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Thermo Scientific Rotor Care Guide

Protect your rotor investment





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Thermo Scientific Rotor Care Guide

Thermo Scientific rotors meet the high standards we set for all of our laboratory products. The precision-engineered design of each rotor, the laboratory tested operating procedures that accompany it and the worldwide network of technical support, customer service and field service personnel ensure the safe and productive operation of your Thermo Scientific centrifuge. Good maintenance however, plays a major role in protecting your rotor and extending its life. This guide is designed to assist you in a program of regular rotor care and inspection...the best way to protect your rotor investment.



Regular cleaning of your rotors will give you years of service and maximize your initial investment.

We offer rotor safety seminars and rotor inspection and safety clinics to ensure the longevity of your investment, and the safety of your workplace.

Visit **www.thermo.com/rotors** for details.

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It is important to differentiate between a scratch and a gouge when evaluating your rotor.

EVALUATION

Rotors are frequently damaged in use. In order to determine if they can be repaired, consideration is given to the location and extent of the damage, age of the rotor and general overall rotor condition. A differentiation should be made between light scratches and gouges. A light scratch will not affect safe operation of the rotor as long as:

- There is no corrosion around the scratch site
- The base metal has not been removed or gouged
- The scratch is in a low stress area
- There are no exposed fibers on carbon fiber rotors

Visually inspect the rotor every time you use it. Schedule a thorough inspection by a Thermo Scientific product representative as part of your annual preventative instrument maintenance program, to determine if corrosion has initiated a crack in the rotor body. Any indication of a crack is cause for immediate rotor replacement. If the rotor is damaged in a low stress area, it may be possible to continue use, but this must be evaluated by a technician.

A thorough inspection will determine if your rotor:

- Is safe for continued operation
- Should be sent for a more extensive evaluation to the manufacturer
- Should be retired and replaced immediately

HANDLING

Improper installation may cause rotor failure. Be extremely careful when handling parts of the rotor.

- Always lock rotors to the spindle, if applicable.
- Ensure buckets are properly seated on their pins.
- Always use the tightening tool on locking knobs and body caps.
- Use proper rotor extractor tool to remove a rotor that can not be removed from the drive.
- Avoid dropping or striking the rotor against a hard surface – it can be permanently damaged.
- Avoid putting anything inside the rotor that could scratch or nick the surface.

Ensure that all tubes, bottles and adapters are being used within their specified limits and according to manufacturers' directions. Tube or bottle failures during centrifugation can result in minor to severe damage to rotors and centrifuge.





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Our swing out rotors offer the convenience and security of buckets that are loaded and unloaded through the top of the rotor body. This innovative time-saving design keeps samples secure by preventing cross-hanging of buckets and consequent run shut-downs.





Our unique Thermo Scientific StepSaver® rotors streamline sample loading and unloading, minimizing opportunities for sample loss.

MAXIMIZE ROTOR LIFE BY REDUCING STRESS

Stress distribution is an important consideration when trying to evaluate the extent of damage in the rotor. Ultraspeed rotors experience the highest level of stress of all rotors. If an ultraspeed rotor is run above its rated speed, it probably has exceeded its yield point. In this event, the metal is permanently stressed and rotor life is severely compromised. Lower speed rotors will also reach a point where the number of runs and the speed of those runs have fatigued them. This point varies from rotor to rotor, but corrosion, improper handling and misuse will often require that you retire your rotor long before normal fatigue becomes a problem.

MISSING PAINT AND ANODIZATION

Missing paint will not affect the life of a titanium rotor or carbon fiber rotor. However, if there is missing anodization on an aluminum rotor, this is a sign that it may be time to retire the rotor.

DROPPED ROTORS

Deformation caused by dropping the rotor cannot be repaired. The rotor should be replaced.

OVERHEATING

Lowspeed and superspeed aluminum rotors and carbon fiber rotors can be autoclaved up to 121˚C. Indications of an overheated rotor are melted bottles, other melted plastic or a rotor that is too hot to touch. Titanium and stainless steel rotors can withstand higher temperatures and are not likely to be damaged by heat generated in the centrifuge.

RUNNING ROTORS OVERSPEED

It is critical that rotors are operated within the stated guidelines for speed and maximum compartment mass. A rotor that is used above its maximum rated speed or mass should be removed from service immediately.



Heavy corrosion can result in premature rotor failure.

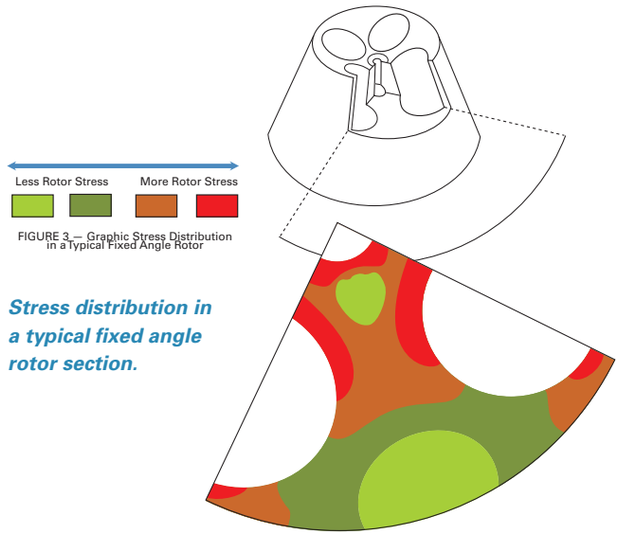


FIGURE 3 — Graphic Stress Distribution in a Typical Fixed Angle Rotor

Stress distribution in a typical fixed angle rotor section.

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Extend the Life of Your Rotor with Proper Maintenance

Corrosion, pitting and even minor surface imperfections all affect the life of the rotor. Any surface damage increases stress locally and makes it difficult to predict at what point the rotor material could fail.

CLEANING & MAINTENANCE

Corrosion can be avoided by following a routine maintenance program after each rotor use, thereby prolonging the rotor's useful life.

- Clean your rotors, lids, adapters and any associated parts with a 1% solution of a mild non-alkaline detergent such as dishwashing liquid, rinse with distilled water and dry thoroughly with a soft cloth.
- Do not use strong alkaline laboratory detergent on aluminum rotors. If encrusted material is present, remove it with a soft, twisted-bristle brush, using the 1% non-alkaline soap solution.
- For benchtop, lowspeed and superspeed swinging bucket rotors, keep the bucket trunnion pins clean and lubricated.
- As part of a weekly maintenance schedule, lubricate o-rings with vacuum grease and metal rotor threads with anti-galling grease (when specified in rotor manual).
- An additional coating of paste wax will prolong the life of the anodized coating.

Note: Refer to Chemical Compatibility Charts by visiting **www.thermo.com/rotors** for details.

STORAGE

- Any moisture left on the rotor can initiate corrosion.
- Remove all adapters from rotor cavities when not in use.
- Store your dried rotors upside down on a PTFE-coated or plastic matting that allows for airflow or ventilated shelf to avoid gathering condensation in the cavity or bucket bottom.

DECONTAMINATION

Given the nature of samples processed in a rotor, either biological or radioactive contamination is possible. For biological contamination of rotors, a 2% glutaraldehyde solution, ethylene oxide or ultraviolet radiation are the recommended methods of sterilization.

- Do not use chlorine bleach on aluminum rotors.
- When autoclaving, rotor components should be separated.
- If sterilization is not necessary, a 70% solution of ethanol can be used.
- Most commercially available radioactivity econtaminants are not compatible with aluminum or anodized coatings and should not be used.
- For a rotor that may be contaminated by a radioactive sample, use a solution of equal parts of 70% ethanol, 10% SDS and water.
- Rinse with ethanol, followed by water and dry with a soft cloth.
- Do not immerse Thermo Scientific SUPER-LITE® rotors. Spin rotor to remove liquid.
- SUPER-LITE and Thermo Scientific FIBERlite® composite rotors are not compatible with ethylene oxide.

For further details on cleaning, decontamination and sterilization please see your rotor instruction manual or visit **www.thermo.com/rotors.**





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Good maintenance plays a major role in protecting your rotor and extending its life. Consult your local representative or visit www.thermo.com/rotors to set up a rotor evaluation and inspection to ensure your rotors are in good working condition.

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Rotors are a significant capital investment. Proper inspection practices can prolong the life of your rotors and maximize that investment.

1. **Be aware of the warning signs for potential problems.**
2. **Be proactive and schedule regular rotor inspection clinics to ensure the safety of your rotor investments and lab work environment.**
3. **Work with your Thermo Scientific product representative to evaluate and correct any areas of concern to prolong the life of your rotors.**

Samples processed in a rotor may cause either biological or radioactive contamination. We require that the rotor be thoroughly cleaned, decontaminated and documented before servicing (we provide decontamination certificates with the purchase of any rotor). If decontamination is not required, note this on the certificate. Decontamination Certificates are found in the rotor instruction manual or you may contact a Thermo Scientific product representative.



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The following table will help you identify what to look for when inspecting your rotor and recommendations on how to prevent and or remedy the situation.

	What to look for	Preventative measures to take	Next steps
1	**Damage to lid assembly**	*Lubricate periodically with a light film of vacuum grease. Lubricate lid assembly threads weekly with anti-galling grease. Avoid banging or dropping. Never use metallic objects to loosen debris or o-rings.*	Some parts can be repaired or replaced
2	**Damage to bio-containment sealing lid**	*Never use sharp objects to remove o-rings. Inspect and replace o-rings regularly. Remove lids from service when they begin to show signs of wear such as crazing or discoloration.*	Replace
3	**Scoring outside of cone area**	*Never use metal objects to clean. Inspect centrifuge mated parts for burrs and ensure no debris in centrifuge chamber.*	Return to manufacturer or replace
4	**Damage or corrosion to the pins in the rotor adaptor**	*Ensure rotor is locked to centrifuge drive securely. Ensure rotors are dried thoroughly between runs.*	Replace adaptor or rotor depending on degree of damage/corrosion
5	**Damage on the bottom of rotor**	*Store rotor on rotor stand or soft surface.*	Surface scratches toward the outside may be repairable
6	**Light speckling from corrosion in the bottom of tube cavity**	*Never use non-compatible chemicals to clean. Clean rotor immediately when exposed to chemicals. Always remove adapters after use and rinse then dry.*	Monitor for corrosion, apply light coating of paste wax or anti-corrosive oil regularly
7	**Cracks appear at bottom of tube cavity**	*Inspect rotor regularly for signs of corrosion and have them inspected early if corrosion appears.*	Replace rotor
8	**Cracked or de-laminated rotor**	*Avoid harsh chemicals, clean and re-coat surface of rotor if corrosion appears.*	Return to manufacturer for evaluation
9	**Damage in critical stress area**	*Avoid banging or dropping. Do not exceed the maximum compartment mass for your given rotor.*	Have rotor inspected
10	**Damage in low stress area**	*Avoid banging or dropping. Do not exceed the maximum compartment mass for your given rotor.*	Rotor can be repaired or painted
11	**Cartridge damage**	*Cartridges are considered a consumable and have a finite life-span of 1000 hours use before requiring replacement. Inspect cartridges regularly for signs of wear such as cracks, scoring or deformation.*	Replace cartridges immediately if any signs of wear are found
12	**Damage to rotor locking stud threads**	*Avoid cross threading of parts. Never use a metallic object to clean. Clean and lubricate regularly.*	Replace locking stud
13	**Damage to bucket seats**	*Carefully slide buckets into place, do not drop or force into position.*	Replace buckets
14	**Windshield (shell) damage**	*Avoid banging or dropping. Always run with all buckets in place.*	Recommended replacement as this will cause vibration that will wear the drive
15	**Rotor bucket damage (Ultra and Superspeed)**	*Avoid banging or dropping. Do not exceed maximum compartment mass for the given rotor. Be aware of point loads.*	Replace buckets or return set for rebalancing
16	**Rotor bucket cap damage**	*Avoid cross threading of parts. Never use a metallic object to clean. Clean and lubricate regularly.*	Replace caps and return set for rebalancing
	Septa damage in continuous flow or zonal rotor	*Inspect before every use and replace if wear or cracks appear.*	Replace septa
	Gouges or corrosion on surface of rotor	*Avoid banging or dropping rotor. Never use metallic objects to remove debris. Ensure rotor is properly tightened before pressing "Start". (see page 2)*	Send for inspection
	Light scratches on surface	*Avoid banging or dropping rotor. Never use metallic objects to remove debris. (see page 2)*	Monitor to ensure corrosion has not begun
	Damage to dual row rotor	*Avoid banging or dropping. Do not exceed the maximum compartment mass for your given rotor.*	Return for evaluation
	Bent shaft in centrifuge	*Always remove rotor in a straight up motion, never at an angle. Ensure samples are properly balanced for the given rotor.*	Replace shaft

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Rotor Life Management

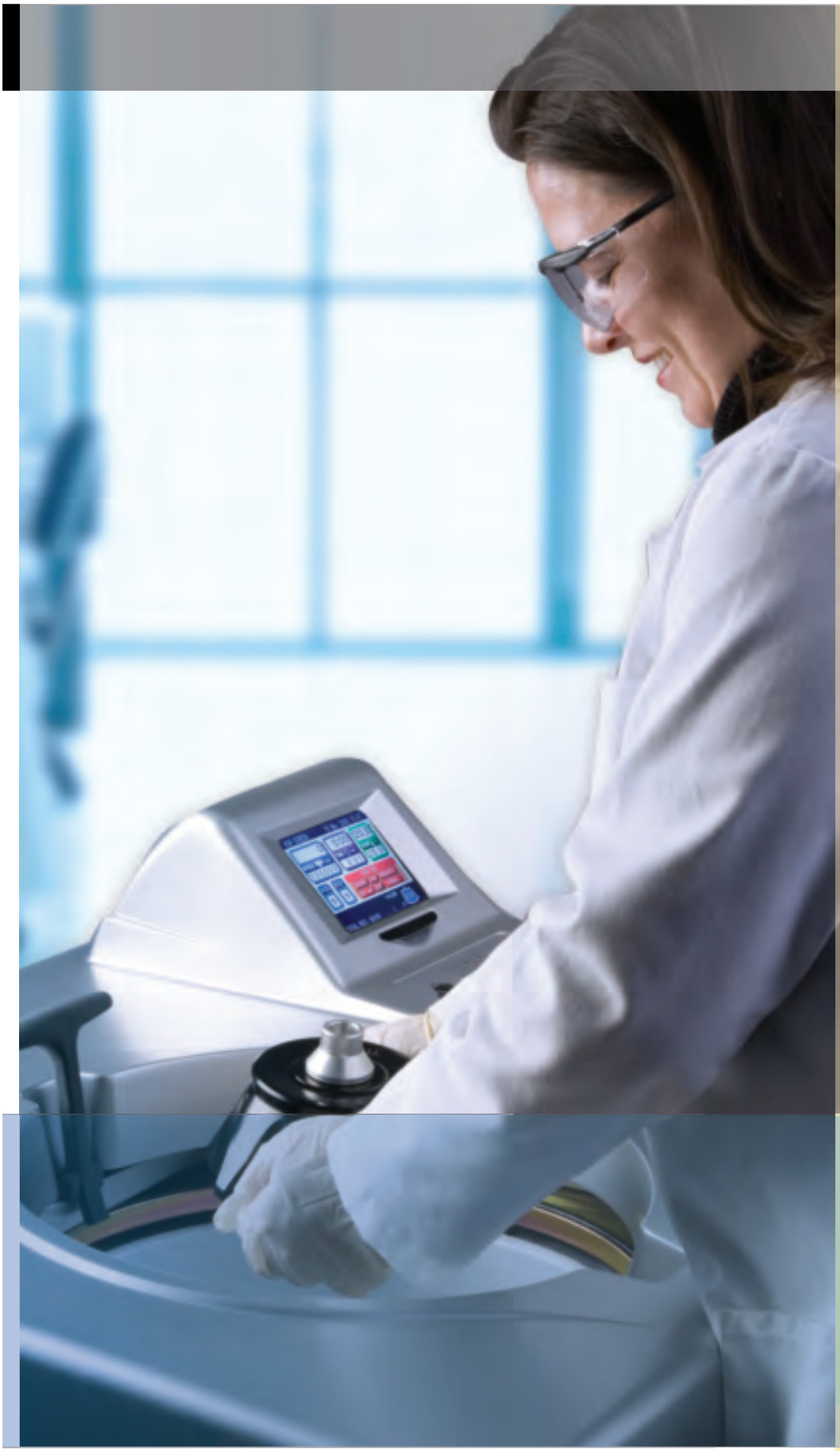
Rotor	Recommended Retirement (cycles)	Recommended Retirement (yrs)	Notes
Large Capacity/Low Speed			
Fixed Angle	Not applicable	14	
Swinging Bucket	See respective manuals	14	Some lowspeed rotors have cycle recommendations in addition to yearly recommendations; please refer to your respective rotor manual.
Superspeed			
Fixed Angle	Not applicable	15	
Swinging Bucket	Not applicable	15	
Vertical	Not applicable	15	
Ultraspeed			
Aluminum Fixed Angle	1,000 cycles / another 1,000 at 90%	10	
Titanium Fixed Angle	5000	10	
Swinging Bucket (any material)	1,000 cycles / another 1,000 at 90%	10	
Titanium Vertical	5000	10	
Benchtop	See respective manuals	7	Some lowspeed rotors have cycle recommendations in addition to yearly recommendations; please refer to your respective rotor manual.
Microcentrifuges	See respective manuals	5	Some lowspeed rotors have cycle recommendations in addition to yearly recommendations; please refer to your respective rotor manual.

Carbon fiber rotors are a lighter, safer alternative to conventional metallic rotors. They are easy to handle and offer superior durability, making them a truly cost-effective investment for your lab.
We offer a comprehensive portfolio of carbon fiber solutions; contact your Thermo Scientific product representative for more information.



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We offer a global network of trained technicians and authorized dealers of Thermo Scientific centrifuge solutions. Contact us to schedule a rotor care and maintenance clinic, request a rotor inspection or evaluation. Be proactive and ensure a safe working environment while protecting and maximizing your rotor investment.

www.thermo.com/rotors

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BENCHTOP CENTRIFUGES

Providing outstanding processing power, unique safety features and a broad array of rotors and accessories, Thermo Scientific benchtop centrifuge solutions deliver the capabilities to accelerate your preparation processes.

With the most comprehensive range of adaptors and rotors, including ultralite carbon fiber rotors, our benchtop centrifuge solutions can meet all your application needs.



FLOOR MODEL CENTRIFUGES

To help you meet your demanding research challenges, we are committed to providing innovative centrifuge solutions that combine outstanding safety, versatility and throughput with time-tested reliability.

From advanced ultracentrifuges and superspeeds to low-speed clinical models, Thermo Scientific centrifuge solutions deliver dependable performance and solid craftsmanship in every unit.



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