1.2 g/mL or less. When centrifuging solutions of densities greater than 1.2 g/mL, the maximum run speed must be reduced according to the following equation to protect the rotor from excessive stresses due to the added tube load:

$$\text{reduced maximum speed} = (10{,}000\ \text{rpm}) \times \sqrt{\frac{12\ \text{grams}}{\text{weight in grams of bucket and contents}}}$$

- When certain glass tubes are used, you should reduce rotor speed to prevent tube breakage. Because the strength of tubes can vary between lots, and will depend on handling and usage, Beckman Coulter highly recommends that you pretest these tubes in the appropriate labware in the S0410 rotor, using water samples, to determine optimal operating conditions.

  NOTE Scratches (even microscopic ones) significantly weaken glass tubes.

Care and Maintenance

Inspection

- Periodically (at least monthly) inspect the rotor, especially inside cavities, for rough spots, cracks, 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.
- Regularly check the condition of the tie-down screw; if it is worn or damaged, replace it.

Maintenance

Do not use sharp tools on the rotor, as they can scratch the anodized surface. Corrosion begins in scratches and may open fissures in the metal with continued use.

- Approximately once a week and after cleaning and/or autoclaving, lubricate the rotor pins with a lubricant such as Tri-Flow oil.
- Before using the tie-down screw, check it for damage such as distortion, splitting, or stripped threads; replace it if it is damaged.

Store the rotor in a dry environment (not in the instrument). Refer to *Chemical Resistances (IN-175)* for chemical resistances of rotor and tube 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.

NOTE Do not wash rotor components in a dishwasher. Do not soak in detergent solution for long periods, such as overnight.

Under normal conditions, wash the rotor frequently to prevent corrosion that can begin in scratches.

- Use a mild detergent such as Beckman Coulter Solution 555, diluted 10 to 1 with water, and a soft brush to wash the yoke and tie-down screw. The Rotor Cleaning Kit (339558) contains two quarts of Solution 555 and brushes that will not scratch rotor components.
- Rinse thoroughly with water.
- Air-dry upside down. Do not use acetone to dry the rotor.

Decontamination

If the anodized aluminum yoke and/or buckets become contaminated with radioactive material, decontaminate it 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 methods and found that they do not damage components, no guarantee of decontamination is expressed or implied. Consult your laboratory safety officer regarding the proper decontamination methods to use.

If the rotor components are contaminated with toxic or pathogenic materials, follow appropriate decontamination procedures as outlined by your laboratory safety officer. Check Chemical Resistances to be sure the decontamination method will not damage any part of the rotor.

Sterilization and Disinfection

- The rotor and all rotor components can be autoclaved at 121°C for up to an hour.

⚠ WARNING

Risk of personal injury or equipment damage. Ethanol is a flammability hazard. Do not use in or near operating centrifuges.

- Ethanol (70%) may be used on all rotor components, including those made of plastic.

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

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.

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 may be obtained from your local Beckman Coulter sales office. It should contain the following information:

- 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
- name and phone number of the person to be notified about repair costs, etc.

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 to:

Beckman Coulter, Inc.
5355 W. 76th St.
Indianapolis, IN 46268

Attention: Returned Goods

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

Supply List

Call Beckman Coulter Customer Service at 1-800-742-2345 (U.S.A. or Canada), or contact your local Beckman Coulter office for detailed information on ordering parts and supplies. For your convenience, a partial list is given below.

Table 2 Replacement Rotor Parts

S0410 rotor assembly	364660
Buckets	364663
Tie-down screw	361367
T-handle rotor wrench	361371

Table 3 Other

Tubes and bottles	see Table 1
Rubber pad (used with 8-mL tubes)	344120
Spinkote lubricant (2 oz)	306812
Tri-Flow Superior Lubricant with Teflon (2 oz)	883371
Rotor Cleaning Kit	339558
Rotor cleaning brush	339379
Beckman Coulter Solution 555	339555

Avanti Series, Spinchron 15 Series, and GS-15 Series Rotor Warranty

Subject to the conditions specified below and the warranty clause of the Beckman Coulter 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 one (1) year after delivery of an Avanti series, SPINCHRON 15 series, or GS-15 series 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 a 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. Rotor bucket sets purchased concurrently with or subsequent to the purchase of a horizontal rotor are warranted only for a term coextensive with that of the rotor for which the bucket sets are purchased.

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.

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