Instructions For Use

# TLN-120
# Near-Vertical Tube Rotor

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



TL-TB-017AE
September 2016

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

BECKMAN COULTER

**TLN-120 Near-Vertical Tube Rotor**
TL-TB-017AE (September 2016)

©2016 Beckman Coulter, Inc.
All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from Beckman Coulter, Inc.

Beckman Coulter, Optima, Quick-Seal and the stylized logo are trademarks of Beckman Coulter, Inc. and are registered in the USPTO.

All other trademarks, service marks, products, or services are trademarks or registered trademarks of their respective holders.

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

Printed in U.S.A.

# Safety Notice

**Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to use this equipment. Do not attempt to perform any procedure before carefully reading all instructions. Always follow product labeling and manufacturer's recommendations. If in doubt as to how to proceed in any situation, contact your Beckman Coulter Representative.**



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

## Alerts for Warning, Caution, and Note

**DANGER**

**DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

**WARNING**

**WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

**CAUTION**

**CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.**

**NOTE** NOTE is used to call attention to notable information that should be followed during installation, use, or servicing of this equipment.

## Safety Information for the TLN-120 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 ultracentrifuge.

Although rotor components and accessories made by other manufacturers may fit in the TLN-120 rotor, their safety in this rotor cannot be ascertained by Beckman Coulter. Use of other manufacturers' components or accessories in the TLN-120 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 and/or floating spacers inserted before installing the rotor lid.

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 Speeds*.

Do not use sharp tools on the rotor that could cause scratches in the rotor surface. Corrosion begins in scratches and may open fissures in the rotor with continued use.

# Contents


## Safety Notice, iii

Alerts for Warning, Caution, and Note, iii

Safety Information for the TLN-120 Rotor, iii

## TLN-120 Near-Vertical Tube Rotor, 1

Specifications, 1

Description, 2

Preparation and Use, 3
- Prerun Safety Checks, 3
- Tubes, 3
- Using the Rotor Vise, 4
- Rotor Preparation, 4
- Operation, 6
- Removal and Sample Recovery, 7
  - Temperature Limits, 8
  - Quick-Seal Tubes, 8
- Run Times, 8
- Run Speeds, 10

Selecting CsCl Gradients, 12
- Typical Examples for Determining CsCl Run Parameters, 14

Care and Maintenance, 16
- Maintenance, 16
  - Rotor Plugs, 16
  - Rotor, 16
  - Rotor Vise, 17
- Cleaning, 17
- Decontamination, 18
- Sterilization and Disinfection, 18
- Storage, 18

Returning a Rotor, 19

Supply List, 19
- Replacement Rotor Parts, 20
- Other, 20

# Illustrations

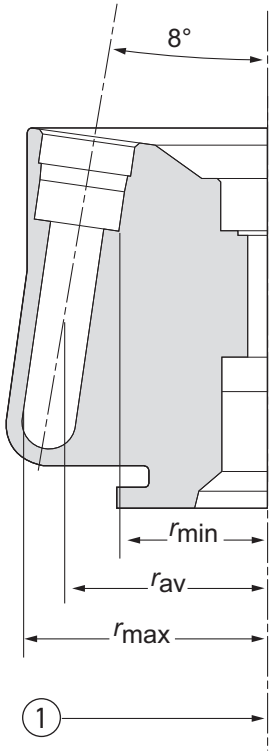
1 The TLN-120 Rotor and Accessories, 4
2 Arranging Tubes in the Rotor, 5
3 Correct Loading of the TLN-120 Rotor, 5
4 Precipitation Curves for the TLN-120 Rotor, 12
5 CsCl Gradients at Equilibrium for the TLN-120 Rotor, 13

# Tables

1 Relative Centrifugal Fields for the TLN-120 Rotor, 11

# TLN-120 Near-Vertical Tube Rotor

## Specifications



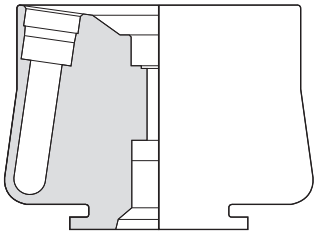

U.S. Pat. Nos. 4,102,490
U.S. Pat. Nos. 4,290,550
Japanese Pat. No. 1,469,154

**1.** Axis of Rotation

| | |
|---|---|
| Maximum speed | 120,000 RPM |
| Density rating at maximum speed | 1.7 g/mL |
| Relative Centrifugal Field[a] at maximum speed | |
| at $r_{max}$ (36.3 mm) | 585,000 × *g* |
| at $r_{av}$ (30.3 mm) | 489,000 × *g* |
| at $r_{min}$ (24.3 mm) | 392,000 × *g* |
| *k* factor at maximum speed | 7 |
| Conditions requiring speed reductions | see *Run Speeds* |
| Number of tube cavities | 8 |
| Available tubes part number | 361082 |
| Nominal tube dimensions | 8 × 35 mm |
| Nominal tube capacity | 1.2 mL |
| Nominal rotor capacity | 9.6 mL |
| Approximate acceleration time to maximum speed (fully loaded) | 3 1/2 min |
| Approximate deceleration time from maximum speed (fully loaded) | 2 min |
| Weight of fully loaded rotor | 0.8 kg (1.8 lb) |
| Rotor material | titanium |

a. Relative Centrifugal Field (RCF) is the ratio of the centrifugal acceleration at a specified radius and speed ($rw^2$) 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 = 1.12r (RPM/1000)$^2$

# Description



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

The TLN-120 is a near-vertical tube rotor with a tube angle of 8 degrees from the axis of rotation. The rotor can centrifuge up to eight 8 × 35-mm (1.2 mL) Quick-Seal tubes.

**⚠ CAUTION**

**Before the TLN-120 rotor is used in a TL-100 ultracentrifuge, the instrument must be updated with a new drive spindle and updated operating software (modification kit number 360477). Operation of the TLN-120 rotor in an unmodified TL-100 may cause the rotor to stick or slip on the spindle**

The slight angle of this rotor significantly reduces run times from a more conventional fixed angle rotor (with a tube angle of 20 to 30 degrees), while allowing components that do not band under separation conditions to either pellet to the bottom or float to the top of the tube.

One example of this process is the separation of plasmid DNA and chromosomal DNA in cesium chloride-ethidium bromide gradients. RNA will pellet; protein and other cellular components with low buoyant density in CsCl will float. The super-coiled plasmic will band in the central area of the tube with typical ClCl densities (approximately 1.55 g/mL). With typical sample loading, the plasmid band will not be in contact with the pellet or the components of the sample which float.

The rotor is made of titanium and is finished with black polyurethane paint. A rotor plug and red tube spacer hold each tube in the rotor, and a plug gasket forms a closure around each rotor plug. The tube cavities are numbered to aid in sample identification.

A plunger mechanism in the rotor is used to secure the rotor to the drive hub before the run begins. Engaging the plunger ensures that the rotor remains seated during centrifugation.

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

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

# Preparation and Use

*Specific information about the TLN-120 rotor is given here. Information common to this and other rotors is contained in* Rotors and Tubes for Tabletop Preparative Ultracentrifuges (*publication TLR-IM), which should be used together with this manual for complete rotor and accessory operation. Publication TLR-IM is included in the literature package shipped with the rotor.*

**NOTE** Although rotor components and accessories made by other manufacturers may fit in the TLN-120 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.*

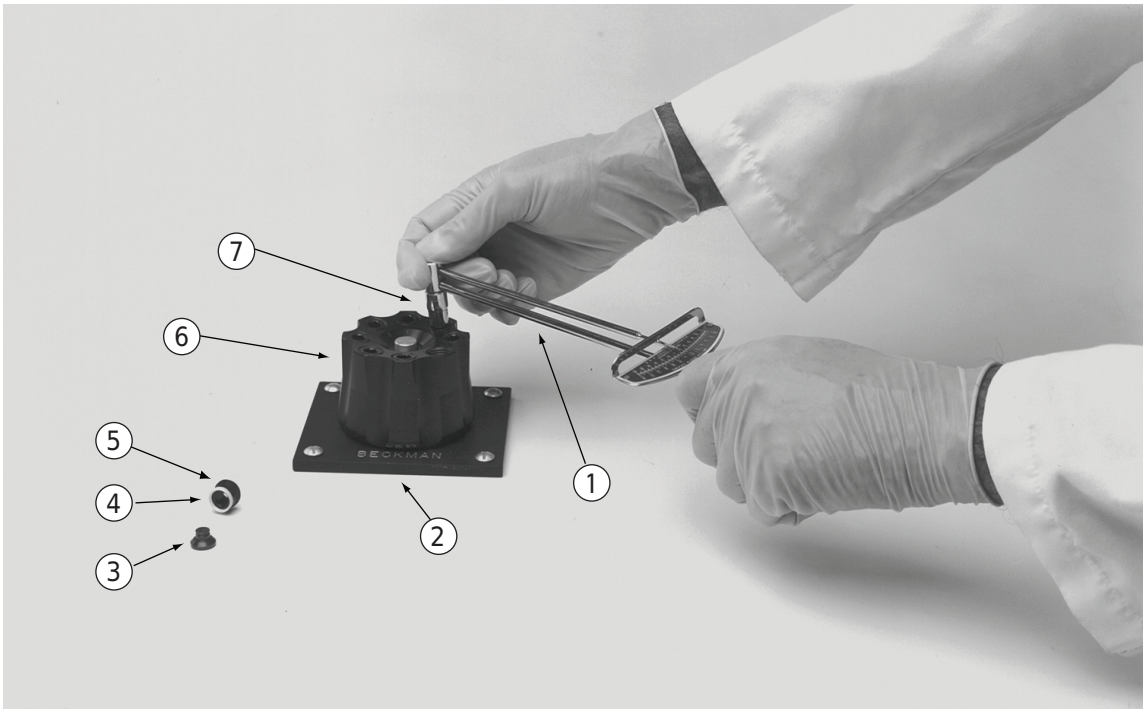
1. Inspect the rotor plugs, gaskets, spacers, and plunger mechanism for damage—the high forces generated in this rotor can cause damaged components to fail.
2. Use only Quick-Seal tube 361082.
3. Check the chemical compatibilities of all materials used (refer to *Chemical Resistances,* publication IN-175).

## Tubes

The TLN-120 rotor may be operated only with Quick-Seal tube 361082 (see Figure 1). The 8 × 35-mm (1.2 mL) tubes are made of propylene ethylene copolymer (polypropylene), and should not be centrifuged below 2°C. Polypropylene tubes may be centrifuged at temperatures up to 40°C (unless the sample material has an adverse effect on tube material), but they should be pretested under anticipated run conditions. If samples have been frozen in polypropylene tubes, made sure tube and sample are thawed to at least 2°C before centrifuging. Refer to publication IN-175, *Chemical Resistances*, for information on the chemical resistances of tube and accessory materials.

Fill Quick-Seal tubes leaving a *small* (1-mm diameter) bubble of air at the base of the neck. Do not leave a large air space—too much air can cause *excessive* tube deformation. The tubes are then heat-sealed. Refer to publication IN-181, *How to Use Quick-Seal Tubes with the Beckman Coulter Cordless Tube Topper*, for more detailed information on filling and sealing Quick-Seal tubes.

**Figure 1** The TLN-120 Rotor and Accessories




1. Torque Wrench
2. Rotor Vise
3. Spacer
4. Gasket
5. Plug
6. Rotor
7. Plug Adapter

## Using the Rotor Vise

Attach the rotor vise to a clean, dry, rigid surface, using the four screws provided with the *vise. It is essential that you attach the vise with the word "Beckman" facing upward as shown in* Figure 1. Otherwise, the vise cannot hold the rotor stationary.

To use the vise, insert the rotor base into the hole. As you begin to tighten the first plug, the rotor will shift into locked position. To remove the rotor after all plugs are tightened, slide it sideways slightly until you can lift it out of the vise.

## Rotor Preparation

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

1 Inspect the rotor plugs and gaskets for damage.

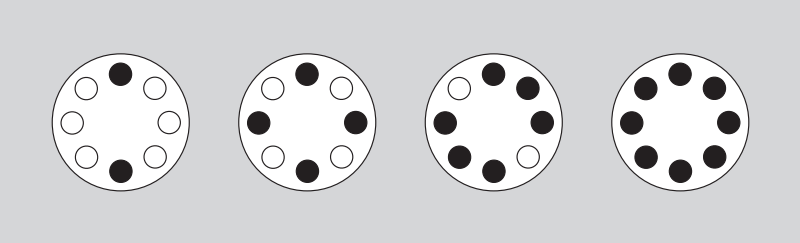
**a.** Be sure that the plug threads are lightly but evenly lubricated with Spinkote lubricant to ensure a proper seal by minimizing thread friction.

**2** Insert the rotor into the rotor vise.

**a.** Load the filled and sealed tubes symmetrically into the rotor.

- Two, four, six, or eight tubes can be run if they are positioned in the rotor as shown in Figure 2.
- Tubes placed opposite each other must be filled with liquid of the same density.

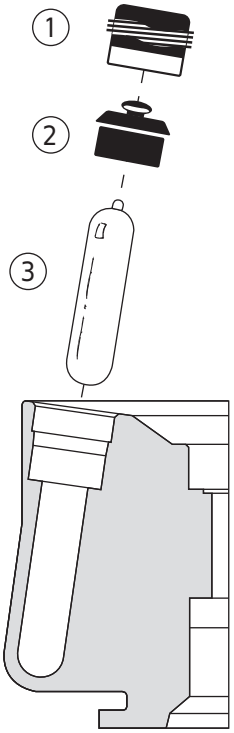
**Figure 2** Arranging Tubes in the Rotor



**3** Place a spacer (see Figure 3) on top of each tube when the tube is loaded into the rotor.

- *In a near-vertical tube rotor, it is important that each cavity being used is completely filled.*

**Figure 3** Correct Loading of the TLN-120 Rotor




1. Rotor Plug and Gasket
2. Aluminum Spacer
3. Quick-Seal Tube

**⚠ CAUTION**

**To avoid plug damage, do not insert plugs or spacers into empty cavities. Leave unused cavities completely empty.**

4 Insert a plug, gasket-side down, over each spacer and screw it in using the plug adapter (Figure 1).

**a.** Tighten the plugs with a torque wrench and plug adapter to 13.6 N•m (120 in.-lb).

**b.** *To avoid stripping the plugs, apply downward pressure to the plug adapter while tightening the plugs.*

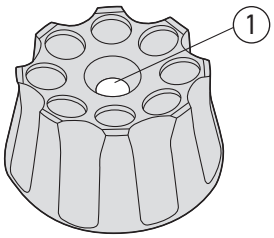
- Do not overtighten plugs.

## 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.




**1.** Plunger Engaged

**a.** If the plunger pops up, repeat the procedure.

- The Optima MAX-TL, MAX-XP, MAX, and MAX-E ultracentrifuges automatically secure the rotor to the drive shaft without the need for engaging the plunger.

**⚠ CAUTION**

**In all ultracentrifuge models except the Optima MAX-TL, MAX-XP, MAX, 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.**

3 Refer to the instrument instruction manual for ultracentrifuge operation.

4 For additional operating information, see the following:

- *Run Times*, page 8, for using *k* factors to adjust run durations.
- *Run Speeds*, page 10, for information about speed limitations.
- *Selecting CsCl Gradients*, page 12, for methods to avoid CsCl precipitation during centrifugation.

Vertical banding of sample and gradient occurs during centrifugation. With deceleration, tube contents reorient back to a horizontal position. For gradient stability when preformed gradients are used, select slow acceleration and deceleration profiles (see the instrument instruction manual).

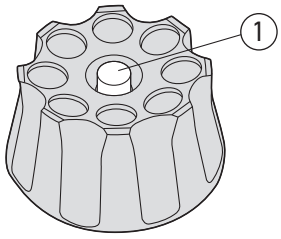
## Removal and Sample Recovery

**⚠ 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.



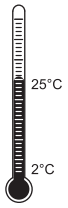

**1.** Plunger Released

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

3 Remove the plugs with the torque wrench and plug adapter.

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

The Beckman Coulter CentriTube Slicer (347960) is designed to recover sample fractions from small plastic tubes. Contact your Beckman Coulter representative to obtain information about this system.

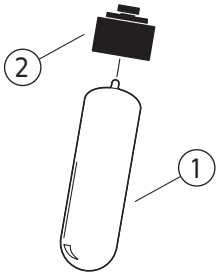



### Temperature Limits

- 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.




1. Quick-Seal Tube
2. Black Aluminum Spacer

**1** Fill Quick-Seal tubes leaving a *small* bubble of air at the base of the neck.

**a.** Do not leave a large air space—too much air can cause excessive tube deformation.

**2** Refer to *Rotors and Tubes* for detailed information on the use and care of Quick-Seal tubes.

## 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**

$$k_{adj} = k \left( \frac{120{,}000}{\text{actual run speed}} \right)^2$$

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.

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**

$$\text{reduced maximum speed} = (120{,}000\ \text{RPM}) \sqrt{\frac{1.7\ \text{g/mL}}{\rho}}$$

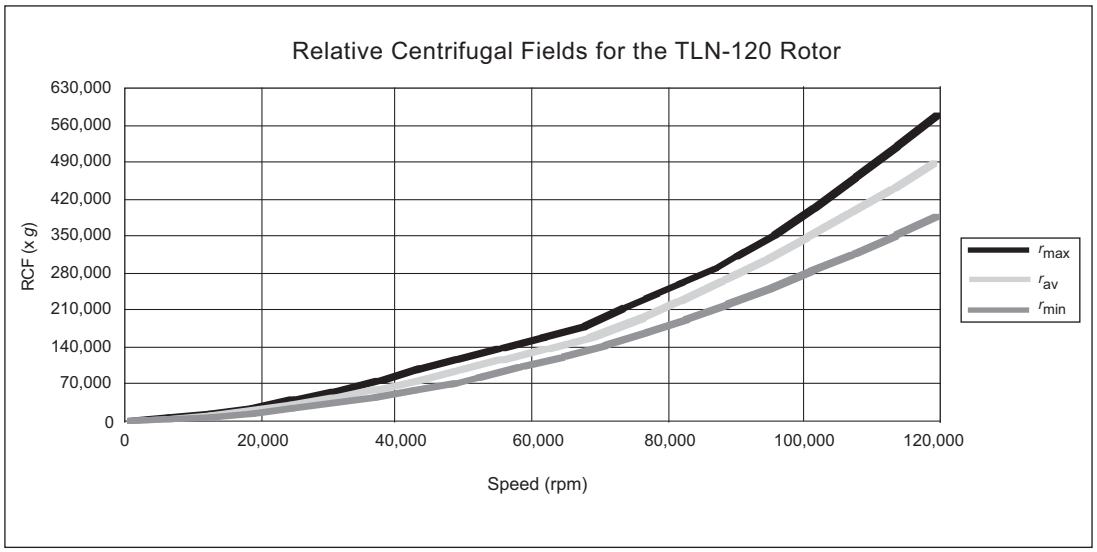
where ρ is the density of the tube contents. This speed reduction will protect the rotor from excessive stresses due to the added tube load.

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 4 and Figure 5, together with the description and examples below, show how to reduce run speeds when using CsCl gradients.

**Table 1** Relative Centrifugal Fields for the TLN-120 Rotor[a]

| Rotor Speed (RPM) | Relative Centrifugal Field (× *g*) | | | *k* Factor* |
|---|---|---|---|---|
| | At $r_{max}$ (36.3 mm) | At $r_{av}$ (30.3 mm) | At $r_{min}$ (24.3 mm) | |
| 120,000 | 585,000 | 489,000 | 392,000 | 7 |
| 115,000 | 538,000 | 449,000 | 360,000 | 8 |
| 110,000 | 492,000 | 411,000 | 329,000 | 8 |
| 105,000 | 448,000 | 374,000 | 300,000 | 9 |
| 100,000 | 407,000 | 339,000 | 272,000 | 10 |
| 95,000 | 367,000 | 306,000 | 246,000 | 11 |
| 90,000 | 329,000 | 275,000 | 220,000 | 13 |
| 85,000 | 294,000 | 245,000 | 197,000 | 14 |
| 80,000 | 260,000 | 217,000 | 174,000 | 15 |
| 75,000 | 229,000 | 191,000 | 153,000 | 18 |
| 70,000 | 199,000 | 166,000 | 133,000 | 21 |
| 65,000 | 172,000 | 143,000 | 115,000 | 24 |
| 60,000 | 146,000 | 122,000 | 98,000 | 28 |
| 55,000 | 123,000 | 103,000 | 82,300 | 34 |
| 50,000 | 102,000 | 85,800 | 68,000 | 41 |

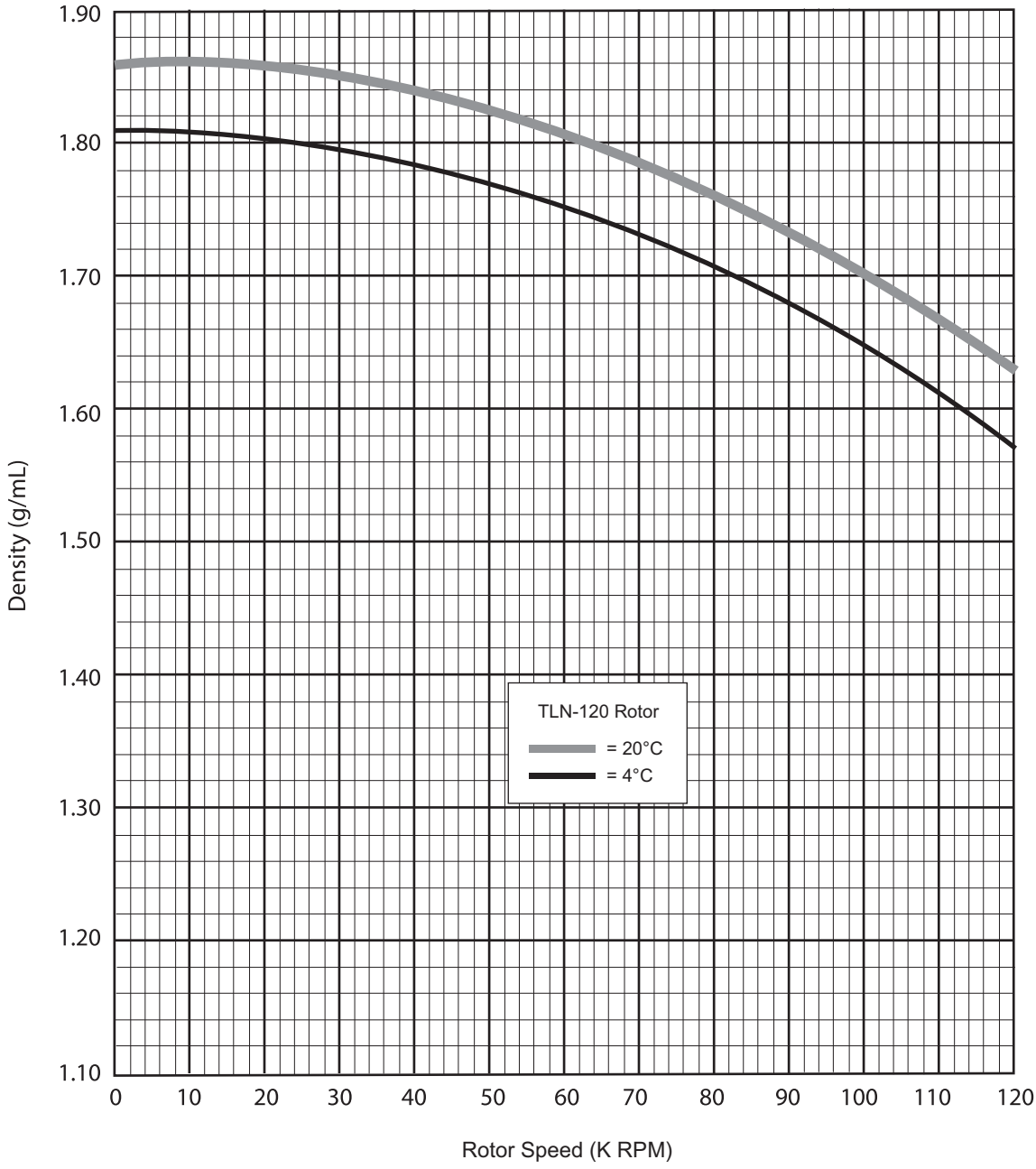
a. Entries in this table are calculated from the formula RCF = 1.12r (RPM/1000)2 and then rounded to three significant digits.



# Selecting CsCl Gradients

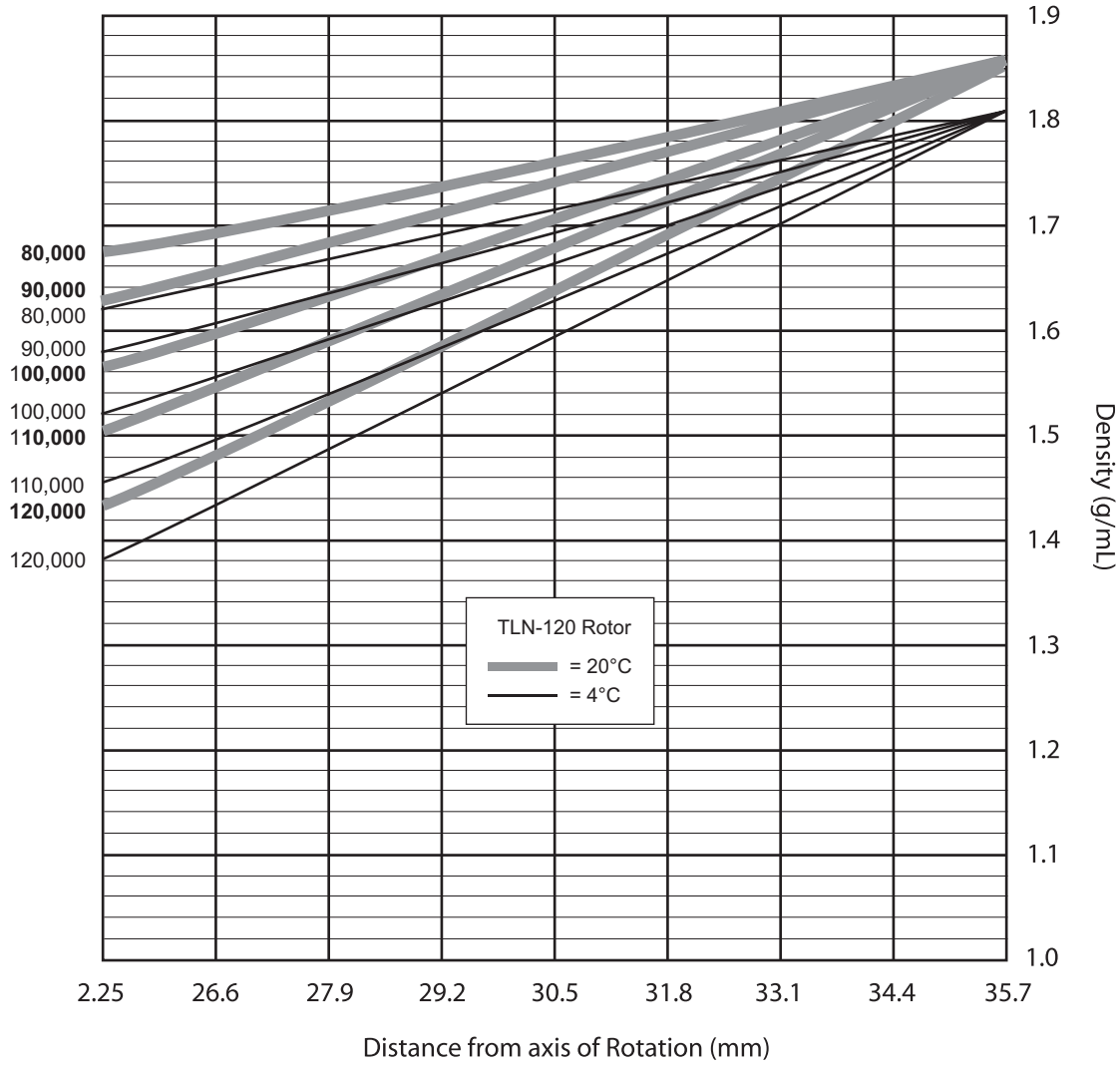
Precipitation during centrifugation would alter density distribution, and this would change the position of the sample bands. Curves in Figure 4 and Figure 5 are provided up to the maximum rated speed of the rotor

**Figure 4** Precipitation Curves for the TLN-120 Rotor*




* Using combinations of rotor speeds and homogeneous CsCl solution densities that intersect on or below these curves ensures that CsCl will not precipitate during centrifugation.

**Figure 5** CsCl Gradients at Equilibrium for the TLN-120 Rotor*




**NOTE** The curves in Figure 4 and Figure 5 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.

Solid CsCl has a density of 4 g/mL, and if precipitated during centrifugation may cause rotor failure. Precipitation will also alter density distribution, and therefore sample separation. In general, lower speeds provide better resolution, but longer run times will be required to achieve particle separation and gradient equilibrium.

Rotor speed is used to control the slope of a CsCl density gradient (Figure 5), and must be limited so that CsCl precipitation is avoided. The reference curves in Figure 4 show gradient distribution at equilibrium. Each curve in Figure 5 is within the density limits allowed for the TLN-120 rotor: each curve was generated for a single run speed using the maximum allowable homogeneous CsCl densities (one for each fill level) that avoid precipitation at that speed. (The gradients in Figure 5 can be generated from step or linear gradients, or from homogeneous solutions. But the total amount

* Centrifugation of homogeneous CsCl solutions at the maximum allowable speeds (from Figure 5) results in gradients presented here. The homogeneous CsCl solution density used to generate each curve is printed along the curve.

of CsCl in solution must be equivalent to a homogeneous solution corresponding to the concentrations specified in Figure 4.) If the desired gradient curve is not shown in Figure 5, interpolate between the nearest curves and draw it in. Figure 5can also be used to approximate the banding positions of sample particles.

## Typical Examples for Determining CsCl Run Parameters

**Example A:**
Knowing homogeneous CsCl solution density (1.67 g/mL) and approximate particle buoyant densities (1.70 and 1.67 g/mL), where will particles band?

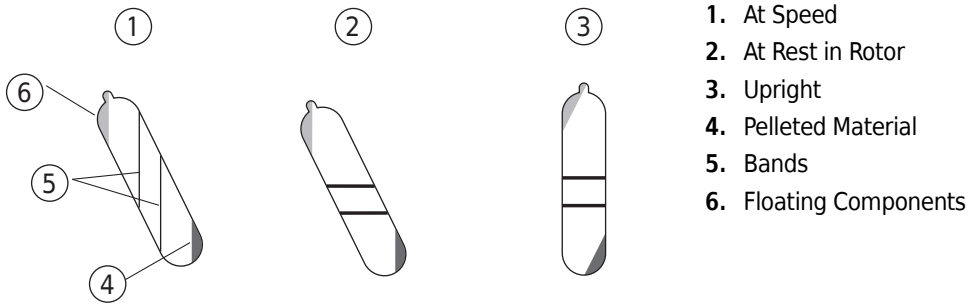
1 In Figure 4, find the curve that corresponds to the required run temperature (20°C).

- The maximum allowable rotor speed is determined from the point where this curve intersects the homogeneous CsCl density (110,000 RPM).

2 In Figure 5, sketch in a horizontal line corresponding to each particle's buoyant density and find the density gradient curve corresponding to the above speed (110,000 RPM).

3 Mark the point in the figure where each particle density intersects the curve corresponding to the run speed (110,000 RPM) and temperature (20°C).

4 Particles will band at these marked points along the tube axis.




1. At Speed
2. At Rest in Rotor
3. Upright
4. Pelleted Material
5. Bands
6. Floating Components

In this example, the particles will band about 31.2 and 30.5 mm from the axis of rotation, about 0.7 mm of centerband-to-centerband separation at the rotor's 8-degree tube angle. When the tube

is removed from the rotor and held upright (vertical and stationary), there will be abut 5.04 mm of centerband-to-centerband separation. This distance, dup, can be calculated from the formula:

**EQ 7**

$$d_{up} = \frac{d_\theta}{\cos\theta}$$

where $d_\theta$ is the centerband-to-centerband distance when the tube is held at an angle, $\theta$ in the rotor.

**Example B:**
Knowing particle buoyant densities (1.64 and 1.67 g/mL), how do you get the best separation? Assume 20°C operation.

**1** In 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 along the selected curve (90,000 RPM).

**4** From Figure 5, determine the maximum homogeneous CsCl density that corresponds to the temperature (20°C) and run speed (90 000 RPM) established above.

- These parameters will provide the particle-banding pattern selected in Step 2.

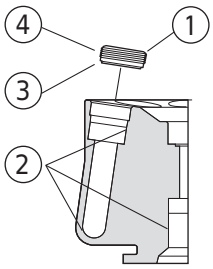
In this example, the particles will separate better along the 90,000-RPM curve than along the higher-speed curves. At 90,000 RPM, particles will band about 27.9 and 26.6 mm from the axis of rotation. In this example, the 1.3 mm of centerband-to-centerband separation achieved during centrifugation will reorient to about 94-mm separation when the tube is removed and held upright

# 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.

### Rotor Plugs




1. Plug (368549)
2. Check for Corrosion
3. Gasket (347371)
4. Threads

**1** Regularly lubricate the metal threads in the rotor plugs with a thin, even coat of Spinkote lubricant.

- *Failure to keep them lubricated can result in seized or galled threads or an inadequate seal during centrifugation.*
- Replace rotor plugs (as a set) if they show signs of wear.

**2** The rotor plug gaskets require no maintenance except being kept clean.

**a.** Replace damaged gaskets.

**b.** To replace the plug gasket, use the sharpened end of a cotton swab or similar nonmetallic tool to pry the gasket from the plug.

**c.** *Do this carefully so that the plug is not damaged.*

- The new gasket snaps onto the grooved end of the plug.

### Rotor

Store the rotor in a dry environment (not in the instrument). Refer to Appendix A in *Rotors and Tubes* 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.

### Rotor Vise

If you need to move the rotor vise after initial installation:

1 Use a flat-blade screwdriver or other tool to pry the vise loose.

   **a.** *Be careful not to scratch the surface of the vise.*

2 If adhesive tape was used to secure the vise, scrape off any tape that remains on the table or vise. Use a solvent, such as acetone, to help remove the adhesive.

3 Use four screws (977305) to reattach the vise as described under *Using the Rotor Vise*, above.

## 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 (339558) contains two plastic- coated brushes and two quarts of Solution 555 for use with rotors and accessories.
  - Dilute the detergent 10 to 1 with water.

**NOTE** Do not wash 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.

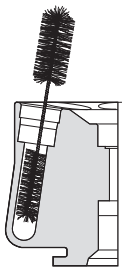
3 Air-dry the rotor upside down.

- *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.



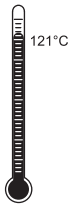
## Decontamination





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* 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 one hour. Remove the lid from the rotor and place the rotor, lid, and O-ring in the autoclave upside down.
- Ethanol (70%)* or hydrogen peroxide (6%) may be used on all rotor components, including those made of plastic. Bleach (sodium hypochlorite) may be used, but may cause discoloration of anodized surfaces. Use the minimum immersion time for each solution, per laboratory standards.

While Beckman Coulter has tested these methods and found that they do not damage the rotor or components, no guarantee of sterility or disinfection is expressed or implied. When sterilization or disinfection is a concern, consult your laboratory safety officer regarding proper methods to use.

## 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.

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

## Returning a Rotor

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

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

To protect our personnel, it is the customer's responsibility to ensure that all parts are free from pathogens and/or radioactivity. Sterilization and decontamination must be done before returning the parts. Smaller items (such as tubes, bottles, etc.) should be enclosed in a sealed plastic bag.

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

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

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

## Supply List

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

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

## Replacement Rotor Parts

| Description | Part Number |
|---|---|
| TLN-120 rotor assembly | 361062 |
| Rotor plug (does not include gasket) | 368549 |
| Plug gasket | 347371 |
| Rotor vise | 347373 |
| Cap and plunger assembly | 349339 |

## Other

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

| Description | Part Number |
|---|---|
| Quick-Seal tubes, 8 x 35-mm; 1.2 mL (pkg/50) | 361082 |
| Tube spacer | 361061 |
| Quick-Seal tube sealing rack | 348302 |
| 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 |
| Quick-Seal Cordless Tube Topper kit, 50-Hz (Canada) | 367803 |
| Tube Topper rack | 355872 |
| Torque wrench | 858121 |
| Plug adapter | 976959 |
| Beckman Coulter CentriTube Slicer | 347960 |
| CentriTube Slicer replacement blades (pkg of 10) | 348299 |
| CentriTube Slicer adapter (for 13-mm tubes) | 354526 |
| Tube removal tool | 338765 |
| Hemostat (6-in., curved) | 927208 |
| Spinkote lubricant (2 oz) | 306812 |
| Rotor vise mounting screws (pkg/4) | 977305 |
| 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.

**Beckman Coulter will assist in seeking compensation under the manufacturer's warranty.**

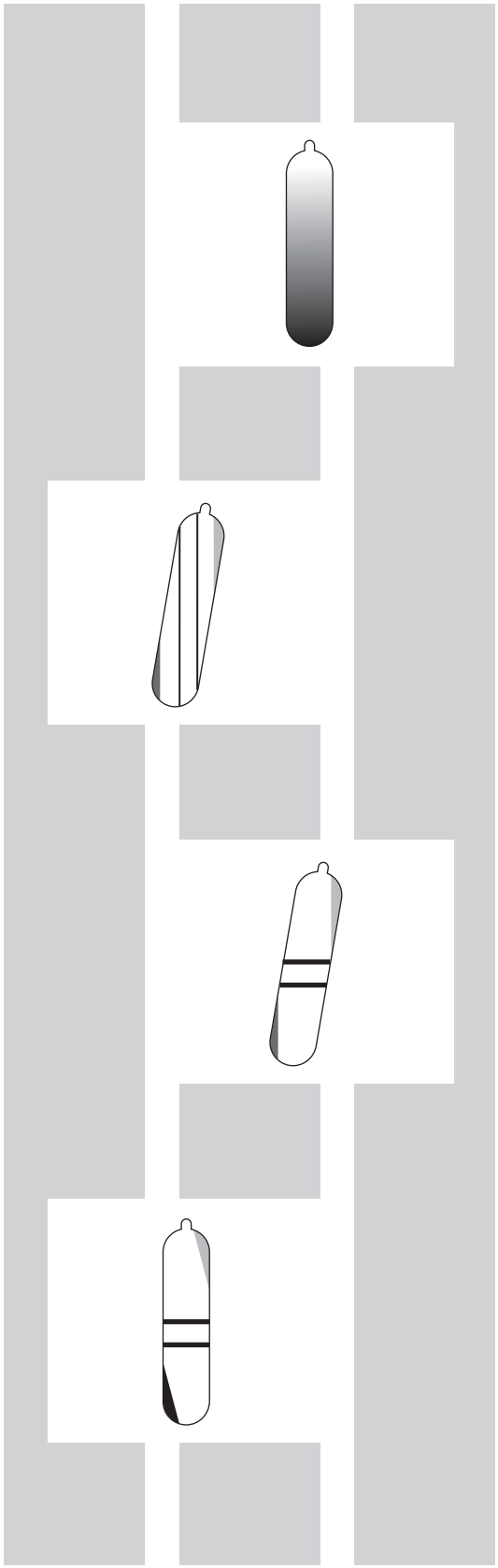
### Disclaimer

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

Available in electronic pdf or CD-ROM by request.

**Additional References**

- Chemical Resistances for Beckman Coulter Centrifugation Products (IN-175)
- How to Use Beckman Coulter Cordless Tube Topper with Quick-Seal Tubes (IN-181)
- Ultracentrifuge Rotors, Tubes, and Accessories catalog (BR-8101)

Available in hard copy or electronic pdf by request.

Available at www.beckmancoulter.com

© 2016 Beckman Coulter, Inc.
All Rights Reserved

**www.beckmancoulter.com**

© 2016 Beckman Coulter, Inc.
All Rights Reserved