Instructions For Use

TLV-100
Vertical Tube Rotor

For Use in the Beckman Coulter
Optima MAX, MAX-XP, MAX-E, TL, TLX, and TL-100
Tabletop Ultracentrifuges



TL-TB-007AG
April 2020

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BECKMAN COULTER

TLV-100 Vertical Tube Rotor
TL-TB-007AG (April 2020)

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

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

Original Instructions

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 to the Beckman Coulter website. For labeling updates, go to www.beckman.com/techdocs and download the most recent manual or system help for your Beckman Coulter instrument, software, or accessory.

Revision AG, 4/2020

Updates were made to the following sections:

- *Safety Notice*
- *Supply List*

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.

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

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 Precautions

⚠ WARNING

Risk of operator injury if:

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

To avoid injury:

- **Keep doors, covers, and panels closed and secured in place while the instrument is in use.**
- **Take full advantage of the safety features of the instrument. Do not defeat safety interlocks and sensors.**
- **Acknowledge and act upon instrument alarms and error messages.**
- **Keep away from moving parts.**
- **Report any broken parts to your Beckman Coulter Representative.**
- **Open/remove and close/replace doors, covers, and panels with care.**
- **Use the proper tools when troubleshooting.**

⚠ CAUTION

Integrity could be compromised and operational failures could occur if this equipment is used in a manner other than specified. Use this rotor as instructed in this product manual.

⚠ CAUTION

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

⚠ WARNING

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

Safety Information for the TLV-100 Rotor



The safety information below 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 throughout this publication, pay special attention to the specific safety information presented. Observance of safety precautions will also help to avoid actions that could damage or adversely affect the performance of the rotor. This rotor was developed, manufactured, and tested for safety and reliability as part of a Beckman Coulter ultracentrifuge/rotor system. Its safety or reliability cannot be assured if used in a centrifuge not of Beckman Coulter's manufacture or in a Beckman Coulter ultracentrifuge that has been modified without Beckman Coulter's approval.

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 ultracentrifuge.

Although rotor components and accessories made by other manufacturers may fit in the TLV-100 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the TLV-100 rotor may void the rotor warranty and should be prohibited by your laboratory safety officer. Only the components and accessories listed in this publication should be used in this rotor.

Make sure that filled containers are loaded symmetrically into the rotor and that opposing tubes are filled to the same level with liquid of the same density. Make sure that cavities in use have the proper spacers inserted before installing the rotor plugs.

If disassembly reveals evidence of leakage, you should 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 Times*, 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.

Safety Data Sheets (SDS/MSDS)

To obtain an SDS for reagents used on Beckman Coulter centrifuges:

1. On the internet, go to http://www.beckman.com:
   a. Select **Safety Data Sheets** (SDS/MSDS) from the **Support** menu.
   b. Follow the instructions on the screen.
   c. Contact us if you have difficulty locating the information.
2. If you do not have internet access, contact us.

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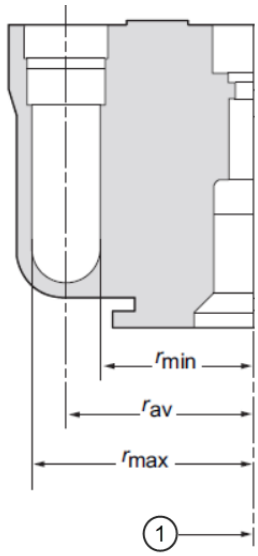
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TLV-100
Vertical Tube Rotor

Specifications



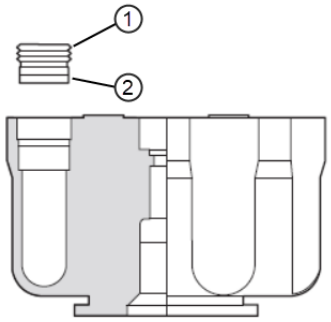
1. Axis of Rotation

U.S. Pat. Nos. 4,102,490, 4,290, 550
Japanese Pat. No. 1,469,154

Maximum speed	100,000 RPM
Density rating at maximum speed	1.7 g/mL
Relative Centrifugal Field[a] at maximum speed	
at r_{max} (35.7 mm)	400,000 × *g*
at r_{av} (30.2 mm)	338,000 × *g*
at r_{min} (24.6 mm)	276,000 × *g*
k factor at maximum speed	9
Conditions requiring speed reductions	see *Run Speeds*
Number of tube cavities	8
Available tubes	polypropylene Quick-Seal (344625)
Nominal tube dimensions	11 × 32 mm
Nominal tube capacity	2 mL
Nominal rotor capacity	16 mL
Approximate acceleration time to maximum speed (fully loaded)	2½ min
Approximate deceleration time from maximum speed (fully loaded)	1½ min
Weight of fully loaded rotor	0.69 kg (1.5 lb)
Rotor body material	aluminum
Rotor material	titanium

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

Description



1. Rotor Plug (368549)
2. Gasket (347371)

This Beckman Coulter rotor has been manufactured in an ISO 9001 or 13485 facility for use with the appropriately classified Beckman Coulter ultracentrifuge.

The TLV-100, rated for 100,000 rpm, is a vertical tube rotor that can centrifuge up to eight tubes. It is used in Beckman Coulter Optima MAX, MAX-XP, MAX-E, TL, TLX, and the TL-100 tabletop ultracentrifuges. The rotor generates sufficient centrifugal force to band macro-molecules such as DNA in small sample volumes.

The rotor is made of titanium and is finished with black polyurethane paint. A plunger in the lid locks the rotor to the drive hub before beginning the run. A tube spacer and rotor plug hold each tube in the rotor, and a plug gasket forms a closure around each plug. Rotor plugs and spacers are anodized aluminum.

The ultracentrifuge identifies rotor speed during the run by means of a magnetic speed sensor in the instrument chamber and magnets on the bottom of the rotor. This overspeed protection system ensures that the rotor does not exceed its maximum permitted speed.

See the *Beckman Coulter, Inc. Ultracentrifuge Rotor Warranty* at the back of this manual for warranty information.

Preparation and Use

Specific information about the TLV-100 rotor is given here. Information common to this and other rotors is contained in Rotors and Tubes for Tabletop Preparative Ultracentrifuges (publication TLR-IM-9), which should be used together with this manual for complete rotor and accessory operation.

NOTE Although rotor components and accessories made by other manufacturers may fit in the TLV-100 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the 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. Inspect the rotor plugs, gaskets, spacers, and plunger mechanism for damage — the high forces generated in this rotor can cause damaged components to fail.
2. Use only Quick-Seal (344625) tubes and spacers (347370).
3. Check the chemical compatibilities of all materials used (refer to *Appendix A* in *Rotors and Tubes (publication TLR-IM-9)*).

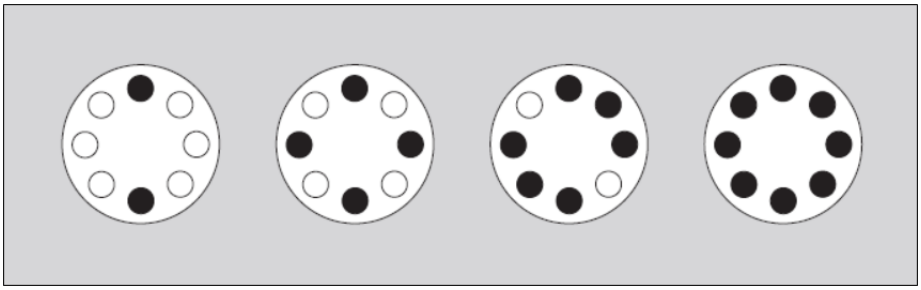
Rotor Preparation

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

1. Lightly but evenly lubricate metal threads with Spinkote lubricant (306812).
2. Set the rotor into the rotor vise, which should be attached to a rigid surface.

3 Load the sealed tubes symmetrically into the rotor (see *Tubes and Accessories*, page 6, for tube information). If fewer than eight tubes are being run, they must be arranged symmetrically in the rotor (see Figure 1). *Opposing tubes must be filled to the same level with liquid of the same density.*

Figure 1 Arranging Tubes in the Rotor



Two, four, six, or eight tubes can be centrifuged per run if they are arranged in the rotor as shown.

4 Use the required spacers to complete the loading operation.

5 Insert a rotor plug (368549), gasket-end down, over each spacer and screw it in.

6 Using the plug adapter (976959) and torque wrench (858121), torque each rotor plug to 13.6 N•m (120 in.-lb). *To avoid stripping the plugs, apply downward pressure to the hex plug adapter while tightening the plugs.* Do not overtighten plugs.

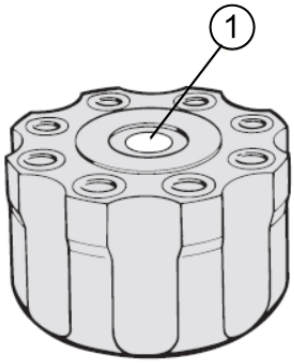
Operation

1 Use an absorbent towel to wipe off condensation from the rotor, then carefully place the rotor on the drive hub.

2 Lock the rotor in place by gently pressing the plunger down until you feel it click. When you remove your finger, the plunger will remain flush with the rotor body if it is properly engaged. If the plunger pops up, repeat the procedure. (The Optima MAX, MAX-XP, or MAX-E ultracentrifuge automatically secures the rotor to the drive shaft without the need for engaging the plunger.)

⚠ CAUTION

In all ultracentrifuge models except the Optima MAX, MAX-XP, and MAX-E, it is very important to lock the rotor in place before beginning the run to ensure that the rotor remains seated during centrifugation. Failure to lock the rotor in place before beginning the run may result in damage to both rotor and instrument.



1. Plunger Locked

3 Refer to the instrument instruction manual for ultracentrifuge operation.

4 For additional operating information, see the following:

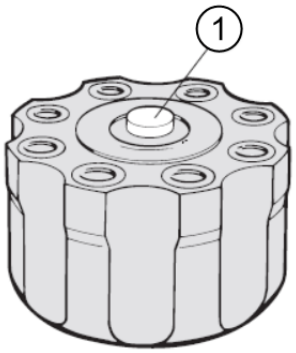
- *Run Times*, page 7, for using *k* factors to adjust run durations.
- *Run Speeds*, page 8, for information about speed limitations.
- *Selecting CsCl Gradients*, page 10, for methods to avoid CsCl precipitation during centrifugation.

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 To release the plunger at the end of the run, gently press it down until you feel it click. When you remove your finger the plunger will pop up to its released position.



1. Plunger Released

2 Remove the rotor from the ultracentrifuge and place it in the rotor vise.

3 Remove the rotor plugs, taking care to apply downward pressure on the hex plug adapter to avoid stripping the plugs.

4 Use a tube removal tool to remove the spacers and tubes.

Tubes and Accessories

The TLV-100 rotor uses Quick-Seal tubes (344625) and spacers (347370). Refer to *Appendix A* in *Rotors and Tubes (publication TLR-IM-9)* for information on the chemical resistances of tube and accessory materials.



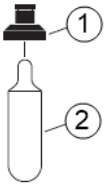
Temperature Limits

- Plastic tubes have been centrifuge tested for use at temperatures between 2 and 25°C. For centrifugation at other temperatures, pretest tubes 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.

Quick-Seal Tubes

Quick-Seal tubes must be sealed prior to centrifugation. These tubes are heat sealed and do not need caps; however, spacers are required on top of the tubes when they are loaded into the rotor.

- Fill Quick-Seal tubes leaving a *small* bubble of air at the base of the neck. Do not leave a large air space — too much air can cause excessive tube deformation.
- Refer to *Rotors and Tubes* (publication TLR-IM-9) for detailed information on the use and care of Quick-Seal tubes.



1. Spacer
2. Quick-Seal Tube

Run Times

The *k* factor of the rotor is a measure of the rotor's pelleting efficiency. Beckman Coulter has calculated the *k* factors for all of its preparative rotors at maximum rated speed and using full tubes. The *k* factor is calculated from the formula:

EQ 1

$$k = \frac{\ln(r_{max}/r_{min})}{\omega^2} \times \frac{10^{13}}{3600}$$

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

After substitution:

EQ 2

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

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).

EQ 3

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

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

EQ 4

$$k_{adj} = k \left(\frac{55{,}000}{\text{actual run speed}} \right)^2$$

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

EQ 5

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

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

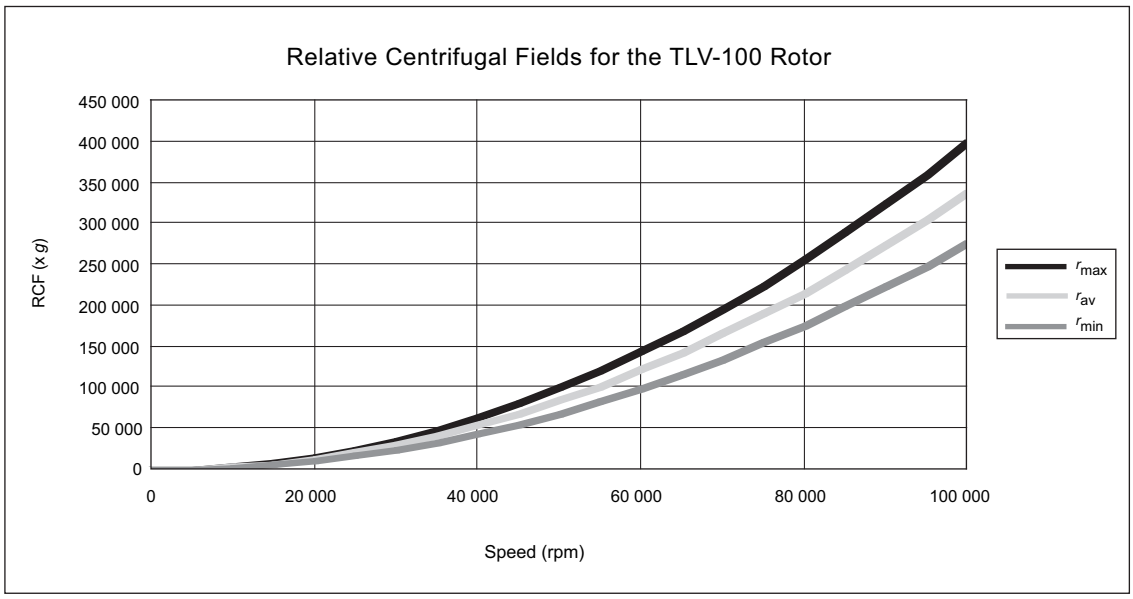
Run Speeds

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 a number of rotor speeds is provided in Table 1.

Table 1 Relative Centrifugal Fields for the TLV-100 Rotor[a]

Rotor Speed (RPM)	Relative Centrifugal Field (× *g*)			*k* Factor*
	At r_{max} (35.7 mm)	At r_{av} (30.2 mm)	At r_{min} (24.6 mm)	
100,000	400,000	338,000	276,000	9
95,000	361,000	305,000	249,000	10
90,000	324,000	274,000	223,000	12
85,000	289,000	244,000	199,000	13
80,000	256,000	216,000	176,000	15
75,000	225,000	190,000	155,000	17
70,000	196,000	166,000	135,000	19
65,000	169,000	143,000	116,000	22
60,000	144,000	122,000	99,200	26
55,000	121,000	102,000	83,300	31
50,000	100,000	84,600	68,900	38
45,000	81,000	68,500	55,800	47

a. Entries in this table are calculated from the formula RCF = 1.12*r* (RPM/1000)^2 and then rounded to three significant digits.



Speeds must be reduced under the following circumstances:

1. If nonprecipitating solutions more dense than 1.7 g/mL are centrifuged, the maximum allowable run speed must be reduced according to the following equation:

EQ 6

$$\text{reduced maximum speed} = (100{,}000\ \text{RPM})\sqrt{\frac{1.7\ \text{g/mL}}{\rho}}$$

where ρ is the density of the tube contents. This speed reduction will protect the rotor from excessive stresses due to the added tube load.

2. *Further speed limits must be imposed* when CsCl or other self-forming-gradient salts are centrifuged, as equation (6) does not predict concentration limits/speeds that are required to avoid precipitation of salt crystals. Precipitation during centrifugation would alter the density distribution of CsCl and this would change the position of the sample bands. Figure 2, Figure 3, and Figure 4, together with the description and examples below, show how to reduce run speeds when using CsCl gradients.

Selecting CsCl Gradients

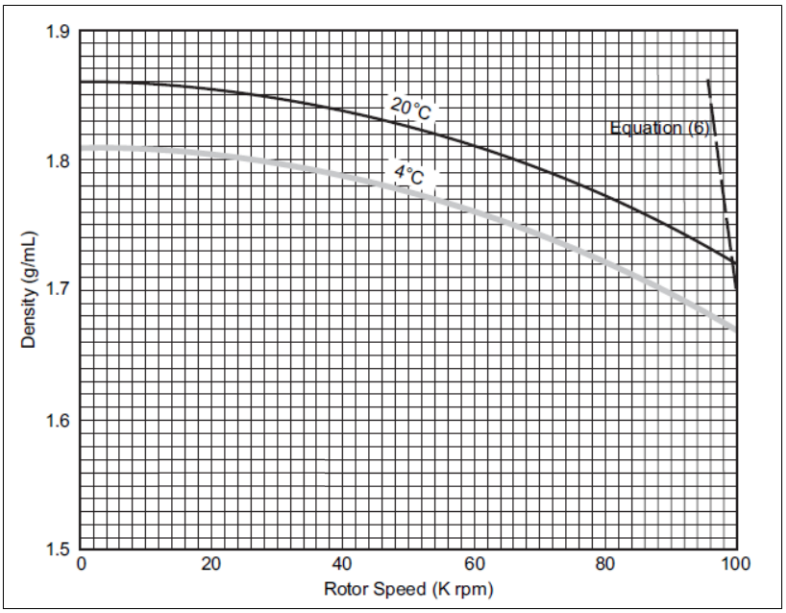


Precipitation during centrifugation would alter density distribution, and this would change the position of the sample bands. Curves in Figure 2, Figure 3, and Figure 4 are provided up to the maximum rated speed of the rotor.

NOTE The curves in Figure 2, Figure 3, and Figure 4 are for solutions of CsCl salt dissolved in distilled water only. If other salts are present in significant concentrations, the overall CsCl concentration may need to be reduced.

Rotor speed is used to control the slope of a CsCl density gradient, and must be limited so that CsCl precipitation is avoided. Speed and density combinations that intersect on or below the curves in Figure 3 ensure that CsCl will not precipitate during centrifugation in the TLV-100 rotor. Curves are provided at two temperatures: 20°C (black curves) and 4°C (gray curves).

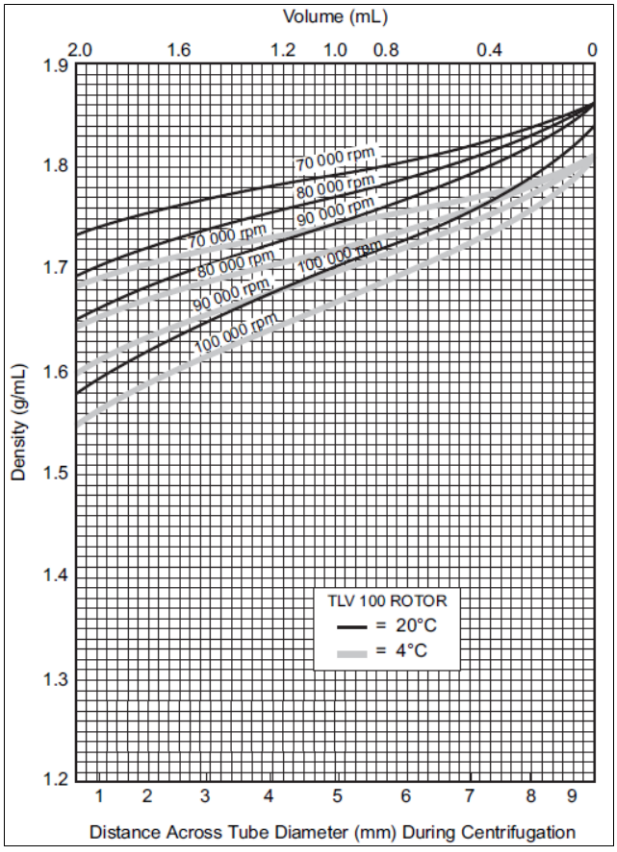
Figure 2 Precipitation Curves



Using combinations of rotor speeds and homogeneous CsCl solution densities that intersect on or below thee curves ensures that CsCl will not precipitate during centrifugation. The dashed line shows the inability of equation (6) to prevent CsCl precipitation.

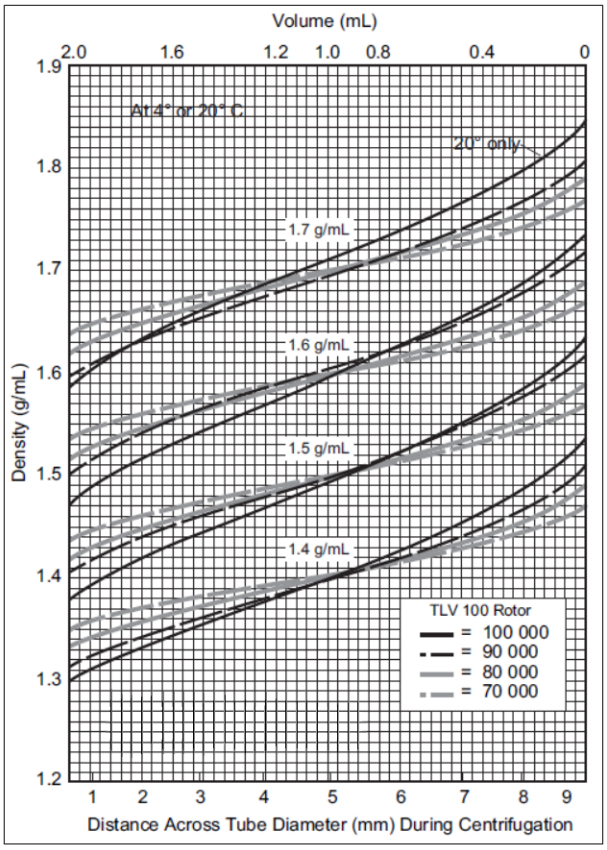
Equilibrium Gradient Curves:

Figure 3 Maximum Densities



Using combinations of rotor speeds and homogeneous CsCl solution densities that intersect on or below thee curves ensures that CsCl will not precipitate during centrifugation. The dashed line shows the inability of equation (6) to prevent CsCl precipitation.

Figure 4 Lower than Max Densities



Centrifugation of less-than-maximum-allowable-density solutions may sometimes give better particle separations. Densities used to generate curves are printed along the curves.

Typical Examples for Determining CsCl Run Parameters

Example A:

Knowing homogeneous CsCl solution density (1.70 g/mL) and approximate particle buoyant densities (1.70 and 1.68 g/mL), where will particles band?

1. In Figure 2, find the curve that corresponds to the required run temperature (4°C). The maximum allowable rotor speed is determined from the point where this curve intersects the homogeneous CsCl density (88,000 rpm).

2. In Figure 3, sketch in a horizontal line corresponding to each particle's buoyant density and find the density gradient curve corresponding to the above speed (88,000 rpm).

3 Mark the point in the figure where each particle density intersects the curve corresponding to the run speed (88,000 rpm) and temperature (4°C).

4 Particles will band at these marked points across the tube diameter (lower axis of Figure 3) at equilibrium during centrifugation. After centrifugation the bands will reorient (upper axis).

In this example, the particles will band along this curve about half of the way from the right edge of the figure. Using the lower horizontal axis, it can be estimated that these particles will about 1 mm apart at equilibrium during centrifugation.

Example B:
Knowing particle buoyant densities (1.65 and 1.66 g/mL), how do you get the best separation? Assume 20°C operation.

1 In Figure 3 or Figure 4, sketch in a horizontal line corresponding to each particle's buoyant density.

2 Select the curve that gives the best particle separation at the required temperature (20°C). Particles will band at points across the tube diameter where the sketched lines intersect this curve (lower axis) at equilibrium during centrifugation. After centrifugation the bands will reorient (upper axis).

3 Note the run speed and homogeneous CsCl concentration for the selected curve.

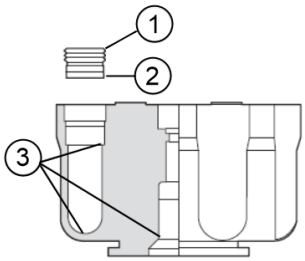
In this example, the 1.70-g/mL, 100,000-rpm curves in Figure 4 give the best separation. The separation is located at the center of the tube, the particles banding about 0.92 mm apart at equilibrium during centrifugation (the lower axis). However, referring to Figure 2, a 1.70-g/mL CsCl solution can only be run at 20°C at 100,000 rpm in the TLV-100 rotor. If a 4°C run is required, the speed must be reduced to 88,000 rpm.

Care and Maintenance

Maintenance

NOTE 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.

- Regularly lubricate the metal threads in the rotor plugs with a thin, even coat of Spinkote lubricant (306812). Failure to keep these threads lubricated can result in damaged threads. Replace rotor plugs (as a set) if they show signs of wear.
- Inspect plug gaskets (347371) for wear or damage. Replace as required. To remove the old gasket, squeeze it with your thumb and first finger until it comes away from the groove. Slip it off and snap a new one in its place. Be careful not to scratch the anodized surface of the plugs.



1. Rotor Plug
2. Gasket
3. Check for Corrosion

Refer to *Appendix A* in *(publication TLR-IM-9)* for the chemical resistances of rotor and accessory materials. Your Beckman Coulter representative provides contact with the Field Rotor Inspection Program and the rotor repair center.

Cleaning

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

Under normal use, wash the rotor frequently (at least weekly) to prevent buildup of residues.



1 Wash the rotor, plugs, and spacers in a mild detergent, such as Beckman Solution 555 (339555), that won't damage the rotor.

- The Rotor Cleaning Kit contains two plastic-coated brushes and two quarts of Solution 555 (339555) for use with rotors and accessories.
- Dilute the detergent 10 to 1 with water.

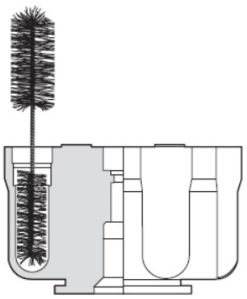
NOTE Do not wash rotor components in a dishwasher. Do not soak in detergent solution for long periods, such as overnight.

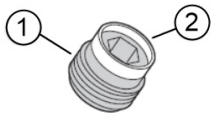
2 Rinse the cleaned rotor and components with distilled water.

3 Air-dry the buckets upside down.

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

4 Clean plug threads as necessary. Use a brush and concentrated Solution 555. Rinse and dry thoroughly, then lubricate lightly but evenly with Spinkote to coat all threads.





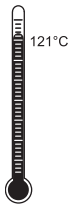
1. Threads
2. Gasket

Decontamination



If the rotor or other components are contaminated with radioactive, toxic, or pathogenic materials, follow appropriate decontamination procedures as outlined by appropriate laboratory safety guidelines and/or other regulations. Consult *Appendix A* in *Rotors and Tubes* (publication TLR-IM-9) to select an agent that will not damage the rotor.

Sterilization and Disinfection



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

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

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 instrument) with the plugs removed to allow air circulation so moisture will not collect in the tube cavities.

Returning a Rotor

Before returning a rotor or accessory for any reason, prior permission (a Returned Goods Authorization form) must be obtained from Beckman Coulter, Inc. This RGA form may be obtained from your local Beckman Coulter sales office, and 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 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 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.beckman.com or by calling Beckman Coulter at 1-800-742-2345 in the United States, or by contacting your local Beckman Coulter office.

Contact Beckman Coulter Sales (1-800-742-2345 in the United States) or see the Beckman Coulter *Ultracentrifuge Rotors, Tubes & Accessories* catalog (BR-8101, available at www.beckman.com) for detailed information on ordering parts and supplies. For your convenience, a partial list is given below.

Replacement Rotor Parts

Description	Part Number
Rotor plug (does not include gasket)	368549
Plug gasket	347371
Rotor vise	347373

Other

NOTE For MSDS information, go to the Beckman Coulter website at www.beckman.com.

Description	Part Number
Quick-Seal tubes (11 × 32 mm)	344625
Tube spacers	347370
Quick-Seal Cordless Tube Topper kit, 60 Hz	358312
Quick-Seal Cordless Tube Topper kit, 50 Hz (Europe)	358313
Quick-Seal Cordless Tube Topper kit, 50 Hz (Great Britain)	358314
Quick-Seal Cordless Tube Topper kit, 50 Hz (Australia)	358315
Tube Topper, cordless (Japan, US, Canada)	358312
Tube Topper rack	349387
Torque wrench	858121
Hex plug adapter	976959
Tube removal tool	361668
Curved hemostat (6-in.)	927208
Fraction Recovery System	342025
Fraction Recovery System Adapter Kit for TL-series tubes	347828
Beckman Coulter CentriTube Slicer	347960
CentriTube Slicer replacement blades (pkg of 10)	348299
Spinkote lubricant (2 oz)	306812
Silicone vacuum grease (1 oz)	335148
Rotor Cleaning Kit	339558
Rotor cleaning brush	347404
Beckman Solution 555 (1 qt)	339555

Beckman Coulter, Inc.
Ultracentrifuge Rotor Warranty

All Beckman Coulter ultracentrifuge Fixed Angle, Vertical Tube, Near Vertical Tube, Swinging Bucket, and Airfuge rotors are warranted against defects in materials or workmanship for the time periods indicated below, subject to the Warranty Conditions stated below.

Preparative Ultracentrifuge Rotors	5 years — No Proration
Analytical Ultracentrifuge Rotors	5 years — No Proration
ML and TL Series Ultracentrifuge Rotors	5 years — No Proration
Airfuge Ultracentrifuge Rotors	1 year — No Proration

For Zonal, Continuous Flow, Component Test, and Rock Core Ultracentrifuge Rotors, see separate warranty.

Warranty Conditions (as applicable)

1. This warranty is valid for the time periods indicated above from the date of shipment to the original Buyer by Beckman Coulter or an authorized Beckman Coulter representative.
2. Maintain one copy of this software for backup purposes (the backup copy shall be supplied by Beckman Coulter);
3. This warranty covers the Beckman Coulter Centrifuge Systems only (including but not limited to the centrifuge, rotor, and accessories) and Beckman Coulter shall not be liable for damage to or loss of the user's sample, non-Beckman Coulter tubes, adapters, or other rotor contents.
4. This warranty is void if the Beckman Coulter Centrifuge System is determined by Beckman Coulter to have been operated or maintained in a manner contrary to the instructions in the operator's manual(s) for the Beckman Coulter Centrifuge System components in use. This includes but is not limited to operator misuse, abuse, or negligence regarding indicated maintenance procedures, centrifuge and rotor classification requirements, proper speed reduction for the high density of certain fluids, tubes, and tube caps, speed reduction for precipitating gradient materials, and speed reduction for high-temperature operation.
5. Rotor bucket sets purchased concurrently with or subsequent to the purchase of a Swinging Bucket Rotor are warranted only for a term co-extensive with that of the rotor for which the bucket sets are purchased.
6. This warranty does not cover the failure of a Beckman Coulter rotor in a centrifuge not of Beckman Coulter manufacture, or if the rotor is used in a Beckman Coulter centrifuge that has been modified without the written permission of Beckman Coulter, or is used with carriers, buckets, belts, or other devices not of Beckman Coulter manufacture.
7. Rotor parts subject to wear, including but not limited to rotor O-rings, VTi, NVT, TLV, MLN, and TLN rotor tube cavity plugs and gaskets, tubing, tools, optical overspeed disks, bearings, seals, and lubrication are excluded from this warranty and should be frequently inspected and replaced if they become worn or damaged.
8. Keeping a rotor log is not mandatory, but may be desirable for maintenance of good laboratory practices.

Repair and Replacement Policies

1. If a Beckman Coulter rotor is determined by Beckman Coulter to be defective, Beckman Coulter will repair or replace it, subject to the Warranty Conditions. A replacement rotor will be warranted for the time remaining on the original rotor's warranty.
2. If a Beckman Coulter centrifuge is damaged due to a failure of a rotor covered by this warranty, Beckman Coulter will supply free of charge (i) all centrifuge parts required for repair (except the drive unit, which will be replaced at the then current price less a credit determined by the total number of revolutions or years completed, provided that such a unit was manufactured or rebuilt by

Beckman Coulter), and (ii) if the centrifuge is currently covered by a Beckman Coulter warranty or Full Service Agreement, all labor necessary for repair of the centrifuge.

3. If a Beckman Coulter rotor covered by this warranty is damaged due to a malfunction of a Beckman Coulter ultracentrifuge covered by an Ultracentrifuge System Service Agreement, Beckman Coulter will repair or replace the rotor free of charge.
4. If a Beckman Coulter rotor covered by this warranty is damaged due to a failure of a Beckman Coulter tube, bottle, tube cap, spacer, or adapter, covered under the Conditions of this Warranty, Beckman Coulter will repair or replace the rotor and repair the instrument as per the conditions in policy point (2) above, and the replacement policy.
5. Damage to a Beckman Coulter rotor or instrument due to the failure or malfunction of a non-Beckman Coulter tube, bottle, tube cap, spacer, or adapter is not covered under this warranty, although Beckman Coulter will assist in seeking compensation under the manufacturer's warranty.

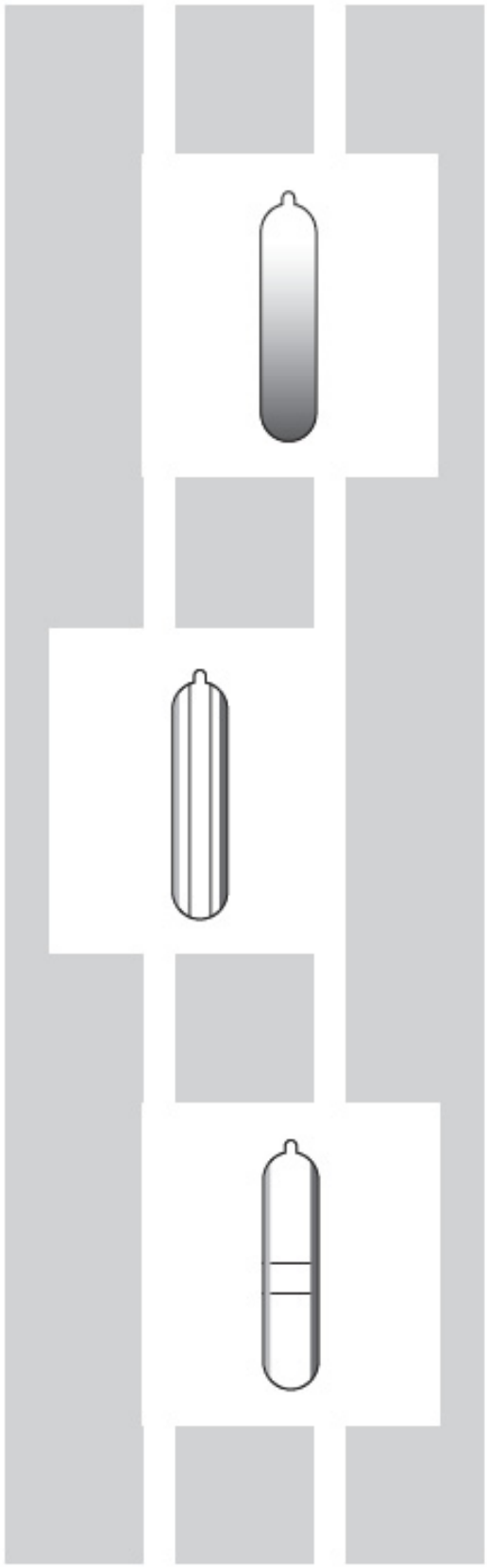
Disclaimer

IT IS EXPRESSLY AGREED THAT THE ABOVE WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND OF THE WARRANTY OF MERCHANTABILITY AND 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.

Factory Rotor Inspection Service

Beckman Coulter, Inc., will provide free mechanical and metallurgical inspection in Indianapolis, Indiana, USA, of any Beckman Coulter rotor at the request of the user. (Shipping charges to Beckman Coulter are the responsibility of the user.) Rotors will be inspected in the user's laboratory if the centrifuge in which they are used is covered by an appropriate Beckman Coulter Service Agreement. Contact your local Beckman Coulter office for details of service coverage or cost.

Before shipping, contact the nearest Beckman Coulter Sales and Service office and request a Returned Goods Authorization (RGA) form and packaging instructions. Please include the complete rotor assembly, with buckets, lid, handle, tube cavity caps, etc. A SIGNED STATEMENT THAT THE ROTOR AND ACCESSORIES ARE NON-RADIOACTIVE, NON-PATHOGENIC, NON-TOXIC, AND OTHERWISE SAFE TO SHIP AND HANDLE IS REQUIRED.



Related Documents

Rotors and Tubes for Beckman Coulter Tabletop Preparative Ultracentrifuges (TLR-IM-9)

- Rotors
- Tubes and Accessories
- Using Tubes and Accessories
- Using Rotors
- Care and Maintenance
- Chemical Resistances
- The Use of Cesium Chloride Curves
- Gradient Materials
- References

Additional References

- Chemical Resistances for Beckman Coulter Centrifugation Products (IN-175)
- Ultracentrifuge Rotors, Tubes, and Accessories catalog (BR-8101)
- Use and Care of Tubes and Bottles (IN-192)

Available in electronic pdf or in hard copy by request.

Available at www.beckman.com.

www.beckman.com

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