



**Thermo Fisher Scientific**

**M-20**

**Instruction Manual**

50121042-3

October 2010

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## Certificate of Containment Testing

### Containment testing of Thermo Scientific swing out bucket rotor 75003624 and buckets 75003625

**Report No. 77- 08 C**

**Report prepared for:** Thermo Fisher  
**Issue Date:** 1<sup>st</sup> June 2009

#### Test Summary

A Thermo Scientific centrifuge bucket 75003625 with aerosol tight lid (Max speed 4,000 rpm) was supplied by Thermo Fisher and containment tested at 4,000 rpm using the method described in Annex AA of EN 61010-2-020. The rotor was shown to contain a spill when tested in triplicate.

**Report Written By**

A handwritten signature in blue ink, appearing to read "M. Capet", written over a horizontal dashed line.

**Report Authorised By**

A handwritten signature in blue ink, appearing to read "M. M.", written over a horizontal dashed line.



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## Preface

Before starting to use the rotor, read through these instruction manual carefully and follow the instructions.

The information contained in these instruction manual is the property of Thermo Fisher Scientific; it is forbidden to copy or pass on this information without explicit approval.

Failure to follow the instructions and safety information in this instruction manual will result in the expiration of the seller's warranty.

## Scope of Supply

Article Number		Quantity	Check
75003624	M-20	1	<input type="checkbox"/>
76003500	Rubber seal grease	1	<input type="checkbox"/>
75003786	Bolt grease	1	<input type="checkbox"/>
50121042	Instruction Manual	1	<input type="checkbox"/>

If any parts are missing, please contact the nearest Thermo Fisher Scientific representative.

## Precautions

In order to ensure safe operation of the M-20, the following general safety regulations must be followed:

- Do not remove the magnet at the rotor bottom
- Do not use rotors which show any signs of corrosion and/or cracks.
- Use only with rotors which have been loaded properly.
- Never overload the rotor.

## Preface

- Use only accessories which have been approved by Thermo Fisher Scientific. Exceptions to this rule are commercially available glass or plastic centrifuge tubes, provided they have been approved for the speed or the RCF value of the rotor.
- Please observe the safety instructions.

Please pay particular attention to the following aspects:

- Rotor installation: Check that the rotor is locked properly into place before operating the centrifuge.
- Always balance the samples.

Maximum sample density at maximum speed:  $1.2 \frac{g}{cm^3}$



This symbol refers to general hazards.

CAUTION means that material damage could occur.

WARNING means that injuries or material damage or contamination could occur.



This symbol refers to biological hazards.

Observe the information contained in the instruction manual to keep yourself and your environment safe.

# Rotor Specifications

## Contents

- “Heraeus” on page 1-2
- “Sorvall” on page 1-4
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# Heraeus

**Table 1-1.** 230V 50Hz/60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3F	Heraeus Megafuge 40
Catalog #	75004500	75004530	75004503
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Heraeus Multifuge X1	Heraeus Megafuge 16
Catalog #	75004210	75004230
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30
Sample heating at $n_{max}$ [° C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

**Table 1-2.** 230V 50Hz/60Hz refrigerated

Centrifuge	Heraeus Multifuge X3R	Heraeus Multifuge X3FR	Heraeus Megafuge 40R
Catalog #	75004515	75004536	75004518
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{\max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{\max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25	25 / 25
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Heraeus Multifuge X1R	Heraeus Megafuge 16R
Catalog #	75004250	75004270
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{\max}$ [rpm]	4000	4000
Maximum RCF value at $n_{\max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

## 1 Rotor Specifications

**Table 1-3.** 120V 60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3F	Heraeus Megafuge 40
Catalog #	75004501	75004531	75004504
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{\max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{\max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{\max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Heraeus Multifuge X1	Heraeus Megafuge 16
Catalog #	75004211	75004231
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{\max}$ [rpm]	4000	4000
Maximum RCF value at $n_{\max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30
Sample heating at $n_{\max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

**Table 1-4.** 120V 60Hz refrigerated

Centrifuge	Heraeus Multifuge X3R	Heraeus Multifuge X3FR	Heraeus Megafuge 40R
Catalog #	75004516	75004537	75004519
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 35	30 / 35	30 / 35
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Heraeus Multifuge X1R	Heraeus Megafuge 16R
Catalog #	75004251	75004271
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 35	30 / 35
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

# Sorvall

**Table 1-5.** 230V 50Hz/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall XF	Sorvall ST40
Catalog #	75004505	75004532	75004509
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1	Sorvall ST16
Catalog #	75004220	75004240
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

**Table 1-6.** 230V 50Hz/60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall XFR	Sorvall ST40R
Catalog #	75004520	75004538	75004524
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25	25 / 25
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1R	Sorvall ST16R
Catalog #	75004260	75004380
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK



## 1 Rotor Specifications

**Table 1-7.** 120V 60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall XF	Sorvall ST40
Catalog #	75004506	75004533	75004510
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1	Sorvall ST16
Catalog #	75004221	75004241
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\*tested by HPA, Porton-down, UK

**Table 1-8.** 120V 60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall XFR	Sorvall ST40R
Catalog #	75004521	75004539	75004525
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 35	30 / 35	30 / 35
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1R	Sorvall ST16R
Catalog #	75004261	75004381
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 35	30 / 35
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

## 1 Rotor Specifications

**Table 1-9.** 100V 50Hz/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall XF	Sorvall ST40
Catalog #	75004507	75004534	75004511
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\*tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1	Sorvall ST16
Catalog #	75004223	75004243
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\*tested by HPA, Porton-down, UK

**Table 1-10.** 100V 50Hz/60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall XFR	Sorvall ST40R
Catalog #	75004522	75004540	75004526
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25	25 / 25
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

Centrifuge	Sorvall Legend X1R	Sorvall ST16R
Catalog #	75004263	75004383
Weight of empty rotor [kg]	4.2	4.2
Max. cycle number	45000	45000
Maximum permissible load [g]	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000
Maximum RCF value at $n_{max}$	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25
Aerosol-tight *	yes	yes
Permissible temperature range autoclavable °C	121	121

\* tested by HPA, Porton-down, UK

# Thermo Scientific

**Table 1-11.** 230V 50Hz/60Hz ventilated

Centrifuge	Thermo Scientific SL 40	Thermo Scientific SL 40F	Thermo Scientific SL 16
Catalog #	75004512	75004542	75004000
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	30 / 30	30 / 30	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5	5	5
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

**Table 1-12.** 230V 50Hz/60Hz refrigerated

Centrifuge	Thermo Scientific SL 40R	Thermo Scientific SL 40F	Thermo Scientific SL 16R
Catalog #	75004527	75004543	75004030
Weight of empty rotor [kg]	4.2	4.2	4.2
Max. cycle number	45000	45000	45000
Maximum permissible load [g]	2x770	2x770	2x770
Maximum speed $n_{max}$ [rpm]	4000	4000	4000
Maximum RCF value at $n_{max}$	2272	2272	2272
Max. / min. radius [cm]	12.2 / 7.9	12.2 / 7.9	12.2 / 7.9
Accel. / braking time [s]	25 / 25	25 / 25	25 / 25
Aerosol-tight *	yes	yes	yes
Permissible temperature range autoclavable °C	121	121	121

\* tested by HPA, Porton-down, UK

**Table 1-13.** 120V 60Hz ventilated

Centrifuge	Thermo Scientific SL 16
Catalog #	75004001
Weight of empty rotor [kg]	4.2
Max. cycle number	45000
Maximum permissible load [g]	2x770
Maximum speed $n_{max}$ [rpm]	4000
Maximum RCF value at $n_{max}$	2272
Max. / min. radius [cm]	12.2 / 7.9
Accel. / braking time [s]	30 / 30
Sample heating at $n_{max}$ [°C] referred to ambient temperature of 23 °C, running time 60 minutes	5
Aerosol-tight *	yes
Permissible temperature range autoclavable °C	121

\* Tested by HPA, Porton-down, UK

**Table 1-14.** 120V 60Hz refrigerated

Centrifuge	Thermo Scientific SL 16R
Catalog #	75004031
Weight of empty rotor [kg]	4.2
Max. cycle number	45000
Maximum permissible load [g]	2x770
Maximum speed $n_{max}$ [rpm]	4000
Maximum RCF value at $n_{max}$	2272
Max. / min. radius [cm]	12.2 / 7.9
Accel. / braking time [s]	30 / 35
Aerosol-tight *	yes
Permissible temperature range autoclavable °C	121

\* Tested by HPA, Porton-down, UK



# Accessories

## Contents

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- “Accessories“ on page 2-2



# M20 Microplate Sealing Rotor

Rotor Specifications	
Capacity (ml)	6 x Standard Microplates
Tube Dimensions (mm)	Max Plate Height 50mm
Angle °	90
Maximum Speed (rpm)	4,000
K Factor	7506
Net Weight (kg)	4,3
RCF/Radius	
	RCF (x g)      Radius (cm)
Maximum	2.272      12,7
Minimum	1.411      7,9

\* Maximum Speed may vary by centrifuge model.



M20 Microplate Sealing Rotor	
Cat. No.	Description
75003624	M20 Microplate Sealing Rotor (comes standard with non-sealing carriers)

Accessories	
Cat. No.	Description
75003625	Sealed carriers for M20 Microplate Rotor (includes trays and lids) (Set of 2)
75002011	Replacement Sealing Caps for M20 Microplate Carriers (Set of 2)
75003626	Replacement O-rings for M20 Sealing Caps (75002011) (Set of 4 with Grease)

Tube Ordering Information														
Cat. No.	Tube Vol. (ml)	Vol. Fill (ml)	Description	Qty.	Max. Speed (rpm)	Dims ØxL (mm)	Sealing Assembly Required:			Adapters Required:			Accessories Required:	
							Cat. No.	Qty /Pkg	Description	Cat. No.	Qty /Pkg	No. of Places		
-	-	-	Standard Microplate	-	-	Max Height 20mm	-	-	-	-	-	-	-	-
-	-	-	Deepwell Microplate	-	-	Max Height 50mm	-	-	-	-	-	-	-	-

# AutoLock™

**Contents**

- “Rotor Installation” on page 3-2
- “Removing the Rotor” on page 3-3

## Rotor Installation



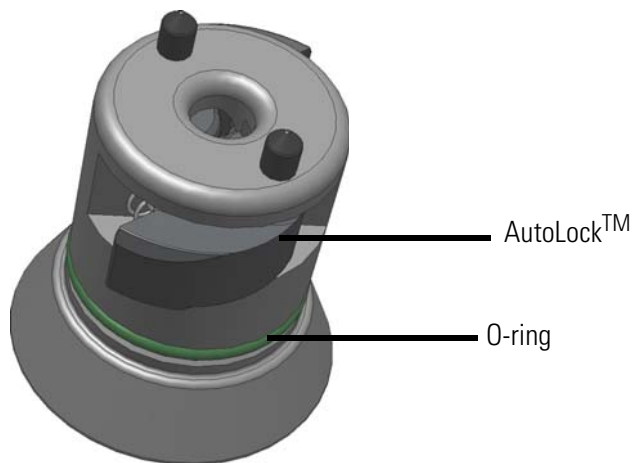
**CAUTION** Unapproved or incorrectly combined accessories can cause serious damage to the centrifuge.

This rotor is equipped with an AutoLock™-system.

This system is used to automatically lock the rotor to the centrifuge spindle. The rotor does not have to be bolted onto the centrifuge spindle.

Proceed as follows:

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.  
AutoLock™ and o-ring must be clean and undamaged.



**Figure 3-1.** AutoLock™

2. Hold the rotor over the centrifuge spindle and let it slide slowly down the centrifuge spindle. The rotor clicks automatically into place.



**CAUTION** Do not force the rotor onto the centrifuge spindle. If the rotor is very light, then it may be necessary to press it onto the centrifuge spindle with a small amount of pressure.

3. Check if the rotor is properly installed by lifting slightly on the handle. If the rotor can be pulled up, then it must be reclamped to the centrifuge spindle.



**WARNING** If the rotor cannot be properly locked in place after several attempts, then the AutoLock™ is defective and you are not permitted to operate the rotor. Check for any damage to the rotor, damaged rotors must not be used. Keep the hub area clear of objects.



**CAUTION** Check that the rotor is properly locked on the centrifuge spindle before each use by pulling it a its handle.



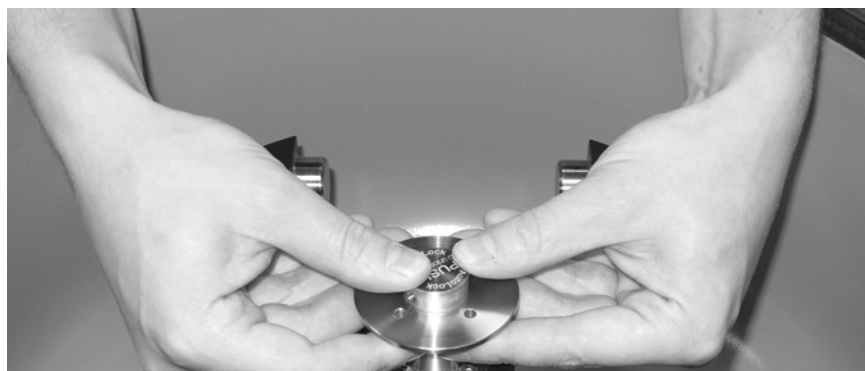
Be sure to check all seals before starting any aerosol-tight applications.

4. Close the centrifuge door.

## Removing the Rotor

To remove the rotor, proceed as follows:

1. Open the centrifuge door.
2. Grab the rotor handle with both hands and press against the green AutoLock™ button. At the same time, pull the rotor directly upwards with both hands and remove it from the centrifuge spindle. Make sure not to jam the rotor while doing this.



# Rotor Loading

## Contents

- “Before a Run” on page 4-2
- “Proper Loading” on page 4-2
- “Improper Loading” on page 4-2
- “Maximum Loading” on page 4-3
- “Cycle Counter” on page 4-3

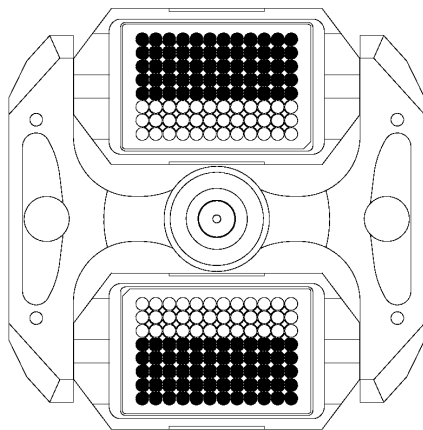


## Before a Run

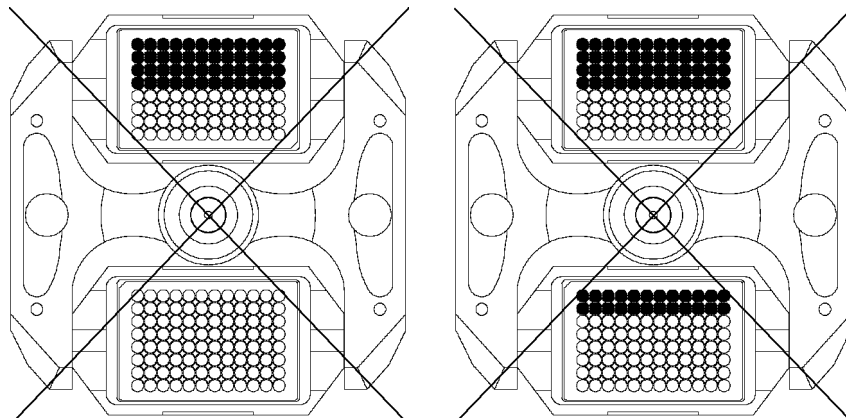
1. Please read and observe the safety instructions contained in these operating instructions and in the instructions for use.
2. Check the rotor and all accessory parts for damages such as cracks, scratches or traces of corrosion.
3. Check the rotor chamber, the motor shaft and the AutoLock™.
4. Check the rotor's suitability using the chemical compatibility chart on [page B-1](#).
5. Make sure the tubes do not touch the microplate carrier lid.
6. Check the rotor bolts and apply grease 7500 3786 before using for the first time.
7. Check that each microplate carrier can swing freely by moving it carefully with your hand. Weigh the bucket content (adaptor and tube). Make sure you do not exceed the maximum compartment load.

## Proper Loading

To ensure safe operation of the centrifuge, the rotor must be evenly loaded at all times



## Improper Loading



## Maximum Loading

The rotor can run at high speeds. The rotor design has sufficient reserve stability even when spinning at top speed.

The safety system of the centrifuge requires that you do not overload the rotor.

There are two options available for centrifuging samples whose weight, including adaptor, exceeds the maximum permissible load:

- Reduce the fill level.
- Reduce the speed.

Use the table or the formula:

Actual Load (g/carrier)	RPM <sub>max</sub>
770	4000
790	3949
810	3900
830	3853
850	3807
870	3763
890	3721
910	3679
930	3640
950	3601
970	3564
990	3528
1010	3493

$$n_{\text{adm}} = n_{\text{max}} \sqrt{\frac{\text{Maximum permissible load}}{\text{Effective load}}}$$

$n_{\text{adm}}$  = admissible speed

$n_{\text{max}}$  = maximum speed

## Cycle Counter

The lifetime of rotors and microplate carriers is dependent on the amount of mechanical load. Do not exceed the number of cycles recommended for rotors and microplate carriers.

The maximum number of cycles is given in the rotor table in the rotor specification section.



**WARNING** Replace the rotor when the specified number of cycles is reached. Due to the mechanical load a rotor can break and thus damage the centrifuge

### Service life examples

Usage profile	Maximum service life at 30,000 cycles
frequent use 20 runs / day 220 days / year	7 years

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# Aerosol-tight Applications

## Contents

- “Basic Principles” on page 5-2
- “Placing O-ring” on page 5-2
- “Fill Level” on page 5-2
- “Checking the Aerosol-Tightness” on page 5-2

## Basic Principles



**CAUTION** When centrifuging hazardous samples, do not open aerosol-tight rotors or buckets unless placed in a safety cabinet. Always bear in mind the maximum permitted fill levels.



Be sure to check all seals before starting any aerosol-tight applications.

- Check that the sample containers are well suited for the desired centrifugation process.

## Placing O-ring

The o-ring fulfills its purpose best, when it is neither stressed nor bulked. Meaning the o-ring should be equally placed in the groove of the lid.

Place the o-ring as follows:

1. Place the o-ring above the groove.
2. Push the o-ring on two opposite places into the groove. Make sure the rest of the o-ring is equally distributed.
3. Push the centers of the loose parts into the groove.
4. Push the remaining o-ring into place.

**Note** If the o-ring seems to be too long or too short, take it off the lid and repeat the process.

## Fill Level

The tubes are only to be filled to a level which ensures that the sample is unable to reach the top of the tube during centrifugation. Therefore fill the tube only 2/3 of the rated level.

## Checking the Aerosol-Tightness

The aerosol tightness testing of the rotors and buckets depend on the microbiological test process in accordance with the EN 61010-2-020 Appendix AA.

Whether or not a rotor is aerosol-tight depends primarily on proper handling.

Check as needed to make sure your rotor is aerosol-tight.

The careful inspection of the seals and seal surfaces for signs of wear and damage such as cracks, scratches and embrittlement is extremely important.

Aerosol-tight applications are not possible if the lids are open.

Aerosol-tightness requires the correct operation when filling the sample vessels and closing the rotor lid.

## Quick Test

As a quick test, it is possible to test the aerosol-tight buckets using the following process:

1. Lubricate all seals lightly.  
Always use the special grease 7600 3500 when lubricating the seals.
2. Fill the bucket with approx. 10 ml of carbonated mineral water.
3. Close the bucket as explained in the handling instructions.
4. Shake the bucket vigorously using your hands.  
This releases the carbonic acid gas which is bound in the water, resulting in excess pressure. Do not apply pressure to the lid when doing so.

Leaks can be detected by escaping water or the sound of escaping gas.

Replace the seals if you detect any leaks. Then repeat the test.

5. Dry the rotor, rotor cover and the cover seal.



**CAUTION** Prior to each use, the seals in the bucket are to be inspected in order to assure that they are correctly seated and are not worn or damaged.

Damaged seals are to be replaced immediately.

When loading the rotor, ensure that the rotor lid closes securely.

Damaged or clouded rotor covers are to be replaced immediately!



# Maintenance and Care

## Contents

- “Cleaning intervals” on page 6-2
- “Cleaning” on page 6-2
- “Disinfection” on page 6-3
- “Decontamination” on page 6-4
- “Autoclaving” on page 6-5
- “Service of Thermo Fisher Scientific” on page 6-5

## Cleaning intervals

For the sake of personal, environmental, and material protection, it is your duty to clean and if necessary disinfect the centrifuge on a regular basis.

Maintenance	Recommended interval
Clean rotor chamber	daily or when polluted
Clean rotor	daily or when polluted
Accessories	daily or when polluted
Cabinet	Once per month
Ventilation holes	Every six months



**CAUTION** Refrain from using any other cleaning or decontamination procedure than those recommended here, if you are not entirely sure that the intended procedure is safe for the equipment.  
Use only approved cleansers.  
If in doubt, contact Thermo Fisher Scientific.

## Cleaning

When cleaning centrifug

- Use warm water with a neutral solvent.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Rinse the cavities out thoroughly.
- Use a soft brush without metal bristles to remove stubborn residue.
- Afterwards rinse with distilled water.
- Place the rotors on a plastic grate with their cavities pointing down.
- If drying boxes are used, the temperature must never exceed 50 °C, since higher temperatures could damage the material and shorten the lifetime of the parts.
- Use only disinfectants with a pH of 6-8.
- Dry aluminum parts off with a soft cloth.
- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Store the aluminum parts at room temperature or in a cold-storage room with the cavities pointing down.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Clean centrifuge and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors.
6. Use a neutral cleaning agent with a pH value between 6 and 8 for cleaning.
7. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
8. Clean the housing of the centrifuge as needed.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the bolt of the swing out rotor with bold grease (75003786).



**CAUTION** When cleaning, do not allow liquids, especially organic solvents, to get on the drive shaft, the bearings, the AutoLock™ or the locks. Organic solvents break down the grease in the motor bearing. The drive shaft could freeze up.

After some applications there might be ice in the rotor chamber. Let the ice melt and drain it off. Clean the rotor chamber as described above.

## Disinfection

Disinfect the centrifuge immediately whenever infectious material has spilled during centrifugation.



**WARNING** Infectious material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions. In case of contamination, make sure that others are not put at risk. Decontaminate the affected parts immediately. Take other precautions if needed.

Use a sprayer whenever possible so that all surfaces are covered evenly.

The rotor chamber and the rotor should be treated preferably with a neutral disinfectant.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment. Observe the safety precautions and handling instructions for the cleaning agents used.

Contact the Service Department of Thermo Fisher Scientific for questions regarding the use of other disinfectants.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.
6. Treat the rotor and accessories according to the instructions for the disinfectant (soak in solution). Adhere strictly to the given application times.
7. Be sure the disinfectant can drain off the rotor.
8. Rinse the rotor and rotor lid thoroughly with water and then rub down.
9. Dispose of the disinfectant according to the applicable guidelines.
10. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the bolt of the swing out rotor with bold grease (75003786).

## Decontamination

Decantaminate the centrifuge immediately whenever radioactive material has spilled during centrifugation.



**WARNING** Radioactive material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions.

In case of contamination, make sure that others are not put at risk.  
Decontaminate the affected parts immediately.  
Take other precautions if need be.



**CAUTION** Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

For general radioactive decontamination use a solution of equal parts of 70% ethanol, 10% SDS and water.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.

6. Rinse the rotor first with ethanol and then with de-ionized water.
  - Adhere strictly to the given application times.
7. Be sure the decontamination solution can drain off the rotor.
8. Rinse the rotor and accessories thoroughly with water.
9. Dispose of the decontamination solution according to the applicable guidelines.
10. Dry all of the rotors and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
  - After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
  - Treat the bolt of the swing out rotor with bold grease (75003786):

## Autoclaving

1. Before autoclaving clean rotor and accessories and described above.
2. Place the rotor on a flat surface.
  - Rotors and adapter can be autoclaved at 121 °C.
  - The maximum permissible autoclave cycle is 20 minutes at 121 °C.

Clean the rotor before autoclaving and rinse it with distilled water. Remove all accessories (tubes, adapters) from the rotor. Place the rotor on a flat surface.

**Note** No chemical additives are permitted in the steam.



**CAUTION** Never exceed the permitted temperature and duration when autoclaving. If the rotor shows signs of corrosion or wear, it must be replaced.

## Service of Thermo Fisher Scientific

Thermo Fisher Scientific recommends having the centrifuge and accessories serviced once a year by an authorized service technician. The service technicians check the following:

- the electrical equipment
- the suitability of the set-up site
- the lid lock and the safety system
- the rotor
- the fixation of the rotor and the drive shaft

Thermo Fisher Scientific offers inspection and service contracts for this work.

## RCF Values

speed rpm	R <sub>min</sub>	R <sub>max</sub>	RZB R <sub>min</sub>	RZB R <sub>max</sub>
300	7.9	12.2	8	12
400	7.9	12.2	14	22
500	7.9	12.2	22	34
600	7.9	12.2	32	49
700	7.9	12.2	43	67
800	7.9	12.2	57	87
900	7.9	12.2	72	110
1000	7.9	12.2	88	136
1100	7.9	12.2	107	165
1200	7.9	12.2	127	196
1300	7.9	12.2	149	231
1400	7.9	12.2	173	267
1500	7.9	12.2	199	307
1600	7.9	12.2	226	349
1700	7.9	12.2	255	394
1800	7.9	12.2	286	442
1900	7.9	12.2	319	492
2000	7.9	12.2	353	546
2100	7.9	12.2	390	602
2200	7.9	12.2	427	660
2300	7.9	12.2	467	722
2400	7.9	12.2	509	786
2500	7.9	12.2	552	852
2600	7.9	12.2	597	922
2700	7.9	12.2	644	994
2800	7.9	12.2	692	1069
2900	7.9	12.2	743	1147
3000	7.9	12.2	795	1228

## A RCF Values

<b>speed rpm</b>	<b>R<sub>min</sub></b>	<b>R<sub>max</sub></b>	<b>RZB R<sub>min</sub></b>	<b>RZB R<sub>max</sub></b>
3100	7.9	12.2	849	1311
3200	7.9	12.2	904	1397
3300	7.9	12.2	962	1485
3400	7.9	12.2	1021	1577
3500	7.9	12.2	1082	1671
3600	7.9	12.2	1145	1768
3700	7.9	12.2	1209	1867
3800	7.9	12.2	1275	1970
3900	7.9	12.2	1343	2075
4000	7.9	12.2	1413	2182

# Chemical Compatibility Chart

CHEMICAL	MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELIRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYMER, GLASS THERMOSET	POLYETHERIMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULONA®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
2-mercaptoethanol		S	S	U	-	S	M	S	-	S	U	S	S	U	S	S	-	S	S	S	S	U	S	S	S	S	S	S
Acetaldehyde		S	-	U	U	-	-	-	M	-	U	-	-	-	M	U	U	U	M	M	-	M	S	U	-	S	-	U
Acetone		M	S	U	U	S	U	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	M	M	S	U	U
Acetonitrile		S	S	U	-	S	M	S	-	S	S	U	S	U	M	U	U	-	S	M	U	U	S	S	S	S	U	U
Alconox®		U	U	S	-	S	S	S	-	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S	S	U
Allyl Alcohol		-	-	-	U	-	-	S	-	-	-	-	S	-	S	S	M	S	S	S	-	M	S	-	-	S	-	-
Aluminum Chloride		U	U	S	S	S	S	U	S	S	S	S	M	S	S	S	S	-	S	S	S	S	S	M	U	U	S	S
Formic Acid (100%)		-	S	M	U	-	-	U	-	-	-	-	U	-	S	M	U	U	S	S	-	U	S	-	U	S	-	U
Ammonium Acetate		S	S	U	-	S	S	S	-	S	S	S	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	S
Ammonium Carbonate		M	S	U	S	S	S	S	S	S	S	S	S	S	S	U	U	-	S	S	S	S	S	S	M	S	S	S
Ammonium Hydroxide (10%)		U	U	S	U	S	S	M	S	S	S	S	S	-	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (28%)		U	U	S	U	S	U	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (conc.)		U	U	U	U	S	U	M	S	-	S	-	S	U	S	U	U	S	S	S	-	M	S	S	S	S	-	U
Ammonium Phosphate		U	-	S	-	S	S	S	S	S	S	S	S	-	S	S	M	-	S	S	S	S	S	S	M	S	S	S
Ammonium Sulfate		U	M	S	-	S	S	U	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	U
Amyl Alcohol		S	-	M	U	-	-	S	S	-	M	-	S	-	M	S	S	S	S	M	-	-	-	U	-	S	-	M
Aniline		S	S	U	U	S	U	S	M	S	U	U	U	U	U	U	U	-	S	M	U	U	S	S	S	S	U	S
Sodium Hydroxide (<1%)		U	-	M	S	S	S	-	-	S	M	S	S	-	S	M	M	S	S	S	S	S	S	M	S	S	-	U
Sodium Hydroxide (10%)		U	-	M	U	-	-	U	-	M	M	S	S	U	S	U	U	S	S	S	S	S	S	M	S	S	-	U
Barium Salts		M	U	S	-	S	S	S	S	S	S	S	S	S	S	S	M	-	S	S	S	S	S	S	M	S	S	S
Benzene		S	S	U	U	S	U	M	U	S	U	U	S	U	U	U	M	U	M	U	U	U	S	U	U	S	U	S
Benzyl Alcohol		S	-	U	U	-	-	M	M	-	M	-	S	U	U	U	U	U	U	U	-	M	S	M	-	S	-	S
Boric Acid		U	S	S	M	S	S	U	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S



## B Chemical Compatibility Chart

CHEMICAL	MATERIAL	MATERIAL																									
		ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORLYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®
Cesium Acetate	M	-	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Chloride	M	S	S	U	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Formate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Sulfate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Chloroform	U	U	U	U	S	S	M	U	S	U	U	M	U	M	U	U	U	M	M	U	U	S	U	U	U	M	S
Chromic Acid (10%)	U	-	U	U	S	U	U	-	S	S	S	U	S	S	M	U	M	S	S	U	M	S	M	U	S	S	S
Chromic Acid (50%)	U	-	U	U	-	U	U	-	-	-	S	U	U	S	M	U	M	S	S	U	M	S	-	U	M	-	S
Cresol Mixture	S	S	U	-	-	-	S	-	S	U	U	U	U	U	U	-	-	U	U	-	U	S	S	S	S	U	S
Cyclohexane	S	S	S	-	S	S	S	U	S	U	S	S	U	U	U	M	S	M	U	M	M	S	U	M	M	U	S
Deoxycholate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S
Distilled Water	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Dextran	M	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Diethyl Ether	S	S	U	U	S	S	S	U	S	U	U	S	U	U	U	U	U	U	U	U	U	U	S	S	S	M	U
Diethyl Ketone	S	-	U	U	-	-	M	-	S	U	-	S	-	M	U	U	U	M	M	-	U	S	-	-	S	U	U
Diethylpyrocarbonate	S	S	U	-	S	S	S	-	S	S	U	S	U	S	U	-	-	S	S	S	M	S	S	S	S	S	S
Dimethylsulfoxide	S	S	U	U	S	S	S	-	S	U	S	S	U	S	U	U	-	S	S	U	U	S	S	S	U	U	U
Dioxane	M	S	U	U	S	S	M	M	S	U	U	S	U	M	U	U	-	M	M	M	U	S	S	S	S	U	U
Ferric Chloride	U	U	S	-	-	-	M	S	-	M	-	S	-	S	-	-	-	S	S	-	-	-	M	U	S	-	S
Acetic Acid (Glacial)	S	S	U	U	S	S	U	M	S	U	S	U	U	U	U	U	M	S	U	M	U	S	U	U	S	-	U
Acetic Acid (5%)	S	S	M	S	S	S	M	S	S	S	S	S	M	S	S	S	S	S	S	M	S	S	M	S	S	M	M
Acetic Acid (60%)	S	S	U	U	S	S	U	-	S	M	S	U	U	M	U	S	M	S	M	S	M	S	M	U	S	M	U
Ethyl Acetate	M	M	U	U	S	S	M	M	S	S	U	S	U	M	U	U	-	S	S	U	U	S	M	M	S	U	U
Ethyl Alcohol (50%)	S	S	S	S	S	S	M	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	M	S	M	U
Ethyl Alcohol (95%)	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	-	S	S	S	M	S	S	S	U	S	M	U
Ethylene Dichloride	S	-	U	U	-	-	S	M	-	U	U	S	U	U	U	U	U	U	U	-	U	S	U	-	S	-	S
Ethylene Glycol	S	S	S	S	S	S	S	S	S	S	S	S	-	S	U	S	S	S	S	S	S	S	S	M	S	M	S
Ethylene Oxide Vapor	S	-	U	-	-	U	-	-	S	U	-	S	-	S	M	-	-	S	S	S	U	S	U	S	S	S	U
Ficoll-Hypaque®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	S	S	S	S	S	S	M	S	S	S	S

<b>CHEMICAL</b>	<b>MATERIAL</b>	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR® ,CLEARCRIMP®,CCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLTER, GLASS THERMOSET	POLYETHERIMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Hydrofluoric Acid (10%)	U	U	U	M	-	-	U	-	-	U	U	S	-	S	M	U	S	S	S	S	M	S	U	U	U	-	-	
Hydrofluoric Acid (50%)	U	U	U	U	-	-	U	-	-	U	U	U	U	S	U	U	U	S	S	M	M	S	U	U	U	-	M	
Hydrochloric Acid (conc.)	U	U	U	U	-	U	U	M	-	U	M	U	U	M	U	U	U	-	S	-	U	S	U	U	U	-	-	
Formaldehyde (40%)	M	M	M	S	S	S	S	M	S	S	S	S	M	S	S	S	U	S	S	M	S	S	S	M	S	M	U	
Glutaraldehyde	S	S	S	S	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	-	-	S	S	S	-	-	
Glycerol	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S
Guanidine Hydrochloride	U	U	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	U	S	S	S	
Haemo-Sol®	S	S	S	-	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S	
Hexane	S	S	S	-	S	S	S	-	S	S	U	S	U	M	U	S	S	U	S	S	M	S	U	S	S	U	S	
Isobutyl Alcohol	-	-	M	U	-	-	S	S	-	U	-	S	U	S	S	M	S	S	S	-	S	S	S	-	S	-	S	
Isopropyl Alcohol	M	M	M	U	S	S	S	S	S	U	S	S	U	S	U	M	S	S	S	S	S	S	S	M	M	M	S	
Iodoacetic Acid	S	S	M	-	S	S	S	-	S	M	S	S	M	S	S	-	M	S	S	S	S	S	M	S	S	M	M	
Potassium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	M	S	S	S	
Potassium Carbonate	M	U	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	
Potassium Chloride	U	S	S	-	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	U	S	S	S	S	
Potassium Hydroxide (5%)	U	U	S	S	S	S	M	-	S	S	S	S	-	S	U	S	S	S	S	S	S	S	M	U	M	S	U	
Potassium Hydroxide (conc.)	U	U	M	U	-	-	M	-	M	S	S	-	U	M	U	U	U	S	M	-	M	U	-	U	U	-	U	
Potassium Permanganate	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S	M	-	S	M	S	U	S	S	M	S	U	S	
Calcium Chloride	M	U	S	S	S	S	S	S	S	S	S	S	S	S	M	S	-	S	S	S	S	S	M	S	S	S	S	
Calcium Hypochlorite	M	-	U	-	S	M	M	S	-	M	-	S	-	S	M	S	-	S	S	S	M	S	M	U	S	-	S	
Kerosene	S	S	S	-	S	S	S	U	S	M	U	S	U	M	M	S	-	M	M	M	S	S	U	S	S	U	S	
Sodium Chloride (10%)	S	-	S	S	S	S	S	S	-	-	-	S	S	S	S	S	-	S	S	S	S	-	S	S	M	-	S	
Sodium Chloride (sat'd)	U	-	S	U	S	S	S	-	-	-	-	S	S	S	S	-	S	S	-	S	-	S	S	M	-	S		
Carbon Tetrachloride	U	U	M	S	S	U	M	U	S	U	U	S	U	M	U	S	S	M	M	S	M	M	M	M	U	S	S	
Aqua Regia	U	-	U	U	-	-	U	-	-	-	-	-	U	U	U	U	U	U	U	-	-	-	-	-	S	-	M	
Solution 555 (20%)	S	S	S	-	-	-	S	-	S	S	S	S	S	S	-	-	S	S	S	-	S	S	S	S	S	S	S	
Magnesium Chloride	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S	
Mercaptoacetic Acid	U	S	U	-	S	M	S	-	S	M	S	U	U	U	U	-	S	U	U	S	M	S	U	S	S	S	S	
Methyl Alcohol	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	M	S	M	U	U	
Methylene Chloride	U	U	U	U	M	S	S	U	S	U	U	S	U	U	U	U	U	U	M	U	U	S	M	U	S	U	U	

## B Chemical Compatibility Chart

CHEMICAL	MATERIAL																											
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORLYL®	NYLON	PET®, POLYCLEAR®, CLEARCRIMP®, CCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLTER, GLASS THERMOSET	POLYETHERIMIDE	POLYTRHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®	
Methyl Ethyl Ketone	S	S	U	U	S	S	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	S	S	S	U	U	
Metrizamide®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	S	M	S	S	S
Lactic Acid (100%)	-	-	S	-	-	-	-	-	-	M	S	U	-	S	S	S	M	S	S	-	M	S	M	S	S	-	S	
Lactic Acid (20%)	-	-	S	S	-	-	-	-	-	M	S	M	-	S	S	S	S	S	S	S	M	S	M	S	S	-	S	
N-Butyl Alcohol	S	-	S	U	-	-	S	-	-	S	M	-	U	S	M	S	S	S	S	M	M	S	M	-	S	-	S	
N-Butyl Phthalate	S	S	U	-	S	S	S	-	S	U	U	S	U	U	U	M	-	U	U	S	U	S	M	M	S	U	S	
N, N-Dimethylformamide	S	S	S	U	S	M	S	-	S	S	U	S	U	S	U	U	-	S	S	U	U	S	M	S	S	S	U	
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	-	S	S	S	S	S	S	M	S	S	S	
Sodium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	M	S	S	S	
Sodium Carbonate (2%)	M	U	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	
Sodium Dodecyl Sulfate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	S	S	M	S	S	S	S	M	S	S	S	M	U	S	M	S	
Sodium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S	
Sodium Nitrate	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	U	S	S	S	S	
Sodium Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S	
Sodium Sulfide	S	-	S	S	-	-	-	S	-	-	-	S	S	S	U	U	-	-	S	-	-	-	S	S	M	-	S	
Sodium Sulfite	S	S	S	-	S	S	S	S	M	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S	S	S	S	
Nickel Salts	U	S	S	S	S	S	-	S	S	S	-	-	S	S	S	S	-	S	S	S	S	S	M	S	S	S	S	
Oils (Petroleum)	S	S	S	-	-	-	S	U	S	S	S	S	U	U	M	S	M	U	U	S	S	U	S	S	S	S	S	
Oils (Other)	S	-	S	-	-	-	S	M	S	S	S	S	U	S	S	S	S	U	S	S	S	S	-	S	S	M	S	
Oleic Acid	S	-	U	S	S	S	U	U	S	U	S	S	M	S	S	S	S	S	S	S	S	S	M	U	S	M	M	
Oxalic Acid	U	U	M	S	S	S	U	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S	S	
Perchloric Acid (10%)	U	-	U	-	S	U	U	-	S	M	M	-	-	M	U	M	S	M	M	-	M	S	U	-	S	-	S	
Perchloric Acid (70%)	U	U	U	-	-	U	U	-	S	U	M	U	U	M	U	U	U	M	M	U	M	S	U	U	S	U	S	
Phenol (5%)	U	S	U	-	S	M	M	-	S	U	M	U	U	S	U	M	S	M	S	U	U	S	U	M	M	M	S	
Phenol (50%)	U	S	U	-	S	U	M	-	S	U	M	U	U	U	U	U	S	U	M	U	U	S	U	U	U	M	S	
Phosphoric Acid (10%)	U	U	M	S	S	S	U	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	U	M	U	S	S	
Phosphoric Acid (conc.)	U	U	M	M	-	-	U	S	-	M	S	U	U	M	M	S	S	S	M	S	M	S	U	M	U	-	S	
Physiologic Media (Serum, Urine)	M	S	S	S	-	-	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Picric Acid	S	S	U	-	S	M	S	S	S	M	S	U	S	S	S	U	S	S	S	S	U	S	U	M	S	M	S	

CHEMICAL	MATERIAL																										
	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET®, POLYCLEAR® ,CLEARCRIMP®,CCLEARCRIMP®	POLYALLUMER	POLYCARBONATE	POLTER, GLASS THERMOSET	POLYETHERIMIDE	POLYTRHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Pyridine (50%)	U	S	U	U	S	U	U	-	U	S	S	U	U	M	U	U	-	U	S	M	U	S	S	U	U	U	U
Rubidium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Rubidium Chloride	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Sucrose	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sucrose, Alkaline	M	S	S	-	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	M	S	S	S
Sulfosalicylic Acid	U	U	S	S	S	S	S	-	S	S	S	U	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S
Nitric Acid (10%)	U	S	U	S	S	U	U	-	S	U	S	U	-	S	S	S	S	S	S	S	S	S	M	S	S	S	S
Nitric Acid (50%)	U	S	U	M	S	U	U	-	S	U	S	U	U	M	M	U	M	M	M	S	S	S	U	S	S	M	S
Nitric Acid (95%)	U	-	U	U	-	U	U	-	-	U	U	U	U	M	U	U	U	U	M	U	U	S	U	S	S	-	S
Hydrochloric Acid (10%)	U	U	M	S	S	S	U	-	S	S	S	U	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S
Hydrochloric Acid (50%)	U	U	U	U	S	U	U	-	S	M	S	U	U	M	U	U	S	S	S	S	M	S	M	U	U	M	M
Sulfuric Acid (10%)	M	U	U	S	S	U	U	-	S	S	M	U	S	S	S	S	S	S	S	S	S	S	U	U	U	S	S
Sulfuric Acid (50%)	M	U	U	U	S	U	U	-	S	S	M	U	U	S	U	U	M	S	S	S	S	S	U	U	U	M	S
Sulfuric Acid (conc.)	M	U	U	U	-	U	U	M	-	-	M	U	U	S	U	U	U	M	S	U	M	S	U	U	U	-	S
Stearic Acid	S	-	S	-	-	-	S	M	S	S	S	S	-	S	S	S	S	S	S	S	S	S	M	M	S	S	S
Tetrahydrofuran	S	S	U	U	S	U	U	M	S	U	U	S	U	U	U	-	M	U	U	U	U	S	U	S	S	U	U
Toluene	S	S	U	U	S	S	M	U	S	U	U	S	U	U	U	S	U	M	U	U	U	S	U	S	U	U	M
Trichloroacetic Acid	U	U	U	-	S	S	U	M	S	U	S	U	U	S	M	-	M	S	S	U	U	S	U	U	U	M	U
Trichloroethane	S	-	U	-	-	-	M	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	S	-	S
Trichloroethylene	-	-	U	U	-	-	-	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	U	-	S
Trisodium Phosphate	-	-	-	S	-	-	M	-	-	-	-	-	-	S	-	-	S	S	S	-	-	S	-	-	S	-	S
Tris Buffer (neutral pH)	U	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Triton X-100®	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Urea	S	-	U	S	S	S	S	-	-	-	-	S	S	S	M	S	S	S	S	-	S	S	S	M	S	-	S
Hydrogen Peroxide (10%)	U	U	M	S	S	U	U	-	S	S	S	U	S	S	S	M	U	S	S	S	S	S	S	M	S	U	S
Hydrogen Peroxide (3%)	S	M	S	S	S	-	S	-	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S
Xylene	S	S	U	S	S	S	M	U	S	U	U	U	U	U	M	U	M	U	U	U	U	S	U	M	S	U	S
Zinc Chloride	U	U	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S
Zinc Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Citric Acid (10%)	M	S	S	M	S	S	M	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S

## B Chemical Compatibility Chart

\*Polyethyleneterephthalate

### Key

S Satisfactory

M = Moderate attack, may be satisfactory for use in centrifuge depending on length of exposure, speed involved, etc.; suggest testing under actual conditions of use.

U Unsatisfactory, not recommended.

-- Performance unknown; suggest testing, using sample to avoid loss of valuable material.

Chemical resistance data is included only as a guide to product use. Because no organized chemical resistance data exists for materials under the stress of centrifugation, when in doubt we recommend pretesting sample lots.

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