



Thermo Scientific Rotor Care Guide

Protect your rotor investment

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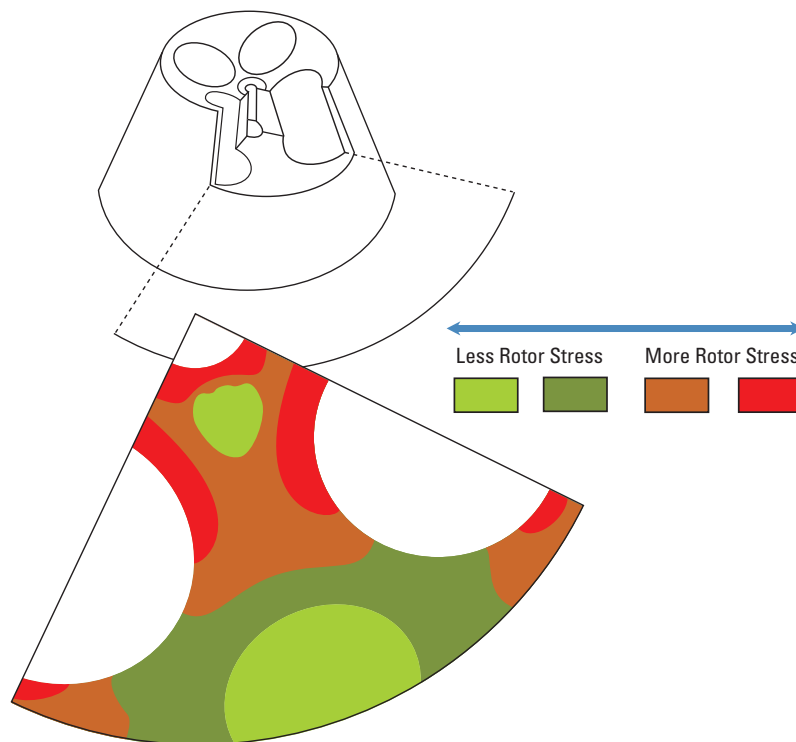


Thermo Scientific rotors meet the high standards we set for all of our laboratory products. The precision-engineered design of each rotor, the laboratory tested operating procedures that accompany it and the worldwide network of service and support ensure the safe and productive operation of your Thermo Scientific centrifuge.

With proper maintenance and inspection practices, prolong the life of your rotors and protect your equipment and samples, maximizing your investment.

Each time you use a rotor, visually inspect its condition for signs of physical wear or damage:

- Corrosion in the rotor cavities or exterior surfaces
- Scratches or gouges to the base metal
- Missing or worn anodizing
- Damage to contact points, such as thread, hubs and screws



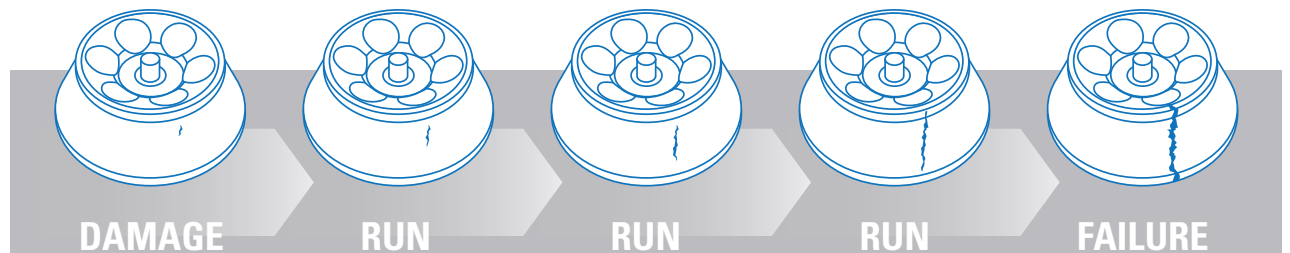
Over time, stress observed in a typical fixed angle rotor will cause metal fatigue.



Heavy corrosion can result in premature rotor failure.

Routine Evaluation and Care of Your Rotor

Rotors are frequently damaged in use and this damage may be exacerbated under centrifugal forces. As a result, even a tiny flaw in a critical part of the rotor may generate stresses greater than the rotor was designed to withstand. Rotors are also subject to high levels of stress due to the centrifugal force created by high rotational speeds, and repeated cycles can cause metal rotors to stretch and change in size.



PROPER HANDLING

Improper installation can lead to failure so it is imperative to:

- 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 the proper rotor extractor tool to remove a rotor
- Avoid dropping or striking the rotor against a hard surface
- Avoid putting anything inside the rotor that could scratch or nick the surface

In addition, ensure that all tubes, bottles and adapters are being used within their specified limits and according to the manufacturer's directions. Tube or bottle failures during centrifugation can result in minor to severe damage to rotors and centrifuges.

STRESS CORROSION

Stress distribution is an important consideration when evaluating the extent of rotor damage.

Ultraspeed rotors experience the highest level of stress of all rotors; if it 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 metal rotors will also become fatigued, depending on the rotor type, number of runs and the speed of those runs. However, corrosion, improper handling and misuse will often require that you retire your rotor long before normal fatigue becomes a danger.

MISSING PAINT AND ANODIZATION

While missing paint will not affect the life of a titanium or carbon fiber rotor, missing anodization on an aluminum rotor may signal that it is time to retire the rotor.

DROPPED ROTORS

Deformation caused by dropping a metal rotor cannot be repaired, requiring that the rotor be replaced. Alternatively, carbon fiber rotors are repairable if damaged.

OVERHEATING

Melted bottles or other plastic or a rotor that is too hot to touch are indications that a rotor has overheated. Aluminum and carbon fiber rotors can be autoclaved up to 121°C, while 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

Rotors must be operated within the stated guidelines for speed and maximum compartment mass; a rotor used above its maximum rated speed or mass should be removed from service immediately.

Regular inspections performed by a Thermo Scientific product representative are a critical part of your annual preventive maintenance program and will ensure the safety of your rotors.

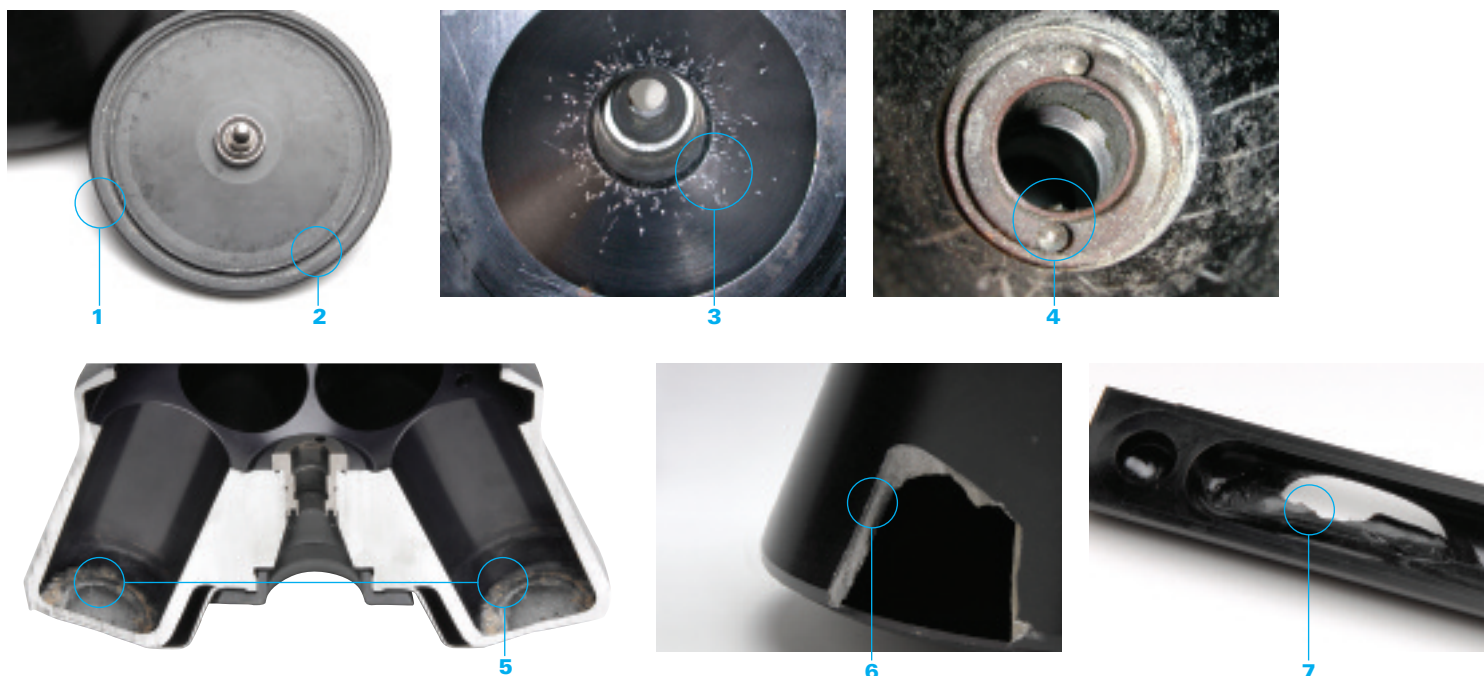
A product representative, after careful consideration to the location and extent of the damage, age of the rotor and general overall rotor condition, will be able to determine if your rotor:

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

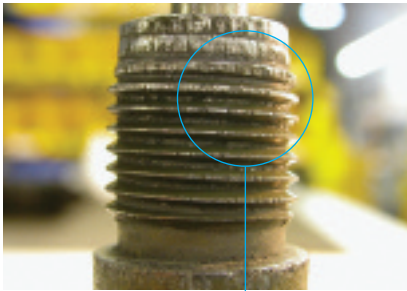


Rotor Maintenance

Protect your rotor against damage or failure with preventive measures and maintain maximum centrifuge performance. However, if rotor damage is observed, ensure the safety of your lab by taking recommended action or contacting your sales representative for an inspection.



| Potential Damage | Preventive Measures | Recommended Action |
|--|---|--|
| 1 Damage to lid assembly | <ul style="list-style-type: none"> – Lubricate periodically with a light film of o-ring or vacuum grease – Keep lid assembly lubricated with anti-galling grease – Avoid banging or dropping – Use care when removing o-rings – Clean with non-abrasive cloth and mild detergent | Return lid assembly parts to manufacturer for repair or replacement |
| 2 Damage to biocontainment sealing lid | <ul style="list-style-type: none"> – Use care when removing o-rings – Inspect and replace o-rings regularly | Replace sealing lid to ensure proper containment |
| 3 Scoring to the bottom of the rotor (outside of cone area) | <ul style="list-style-type: none"> – Gently place rotor on the centrifuge spindle – Clean with non-abrasive cloth and mild detergent – Inspect centrifuge mated parts for burrs and ensure no debris in centrifuge chamber – Store rotor on rotor stand or soft surface | Return rotor to manufacturer for evaluation or replacement |
| 4 Damage to the rotor drive pins | <ul style="list-style-type: none"> – Gently place rotor on the spindle – Ensure rotor is securely locked to centrifuge drive | Return rotor to manufacturer for replacement of rotor hub adapter or replace rotor depending on degree of damage/corrosion |
| 5 Pitting from corrosion in the bottom of tube cavity (metal rotors) | <ul style="list-style-type: none"> – Ensure rotor is dried thoroughly between runs – Clean rotor immediately after use and when exposed to chemicals with approved solvent – Remove adapters after use, rinse and dry | Return rotor to manufacturer for evaluation |
| 6 Cracked or de-laminated rotor | <ul style="list-style-type: none"> – Avoid sharp impact – Avoid harsh chemicals – Clean and re-coat surface of rotor if corrosion appears | Return rotor to manufacturer for evaluation |
| 7 Cartridge damage | <ul style="list-style-type: none"> – Inspect cartridges regularly | Replace cartridges, after 1000 hours of use or when begins to show signs of wear such as cracks, scoring or deformation |



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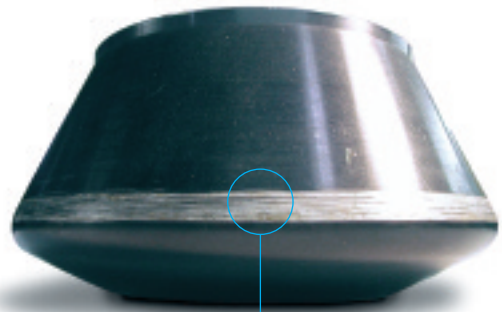
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| Potential Damage | Preventive Measures | Recommended Action |
|--|---|--|
| 8 Damage to rotor tie-down threads | <ul style="list-style-type: none"> - Avoid cross threading of parts - Never use metallic or abrasive objects to clean - Clean and lubricate regularly | Replace rotor tie-down assembly |
| 9 Damage to bucket seats | <ul style="list-style-type: none"> - Lubricate buckets regularly - Slide buckets into place carefully to avoid dropping or forcing into position | Replace rotor bucket set |
| 10 Windshield damage | <ul style="list-style-type: none"> - Avoid banging or dropping - Do not exceed rotor's maximum compartment mass - Ensure windshield area is free of debris | Replace rotor to avoid vibration that will wear the drive |
| 11 Rotor bucket cap damage | <ul style="list-style-type: none"> - Avoid cross threading of parts - Never use metallic objects to clean - Clean and lubricate regularly | Replace rotor bucket caps and return set for rebalancing |
| 12 Rotor bucket damage | <ul style="list-style-type: none"> - Avoid banging or dropping - Do not exceed rotor's maximum compartment mass - Ensure buckets are free of debris | Replace rotor buckets or return bucket set for rebalancing |
| 13 Gouges or corrosion on surface of rotor | <ul style="list-style-type: none"> - Inspect before every use | Return rotor to manufacturer for evaluation or replacement |
| Septa damage in continuous flow or zonal rotor | <ul style="list-style-type: none"> - Avoid sharp impact - Avoid harsh chemicals - Clean and re-coat surface of rotor if corrosion appears | Return rotor to manufacturer for evaluation |
| Light scratches on surface | <ul style="list-style-type: none"> - Avoid banging or dropping - Never use metallic objects to remove debris | Monitor to ensure no corrosion has occurred |
| Bent shaft in centrifuge | <ul style="list-style-type: none"> - Remove rotor in a straight up motion - Ensure samples are properly balanced | Call service for shaft replacement |

Rotor Maintenance

Corrosion, pitting and even minor surface imperfections affect metal rotor life by increasing stress and, as a result, make it difficult to predict at what point the rotor material could fail.

CLEANING & MAINTENANCE

Metal corrosion can be avoided by following a routine maintenance program after each rotor use:

- Clean 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 and the 1% non-alkaline soap solution
- For benchtop, lowspeed and superspeed swinging bucket rotors, keep the bucket trunnion pins clean and lubricated
- Lubricate o-rings with vacuum grease and metal rotor threads with anti-galling grease weekly, when specified in rotor manual
- Apply an additional coating of paste wax to prolong the life of an anodized coating

STORAGE

Any moisture left on a metal rotor can initiate corrosion, so after cleaning ensure proper storage:

- Remove all adapters from rotor cavities when not in use
- Dry and store upside-down on a PTFE-coated or plastic matting to allow for airflow or a ventilated shelf to avoid gathering condensation in the cavity or bucket bottom

DECONTAMINATION

Given the nature of samples processed in a rotor, biological or radioactive contamination is possible.

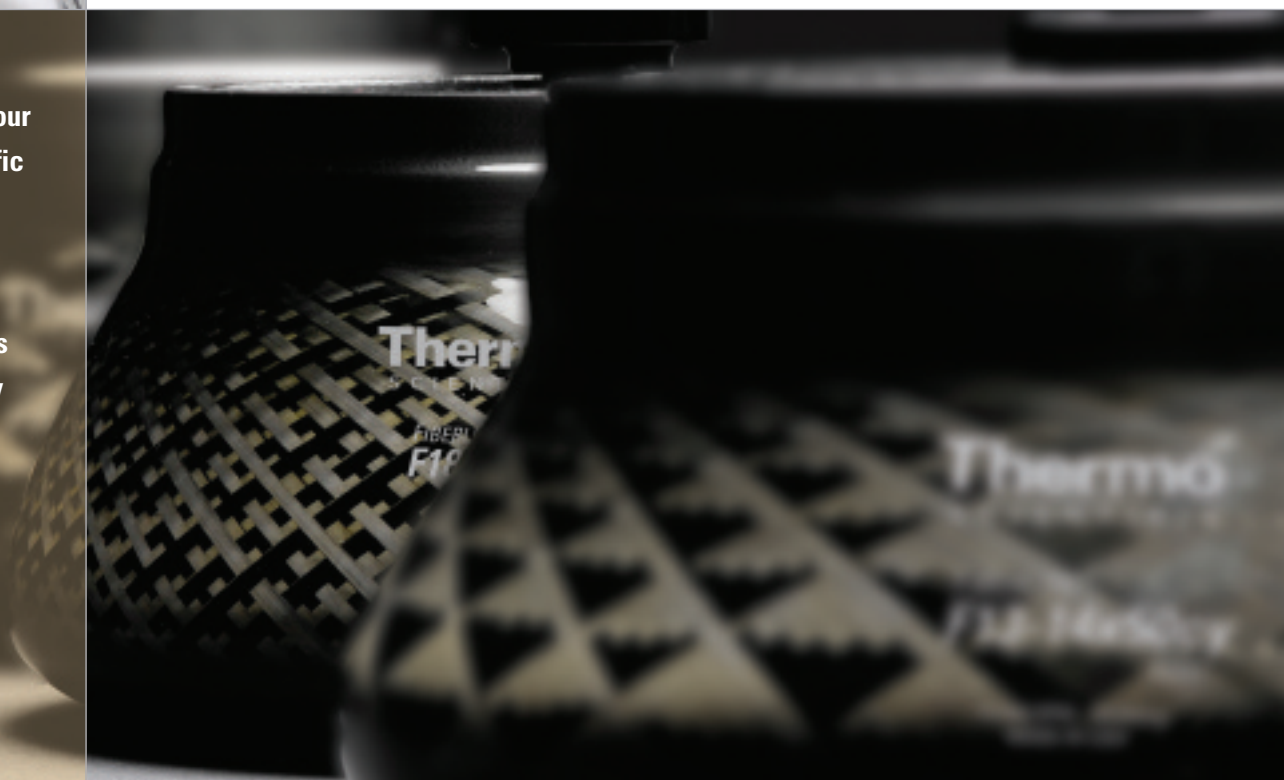
For biological contamination of rotors, a 2% glutaraldehyde solution, ethylene oxide or ultraviolet radiation are the recommended methods of sterilization, while for a rotor that may be contaminated by a radioactive sample, use a solution of equal parts of 70% ethanol, 10% SDS and water. In addition:

- 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 detergents for radioisotopic contamination are not compatible with aluminum or anodized coatings and should not be used
- Rinse with ethanol, followed by water and dry with a soft cloth
- Do not immerse Thermo Scientific Fiberlite rotors; spin rotor to remove liquid
- Fiberlite® composite rotors are not compatible with ethylene oxide

For further details on proper maintenance or decontamination, please consult your rotor manual.

Maximize the performance of your centrifuge with Thermo Scientific Fiberlite carbon fiber rotors, an advanced alternative to traditional metal rotors.

- Lightweight design improves ergonomics and productivity
- Corrosion and fatigue-resistance provides unequalled durability and cleaning convenience
- Secure investment backed by a 15-year warranty





Thermo Scientific Rotor Safety Program

On-site rotor inspection and safety clinics ensure the longevity of your investment and the safety of your workplace by preventing premature rotor failure.

Thermo Scientific product representatives will evaluate the safety of your rotors and provide a comprehensive report for each rotor examined. As part of the inspection, our representatives will present information on proper rotor care and offer recommendations based upon the current rotor condition to maximize the performance of your centrifuge.

Please contact your sales representative to schedule a clinic.

Note: Rotors must be thoroughly cleaned, decontaminated and documented before servicing.
Decontamination Certificates are found in the rotor instruction manual or contact your sales representative.

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Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

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