

Beckman Coulter Floor Model Ultracentrifuge Rotors by Use

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Rotors for Centrifuging Extremely Small Particles

Rotor	Max. rpm	Max. g	k Factor	No. of Tubes x Nominal Tube Volume (mL) ¹	Nominal Rotor Capacity (mL)	For Use in Instruments Classified
Type 100 Ti	100 000	802 000	15	8 x 6.7	54	RS
NVT 100	100 000	750 000	8	8 x 5.1	40.8	RS
Type 90 Ti	90 000	694 000	25	8 x 13.5	108	HRS
NVT 90	90 000	645 000	10	8 x 5.1	40.8	HRS
VTi 90	90 000	645 000	6	8 x 5.1	40.8	HRS
Type 70.1 Ti	70 000	450 000	36	12 x 13.5	162	HRS
NVT 65	65 000	402 000	21	8 x 13.5	108	HRS
NVT 65.2	65 000	416 000	15	16 x 5.1	81.6	HRS
VTi 65.1	65 000	402 000	13	8 x 13.5	108	HRS
VTi 65.2	65 000	416 000	16	16 x 5.1	81.6	HRS

Rotors for Centrifuging Small Particles in Volume

Type 70 Ti	70 000	504 000	44	8 x 39	312	HRS
Type 50.2 Ti	50 000	302 000	69	12 x 39	468	HRS
VTi 50	50 000	242 000	36	8 x 39	312	HRS
Type 45 Ti	45 000	235 000	133	6 x 94	564	HRS

Rotors for Differential Flotation

Type 50.4 Ti	50 000	312 000	33	44 x 6.5	286	HRS
Type 42.2 Ti	42 000	223 000	9	72 x 230 µL	16.5	HRS
Type 25	25 000	92 500	62	100 x 1	100	HRS

Rotor for Concentrating Large Particles in Volume

Type 19	19 000	53 900	951	6 x 250	1500	HRS
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Rotors for Isopycnic and Rate-Zonal Gradients

SW 60 Ti	60 000	485 000	45	6 x 4	24	HRS
SW 55 Ti	55 000	368 000	48	6 x 5.0	30	HRS
SW 41 Ti	41 000	288 000	124	6 x 13.2	79.2	HRS
SW 40 Ti	40 000	285 000	137	6 x 14	84	HRS

Rotors with Long, Slender Tubes for Rate-Zonal Gradients

SW 32.1 Ti	32 000	187 000	228	6 x 17	102	HRS
SW 28.1	28 000	150 000	276	6 x 17	102	HRS

Rotors for Larger-Volume Density Gradients

SW 32 Ti	32 000	175 000	204	6 x 38.5	231	HRS
SW 28	28 000	141 000	245	6 x 39	234	HRS

Continuous Flow and Zonal Rotors

Rotor	Max. rpm	Max. g	Capacity (mL)	Typical Sample Volume (mL) ¹	Size Range of Particles Separated (S)	For Use in Instruments Classified
CF-32 Ti	32 000	102 000	430	>1000	>50	HS
Ti-15	32 000	102 000	1 675	50-200	>100	HS
Ti-14	48 000	172 000	665	20-50	20-100	HS

¹ Smaller-volume tubes may also be used with adapters and/or spacers. Check the rotor listing for more information.

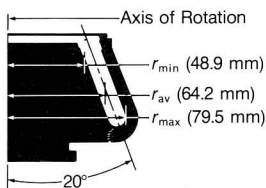
Beckman Coulter Floor Model Ultracentrifuge Rotors by Use

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Floor Model Rotor Selection by Application

		Type 100 Ti	Type 90 Ti	Type 70.1 Ti	Type 70 Ti	Type 50.2 Ti	Type 50.4 Ti	Type 42.2 Ti	Type 45 Ti	Type 25	Type 19	SW 60 Ti	SW 55 Ti	SW 41 Ti	SW 40 Ti	SW 32.1 Ti	SW 32 Ti	SW 28.1	SW 28	NVT 100	NVT 90	NVT 65	NVT 65.2	VTi 90	VTi 65.1	VTi 65.2	VTi 50	CF-32 Ti	Ti-15					
Separation of Subcellular Particles	Largest Volume for Pelleting		●	●	●	●			●		●											●							●	●				
	Largest Volume Rate-Zonal Separation																●			●										●	●			
	Fastest Rate-Zonal Separation				●	●			●		●		●	●	●	●					●	●	●	●	●	●	●	●	●	●	●	●		
Separation of Virus and Viral Particles	Largest Volume for Pelleting				●	●			●		●						●			●										●	●			
	Largest Volume Rate-Zonal Separation															●	●	●	●	●										●	●			
	Fastest Rate-Zonal Separation											●	●	●	●						●	●	●	●	●	●	●	●	●	●	●	●		
Rate-Zonal Separation of Proteins in Sucrose Gradient	Fastest Separation																			●	●	●	●	●	●	●	●	●	●	●	●	●		
	Largest Volume		●	●	●	●											●				●		●							●	●			
	Largest Number of Samples			●		●																		●							●	●		
	Greatest Interband Distance											●	●	●	●	●	●	●	●	●														
Separation of Lipoproteins	Fastest Differential Flotation	●	●	●	●																													
	Largest Number for Differential Flotation						●	●		●																								
	Largest Volume for Differential Flotation		●	●	●	●																												
	Greatest Interband Space											●	●	●	●	●	●	●	●	●														
	Fastest Density Gradient Separation																				●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pelleting RNA Through a CsCl Gradient	Fastest Separation											●	●	●	●					●	●		●											
	Largest Volume				●	●										●	●	●	●															
Isopycnic Separation of Plasmid DNA	Fastest Separation																			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Greatest Interband Distance	●	●	●	●											●	●	●	●															
	Largest Volume		●	●	●	●											●																	

Type 50.3 Ti



Fixed Angle Rotor, Titanium

For use in instruments classified

B C D F G H Q R S

Major application: differential flotation of lipoproteins

Max. rpm	Max. g	k Factor	Number tubes Volume/Size	Rotor Capacity
50,000	223,000	49	18 x 6.5 mL ½ x 2½ in 13 x 64 mm	117 mL

No. 343147. Type 50.3 Ti Rotor Assembly with 3 spare 011757 O-rings, 3 spare 801767 O-rings, and 2 extra 330336 Overspeed Disks.

No. 348167. Quick-Seal Tube Kit with 2 boxes 344619 Polyallomer Tubes, 2 boxes 344320 Ultra-Clear Tubes, 20 344389 Spacers, and 1 each 344638 Tube Rack, 306812 Spinkote Lubricant and 335148 Vacuum Grease. (Tube Sealing Kit required; see page 42.)

No. 348166. Open-Top Tube Kit with 2 boxes 326820 Polyallomer Tubes, 2 boxes 344088 Ultra-Clear Tubes, 20 346256 Tube Caps, and 1 each 306812 Spinkote Lubricant and 335148 Vacuum Grease. (301875, 841883, and 305075 tools required; see page 39.)

Tubes/Bottles

Tube Material	Order No.	Units	Vol. (mL)	Req'd Cap/Spacer/ Floating Spacer	Req'd Adapter	Max Speed
Ultra-Clear	344088	50	6.5	346256	—	50,000
	344091	50	2	303658	303823	45,000
Quick-Seal Ultra-Clear	344320	50	6	344389	—	50,000
Polyallomer	326820	50	6.5	346256	—	50,000
Thick-walled Polyallomer	355644	25	4	—	—	30,000
Quick-Seal Polyallomer	344619	50	6	344389	—	50,000
	345829†	50	2	345827	—	50,000
Thick-walled Polycarbonate	355645	25	4	—	—	50,000
Stainless Steel	301099	1	6.5	303113, 346256 or 305022	—	*

*See bulletin L5-TB-072C for maximum speed.

†To simplify ordering, refer to g-Max System kits described on 37.

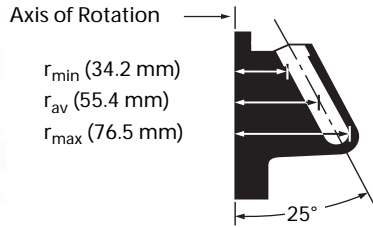
Rotor Replacement Parts

011757 O-ring for Rotor Handle	335158 Mechanical Overspeed Device, 50,000 rpm
330336 Overspeed Disk, 50,000 rpm	801767 O-Ring for Rotor Lid
343146 Rotor Handle	

Type 90 Ti

8 x 13.5 mL

Type 90 Ti



Fixed-Angle Rotor, Titanium

For use in instruments classified: **HRS**

Major applications: Five-hour separation of plasmid DNA and rapid differential centrifugation of small particles.

Max. RPM	Max. g	k Factor	Number of Tubes Volume/Size	Rotor Capacity
90 000	694 000	25	8 x 13.5 mL 5/8 x 3 in 16 x 76 mm	108 mL

No. 355530. Type 90 Ti Rotor Assembly with 3 each 839347 O-rings, 3 each 876089 O-rings, 2 each 355539 Overspeed Disks, and 356959 Tool.

No. 348179. Quick-Seal® Tube Kit with 2 boxes 342413 Polyallomer Tubes, 2 boxes 344322 Ultra-Clear™ Tubes, 12 each 342695 Spacers, 306812 Spinkote™ Lubricant, and 335148 Vacuum Grease. (Cordless Tube Topper Kit and Tube Rack required; see Tools, Accessories, and Supplies.)

No. 348180. Open-Top Tube Kit with 2 boxes 326814 Polyallomer Tubes, 2 boxes 344085 Ultra-Clear Tubes, 12 each 341968 Tube Caps, and 1 each 306812 Spinkote Lubricant, and 1 each 335148 Vacuum Grease. (331202 and 305075 Tools required; see Tools, Accessories, and Supplies.)

No. 361660. OptiSeal™ Tube Kit with 4 boxes of OptiSeal Tubes 361623, 12 Spacers 361670 (6 pkg. of 2), 1 OptiSeal Tube Rack 361642, 1 Tube Extraction Tool 361668, and 1 Spacer Removal Tool 338765.

Tubes and Bottles

Tube Style/Material	Vol. (mL) <i>g-Max</i>	Part No.	Quantity	Size (mm)	Required Caps/ Spacers (qty. 1)	Required Adapters (qty. 1)	<i>g</i> -Force	k Factor	Max. Speed
OptiSeal Polyallomer	8.9	361623	56	16 x 60	361670 ^a	—	694 000	21	90 000
Quick-Seal Polyallomer	4.2	356562	50	16 x 38	345828	—	694 000	11	90 000
	4.2	357332 ^b	50	16 x 38	345828	—	694 000	11	90 000
	6.3	345830	50	16 x 45	345828	—	694 000	14	90 000
	6.3	357334 ^b	50	16 x 45	345828	—	694 000	14	90 000
	10.0	344622	50	16 x 67	344676	—	694 000	21	90 000
Quick-Seal Ultra-Clear	13.5	342413	50	16 x 76	342695	—	694 000	25	90 000
	13.5	344322	50	16 x 76	342695	—	694 000	25	90 000
Polycarbonate Bottle/Assembly	10.4	355603 ^c	6	16 x 76	—	—	362 000	48	65 000
	10.4	355651	6	16 x 76	—	—	362 000	48	65 000
Thinwall Polyallomer	6.5	326820	50	13 x 64	346256	303313	197 000	69	50 000
	13.5	326814	50	16 x 76	341968	—	548 000	32	80 000
Thickwall Polyallomer	4.0	355644	25	13 x 64	—	303313	197 000	69	50 000
	10.0	355640	25	16 x 76	338907	—	77 000	190	30 000
Thickwall Polycarbonate	4.0	355645	25	13 x 64	—	303313	197 000	69	50 000 ^d
	10.0	355630	25	16 x 76	338907	—	197 000	69	50 000
Ultra-Clear	2.0	344091	50	8 x 49	303624	303376	128 000	72	40 000
	3.0	344092	50	13 x 32	346256	303401	129 000	59	45 000
	4.0	344093	50	13 x 41	346256	303402	138 000	67	45 000
	6.5	344088	50	13 x 64	346256	303313	197 000	69	50 000
	13.5	344085	50	16 x 76	341968	—	548 000	32	80 000

^a Set of two.

^b To simplify ordering, this *g-Max*™ Kit includes enough spacers to fill rotor, 50 tubes, and required tools.

Note: To help you locate *g-Max* tubes in the rotor listings, these tubes are highlighted with bold, italic type.

^c Bottle assembly.

^d Maximum speeds given above are those which the tubes could withstand when tested at 25°C for 24 hours. Further tests have shown that the polycarbonate tubes can run at 75 000 rpm for six hours or at 65 000 rpm for eight hours.

Rotor Replacement Parts

- 355528 Lid
- 355529 Handle
- 355530 Rotor
- 355539 Overspeed Disk
- 356959 Tool, handle
- 839347 O Ring, Inner
- 876089 O Ring, Outer

Adapters/Spacers/Caps

303313 303376 303401 303402 303624 338907 341968 346256 342695 344676 345828 361670

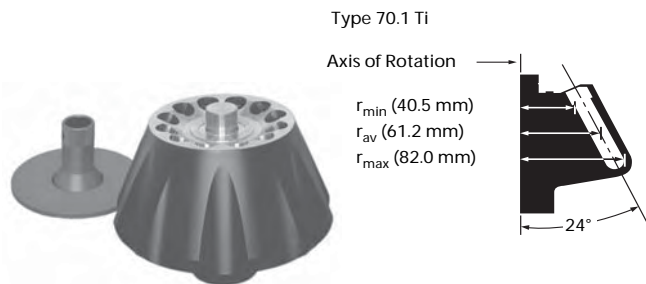




Type 70.1 Ti

12 x 13.5 mL

Type 70.1 Ti



Fixed-Angle Rotor, Titanium

For use in instruments classified: **H R S**

Major applications: Differential centrifugation of subcellular particles.

Max. RPM	Max. <i>g</i>	<i>k</i> Factor	Number of Tubes Volume/Size	Rotor Capacity
70 000	450 000	36	12 x 13.5 mL 5/8 x 3 in 16 x 76 mm	162 mL

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No. 342184. Type 70.1 Ti Rotor Assembly with 3 each 011757 O-rings, 3 each 858125 O-rings, 2 each 335585 Overspeed Disks.

No. 348179. Quick-Seal® Tube Kit with 2 boxes 342413 Polyallomer Tubes, 2 boxes 344322 Ultra-Clear™ Tubes, 12 each 342695 Spacers, and 306812 Spinkote™ Lubricant, and 335148 Vacuum Grease. (Cordless Tube Topper Kit and Tube Rack required; see Tools, Accessories, and Supplies.)

No. 348180. Open-Top Tube Kit with 2 boxes 326814 Polyallomer Tubes, 2 each 344085 Ultra-Clear Tubes, and 12 each 341968 Tube Caps, and 1 each 306812 Spinkote Lubricant, and 335148 Vacuum Grease. (331202 and 305075 Tools required; see Tools, Accessories, and Supplies.)

No. 361660. OptiSeal™ Tube Kit with 4 boxes of OptiSeal Tubes 361623, 12 Spacers 361670 (6 pkg of 2), 1 OptiSeal Tube Rack 361642, 1 Tube Extraction Tool 361668, and 1 Spacer Removal Tool 338765.

Tubes and Bottles

Tube Style/Material	Vol. (mL) <i>g</i> -Max	Part No.	Quantity	Size (mm)	Required Caps/ Spacers (qty. 1)	Required Adapters (qty. 1)	<i>g</i> -Force	<i>k</i> Factor	Max. Speed
OptiSeal Polyallomer	8.9	361623	56	16 x 60	361670*	—	450 000	32	70 000
Quick-Seal Polyallomer	4.2	356562	50	16 x 38	345828	—	450 000	17	70 000
	4.2	357332†	50	16 x 38	345828	—	450 000	17	70 000
	6.3	345830	50	16 x 45	345828	—	450 000	24	70 000
	6.3	357334†	50	16 x 45	345828	—	450 000	24	70 000
	10.0	344622	50	16 x 67	344676	—	450 000	34	70 000
		342413	50	16 x 76	342695	—	450 000	36	70 000
Quick-Seal Ultra-Clear	13.5	344322	50	16 x 76	342695	—	450 000	36	70 000
Polycarbonate Bottle Assembly	10.4	355603	6	16 x 76	—	—	388 000	42	65 000
	10.4	355651	6	16 x 76	—	—	694 000	25	90 000
Thinwall Polyallomer	6.5	326820	50	13 x 64	346256	303313	212 000	60	50 000
	13.5	326814	50	16 x 76	341968	—	450 000	36	70 000
Thickwall Polyallomer	4.0	355644	25	13 x 64	—	303313	212 000	60	50 000‡
	10.0	355640	25	16 x 76	—	—	82 700	199	30 000‡
Thickwall Polycarbonate	4.0	355645	25	13 x 64	—	303313	212 000	60	50 000‡
	8.0	355630	25	16 x 76	—	—	230 000	71	50 000‡
Ultra-Clear	2.0	344091	50	8 x 49	303624	303376	138 000	63	40 000
	3.0	344092	50	13 x 32	346256	303401	143 000	51	45 000
	4.0	344093	50	13 x 41	346256	303402	152 000	58	45 000
	6.5	344088	50	13 x 64	346256	303313	212 000	60	50 000
	13.5	344085	50	16 x 76	341968	—	450 000	36	70 000

*Set of 2.

† To simplify ordering, this *g*-Max™ Kit includes enough spacers to fill rotor, 50 tubes, and required tools.

Note: To help you locate *g*-Max tubes in the rotor listings, these tubes are highlighted with bold, italic type.

‡ Maximum speeds given above are those which the tube could withstand when tested at 25°C for 24 hours. Further tests have shown that the polycarbonate tube can be run at 70 000 rpm for six hours or at 65 000 rpm for eight hours.

Rotor Replacement Parts

- 011757 O-ring for Rotor Handle
- 337924 Rotor Handle
- 335585 Overspeed Disk, 70 000 rpm
- 858125 O-ring for Rotor Lid
- 342183 Rotor Lid

Adapters/Spacers/Caps

303313 303376 303401 303402 303624 341968 342695 344676 345828 346256 361670

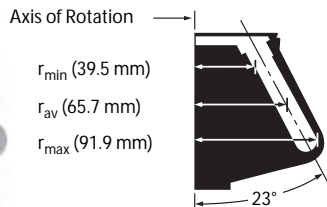




Type 70 Ti

8 x 39 mL

Type 70 Ti



Fixed-Angle Rotor, Titanium

For use in instruments classified: **H R S**

Major applications: Differential centrifugation of subcellular fractions.

Max. RPM	Max. <i>g</i>	<i>k</i> Factor	Number of Tubes Volume/Size	Rotor Capacity
70 000	504 000	44	8 x 39 mL 1 x 3 1/2 in 25 x 89 mm	312 mL

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No. 337922. Type 70 Ti Rotor Assembly with 3 each 011757 O-rings, 3 each 870612 O-rings, and 2 each 335585 Overspeed Disks.

No. 348178. Quick-Seal® Tube Kit with 2 boxes 342414 Polyallomer Tubes, 2 boxes 344326 Ultra-Clear™ Tubes, 12 each 342699 Spacers, 306812 Spinkote™ Lubricant, and 335148 Vacuum Grease. (Cordless Tube Topper Kit and Rack required; see Tools, Accessories, and Supplies.)

No. 348172. Open-Top Tube Kit with 4 boxes 344367 Polyallomer Tubes, 10 each 337927 Tube Caps, and 1 each 306812 Spinkote Lubricant, and 335148 Vacuum Grease. (338841 and 305075 Tools required; see Tools, Accessories, and Supplies.)

No. 361662. OptiSeal™ Tube Kit with 4 boxes of Tubes 361625, 12 Spacers 361669 (6 pkg of 2), 1 OptiSeal Tube Rack 361646, 1 Tube Extraction Tool 361668, and 1 Spacer Removal Tool 338765.

Tubes and Bottles

Tube Style/Material	Vol. (mL) <i>g-Max</i>	Part No.	Quantity	Size (mm)	Required Caps/ Spacers (qty. 1)	Required Adapters (qty. 1)	<i>g</i> -Force	<i>k</i> Factor	Max. Speed
OptiSeal Polyallomer	32.4	361625	56	25 x 77	361669 ^a	—	504 000	44	70 000
Quick-Seal Polyallomer	15.0	343664	50	25 x 38	343448	—	504 000	24	70 000
	15.0	357343 ^b	50	25 x 38	343448	—	504 000	24	70 000
	27.0	343665	50	25 x 64	343448	—	504 000	31	70 000
	27.0	357346 ^b	50	25 x 64	343448	—	504 000	31	70 000
	33.0	344623	50	25 x 83	344635	—	504 000	38	70 000
Quick-Seal Ultra-Clear	39.0	342414	50	25 x 89	342699	—	504 000	44	70 000
	15.0	344324	50	25 x 38	343448	—	504 000	24	70 000
	27.0	344323	50	25 x 64	343448	—	504 000	31	70 000
Polycarbonate Bottle Assembly	39.0	344326	50	25 x 89	342699	—	504 000	44	70 000
	26.3	355618	6	25 x 89	—	—	371 000	59	60 000
	6.5	326820	50	13 x 64	346256	303392	102 000	69	45 000
Thinwall Polyallomer	13.5	326814	50	16 x 76	330860	303307	151 000	104	40 000
	35.5	344367	50	25 x 83	337927	—	504 000	43	70 000
	38.5	326823	50	25 x 89	331151	—	371 000	59	60 000
	4.0	355644	25	13 x 64	—	303392	102 000	69	45 000
Thickwall Polyallomer	10.0	355640	25	16 x 76	338907 ^c	303307	151 000	104	40 000
	30.0	355642	25	25 x 89	338906 ^c	—	371 000	59	60 000
	4.0	355645	25	13 x 64	—	303392	102 000	69	45 000
Thickwall Polycarbonate	10.0	355630	25	16 x 76	338907 ^c	303307	151 000	104	40 000
	30.0	355631	25	25 x 89	338906 ^c	—	371 000	59	60 000
	6.0	344088	50	13 x 64	346256	303392	102 000	69	45 000
Ultra-Clear	13.5	344085	50	16 x 76	330860	303307	151 000	104	40 000
	38.5	344058	50	25 x 89	331151	—	371 000	59	60 000

^a Set of two.

^b To simplify ordering, this *g-Max*™ Kit includes enough spacers to fill rotor, 50 tubes, and required tools.

Note: To help you locate *g-Max* tubes in the rotor listings, these tubes are highlighted with bold, italic type.

^c Caps are optional for these Thickwall tubes. In the Type 70 Ti, the filling level for 355642 and 355631 is 16.5 mL. For 355640 and 355630, the filling level is 7.5 mL. Maximum speeds for these open-top tubes without a cap: Polycarbonate—45 000 rpm. Polyallomer—20 000 rpm. These speeds are those which the tubes could withstand when tested at 25°C for 24 hours. Further tests have shown that the polycarbonate tube can run at 50 000 rpm for four hours.

Rotor Replacement Parts

- 011757 O-ring for Rotor Handle
- 335585 Overspeed Disk, 70 000 rpm
- 337924 Rotor Handle
- 870612 O-ring for Rotor Lid
- 337923 Rotor Lid

Adapters/Spacers/Caps

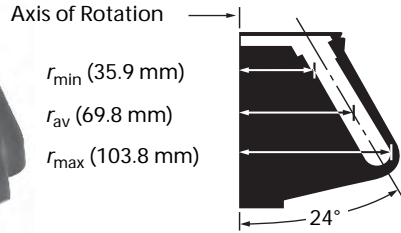
303307 303392 330860 331151 337927 338906 338907 342699 343448 344635 346256 361669



Type 45 Ti

6 x 94 mL

Type 45 Ti



Fixed-Angle Rotor, Titanium

For use in instruments classified: **H R S**

Note: This rotor cannot be used in 40 000 rpm F or H instruments or the L5-50E unless the instruments have been upgraded with a diffusion pump and vacuum indicator.

Major applications: Differential centrifugation of large volumes of subcellular fractions and viruses.

Max. RPM	Max. g	k Factor	Number of Tubes Volume/Size	Rotor Capacity
45 000	235 000	133	6 x 94 mL 1½ x 4 in 38 x 102 mm	564 mL

No. 339160. Type 45 Ti Rotor Assembly with 3 each 854519 O-rings, 3 each 878260 O-rings, and 2 each 335458 Overspeed Disks.

No. 348175. Quick-Seal® Tube Kit with 4 boxes 345776 Polyallomer Tubes, 4 boxes 345778 Ultra-Clear™ Tubes, 8 each 342697 Spacers, 306812 Spinkote™ Lubricant, and 335148 Vacuum Grease. (Cordless Tube Topper Kit and Tube Rack required; see Tools, Accessories, and Supplies.)

No. 348176. Open-Top Tube Kit with 4 boxes 345775 Polyallomer Tubes, 4 boxes 345777 Ultra-Clear Tubes, and 8 each 330901 Tube Caps, and 1 each 306812 Spinkote Lubricant and 335148 Vacuum Grease. (331202 and 305075 Tools required; see Tools, Accessories, and Supplies.)

Tubes and Bottles

Tube Style/Material	Vol. (mL)	Part No.	Quantity	Size (mm)	Required Caps/ Spacers (qty. 1)	Required Adapters (qty. 1)	g-Force	k Factor	Max. Speed
Quick-Seal Polyallomer	94.0	345776	25	38 x 102	342697	—	235 000	133	45 000
Quick-Seal Ultra-Clear	94.0	345778	25	38 x 102	342697	—	235 000	133	45 000
Polycarbonate Bottle/Assembly	70.0	355655**	25	38 x 102	—	—	235 000	133	45 000†
	70.0	355622*	6	38 x 102	—	—	235 000	133	45 000†
Thinwall Polyallomer	6.5	326820	50	13 x 64	346256	303449	138 000	90	39 000
	10.5	326822	50	13 x 89	346256	303459	156 000	110	39 000
	13.5	326814	50	16 x 76	330860	303448	149 000	107	39 000
	94.0	345775	25	38 x 102	330901	—	235 000	133	45 000
Thickwall Polyallomer	4.0	355644	25	13 x 64	—	303449	138 000	90	39 000
	10.0	355640	25	16 x 76	338907†	303448	149 000	107	39 000
	10.0	355639	25	13 x 89	—	303459	156 000	110	39 000
	81.0	355643	25	38 x 102	338905†	—	235 000	133	45 000
Thickwall Polycarbonate	4.0	355645	25	13 x 64	—	303449	138 000	90	39 000
	10.0	355630	25	16 x 76	338907†	303448	149 000	107	39 000
	10.0	355629	25	13 x 89	—	303459	156 000	110	39 000
	81.0	355628	25	38 x 102	338905†	—	235 000	133	45 000
Thinwall Ultra-Clear	6.5	344088	50	13 x 64	346256	303449	138 000	90	39 000
	10.5	344087	50	13 x 89	346256	303459	156 000	110	39 000
	13.5	344085	50	16 x 76	330860	303448	149 000	107	39 000
	94.0	345777	25	38 x 102	330901	—	235 000	133	45 000

* Bottle assembly. Reduce speed to 35 000 rpm when the bottle is centrifuged less than full (minimum fill volume is 35 mL).

** Bottle only. Reduce speed to 35 000 rpm when the bottle is centrifuged less than full (minimum fill volume is 35 mL).

† Caps are optional for these Thickwall tubes. In the Type 45 Ti the filling level for 355643 and 355628 is 47 mL. For 355640 and 355630, the filling level is 8 mL. Maximum speeds for these open-top tubes without a cap: Polycarbonate — 30 000 rpm; Polyallomer — 15 000 rpm.

Rotor Replacement Parts

- 335458 Overspeed Disk, 45 000 rpm
- 339164 Rotor Handle
- 854519 O-ring, small, for Rotor Lid
- 878260 O-ring, large, for Rotor Lid
- 339163 Rotor Lid

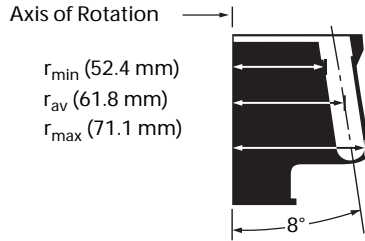
Adapters/Spacers/Caps



NVT 90

8 x 5.1 mL

NVT 90



NVT™ Near-Vertical Tube Rotor, Titanium

For use in instruments classified: **H R S**

Note: Non-precipitating solutions up to 1.7 g/mL in density can be run in this rotor without a reduction in rotor speed. For speed reductions for CsCl prescription, refer to rotor manual.

Major applications: Separation of plasmid or mitochondrial DNA in CsCl gradients in 2.5 – 4 h.

Max. RPM	Max. <i>g</i>	<i>k</i> Factor	Number of Tubes Volume/Size	Rotor Capacity
90 000	645 000	10	8 x 5.1 mL ½ x 2 in 13 x 51 mm	40.8 mL

No. 362752. NVT 90 Rotor Package with 342705 Vise, 858121 Torque Wrench, 976959 Torx Wrench Adapter, 306812 Spinkote™ Lubricant, and 355539 Overspeed Disk.

No. 360970. OptiSeal™ Tube Kit with 4 boxes 362185 OptiSeal™ Polyallomer Tubes, 8 each 362198 Spacers, 360534 Tube Rack, 361668 Tube Extraction Tool, and 338765 Spacer Removal Tool.

No. 360979. Quick-Seal® Tube Kit with 4 boxes 342412 Quick-Seal® Polyallomer Tubes, 8 each 342883 Spacers, 348122 Tube Topper Tube Rack, and 361668 Tube Extraction Tool (Cordless Tube Topper Kit required, see Tools, Accessories, and Supplies).

Tubes

Tube Style/Material	Vol. (mL) <i>g-Max</i>	Part No.	Quantity	Size (mm)	Spacers (qty. 1)	Floating Spacers (qty. 1)	<i>g</i> -Force	<i>k</i> Factor	Max. Speed
OptiSeal Polyallomer	4.9	362185	56	13 x 51	362198	—	645 000	10	90 000
Quick-Seal Polyallomer	2.0	345829	50	13 x 25	342883	345827	645 000	7	90 000
	2.0	357325*	50	13 x 25	342883	345827	645 000	7	90 000
	5.1	342412	50	13 x 51	342883	—	645 000	10	90 000
Quick-Seal Ultra-Clear™	5.1	344075	50	13 x 51	342883	—	645 000	10	90 000

* To simplify ordering, this *g-Max*™ Kit includes enough spacers to fill rotor; 50 tubes, and required tools.

Note: To help you locate *g-Max* tubes in the rotor listings, these tubes are highlighted with bold, italic type.

Rotor Replacement Parts

For Rotors Manufactured Prior to 1/2000

- 355539 Overspeed Disk, 90 000 rpm
- 342881 Rotor Plug, Hex style†
- 342882 Gasket for Rotor Plug

For Rotors Manufactured After 1/2000

- 355539 Overspeed Disk, 90 000 rpm
- 368546 Rotor Replacement Plug (set of 8)
- 368545 Rotor Replacement Plug (single)
- 342882 Gasket for Rotor Plug
- 976959 Torx Adapter

† This part number is no longer available. If replacing all rotor plugs, use Torx style, P/N 368545.

Adapters/Spacers

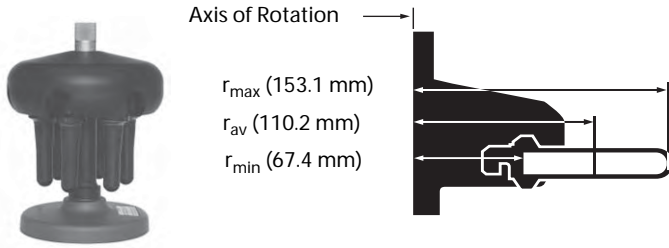
342883 345827 362198



SW 41 Ti

6 x 13.2 mL

SW 41 Ti



Swinging-Bucket Rotor, Titanium Head, and Buckets (black buckets)

For use in instruments classified: **HRS**

Major applications: Rate-zonal and isopycnic centrifugation of viruses, rate-zonal centrifugation of RNA.

Max. RPM	Max. <i>g</i>	<i>k</i> Factor	Number of Tubes Volume/Size	Rotor Capacity
41 000	288 000	124	6 x 13.2 mL 5/16 x 3 1/2 in 14 x 89 mm	79.2 mL

1

No. 331336. SW 41 Ti Rotor Package with 330070 Hinge Pin Tool, 2 boxes 331372 Polyallomer Tubes, 2 boxes 344059 Ultra-Clear™ Tubes, 331313 Bucket Holder Rack, 306812 Spinkote™ Lubricant, 335148 Vacuum Grease, 330335 Overspeed Disk, and 331309 Gaskets for Buckets.

No. 331362. SW 41 Ti Rotor Assembly.

Tubes

Tube Style/Material	Vol. (mL) <i>g-Max</i>	Part No.	Quantity	Size (mm)	Floating Spacers (qty. 1)	Adapters (qty. 1)	<i>g</i> -Force	<i>k</i> Factor	Max. Speed
Quick-Seal®	3.5	357330*	50	14 x 25	355534	—	288 000	27	41 000
Polyallomer	3.5	355870	50	14 x 25	355534	—	288 000	27	41 000
	5.9	355537	50	14 x 47	355534	—	288 000	55	41 000
Quick-Seal <i>konical</i> ™	4.0	358650	50	14 x 48	355534	358154	284 000	57	41 000
Polyallomer	8.0	358649	50	14 x 89	355534	358154	284 000	124	41 000
Polyallomer	13.2	331372	50	14 x 89	—	—	288 000	124	41 000
<i>konical</i> Polyallomer	10.0	358120	50	14 x 89	—†	358154	284 000	124	41 000
Ultra-Clear	13.2	344059	50	14 x 89	—	—	288 000	124	41 000

* To simplify ordering, this *g-Max*™ Kit includes enough spacers to fill rotor, 50 tubes, and required tools.

† Recommend 354468 Extractor Tool (*konical* tube adapters).

Note: To help you locate *g-Max* tubes in the rotor listings, these tubes are highlighted with bold, italic type.

Rotor Replacement Parts

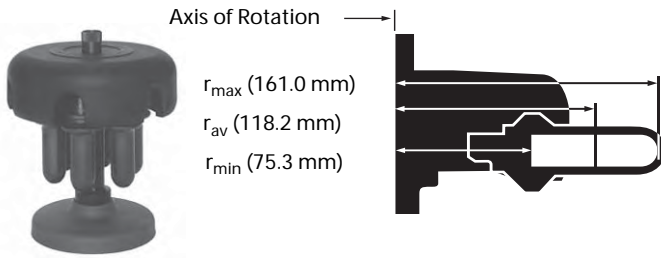
- 330335 Overspeed Disk, 41 000 rpm
- 331313 Bucket Holder Rack
- 332400 Rotor Stand
- 333790 Bucket Assembly, Black Titanium, with Caps and Gaskets, matched set of 6
- 331309 Gasket for Bucket
- 331763 Caps, matched set of 6

Adapters/Spacers

355534

358154





Swinging-Bucket Rotor, Aluminum Head, and Titanium Buckets

For use in instruments classified: **H R S**

Major applications: Differential centrifugation of subcellular fractions and viruses.

Max. RPM	Max. <i>g</i>	<i>k</i> Factor	Number of Tubes Volume/Size	Rotor Capacity
28 000	141 000	246	6 x 39 mL 1 x 3½ in 25 x 89 mm	234 mL

1

No. 342204. SW 28 Rotor Package with 2 boxes 326823 Polyallomer Tubes, 2 boxes 344058 Ultra-Clear™ Tubes, 331186 Bucket Holder Rack, 306812 Spinkote™ Lubricant, 335148 Vacuum Grease, 342211 Overspeed Disk, and 812715 O-rings.

No. 342207. SW 28 Rotor Assembly.

Tubes

Tube Style/Material	Vol. (mL) <i>g</i> -Max	Part No.	Quantity	Size (mm)	Floating Spacers (qty. 1)	Adapters (qty. 1)	<i>g</i> -Force	<i>k</i> Factor	Max. Speed
OptiSeal Polyallomer	32.4	361625	56	25 x 77	361669*	—	141 000	206	28 000
Quick-Seal®	15.0	343664	50	25 x 38	355536	—	141 000	87	28 000
Polyallomer	27.0	343665	50	25 x 64	355536	—	141 000	164	28 000
Bell-Top	33.5	344623	50	25 x 83	355536	—	141 000	234	28 000
Quick-Seal	8.4	358652	50	25 x 38	355536	358156**	141 000	87	28 000
konical™	22.5	358654	50	25 x 76	355536	358156**	141 000	206	28 000
Polyallomer	28.0	358651	50	25 x 83	355536	358156**	141 000	234	28 000
Bell-Top									
konical	25.5	358125	50	25 x 76	—	358156**	141 000	206	28 000
Polyallomer	31.5	358126	50	25 x 89	—	358156**	141 000	246	28 000
Thickwall Polyallomer	31.0	355642	25	25 x 89	—	—	141 000	246	28 000
Thinwall Polyallomer	38.5	326823	50	25 x 89	—	—	175 000	204	32 000
Thickwall Polycarbonate	31.0	355631	25	25 x 89	—	—	141 000	246	28 000
Ultra-Clear™	38.5	344058	50	25 x 89	—	—	141 000	246	28 000

* Set of 2.

** Package of 6.

Note: To help you locate *g*-Max tubes in the rotor listings, these tubes are highlighted with bold, italic type.

Rotor Replacement Parts

- 331186 Bucket Holder Rack
- 332400 Rotor Stand
- 342211 Overspeed Disk, 28 000 rpm
- 342217 Bucket Assembly, Titanium, with Caps and O-rings, matched set of 6
- 812715 O-ring for Bucket
- 342179 Bucket Cap (each)

Extra Buckets for the SW 28

The long slender buckets of the SW 28.1 can be used with the SW 28 rotor head.
342212 Bucket Assembly SW 28.1, Titanium, with Caps and O-rings, matched set of 6

Adapters/Spacers





Reference

How to Choose a Rotor

When choosing a rotor, there are several factors to consider: your sample volume and number of individual samples; the number of components in each sample; the level of purity your research requires; and how quickly you wish to achieve the separation.

The Importance of k Factor

Obviously, separation is affected by maximum speed and maximum radius which together determine maximum g -force. However, particle pathlength also affects separation time. A simple measure of overall rotor efficiency which incorporates both g -force and particle pathlength is the k factor. Generally speaking, the lower the k factor, the shorter the run time. This makes the k factor one of the most important considerations when selecting a rotor. The chart on page 4–5 compares k factors among the four basic rotor types. (Refer to page 4–12 for useful formulas relating to k factors.)

Rotor Material

Beckman Coulter ultracentrifuge rotors are made of either aluminum, or titanium.

- Aluminum rotors are relatively light and easy to handle, but less durable and slightly more susceptible to corrosion than titanium rotors. Beckman Coulter still offers some aluminum rotors for customers who own older ultracentrifuges, the primary instruments for which these rotors were originally designed.
- Titanium rotors are generally stronger and more resistant to corrosion, making them the logical choice for rapid separation at high speeds or when corrosive chemicals will be used.

Swinging-Bucket (SW) Rotors

Generally used when maximum resolution of sample zones is needed, as in rate zonal studies. Because tubes are held in a horizontal position while spinning, the pathlength is the full length of the tube, which results in longer run times than with other rotor types. These long run times are offset by excellent resolution of sample bands in rate zonal separations. Swinging-Bucket Rotors are also the best choice when a compact pellet is needed, as when pelleting RNA through a cesium chloride cushion.

Fixed-Angle (FA) Rotors

These rotors provide faster run times than SW rotors at the expense of some resolution in rate zonal studies. They are most useful for pelleting and for isopycnic banding of DNA, where a shallow density gradient and reorientation combine to increase both the width of sample bands and the distance between them, making band extraction easier.

Vertical-Tube (VT) Rotors

These rotors are often used for isopycnic and rate zonal separations when run-time reduction is important. Since vertical tube rotors hold sample tubes parallel to the axis of rotation, particle pathlengths are limited to the diameter of the tube — a short pathlength that results in fast run times.

NVT™ Near-Vertical Tube Rotors

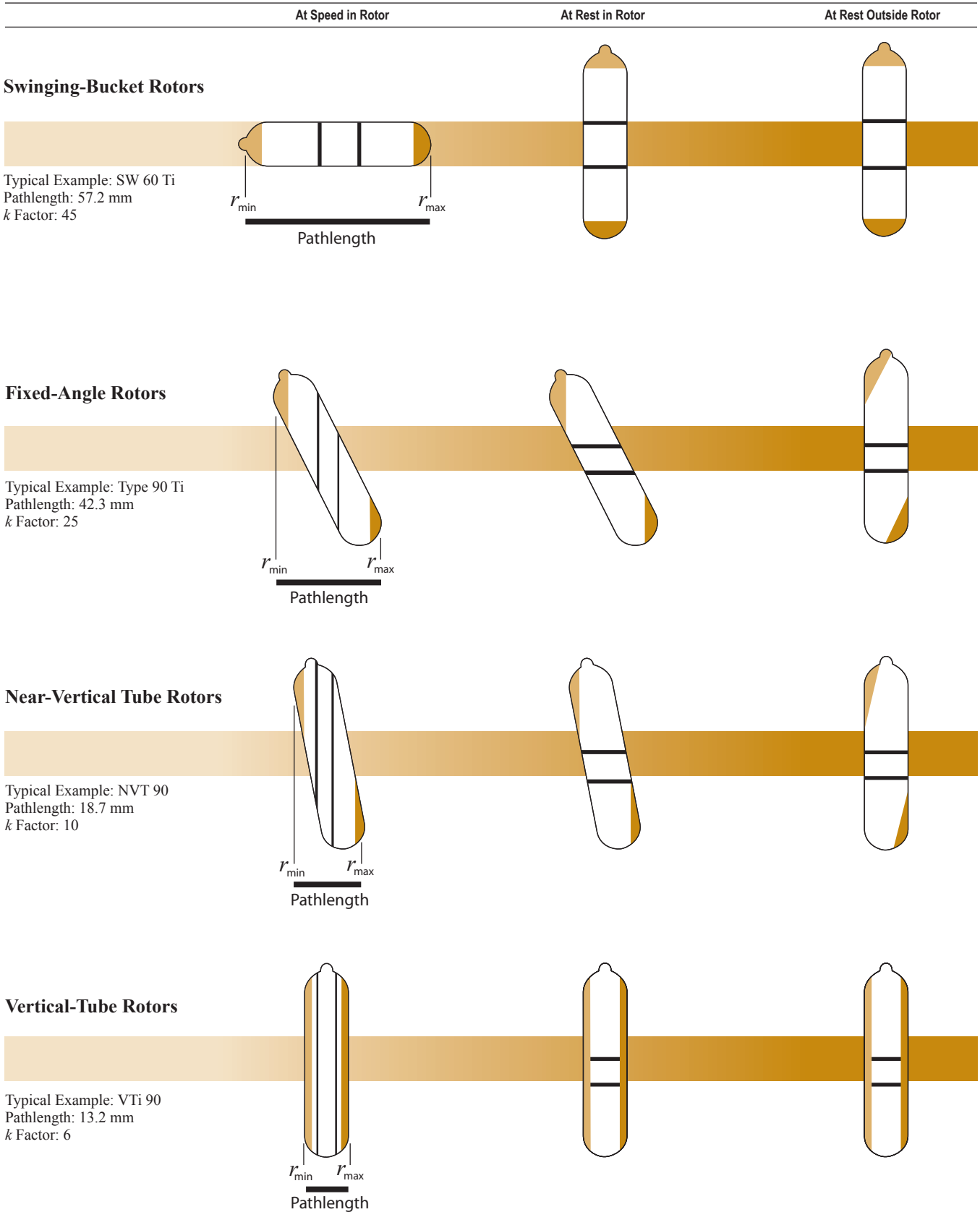
NVT Near-Vertical Tube Rotors, a patented Beckman Coulter innovation, were designed specifically for density gradient separations. Their narrow angle of less than 10° is calculated using a proprietary algorithm which determines the optimal angle for each rotor, taking into consideration specific tube geometries. These angles result in significantly reduced run times compared with conventional Fixed-Angle Rotors, while positioning pelleted and floated components at the ends of the tubes, away from the bands of interest.

Continuous-Flow/Zonal Rotors

These rotors are capable of processing large sample volumes in their cores. This large-scale processing ability is clearly evident in Continuous-Flow Rotors, which can process a typical 10-liter sample in about four hours, instead of the 12–24 hours required by conventional methods. Zonal Rotors have similar utility in large-scale density gradient separations.

Reference

Particle Separation in Swinging-Bucket, Fixed-Angle, Near-Vertical Tube, and Vertical-Tube Rotors



Dark orange represents pelleted material, light orange depicts floating components, and bands are indicated by black lines.

4



Reference

Useful Formulas

***k* Factor**

To determine *k* factor

$$k = \frac{\ln(r_{\max}/r_{\min})}{\omega^2} \times \frac{10^{-13}}{3600} \quad \text{OR} \quad k = \frac{2.53 \times 10^5 \ln(r_{\max}/r_{\min})}{(\text{rpm}/1000)^2}$$

To determine pelleting time (*t*)

$$t = \frac{k}{s} \quad \text{where } s = \text{sedimentation coefficient in Svedbergs}$$

To relate pelleting time between rotors

$$\frac{k_1}{t_1} = \frac{k_2}{t_2}$$

To adjust *k* factor for runs less than maximum rotor speed

$$k_{\text{adj}} = k \left(\frac{\text{maximum rated speed of rotor}}{\text{actual run speed}} \right)^2$$

To relate relative centrifugal force (RCF) to speed (rpm):

$$\text{RCF}_{\max} = 1.12 r_{\max} \left(\frac{\text{rpm}}{1000} \right)^2 \quad \text{OR} \quad \text{rpm} = 10^3 \sqrt{\frac{\text{RCF}}{1.12 r_{\max}}}$$

To relate the sedimentation coefficient (*s*) to rotational speed:

$$s = \frac{dr}{dt} \times \frac{1}{\omega^2 r}$$

Svedberg unit (S) equivalent:

$$S = 10^{-13} \text{ seconds}$$

Reduced run speed for dense solutions:

$$\text{reduced run speed} = \text{max rated speed of rotor} \times \sqrt{A/B}$$

where A = max. permissible density of rotor tube contents, and
B = actual density of the tubes to be centrifuged