

Herolab

*Manufacturer
of Life Science*



If your centrifuge has one of those hubs – We have the rotor



Rotors

Made in Germany

For High-Speed Centrifuges

ROTORS FOR HIGH-SPEED CENTRIFUGES



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List of used trademarks:

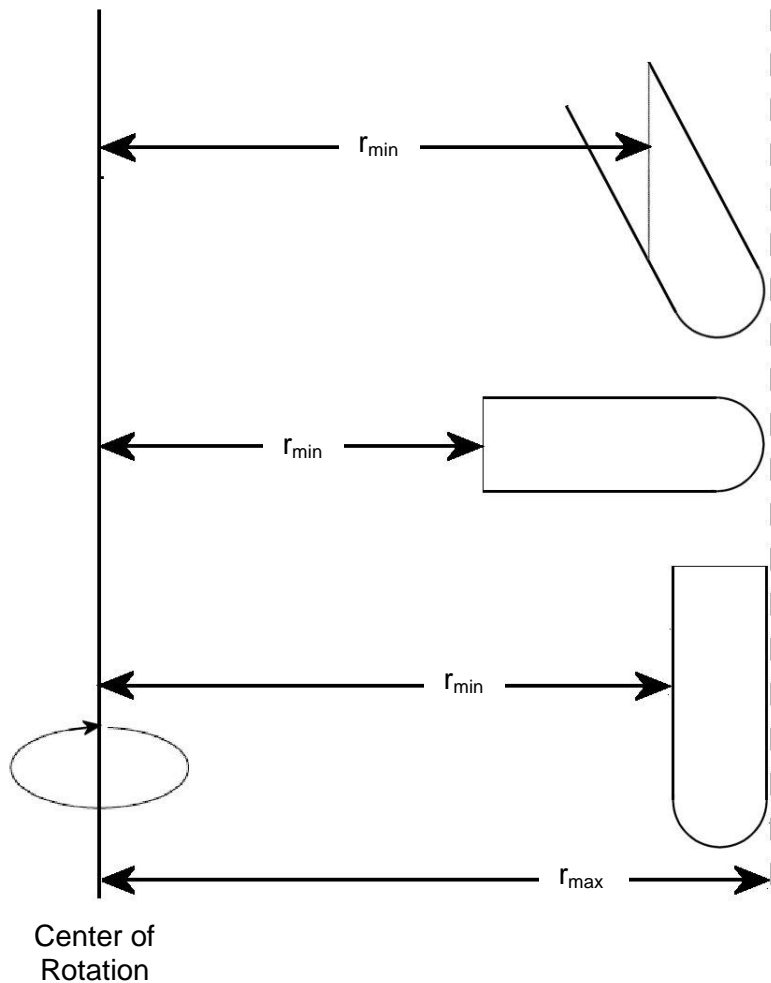
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1.1. Geometry

Rotors are classified by their geometry – we distinguish **fixed angle**, **swing-out** and **vertical rotors**. The limiting factors are given by the maximum speed they can withstand, by the nature of the sample and the desired separation method.



Fixed Angle Rotor



Swing-Out Rotor



Vertical Rotor



Herolab offers all three types of rotors. **Zonal rotors** and **continuous-flow rotors** are no longer in regular production but available on request.

1.2. Material

All Herolab rotors are made of **high-strength aluminum alloy** and are therefore very heavy, especially the types with large volume.



1.3. Volume of Tubes

Volume of Tubes	Ø of Rotor Bore x max. length in mm	Tubes will fit into the next larger sized rotor with adapters. Swing-out Rotors are listed without the bucket respectively adapter numbers. The given information is as accurate as possible. Errors or incompleteness could be contained. Herolab reserves the right to modify any part without prior notice.	
		The Standard Rotor Line	The New Rotor Generation Line
10 ml	16.1 x 80		AF 20.10, With Adapters in AF 8.50.1 und ~.2
14 ml	18.0 x 75	A 12.24	With Adapters in AF 8.50.1 and AF 8.50.2
15 ml	Tissue Culture Tubes		With Adapters in AF 8.50.3
16 ml	18.0 x 102	A 24.24	With Adapters in AF 8.50.1 and AF 8.50.2
30 ml	25.3 x 92		With Adapters in AF 8.50.1 and AF 8.50.2
50 ml	Tissue Culture Tubes		AF 8.50.3
50 ml	28.7 x 103	A 12.17	AF 8.50.1, AF 8.50.2
80 ml	38.1 x 105	A 8.20	AF 6.94 (6.80)
250 ml	61.8 x 122		AF 6.250
500 ml	69.5 x 165		AF 6.500
500 ml	98.0 x 114		AS 4.500
650 ml	97.5 x 136		AS 4.750
750 ml	97.5 x 152		AS 4.750
1000 ml	97.5 x 175		AS 4.1000, AF 4.1000, AF 6.1000



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1.4. Number of Tubes

Number of Tubes	Volume of Tubes	Ø of Rotor Bore x max. length in mm	The Standard Rotor Line	The New Rotor Generation Line
6 (2x3)		Microtiter Plates		AS 2.6 (Swing-out Rotor)
24	2 ml	Microtiter Tubes		AF 24.2
8	10 ml	16.1 x 80		With Adapters in AF 8.50.1 and AF 8.50.2
20	10 ml	16.1 x 80		AF 20.10
12	14 ml	18 x 75	A 12.24	
8	15 ml	Tissue Culture Tubes		With Adapters in AF 8.50.3
24	16 ml	18 x 102	A 24.24	
8	30 ml	25.3 x 92		With Adapters in AF 8.50.1 and AF 8.50.2
8	50 ml	Tissue Culture Tubes		AF 8.50.3
8	50 ml	28.7 x 103		AF 8.50.1, AF 8.50.2
12	50 ml	28.7 x 103	A 12.17	
6	80 ml	38.1 x 105		AF 6.94 (6.80)
8	80 ml	38.1 x 105	A 8.20	
6	250 ml	61.8 x 122		AF 6.250
6	500 ml	69.5 x 165		AF 6.500
4	500 ml	98.0 x 114		AS 4.500 (Swing-out Rotor)
4	650 ml	97.5 x 136		AS 4.750 (Swing-out Rotor)
4	750 ml	97.5 x 152		AS 4.750 (Swing-out Rotor)
4	1000 ml	97.5 x 175		AS 4.1000 (Swing-out Rotor), AF 4.1000,
6	1000 ml	97.5 x 175		AF 6.1000

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1.5. Speed and g-Force

The maximum speed and g-force numbers are the limits that the rotors are designed for. **The real speed and g-force depends on the power of the centrifuge type.**

Maximum Speed	Maximum g-Force	Number of Tubes	Volume	The Standard Rotor Line	The New Rotor Generation Line
3,600	3,086	4	1000 ml		AS 4.1000 (Swing-out Rotor)
5,000	3,075	6 (2x3)	MP		AS 2.6 (Swing-out Rotor Microtiter Plates)
5,000	5,562	4	650 ml		AS 4.750 (Swing-out Rotor)
5,000	5,562	4	750 ml		AS 4.750 (Swing-out Rotor)
5,200	5,290	4	500 ml		AS 4.500 (Swing-out Rotor)
7,000	11,291	6	1000 ml		AF 6.1000
8,000	12,042	4	1000 ml		AF 4.1000
9,000	14,725	6	500 ml		AF 6.500
13,500	21,191	8	50 ml		AF 8.50.3 (Tissue Culture Tubes)
14,000	31,774	6	250 ml		AF 6.250
15,000	26,790	12	30 ml		AF 12.30
16,000	33,486	72	2 ml		AF 72.2
	36,920				
16,500	39,569	12	50 ml	A 12.17	
18,000	34,742	8	50 ml		AF 8.50.2
18,000	35,499	20	10 ml		AF 20.10
18,000	35,499	6	80 ml		AF 6.94 (6.80)
18,000	36,223	24	2 ml		AF 24.2 (Microliter Tubes)
19,000	45,203	8	80 ml	A 8.20	
20,500	50,742	8	50 ml		AF 8.50.1
24,000	59,899	12	14 ml	A 12.24	
24,000	70,965	24	16 ml	A 24.24	



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Number of Tubes	24	AF 24.2	
Max. Volume	1.5/2.2 ml		
Angle	45°	Cat. No.	20 96 100
Max. Radius	10.00 cm		
K-Factor	225		
Net Weight	1.85 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	13,000	15,000	14,000	16,000	18,000	18,000
Maximum g-Force (x g)	18,894	25,155	21,913	28,621	36,223	36,223



Number of Tubes	72 (40 + 32)	AF 72.2	
Max. Volume	1.5/2.2 ml		
Angle	40°	Cat. No.	20 75 100
Max. Radius	12.60 – 11.30 cm		
K-Factor	322 – 366		
Net Weight	6.5 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	16,000	16,000
Maximum g-Force (x g)	----	----	----	----	36,062	36,062



Number of Tubes	20	AF 20.10	
Max. Volume	10 ml		
Angle	25°	Cat. No.	20 94 100
Max. Radius	9.80 cm		
K-Factor	253		
Net Weight	5.16 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	10,000	15,000	11,000	18,000	18,000	18,000
Maximum g-Force (x g)	10,956	24,652	13,257	35,499	35,499	35,499

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Number of Tubes	12	A 12.24	
Max. Volume	14 ml		
Angle	40°	Cat. No.	20 35 00
Max. Radius	9.30 cm		
K-Factor	312		
Net Weight	4.2 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	11,000	15,000	12,000	18,000	21,000	21,000
Maximum g-Force (x g)	12,581	23,394	14,972	33,688	45,853	45,853



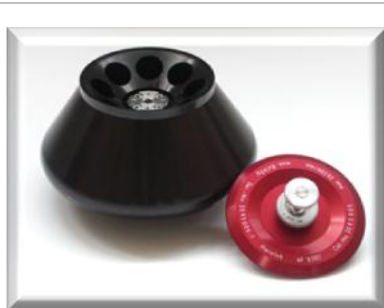
Number of Tubes	24 (16 + 8)	A 24.24	
Max. Volume	16 ml		
Angle	28°	Cat. No.	20 26 00
Max. Radius	11.02 – 8.89 cm		
K-Factor	288 – 386		
Net Weight	7.7 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	8,000	12,000	9,000	13,000	20,000	20,000
Maximum g-Force (x g)	7,885	17,741	9,979	20,821	49,281	49,281

Number of Tubes	12	AF 12.30	
Max. Volume	30 ml		
Angle	28°	Cat. No.	20 45 100
Max. Radius	10.65 cm		
K-Factor			
Net Weight			

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	13,000	15,000	14,000	15,000	15,000	15,000
Maximum g-Force (x g)	20,122	26,790	23,337	26,790	26,790	26,790

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Number of Tubes	8	AF 8.50.1	
Max. Volume	50 ml		
Angle	34°	Cat. No.	20 93 000
Max. Radius	10.80 cm		
K-Factor	383		
Net Weight	7.0 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	9,000	14,000	10,000	15,000	20,500	20,500
Maximum g-Force (x g)	9,780	23,666	12,074	27,167	50,743	50,743



Number of Tubes	8	AF 8.50.2	
Max. Volume	50 ml		
Angle	25°	Cat. No.	20 93 100
Max. Radius	9.60 cm		
K-Factor	389		
Net Weight	4.4 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	8,000	14,000	9,000	18,000	18,000	18,000
Maximum g-Force (x g)	6,869	21,036	8,694	34,774	34,774	34,774



Number of Tubes	8	AF 8.50.3	
Max. Volume	50 ml (Falcon)		
Angle	40°	Cat. No.	20 98 100
Max. Radius	10.40 cm		
K-Factor	590		
Net Weight	7.6 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	8,000	12,000	9,000	13,500	13,500	13,500
Maximum g-Force (x g)	7,441	16,743	9,418	21,191	21,191	21,191

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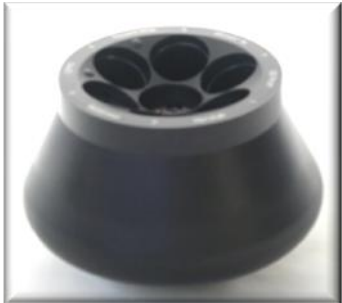
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	Number of Tubes		12		A 12.17	
	Max. Volume		50 ml			
	Angle		34°		Cat. No.	20 44 00
	Max. Radius		13.00 cm			
	K-Factor		452			
	Net Weight		10.2 kg			
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	6,000	9,000	7,000	10,000	16,500	16,500
Maximum g-Force (x g)	5,232	11,773	7,122	14,534	39,569	39,569

	Number of Tubes		6		AF 6.94	
	Max. Volume		94 ml			
	Angle		25°		Cat. No.	20 92 100
	Max. Radius		9.80 cm			
	K-Factor		375			
	Net Weight		6.23 kg			
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	9,000	14,000	10,000	16,500	18,000	18,000
Maximum g-Force (x g)	8,875	21,475	10,956	29,829	35,499	35,499

	Number of Tubes		8		A 8.20	
	Max. Volume		94 ml			
	Angle		25°		Cat. No.	20 71 00
	Max. Radius		11.20 cm			
	K-Factor		281			
	Net Weight		8.8 kg			
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	7,000	10,000	8,000	10,000	19,000	19,000
Maximum g-Force (x g)	6,136	12,522	8,014	12,522	45,203	45,203

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Herolab GmbH Laborgeräte
Ludwig-Wagner-Str. 12
69168 Wiesloch
GERMANY

Tel.: +49 (0) 6222 – 5802-0
Fax: +49 (0) 6222 – 5802-34
E-Mail: info@herolab.de
Internet: www.herolab.de

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2.
Angle
Rotors

ROTORS FOR HIGH-SPEED CENTRIFUGES

	Number of Tubes		6		AF 6.250	
	Max. Volume		250 ml			
	Angle		30°		Cat. No.	20 22 100
	Max. Radius		14.50 cm			
	K-Factor		576			
	Net Weight		11.7 kg			
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	7,000	9,000	7,000	10,000	14,000	14,000
Maximum g-Force (x g)	7,943	13,131	7,943	16,211	31,774	31,774

	Number of Tubes		6		AF 6.500	
	Max. Volume		500 ml			
	Angle		30°		Cat. No.	20 23 100
	Max. Radius		16.68 cm			
	K-Factor		1,151			
	Net Weight		18.4 kg			
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	10,500	10,500
Maximum g-Force (x g)	----	----	----	----	20,560	20,560

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Herolab GmbH Laborgeräte
Ludwig-Wagner-Str. 12
69168 Wiesloch
GERMANY

Tel.: +49 (0) 6222 – 5802-0
Fax: +49 (0) 6222 – 5802-34
E-Mail: info@herolab.de
Internet: www.herolab.de



Number of Tubes	4	AF 4.1000	
Max. Volume	1,000 ml		
Angle	22°	Cat. No.	20 24 100
Max. Radius	16.83 cm		
K-Factor	1,404		
Net Weight	22.0 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	8,000	8,000
Maximum g-Force (x g)	----	----	----	----	12,042	12,042



Number of Tubes	6	AF 6.1000	
Max. Volume	1,000 ml		
Angle	22°	Cat. No.	20 25 100
Max. Radius	20.61 cm		
K-Factor	1,816		
Net Weight	34.0 kg		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	----	7,000
Maximum g-Force (x g)	----	----	----	----	----	11,291

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Without Windshield		AS 2.6	
With 2 Carriers for Microtiter Plates			
		Cat. No.	20 97 100
Max. Capacity	6 Microtiter Plates		
Max. Radius	11.00 cm		
K-Factor	4,574		
Net Weight	2.15 kg (without carriers)		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	4,000	4,500	4,000	5,000	5,000	5,000
Maximum g-Force (x g)	1,968	2,490	1,968	3,075	3,075	3,075

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E-Mail: info@herolab.de
Internet: www.herolab.de



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3.
Swing-out
Rotors

ROTORS FOR HIGH-SPEED CENTRIFUGES

			Without Windshield				AS 4.500	
			Max. Radius		17.50 cm		Cat. No.	20 90 501
							Without Buckets	
			K-Factor		6,757			
			Net Weight		4.0 kg (without buckets)			
Buckets	Image	Radius Max. (cm)	Number of Buckets	Tubes x Max. Vol. (ml)	K-Factor	Net Weight	Cat. No.	
Set 1		17.50	4	1 x 500	6.757	0.570 kg	20 90 511	
Performance in Centrifuges			<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Maximum Speed (rpm)			4,000	4,500	4,500	5,200	5,200	5,200
Max. g-Force (x g) – Set 1			3,077	3,984	3,984	5,290	5,290	5,290



Accessories for Buckets

Cat. No.		Units per pack
20 35 51	Bottles 500 ml PPCO (98 x 114 mm) with screw cap	4
20 90 530	Adapter for round buckets Set 1 (20 90 511) for 5 x 50 ml Falcon-Tubes	2
20 90 535	Adapter for round buckets Set 1 (20 90 511) for 8 x 15 ml Falcon-Tubes	2

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Internet: www.herolab.de

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3.
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With Windshield		AS 4.750	
		Cat. No.	20 70 060
Max. Radius	See below	Without Buckets	
K-Factor	See below		
Net Weight	8.8 kg (without buckets)		

Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21G</i>	<i>HiGen XL</i>
Max. Speed (rpm) – Set 1	----	----	----	----	----	5,000
Max. Speed (rpm) – Set 2	----	----	----	----	----	3,000
Max. Speed (rpm) – Set 3	----	----	----	----	----	4,500
Max. g-Force (x g) – Set 1	----	----	----	----	----	5,450
Max. g-Force (x g) – Set 2	----	----	----	----	----	1,902
Max. g-Force (x g) – Set 3	----	----	----	----	----	4,800

Buckets	Image	Radius Max. (cm)	Number of Buckets	Tubes x Max. Vol. (ml)	K-Factor	Net Weight	Cat. No.
Set 1		19.50	4	Tube Racks	6,809	0.95 kg	20 70 100
		18.90	4	Up to 3 Microtiter Plates	18,036	0.90 kg	20 70 400
Set 3		21.20	4 incl. sealing cap	1 x 750	9,451	1.10 kg	20 70 300

Suitable tube racks and other accessories you will find on the following page.

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69168 Wiesloch
GERMANY

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Tel.: +49 (0) 6222 – 5802-0
Fax: +49 (0) 6222 – 5802-34
E-Mail: info@herolab.de
Internet: www.herolab.de

2012-09

Manufacturer
of Life Science ...


Herolab

GmbH





Laborgeräte

3.
Swing-out
Rotors

ROTORS FOR HIGH-SPEED CENTRIFUGES

	Without Windshield		AS 4.1000	
			Cat. No.	20 70 050
	Max. Radius	See below	Without Buckets	
	K-Factor	See below		
	Net Weight	6.3 kg (without buckets)		

Performance in Centrifuges	HiGen T	HiGen TR	HiGen F	HiGen FR	HiGen 21G	HiGen XL
Maximum Speed (rpm)	----	----	----	----	----	3,600
Max. g-Force (x g) – Set 1	----	----	----	----	----	2,825
Max. g-Force (x g) – Set 2 *	----	----	----	----	----	* 2,738
Max. g-Force (x g) – Set 3	----	----	----	----	----	3,072
Max. g-Force (x g) – Set 4	----	----	----	----	----	3,362

Buckets	Image	Radius Max. (cm)	Number of Buckets	Tubes x Max. Vol. (ml)	K-Factor	Net Weight	Cat. No.
Set 1		19.50	4	Tube Racks	13,135	0.95 kg	20 70 100
Set 2		18.90	4	Up to 3 Microtiter Plates	* 12,525	0.90 kg	20 70 400
Set 3		21.20	4 incl. sealing cap	1 x 750	14,767	1.10 kg	20 70 300
Set 4		23.20	4 incl. sealing cap	1 x 1000	16,527	1.15 kg	20 70 200

* Maximum speed with carriers for microtiter plates (set 2) only possible with 2 microtiter plates or 1 deep well plate in each carrier. Maximum speed when fully loaded: 3,000 rpm = 1,902 x g; k-factor: 18,036

Suitable tube racks and other accessories you will find on the following page.

All products built by Herolab carry the CE sign. Herolab is DIN EN ISO 9001.2008 certified.

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Herolab GmbH Laborgeräte
Ludwig-Wagner-Str. 12
69168 Wiesloch
GERMANY

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Adapters for Rotors AS 4.750 and AS 4.1000

Tube Racks for Rectangular Buckets (Cat. No. 20 70 100)

Cat. No.	No. of Tubes x Max. Vol. (ml)	Ø of Tubes (mm)	Length of Tubes Min./Max. (mm)	Units per Pack
20 70 110	2 x 250	62.0	94 / 125 (flat bottom bottles)	1
20 70 115	4 x 100	41.0	87 / 132	1
20 70 120	6 x 50	34.0	87 / 120 (glass tubes)	1
20 70 125	8 x 50	29.0	89 / 126 (plastic tubes)	1
20 70 130	5 x 50 Falcon	29.0	116	1
20 70 135	12 x 30	26.0	87 / 120	1
20 70 140	30 x 15	17.0	87 / 119	1
20 70 145	17 x 15 Falcon	17.0	122 (for conical and round bottom tubes)	1
20 70 150	48 x RIA (5 ml)	13.0	70 / 118	1
20 70 155	48 x RIA (5 ml) (with decanting device)	11.5 – 13.0	72 / 120	1
20 70 160	48 x Haemolysis tubes	13.0	53 / 120	1

Tube Racks for Round Buckets (Cat. No. 20 70 200 and 20 70 300)

Cat. No.	No. of Tubes x Max. Vol. (ml)	Ø of Tubes (mm)	Length of Tubes Min./Max. (mm)	Units per Pack
20 70 210	1 x 500	70.0		1
20 70 215	1 x 250	63.0	Conical bottles	1
20 70 220	1 x 250	62.0		1
20 70 225	3 x 100	41.0		1
20 70 230	5 x 50 Falcon	29.0		1
20 70 235	7 x 50	29.0	Plastic tubes	1
20 70 240	8 x 30	26.0		1
20 70 245	12 x 15 Falcon	17.0		1
20 70 250	18 x 15	17.0		1
20 70 255	20 x 12	16.5		1
20 70 260	32 x 7	13.5		1
20 70 265	21 x 7	16.5		1
20 70 270	35 x 5	13.5		1
20 70 275	60 x 0.5	9.5		1


Additional Accessories


Cat. No.		Units per Pack
20 70 950	Spare O-Ring for round buckets (25 75 200 and 25 75 300)	10
20 70 960	Spare PC cap for round buckets (25 75 200 and 25 75 300)	4
20 70 970	1,000 ml stainless steel beaker for rotor AS 4.1000	4

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	Number of Tubes	8		AV 8.20		
	Max. Volume	38.5 ml				
	Angle	0°		Cat. No.	20 46 00	
	Max. Radius	9.00 cm				
	K-Factor	206				
	Net Weight	9.3 kg				
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	20,000	20,000
Maximum g-Force (x g)	----	----	----	----	40,248	40,248

	Number of Tubes	8		AV 8.19		
	Max. Volume	94 ml				
	Angle	0°		Cat. No.	20 48 00	
	Max. Radius	9.10 cm				
	K-Factor	379				
	Net Weight	8.5 kg				
Performance in Centrifuges	<i>HiGen T</i>	<i>HiGen TR</i>	<i>HiGen F</i>	<i>HiGen FR</i>	<i>HiGen 21C</i>	<i>HiGen XL</i>
Maximum Speed (rpm)	----	----	----	----	19,000	19,000
Maximum g-Force (x g)	----	----	----	----	36,727	36,727

Both rotor types have eight pockets at a vertical angle of 0° and a specially designed lid which counteracts the hydraulic pressure in the tubes by increasing downward pressure the faster the rotor turns.

The tubes are to be sealed by conventional ultracentrifuge methods (outside the Vertical Rotor), immediately placed into the Vertical Rotor and at the end of the run, removed in their sealed state. That makes it possible to conduct a fully sterile run with a simple method that permits disturbance-free removal of sample from the rotor.

The AV 8.20 with a capacity of 8 x 38.5 ml is a conventionally sized vertical rotor. The AV 8.19, by its large capacity of 8 x 94 ml, replaces in many cases the need of zonal rotors.

“Plug-in“-adapters are available for both rotors which can reduce the maximum capacity in steps of 4.4 ml. The slightly lower g-value is compensated by improving the k-factor and can often be improved by extending the centrifugation time.

For a soft acceleration and deceleration below the critical speed range of approximately 1.000 rpm an Acceleration Rate Control is offered for High Speed Refrigeration Centrifuges.

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5.
Rotor
Recognition
and
Monitoring

5. Rotor Recognition and Monitoring

All Herolab High-Speed Centrifuges have a non-contact rotor recognition system (Herolab APRI™-System).

The microprocessor checks if the preset values for speed or g-force fits to the recognized respectively selected rotor.

After starting, during the start-up phase, the computer checks the identity of the rotor. Input errors are impossible.

This means that the highest reliability and safety is guaranteed in Herolab centrifuges.

ROTORS FOR HIGH-SPEED CENTRIFUGES



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6. Care and Maintenance

All Herolab rotors are made of a high-strength aluminum alloy with highest precision. Despite the low weight this material has a very high resistance but is not comparable with stainless steel or titanium. Therefore all of these rotors have to be handled with special care. This prevents damages by corrosion and is extending the lifetime essentially.

6.1. Corrosion

Sometimes, through lack of care and maintenance, serious degradation of the rotor and/or accessory structure occurs through corrosion and this, combined with the high stress to which centrifuge rotors and accessories are normally subjected under dynamic conditions, could result in disintegration. Also, ageing equipment increases the risk of failure because of metal fatigue. It makes sense, therefore, that every effort should be made to prevent possible accident, so that the operator safety is ensured and the high cost of repair – which could be a direct result – avoided.

Simple routine precautions, periodic maintenance and occasional inspection by a qualified person will ensure long, trouble-free service and safe centrifuge operation.

Aluminum centrifuge rotors and accessories are liable to attack by acid or alkaline solutions – regardless of pH level – resulting in corrosion problems. Therefore, any spillage on or within a rotor assembly should be regarded as a potential cause of corrosion and should be removed as soon as possible after the occurrence. Under no circumstances must spillage be ignored, or treated lightly.

It is important that any solid residue that may be deposited within the pockets after spillage is removed. If solids are allowed to remain, atmospheric moisture can be absorbed and, under centrifugal force, can be forced into minute cracks in the protective film, thereby leading to corrosion.

Overall preventive measures, including thorough washing, drying, coating with a protective spray or waxing, and proper storage will extend the lifespan of your rotor. The importance of care and thoroughness in these areas cannot be over-emphasized.

6.2. Washing

Rotors should be cleaned regularly, best of all every time after being in use. If, at any time, it is found that tube or bottle contents have spilled onto the rotor, immerse and wash immediately in warm water containing a mild detergent. Most domestic detergents are suitable. If possible, direct a jet of water into each tube pocket. Use a brush (bristle or nylon) to assist cleaning, particularly in pockets and other areas not readily accessible. Take great care not to allow metal holders of the brush to scratch the protective anodized surface of the rotor.

After the rotors have been cleaned, follow with a series of rinses in clean warm water. In hard water areas ensure that the last rinse is carried out with distilled water.

6.3. Drying

Dry the rotor thoroughly, using a swab, air blast or gentle heat (not exceeding 80°C). Ensure that the tube pockets, or buckets, are thoroughly dry. After drying apply rotor spray immediately, and again before further use. Do not leave rotors standing on any surface for any length of time as chemical reaction could take place.

6.4. Protection

After the rotor has been dried, any silicon polish may be used as a protection against corrosion. A special rotor spray containing lanolin and a de-waterising agent is ideal for the purpose. Apply any wax or spray generously, particularly in rotor pockets, the rotor bore and buckets seating and polish off with a soft, clean cloth to a high-shine finish.

Certain swing-out rotors require a coating of PTFE on rotor seating. Before applying PTFE ensure that any wax or rotor spray deposits are cleaned off from these areas.

6.5. Normal Storage

Rotors should be stored in a clean, dry dust-free area. After cleaning and polishing, angle rotors must be stored upside down with the lid removed and preferable on a surface that will allow circulation of air, e.g. a woven plastic mat. A smooth surface should be avoided as a seal could be formed which will trap any residual moisture within the pockets of the rotor.

Swing-out rotors should be stored similarly. Buckets should be removed from the rotors, the caps detached and then stored upside down to allow the escape of any moisture that may remain.

Note: Do not store on the centrifuge drive shaft. A special rotor stand is available from HEROLAB.

6.6. Cold Storage

Before placing angle rotors in a cold storage room, remove the lid, treat the rotor and lid with a generous application of rotor spray, and polish as described earlier. Place the rotor and lid inside separate plastic bags, remove the air and seal the bags. Store the rotor in the inverted position. Swing-out rotors should be stored similarly in a dismantled condition.

6.7. Autoclaving and Disinfection of Rotors

Autoclaving is preferred to chemical cleaning and disinfection after rotors have been used for pathogenic work, or after other hazardous materials have been used. A temperature of 121°C is normally sufficient. However, it is recommended that the Technical Department is consulted if a longer autoclaving is required. Also, advice should be sought before autoclaving at 130°C – if this should be necessary – as some loss of material strength may occur.

All usual disinfectants like eg. Sagrotan, Buraton or Terralin (to obtain at chemist's shops) can be used.

The centrifuges and the accessories consist of different materials. A possible incompatibility must be considered. For sterilization by steam resistance to temperature of the individual material must be checked. Please contact your laboratory safety officer regarding proper methods to use.

If dangerous materials are used, the centrifuge and the accessories must be disinfected.

Time/temperature conditions during autoclaving:

Absolute pressure kPa	Steam temperature		Minimum dwell time min
	Nominal temperature °C	Range °C	
225	136,0	134-138 Aluminum	3
150	127,5	126-129 Aluminum	10
115	122,5	121-123 Aluminum, Plastic	15
75	116,5	115-118 Aluminum, Plastic	30

Principally we want to point out that for centrifuging of e. g. infectious material hermetically sealed buckets should be used in order to avoid contamination of the centrifuge.

6.8. Glass Breakage

In case of glass breakage all glass particles must be carefully removed. Rubber inserts have to be cleaned carefully and possibly be replaced. If a problem has occurred, the following has to be considered:

Glass particles in the rubber cushion will cause glass breakage again. Particles on the rotor pins prevent buckets and carriers from swinging evenly which will cause an imbalance.

Glass particles in the centrifuge chamber will cause metal abrasion due to the strong air circulation. This dust will not only pollute the centrifuge chamber, the rotor, the buckets, the carriers and the material to be centrifuged but also damage the surfaces of the accessories, the rotors and the centrifuge chamber.

In order to totally remove the glass particles and the metal dust from the rotor chamber, it is advisable to grease the upper part of the centrifuge chamber with eg. Vaseline. Then the rotor should rotate for some minutes at a moderate speed. The glass and metal particles will now collect at the greased part and can easily be removed with a cloth together with the grease. If necessary repeat this procedure.

6.9. Queries

Any queries concerning servicing of the centrifuge rotors should be directed to our Service Organization or our authorized dealer from HEROLAB.



How to use the nomograph

To determine the relative centrifugal force (RCF) if the speed of rotation (rpm) and the radial distance (r_{max}) are known:

Place a ruler on the nomograph connecting the known values, rpm and r_{max} . The point at which the line intersects the RCF axis is the approximate relative centrifugal force (xg).

The speed of rotation (rpm) can be determined in the same way if the RCF and r_{max} are known.

Use the right sided RCF and RPM scales for higher speed determination.

The relative centrifugal force (RCF), the speed of rotation (rpm) and the radial distance (r_{max}) are related by the formula:

$$RCF = 11.18 \times r_{max} \times Krpm^2$$

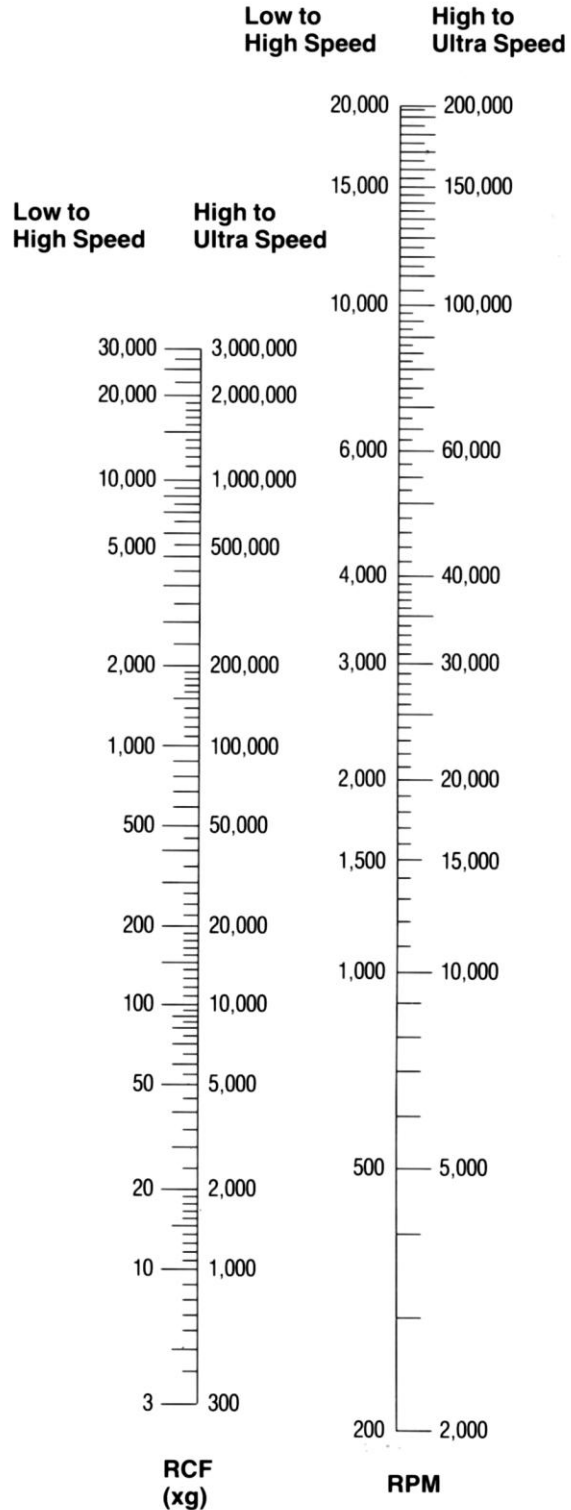
RCF relative centrifugal force

r_{max} radius (cm) measured from the center point of the drive axis to the end point of the sample tube

Krpm rpm in 1000s



Rotating Radius (cm)



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8.
Matching
Guide for
Tubes and
Bottles

Herolab Tubes and Bottles for Highspeed Rotors

Material Abbreviations
 B - Borex Glass® PA - Polyallomer PE - Polyflor®
 C - Corex Glass® PC - Polycarbonate PP - Polypropylene
 D - Duran Glass® PE - Polyethylene PS - Polystyrene

NOMINAL CAPACITY ROTOR MATCHING GUIDE *For Commonly Used Rotors*

10 ml 16 x 80 mm	14 ml 18 x 75 mm	30 ml 18 x 102 mm	50 ml 18 x 102 mm	80 ml 18 x 102 mm	250 ml 18 x 102 mm	500 ml 18 x 102 mm
Herolab AFH 20.180 Beckman JA-21 Sigma 2157 12.111	Sorvall SC-12 Kontron A.12.24	Sigma 12.158	Sigma 12.156 12.150 Beckman JA-20 JS-13 JA-17 JS-7.3	Herolab AFH 8.180 Kontron A.8.20 AS 4.13.2 AV 8.19 Beckman JA-16 JS-7.3	Herolab AFH 6.180 Sigma 12.158 12.156	Kontron A.6.9 Beckman JA-10 Sorvall GSA HS-4

A = Adaptor required: See individual rotor data books or the Herolab Centrifuge Labware Catalog.

<p>10 ml 16 x 80 mm</p> <p>Cat. No. rpm PA - 25 94 11 24,000 PC - 25 94 01 24,000 PE - 25 94 01 18,000 PF - 25 94 51 20,000 PP - 25 24 21 24,000</p> <p>12 ml 18 x 102 mm</p> <p>Cat. No. rpm B - 25 11 00 7,000/12,500</p> <p>16 ml 18 x 100 mm</p> <p>Cat. No. rpm PA - 25 27 20 24,000 PC - 25 27 40 24,000 PE - 25 27 40 20,000 PF - 25 27 51 20,000 PP - 25 27 10 20,000</p> <p>30 ml 24 x 105 mm</p> <p>Cat. No. rpm B - 25 11 10 5,000/12,500 C - 25 11 40 10,000/12,500</p>	<p>15 ml 18 x 102 mm</p> <p>Cat. No. rpm C - 25 10 90 9,000/12,500</p> <p>50 ml 29 x 103 mm</p> <p>Cat. No. rpm PA - 25 31 60 24,000 PC - 25 31 60 24,000 PE - 25 31 30 20,000 PF - 25 31 51 20,000 PP - 25 31 10 20,000</p> <p>80 ml 38 x 105 mm</p> <p>Cat. No. rpm PA - 25 32 45 20,000 PC - 25 32 41 20,000 PE - 25 32 47 12,000 PF - 25 32 49 15,000 PP - 25 32 43 20,000</p>	<p>14 ml 18 x 75 mm</p> <p>Cat. No. rpm PA - 25 96 90 24,000 PC - 25 96 70 24,000 PE - 25 96 60 20,000 PF - 25 25 90 20,000 PP - 25 25 80 20,000</p> <p>50 ml 29 x 103 mm</p> <p>Cat. No. rpm PA - 25 31 45 24,000 PC - 25 31 05 24,000 PP - 25 31 15 20,000</p> <p>250 ml 62 x 120 mm</p> <p>Cat. No. rpm PA - 25 34 45 14,400 PC - 25 34 41 14,400 PE - 25 34 40 15,500 PF - 25 34 40 12,600 PP - 25 34 43 14,400</p>	<p>250 ml 62 x 122 mm</p> <p>Cat. No. rpm PA - 25 34 21 14,400 PC - 25 34 01 14,400 PE - 25 34 31 15,500 PF - 25 34 39 14,400 PP - 25 34 11 14,400 PP - 25 34 12/Black</p> <p>290 ml 62 x 137 mm</p> <p>Cat. No. rpm PA - 25 34 85 14,400 PC - 25 34 81 14,400 PE - 25 34 87 15,500 PP - 25 34 83 14,400</p>	<p>50 ml 29 x 103 mm</p> <p>Cat. No. rpm PA - 25 32 11 24,000 PC - 25 32 01 24,000 PE - 25 32 15 12,000 PF - 25 32 21 16,000 PP - 25 32 05 24,000</p> <p>80 ml 38 x 105 mm</p> <p>Cat. No. rpm PA - 25 32 45 20,000 PC - 25 32 41 20,000 PE - 25 32 47 12,000 PF - 25 32 49 15,000 PP - 25 32 43 20,000</p>	<p>500 ml 70 x 165 mm</p> <p>Cat. No. rpm PA - 25 35 21 9,000 PC - 25 35 01 9,000 PE - 25 35 01 9,000 PP - 25 35 11 9,000 PP - 25 35 12 / Black</p>
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The information in this wall chart is intended as a general guide only. Since the performance of centrifuge labware depends on many different variables, no absolute guarantee of performance can be given. Should there be any doubts, users should experiment with the centrifuge labware under their own operating conditions prior to the actual test. Specifications are subject to change.

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