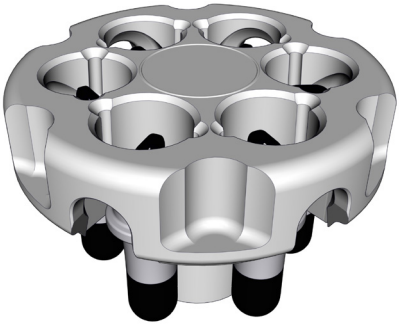


Thermo Scientific

SureSpin 632 (17 mL)
SureSpin 632 (38.5 mL)

Ultracentrifuge Rotors

Instructions for Use

50153788-c • 05 / 2020

Visit us online to register your warranty:
thermofisher.com/labwarranty

ThermoFisher SCIENTIFIC

Table of Contents

Preface 4
Intended Use 4
Items Supplied 5
SureSpin 632 (17 mL) Rotor 5
SureSpin 632 (38.5 mL) Rotor 5
Signal Words and Colors 6
Safety Instructions 6
Symbols used on the Rotor 8
Symbols used in the Manual 8
I. Technical Specifications 9
II. Operation 11
1. Prerun Safety Checks 11
2. Bucket Use 12
3. Maximum Loading 13
4. Critical Speed 13
5. Rotor Precool 14
6. Chemical Compatibility 14
7. Relative Centrifugal Force (RCF) Determination 14
8. Calculation of Sedimentation Times in Aqueous (Non-Gradient) Solutions 20
9. Calculation of Sedimentation Times in Gradient Solutions 21
10. Rotor Installation 21
11. Tube Filling and Bucket Loading 22
12. Installing Buckets and Performing a Run 26
13. Rotor Log 27

III. Maintenance and Care 28

1. Cleaning Intervals 28

2. Basics 28

Rotors and Accessories Inspection 29

Speed Disk Decal Replacement. 29

3. Cleaning 30

4. Disinfection 31

5. Decontamination 32

6. Autoclaving. 33

7. Storage 34

8. Shipping 34

9. Disposal 34

Chemical Compatibility Chart 35

Index 48

Table of Figures

Figure 1 – Cross section showing Rotor Radii 15

Figure 2 – Rotor Balancing. 22

Figure 3 – Cap and Bucket Assembly 24

Figure 4 – How to tighten the Bucket Caps 25

Figure 5 – Orientation of Bucket Cap Handle with Numbers. 26

Figure 6 – Sample Rotor Log Sheet 27

Table of Tables

Table 1 – Cross section showing Rotor Radii 15

Table 2 – RCF Values and K Factor for 17 mL Buckets . .17

Table 3 – RCF Values and K Factor for 38.5 mL Buckets 19

Preface

Before using the centrifuge, read through this instruction manual carefully and follow the instructions.
Not following the instructions and safety information in this instruction manual will result in the expiration of the sellers warranty.

Intended Use

This rotor is only to be used for research to separate substance mixtures of different densities. This rotor is not intended to be used in diagnostic procedures. This rotor has to be operated by trained personnel only.
This rotor is intended to be operated in an ultracentrifuge of the Sorvall WX or WX+ series.

Items Supplied

The Thermo Scientific™ SureSpin™ 632 Rotor is supplied with accessories either for 17 mL or 38.5 mL.

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

SureSpin 632 (17 mL) Rotor

Article No.	Item	Quantity
75003031	Thermo Scientific SureSpin 632 Ultracentrifuge Rotor (17 mL) including Buckets, Rack, Rotor Stand, O-rings, O-ring Grease, Lubricant for Bucket Threads, Speed Disk (32 000 rpm), Rotor Log Book, Instruction Manual	1 set

SureSpin 632 (38.5 mL) Rotor

Article No.	Item	Quantity
75003032	Thermo Scientific SureSpin 632 Ultracentrifuge Rotor (38.5 mL) including Buckets, Rack, Rotor Stand, O-rings, O-ring Grease, Lubricant for Bucket Threads, Speed Disk (32 000 rpm), Rotor Log Book, Instruction Manual	1 set

Signal Words and Colors

WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Inidicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

Safety Instructions

WARNING

Observe the safety instructions. Not following these instructions can cause damage.

The rotor is to be used for its intended use only. Improper use can cause damages, contamination, and injuries with fatal consequences.

The rotor must be operated by trained personnel only.

Keep a safety zone of minimum 30 cm around the centrifuge. Persons and hazardous substances must be kept out of this safety zone while centrifuging.

Preparation

WARNING

It is the obligation of the operator to make sure, that protective clothing is used. Mind the "Laboratory Biosafety Manual" of the World Health Organization (WHO) and the regulations in your country.

NOTICE

- Use only with a rotor that has been properly installed. Follow the instructions in section "Prerun Safety Checks" on page 11.
- Do not use a rotor or accessories that show any signs of corrosion or cracks.
- Contact customer service for further advice or inspections.
- Use only with a rotor that has been properly loaded.
- Never overload the rotor.
- Always balance the samples.
- Use only rotors and accessories approved by Thermo Fisher Scientific.
- Make sure the rotor is locked properly into place before operating the centrifuge.
- Do not use a damaged rotor. Replace the rotor, if it was dropped.

Hazardous Substances

WARNING

- Especially when working with corrosive samples (salt solutions, acids, bases), the accessory parts and vessel have to be cleaned thoroughly.
- Do not centrifuge explosive or flammable materials or substances.
- Do not centrifuge toxic or radioactive materials or any pathogenic micro-organisms without suitable safety precautions.

If any hazardous materials are centrifugated, mind the "Laboratory Biosafety Manual" of the World Health Organization (WHO) and any local regulations. When centrifuging microbiological samples from the Risk Group II (according to the "Laboratory Biosafety Manual" of the World Health Organization (WHO)), aerosol-tight biological seals have to be used. Look on the internet page of the World Health Organization (www.who.int) for the "Laboratory Biosafety Manual". For materials in a higher risk group, extra safety measures have to be taken.

- If toxins or pathogenic substances have contaminated the centrifuge or its parts, appropriate disinfection measures have to be taken ("Disinfection" on page 31).
- Extreme care should be taken with highly corrosive substances which can cause damage and impair the mechanical stability of the rotor. These should only be centrifuged in fully sealed tubes.
- In case of rotor failure the centrifuge can be damaged. The coolant can escape. Ventilate the room well and leave it. Inform customer service.
- If a hazardous situation occurs, turn off the power supply to the centrifuge and leave the area immediately.

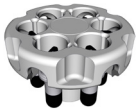
Symbols used on the Rotor

CE	The CE mark states that this product is meeting all requirements for the European Economic Area.
	This symbol refers to information on hazards, described within the manual.

Symbols used in the Manual

	This symbol refers to general hazards.
	This symbol refers to biological hazards. Observe the information contained in the instruction manual to keep yourself and your environment safe.

I. Technical Specifications



Thermo Scientific SureSpin 632 Rotor Body	
Maximum Speed n_{max}	32 000 rpm
Critical Speed	1 100 rpm
Maximum Cycle Number	1 200
Number of Buckets	6
Weight (without Buckets)	6 382 g
Buckets for 38.5 mL Tubes	
Maximum RCF Value at n_{max} at $r_{minimum}$ (7.46 cm) at $r_{average}$ (11.91 cm) at $r_{maximum}$ (16.36 cm)	 85 404 x g 136 349 x g 187 295 x g
K-Factor at n_{max}	194
Tube Volume	38.5 mL
Tube Diameter	25 mm
Tube Length	89 mm
Maximum Cycle Number	1 200
Compartment Mass (incl. complete bucket, tube, sample)	190.5 g
Maximum Kinetic Energy	223 kJ
Weight (Rotor Body with empty Buckets)	7 210 g
Buckets for 17 mL Tubes	
Maximum RCF Value at n_{max} at $r_{minimum}$ (6.85 cm) at $r_{average}$ (11.80 cm) at $r_{maximum}$ (16.75 cm)	 78 421 x g 135 090 x g 191 759 x g
K-Factor at n_{max}	221
Tube Volume	17 mL
Tube Diameter	16 mm
Tube Length	102 mm
Maximum Cycle Number	1 200
Compartment Mass (incl. complete bucket, tube, sample)	183 g
Maximum Kinetic Energy	211 kJ
Weight (Rotor Body with empty Buckets)	7 342 g

Accessories

Article No.	Item
75003036	17 mL Bucket set, incl. Buckets, Rack, O-Rings (17 mL) (set of 6) O-ring Grease and Lubricant for Bucket Threads
75003037	38.5 mL Bucket set, incl. Buckets, Rack, O-Rings (38.5 mL) (set of 6) O-ring Grease and Lubricant for Bucket Threads
75003038	O-Rings (38.5 mL) (set of 6) and O-ring Grease
75003039	O-Rings (17 mL) (set of 6) and O-ring Grease
51360	Speed Disk (32 000 rpm)
52240	Rack
52384	Rotor Log Book
20048993	Rotor Stand
76003500	O-Ring Grease
75003786	Lubricant for Bucket Threads

II. Operation

This chapter contains the information necessary to prepare the rotor for operation and includes important safety information.

1. Prerun Safety Checks

CAUTION

Every part of the rotor must be clean and must be carefully inspected before every run. If there is any sign of corrosion or cracking, the rotor should not be used.

Failure to properly maintain your rotor can cause rotor failure with subsequent damage to your centrifuge including the sample.

To ensure safe performance of the rotor, before every run you should:

a. read and observe the „Precautions“ on page 6.

b. make sure that there are no burrs or scratches on the bucket, bucket seats, or bucket pins.

c. check the centrifuge drive chamber, drive spindle, and mounting surface of the rotor to be sure that they are clean and free of scratches or burrs.

d. inspect the bucket cap O-rings for cracks, tears, or abrasions; replace if necessary.

e. make sure that the numbers on the bucket cap, bucket, and rotor compartment match, and that opposing loads are balanced.

f. make sure each bucket cap is correctly installed. Gently tighten each bucket cap by hand until they stop turning (Figure 5 on page 26).

g. after placement in the rotor, move each bucket slightly to ensure that they pivot freely on their pins. When properly installed, the tops of all six buckets will be at the same height.

CAUTION Make sure that the caps are closed completely. Incompletely closed caps prevent the complete swing out of the buckets. An incomplete swing out of the buckets can cause imbalance and damage the rotor and the centrifuge.

h. check the chemical compatibility of all materials used (“Chemical Compatibility Chart” on page 35).

i. be sure that the proper environment has been selected for operation; for example, controlled ventilation or isolation, if required.

j. check the top speed capability of the tube being used.

CAUTION Be sure to do a test run for the desired application to check the top speed capability of the tubes being used.

2. Bucket Use

The bucket and cap assemblies are weighed, balanced, and supplied as a set of 6 that, for warranty requirements, shall not be mixed with buckets or caps from other sets. For identification, all buckets in a specific set are marked with the same weight, and each bucket and corresponding cap are numbered with rotor compartment position (1 through 6).

If a bucket or cap is damaged so that it must be removed from service, the entire set must be removed from service. If you question whether or not a rotor or bucket set should be used, contact Thermo Fisher Scientific authorized service or your local representative for Thermo Fisher Scientific products.

When a rotor body or a bucket set is removed from service at the end of their lifetime it is possible to use the remaining rotor body or bucket set with a new replacement until they reach the end of their service lifetime.

3. Maximum Loading

The rotor is designed to run with his maximum load at maximum speed. The safety system of the centrifuge requires that the rotor is not overloaded.

The rotor is designed to work with substance mixtures with a density of up to 1.2 g/mL. Maximum load includes the bucket, bucket cap, specimen and tube for each of the six compartments of the rotor. If the admissible maximum load is exceeded the following steps need to be taken:

- Reduce the fill level.
- Reduce the speed.

Use the following formula:

$$n_{adm} = n_{max} \sqrt{\frac{w_{max}}{w_{app}}}$$

n_{adm} = admissible maximum application speed

n_{max} = maximum rated speed

w_{max} = maximum rated load

w_{app} = applied load

CAUTION This formula does not apply when using gradients that can precipitate.

4. Critical Speed

CAUTION Continued operation at the critical speed will have a detrimental effect on centrifuge component life.

The critical speed is that speed at which any rotor imbalance will produce a driving frequency equal to the resonant frequency of the rotating system (rotor and centrifuge drive). At this speed, the rotor may produce large amplitude vibrations which can be felt in the instrument frame. Mass imbalance will contribute to increased vibration intensity at the critical speed. Operation at critical speed (“Technical Specifications” on page 9) has a negative effect on centrifuge component life and should be avoided.

5. Rotor Precool

CAUTION Do not precool the rotor at critical speed.

If samples are routinely processed around 4 °C or below, the rotor can be stored in a refrigerator or a cold room. If this is not possible, the rotor may be able to be precooled in an ultracentrifuge. Refer to the individual Ultracentrifuge Instruction Manual for precooling directions.

6. Chemical Compatibility

The critical components of the rotor to come in contact with solution are: rotor body (titanium), rotor buckets (titanium), bucket caps (anodized aluminum), O-rings (Viton), and tubes (polyallomer supplied, other tube materials vary).
The chemical compatibility of rotor elements and accessory materials is given in „Chemical Compatibility Chart“ on page 35. Because no organized chemical resistance data exists for materials under the stress of centrifugation, this data is intended to be used only as a guide. Thermo Fisher Scientific recommends pretesting of sample lots when in doubt.

7. Relative Centrifugal Force (RCF) Determination

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 are used for calculation:

$$RCF = 11.18 \times \left(\frac{n}{1000}\right)^2 \times r$$

r = radius in cm from the centerline of the rotor to the point in the tube where RCF value is required
n = rotational speed in rpm

The maximum RCF value is related to the maximum radius of the bucket cavity and doesn't take the thickness of the tube into consideration.

Figure 1 on page 15 shows the minimum, average, and maximum radii. Table 1 on page 15 gives the RCF value at each radius at speeds from 5000 rpm to 32000 rpm (in increments of 500 rpm). The RCF value at any other given speed or radius can be calculated by using the above formula.

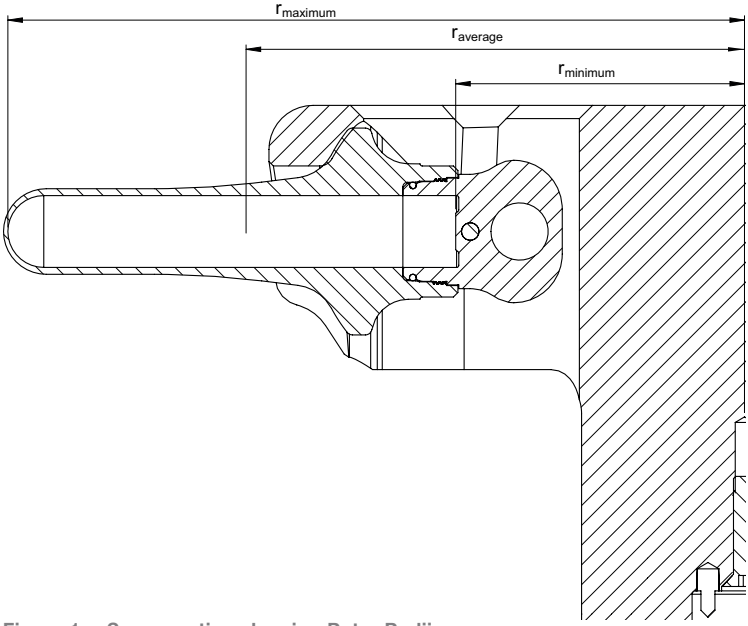


Figure 1 – Cross section showing Rotor Radii

	17 mL	**38.5 mL**
$r_{maximum}$	16.75 cm	16.36 cm
$r_{average}$	11.80 cm	11.91 cm
$r_{minimum}$	6.85 cm	7.46 cm

Table 1 – Cross section showing Rotor Radii

17 mL Buckets				
Speed (rpm)	RCF			K Factor
	$r_{maximum}$ 16.75 cm	$r_{average}$ 11.80 cm	$r_{minimum}$ 6.85 cm	
5000	4682	3298	1915	9049
5500	5665	3991	2317	7478
6000	6742	4749	2757	6284
6500	7912	5574	3236	5354
7000	9176	6464	3753	4617
7500	10534	7421	4308	4022
8000	11985	8443	4901	3535
8500	13530	9532	5533	3131
9000	15168	10686	6203	2793
9500	16901	11906	6912	2507
10000	18727	13192	7658	2262
10500	20646	14545	8443	2052
11000	22659	15963	9267	1870
11500	24766	17447	10128	1711
12000	26966	18997	11028	1571
12500	29260	20613	11966	1448
13000	31648	22295	12943	1339
13500	34129	24043	13957	1241
14000	36704	25857	15010	1154
14500	39372	27737	16102	1076
15000	42135	29683	17231	1005
15500	44990	31695	18399	942
16000	47940	33773	19605	884
16500	50983	35916	20850	831
17000	54120	38126	22132	783
17500	57350	40402	23454	739
18000	60674	42743	24813	698
18500	64091	45151	26211	661
19000	67603	47625	27646	627
19500	71208	50164	29121	595
20000	74906	52770	30633	566

17 mL Buckets				
Speed (rpm)	RCF			K Factor
	$r_{maximum}$ 16.75 cm	$r_{average}$ 11.80 cm	$r_{minimum}$ 6.85 cm	
20500	78698	55441	32184	538
21000	82584	58178	33773	513
21500	86563	60982	35400	489
22000	90636	63851	37066	467
22500	94803	66787	38770	447
23000	99063	69788	40512	428
23500	103417	72855	42293	410
24000	107865	75988	44112	393
24500	112406	79187	45969	377
25000	117041	82453	47864	362
25500	121769	85784	49798	348
26000	126591	89181	51770	335
26500	131507	92644	53780	322
27000	136516	96173	55829	310
27500	141619	99768	57916	299
28000	146816	103428	60041	289
28500	152106	107155	62205	279
29000	157490	110948	64406	269
29500	162967	114807	66646	260
30000	168539	118732	68925	251
30500	174203	122722	71241	243
31000	179962	126779	73596	235
31500	185814	130902	75989	228
32000	**191759**	**135090**	**78421**	**221**

Table 2 – RCF Values and K Factor for 17 mL Buckets

38.5 mL Buckets				
Speed	RCF			K Factor
	$r_{maximum}$ 16.36 cm	$r_{average}$ 11.91 cm	$r_{minimum}$ 7.46 cm	
5000	4573	3329	2085	7947

38.5 mL Buckets				
Speed	RCF			K Factor
	$r_{maximum}$ 16.36 cm	$r_{average}$ 11.91 cm	$r_{minimum}$ 7.46 cm	
5500	5533	4028	2523	6568
6000	6585	4794	3003	5519
6500	7728	5626	3524	4702
7000	8962	6525	4087	4055
7500	10288	7490	4691	3532
8000	11706	8522	5338	3104
8500	13215	9620	6026	2750
9000	14815	10785	6756	2453
9500	16507	12017	7527	2201
10000	18290	13315	8340	1987
10500	20165	14680	9195	1802
11000	22131	16112	10092	1642
11500	24189	17610	11030	1502
12000	26338	19174	12010	1380
12500	28579	20805	13032	1272
13000	30911	22503	14095	1176
13500	33334	24267	15200	1090
14000	35849	26098	16347	1014
14500	38456	27996	17535	945
15000	41154	29960	18766	883
15500	43943	31990	20038	827
16000	46824	34087	21351	776
16500	49796	36251	22706	730
17000	52859	38481	24103	687
17500	56015	40778	25542	649
18000	59261	43142	27023	613
18500	62599	45572	28545	581
19000	66029	48069	30108	550
19500	69550	50632	31714	522
20000	73162	53262	33361	497
20500	76866	55958	35050	473

38.5 mL Buckets				
Speed	RCF			K Factor
	$r_{maximum}$ 16.36 cm	$r_{average}$ 11.91 cm	$r_{minimum}$ 7.46 cm	
21000	80661	58721	36781	451
21500	84548	61550	38553	430
22000	88526	64446	40367	410
22500	92596	67409	42223	392
23000	96757	70438	44120	376
23500	101009	73534	46059	360
24000	105353	76697	48040	345
24500	109789	79926	50063	331
25000	114316	83221	52127	318
25500	118934	86583	54233	306
26000	123644	90012	56380	294
26500	128445	93507	58570	283
27000	133338	97069	60801	273
27500	138322	100698	63073	263
28000	143397	104393	65388	253
28500	148564	108154	67744	245
29000	153823	111982	70142	236
29500	159173	115877	72581	228
30000	164614	119838	75063	221
30500	170147	123866	77585	214
31000	175772	127961	80150	207
31500	181487	132122	82756	200
32000	**187295**	**136349**	**85404**	**194**

Table 3 – RCF Values and K Factor for 38.5 mL Buckets

8. Calculation of Sedimentation Times in Aqueous (Non-Gradient) Solutions

The time required to sediment a particle in water at 20 °C through the maximum rotor path length (that is, the distance between rminimum and rmaximum) can be estimated using the equation:

$$t = \frac{K}{S_{20,W}}$$

where:

t = sedimentation time in hours

K = the clearing factor for the rotor (defined below).

$S_{20,\,w}$ = the sedimentation coefficient for the particle of interest in water at 20 °C as expressed in Svedbergs*

The clearing, or K factor, is defined by the equation:

$$K = (250\,000)\left[\ln\left(\frac{r_{maximum}}{r_{minimum}}\right)\right] \div \left(\frac{rotor\ speed}{1000}\right)^2$$

Where rmaximum and rminimum are the maximum and minimum rotor radii, respectively, and rotor speed is expressed in rpm.

K factors for the rotor at speeds from 5 000 rpm to 32 000 rpm have been listed in Table 2 on page 17 and Table 3 on page 19.

Example: The rotor has a K factor of 255 at the maximum speed when 17 mL buckets are used. If the particles to be sedimented have a sedimentation coefficient of 40 S, the estimated run time required at maximum speed will be:

$$t = \frac{255}{40\,S} = 6.4 \text{ hours} = 6 \text{ hours, } 24 \text{ minutes}$$

** The sedimentation coefficient (S) in seconds, for a particle in a centrifugal field is defined by the equation S = (dx/dt) [1/(ω²x)]; where dx/dt = sedimentation velocity of the particle in cm/s; ω = rotor speed in rad/s; and x = the distance of the particle from the axis of rotation in centimeters. Conventionally, experimentally determined values of sedimentation coefficients are multiplied by 10^{13} to convert them to Svedberg units (S), so a particle with an experimentally determined sedimentation coefficient of 10^{-11} seconds is usually referred to in the literature as a "100 S particle." The value determined for the sedimentation coefficient is dependent on the density and viscosity of the solution in which centrifugation is performed, values are usually reported for the standard conditions of infinite dilution in water at 20 °C, and designated $S_{20,\,w}$.*

Note that the calculation assumes particles in water at 20 °C; if the suspending medium is denser or more viscous than water, the sedimentation time will be greater.

9. Calculation of Sedimentation Times in Gradient Solutions

The time required to sediment a particle through a density gradient can be calculated using the following formula:

$$t = \frac{K}{S_{20,w}}$$

where:

t = sedimentation time in hours

K = the clearing factor for the rotor

$S_{20,\,w}$ = the sedimentation coefficient for the particle of interest in water at 20 °C as expressed in Svedbergs**

10. Rotor Installation

1. Inspect the rotor as explained in "Prerun Safety Checks" on page 11.
2. Install the rotor as follows:
    a. Using both hands, carefully carry the rotor body to the ultracentrifuge rotor chamber.
    b. Lower the rotor body into the rotor chamber. Gently place it on the drive spindle. Make sure that the rotor is fully seated on the drive spindle.

*** The sedimentation coefficient (S) in seconds, for a particle in a centrifugal field is defined by the equation S = (dx/dt) [1/(ω²x)]; where dx/dt = sedimentation velocity of the particle in cm/s; ω = rotor speed in rad/s; and x = the distance of the particle from the axis of rotation in centimeters. Conventionally, experimentally determined values of sedimentation coefficients are multiplied by 10^{13} to convert them to Svedberg units (S), so a particle with an experimentally determined sedimentation coefficient of 10^{-11} seconds is usually referred to in the literature as a "100 S particle." The value determined for the sedimentation coefficient is dependent on the density and viscosity of the solution in which centrifugation is performed, values are usually reported for the standard conditions of infinite dilution in water at 20 °C, and designated $S_{20,\,w}$.*

11. Tube Filling and Bucket Loading

CAUTION Be sure to do a test run for the desired application to check the top speed capability of the tubes being used.

CAUTION Always run the rotor with all buckets from one bucket set installed.

CAUTION Never mix different types of buckets and buckets from different sets of the same type in a centrifugation run. Always use buckets of the same type and from one set in a centrifugation run.

NOTICE The rotor may be run with two, three, four, or six tubes. If six tubes are not required or if not all tubes will have identical contents, consider how the tubes must be configured in the rotor, so that the rotor will be balanced. Buckets are to be run empty if less than six tubes are used (Figure 2 – Rotor Balancing).

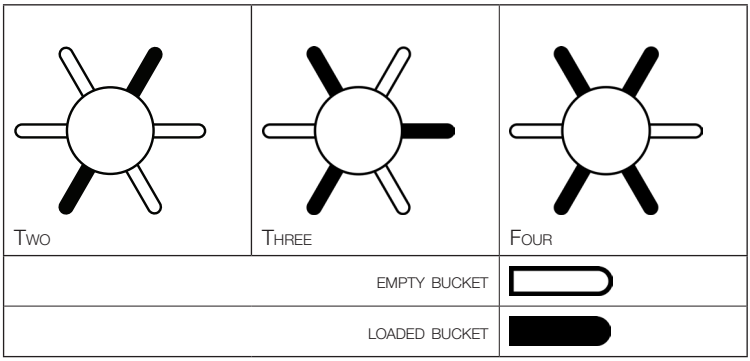


Figure 2 – Rotor Balancing

Assemble the tube and bucket as follows (Figure 3 on page 24):

1. Make sure there is a film of vacuum grease (76003500) on each bucket cap O-ring, as well as a thin film of lubricating grease (75003786) on the fine threads on each bucket cap.
2. For thinwall polyallomer tubes supplied with the rotor, fill each tube to within

3 mm (1/8 inch) from the top to prevent the tube from collapsing during centrifugation. If the sample does not fill the tube to this level, add a light mineral oil above the sample or a dense, inert liquid below it.

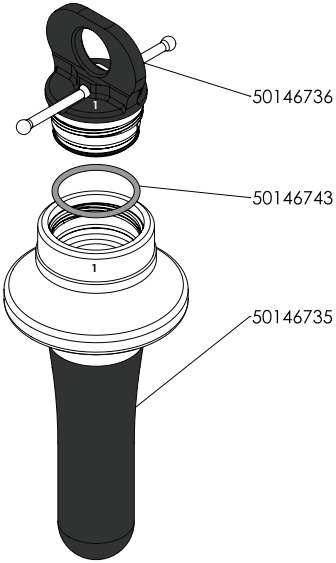
CAUTION Do not operate this rotor unless it is symmetrically balanced. Operating the centrifuge with the rotor out of balance can cause damage to the centrifuge drive assembly.

NOTICE The rotor is designed for stability, and does not require precise adjusting of loads to meet narrow balance criteria. Opposing tubes must contain fluid of identical densities and be filled similarly, but eyebalancing is appropriate.

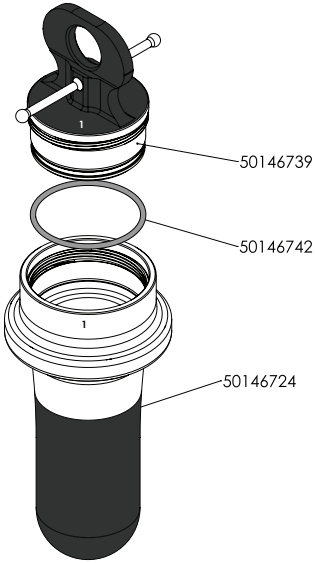
3. Make sure that the outside of the tubes and the inside of the buckets are completely dry.

   NOTICE Avoid any liquid between the tube and bucket. It can lead to difficulty removing the tube after centrifugation or even cause the tube to collapse during centrifugation.

4. Carefully place the tubes into the buckets so that opposing bucket numbers (1 & 4, 2 & 5, and 3 & 6) contain similar loads. If running three tubes (see Figure 2 on page 22), all three must contain similar loads.



17 mL	
50146736	Bucket Cap
50146743	O-Ring
50146735	Bucket



38.5 mL	
50146739	Bucket Cap
50146742	O-Ring
50146724	Bucket

Figure 3 – Cap and Bucket Assembly

Insert each numbered bucket cap into the bucket with the same number, so that the cap threads seat on the bucket threads.

CAUTION Use only the black bucket cap handle (highlighted in green) to tighten the bucket caps. Do not use the metallic swing out bar (highlighted in red) to tighten the bucket caps.

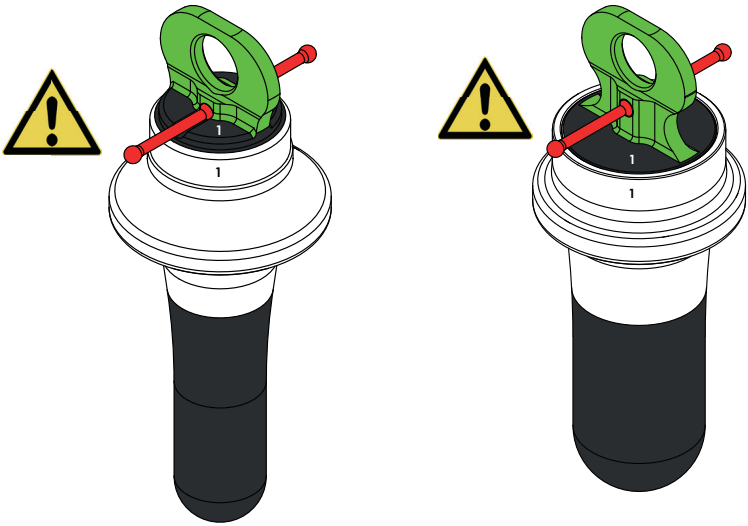


Figure 4 – How to tighten the Bucket Caps

Then, rotate each cap clockwise by hand until the cap seats firmly inside the bucket. When tightened properly, the cap handle cannot be turned further. When the bucket cap is installed correctly, the bucket cap handle is aligned to one of the three numbers labelled on the bucket (Figure 5 on page 26). Random variation of the cap alignment to the three numbers and variation of the hanging orientation of the bucket in its place on the rotor is intended by design.

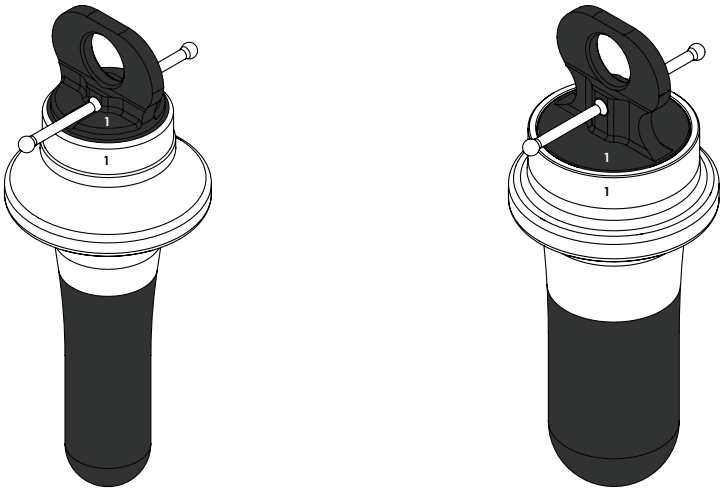


Figure 5 – Orientation of Bucket Cap Handle with Numbers

12. Installing Buckets and Performing a Run

To install the buckets on the rotor:

1. Make sure that the bucket is vertical at all times. Gently lower a bucket assembly into position until it engages and is fully seated on the two pins on the rotor body.

   NOTICE The number on the bucket assembly must match the compartment number on the rotor body.

2. Install the other five buckets the same way. Always run all six buckets – if running less than six tubes, sealed empty bucket assemblies must be placed in the remaining positions.
3. Gently rock each bucket assembly slightly to be sure all six pivot freely on their pins. For a visual check, the tops of all six bucket assemblies will be at the same height when properly installed.
4. Complete any Prerun Safety Checks that have not yet been done, then observe all Safety Instructions, and perform the run as explained in the centrifuge instruction manual.

5. Record the run data in the Rotor Log Book supplied (Figure 6 – Sample Rotor Log Sheet) for the rotor body and the used bucket set.
6. To remove the bucket caps at the end of the run, gently turn each cap counterclockwise.

13. Rotor Log

A Rotor Log Book is supplied with the rotor so that you can easily record all data necessary to meet the warranty conditions. Any defective rotor being returned to Thermo Fisher Scientific must be accompanied by an up-to-date history of the rotor. Each time a rotor body and a bucket set is used, record the run in the log book as shown in Figure 6 – Sample Rotor Log Sheet.

Thermo Scientific Rotor Log Book					RUN TIME (List by Rotor Used)								This log is for use with one centrifuge ONLY:
					Rotor: SureSpin 632 S/N: 1731384		Rotor: 17mL Buckets S/N: 110150		Rotor: 35.5mL Buckets S/N: 0931255		Rotor: S/N:		Model: Sorvall WX+ 80 Ser. No.: 9102448
Date	Operator	Rev. Count @ Run Start	TEMP	SPEED	HRS	MIN	HRS	MIN	HRS	MIN	HRS	MIN	Remarks
09/04/17	J. Jones	00410290	4	57.0	05	30	05	30					Plasmid Prep..
09/05/17	B. Smith	00429100	4	21.0	26	00	26	00					Sucrose Gradient
09/07/17	J. Jones	00461860	21	70.0	18	00			18	00			Lipoprotein Sep.

Figure 6 – Sample Rotor Log Sheet

CAUTION A rotor body has to be retired upon reaching the end of its service lifetime. A bucket set has to be retired upon reaching the end of its service lifetime. Exceeding the maximum number of cycles can result in rotor failure with subsequent damage to the centrifuge.

III. Maintenance and Care

1. Cleaning Intervals

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

2. Basics

CAUTION

Not rated procedures or agents could deteriorate the materials of the centrifuge and lead to malfunction.

Refrain from using any other cleaning or decontamination procedure, if you are not entirely sure that the intended procedure is safe for the equipment.

Use only cleaning agents that will not damage the equipment. In doubt contact the manufacturer of the cleaning agent.

If in doubt, contact Thermo Fisher Scientific.

- Use warm water with a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agents.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Remove rotor and clean with a small amount of cleaning agent, applied to a clean cloth.
- Use a soft brush without metal bristles to remove stubborn residue. Afterwards rinse with a small amount of distilled water and remove any excess with absorbent towels.
- Use only disinfectants with a pH of 6-8.

Rotors and Accessories Inspection

NOTICE

Do not use a rotor or accessories with signs of damage.
Make sure that rotor, buckets and accessories are within their service lifetime (age and cycles).
It is recommended to check rotors and accessories within a yearly routine inspection to ensure safety.

After thoroughly cleaning rotor and accessories, they should be inspected for damage and wear.

Speed Disk Decal Replacement

Before replacing the speed disk decal, be sure that the rotor is dry and at room temperature. If it is not, the new decal will not adhere properly.
To replace the speed disk decal:

1. Remove the existing speed disk decal from the bottom of the rotor being careful not to scratch the rotor surface.
2. Clean the adhesive from the rotor surface using an adhesive solvent.
3. Wipe the surface dry with a clean, soft cloth.
4. Peel the paper backing off the new speed disk decal, and fit the decal into the recess on the bottom of the rotor. Be sure that the decal is properly centred, then press the decal firmly in place.

3. Cleaning

NOTICE Before using any cleaning methods except those recommended by the manufacturer, users should check with the manufacturer of the cleaning agents that the proposed method will not damage the equipment.

NOTICE Drive and door lock can be damaged by entering liquids. Do not allow liquids, especially organic solvents, to get on the drive shaft, the drive bearings or the centrifuge door locks. Organic solvents break down the grease in the motor bearing. The drive shaft could lock up.

Clean as follows:

1. Clean rotor, buckets and accessories outside of the centrifuge bowl.
2. Separate rotor, buckets and tubes to allow thorough cleaning.

   Remove the O-rings from the bucket caps.
3. Rinse rotor and accessories with warm water and a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agents. Clean away the grease from the rotor trunnions (pivot point for swinging buckets).
4. Use a soft brush without metal bristles to remove stubborn residue.
5. Rinse rotor and accessories with distilled water.
6. Place the rotor and buckets on a plastic grate with cavities pointing down, to allow fully drain and dry.
7. Dry rotor and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50 °C. If drying boxes are used, the temperature must never exceed 50 °C, since higher temperatures could damage the material and shorten the lifetime of the parts.

   Once clean and dry, inspect rotor and accessories.
   Use grease (76003500) on the bucket cap O-rings before using them.

4. Disinfection

WARNING

Do not touch infected parts.

Hazardous infection is possible when touching the contaminated rotor and centrifuge parts. Infectious material can get into the centrifuge when a tube breaks or as a result of spills.

In case of contamination, make sure that others are not put at risk.

Disinfect the affected parts immediately.

NOTICE

Equipment can be damaged by inappropriate disinfection methods or agents.

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

Observe the safety precautions and handling instructions for the cleaning agents used.

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

Contact the Service Department of Thermo Fisher Scientific for questions regarding the use of other disinfectants. For details check “Basics” on page 28.

Disinfect as follows:

1. Disinfect the rotor, buckets and tubes outside of the centrifuge bowl.
2. Seperate the rotor, buckets and tubes to allow thorough disinfection.
3. Treat the rotor, buckets and tubes according to the instructions for the disinfectant. Adhere strictly to the given application times.

   Be sure the disinfectant can drain of the rotor.
4. Rinse the rotor, buckets and tubes with water.
5. Allow to fully drain and dry.
6. Dispose the disinfectant according to the applicable guidelines.
7. Clean the rotor, buckets and tubes after disinfecting as described in “Cleaning” on page 30.

5. Decontamination

WARNING

Do not touch contaminated parts.

Exposure to radiation is possible when touching the contaminated rotor and centrifuge parts.

Radioactive material can get into the centrifuge when a tube breaks or as a result of spills.

In case of contamination, make sure that others are not put at risk.

Decontaminate the affected parts immediately.

NOTICE

Equipment can be damaged by inappropriate decontamination methods or agents.

Make sure that the decontamination agent or the method will not damage the equipment. In doubt contact the manufacturer of the decontamination agent.

Observe the safety precautions and handling instructions for the cleaning agents used.

For general radioactive decontamination use a solution of equal parts of 70% ethanol, 10% SDS (Sodium Dodecyl Sulfate) and water.
Decontaminate as follows:

1. Decontaminate the rotor, buckets and tubes outside of the centrifuge bowl.
2. Seperate the rotor, buckets and tubes to allow thorough disinfection.
3. Treat the rotor, buckets and tubes according to the instructions for the decontamination solution. Adhere strictly to the given application times.

   Be sure the decontamination solution can drain of the rotor.
4. Rinse the rotor, buckets and tubes first with ethanol and then with water.

   Adhere strictly to the given application times.

   Be sure the decontamination solution can drain off the rotor.
5. Rinse the rotor, buckets and tubes with water.
6. Allow to fully drain and dry.
7. Dispose the disinfectant according to the applicable guidelines.
8. Clean the rotor, buckets and tubes after disinfecting as described in “Cleaning” on page 30.

6. Autoclaving

CAUTION Never exceed the permitted temperature and duration when autoclaving.

NOTICE No chemical additives are permitted in the steam.

Always disassemble all parts before autoclaving, e.g. a cap needs to be removed before autoclaving a bucket.

If not stated otherwise on the parts themselves, all parts can be autoclaved at 121 °C for 20 min.

Make sure that the necessary sterility is achieved according to your requirements.

7. Storage

WARNING

When removing the rotor from use, clean and additionaly disinfect or decontaminate the entire system if biological or chemical substances were used. If in doubt contact the Thermo Fisher Scientific customer service.

- Before storing the rotor it must be cleaned and if necessary disinfected and decontaminated.
  Rotor, buckets and accessories have to be thoroughly dried before storage.
- Store the rotor in a clean, dust-free location.
- Avoid storing the rotor in direct sunlight.

8. Shipping

WARNING

Before shipping the rotor you have to clean and additionaly disinfect or decontaminate the entire system if biological or chemical substances were used. In doubt contact the Thermo Fisher Scientific customer service.

Before shipping the rotor please keep the following in mind:

- The rotor must be cleaned and decontaminated.
- The decontamination must be confirmed with a decontamination certificate. Contact customer service for more details.

9. Disposal

WARNING

When removing the rotor from use for disposal you have to clean and additionaly disinfect or decontaminate the entire system if biological or chemical substances were used. In doubt contact the Thermo Fisher Scientific customer service.

For the disposal of the rotor mind the regulations in your country. Contact the Thermo Fisher Scientific Customer Service for the disposal of the rotor. For contact information check the backpage of this manual or visit http://www.thermofisher.com/centrifuge

Chemical Compatibility Chart

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	Noryl™	Nylon	PET', Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon 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	S	M	S	S	S	S	S	S	S	S	S	S	S	U
Allyl Alcohol	/	/	/	U	/	/	S	/	/	/	/	S	/	S	S	M	S	S	S	/	M	S	/	/	S	/	/
Aluminum Chloride	U	U	S	S	S	S	U	S	S	S	S	M	S	S	S	S	/	S	S	S	S	S	M	U	U	S	S
Formic Acid (100%)	/	S	M	U	/	/	U	/	/	/	/	U	/	S	M	U	U	S	S	/	U	S	/	U	S	/	U
Ammonium Acetate	S	S	U	/	S	S	S	/	S	S	S	S	S	S	S	U	/	S	S	S	S	S	S	S	S	S	S
Ammonium Carbonate	M	S	U	S	S	S	S	S	S	S	S	S	S	S	U	U	/	S	S	S	S	S	S	M	S	S	S

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	Noryl™	Nylon	PET¹, Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Ammonium Hydroxide (10%)	U	U	S	U	S	S	M	S	S	S	S	S	/	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (28%)	U	U	S	U	S	U	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (conc.)	U	U	U	U	S	U	M	S	/	S	/	S	U	S	U	U	S	S	S	/	M	S	S	S	S	/	U
Ammonium Phosphate	U	/	S	/	S	S	S	S	S	S	S	S	/	S	S	M	/	S	S	S	S	S	S	M	S	S	S
Ammonium Sulfate	U	M	S	/	S	S	U	S	S	S	S	S	S	S	S	S	/	S	S	S	S	S	S	U	S	S	U
Amyl Alcohol	S	/	M	U	/	/	S	S	/	M	/	S	/	M	S	S	S	S	M	/	/	/	U	/	S	/	M
Aniline	S	S	U	U	S	U	S	M	S	U	U	U	U	U	U	U	/	S	M	U	U	S	S	S	S	U	S
Sodium Hydroxide (<1%)	U	/	M	S	S	S	/	/	S	M	S	S	/	S	M	M	S	S	S	S	S	S	M	S	S	/	U
Sodium Hydroxide (10%)	U	/	M	U	/	/	U	/	M	M	S	S	U	S	U	U	S	S	S	S	S	S	M	S	S	/	U
Barium Salts	M	U	S	/	S	S	S	S	S	S	S	S	S	S	S	M	/	S	S	S	S	S	S	M	S	S	S
Benzene	S	S	U	U	S	U	M	U	S	U	U	S	U	U	U	M	U	M	U	U	U	S	U	U	S	U	S

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	S	M	S	S	S
Cesium Bromide	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Cesium Chloride	M	S	S	U	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Cesium Formate	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Cesium Iodide	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Cesium Sulfate	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Chloroform	U	U	U	U	S	S	M	U	S	U	U	M	U	M	U	U	U	M	M	U	U	S	U	U	U	M	S
Chromic Acid (10%)	U	/	U	U	S	U	U	/	S	S	S	U	S	S	M	U	M	S	S	U	M	S	M	U	S	S	S
Chromic Acid (50%)	U	/	U	U	/	U	U	/	/	/	S	U	U	S	M	U	M	S	S	U	M	S	/	U	M	/	S
Cresol Mixture	S	S	U	/	/	/	S	/	S	U	U	U	U	U	U	/	/	U	U	/	U	S	S	S	S	U	S

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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
Dimethylsulfoxide	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

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Acetic Acid (60%)	S	S	U	U	S	S	U	/	S	M	S	U	U	M	U	S	M	S	M	S	M	S	M	U	S	M	U
Ethyl Acetate	M	M	U	U	S	S	M	M	S	S	U	S	U	M	U	U	/	S	S	U	U	S	M	M	S	U	U
Ethyl Alcohol (50%)	S	S	S	S	S	S	M	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	M	S	M	U
Ethyl Alcohol (95%)	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	/	S	S	S	M	S	S	S	U	S	M	U
Ethylene Dichloride	S	/	U	U	/	/	S	M	/	U	U	S	U	U	U	U	U	U	U	/	U	S	U	/	S	/	S
Ethylene Glycol	S	S	S	S	S	S	S	S	S	S	S	S	/	S	U	S	S	S	S	S	S	S	S	M	S	M	S
Ethylene Oxide Vapor	S	/	U	/	/	U	/	/	S	U	/	S	/	S	M	/	/	S	S	S	U	S	U	S	S	S	U
Ficoll-Hypaque™	M	S	S	/	S	S	S	/	S	S	S	S	/	S	S	/	S	S	S	S	S	S	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

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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
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

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	Noryl™	Nylon	PET¹, Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Potassium Hydroxide (conc.)	U	U	M	U	/	/	M	/	M	S	S	/	U	M	U	U	U	S	M	/	M	U	/	U	U	/	U
Potassium Permanganate	S	S	S	/	S	S	S	/	S	S	S	U	S	S	S	M	/	S	M	S	U	S	S	M	S	U	S
Calcium Chloride	M	U	S	S	S	S	S	S	S	S	S	S	S	S	M	S	/	S	S	S	S	S	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

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	Noryl™	Nylon	PET¹, Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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	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-Dimethylformamide	S	S	S	U	S	M	S	/	S	S	U	S	U	S	U	U	/	S	S	U	U	S	M	S	S	S	U
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	/	S	S	S	S	S	S	M	S	S	S
Sodium Bromide	U	S	S	/	S	S	S	/	S	S	S	S	S	S	S	S	/	S	S	S	S	S	S	M	S	S	S

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	Noryl™	Nylon	PET, Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Sodium Carbonate (2%)	M	U	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S
Sodium Dodecyl Sulfate	S	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	S	S	S	S	S	S	S	S	S	S	S
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	S	S	M	S	S	S	S	M	S	S	S	M	U	S	M	S
Sodium Iodide	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Sodium Nitrate	S	S	S	/	S	S	S	S	S	S	S	S	S	S	S	S	/	S	S	S	S	S	U	S	S	S	S
Sodium Sulfate	U	S	S	/	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Sodium Sulfide	S	/	S	S	/	/	/	S	/	/	/	S	S	S	U	U	/	/	S	/	/	/	S	S	M	/	S
Sodium Sulfite	S	S	S	/	S	S	S	S	M	S	S	S	S	S	S	M	/	S	S	S	S	S	S	S	S	S	S
Nickel Salts	U	S	S	S	S	S	/	S	S	S	/	/	S	S	S	S	/	S	S	S	S	S	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

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Oxalic Acid	U	U	M	S	S	S	U	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	U	M	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

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvinyl Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Rubidium Chloride	M	S	S	/	S	S	S	/	S	S	S	S	S	S	S	/	/	S	S	S	S	S	S	M	S	S	S
Sucrose	M	S	S	/	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sucrose, Alkaline	M	S	S	/	S	S	S	/	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	M	S	S	S
Sulfosalicylic Acid	U	U	S	S	S	S	S	/	S	S	S	U	S	S	S	/	S	S	S	/	S	S	S	U	S	S	S
Nitric Acid (10%)	U	S	U	S	S	U	U	/	S	U	S	U	/	S	S	S	S	S	S	S	S	S	M	S	S	S	S
Nitric Acid (50%)	U	S	U	M	S	U	U	/	S	U	S	U	U	M	M	U	M	M	M	S	S	S	U	S	S	M	S
Nitric Acid (95%)	U	/	U	U	/	U	U	/	/	U	U	U	U	M	U	U	U	U	M	U	U	S	U	S	S	/	S
Hydrochloric Acid (10%)	U	U	M	S	S	S	U	/	S	S	S	U	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S
Hydrochloric Acid (50%)	U	U	U	U	S	U	U	/	S	M	S	U	U	M	U	U	S	S	S	S	M	S	M	U	U	M	M
Sulfuric Acid (10%)	M	U	U	S	S	U	U	/	S	S	M	U	S	S	S	S	S	S	S	S	S	S	U	U	U	S	S
Sulfuric Acid (50%)	M	U	U	U	S	U	U	/	S	S	M	U	U	S	U	U	M	S	S	S	S	S	U	U	U	M	S
Sulfuric Acid (conc.)	M	U	U	U	/	U	U	M	/	/	M	U	U	S	U	U	U	M	S	U	M	S	U	U	U	/	S

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	Noryl™	Nylon	PET¹, Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
Stearic Acid	S	/	S	/	/	/	S	M	S	S	S	S	/	S	S	S	S	S	S	S	S	S	M	M	S	S	S
Tetrahydrofuran	S	S	U	U	S	U	U	M	S	U	U	S	U	U	U	/	M	U	U	U	U	S	U	S	S	U	U
Toluene	S	S	U	U	S	S	M	U	S	U	U	S	U	U	U	S	U	M	U	U	U	S	U	S	U	U	M
Trichloroacetic Acid	U	U	U	/	S	S	U	M	S	U	S	U	U	S	M	/	M	S	S	U	U	S	U	U	U	M	U
Trichloroethane	S	/	U	/	/	/	M	U	/	U	/	S	U	U	U	U	U	U	U	U	U	S	U	/	S	/	S
Trichloroethylene	/	/	U	U	/	/	/	U	/	U	/	S	U	U	U	U	U	U	U	U	U	S	U	/	U	/	S
Trisodium Phosphate	/	/	/	S	/	/	M	/	/	/	/	/	/	S	/	/	S	S	S	/	/	S	/	/	S	/	S
Tris Buffer (neutral pH)	U	S	S	S	S	S	S	/	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Triton X/100™	S	S	S	/	S	S	S	/	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Urea	S	/	U	S	S	S	S	/	/	/	/	S	S	S	M	S	S	S	S	/	S	S	S	M	S	/	S
Hydrogen Peroxide (10%)	U	U	M	S	S	U	U	/	S	S	S	U	S	S	S	M	U	S	S	S	S	S	S	M	S	U	S
Hydrogen Peroxide (3%)	S	M	S	S	S	/	S	/	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S

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	Noryl™	Nylon	PET[1], Polyclear™, Clear Crimp™	Polyallomer	Polycarbonate	Polyester, Glass Thermoset	Polythermide	Polyethylene	Polypropylene	Polysulfone	Polyvynil Chloride	Rulon A™, Teflon™	Silicone Rubber	Stainless Steel	Titanium	Tygon™	Viton™
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

[1] *Polyethlyeneterephtalate*

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

Accessories 10
Autoclaving 33

B

Bucket Loading 22
Bucket Use 12

C

Calculation of Sedimentation Times in Aqueous (Non-Gradient) Solutions 20
Calculation of Sedimentation Times in Gradient Solutions 21
Chemical Compatibility 14
Chemical Compatibility Chart 35
Cleaning 30
Cleaning Intervals 28
Critical Speed 13

D

Decontamination 32
Disinfection 31

H

Hazardous Substances 7

I

Installing Buckets 26
Intended Use 4
Items Supplied 5

M

Maintenance and Care 28
Maximum Loading 13

O

Operation 11

P

Preface 4
Preparation 6
Prerun Safety Checks 11

R

Relative Centrifugal Force (RCF) Determination 14
Rotor Installation 11
Rotor Log 27
Rotor Precool 14

S

Shipping 34
Signal Words and Colors 6
Storage 34
Symbols used in the Manual 8
Symbols used on the Centrifuge 8

T

Technical Specifications 9
Tube Filling 22

thermo scientific

CE

50153788 is the original instruction manual.

thermofisher.com/centrifuge

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.

Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.
Shown pictures within the manual are examples and may differ considering the set parameters and language.

Australia +61 39757 4300
Austria +43 1 801 40 0
Belgium +32 53 73 42 41
China +800 810 5118 or
+400 650 5118
France +33 2 2803 2180
Germany national toll free 0800 1 536 376
Germany international +49 6184 90 6000
India toll free 1800 22 8374
India +91 22 6716 2200
Italy +39 02 95059 552
Japan +81 3 5826 1616
Netherlands +31 76 579 55 55
New Zealand +64 9 980 6700
Nordic/Baltic/CIS countries +358 10 329 2200
Russia +7 812 703 42 15
Spain/Portugal +34 93 223 09 18
Switzerland +41 44 454 12 12
UK/Ireland +44 870 609 9203
USA/Canada +1 866 984 3766

Other Asian Countries +852 3107 7600
Countries not listed +49 6184 90 6000

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

en

ThermoFisher SCIENTIFIC