



Thermo Scientific

# Sorvall RC BIOS 6 Centrifuge

with F8-6x1000y Fiberlite Rotors

---

Thermo Scientific

# Sorvall RC BIOS 10 Centrifuge

with F5-10x1000 Fiberlite Rotors

## Instruction Manual

50142539-b • 03 / 2014



Thermo Scientific

**Sorvall RC BIOS 6**  
**Centrifuge**  
**with F8-6x1000y Fiberlite Rotors**

---

Thermo Scientific

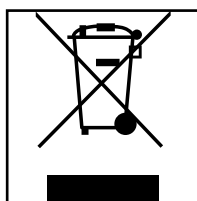
**Sorvall RC BIOS 10**  
**Centrifuge**  
**with F5-10x1000 Fiberlite Rotors**

**Instruction Manual**

50142539-b • 03 / 2014

# WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. See [www.thermoscientific.com/rohsweee](http://www.thermoscientific.com/rohsweee) for further information on Thermo Fisher Scientific's compliance with these Directives and the recyclers in your country.



**KONFORMITÄTSERKLÄRUNG  
DECLARATION OF CONFORMITY**

Name und Anschrift des Herstellers und des Bevollmächtigten für die Zusammenstellung der relevanten technischen Unterlagen:  
Name and address of the manufacturer and of the authorized representative to compile the relevant technical documentation:

**Thermo Electron LED GmbH  
Zweigniederlassung Osterode  
Am Kalkberg  
37520 Osterode am Harz  
Germany**

*Hiermit erklären wir, dass die nachstehend beschriebene Maschine  
Herewith we declare, that the machinery described below*

<b>Beschreibung /description</b>	<b>: Labor-Zentrifuge mit Zubehör / centrifuge with accessories</b>
<b>Marke / brand</b>	<b>: SORVALL</b>
<b>Modellbezeichnung / model name</b>	<b>: RC 12BP+ - RC BIOS , RC BIOS 6</b>
<b>Modell Nr. / model no.</b>	<b>: 75007032, 75007033 - 75007036, 75007037</b>
<b>Gültig ab Equipmentnr. Valid from equipment no.</b>	<b>: 41465205</b>

*mit allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG in Übereinstimmung ist.  
is in conformity with all relevant terms of directive for machinery 2006/42/EC.*

*Die Maschine ist auch in Übereinstimmung mit allen einschlägigen Bestimmungen der Richtlinie 2004/108/EG über elektromagnetische Verträglichkeit.  
The machinery is in accordance with all relevant terms of directives for electromagnetic compatibility 2004/108/EC.*

*Die Schutzziele der Niederspannungsrichtlinie 2006/95/EG werden eingehalten.  
The protection goals of the directive for low voltage 2006/95/EC are met.*

Angewandte harmonisierte Normen/  
Harmonized standards used:

**EN 61010-1: 2004  
EN 61010-2-020: 2006  
EN 61326-1: 2006**

Osterode am Harz, den 20.11.2013

Dr. Andreas Karl  
Director R&D

	Name	Datum	Dokument	Revision
Erstellt	ULi	20.11.2013	50124625	02



## KONFORMITÄTSERKLÄRUNG DECLARATION OF CONFORMITY

Name und Anschrift des Herstellers und des Bevollmächtigten  
für die Zusammenstellung der relevanten technischen Unterlagen:  
Name and address of the manufacturer and of the authorized  
representative to compile the relevant technical documentation:

**Thermo Electron LED GmbH**  
**Zweigniederlassung Osterode**  
**Am Kalkberg**  
**37520 Osterode**  
**Germany**

*Hiermit erklären wir, dass die nachstehend beschriebene Maschine  
Herewith we declare, that the machinery described below*

<b>Beschreibung / description</b>	<b>: Labor-Zentrifuge / centrifuge</b>
<b>Marke / brand</b>	<b>: Sorvall</b>
<b>Modellbezeichnung / model name</b>	<b>: RC Bios 10</b>
<b>Modell Nr. / model no.</b>	<b>: 75007136</b>
<b>Gültig ab Equipmentnr. Valid from equipment no.</b>	<b>: 41568332</b>

*mit allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG in Übereinstimmung ist.  
is in conformity with all relevant terms of directive for machinery 2006/42/EC.*

*Die Maschine ist auch in Übereinstimmung mit allen einschlägigen Bestimmungen der Richtlinie  
2004/108/EG über elektromagnetische Verträglichkeit.  
The machinery is in accordance with all relevant terms of directives for electromagnetic compatibility  
2004/108/EC.*

*Die Schutzziele der Niederspannungsrichtlinie 2006/95/EG werden eingehalten.  
The protection goals of the directive for low voltage 2006/95/EC are met.*

Angewandte harmonisierte Normen/  
Harmonized standards used:

**EN 61010-1: 2004**  
**EN 61010-2-020: 2006**  
**EN 61326-1: 2006**

Osterode, den 30.10.2013

Dr. Andreas Karl  
Director R&D

	Name	Datum	Dokument	Revision
Erstellt	Lienemann	30.10.2013	50142853_00	00
Freigegeben	Laaboubi	30.10.2013		



**KONFORMITÄTSERKLÄRUNG  
DECLARATION OF CONFORMITY**

Name und Anschrift des Herstellers und des Bevollmächtigten für die Zusammenstellung der relevanten technischen Unterlagen:  
Name and address of the manufacturer and of the authorized representative to compile the relevant technical documentation:

**Thermo Electron LED GmbH  
Zweigniederlassung Osterode  
Am Kalkberg  
37520 Osterode  
Germany**

*Hiermit erklären wir, dass die nachstehend beschriebene Maschine  
Herewith we declare, that the machinery described below*

<b>Beschreibung / description</b>	<b>: Labor-Zentrifuge / centrifuge</b>
<b>Marke / brand</b>	<b>: Sorvall</b>
<b>Modellbezeichnung / model name</b>	<b>: RC Bios 10</b>
<b>Modell Nr. / model no.</b>	<b>: 75007137</b>
<b>Gültig ab Equipmentnr. Valid from equipment no.</b>	<b>: 41568332</b>

*mit allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG in Übereinstimmung ist.  
is in conformity with all relevant terms of directive for machinery 2006/42/EC.*

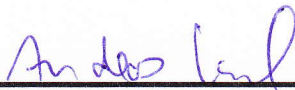
*Die Maschine ist auch in Übereinstimmung mit allen einschlägigen Bestimmungen der Richtlinie  
2004/108/EG über elektromagnetische Verträglichkeit.  
The machinery is in accordance with all relevant terms of directives for electromagnetic compatibility  
2004/108/EC.*

*Die Schutzziele der Niederspannungsrichtlinie 2006/95/EG werden eingehalten.  
The protection goals of the directive for low voltage 2006/95/EC are met.*

Angewandte harmonisierte Normen/  
Harmonized standards used:

**EN 61010-1: 2004  
EN 61010-2-020: 2006  
EN 61326-1: 2006**

Osterode, den 30.10.2013

  
\_\_\_\_\_  
Dr. Andreas Karl  
Director R&D

	Name	Datum	Dokument	Revision
Erstellt	Lienemann	30.10.2013	50142852_00	00
Freigegeben	Laaboubi	30.10.2013		

# Table of Contents

<b>WEEE Compliance</b> .....	<b>4</b>
<b>Preface</b> .....	<b>13</b>
<b>Items Supplied</b> .....	<b>13</b>
<b>Intended Use</b> .....	<b>13</b>
<b>Precautions</b> .....	<b>14</b>
Setup Conditions .....	14
Preparation .....	14
Hazardous Substances .....	14
Operating .....	15
<b>Symbols</b> .....	<b>16</b>
<b>Technical Specifications</b> .....	<b>17</b>
<b>Characteristics of the Centrifuge</b> .....	<b>17</b>
Functions and Features .....	17
Package Solutions .....	17
<b>Technical Data</b> .....	<b>18</b>
Sorvall RC BIOS 6 Centrifuge .....	18
Fiberlite F8-6x1000y Rotor .....	19
Sorvall RC BIOS 10 Centrifuge .....	20
Fiberlite F5-10x1000 Rotor .....	21
Directives, Standards and Guidelines .....	22
<b>Mains Supply</b> .....	<b>23</b>
Sorvall RC BIOS 6 Centrifuge .....	23
Sorvall RC BIOS 10 Centrifuge .....	23
<b>Transport and Set Up</b> .....	<b>25</b>
<b>Before Setting Up</b> .....	<b>25</b>
<b>Location</b> .....	<b>25</b>
<b>Aligning the Centrifuge</b> .....	<b>25</b>
<b>Aligning the Centrifuge</b> .....	<b>28</b>
<b>Transporting the Centrifuge</b> .....	<b>28</b>
<b>Mains Connection</b> .....	<b>28</b>
<b>Other Connections</b> .....	<b>29</b>
<b>Storage</b> .....	<b>29</b>



<b>Rotor Preparation and Installation</b> .....	<b>31</b>
<b>Before a Run</b> .....	<b>31</b>
<b>Proper Loading</b> .....	<b>31</b>
Fiberlite F8-6x1000y Rotor .....	31
Fiberlite F5-10x1000 Rotor .....	31
<b>Improper Loading</b> .....	<b>32</b>
Fiberlite F8-6x1000y Rotor .....	32
Fiberlite F5-10x1000 Rotor .....	32
<b>Open and Close of the Rotor</b> .....	<b>32</b>
<b>Rotor Installation</b> .....	<b>33</b>
Installing the F8-6x1000y Fiberlite rotor .....	33
Installing the F5-10x1000 Fiberlite rotor .....	33
<b>Removing the Rotor</b> .....	<b>34</b>
Removing the F8-6x1000y Fiberlite rotor .....	34
Removing the F5-10x1000 Fiberlite rotor .....	34
<b>Maximum Loading</b> .....	<b>34</b>
<b>Control Panel</b> .....	<b>35</b>
<b>Operation</b> .....	<b>37</b>
<b>Switch on Centrifuge</b> .....	<b>37</b>
<b>Lid Opening</b> .....	<b>38</b>
<b>Close Lid</b> .....	<b>38</b>
Door Gas Springs .....	38
<b>Normal Operation</b> .....	<b>39</b>
<b>Centrifugation</b> .....	<b>40</b>
<b>Programmed Operation</b> .....	<b>41</b>
Storing Selections to Program Memory .....	41
Performing a Programmed Run .....	42
<b>Using Advanced Features</b> .....	<b>43</b>
SELECT QC RUN .....	44
SLOW START .....	45
SLOW STOP .....	45
BRAKE OFF .....	45
CHANGE OVERTEMPERATURE LIMIT .....	46
STEP RUN .....	46
SAVE TO PROGRAM MEMORY? .....	47
<b>Temperature Control</b> .....	<b>47</b>
<b>Rotor Temperature Equilibration</b> .....	<b>48</b>
<b>Maintenance and Care</b> .....	<b>49</b>
<b>Customer Controlled Inspection</b> .....	<b>49</b>
Speed Controls .....	49
Timer Controls .....	49
Temperature Controls .....	50

<b>Cleaning Intervals</b> .....	<b>50</b>
<b>Cleaning</b> .....	<b>51</b>
<b>Cleaning</b> .....	<b>51</b>
<b>Disinfection</b> .....	<b>52</b>
<b>Decontamination</b> .....	<b>53</b>
<b>Autoclaving</b> .....	<b>54</b>
<b>Rotor Maintenance</b> .....	<b>54</b>
<b>Rotor Evaluation and Care of Your Rotor</b> .....	<b>56</b>
Proper Handling .....	56
Stress Corrosion .....	56
Missing Paint and Anodization .....	56
Dropped Rotors .....	56
Overheating .....	56
<b>Service of Thermo Fisher Scientific</b> .....	<b>57</b>
<b>Storage</b> .....	<b>57</b>
<b>Shipping and Depositing</b> .....	<b>57</b>
<b>Troubleshooting</b> .....	<b>59</b>
<b>Mechanical Emergency Door Release</b> .....	<b>59</b>
<b>Circuit Breakers</b> .....	<b>59</b>
<b>Failure Message</b> .....	<b>60</b>
<b>Chemical Compatibility Chart</b> .....	<b>65</b>
<b>Index</b> .....	<b>71</b>





## Preface

Before starting to use the centrifuge, read through this instruction manual carefully and follow the instructions.

## Items Supplied

Sorvall RC BIOS 6	
Item	Quantity
<b>Sorvall RC BIOS 6 Centrifuge</b>	1
Power Supply Cable	1
Installation Kit	1
Instruction Manual	1
<b>Fiberlite F8-6x1000y Rotor</b>	1
Refresher Kit	1
O-Ring Package	5
O-Ring Package	5
Vacuum Grease	1
Product Brochure	1
Rotor Care and Maintenance	1
Rotor Replacement Chart	1
Fiberlite Rotor Safety CD	1
RCF Chart	1
Instruction Manual	1

**or**

Sorvall RC BIOS 10	
Item	Quantity
<b>Sorvall RC BIOS 6 Centrifuge</b>	1
Power Supply Cable	1
Installation Kit	1
Instruction Manual	1
<b>Fiberlite F5-10x1000 Rotor</b>	1
Refresher Kit	1
O-Ring Package	1
Lid Screw O-Ring 2-206	5
Parker 2-282 N70	5
Vacuum Grease	1
Product Brochure	1
Rotor Care and Maintenance	1
Rotor Replacement Chart	1
Fiberlite Rotor Safety CD	1
RCF Chart	1
Instruction Manual	1

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

## Intended Use

This centrifuge is a laboratory product designed to separate components by generation of Relative Centrifugal Force. It separates human samples (e.g. blood, urine and other body fluids) collected in appropriate containers, either alone or after addition of reagents or other additives.

The centrifuge is designed to also run other containers filled with chemicals, environmental samples and other non-human body samples.

This centrifuge should be operated by trained specialists only.

## Precautions

Observe the safety instructions. Not following the safety instructions can result in severe damage and injuries.

Do not manipulate the safety devices.

The centrifuge is to be used for its intended use only.

The centrifuge should be operated by trained specialists only.

Prerequisite for the safe operation of the centrifuge is a work environment in compliance with the regulatory requirements of your country.

## Setup Conditions

- Plug the centrifuge only into sockets which have been properly grounded.
- The mains plug and main switch must be freely accessible at all times. Pull out the power supply plug or disconnect the power supply in an emergency.
- Maintain a radius of at least 30 cm around the centrifuge.
- Setup in a well-ventilated environment, on a level and rigid surface with adequate loadbearing capacity.

## Preparation

- Do not touch the mechanical components of the rotor and do not make any changes to the mechanical components.
- Do not remove the magnet at the rotor bottom.
- Do not touch the electronic components of the centrifuge or alter any electronic or mechanical components.
- Do not use rotors which show any signs of damage.
- Use only rotors which have been properly installed. (see „Rotor Installation“ on page 33)
- Maximum sample density at maximum speed:  $1.2 \frac{g}{cm^3}$
- Use only with rotors that have been loaded properly.
- Never overload the rotor.
- Always balance the samples.
- 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.
- Rotor installation: Make sure the rotor is locked properly into place before operating the centrifuge.

## Hazardous Substances

- When working with corrosive samples (salt solutions, acids, bases), the accessory parts and vessel have to be cleaned carefully.
- Do not centrifuge explosive or flammable materials or substances which could react violently with one another.
- The centrifuge is neither inert nor protected against explosion. Never use the centrifuge in an explosion-prone environment.
- Do not centrifuge inflammable substances.
- Do not centrifuge toxic or radioactive materials or any pathogenic micro-organisms without suitable safety precautions.
- Do not centrifuge toxic or radioactive materials or any pathogenic micro-organisms without suitable safety precautions.

When centrifuging microbiological samples from the Risk Group II (according to the "Laboratory Biosafety Manual" of the World Health, aerosol-tight biological seals have to be used. For materials in a higher risk group, extra safety measures have to be taken.

- If toxins or pathogenic substances have gotten into the centrifuge or its parts, appropriate disinfection measures have to be taken. (see „Disinfection“ on page 52)
- Highly corrosive substances which can cause material damage and impair the mechanical stability of the rotor, should only be centrifuged in corresponding protective tubes.

If a hazardous Situation occurs, turn off the power supply to the centrifuge and leave the area immediately.

## Operating

- Never start the centrifuge when the lid is open.
- Never use the centrifuge if parts of its cover panels are damaged or missing.
- Do not move the centrifuge while it is spinning. It is recommended, to implement special measures, which ensure that no one can approach the centrifuge for longer than absolutely necessary while it is spinning.
- Never open the lid until the rotor has come to a complete stop and this has been confirmed in the display.
- The lid emergency release may be used in emergencies only to recover the samples from the centrifuge, e.g. during a power failure. (see „Mechanical Emergency Door Release“ on page 59) should only be centrifuged in corresponding protective tubes.

## Symbols



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.



This symbol means that the rotor and centrifuge manual contain additional important information.

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



This symbol refers to a rotor failure.

3~

This symbol refers to 3 phase alternating current.



# Technical Specifications

## Characteristics of the Centrifuge

The maintenance-free induction motor ensures quiet and low-vibration operation even at high speeds, and guarantees a very long lifetime. The user-friendly control panel makes it easy to preset the speed, RCF-value, running time, temperature, and running profile (acceleration and braking curves). You can choose between the display of speed and RCF or the entry mode. These settings can be changed even while the centrifuge is running.

The Thermo Scientific™ Sorvall™ RC BIOS 6 and Thermo Scientific™ Sorvall™ RC BIOS 10 centrifuges are equipped with various safety features:

Housing, rotor chamber, baseframe, and guard ring are made of high-strength, high-quality steel.

## Functions and Features

Component / Function	Description / Features
Structure / Housing	Galvanized and powder coated high strength steel chassis and guard-ring
Chamber	Stainless steel
Drive	Induction drive without carbon brushes
Keys and display	Easy-to-clean keypad and display surface
Controls	Microprocessor-controlled
Internal memory	The most recent data is saved
Functions	RCF-selection, temperature controlled
Acceleration / braking profiles	9 acceleration and 10 braking curves
Imbalance detection	Electronic, contingent on rotor and speed
Lid view port	Optical control of operating status
Lid lock	Automatic lid closing and locking starting from an initial hold position
Lid emergency release	Mechanical emergency release of the lid lock

## Package Solutions

The Sorvall RC BIOS 6 is sold commercially in a package solution. The rotor available for use with the Sorvall RC BIOS 6 is the Thermo Scientific™ Fiberlite™ F8-6x1000y Rotor.

The Sorvall RC BIOS 10 is sold commercially in a package solution. The rotor available for use with the Sorvall RC BIOS 10 is the Thermo Scientific™ Fiberlite™ F5-10x1000 Rotor

For more information visit our website at <http://www.thermoscientific.com/centrifuge>



# Technical Data

## Sorvall RC BIOS 6 Centrifuge

Environmental Conditions	Use in interior spaces Altitudes of up to 2000 m above sea level Max. relative humidity 80% up to 31 °C; decreasing linearly up to 50% relative humidity at 40 °C
Permissible Ambient Temperature	+2 °C to +40 °C

Heat Dissipation	208-220 V, 60 Hz	230 V, 60 Hz	220-230 V, 50 Hz	400 V, 50 Hz
	~4.4 kW	~4.5 kW	~4.3 kW	~4.9 kW
	15000 Btu/h	15300 Btu/h	14700 Btu/h	16700 Btu/h
Overvoltage Category	II			
Pollution Degree	2			
IP	20			
Running Time	Unlimited			
Maximum Speed $n_{max}$	5500 rpm			
Minimum Speed $n_{min}$	300 rpm			
Minimum Sample Temperature	4 °C at 5500 rpm			
Maximum RCF Value at $n_{max}$	9300 xg			
Noise Level at Maximum Speed <sup>1</sup>	< 65 dB (A)			
Maximum Kinetic Energy	< 212 kJ			
Temperature Setting Range	-10 °C to +40 °C			

Dimensions	
Height	1178 mm / 46.3 inch
Width	800 mm / 31.5 inch
Depth	905 mm / 35.6 inch
Length Power Cord	3000 mm / 118.1 inch
Weight <sup>2</sup>	475 kg / 1047 lb

<sup>1</sup> Front Side Measurement

<sup>2</sup> Without Rotor

## Fiberlite F8-6x1000y Rotor

Weight (empty)	17.5 kg
Max. Cycle Number	7 years
Maximum Permissible Load	1440 g
Maximum Speed $n_{\max}$	5500 rpm
Maximum RCF-Value at $n_{\max}$	9300 xg
K-Value at $n_{\max}$	4514
Radius max. / min.	196 mm / 51 mm
Angle	20°
Acceleration / Braking Time	220 s / 230 s
Maximum Speed at 4 °C	5300 rpm
Sample Cooling at $n_{\max}$ (Ambient temperature of 23 °C, run time 60 minutes)	< 9 °C (230 V, 50 Hz / 400 V, 50 Hz) < 14 °C (208 V, 60 Hz)

## Sorvall RC BIOS 10 Centrifuge

Environmental Conditions	Use in interior spaces Altitudes of up to 2000 m above sea level Max. relative humidity 80% up to 31 °C; decreasing linearly up to 50% relative humidity at 40 °C			
Permissible Ambient Temperature	+2 °C to +40 °C			
Heat Dissipation	208-220 V, 60 Hz	230 V, 60 Hz	220-230 V, 50 Hz	400 V, 50 Hz
	~4.2 kW	~4.2 kW	~4.6 kW	~5.1 kW
	14300 Btu/h	14300 Btu/h	15700 Btu/h	17400 Btu/h
Overvoltage Category	II			
Pollution Degree	2			
IP	20			
Running Time	Unlimited			
Maximum Speed $n_{max}$	5500 rpm			
Minimum Speed $n_{min}$	300 rpm			
Minimum Sample Temperature	4 °C at 5500 rpm			
Maximum RCF Value at $n_{max}$	9300 xg			
Noise Level at Maximum Speed <sup>1</sup>	< 65 dB (A)			
Maximum Kinetic Energy	< 299 kJ			
Temperature Setting Range	-10 °C to +40 °C			
Dimensions				
Height	1178 mm / 46.3 inch			
Width	800 mm / 31.5 inch			
Depth	905 mm / 35.6 inch			
Length Power Cord	3000 mm / 118.1 inch			
Weight <sup>2</sup>	475 kg / 1047 lb			

<sup>1</sup> Front Side Measurement

<sup>2</sup> Without Rotor

## Fiberlite F5-10x1000 Rotor

Weight (empty)	30.8 kg
Max. Cycle Number	7 years
Maximum Permissible Load	1440 g
Maximum Speed $n_{\max}$	5500 rpm
Maximum RCF-Value at $n_{\max}$	9300 xg
K-Value at $n_{\max}$	4770
Radius max. / min.	275 mm / 124 mm
Angle	25°
Acceleration / Braking Time	215 s / 195 s
Maximum Speed at 4 °C	5300 rpm
Sample Cooling at $n_{\max}$ (Ambient temperature of 23 °C, run time 60 minutes)	< 9 °C (230 V, 50 Hz / 400 V, 50 Hz) < 14 °C (208 V, 60 Hz)

## Directives, Standards and Guidelines

Region	Directive	Standard
<b>Europe</b> 230 V, 50/60 Hz 400 V, 50 Hz	2006/95/EC Low Voltage LVD 2006/42/EC Machinery (MD) 2004/108/EC Electromagnetic Compatibility (EMC) 2002/96/EC Waste Electrical and Electronic Equipment (WEEE) 1907/2006 Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)	EN 61010-1, 2nd Edition EN 61010-2-020, 2nd Edition EN 61326-1 EN 61000-6-2
<b>North America (USA &amp; Canada)</b> 208-220 V, 60 Hz 220-230 V, 60 Hz	FDA Device Class 1 Product code KSO: Blood bank centrifuge for in vitro diagnostic use	CAN/CSA-C22.2 No. 61010-1-04 UL Std. No. 61010-1, 2nd Edition) CAN/CSA-C22.2 No. 61010-2-020- 09-Part 2-020 IEC 61010-2-020, 2nd Edition
<b>China</b> 220-230 V, 50 Hz	SFDA	<u>Safety</u> IEC 61010-1, 2nd Edition IEC 61010-2-020, 2nd Edition <u>EMC</u> EN 61326-1 Class B EN 61000-6-2

## Mains Supply

The following table contains an overview of the electrical connection data. This data is to be taken into consideration, when selecting the mains connection socket.

### Sorvall RC BIOS 6 Centrifuge

Catalog No.	Mains Voltage	Frequency	Rated Current	Power Consumption	Equipment Fuse	Building Fuse	Supply Power Plugs
75007034	208-220 V	60 Hz	23.5 A	4400 W	25 A & 6 A	30 A	NEMA 6-30P Single Phase
75007035	230 V	60 Hz	22.5 A	4500 W	25 A & 6 A	30 A	NEMA 6-30P Single Phase
75007036	220-230 V	50 Hz	22.0 A	4300 W	25 A & 6 A	32 A	IEC 60309 CEE 32 A-6h 1P+N+PE
75007037	400 V	50 Hz	19.0 A	4900 W	25 A & 6 A	3 x 32 A	IEC 60309 CEE 32 A-6h 3P+N+PE

### Sorvall RC BIOS 10 Centrifuge

Catalog No.	Mains Voltage	Frequency	Rated Current	Power Consumption	Equipment Fuse	Building Fuse	Supply Power Plugs
75007134	208-220 V	60 Hz	23.5 A	4150 W	25 A & 6 A	30 A	NEMA 6-30P Single Phase
75007135	230 V	60 Hz	22.5 A	4200 W	25 A & 6 A	30 A	NEMA 6-30P Single Phase
75007136	220-230 V	50 Hz	24.0 A	4600 W	25 A & 6 A	32 A	IEC 60309 CEE 32 A-6h 1P+N+PE
75007137	400 V	50 Hz	18.5 A	5050 W	25 A & 6 A	3 x 32 A	IEC 60309 CEE 32 A-6h 3P+N+PE



# 2

## Transport and Set Up

### Before Setting Up

1. Check the centrifuge and the packaging for any shipping damage. Inform the shipping company and Thermo Fisher Scientific immediately if any damage is discovered.
2. Remove the packaging.
3. Check the order for completeness. (see „Items Supplied“ on page 13)  
If the order is incomplete, please contact Thermo Fisher Scientific.

### Location

The centrifuge should only be operated indoors.

The set-up location must fulfill the following requirements:

- A safety zone of at least 30 cm must be maintained around the centrifuge.  
People and hazardous substances must be kept out of the safety zone while centrifuging.
- The supporting structure must be stable and free of resonance.
- The supporting structure must be suitable for horizontal setup of the centrifuge.
- The centrifuge should not be exposed to heat and strong sunlight.



#### WARNING

UV rays reduce the stability of plastics.  
Do not subject the centrifuge, rotors and plastic accessories to direct sunlight.

- The set-up location must be well-ventilated at all times.

### Aligning the Centrifuge



#### WARNING

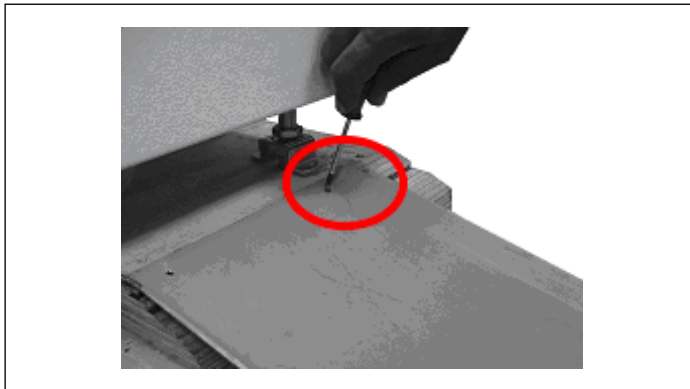
The centrifuge operates with high kinetic energies. Do not run the centrifuge without a radius of at least 30 cm around the centrifuge.  
Do not run the centrifuge while standing on its casters.

#### NOTICE

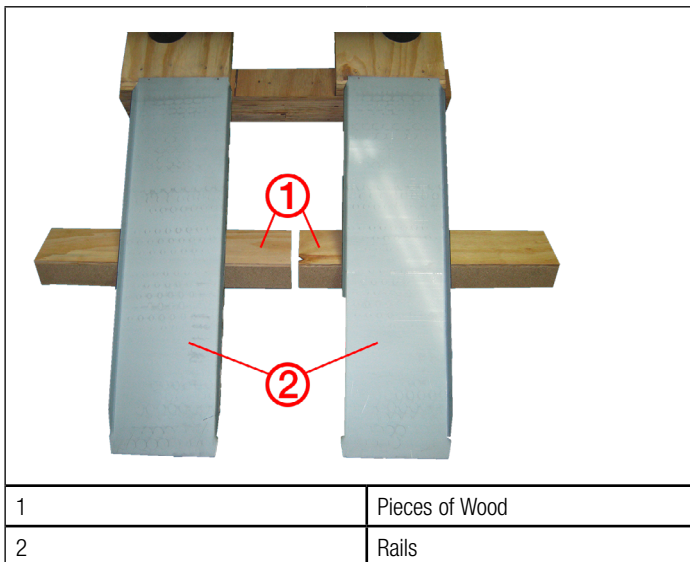
The centrifuge is screwed onto the pallet with four screws.



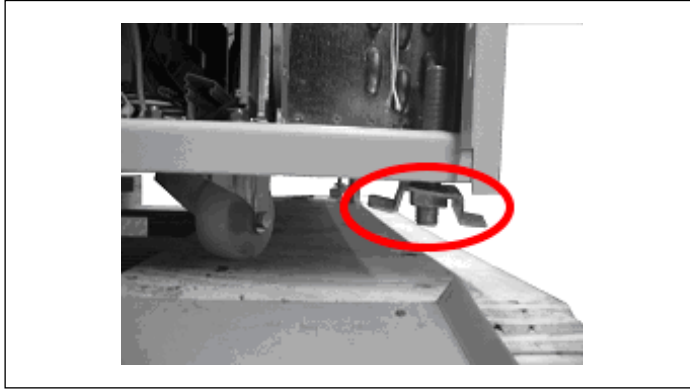
1. Place the pallet with the centrifuge so that you have at least 2 m room in front of the pallet.
2. Release the rails from the pallet.
3. Screw the rails onto the pallet in front of the centrifuge.



4. Place the piece of wood under the rails.



5. Place the rubber feet under the struds with the safety brackets and screw them entirely up.
6. Remove the four screws that fix the centrifuge to the pallet. The heads are upside down in the pallet.
7. Remove the bolt spacers.
8. Screw the studs with the safety brackets entirely up. Otherwise they might get stuck when rolling the centrifuge off the pallet.



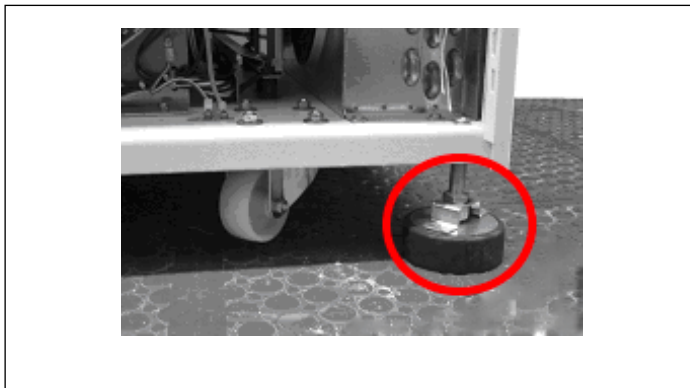
9. Remove the rubber feet.
10. Check that the steering casters point to the back.
11. Use several people and other means in order to roll the centrifuge off the pallet.



## WARNING

Due to the centrifuges weight it must be controlled by several people and other means when rolling of the pallet. Do not stand in front of the centrifuge when rolling it down. the centrifuge might run over you.

12. Once the centrifuge is in its final position mount the enclosed locking stabilizers.
13. Screw the studs down.
14. Place the rubber feet centrally and align the centrifuge. All the rubber feet should carry uniformly (check by a tilt test).  
The casters are at a distance of about 5-15 mm from the ground.



15. Switch on the centrifuge.
16. Open the centrifuge.
17. Put the enclosed water level on the drive spindle.
18. Use a wrench to rotate the safety brackets alternately to raise or lower them until the centrifuge is leveled.

**CAUTION**

If the centrifuge isn't leveled, imbalances can occur and the centrifuge can be damaged.

Do not place anything under the centrifuge feet to level the centrifuge.

19. Remove the water level when the centrifuge is leveled.
20. Be sure that the four locking stabilizers stand safe and don't jolt. The final assembly of the safety brackets is carried out after leveling.
21. Tighten the locking nuts of the locking stabilizers firmly.  
Mount the safety brackets by means of an 8 mm open-end wrench on the stabilizers.
22. Optional: To be certain the centrifuge is working properly, refer to the Customer Control Inspection paragraph located in (see „Customer Controlled Inspection“ on page 49). Perform the procedures listed under Speed Control, Timer, and Temperature Control.

## Aligning the Centrifuge

The horizontal alignment of the centrifuge must be checked every time after moving it to a different location.

The supporting structure must be suitable for horizontal setup of the centrifuge.

## Transporting the Centrifuge

- Use a forklift to lift the centrifuge.
- The centrifuge can be damaged by impacts.
- Transport the centrifuge upright and if at all possible in packaging.

**NOTICE**

The packaging is an one-way packaging. Assign a logistic company for the transport. Contact Customer Service.

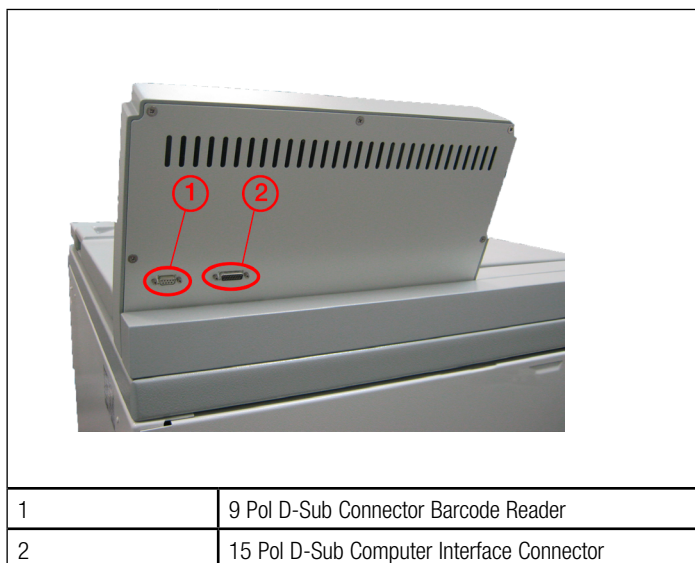
**WARNING**

Always remove the rotor before moving the centrifuge.

## Mains Connection

1. Turn off the power supply switch located on a small recessed panel in the upper right corner of the front cabinet panel (press "0").
2. Plug the centrifuge into grounded electrical sockets only.
3. Check whether the cable complies with the safety standards of your country.
4. Make sure that the voltage and frequency correspond to the figures on the rating plate.
5. Establish the connection to the power supply with the connecting cable.

## Other Connections



1	9 Pin D-Sub Connector Barcode Reader
2	15 Pin D-Sub Computer Interface Connector

## Storage

- Before storing the centrifuge and the accessories, it must be cleaned and if necessary disinfected and decontaminated.
- Store the centrifuge in a clean, dust-free location.
- Be sure to place the centrifuge on its feet.
- Avoid direct sunlight.



# 3

## Rotor Preparation and Installation

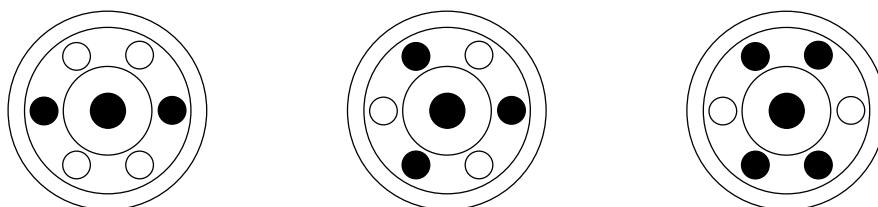
### Before a Run

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 and scratches.
3. Check the rotor chamber and the centrifuge spindle.
4. Check the rotor's suitability using the Chemical Compatibility Chart. (see „Chemical Compatibility Chart“ on page 65)
5. Make sure the tubes do not touch the lid.
6. For runs at other than room temperature, always refrigerate or warm the rotor for fast equilibration.

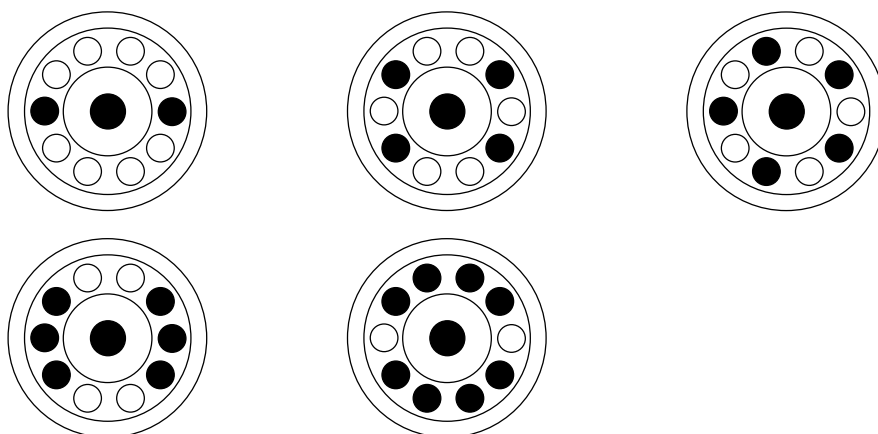
### Proper Loading

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

#### Fiberlite F8-6x1000y Rotor



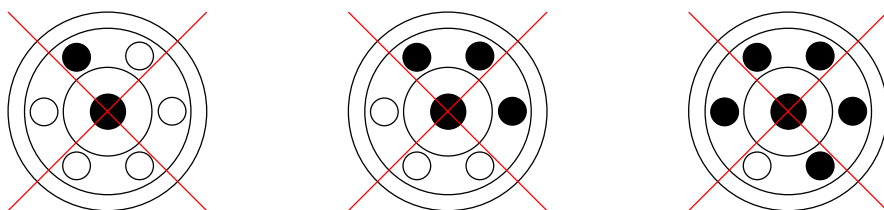
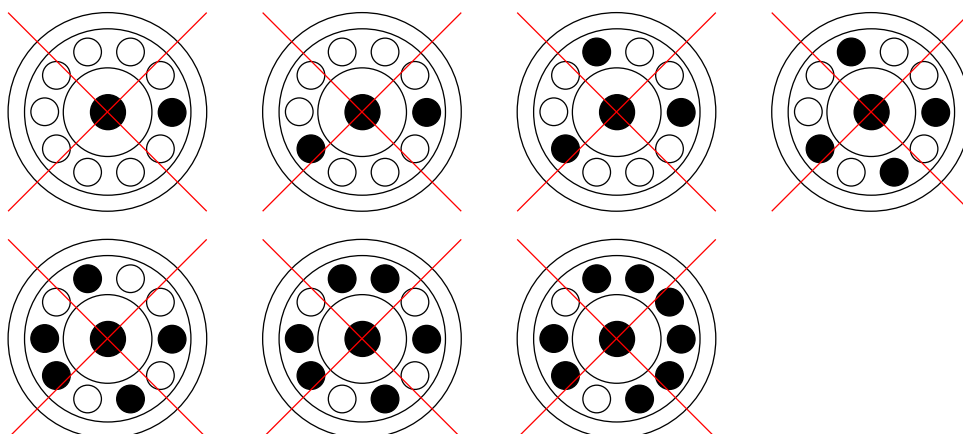
#### Fiberlite F5-10x1000 Rotor



**NOTE**

You can also fully load the rotor. It is very important that the tubes are balanced against each other.

If the rotor is not fully loaded, the tubes or bottles must be arranged symmetrically in the rotor. Opposing tubes or bottles must be filled to the same level with liquid of the same density.

**Improper Loading****Fiberlite F8-6x1000y Rotor****Fiberlite F5-10x1000 Rotor****Open and Close of the Rotor**

1. To tighten the lid, twist the lid handle clockwise until “hand tight”. As a general rule, once the lid is tightend to the point of resistance, tighten an additional  $\frac{1}{4}$  turn.
2. To remove the lid, twist the lid handle counter clockwise until the lid can be removed from the rotor.

**NOTE**

The rotor may be carried by the lid handle if the lid is properly tightened.

## Rotor Installation

Before installing the rotor, make sure that the rotor's center hole and drive spindle are clean and dry, and free of nicks and scratches. Also make sure that all rotor parts, the centrifuge chamber surfaces, and the drive spindle are clean and dry.

### Installing the F8-6x1000y Fiberlite rotor

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.
2. Place the rotor over the centrifuge spindle and let it slide down slowly the centrifuge spindle.
3. Slightly push the allen key through the hole in the middle of the rotor until it sticks.

You can install the rotor with or without the windshield mounted.

4. Tighten the rotor with the allen key firmly in a clockwise direction on the centrifuge spindle.

### Installing the F5-10x1000 Fiberlite rotor

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.
2. Remove the windshield from the rotor.

It is not possible to install the rotor properly with the windshield mounted.

3. Place the rotor over the centrifuge spindle and let it slide down slowly the centrifuge spindle.
4. Slightly push the allen key through the hole in the middle of the rotor until it sticks.
5. Tighten the rotor with the allen key firmly in a clockwise direction on the centrifuge spindle.
6. Mount the windshield onto the rotor.



#### WARNING

If the rotor cannot be properly locked in place after several attempts, you are not permitted to operate the rotor.  
Check for any damage to the rotor: Damaged rotors must not be used.  
Keep the centrifuge spindle area of the rotor clear of objects.

#### NOTICE

Be sure to check all sealings before starting any aerosol-tight applications.  
See the information in the rotor instruction manual.



## Removing the Rotor

### Removing the F8-6x1000y Fiberlite rotor

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.
2. Slightly push the allen key through the hole in the middle of the rotor until it sticks.  
You can remove the rotor with or without the windshield mounted.
3. Untighten the rotor with the allen key in an anti-clockwise direction off the centrifuge spindle.
4. Slowly lift the rotor off the centrifuge spindle.

### Removing the F5-10x1000 Fiberlite rotor

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.
2. Unmount the windshield from the rotor.  
It is not possible to remove the rotor properly with the windshield mounted.
3. Slightly push the allen key through the hole in the middle of the rotor until it sticks.
4. Untighten the rotor with the allen key firmly in an anti-clockwise direction off the centrifuge spindle.
5. Slowly lift the rotor off the centrifuge spindle.

## 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 symmetrically balance the tubes in the rotor. This refers to each cavity.

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

- Reduce the fill level.
- Reduce the speed.

Use this formula:

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

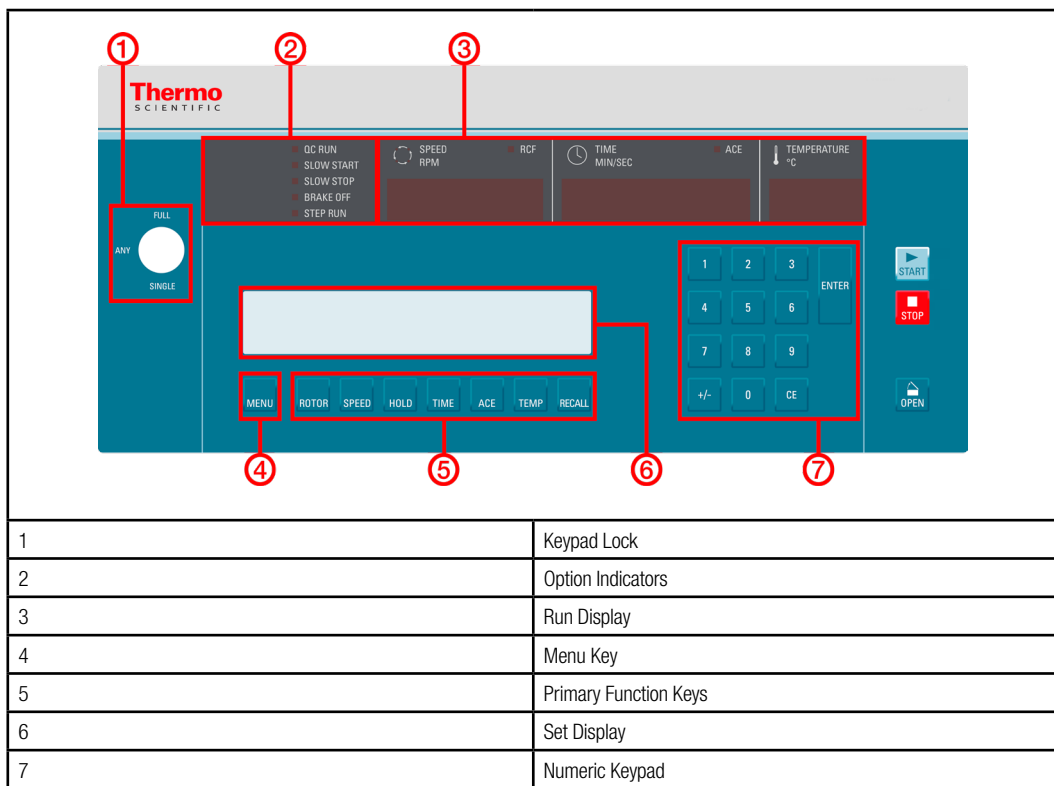
$n_{adm}$  = admissible speed

$n_{max}$  = maximum speed

# 4

## Control Panel

The control panel consists of the *Run Display*, the *Set Display*, the *Menu Key* with the *Option Indicators*, the *Primary Function Keys*, a *Numeric Keypad*, and a *Keypad Lock*.





# 5

## Operation

### Switch on Centrifuge

#### NOTICE

Make sure the centrifuge is properly installed before turning it ON for the first time, (see Chapter 2, Installation).

1. Turn on the power switch located on a small recessed panel in the upper right corner of the front cabinet panel into position "1".

The device performs a self-check of its software.

2. Watch the control panel LEDs to be sure that all segments light.

#### NOTICE

If any LED segments do not light, note which ones and inform Customer Service. Continued operation when the centrifuge is unable to display all run information correctly could mislead an unaware observer.


During start-up the SET DISPLAY shows:

```
THERMO SCIENTIFIC CENTRIFUGES  
Software selftest...
```

- If an error is detected, an error message will appear in the SET DISPLAY.
- If no error is found, the SET DISPLAY will display the values that was displayed when the centrifuge was turned OFF.
- All OPTIONS selections will also be the same as when the centrifuge was turned OFF.

## Lid Opening

The lid of the centrifuge can only be opened while the centrifuge is switched on and the rotor has come to a complete stop. The centrifuge cannot be started until the lid has been closed properly.

	<b>WARNING</b>
Do not reach into the crack between the lid and the housing. The lid is drawn shut automatically. Use the emergency release only for malfunctions and power failures. (see „Mechanical Emergency Door Release“ on page 59)	

Press the “OPEN” key .

## Close Lid

Close the lid by pressing down on it lightly in the middle or on both sides of it. Two locks close the lid completely. The lid will close automatically.


	<b>WARNING</b>
Do not reach into the crack between the lid and the housing. The lid is drawn shut automatically.	

<b>NOTICE</b>
The lid should audibly click into place.

## Door Gas Springs

Periodically check that the two door gas springs are functioning properly.

- a. Open the chamber door and making sure it remains open.
  - The gas springs counterbalance the weight of the door and hold it in the open position.
  - If the chamber door will not stay in the open position, inform Customer Service.
- b. Check that the gas spring bracket is not cracked.
  - If the gas spring bracket is cracked, inform Customer Service.

	<b>CAUTION</b>
The door gas springs must be checked periodically for proper functioning. If gas pressure is not sufficient the door will not stay open and possible injury could result.	

## Normal Operation

### Preselecting Speed / RCF

1. Press the SPEED key.

The display shows the RPM or the RCF-value depending on the display setting. Press the SPEED key to toggle between the two modes.

2. Enter the desired value using the numeric pad.

The digits show in sequential order.

#### NOTICE

If you select a value that is too high for the defined rotor it will not be accepted. The value will continue to blink.

3. Confirm your entry by pressing ENTER.

Your entry will also be automatically confirmed if you do not press any key for 5 seconds.

#### NOTICE

The equivalent value will be calculated and displayed. If an extremely low RCF value has been selected, it will be corrected automatically if the resulting speed is less than 300 rpm. This is because 300 rpm is the lowest selectable speed.

#### Explanation of RCF-Value

The relative centrifugal force (RCF) is given as a multiple of the force of gravity  $g$ . It is a unitless numerical value which is used to compare the separation or sedimentation capacity of various centrifuges, since it is independent of the type of device. Only the centrifuging radius and the speed come into play in it:

$$RCF = 11.18 \times (n/1000)^2 \times r$$

$r$  = centrifuging radius in cm

$n$  = rotational speed in rpm

The maximum RCF value is related to the maximum radius of the tube opening.

Remember that this value is reduced depending on the tubes and adapters used.

This can be accounted for in the calculation above if required.

### Preselecting Run time

1. Press the TIME key in order to open the runtime selection menu.

2. Enter the desired runtime using the numeric pad.

The maximum selectable run time is 99:59.

The digits show in sequential order.

3. Confirm your entry by pressing ENTER.

Your entry will be automatically confirmed if you do not press any key for 5 seconds.

## ACE

1. Press the ACE key in order to open the ACE selection menu.
2. Enter the desired runtime using the numeric pad.  
The maximum selectable ACE is 9.99 x 1030 (read 9.99e30 in SET DISPLAY)  
The digits show in sequential order.
3. Confirm your entry by pressing ENTER.  
Your entry will be automatically confirmed if you do not press any key for 5 seconds.

## HOLD

Press the HOLD key in order to select the HOLD run. During HOLD, the centrifuge will continue running until you stop it manually with the STOP key.

## Preselecting temperature

You can preselect temperatures between -10 °C and +40 °C.

1. Press the TEMP key in order to enter the temperature.
2. Enter the desired temperature using the numeric pad.  
The digits show in sequential order.
3. Confirm your entry by pressing ENTER.  
Your entry will be automatically confirmed if you do not press any key for 5 seconds.

# Centrifugation

Once the rotor has been properly installed, the main switch has been turned on and the door has been closed, you can start centrifugation

## Starting centrifuge program

1. Press the START key on the control panel.  
The centrifuge accelerates to the preset speed with the time display active.
2. You cannot open the door while the centrifuge is running.

## Imbalance indicator

If a load is imbalanced, this will be indicated by the message "ROTOR IMBALANCE - BALANCE ROTOR".

The run will terminate.

Check the loading and start the centrifuge once again. See the information on proper loading in the rotor instruction manual. For information on troubleshooting, see „Troubleshooting“ on page 59.

## Stopping the centrifugation program

### Set run time

Usually the run time is preset and you only have to wait until the centrifuge stops automatically when the preset time limit expires.

As soon as the speed drops to zero, the message "END" will appear in the SPEED field. By pressing the OPEN key, you can open the lid and remove the centrifuge material.

You can also stop the centrifugation program manually at any time by pressing the STOP key.

## ACE

When you select an ACE control run, the run will determine when the centrifuge has reached the set ACE value.

## HOLD

If you selected continuous operation (see „HOLD“ on page 40), you will have to stop the centrifuge manually. Press the STOP key on the control panel. The centrifuge will be decelerated at the designated rate. The message “END” will illuminate, and after pressing the key OPEN, the lid will open and you can remove the samples.

# Programmed Operation

## Storing Selections to Program Memory

1. Establish all desired run parameters as explained above, see „Normal Operation“ on page 39.

NOTICE	
<p>If you plan on using the QC RUN feature, consider the following as you save runs to program memory:</p> <ul style="list-style-type: none"> <li>• QC programs should all apply to using the same rotor.</li> <li>• QC RUN programs should not use HOLD.</li> </ul>	

To minimize the time it takes to perform a QC RUN, we recommend the following:

Starting with program 1, save runs to program memory: first by temperature (highest first), then, by speed (lowest first).

**For Example:** The programs below are listed in correct order for using QC RUN function (program values shown are for example purposes only, actual set parameters will vary).

ROTOR	SPEED	TIMED	DEG C	PROG #
F8-6x1000y	2900	04:00	22	1
F8-6x1000y	4000	03:00	22	2
F8-6x1000y	3800	03:45	4	3
F8-6x1000y	4700	05:30	4	4

2. Press the MENU key to access the advanced features screens.
3. Press the ENTER key (six times after first accessing the advanced features) until the following screen is in the SET DISPLAY:



4. Press 1.

The following screen will appear in the SET DISPLAY:





## NOTICE

Single-digit program numbers 1-9 are for storing sets of standard run parameters. Double-digit program numbers 10-15 are for storing step-runs.

5. Enter a program number.
6. Press ENTER key.

The SET DISPLAY will then return to the HOME screen, and that program number will appear in the PROG # field as confirmation:

```

ROTOR  SPEED  TIMED  DEG C  PROG #
H12000 2800   4:00   22     1
  
```

7. Record saved information on the Program Log Pad (supplied).

## NOTICE

To prevent accidental erasure of established programs, if the entered program number has been previously assigned, the following message will appear:

```

PROGRAM IN USE - OVERWRITE?
(1=YES, 0 or ENTER=NO)
  
```

To review stored programs before overwriting, refer to your Program Log Pad or press RECALL. If you press RECALL, you will have to go back and re-establish the run parameters before you can store them to memory.

## Performing a Programmed Run

Read the Safety Information Page at the front of this manual.

1. Press RECALL .
 

The SET DISPLAY will change to display a program number flashing in the PROG # field.
2. Input the desired program number, then press ENTER key.
 

The SET DISPLAY and options indicators change to reflect the run parameters that were saved to that program number.
3. Prepare the rotor according to the rotor manual.
4. Open the chamber door and install the rotor, making sure that the rotor is fully seated and locked to the drive spindle. Install the rotor cover, if any, then close the chamber door.

**NOTICE**

Rotor names are saved within the program. If the rotor is changed by selecting a different program this will be indicated in the SET DISPLAY. Be sure that the installed rotor is correct for the recalled program. Make sure that the SET rotor identifies the installed rotor.

5. If using logging software, make sure it is running, then press START key.
6. The rotor will accelerate according to the recalled parameters, and continue until run termination. At termination, the rotor will decelerate to a stop. After it stops "End" will appear in the SPEED display and remains there until the door is opened or the START key will be pressed.

**NOTICE**

If you select a program number that has not been used to save a program, a warning message will be displayed. In this case no program will be recalled.

## Using Advanced Features

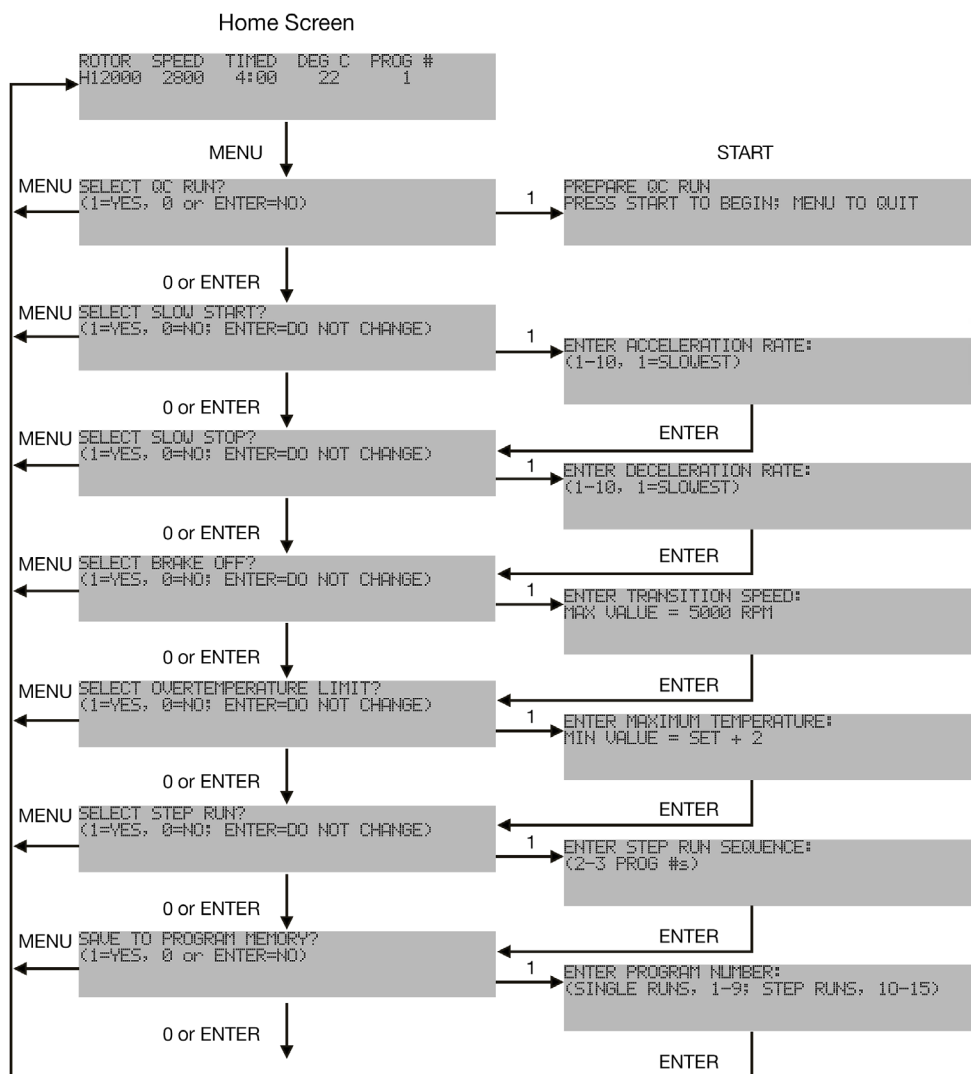
The advanced features of the centrifuge allow for:

- performing quality control runs, changing speed or time control ranges,
- changing acceleration/deceleration or overtemperature alert settings,
- linking together programmed run parameters, and
- saving run parameters to program memory for simple recall.

Advanced feature selection is usually reflected by LED option status indicators. When a feature has been selected, the corresponding indicator will be lit (although specific settings for several features can only be checked by reselecting the feature in the options screens). If changes to advanced feature selection are required (other than to RPM/RCF or TIME/HOLD/ACE status, which are accessible through primary function keys). The features are accessed by pressing MENU and then pressing ENTER until the selection screen of the particular feature appears in the SET DISPLAY.

- The MENU key accesses advanced feature options listed below it, plus other features such as saving parameters to memory.

Press the MENU key to enter the advanced features. After that pressing 1 accesses a secondary screen to view or enter values, plus confirm option selection. Pressing 0 deselects options. Pressing ENTER steps through options without changing selections or settings, and on secondary screens, enters values to select the option. Pressing MENU exits the options and returns to the SET DISPLAY without entering/selecting a flashing value.



### Advanced Feature Option Screen

## SELECT QC RUN

- QC RUN allows simple, automatic quality control run speed/ temperature verification when used with the optional computer interface package. The QC RUN feature will run and document the data from each set of parameters that has been saved in program memory.
- When QC RUN is selected, the SET DISPLAY will prompt you to prepare for the run and press the START key to begin. The centrifuge will start running program number 1, and systematically run each program in-order through program number 9.
- While the QC RUN is in progress, the parameters of the program that is running will be in the SET DISPLAY.
- During a QC RUN the centrifuge checks if the preset speed and temperature can be reached. In order to save time during the QC RUN the next program will be run once the desired speed has been reached and the temperature is within °K of the preset value.

## NOTICE

If you plan on using the QC RUN feature, consider the following as you save runs to program memory:

- QC programs should all apply to using the same rotor.
- QC RUN programs should not use HOLD.

- To minimize the time it takes to perform a QC RUN, we recommend the following: Starting with program 1, save runs to program memory. Sort first by temperature (highest first), then, if there is more than one run at a single temperature, by speed (lowest first).

**For Example:** The programs below are listed in correct order for using QC RUN (program values shown are for example purposes only, actual set parameters will vary).

ROTOR	SPEED	TIMED	DEG C	PROG #
F8-6x1000y	2900	04:00	22	1
F8-6x1000y	4000	03:00	22	2
F8-6x1000y	3800	03:45	4	3
F8-6x1000y	4700	05:30	4	4

To select the QC RUN feature:

1. Press MENU key.
2. Input 1.
3. Install the correct rotor.
4. Press START key.

The QC RUN sequence will begin, running program number 1.

If, during a QC RUN, the observed RUN temperature is more than 2 °C over SET temperature, the rotor continues spinning until set temperature is reached.

## SLOW START

- SLOW START chooses gentle acceleration from 0 to 250 rpm (acceleration transitions to the normal, maximum rate at 250 rpm), with the slow start rate defined by selection of one of ten different acceleration profiles.
- The profiles are numbered for ease of selection, with number 1 being the slowest, most gradual rate, and each successive rate being incrementally faster up to number 10.
- If SLOW START is selected when START is pressed, the rotor will accelerate at a more gradual rate.
- After SLOW START selections are completed, SELECT SLOW STOP? will appear in the SET DISPLAY.

## SLOW STOP

- SLOW STOP chooses gentle deceleration from 500 to 0 rpm (normal deceleration braking from set speed transitions to the more gradual rate at 500 rpm), with the rate defined by selection of one of ten different deceleration profiles.
- The profiles are numbered for ease of selection, with number 1 being the slowest, most gradual rate, and each successive rate incorporating incrementally more braking up to number 10.
- Selection of BRAKE OFF will have an affect on SLOW STOP (see NOTE under BRAKE OFF).

## BRAKE OFF

- BRAKE OFF deactivates normal deceleration braking for a coasting stop from any specified speed (in rpm).
- The time it takes for the rotor to stop depends on the transition speed, windage and inertia of the rotor.
- BRAKE OFF transition speed is set independently of set run speed, and is not affected by changes to set run speed. If the transition speed is set higher than the set run speed, at run termination, the centrifuge will coast to a stop from set speed.

## NOTICE

If SLOW STOP and BRAKE OFF are both selected:

- If the BRAKE OFF transition speed is set to 500 rpm or higher, the SLOW STOP selection will be ignored.
- If the BRAKE OFF transition speed is set below 500 rpm, the centrifuge will decelerate with full braking to 500, transition to the specified SLOW STOP rate, then change to a coasting stop when the specified BRAKE OFF transition speed is reached.

- After BRAKE OFF selections are completed, CHANGE OVERTEMPERATURE LIMIT? will appear in the SET DISPLAY.

## CHANGE OVERTEMPERATURE LIMIT

- CHANGE OVERTEMPERATURE LIMIT allows changing the maximum allowable sample temperature to establish a new overtemperature offset value.
- The centrifuge calculates the difference between the set and the maximum temperatures, and retains that value as an offset to apply to future runs, until it is changed. The retained offset will apply to any normal (manual entry) run.
- Recalling program runs may change the overtemperature limit. Specific overtemperature limit settings can be saved in run programs. See the EXAMPLE:

EXAMPLE: If you have a set temperature of 22 °C and set the maximum temperature to 24 °C, an overtemperature alert will occur if the calculated sample temperature reaches 25 °C. If the set temperature is then changed to 4 °C, the maximum temperature setting will automatically change to 6 °C.

- During a run, if the calculated sample temperature in the RUN display goes above the maximum allowable sample temperature, the run will terminate, a SAMPLE TEMPERATURE OVER LIMIT message will appear in the SET DISPLAY, and an alarm will sound. This may indicate a condition requiring simple corrective action, or it could indicate a refrigeration problem. (see „SAMPLE TEMPERATURE OVER LIMIT“ on page 60)
- Overtemperature termination is deactivated when a temperature change between programs occurs in a QC RUN. The QC RUN is repeated until the temperature is within 2 °C of set temperature.
- After CHANGE OVERTEMPERATURE LIMIT selections are completed, SELECT STEP RUN? will appear in the SET DISPLAY.

## STEP RUN

- STEP RUN allows the linking-together of up to three sets of programmed run parameters to automatically perform step run protocols.
- If the desired parameters have not been entered into memory, you must save each desired set of parameters to memory before continuing with step run creation.
- If programs are used within a step run, that have not been defined before, a warning message will be displayed.
- To create a step run, input a program number 1-9 for the first portion of the step run.
- The SET DISPLAY will prompt for another number, input a program number 1-9 for the second portion of the step run.
- The SET DISPLAY will prompt for another number, and you can either press ENTER (if you are creating a two-stage step run), or input a program number 1-9 for the third portion of your run.

## NOTICE

When step run is selected, the specified programs must specify the same rotor at similar temperatures.

- Step runs can be saved to program memory (program numbers 10-15) for simple recall in future use (see SAVE RUN below).
- Runs are not inadvertently corrupted, whenever STEP RUN has been selected (indicator lit).
- Changes to run parameters will be ignored unless STEP RUN is deselected before START is pressed.

- The only changes that could be made without deselecting would be if a different step run was recalled from program memory (program numbers 10-15).
- After STEP RUN selections are completed, SAVE TO PROGRAM MEMORY? will appear in the SET DISPLAY.

## SAVE TO PROGRAM MEMORY?

- SAVE RUN allows pre-programming of up to 15 different sets of run parameters (9 standard runs, and 6 step runs) for future simple recall and error-free run reproducibility.
- In addition to basic parameters, all option selections and settings (excluding rotor name and overtemperature limit) will also be saved to program memory.
- To eliminate inadvertent loss of existing programs, the save run sequence alerts users before overwriting.
- The RECALL key allows browsing through existing programs for selection or reference.

### NOTICE

If you plan to use the QC RUN feature, specific guidelines should be considered when saving parameters to memory.

- To save a run, all run parameter selections should be made before selecting this option.
- After SAVE RUN selection and assignment of a program number, the SET DISPLAY will return to the HOME screen.

## Temperature Control

The centrifuge controls calculated sample temperature during a run based on the rotor selected, rotor speed, run time, SET temperature and measured chamber temperature. The complex calculation the centrifuge performs must assume, however, that the sample and the rotor are at SET temperature at the start of the run. If temperatures are not equilibrated, adjustments made by the centrifuge's control system may not be appropriate (although, over time, temperature control should come into range).

### NOTICE

When temperature control is critical, the sample, SET temperature, rotor (body, buckets, adapters, and cover), and rotor chamber should all be at the same temperature when START is pressed. Also, remove the sample soon after a run has ended, so that it will not be affected if chamber temperature drops slightly when the rotor is no longer generating heat due to air friction.

Either store the rotor in a controlled temperature environment (such as refrigerator or cold room), or precool/preheat the rotor in the centrifuge chamber, until the rotor is the same temperature as the sample and the required SET temperature.

Temperature control needs can vary with the application. In many cases, the centrifuge will be used to run large volumes of sample for short amounts of time. With such a run, if all components have been equilibrated, it would be difficult to significantly change sample temperature during the run – even if the centrifuge's temperature control performance was reduced.

## Rotor Temperature Equilibration

To equilibrate the rotor temperature in the centrifuge chamber:

1. Install the rotor in the rotor chamber, place empty buckets (if applicable) in all positions, and the rotor cover, if any.
2. Close the door.
3. Turn off all options (access with MENU key).
4. Check to be sure the correct rotor name is in the ROTOR field of the SET DISPLAY. If not, press ROTOR until it is.
5. Press SPEED. If cooling, input 1500 rpm. If heating, input a value that is approximately 70% of the maximum rated speed of the selected rotor.
6. Press HOLD to select a continuous run.
7. Press TEMP and enter the desired temperature.
8. Press START to begin temperature equilibration.
9. The centrifuge will alert you that a sample overtemperature condition exists, and that precooling is taking place. Press CLEAR.
10. Monitor progress of the value in the RUN TEMPERATURE display, and note the time when the displayed RUN temperature reaches the SET temperature. From the time it does, allow the run to continue for an additional 30 minutes, then press STOP.

# 6

## Maintenance and Care

### Customer Controlled Inspection

To keep your centrifuge in good working condition and ensure accurate test results, Thermo Fisher Scientific recommends that you check the speed controls, timer controls and temperature controls at least twice a year. If the bi-annual inspection reveals inaccurate results for any of these controls, inform Customer Service to recalibrate the controls.

#### Speed Controls

1. Prepare a sample of test fluid.
2. Load and balance the rotor according to the instructions in the rotor manual.
3. Install the rotor in the chamber.
4. Close the chamber door.
5. Set the run parameters for a commonly used protocol, with SPEED controlled by rpm, and run duration set to HOLD.
6. Deselect RCF or SLOW START if indicators are lit.
7. Press START key .
8. Wait for the SPEED value in the RUN display to reach the specified SET speed. Wait an additional 5 minutes for speed to stabilize.
9. Check rotor speed through the viewing port in the centrifuge door using a strobe tachometer (in rpm, following instructions supplied with the tachometer).  
  
The tachometer should indicate rpm equal to the SET value 20 rpm or  $\pm 1\%$ , (2000 rpm and below,  $\pm 20$  , above 2000 rpm,  $\pm 1\%$ ).
10. If necessary, repeat this procedure at other speeds that are commonly used in your protocols.

#### Timer Controls

1. Prepare a sample of test fluid.
2. Load and balance the rotor according to the instructions in the rotor manual.
3. Install the rotor in the chamber.
4. Close the chamber door.
5. Set the run parameters for a commonly used protocol, but set the run duration by TIME (MIN:SEC) to 10:00.
6. Press START key .
7. Using a stopwatch, begin timing precisely as the RUN TIME display counts down to 10:00. Then stop timing precisely as the RUN TIME display counts down to 00:00.  
  
The stopwatch should read between 9:30 to 10:30, representing 10:00  $\pm 5\%$  (29 seconds) plus an additional second to allow for cumulative human error.
8. If necessary, repeat this procedure at other time ranges that are commonly used in your protocols.



## Temperature Controls

When verifying temperature control, all test run conditions (TEMP, SPEED, TIME, ROTOR and option selections) should match your required protocol(s). Test fluid must be at the same volume and temperature as the actual sample (use a calibrated thermometer to confirm). The sample temperature, rotor assembly temperature, and SET temperature must match also. Ideally, all components would have been stored in the same controlled-temperature area overnight. If that is not possible, you can precool or preheat the rotor as required. Immediately after the test run is performed, check test fluid temperature using the same thermometer that was used before the run.

1. Set the run parameters. Choose the protocol with the longest run time.
2. Equilibrate the rotor chamber and the temperature of all rotor parts (include any tubes, bottles, or adapters to be used) to the desired sample temperature.
3. Prepare two equal loads of test fluid (similar in volume to normal run samples) equilibrated to the desired sample temperature. Check the sample temperature using a calibrated thermometer.

### NOTE

Test fluid must be compatible with aluminum and have a freezing point below the desired sample temperature.

4. Load and balance the rotor according to the instructions in the rotor manual.
5. Install the rotor in the chamber.
6. Close the chamber door.
7. Press START key.  
During the run, the RUN display temperature should be within 2 °C of the SET DISPLAY temperature.
8. Immediately after the run measure the sample temperature using the same calibrated thermometer used earlier.  
The measured sample temperature should be within 2 °C of SET temperature.
9. If required, repeat this procedure at any other speed/temperature ranges that are commonly used in your run protocols.
10. If an out-of-range temperature is observed, re-equilibrate the chamber, rotor, and test fluid temperatures to match desired sample temperature, and repeat the test run.

## 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



### 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



### 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.

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 neutral cleaning agent with a pH value between 6 and 8, 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 (75003786) weekly, when specified in rotor manual.
- Apply an additional coating of anti-corrosion oil (70009824) to prolong the life of an anodized coating.
- Refer to the Maintenance and Care chapter in this rotor manual.

## Cleaning

When cleaning the rotor:

- 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.
- Air-dry all rotor components.
- Do not wash any rotor components in a dishwasher.
- Do not soak in detergent solutions for long periods, i.e. overnight.
- Use only disinfectants with a pH of 6-8.
- Dry aluminum parts off with a soft cloth.




### 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 the centrifuge and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Remove the rotor as described in „“ on page 33.
5. Remove the centrifuge tubes and adapters.
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.

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


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.

	<b>WARNING</b>
<p>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.</p> <p>In case of contamination, make sure that others are not put at risk.</p> <p>Decontaminate the affected parts immediately.</p> <p>Take other precautions if needed.</p>	

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

	<b>CAUTION</b>
<p>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.</p> <p>Observe the safety precautions and handling instructions for the cleaning agents used.</p>	


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. Remove the rotor as described in „ [on page 33](#).
5. Remove the centrifuge tubes and adapters and dispose of them or disinfect them.
6. Treat the rotor and accessories according to the instructions for the disinfectant. 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.

## Decontamination

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

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

	<b>CAUTION</b>
<p>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.</p>	

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. Remove the rotor as described in „“ on page 33.
5. Remove the centrifuge tubes and adapters and dispose of them or disinfect them.
6. Rinse the rotor first with ethanol and then with deionized 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.

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.

## 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.

<b>NOTE</b>
No chemical additives are permitted in the steam.

	<b>CAUTION</b>
Never exceed the permitted temperature and duration when autoclaving.	

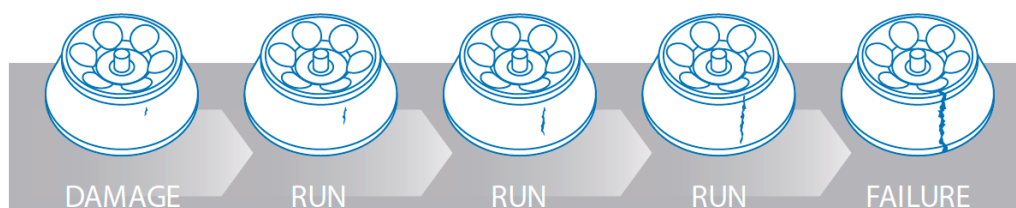
## Rotor Maintenance

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.



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
Damage to lid assembly	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.

Potential Damage	Preventive Measures	Recommended Action
Damage to biocontainment sealing lid	Use care when removing o-rings. Inspect and replace o-rings regularly.	Replace sealing lid to ensure proper containment.
Scoring to the bottom of the rotor (outside of cone area)	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.
Pitting from corrosion in the bottom of tube cavity (metal rotors)	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.
Cracked or de-laminated rotor	Avoid sharp impact. Avoid harsh chemicals. Clean and re-coat surface of rotor if corrosion appears.	Return rotor to manufacturer for evaluation.
Cartridge damage	Inspect cartridges regularly.	Replace cartridges, after 1000 hours of use or when begins to show signs of wear such as cracks, scoring or deformation.
Damage to rotor tie-down threads	Avoid cross threading of parts. Never use metallic or abrasive objects to clean. Clean and lubricate regularly.	Replace rotor tie-down assembly.
Damage to bucket seats	Lubricate buckets regularly. Slide buckets into place carefully to avoid dropping or forcing into position.	Replace rotor bucket set.
Windshield damage	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.
Rotor bucket cap damage	Avoid cross threading of parts. Never use metallic objects to clean. Clean and lubricate regularly.	Replace rotor bucket caps and return set for rebalancing.
Rotor bucket damage	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.
Gouges or corrosion on surface of rotor	Inspect before every use.	Return rotor to manufacturer for evaluation or replacement.
Septa damage in continuous flow or zonal rotor	Avoid sharp impact. Avoid harsh chemicals. Clean and re-coat surface of rotor if corrosion appears.	Return rotor to manufacturer for evaluation.

Potential Damage	Preventive Measures	Recommended Action
Light scratches on surface	Avoid banging or dropping. Never use metallic objects to remove debris.	Monitor to ensure no corrosion has occurred.
Bent centrifuge spindle	Remove rotor in a straight up motion. Ensure samples are properly balanced.	Call service for replacement of centrifuge spindle.

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.

## Rotor 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, if applicable.
- Use the proper rotor extractor tool to remove a rotor, if applicable.
- 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.

## 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 technician checks the following

- the electrical equipment
- the suitability of the set-up site
- the door lock and the safety system
- the rotor
- the fixation of the rotor and the centrifuge spindle

Thermo Fisher Scientific offers inspection and service contracts for this work. Any necessary repairs are performed for free during the warranty period and afterwards for a charge.

This is only valid if the centrifuge has only been maintained by a Thermo Scientific service technician.

## 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.

## Shipping and Depositing

Contact the Thermo Scientific customer service before returning any items. You will receive a Return Materials Authorization (RMA) that must be used for the shipping. When you have questions regarding the depositing the customer service will help you as well.



### WARNING

Before shipping or depositing centrifuges and accessories you have to clean and if necessary disinfect or decontaminate the entire system. Before storing the centrifuge and the accessories it must be cleaned and if necessary disinfected and decontaminated.





## Troubleshooting

### Mechanical Emergency Door Release

During a power failure, you will not be able to open the centrifuge lid with the regular electric lid release. A mechanical override is provided to allow sample recovery in the case of an emergency. However, this should be used only in emergencies and after the rotor has come to a complete stop.



#### WARNING

The rotor can still be spinning at high speed. If touched, it can cause serious injuries.

Always wait until the rotor has come to a stop without braking. The brake does not work when there is no current. The braking process lasts much longer than usual.

Proceed as follows:

1. Make sure the rotor has stopped (view port in the lid).



#### WARNING

Never use your hand or other tools to brake the rotor.

2. Pull out the power supply plug.
3. Unlock the front door by means of square box wrench.
4. Open the front door.
5. Pull down both levers on the right hand side.

The door lock will be release mechanical. The lid will open and the samples can be removed.

6. Close the door and lock it well.

Reconnect the centrifuge once the power has been restored. Switch on the centrifuge. Press the OPEN key to have the door locks operative again.

### Circuit Breakers

The centrifuge has circuit breakers. In the event of a failure inform Customer Service.

## Failure Message

NOTICE		
If problems occur other than those listed in this table, the authorized customer service representative must be contacted.		

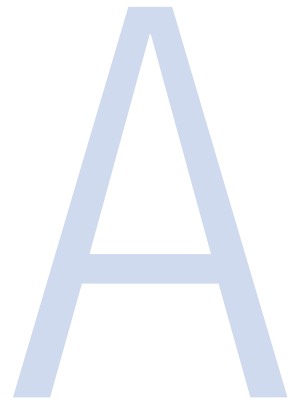
Failure message	Problem with centrifuge	Possible causes and cures
NO ROTOR DETECTED	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The rotor could not be identified. Check to see if the rotor is properly installed. Restart the centrifuge. If an error message appears again, inform Customer Service.
ROTOR IMBALANCE - BALANCE ROTOR	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	Imbalance detected. Check the load placed in the rotor. Check that the rotor cross bolts are well greased. Restart the centrifuge. If an error message appears again, inform Customer Service.
CRITICAL OVERTEMP	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked. The run will not terminate	Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
SAMPLE TEMPERATURE OVER LIMIT	The RUN DISPLAY temperature went above the maximum allowable (overtemperature limit) setting. The centrifuge cannot be operated.	The set temperature is too low for the selected speed. <ul style="list-style-type: none"> <li>The selected maximum temperature is in the overtemperature limit.</li> <li>The permissible ambient temperature at the air inlet is &gt;35 °C.</li> <li>The air inlet is blocked, the clearance is too small &lt;30 cm.</li> </ul> Check the aspects mentioned above. If an error message appears again, inform Customer Service.
AIR TEMP MEASURE ERROR	The centrifuge cannot be operated.	The cooling circuit is open. The temperature is >45 °C. Wait for the rotor to cool down in order to prevent burn. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.

Failure message	Problem with centrifuge	Possible causes and cures
AIR TEMP SENSOR FAIL	The centrifuge cannot be operated.	The temperature sensor detects a temperature increase >10 °C, while the centrifuge is cooled down. The cooling circuit is open. The temperature sensor is broken. Wait for the rotor to cool down in order to prevent burn. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
MISSING MEMORY CONTAINING CONFIGURATION	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The centrifuge did not find the NVRAM2 during self-testing. Restart the centrifuge. If an error message appears again, turn of the centrifuge. Pull out the power supply plug. Inform Customer Service.
DOOR CLOSED SWITCH FAILURE	The centrifuge cannot be operated. The centrifuge runs down without being braked.	The door lock opened during a run. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
DOOR LOCK SWITCH FAILURE	The centrifuge cannot be operated. The centrifuge runs down without being braked.	The door lock opened during a run. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
DOOR LOCK SWITCH SHORTED	Centrifuge does not open.	The power supply for the door lock is broken. The emergency lid release enables you to retrieve your samples. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
ROTOR NOT SPINNING	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	Error during the self-test of the centrifuge program and the electronics. The emergency lid release enables you to retrieve your samples. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
MAIN CONTACT FAILURE	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The main fuse is not available. Restart the centrifuge. If an error message appears again, turn of the centrifuge. Pull out the power supply plug. The emergency lid release enables you to retrieve your samples. Inform Customer Service.

Failure message	Problem with centrifuge	Possible causes and cures
TACH FAULT DETECTED	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The tachometer signal is not available. The emergency lid release enables you to retrieve your samples. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
INTERNAL SYSTEM ERROR OCCURRED	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The microprocessor has detected erroneous information. Restart the centrifuge. If an error message appears again, turn of the centrifuge. Pull out the power supply plug. The emergency lid release enables you to retrieve your samples. Inform Customer Service.
ROTOR OVER MAX SPEED	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The speed is more than 200 rpm above the rotor's maximum rated speed. The emergency lid release enables you to retrieve your samples. Turn off the centrifuge. Pull out the power supply plug. Inform Customer Service.
MEMORY DATA NOT SUITABLE FOR INSTRUMENT	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The centrifuge detected during self-testing that the NVRAM2 does not match the processor. Restart the centrifuge. If an error message appears again, turn of the centrifuge. The emergency lid release enables you to retrieve your samples. Pull out the power supply plug. Inform Customer Service.
MEMORY NOT INITIALISED	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The centrifuge did not find the program memory during self-testing. Restart the centrifuge. If an error message appears again, turn of the centrifuge. The emergency lid release enables you to retrieve your samples. Pull out the power supply plug. Inform Customer Service.
INTERNAL PROGRAM ERROR	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The centrifuge detected a program fault. Restart the centrifuge. If an error message appears again, turn of the centrifuge. The emergency lid release enables you to retrieve your samples. Pull out the power supply plug. Inform Customer Service.

Failure message	Problem with centrifuge	Possible causes and cures
FREQUENCY CONVERTER VOLTAGE TO HIGH	The centrifuge cannot be operated. The run does not start or the centrifuge runs down without being braked.	The line voltage exceeds the tolerance or failure of the braking resistance. Restart the centrifuge. If an error message appears again, turn of the centrifuge. The emergency lid release enables you to retrieve your samples. Pull out the power supply plug. Inform Customer Service.





# 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	NORLY™	NYLON	PET*, POLYCLEAR™, CLEARCRIMP™	POLYALLUMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	FULON A™, 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	M	S	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	M	S	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	M	/	S	S	S	S	S	S	M	S	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	U	S	S	U	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	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	M	S	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
Cesium Acetate		M	/	S	/	S	S	S	/	S	S	S	S	/	S	S	/	/	S	S	S	S	S	M	S	S	S	S
Cesium Bromide		M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	M	S	S	S	S



CHEMICAL	MATERIAL	ALUMINIUM	ANODIC COATING for ALUMINIUM	BUNAN	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN™	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL™	NYLON	PET, POLYCLEAR™, CLEARCRIMP™	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULONA™, TEFLON™	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON™	VITON™
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	S	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
Diethylpyro-carbonate		S	S	U	/	S	S	S	/	S	S	U	S	U	S	U	/	/	S	S	S	M	S	S	S	S	S	S
Dimethylsulfide		S	S	U	U	S	S	S	/	S	U	S	S	U	S	U	U	/	S	S	U	U	S	S	S	S	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	S	M	S	S	M	S	S	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	M	S	M	S	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	S	M	S	S	S
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
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

CHEMICAL	MATERIAL	ALUMINIUM	ANODIC COATING for ALUMINIUM	BUNAN	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN™	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL™	NYLON	PET, POLYCLEAR™, CLEARCRIMP™	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYHERMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A™, TEFLON™	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON™	VITON™
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	S	U	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	M	S	/	S	S	S	S	S	S	S	M	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	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	
Methylene Chloride		U	U	U	U	M	S	S	U	S	U	U	S	U	U	U	U	U	M	U	U	U	S	S	M	U	S	U
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	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-Dimethyl-formamide		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	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	M	S	S	S	
Sodium Carbonate (2%)		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	S

CHEMICAL	MATERIAL	ALUMINIUM	ANODIC COATING for ALUMINIUM	BUNAN	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELTRIN™	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL™	NYLON	PET, POLYCLEAR™, CLEARCRIMP™	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYETHERIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULONA™, TEFLON™	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON™	VITON™
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	
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	S	M	S	S	S
Oils (Petroleum)		S	S	S	/	/	/	S	U	S	S	S	S	U	U	M	S	M	U	U	S	S	S	U	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	S	U	S	U	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
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	U	M	S	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

CHEMICAL	MATERIAL	ALUMINIUM	ANODIC COATING for ALUMINIUM	BUNAN	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELTRIN™	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL™	NYLON	PET <sup>1</sup> , POLYCLEAR™, CLEARCRIMP™	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYHERMIDE	POLYETHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULONA™, TEFLON™	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON™	VITON™
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	U	M	U	M	U	U	U	S	U	M	S	U	S
Zinc Chloride		U	U	S	S	S	S	U	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

<sup>1</sup>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.

**NOTICE**

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



# Index

## A

Aligning the Centrifuge 25  
Anodization 56  
Autoclaving 53

## B

Before a Run 31  
Before Setting Up 25

## C

Care of Your Rotor 56  
Characteristics 17  
Chemical Compatibility Chart 65  
Circuit Breakers 59  
Cleaning 51  
Cleaning Intervals 50  
Close Lid 38  
Control Panel 35  
Customer Controlled Inspection 50

## D

Decontamination 53  
Deposing 57  
Directives, Standards and Guidelines 22  
Disinfection 52  
Dropped Rotors 56

## F

Failure Message 60

## I

Improper Loading 32  
Intended Use 13  
Items Supplied 13

## L

Location 25

## M

Mains Supply 23  
Maintenance and Care 49  
Maximum Loading 34  
Mechanical Emergency Door Release 59  
Missing Paint 56

## O

Open and Close of the Rotor 32  
Open Lid 37  
Operation 37  
Overheating 56

## P

Precautions 14  
Preface 13  
Proper Loading 31

## R

RCF-Value 39  
Removing the Rotor 33  
Rotor Evaluation 56  
Rotor Installation 33  
Rotor Maintenance 54, 57  
Rotor Preparation and Installation 31  
Running time pre-selection 39

## S

Service 57  
Service of Thermo Fisher Scientific 57  
Shipping 57  
Shipping and Deposing 57  
Storage 29, 57  
Stress Corrosion 56  
Switch on Centrifuge 37  
Symbols 16

## T

Technical Data 18  
Technical Specifications 17  
Transport and Set Up 25  
Transporting the Centrifuge 28  
Troubleshooting 59

## W

WEEE 4



**Thermo Electron LED GmbH**

Robert-Bosch-Straße 1  
63505 Langenselbold  
Germany

[thermoscientific.com/centrifuges](http://thermoscientific.com/centrifuges)

© 2014 Thermo Fisher Scientific Inc. All rights reserved.

Delrin, TEFLON, and Viton are registered trademarks of DuPont. Noryl is a registered trademark of SABIC. POLYCLEAR is a registered trademark of Hongye CO., Ltd. Hypaque is a registered trademark of Amersham Health As. RULON A and Tygon are registered trademarks of Saint-Gobain Performance Plastics. Alconox is a registered trademark of Alconox. Ficoll is a registered trademark of GE Healthcare. Haemo-Sol is a registered trademark of Haemo-Sol. Triton X-100 is a registered trademark of Sigma-Aldrich Co. LLC. Valox is a registered trademark of General Electric Co.

All other trademarks are the property of Thermo Fisher Scientific Inc. and its subsidiaries.

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

**United States/Canada** +1 866 984 3766  
**Latin America** +1 866 984 3766  
**Austria** +43 1 801 40 0  
**Belgium** +32 53 73 42 41  
**France** +33 2 2803 2180  
**Germany national toll free** 0800 1 536 376  
**Germany international** +49 61 84 90 6000  
**Italy** +39 02 95059 552

**Netherlands** +31 76 579 55 55  
**Nordic/Baltic States/CIS** +358 9 329 10200  
**Russia** +7 812 703 42 15  
**Spain/Portugal** +34 93 223 09 18  
**Switzerland** +41 44 454 12 22  
**UK/Ireland** +44 870 609 9203  
**India** +91 22 6716 2200

**China** +800 810 5118 or  
+400 650 5118  
**Japan** +81 3 5826 1616  
**Other Asian Countries** +852 2885 4613  
**Australia** +61 39757 4300  
**New Zealand** +64 9 980 6700  
**Countries not listed** +49 6184 90 6000 or  
+33 2 2803 2180

**Thermo**  
SCIENTIFIC  
Part of Thermo Fisher Scientific