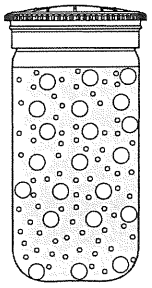
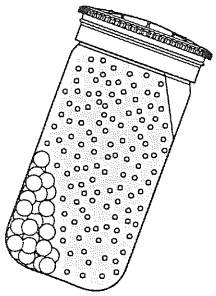
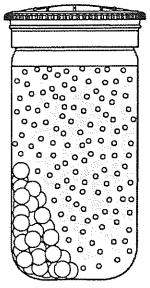
J-TB-073AH
July 2009

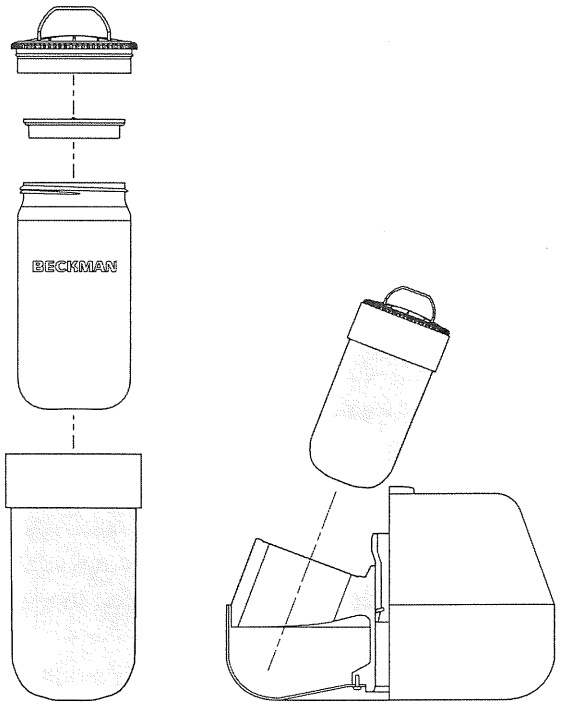
BECKMAN COULTER®







J-Lite®
JLA-8.1000 and JLA-9.1000 Fixed Angle Rotor Assemblies



Please read and follow all the instructions in this manual, and pay special attention to the safety information on pages 2 and 3.

Used In Beckman Coulter Avanti® J Series Centrifuges

Additional information for the safe use of the J-Lite® JLA-8.1000 and JLA-9.1000 rotor assemblies. Please read before use.

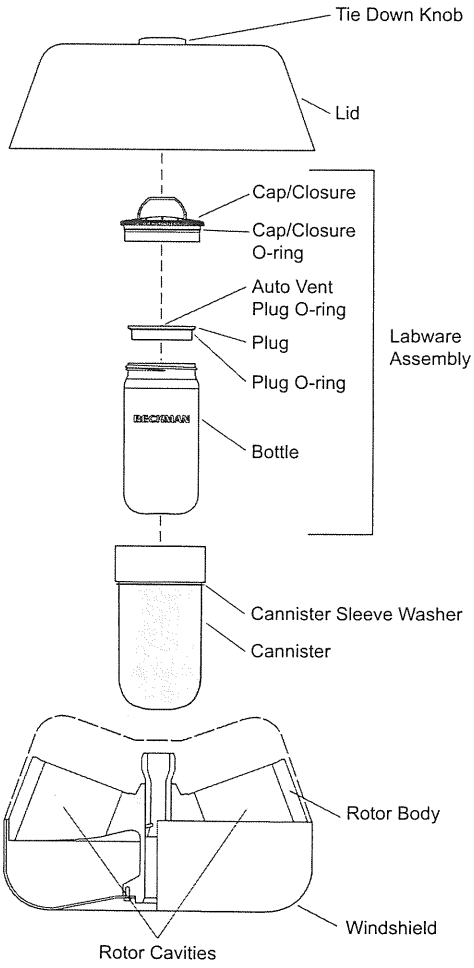
- Use all rotor components during each run, as shown. Six cannisters must be run at all times in the JLA-8.1000, and four in the JLA-9.1000, whether loaded or empty. Do not place cap/closures on top of empty cannisters.

- NEVER load sample directly into a cannister. Load sample into a bottle, seal the bottle with a plug and a cap/closure as described in this manual, and place the sealed bottle inside a cannister.

- NEVER place a bottle directly into a rotor cavity. Place filled, sealed labware assemblies in cannisters, previously installed in the rotor body.

- Check cap/closures, plugs, and their O-rings before each run to ensure that they are in good condition. The cap/closures must be free of crazing or other defects. The plug and cap/closure O-rings must be free of defects, and must be dry and unlubricated to ensure seal integrity.

- Before the first use of a labware assembly, write the date of receipt in permanent ink on top of each cap/closure and plug, and on each bottle. Retire the entire labware assembly from use 6 months after the date of receipt, or replace any of the components at the first signs of damage or fatigue.



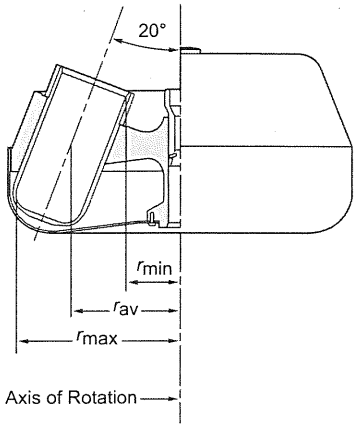
- Place filled cannisters in at least two opposing cavities; place empty cannisters in the other cavities. Make sure that filled cannisters are loaded symmetrically into the rotor and that opposing containers are filled to the same level with liquid of the same density.

- Place the rotor lid on top of the rotor body and securely fasten the round tie-down knob.

- Although rotor components and accessories made by other manufacturers may fit in the JLA-8.1000 and JLA-9.1000 rotors, their safety in these rotors cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in these rotors may void the rotor warranty and should be prohibited by your laboratory safety officer. Use only the components and accessories listed in this publication in these rotors.

SPECIFICATIONS

JLA-8.1000 FIXED ANGLE ROTOR ASSEMBLY



U.S. Pat. No. 5,728,038

NOTE

The JLA-8.1000 rotor can be used in Avanti J-26 XP series and in discontinued Avanti J-20 series centrifuges only.

Maximum speed	8 000 rpm
Critical speed range*	200 to 400 rpm
Maximum solution density	1.2 g/mL
Relative Centrifugal Field† at maximum speed	
at r_{max} (222.8 mm)	15 970 × *g*
at r_{av} (171 mm)	12 300 × *g*
at r_{min} (119 mm)	8 530 × *g*
k factor at maximum speed (full 1 000-mL bottle)	2 482
Conditions requiring speed reduction	see RUN SPEEDS
Number of removable cannisters	6
Available bottles and tubes	see Table 1
Nominal dimensions of largest bottle	95 × 191 mm
Nominal bottle capacity	1 000 mL
Nominal rotor capacity	6 liters
Weight of fully loaded rotor (with lid)	34.6 kg (76 lb)
Minimum installation weight (rotor body and windshield)	16.8 kg (37 lb)
Weight of single empty cannister	630 grams (1.4 lb)
Maximum sample load for each cannister at rated speed (including bottle, plug, cap/closure, and sample)	1 500 grams (3.3 lb)
Approximate acceleration time to maximum speed (rotor fully loaded)	6 min
Approximate deceleration time from maximum speed (rotor fully loaded, max. brake)	3 min
Maximum allowable imbalance of opposing loads	30 grams
Rotor body material	aluminum
Cannister material	carbon fiber epoxy composite
Plug material	polycarbonate or Ultem‡
Cap/closure material	Radel**

*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.

† 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, ω is the angular velocity in radians per second (2π RPM / 60), and g is the standard acceleration of gravity (9807 mm/s²). After substitution:

$$RCF = 1.12\,r\left(\frac{RPM}{1000}\right)^2$$

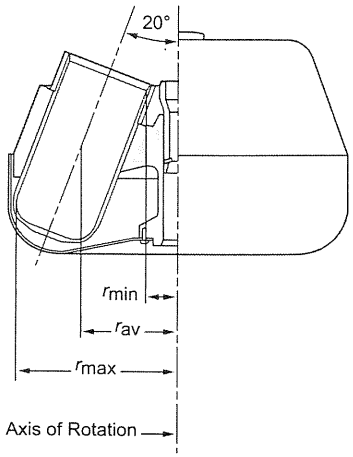
‡ Ultem is a registered trademark of GE Plastics.

** Radel is a registered trademark of BP Amoco.

JLA-9.1000 FIXED ANGLE ROTOR ASSEMBLY

NOTE

Before the JLA-9.1000 rotor can be used in an Avanti J series centrifuge shipped before January 1998, a field upgrade of the centrifuge is required. Contact Beckman Coulter Field Service for information.



U.S. Pat. No. 5,728,038

Maximum speed	9 000 rpm
Critical speed range*	200 to 400 rpm
Maximum solution density	1.2 g/mL
Relative Centrifugal Field† at maximum speed	
at r_{max} (185 mm)	16 800 × *g*
at r_{av} (134 mm)	12 200 × *g*
at r_{min} (82 mm)	7 440 × *g*
k factor at maximum speed (full 1 000-mL bottle)	2 540
Conditions requiring speed reduction	see RUN SPEEDS
Number of removable cannisters	4
Available bottles and tubes	see Table 1
Nominal dimensions of largest bottle	95 × 191 mm
Nominal bottle capacity	1 000 mL
Nominal rotor capacity	4 liters
Weight of fully loaded rotor (with lid)	20.8 kg (45.9 lb)
Minimum installation weight (rotor body and windshield)	10.8 kg (23.9 lb)
Weight of single empty cannister	630 grams (1.4 lb)
Maximum sample load for each cannister at rated speed (including bottle, plug, cap/closure, and sample)	1 500 grams (3.3 lb)
Approximate acceleration time to maximum speed (rotor fully loaded)	2 1/2 min
Approximate deceleration time from maximum speed (rotor fully loaded, max. brake)	3 min
Maximum allowable imbalance of opposing loads	30 grams
Rotor body material	aluminum
Cannister material	carbon fiber epoxy composite
Plug material	polycarbonate or Ultem‡
Cap/closure material	Radel**

*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.

† 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, ω is the angular velocity in radians per second (2π RPM / 60), and g is the standard acceleration of gravity (9807 mm/s²). After substitution:

$$RCF = 1.12\,r\left(\frac{RPM}{1000}\right)^2$$

‡ Ultem is a registered trademark of GE Plastics.

** Radel is a registered trademark of BP Amoco.

DESCRIPTION

These rotors have been manufactured in a registered ISO 9001 or 13485 facility for use in the specified Beckman Coulter centrifuges.

The J-Lite® JLA-8.1000 fixed angle rotor assembly, rated for 8 000 rpm, has a tube angle of 20 degrees from the axis of rotation and is used in Beckman Coulter Avanti® J-26XP series and discontinued Avanti J-20 series centrifuges. The J-Lite® JLA-9.1000 fixed angle rotor assembly, rated for 9 000 rpm, also has a tube angle of 20 degrees from the axis of rotation and is used in all Beckman Coulter Avanti® J series centrifuges. These rotors develop centrifugal forces that can efficiently pellet cells from large volumes of culture media, cell particles from tissue homogenates, or subcellular organelles.

The JLA-8.1000 and 9.1000 rotor assemblies consist of a rotor body with attached windshield, a rotor lid and lid knob, and six (JLA-8.1000) or four (JLA-9.1000) removable carbon fiber composite cannisters (see Figures 1 and 2). The cannisters are interchangeable, allowing the use of multiple sets of cannisters with a single rotor body.

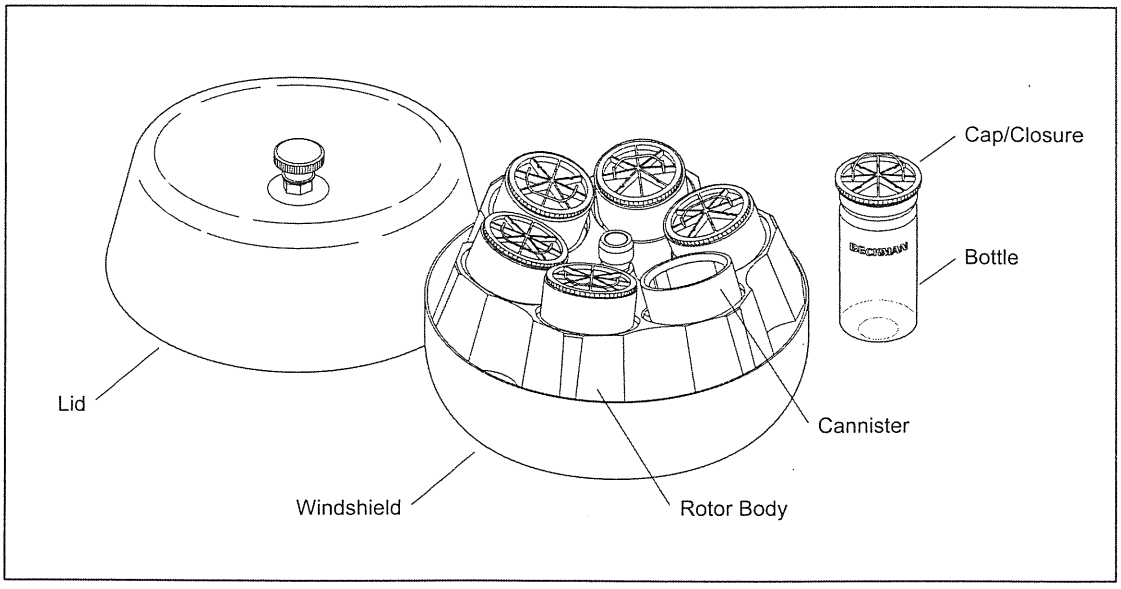


Figure 1. The JLA-8.1000 Fixed Angle Rotor

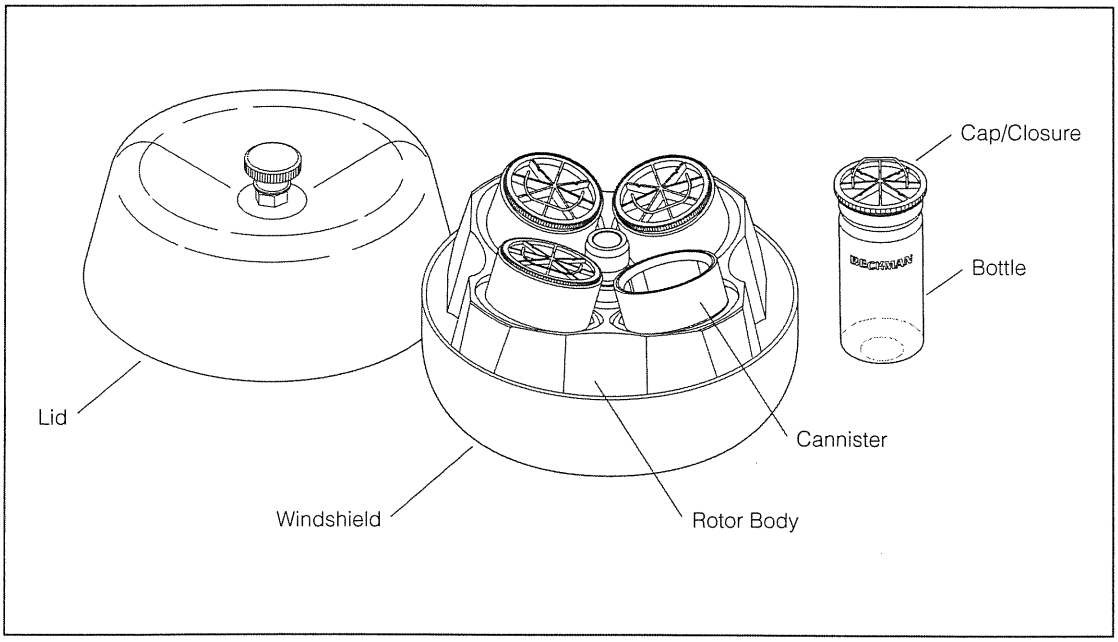


Figure 2. The JLA-9.1000 Fixed Angle Rotor

The rotor body, windshield, and lid are made of anodized aluminum. The cannisters are made of carbon fiber epoxy composite, with a nickel-plated aluminum sleeve. Two pins in the rotor drive hole seat alongside the centrifuge drive hub teeth, preventing the rotor from slipping during centrifugation. The lid tie-down knob assembly secures the rotor to the centrifuge drive hub.

The rotors, with bottles 363676 and 363678, and with HarvestLine™ System liners in bottle 363676, have been tested[1] to demonstrate containment of microbiological aerosols under normal conditions of the associated Beckman Coulter centrifuge when used and maintained as instructed.

For warranty information, see the WARRANTY at the back of this manual. Each cannister is marked with an individual serial number and expiration date; *do not use a cannister after the expiration date.*

[1] Validation of microbiological containment was done at an independent third-party testing facility (CAMR, Porton Down, UK, or USAMRIID, Ft. Detrick, MD, U.S.A.). Improper use or maintenance may affect seal integrity and thus containment.

PREPARATION AND USE

Specific information about the JLA-8.1000 and JLA-9.1000 rotor assemblies is given here. Information common to these and other rotors is contained in the manual *Rotors and Tubes for J Series Centrifuges* (publication JR-IM), which should be used together with this manual for complete rotor and accessory information.

> Although rotor components and accessories made by other manufacturers may fit in the JLA-8.1000 and JLA-9.1000 rotors, their safety in these rotors cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in these rotors may void the rotor warranty and should be prohibited by your laboratory safety officer. Use only the components and accessories listed in this publication in these rotors.

BOTTLES AND TUBES

The JLA-8.1000 and JLA-9.1000 rotor assemblies use the bottles and tubes listed in Table 1. Be sure to use only those items listed and to observe the maximum fill volumes and speed limits shown. Refer to Appendix A in *Rotors and Tubes* for information on the chemical resistances of bottle and accessory materials.

The specially designed Beckman Coulter 1 000-mL bottles are sealed using attached plugs and patented cap/closures (see Figure 3). The cap/closure is sealed under centrifugal force, providing secondary containment of the sample in the event of bottle leakage.

Silicone O-rings on the plug and the cap/closure create the seals *(the O-rings must be free of defects, dry, and unlubricated to ensure sealing).*

Bottles may be centrifuged at normal operating temperatures (from 2 to 25°C), but should be tested under simulated conditions first when working at temperatures below 2°C or above 25°C.

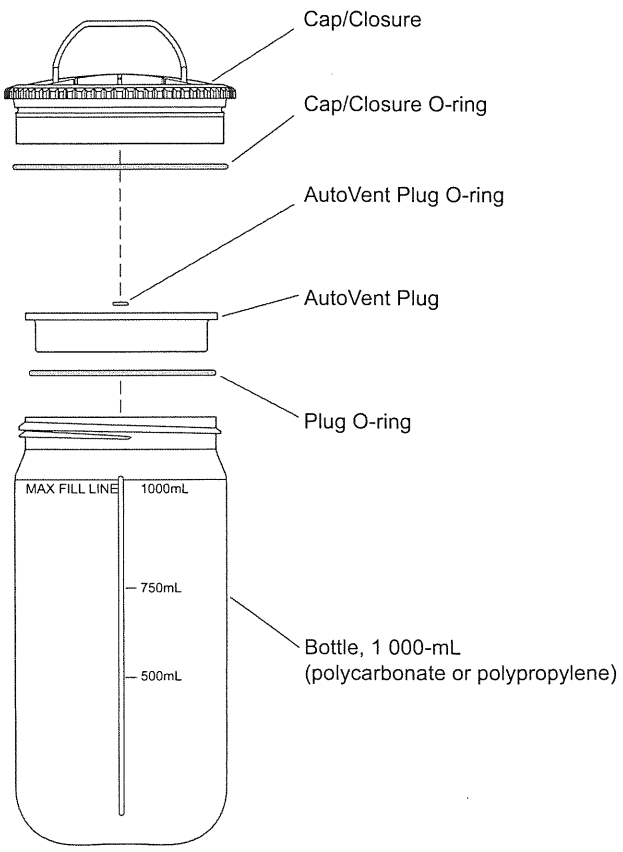


Figure 3. 1 000-mL Bottle Assemblies Used in the JLA-8.1000 and JLA-9.1000 Rotor Assemblies.
See the SUPPLY LIST for part numbers.

NOTE

The useful life of plastic bottles varies slightly between lots, but will largely depend on handling and usage. We highly recommend that you pretest labware in the rotor using water samples to determine your optimal operating conditions.

The manufacturing process can cause small cosmetic flaws on polycarbonate and polypropylene bottles. These flaws, which may appear as irregular or scraped surface areas, are cosmetic only. They do not affect the function nor shorten the life of the bottle.

Table 1. Bottles and Tubes Used in the JLA-8.1000 and JLA-9.1000 Rotors

Bottle or Tube			Max Fill Volume (mL)	Required Accessory				
Dimensions and Volume	Description	Part Number		Description	Part Number	Max No. Tubes per Adapter	Max Speed[a]/ RCF/ *k* factor in JLA-9.1000	Max Speed[a]/ RCF/ *k* factor in JLA-8.1000
95 × 191 mm 1 000 mL	polycarbonate bottle with cap/ closure and plug	363676	1000[b]	none	—	—	9 000/ 16 800/ 2544	8 000/ 15 970/ 2482
95 × 191 mm 1 000 mL	polypropylene bottle with cap/ closure and plug	363678	1000[b]	none	—	—	8 000/ 13 300/ 3220	7 000/ 12 200/ 3242
69 × 160 mm 500 mL	polycarbonate bottle w/cap assy	355605	465	adapter	363683[c]	1	9 000 —	8 000 —
69 × 160 mm 500 mL	polypropylene bottle w/cap assy	355607	445	adapter	363683[c]	1	8 000 —	8 000 —
62 × 120 mm 250 mL	polypropylene wide-mouth bottle w/cap assy	356011	250	adapters	362750[c] in 363683[c]	1	9 000 —	8 000 —
62 × 120 mm 250 mL	polycarbonate wide-mouth bottle w/cap assy	356013	250	adapters	362750[c] in 363683[c]	1	9 000 —	8 000 —
29 × 104 mm 50 mL	polycarbonate bottle w/liquid-tight cap assy	357000	45	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
29 × 104 mm 50 mL	polyallomer bottle w/liquid-tight cap assy	357001	45	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
29 × 104 mm 50 mL	polyallomer bottle w/screw cap	357003	40	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —

Continued—

[a] Maximum speeds listed are guidelines only. These speeds have been achieved in reliability tests at Beckman Coulter, but, because of manufacturing variances, no guarantee of performance is expressed or implied.

[b] Do not fill above the maximum fill line marked on the bottle. Minimum fill volume for bottle 363676 is 500 ml; minimum fill volume for bottle 363678 is 1 000 mL.

[c] Polyethylene teraphthalate (PET).

[d] Polypropylene.

[e] Polypropylene, package of 25.

[f] Delrin, a registered trademark of GE Plastics.

Table 1. Bottles and Tubes Used in the JLA-8.1000 and JLA-9.1000 Rotors (continued)

Bottle or Tube				Required Accessory				
Dimensions and Volume	Description	Part Number	Max Fill Volume (mL)	Description	Part Number	Max No. Tubes per Adapter	Max Speed[a]/ RCF/ *k* factor in JLA-9.1000	Max Speed[a]/ RCF/ *k* factor in JLA-8.1000
29 × 104 mm 50 mL	polypropylene thickwall tube w/snap-on cap	357005	36.5	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
				natural 29-mm cap red 29-mm cap green 29-mm cap yellow 29-mm cap blue 29-mm cap	356264[e] 357369[e] 357360[e] 357361[e] 357362[e]			
29 × 104 mm 50 mL	polypropylene thickwall tube, no cap	357007	50	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
29 × 104 mm 50 mL	polycarbonate open-top tube	363647	40	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
29 × 104 mm 50 mL	polycarbonate tube w/snap-on cap	363664	40	adapters	356996[d] in 363683[c]	1	9 000 —	8 000 —
17 × 119 mm 15 mL	conical polypropylene open-top tube	355663	15	adapters	356996[d] in 363683[c]	5	6 500 —	6 500 —
Bio-Vials 14 × 55 mm 4 mL	polypropylene, capped	566353	4	adapters	342098[f] in 362750[c] in 363683[c]	1	9 000 —	8 000 —

[a] Maximum speeds listed are guidelines only. These speeds have been achieved in reliability tests at Beckman Coulter, but, because of manufacturing variances, no guarantee of performance is expressed or implied.

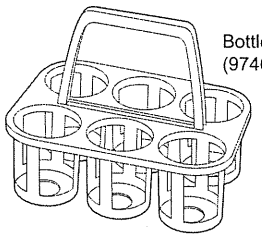
[b] Do not fill above the maximum fill line marked on the bottle. Minimum fill volume for bottle 363676 is 500 ml; minimum fill volume for bottle 363678 is 1 000 mL.

[c] Polyethylene teraphthalate (PET).

[d] Polypropylene.

[e] Polypropylene, package of 25.

[f] Delrin, a registered trademark of GE Plastics.



A six-place rack (974627) for carrying the bottles is provided with labware kit 392574. Extra racks may be ordered.

The patented[2] 500-mL adapter (363683, see Figure 4) enables the use of 500-mL, 250-mL, 50-mL, and 15-mL bottles and tubes, and Bio-Vials. Labware smaller than 500 mL must be placed in another adapter, or in more than one other adapter, before being placed in the 500-mL adapter. See Table 1 for a list of bottles, tubes, and adapters that can be used.

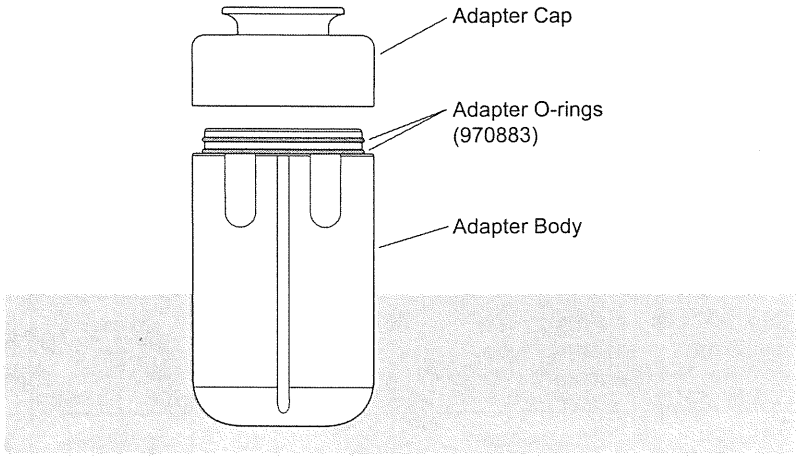


Figure 4. The 500-mL Adapter for the JLA-8.1000 and JLA-9.1000 Rotors

HARVESTLINE™ SYSTEM LINERS

The HarvestLine™ System (369264), consisting of nonsterile polyetherurethane liners[3] that are placed inside the rotor bottles, is available for use with the JLA-8.1000 and JLA-9.1000 rotors. The HarvestLine System provides a convenient method of loading, recovering, and storing samples. The liners are loaded with sample through a funnel or fermentor hose. A valve in the liner neck is sealed, and the liner necks are folded to fit inside the 1 000-mL bottles. The bottles are sealed with rotor plugs and cap/closures, and the sealed bottles are placed into the rotor cannisters for centrifugation. After centrifugation, the liner valves are cut off and the supernatant is decanted, either for storage or disposal. The liners can then be heat-sealed for pellet storage or disposal.

[2] U.S. patent no. 5,901,873
[3] U.S. patent nos. 6,387,030, 6,458,067, 6,746,601

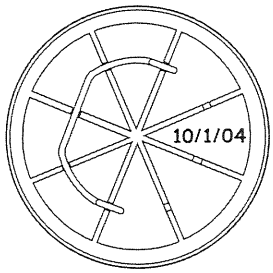
This rotor manual does not contain instructions for use of the HarvestLine System. HarvestLine System instructions are contained in litpak 369263.

CAUTION

HarvestLine System liners can be used with polycarbonate bottles 363676 only. The liners cannot be used with polypropylene bottles 363678.

PRERUN SAFETY CHECKS

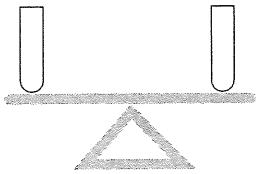
Read the Safety Notice and related information at the front of this manual before using the rotor.



1. Make sure that the rotor and lid are clean and show no signs of corrosion or cracking.
2. Inspect the cannisters for damage (see About Composite Cannisters, later in this manual).
3. Inspect the bottles, cap/closures, and plugs for damage, cracks, or other defects. Before the first use of a labware assembly, write the date of receipt in permanent ink[4] on top of each cap/closure. Before each use, check the date. Discontinue use of the cap/closures after 6 months or at the first sign of damage.
4. Check the chemical compatibilities of all materials used (refer to Appendix A in *Rotors and Tubes*).
5. Use only the bottles, tubes, and adapters listed in Table 1.

[4] Beckman Coulter has tested a number of permanent ink pens and can recommend three that stay on after repeated autoclaving. See SUPPLIES at the back of this manual for details.

ROTOR PREPARATION



- Before each run, make sure the rotor is seated on the centrifuge drive hub, with the rotor drive pins alongside the teeth on the top surface of the hub, and that the lid knob is tight.
- If you run less than a full load, arrange the loaded cannisters opposite each other in the rotor and place empty cannisters in the other cavities. Fill opposing bottles to the same level with liquid of the same density. *Place a cannister, loaded or empty, in each rotor position during a run.*
- Make sure that the plug and cap/closure O-rings are in good condition, are properly installed, and that they are completely *dry and unlubricated.* If the O-rings or the sealing area are wet, bottle leakage may result.
- For low-temperature runs (from approximately 2 to 10°C), precool the rotor, cannisters, labware, and sample in the centrifuge or in a refrigerator before use, especially before short runs. A suggested rotor precooling cycle is a minimum of 30 minutes at 2 000 rpm at the required temperature.
- After high-temperature runs (40°C), the cap/closure may be difficult to remove. To prevent sticking, spray a light coating of Teflon[5] spray (366772) on the *top surface only* of the plug. Allow the plug to dry completely before use.

INSTALLING THE ROTOR

1. Hold the rotor by the scalloped areas between the cannister cavities and carefully lower the rotor straight down onto the centrifuge drive hub (see Figure 5). Do not hold the rotor by the windshield during installation.
2. Turn the rotor slightly around the centrifuge drive hub to ensure that the rotor is properly seated.
3. After cannisters are installed, place the lid on the rotor and tighten the lid tie-down knob to secure the rotor to the centrifuge drive hub.

[5] Teflon is a registered trademark of E.I. Du Pont de Nemours and Co.

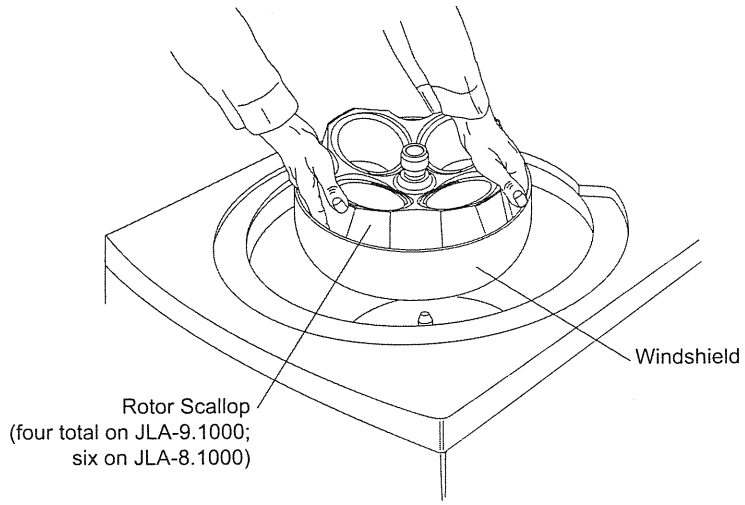


Figure 5. Installing the Rotor (JLA-9.1000 shown)

NOTE

Do not drop the rotor onto the hub or the hub could be damaged.

WARNING

If the rotor is left in the centrifuge between runs, make sure the rotor is seated on the drive hub and the tie-down knob is tight before each run.

LOADING THE CANNISTERS

NOTE

Cannisters run in opposite positions in the rotor must balance to within 30 grams of each other. Load opposing cannisters with the same type of labware containing the same amounts of fluid of equal density.

Do not exceed the rated maximum sample load for any single cannister, which is 1 500 grams (3.3 lb), including bottle, sample, plug, and cap/closure.

Working with Physiological Fluids

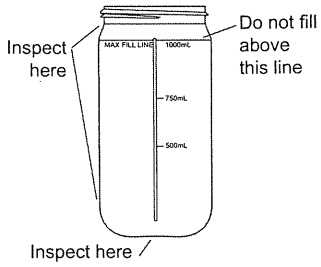
WARNING

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. Take appropriate safety precautions when handling toxic, pathogenic, or other hazardous materials.

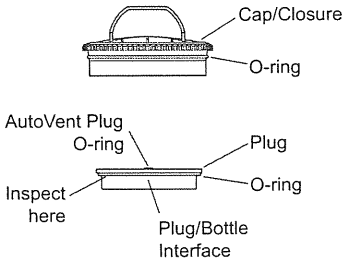
When working with potentially hazardous materials, always fill and open containers in an appropriate hood or biological safety cabinet. In addition, it is strongly recommended that all containers carrying physiological fluids be capped to prevent leakage.

Loading the 1 000-mL Bottle and Labware Assemblies

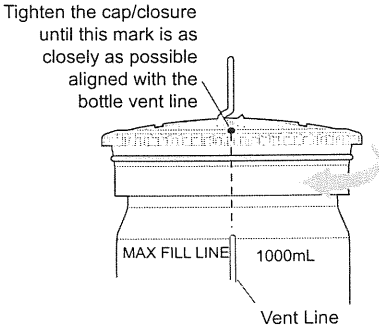
1. Inspect the bottles that you will be using, especially in the areas shown in the illustration. Do not use bottles that are cracked or deformed.



2. Fill a bottle with sample. *Do not fill above the maximum fill line marked on the bottle.* See Table 1 for complete fill volume and run speed information.



3. Regularly inspect the cap/closure you will be using. Inspect the O-ring groove threaded areas, inside and out, for cracking. Regularly inspect the plug in the areas behind the O-ring for cracking. Make sure that the O-rings are in place and in good condition, and that for the plug, both the O-ring and the plug/bottle interface are completely dry. Make sure that the large and small plug O-rings are in place. For the cap/closure, make sure that the area around the O-ring is completely dry. *Do not lubricate the O-rings.*



4. Place a plug on the bottle. Then place a cap/closure over the plug and tighten firmly by hand, to where the scribe mark is as closely as possible aligned with the vent line on the bottle, or beyond the line if possible. You cannot over tighten the closure by hand.

   Tools are available to assist in tightening and loosening cap/closures. See **Bottle Grip and Wrench**, below.

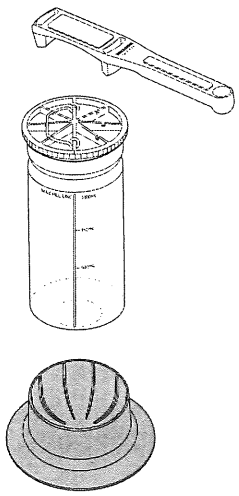
5. Place the filled, sealed labware assembly into an empty cannister, using a twisting motion to ensure proper seating. Place the cannister into a cavity in the installed rotor.

CAUTION

Bottles MUST be placed into cannisters. NEVER place a bottle directly into a rotor cavity.

6. Repeat steps 1 through 5 for all of the bottles to be run.

7. Make sure that a cannister is installed in every rotor position (run empty cannisters without cap/closures). Opposing filled cannisters, plus labware and sample, must weigh within 30 grams of each other.



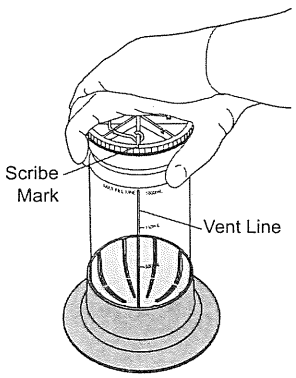
Bottle Grip[6] and Wrench (Kit 366770)

It is very important that bottles be tightly sealed before a run to prevent leakage. Some users may find it difficult to hand-tighten the parts adequately. Kit 366770, provided with labware kit 392574, contains a bottle grip and a wrench that are designed to simplify tightening and loosening cap/closures to seal and unseal bottles.

Using the Bottle Grip

The bottle grip seats on any flat surface and holds the bottle snugly in place, leaving both hands free for loading and sealing. It is not necessary to affix the grip to the surface; pressing down as you turn the cap/closure prevents the grip from moving.

1. Inspect all parts as described in **Loading the Bottles and Labware Assemblies**, above.
2. Place an empty bottle in the grip, with the bottle vent line toward you. Push down until the bottle is seated.
3. Fill the bottle.
4. Place a plug on the bottle.
5. Place a cap/closure over the plug.
6. Tighten the cap/closure.



Without the wrench:

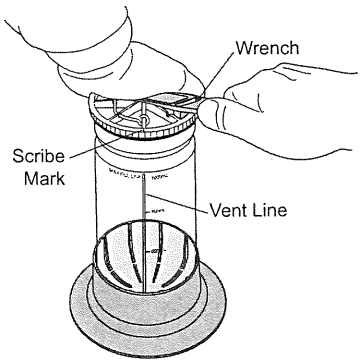
Grasp the cap/closure with both hands, push down for leverage, and turn the cap/closure to the right (clockwise) until the scribe mark on the cap/closure is as closely as possible aligned with the bottle vent line.

Using the wrench:

NOTE

The wrench provides additional leverage for tightening and loosening the cap/closure.

[6] U.S. patent no. 5,961,086



Hold the narrow end of the wrench in one hand and insert the two prongs in any position in the top of the cap/closure. Place your other palm on the flat textured area over the prongs. Press down with your palm and tighten the cap/closure until the scribe mark on the cap/closure is as closely as possible aligned with the vent line on the bottle. Loosen sealed bottles by pressing down and turning the wrench to the left (counterclockwise).

7. Remove the bottle from the bottle grip, load it into a cannister, and then into the rotor.

Loading the 500-mL Adapters

1. Prepare the 500-mL adapter by making sure that the two O-rings are in place as shown in Figure 4. *Do not lubricate the O-rings.*
2. Fill and seal the bottles or tubes to be used in the 500-mL adapters.
3. If 500-mL bottles are used, place each bottle directly into a 500-mL adapter. For bottles of different sizes, first load the bottles into the adapters listed in Table 1 and then place the filled bottle/adapter assembly into the 500-mL adapters. *Do not load sample directly into the 500-mL adapter.*
4. Place the adapter cap on the adapter, push down, and twist. The bottom edge of the adapter cap will not touch the top of the adapter, but the assembly is sealed by the O-rings and will seal completely during centrifugation.
5. *Hold the adapter by the adapter body, not by the adapter cap,* and place the filled adapter into a cannister. No special orientation of the adapter in the cannister is required. Make sure that six cannisters are loaded into the JLA-8.1000 rotor, or four cannisters in the JLA-9.1000 rotor, prior to centrifugation.

TEMPERATURE

TEMP °C
4

Enter the run temperature according to the instructions in your centrifuge instruction manual.

NOTE

To ensure that the rotor assembly reaches the required temperature during the run, precool or prewarm the rotor, cannisters, labware, and sample to the required run temperature before starting the run.

REMOVAL AND SAMPLE RECOVERY

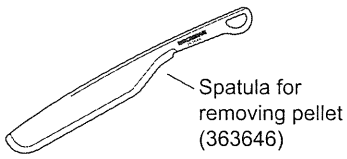
CAUTION

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

Removing 1 000-mL Bottles

1. Unscrew the rotor lid knob. Remove the lid and set it aside.
2. Grasp the metal handle on top of each cap/closure and, using a lifting and twisting motion, lift the sealed bottle assemblies out of each cannister. If required, place the sealed bottles under a safety hood before removing the cap/closures and plugs. Use caution when opening the sealed assemblies. Tools are available to assist in tightening and loosening cap/closures. See **Bottle Grip and Wrench**, above.

Removing Pellets from 1 000-mL Bottles



Use the spatula provided to remove pellet from the bottle. Do not use a metal tool to remove pellet, as metal could scratch or damage the bottle and shorten the bottle's useful life.

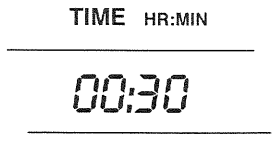
Removing 500-mL Adapters

1. After centrifugation, remove the 500-mL adapters from the cannisters by grasping each adapter cap top and pulling up until you can grasp the adapter body. Then, holding the adapter body, remove the adapter completely and set it on a flat surface.

2. To remove the adapter cap, hold the adapter firmly in one hand and, with the other hand, twist and lift off the cap. Placing your fingers in the indentations in the adapter may help you to grip the adapter tightly.

   Some users may find the adapter caps difficult to remove. To facilitate removal, use the bottle grip tool described above.

RUN TIMES



The k factor of a rotor is a measure of the rotor's pelleting efficiency. Beckman Coulter has calculated the k factors for all of its rotors, at maximum speed with full tubes or bottles, using the following formula:

$$k = \frac{\ln(r_{max}/r_{min})}{\omega^2} \times \frac{10^{13}}{3\,600} \qquad (1)$$

where ω is the angular velocity of the rotor in radians per second ($\omega = 0.105 \times \text{rpm}$), r_{max} is the maximum radius, and r_{min} is the minimum radius.

After substitution:

$$k = \frac{(2.533 \times 10^{11})\ln(r_{max}/r_{min})}{\text{rpm}^2} \qquad (2)$$

In the JLA-8.1000 rotor, the k factor is 2 482 for full 1 000-mL bottles at 8 000 rpm. In the JLA-9.1000 rotor, the k factor is 2 540 for full 1 000-mL bottles at 9 000 rpm. At reduced speeds, the k factors will be different. Calculate k factors for these containers using equation (2).

Use the k factor in the following equation to estimate the run time t (in hours) required to pellet particles of known sedimentation coefficient s (in Svedberg units, S).

$$t = \frac{k}{s} \tag{3}$$

Run times can be estimated for centrifugation at less than maximum speed by adjusting the k factor as follows:

$$k_{adj} = k\left(\frac{8\,000^{*}}{\text{actual run speed}}\right)^{2} \tag{4}$$

* for the JLA-8.1000 rotor; 9 000 for the JLA-9.1000 rotor.

Run times can also be estimated from data established in prior experiments using a different rotor if the k factor of the previous rotor is known. For any two rotors, a and b,

$$\frac{t_a}{t_b} = \frac{k_a}{k_b} \tag{5}$$

For more information on k factors, see *Use of* k *Factor for Estimating Run Times from Previously Established Run Conditions* (publication DS-719).

RUN SPEEDS

SPEED RPM/RCF

8 000 RPM

SPEED RPM/RCF

9 000 RPM

The centrifugal force at a given radius in a rotor is a function of run speed. Comparisons of forces between different rotors are made by comparing the rotor's 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 a number of rotor speeds is provided in Table 2.

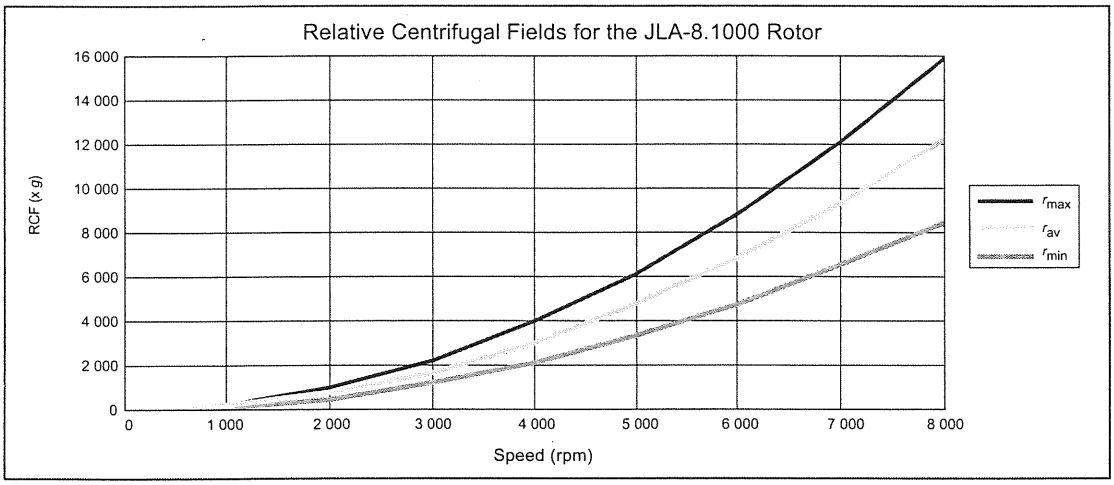
Do not select rotational speeds higher than the limits provided in Table 1.

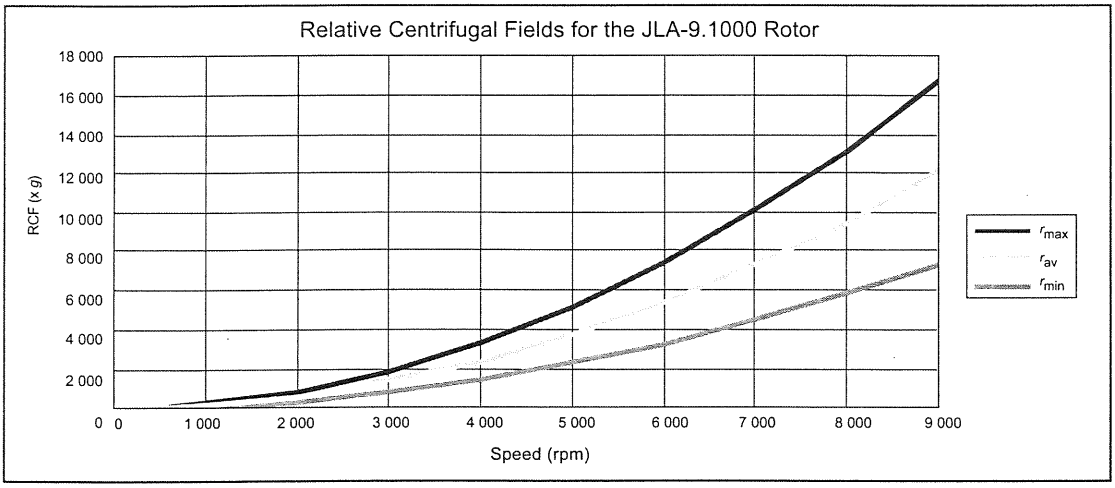
Table 2. Relative Centrifugal Fields for the JLA-8.1000 and JLA-9.1000 Rotors. Entries in this table are calculated from the formula $RCF = 1.12r\,(RPM/1000)^2$ and then rounded to three significant digits.

JLA-8.1000 Rotor			
Rotor Speed (rpm)	Relative Centrifugal Field (× *g*)		
	At r_{max} (222.8 mm)	At r_{av} (171 mm)	At r_{min} (119 mm)
8 000	15 970*	12 300	8 530
7 000	12 200	9 380	6 530
6 000	8 950	6 900	4 800
5 000	6 220	4 790	3 330
4 000	3 980	3 060	2 130
3 000	2 240	1 720	1 200
2 000	995	766	533
1 000	249	192	133
500	62	48	33

JLA-9.1000 Rotor			
Rotor Speed (rpm)	Relative Centrifugal Field (× *g*)		
	At r_{max} (185 mm)	At r_{av} (134 mm)	At r_{min} (82 mm)
9 000	16 800	12 200	7 440
8 000	13 300	9 610	5 880
7 000	10 200	7 350	4 500
6 000	7 460	5 400	3 310
5 000	5 180	3 750	2 300
4 000	3 320	2 400	1 470
3 000	1 870	1 350	830
2 000	829	600	370
1 000	207	150	92
500	52	38	23

*Not rounded.





When solutions more dense than 1.2 g/mL are centrifuged in the JLA-8.1000 rotor, use equation (6) to calculate the reduced maximum allowable rotor speed. Use equation (7) to calculate the reduced maximum allowable rotor speed for the JLA-9.1000 rotor.

$$\text{reduced maximum speed} = (8\,000 \text{ rpm}^*) \sqrt{\frac{1.2 \text{ g/mL}}{\text{density of tube contents}}} \quad (6)$$

$$\text{reduced maximum speed} = (9\,000 \text{ rpm}^*) \sqrt{\frac{1.2 \text{ g/mL}}{\text{density of tube contents}}} \quad (7)$$

* The maximum speed for 1 000-mL polypropylene bottles (363678) is 7 000 rpm in the JLA-8.1000 and 8 000 rpm in the JLA-9.1000.

CARE AND MAINTENANCE

CAP/CLOSURE AND PLUG INSPECTION AND MAINTENANCE

- Plug and cap/closure performance depend on proper use and maintenance. Check the O-rings before each use to make sure that they are in good condition and are completely dry. Replace the O-rings if they are damaged, torn, or dirty. *O-ring integrity is the key to successful function of cap/closure and plug assemblies.*
- Do not lubricate the cap/closure and plug O-rings. If they are lubricated, they will cause the assembly to seal too tightly during centrifugation.

  If crazing or cracks appear on or in a cap/closure or plug, replace the cap/closure and plug immediately with a new cap/closure and plug assembly. Do not continue to use damaged or suspect cap/closures, plugs, or other assembly components. Replace labware assemblies 6 months from the date of receipt, or at the first sign of damage to any of the components.

CANNISTER INSPECTION AND MAINTENANCE

Regularly inspect each cannister as described below.

- Before each use, inspect the cannisters (363686) for deep cracks. If any cracking or other damage is visible on the outside wall, *do not use the cannister.* Contact Beckman Coulter Field Service.

- **If a crack or blemish appears after a cannister is dropped from a height of several feet, or after it strikes a sharp edge of a bench or table, autoclave the cannister and then return it to Beckman Coulter for inspection. Include a written explanation of the reason for the return.**

- Each cannister has an expiration date, which is engraved on the aluminum sleeve around the top of the cannister (see Figure 6). *Do not use the cannister after this date.* New cannisters can be used with the same rotor body. See the Warranty at the back of this manual for more information.

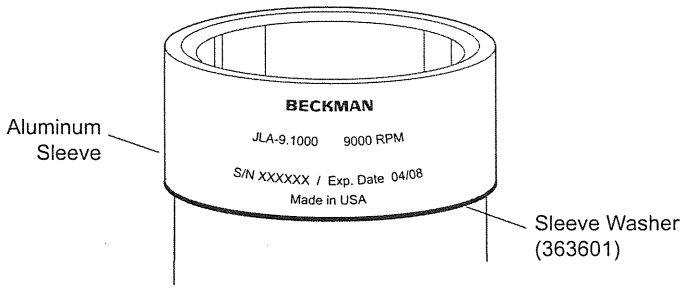


Figure 6. Cannister Sleeve Washer

Each cannister has an Ultem sleeve washer (363601) beneath the aluminum sleeve (see Figure 6), which acts as a cushion between the cannister and the rotor body. Before each use, make sure that the sleeve washer is securely in place. If the cannister is exposed to high temperatures and/or autoclaving, the washer may loosen; if this happens, press it back into place with your finger. If the washer becomes deformed so that it no longer stays on the cannister, replace it.

ABOUT COMPOSITE CANNISTERS

The carbon fiber epoxy composite material used in the JLA-8.1000 and JLA-9.1000 cannisters is extremely strong and ideally suited to the high stresses produced by centrifugal force. The cannisters will retain their strength throughout their 7-year life, but will exhibit certain cosmetic changes with time. The cannisters also require different inspection and handling procedures than all-metal rotor components.

After several thousand centrifuge run cycles, surface cracks may appear in the cannister dome area (see Figure 7) and may increase in number with continued use. Surface cracks are not uncommon in carbon fiber components, and *do not affect the structural integrity of the cannister.* However, cracks or other damage on the outside wall should be inspected by a Beckman Coulter representative.

Repeated autoclaving of the cannisters may cause the following conditions, all of which are cosmetic in nature during the 7-year warranty period:

- an increase in the number of surface cracks in the dome area,
- increased visibility of existing surface cracks,
- a change in cannister color due to oxidation of the epoxy, and
- formation of a white, powdery residue on the outside wall of the cannister; this residue can be wiped off with a soft, damp cloth.

Repeated autoclaving may also cause the sleeve washer (363601) to deform so that it no longer stays on the cannister. If this happens, replace the washer.

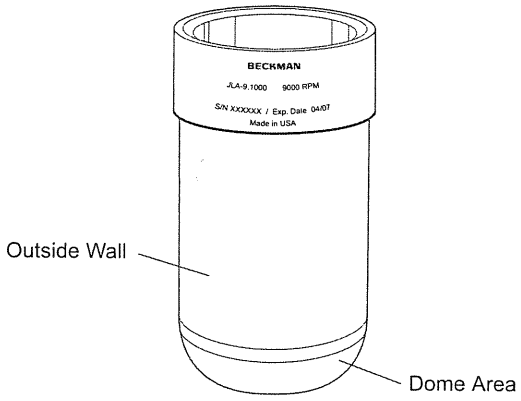


Figure 7. Cannister Dome Area

ROTOR BODY INSPECTION AND MAINTENANCE

- Periodically (at least monthly) inspect the rotor body for rough spots, pitting, or heavy discoloration. If any of these signs are evident, do not use the rotor. Contact Beckman Coulter field service for information about the Field Rotor Inspection Program and the rotor repair center.

- Before using the rotor, inspect the rotor drive pins to ensure that they are not damaged. Damaged drive pins can prevent the rotor from seating properly on the centrifuge drive hub (Avanti J series centrifuges only). To inspect the drive pins, turn the rotor upside down and look into the drive hole in the center of the rotor. If the drive pins appear damaged, contact Beckman Coulter Field Service.

- Do not use sharp tools on the aluminum rotor body, as corrosion begins in scratches and may open fissures in the metal with repeated use. If the rotor body is scratched, contact Beckman Coulter field service about having it reanodized. Do not use sharp objects or tools on the composite cannisters, as the composite material is easily damaged.

- To prevent corrosion of the aluminum rotor body, store the rotor in a dry environment with the lid removed. Do not store the rotor in the centrifuge.

- To prevent abrasion of the metal rotor tie-down components, place the rotor lid upside down on a flat surface and put two or three drops of Tri-Flow[7] oil (392645) between the lid adapter and the lid stem (see Figure 8). This area should be lubricated every few weeks or after each autoclave cycle.

- To provide lubrication between the rotor and the centrifuge drive hub, apply a thin coat of Spinkote™ lubricant (306812) to the threads of the rotor tie-down knob before each run.

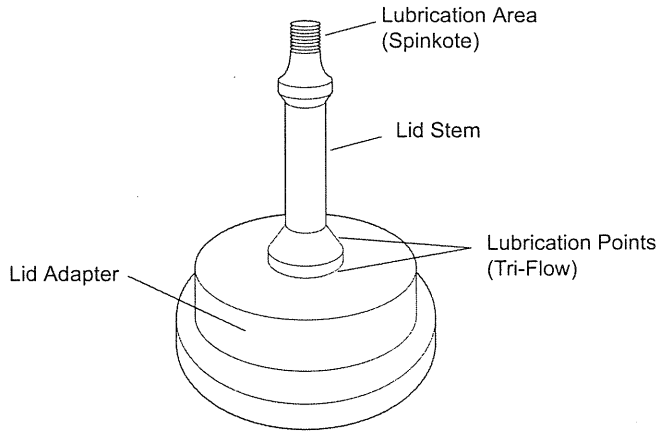


Figure 8. Lubricating the Lid Stem

[7] Manufactured by Thompson & Formby, Inc., 10136 Magnolia Drive, Olive Branch, MS 38654, U.S.A.

- If the rotor is left in the centrifuge between runs, leave the centrifuge power off and the door open.

Refer to Appendix A in *Rotors and Tubes* for 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

Rotor Cleaning Kit (339558)

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.

Wash the rotor frequently (at least weekly) to prevent buildup of residues.

1. Wash the rotor, cannisters, plugs, cap/closures, and 500-mL adapters and adapter caps in a mild detergent, such as Beckman Solution 555™, that will not damage the rotor and components. The Rotor Cleaning Kit (339558) contains two special plastic-coated brushes and two quarts of Solution 555 for use with rotors and accessories. Dilute the detergent 10 to 1 with water.

   O-rings on the 500-mL adapters can be left in place during cleaning unless spillage has occurred. To remove them, use fingers or a tool that will not damage the O-rings. Thoroughly wash and dry them before replacing them on the adapter. *Do not lubricate adapter O-rings.*

2. Thoroughly rinse the cleaned rotor and components with distilled water.

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

CAUTION

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.

Do not use acetone, MEK (methylethyl ketone), chloroform, cyclohexane, or organic solvents on the cannisters at any time. These substances will damage the epoxy resin surface material.

SUPPLY LIST

NOTE

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

See the Beckman Coulter *High Performance, High Speed, High Capacity Rotors, Tubes & Accessories* catalog (BR-8102, available at www.beckmancoulter.com) or Beckman Coulter Sales (1-800-742-2345 in the United States) or your local Beckman Coulter office for detailed information on ordering parts and supplies. For your convenience, a partial list is given below.

REPLACEMENT ROTOR PARTS AND LABWARE

NOTE

In the kits and assemblies listed below, cap/closures, plugs, and adapters are shipped with the O-rings installed and one spare of each O-ring is provided.

Labware Kit 392574
Includes one six-place bottle rack (974627), one spatula (363646), and one tool kit (366770)

Bottle assembly, 1 000-mL polycarbonate, set of two 363676
Includes two 1 000-mL polycarbonate bottles (366751), two cap/closure and plug assemblies (363680, includes two cap/closures and four cap/closure O-rings), two AutoVent polycarbonate plug sets (366748, includes two plugs, four large plug O-rings, and four AutoVent plug O-rings)

Bottle assembly, 1 000-mL polypropylene, set of two 363678
Includes two 1 000-mL polypropylene bottles (366752), two cap/closure and plug assemblies (363680, includes two cap/closures and four cap/closure O-rings), two AutoVent polycarbonate plug sets (366748, includes two plugs, four large plug O-rings, and four AutoVent plug O-rings)

HarvestLine™ System liner kit. 369264
Includes 120 HarvestLine System liners, nonsterile (polyetherurethene, USP 23 class VI), one stainless steel filling rack, and one funnel

Cap/closure and plug assembly, set of two 363680
Includes two cap/closures, two AutoVent polycarbonate plugs, two cap/closure O-rings, two large plug O-rings, and two AutoVent plug O-rings

Plug assembly, AutoVent polycarbonate, set of two 366748
Includes two polycarbonate AutoVent plugs, two large plug O-rings, and two AutoVent plug O-rings

Plug assembly, AutoVent Ultem, set of two 366749
Includes two Ultem AutoVent plugs, two large plug O-rings, and two AutoVent plug O-rings

Bottles, 1 000-mL polycarbonate, set of two 363676

Bottles, 1 000-mL polypropylene, set of two 363678

Cap/closure replacement assembly, set of six 366768

Cap/closure replacement O-rings, set of six 366769

AutoVent plug replacement O-rings, set of six 366767
Includes six large plug O-rings and six AutoVent plug O-rings

Bottle rack (polyethylene, holds six 1 000-mL bottles) 974627

Cannisters, set of two 363686

Cannister sleeve washer, set of six 363601

Lid assembly, JLA-8.1000 363563

Lid assembly, JLA-9.1000 363583

Tool Kit 366770
Includes one bottle grip (366763) and one wrench (367309)

500-mL Adapter assembly 363683
contains
Adapter, PET (polyethylene teraphthalate), one
Adapter cap, polycarbonate, one
Adapter O-rings, silicone, set of two (replacement part number 970883)

SUPPLIES

Rotor Cleaning Kit 339558

Solution 555 (1 qt). 339555

Spinkote lubricant (2 oz). 306812

Spatula, polyethylene (for removing pellet from 1 000-mL bottles). 363646

Teflon spray. 366772

Tri-flow lubricant (2 oz) 392645