

Specificația Tehnică Completată**Model: Universal 320R rotor 1418 si 8 adaptoare 1467****Producător: Andreas Hettich****Țara: Germania**

Specificarea tehnică deplină solicitată de către autoritatea contractantă	Specificația tehnică propusă de operatorul economic
<p>1. Caracteristici generale: Centrifugă de uz general, cu refrigerare Funcție de prerăcire Interval temperatură: minim de la -20°C până la cel puțin +40°C Viteză variabilă: Minim: 500–1000 rpm Maxim: ≥ 15.000 rpm Ajustare în pași de cel mult 10 rpm RCF maxim: ≥ 20.000 Nivel de zgomot: ≤ 65 dB Operare prin tastatură și buton multifuncțional de control Tastă de impuls pentru funcționare scurtă</p> <p>2. Programe și control: Minimum 9 programe de lucru programabile Minimum 9 trepte de accelerație și 10 trepte de decelerație Sistem de afișaj digital (LCD/LED) cu iluminare, ce indică toți parametrii activi Mesaj auditiv (beep) la finalul ciclului</p> <p>3. Siguranță și structură: Carcasă și capac: material metalic rezistent Cameră de centrifugare: oțel inoxidabil Port de vizualizare în capac Blocare automată motorizată a capacului Protecție împotriva deschiderii accidentale Deblocare de urgență Detecție automată a dezechilibrului Detecție și afișare erori pe ecran Recunoaștere automată a rotorului</p> <p>4. Specificații tehnice: Alimentare: 200–240V, 50/60 Hz Timer: 1 sec – 99 min 59 sec, mod funcționare continuă Rulare și frânare: max. 30 secunde</p> <p>5. Rotor și compatibilitate: Furnizată cu rotor unghiular fix (45°) Capacitate totală a rotorului: 90 ml-200ml Compatibilitate cu eprubete standard: Minim 30 eprubete per rotor Suport pentru eprubete de: 3–5 ml (13 × 75 mm) 8–10 ml (16 × 100 mm)</p>	<p>1. Caracteristici generale: Centrifugă de uz general, cu refrigerare Funcție de prerăcire Interval temperatură: minim de la -20°C până la +40°C Viteză variabilă: Minim: 500 rpm Maxim: 16.000 rpm Ajustare în pași de 10 rpm RCF maxim: 24.900 Nivel de zgomot: 50 dB Operare prin tastatură și buton multifuncțional de control Tastă de impuls pentru funcționare scurtă</p> <p>2. Programe și control: 9 programe de lucru programabile 9 trepte de accelerație și 10 trepte de decelerație</p> <p>Sistem de afișaj digital (LCD/LED) cu iluminare, ce indică toți parametrii activi Mesaj auditiv (beep) la finalul ciclului</p> <p>3. Siguranță și structură: Carcasă și capac: material metalic rezistent Cameră de centrifugare: oțel inoxidabil Port de vizualizare în capac Blocare automată motorizată a capacului Protecție împotriva deschiderii accidentale Deblocare de urgență Detecție automată a dezechilibrului Detecție și afișare erori pe ecran Recunoaștere automată a rotorului</p> <p>4. Specificații tehnice: Alimentare: 200–240V, 50/60 Hz Timer: 1 sec – 99 min 59 sec, mod funcționare continuă Rulare și frânare: 30 secunde</p> <p>5. Rotor și compatibilitate: Furnizată cu rotor unghiular fix (45°) cod 1418 Capacitate totală a rotorului: 90 ml-200ml Compatibilitate cu eprubete standard: 32 eprubete per rotor, prin 8x adaptoare 1467 Suport(adaptor 1467) pentru eprubete de: 3–5 ml (13 × 75 mm) 8–10 ml (16 × 100 mm)</p>

Benchtop centrifuges

UNIVERSAL 320 | 320 R

A universal choice

The UNIVERSAL 320 is a compact, versatile and indispensable general purpose centrifuge. Excellent performance and a comprehensive range of accessories enable the UNIVERSAL 320 to carry out virtually any centrifuging tasks including plates, blood tubes, cell culture, microliter and cytology.

This unit is available with refrigeration and a temperature range from -20 °C to +40 °C (UNIVERSAL 320 R).



■ Highlights

- RPM: 500 - 16,000 min⁻¹
Adjustable in increments of 10
- max. RCF: 24,900
- max. capacity: 4 x 200 ml / 6 x 94 ml
- the universal choice among the benchtop centrifuges
- choice of 18 rotors
- IVDR-conform according to regulation (EU) 2017/746
- noise level of 48 dB(A) with angle rotor 1611
- impulse button for short centrifugation
- easy operation with keypad and control knob
- impulse key for short cycle mode
- 9 program memories
- 9 individual acceleration and 10 deceleration stages
- model 320 R coolable from -20 to +40 °C with pre-cooling function

■ Features

- metal housing and lid
- viewing port in the lid
- powered lid lock
- lid dropping protection
- emergency lid lock release
- stainless steel chamber
- automatic rotor recognition
- brushless drive
- error display
- imbalance switch-off
- backlit panel with actual values of all parameters
- auditory message after completion of the centrifugation run

Technical data

	UNIVERSAL 320 non-refrigerated	UNIVERSAL 320 R refrigerated
voltage *)	200 – 240 V 1 ~	200 – 240 V 1 ~ 240 V 1 ~
frequency	50 – 60 Hz	50 – 60 Hz 60 Hz
consumption	400 VA	800 VA
emission, immunity	EN/IEC 61326-1, class B	EN/IEC 61326-1, class B
max. capacity	4 x 200 ml / 6 x 94 ml	4 x 200 ml / 6 x 94 ml
max. RPM	16,000 min ⁻¹	16,000 min ⁻¹
max. RCF	24,900	24,900
running time	1 sec – 99 min: 59 sec, ∞ continuous run, short cycle mode (impulse button)	1 sec – 99 min: 59 sec, ∞ continuous run, short cycle mode (impulse button)
dimensions (WxDxH)	401 x 529 x 346 mm	407 x 698 x 346 mm
weight	approx. 31 kg	approx. 52 kg
noise level	48 dB (A) with rotor 1611	50 dB (A) with rotor 1611
temperature control, infinitely variable	-	from -20 to +40 °C
Cat. No.	1401	1406
100 – 127 V 1 ~ / 50–60 Hz *)	1401-01	1406-01
consumption	400 VA	950 VA
emission, Immunity	FCC class B	FCC class B

*) Other voltages on request.

Available rotors

SWING-OUT ROTORS	angle	max. RPM	max. capacity	Cat. No.	page
Swing-out rotor, 4-places	90°	4,500 min ⁻¹	4x200 ml	1554	3
Swing-out rotor, 4-places	90°	5,000 min ⁻¹	4x100 ml	1494	6
Swing-out rotor, 4-places	90°	4,000 min ⁻¹	4x100 ml	1624	9
Swing-out rotor, 4-places	90°	4,500 min ⁻¹	4x100 ml	1324	12
Swing-out rotor, 8-places	90°	4,000 min ⁻¹	8x15 ml	1611	14
Swing-out rotor, 12-places	55° / 60° / 80°	4,000 min ⁻¹	12x15 ml	1628	14
Swing-out rotor, 8-places	45°	5,000 min ⁻¹	8x50 ml	1617	15
Swing-out rotor, 6-places	90°	4,000 min ⁻¹	6x50 ml	1619	15
Swing-out rotor, 2-places	90°	4,000 min ⁻¹	10 plates	1460	16
Swing-out rotor, 24-places	90°	13,000 min ⁻¹	24x2 ml	1555	16
ANGLE ROTORS					
Angle rotor, 24-places	50°	16,000 min ⁻¹	24x2 ml	1552	17
Angle rotor, 30-places	45°	14,150 min ⁻¹	30x2 ml	1553	17
Angle rotor, 8-places	45°	13,000 min ⁻¹	8 x 8 PCR strips	1551	18
Angle rotor, 18-places	45°	14,150 min ⁻¹	18 x 5 ml	1627	18
Angle rotor, 6-places	35°	9,000 min ⁻¹	6x94 ml	1556	19
Angle rotor, 12-places	35°	6,000 min ⁻¹	12x15 ml	1613	20
Angle rotor, 12-places	35°	12,000 min ⁻¹	12x15 ml	1615	21
Angle rotor, 8-places	45°	4,500 min ⁻¹	8x50 ml	1418	22

Swing-out rotor, 4-place | 1554

Rotor

max. RPM max. RCF	4,500 min ⁻¹ 3,328
max. capacity	4 x 200 ml
run-up run-down, braked in sec	28 31
angle max. noise level	90° 60 dB (A)
temperature in °C ¹⁾	-8
Cat. No.	1554



Bucket with clamp lock

Lid bioseal ⁵⁾	1561
Cat. No.	1560
Bucket without clamp lock¹⁴⁾	
Cat. No.	1565



Vessels

	microliter tubes			tubes ²⁾												-	-
capacity in ml	1.5	2.0	5	5	6	7	9	15	15	25	50	85	100	125	150		
Ø x L in mm	11 x 38	11 x 38	17 x 59	12 x 75	12 x 82	12 x 100	14 x 100	17 x 100	18 x 102	24 x 100	34 x 100	38 x 101	44 x 100	51 x 100	51 x 116		
max. RCF ²⁾	3,328	2,332	3,328	3,215	3,215	3,215	3,215	3,215	3,260	3,056	3,147	3,260	3,124	3,328	3,328		
radius in mm	147	103	147	142	142	142	142	142	144	135	138	144	138	147	147		



Adapter

boring Ø x L in mm	11.5 x 39	11.5 x 39	17 x 52	13.5 x 60	13.5 x 60	13.5 x 60	17.5 x 60	17.5 x 60	18.5 x 74	25.2 x 66	35.2 x 69	38.5 x 74	45.5 x 69	52 x 77	52 x 77		
vessels per rotor	56	56	16	28	28	28	20	20	16	4	4	4	4	4	4		
Cat. No.	1571	1571	1593	1589	1589	1589	1588	1588	1572	1573	1574	1575	1576	1594	1594		

0555

blood collection / urine vessels

Vessels

capacity in ml	200	1.1–1.4	2.6–3.4	4.9	2.7–3	4–5	4–5.5	7.5–8.2	9–10	10	1.6–5	4–7	4–7	8.5–10	12		
Ø x L in mm	56 x 112	8 x 66	13 x 65	13 x 90	11 x 66	11 x 92	15 x 75	15 x 92	16 x 92	15 x 102	13 x 75	13 x 100	16 x 75	16 x 100	17 x 102		
max. RCF ²⁾	3,328	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215	3,215		
radius in mm	147	142	142	142	142	142	142	142	142	142	142	142	142	142	142		



Adapter

boring Ø x L in mm	57 x 77	13.5 x 60	13.5 x 60	13.5 x 60	13.5 x 60	13.5 x 60	17.5 x 60	17.5 x 60	17.5 x 60	17.5 x 60	13.5 x 60	13.5 x 60	17.5 x 60	17.5 x 60	17.5 x 74		
vessels per rotor	4	28	28	28	28	28	20	20	20	20	28	28	20	20	12		
Cat. No.	-	1589	1589	1589	1589	1589	1588	1588	1588	1588	1589	1589	1588	1588	1591		

Nunc[®]

tubes with screw cap

0534⁶⁾

chrome bath tube

Vessels

capacity in ml	11	15	15	30	50	12	25	30	50	10	30	50	85	94	30		
Ø x L in mm	16 x 110	17 x 120	17 x 120	25 x 110	30 x 115	17 x 100	25 x 90	15 x 110	29 x 115	16 x 80	26 x 95	29 x 107	38 x 106	38 x 102	44 x 105		
max. RCF ²⁾	3,260	3,328	3,328	3,328	3,328	3,260	3,328	3,328	3,328	3,215	3,260	3,260	3,260	3,260	3,192		
radius in mm	144	147	147	147	147	144	147	147	147	142	144	144	144	144	141		


+ E 2109



Adapter































boring Ø x L in mm	17.5 x 74	17 x 77	17 x 77	26 x 77	30 x 77	17.5 x 74	26 x 65	26 x 65	30 x 77	16.5 x 60	26 x 74	29 x 74	38.5 x 74	38.5 x 74	45 x 71		
vessels per rotor	16	8	12	4	4	16	4	4	4	20	4	4	4	4	4		
Cat. No.	1581	1577	1595	1578	1579	1581	1582	1582	1583	1584	1585	1586	1575	1575	1587		















— Swing-out rotor, 4-place | 1554

Rotor	
max. RPM max. RCF	4,500 min ⁻¹ 3,328
max. capacity	4 x 50 ml
run-up run-down, braked in sec	28 31
angle max. noise level	90° 58 dB (A)
temperature in °C ¹⁾	-8
Cat. No.	1554

Bucket	
Cat. No.	1559



	tubes ²⁾						blood collection / urine vessels								
Vessels															
capacity in ml	5	6	7	8	9	15	2.6 – 3.4	2.7 – 3	4 – 5.5	4.5 – 5	4.9	9 – 10	10	1.6 – 5	4 – 7
Ø x L in mm	12x75	12x82	12x100	16x125	14x100	17x100	13x65	11x66	15x75	11x92	13x90	16 x 92	15 x 102	13x75	13x100
max. RCF ²⁾	3.215	3.215	3.215	3.328	3.260	3.260	3.215	3.215	3.215	3.215	3.215	3.260	3.260	3.215	3.215
radius in mm	142	142	142	147	144	144	142	142	142	142	142	144	144	142	142
+															
Adapter										+ 0715					
boring Ø x L in mm	13.4x57.5	13.4x57.5	13.4x57.5	16.4x82	17.5x81	17.5x81	13.4x57.5	13.4x57.5	17.5x81	13.4x57.5	13.4x57.5	17.5x81	17.5x81	13.4x57.5	13.4x57.5
vessels per rotor	20	20	20	16	16	16	20	20	16	20	20	16	16	20	20
Cat. No.	1486	1486	1486	1488	1482A	1482A	1486	1486	1482A	1486	1486	1482A	1482A	1486	1486

	blood- / urine vessels			tubes with screw cap			
Vessels							
capacity in ml	4 – 7	8.5 – 10	12	15	50	12	50
Ø x L in mm	16x75	16x100	17x102	17x120	29 x 115	17x100	29x115
max. RCF ²⁾	3,215	3,260	3,147	3,351	3,305	3,260	3,305
radius in mm	142	144	139	148	146	144	146
Adapter							
boring Ø x L in mm	17.5x81	17.5x81	17.5x74	17x100	30x98	17.5x81	30x98
vessels per rotor	16	16	12	16	4	16	4
Cat. No.	1482A	1482A	1487	1483A	1484	1482A	1484 ⁴⁾

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

3.2) When using these tubes, bucket 1560 cannot be closed with lid 1561.



4) Please remove the spacer.

5) Tested by the TÜV in conformity with DIN EN 61010, section 2-020.









6) A rubber stopper for closing the tube for agitating or mixing is available under Cat. No. 0535. The tube may not be centrifuged with the stopper.

14) With the E3922 add-on kit and the 1561 lid, the 1565 carrier can be converted at a later time to a 1560 carrier with single-hand clamp lock.

— Swing-out rotor, 4-place | 1554

			
Rotor		Bucket	
max. RPM max. RCF	4,500 min ⁻¹ 3,260	Cat. No.	1563
max. capacity	8 x 50 ml		
run-up run-down, braked in sec	28 31		
angle max. noise level	90° 58 dB (A)		
temperature in °C ¹⁾	-8		
Cat. No.	1554		




tubes with screw cap				
				
Vessels	12	15	50	50
capacity in ml				
Ø x L in mm	17x100	17x120	29x115	29x115
max. RCF ²⁾	3,260	3,260	3,260	3,260
radius in mm	144	144	144	144
		+ E 2109	+E2110-A	
				
Adapter				
boring Ø x L in mm	17x87	17x87	30x87	30x87
vessels per rotor	8	8	8	8
Cat. No.	1592	1592	-	-

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.




























— Swing-out rotor, 4-place | 1494

	
Rotor	
max. RPM max. RCF	5,000 min ⁻¹ 4,193
max. capacity	4 x 100 ml
run-up run-down, braked in sec	30 32
angle max. noise level	90° 56 dB (A)
temperature in °C ¹⁾	-10
Cat. No.	1494



Bucket	
Cat. No.	1425




	microliter tubes		Rhesus	tubes ²⁾										cyto chambers
Vessels														
capacity in ml	1.5	2.0	1	3	5	6	7	9	15	25	50	100	1–8	
Ø x L in mm	11 x 38	11 x 38	6 x 45	10 x 60	12/18x75	12 x 82	12 x 100	14 x 100	17 x 100	24 x 100	34 x 100	44 x 100	simple / multiple	
max. RCF ²⁾	3,885	3,885	3,969	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,801	2,879	
radius in mm	139	139	142	140	140	140	140	140	140	140	140	136	103	
														
Adapter														
boring Ø x L in mm	11.2 x 38	11.2 x 38	6.5 x 34	10.5 x 40	13.4 x 50	12.5 x 60	12.5 x 60	17.5 x 84	17.5 x 84	25.5 x 84	35.5 x 84	45.5 x 80	-	
vessels per rotor	36	36	144	56	28	48	48	28	28	8	4	4	4	
Cat. No.	1444	1444	1432	1433	1438	1434	1434	1431	1431	1435	1436	1437	1452	

	blood collection / urine vessels											-
Vessels												
capacity in ml	2.6–3.4	2.7–3	4–5.5	4.5–5	4.9	7.5–8.2	9–10	1.6–5	4–7	4–7	8.5–10	50
Ø x L in mm	13x65	11x66	15x75	11x92	13x90	15x92	16x92	13x75	13x100	16x75	16x100	29x115
max. RCF ²⁾	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,913	3,913	4,081
radius in mm	140	140	140	140	140	140	140	140	140	140	140	146
Adapter												
boring Ø x L in mm	13.4x50	13.4x50	16.5x50	13.4x50	13.4x50	16.5x50	17x45	13.4x50	13.4x50	16.5x50	16.5x50	30x90
vessels per rotor	28	28	28	28	28	28	16	28	28	28	28	4
Cat. No.	1438	1438	1441	1438	1438	1441	1439	1438	1438	1441	1441	1443

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.






























Swing-out rotor, 4-place | 1494



























	
Rotor	
max. RPM max. RCF	5,000 min ⁻¹ 4,109
max. capacity	4 x 50 ml
run-up run-down, braked in sec	30 32
angle max. noise level	90° 54 dB (A)
temperature in °C ¹⁾	-7
Cat. No.	1494



	
Bucket	
Lid	1421
Cat. No.	1427



	microliter tubes		Rhesus	tubes ²⁾								blood collection / urine vessels			
Vessels															
capacity in ml	1.5	2.0	1	3	5	6	7	9	15	25	50	1.1–1.4	2.6–2.9	2.7–3	4–5.5
Ø x L in mm	11x38	11x38	6x45	10x60	12/13x75	12x82	12x100	14x100	17x100	24x100	34x100	8x66	13x65	11x66	15x75
max. RCF ²⁾	4,109	4,109	4,081	4,053	4,025	4,053	3,941	3,941	3,941	3,941	3,941	4,109	4,025	4,053	4,109
radius in mm	147	147	146	145	144	145	141	141	141	141	141	147	144	145	147
+															
Adapter															
boring Ø x L in mm	11.5x38	11.5x38	6.5x23	10.5x23	13.4x58	12.5x42	12.4x82.5	15x69.5	17.8x82.5	25.5x82.5	35.5x82.5	9x41	13.4x58	12.5x42	15.6x41
vessels per rotor	36	36	120	48	32	48	48	24	24	8	4	48	32	48	20
Cat. No.	5277	5277	1357	1327	1732	5229	5230	5237	5231	5232	5233	5278	1732	5229	5279

	blood collection / urine vessels								tubes with screw cap					
Vessels														
capacity in ml	4.5-5	4.9	7.5-8.2	9-10	1.6-5	4-7	4-7	8.5-10	15	50	25	30	50	
Ø x L in mm	11 x 92	13 x 90	15 x 92	16 x 92	13 x 75	13 x 100	16 x 75	16 x 100	17 x 120	29 x 115	25 x 90	25 x 110	34 x 100	
max. RCF ²⁾	3,941	4,025	4,109	3,969	4,025	4,025	3,969	3,941	4,165	4,053	3,565	4,025	3,941	
radius in mm	141	144	147	142	144	144	142	141	145	145	142	144	141	
+														
Adapter														
boring Ø x L in mm	12.4 x 82.5	13.4 x 58	15.6 x 41	17 x 66	13.4 x 58	13.4 x 58	17 x 66	17.8 x 82.5	17 x 90	30 x 90	25.5 x 72	25.5 x 85	35.5 x 82.5	
vessels per rotor	48	32	20	20	32	32	20	24	4	4	8	4	4	
Cat. No.	5230	1732	5279	5271 ⁴⁾	1732	1732	5271 ⁴⁾	5231	5275	5276	1731	5272	5233 ⁴⁾	

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

3.1) When using these tubes, carrier 1427 cannot be closed with lid 1421.

4) Please remove the spacer.

Swing-out rotor, 4-place | 1494

Rotor

max. RPM max. RCF	5.000 min ⁻¹ 4.193
max. capacity	4 x 100 ml
run-up run-down, braked in sec	30 32
angle max. noise level	90° 58 dB (A)
temperature in °C ¹⁾	-10
Cat. No.	1494

Bucket

Lid bioseal ⁵⁾	1492
Cat. No.	1495



Vessels

	0.5	1.5	2.0	1	3	5	6	7	9	15	25	50	94	100
capacity in ml	0.5	1.5	2.0	1	3	5	6	7	9	15	25	50	94	100
Ø x L in mm	10.7x46	11x38	11x38	6 x 45	10 x 60	12/13x75	12x82	12x100	14x100	17x100	24x100	34x100	38x102	44x100
max. RCF ²⁾	3,745	3,857	3,857	4,081	4,137	4,025	4,025	4,025	3,997	3,997	3,829	3,801	4,109	4,025
radius in mm	134	138	138	145	148	144	144	144	143	143	137	136	147	144



Adapter

boring Ø x L in mm	11.2 x 38	11.2 x 38	11.2 x 38	6.5 x 34	10.5 x 40	13.4 x 45	13.4 x 45	13.4 x 45	17.6 x 89	17.6 x 89	25.2 x 77	35.2 x 77	38.5 x 92	45.6 x 98
vessels per rotor	20	20	20	108	36	20	20	20	16	16	4	4	4	4
Cat. No.	1351	1351	1351	1339	1343	1383	1383	1383	1329	1329	1330	1331	1396	0761

blood collection / urine vessels

Vessels

capacity in ml	1.1 – 1.4	2.7 – 3	4.5 – 5	2.6 – 2.9	4.9	4 – 5.5	7.5 – 8.2	9 – 10	10	1.6 – 7	1.6 – 7	4 – 10	4 – 10
Ø x L in mm	8 x 66	11 x 66	11 x 92	13 x 65	13 x 90	15 x 75	15 x 92	16 x 92	15 x 102	13 x 75	13 x 100	16 x 75	16 x 100
max. RCF ²⁾	4,053	4,025	4,025	4,025	4,025	4,053	4,053	3,997	4,193	4,025	4,025	4,025	4,025
radius in mm	145	144	144	144	144	145	145	143	150	144	144	144	144



Adapter

boring Ø x L in mm	9 x 47	13.4 x 45	13.4 x 45	13.4 x 45	13.4 x 45	15.6 x 47	15.6 x 47	17.6 x 89	17.6 x 89	13.4 x 45	13.4 x 45	16.5 x 52	16.5 x 52
vessels per rotor	28	20	20	20	20	16	16	16	16	20	20	16	16
Cat. No.	1457	1383	1383	1383	1383	1459	1459	1329	1329 ⁴⁾	1383	1383	1348	1348

tubes with screw cap

Vessels

capacity in ml	15	30	50	12	25	50	10	30	50	85	30
Ø x L in mm	17 x 120	25 x 110	29 x 115	17 x 100	25 x 90	29 x 115	16 x 80	26 x 95	29 x 107	38 x 106	44 x 105
max. RCF ²⁾	4,193	4,193	4,193	4,193	3,689	4,193	4,025	3,857	4,137	4,109	3,997
radius in mm	150	150	150	150	132	150	144	138	148	147	143



Adapter

boring Ø x L in mm	17 x 90	26 x 80	30 x 90	17 x 80	26 x 72	29.5 x 80	16.5 x 52	26 x 83	29 x 93	38.5 x 92	45.9 x 98
vessels per rotor	4	4	4	4	4	4	16	4	4	4	4
Cat. No.	1347	1365	1384	6311	1363	6318	1348	4417	4416	1396	0765

0534 ⁶⁾
chrome
bath tube

- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.
- 3) When using these tubes, bucket 1495 cannot be closed with lid 1492.
- 4) Please remove the spacer.
- 5) Tested by the TÜV in conformity with DIN EN 61010. section 2-Q20.
- 6) A rubber stopper for closing the tube for agitating or mixing is available under Cat. No. 0535. The tube may not be centrifuged with the stopper.

Swing-out rotor, 4-place | 1624



Rotor

max. RPM max. RCF	4,000 min ⁻¹ 2,665
max. capacity	4 x 50 ml
run-up run-down, braked in sec	20 25
angle	90°
Cat. No.	1624



	tubes ²⁾												cyto chambers
Vessels													
capacity in ml	5	5	6	7	9	9	15	15	20	25	45	50	1–8
Ø x L in mm	12 x 75	12 x 75	12 x 82	12 x 100	14 x 100	14 x 100	17 x 100	17 x 100	21 x 100	24 x 100	31 x 100	34 x 100	simple / multiple
max. RCF ²⁾	2,057	2,164	2,308	2,308	2,308	2,415	2,308	2,415	2,361	2,451	2,361	2,451	1,646
radius in mm	115	121	129	129	129	135	129	137	132	137	132	137	92
temperature in °C ¹⁾	-17	-17	-17	-17	-17	-15	-17	-15	-15	-15	-15	-15	-16
Carrier													
boring Ø x L in mm	12 x 75	13.5 x 65	12.5 x 71.5	12.5 x 71.5	14.6 x 74	14.6 x 78	17.6 x 71.5	17.6 x 78	21.5 x 74	26 x 78	32 x 74	35 x 78	-
vessels per rotor	16	68	16	16	20	40	16	28	8	8	4	4	4
Cat. No.	1369-91	1372	1369-92	1369-92	1370	1741	1369	1742	1346	1745	1345	1746	1660

	blood collection / urine vessels										-
Vessels											
capacity in ml	1.1 – 1.4	2.6 – 3.4	4.5 – 5	4.9	1.6 – 5	4 – 7	4 – 7	4 – 7	8.5 – 10	30	
Ø x L in mm	8 x 66	13 x 65	15 x 75	13 x 90	13 x 75	16 x 75	13 x 100	13 x 100	16 x 100	26 x 95	
max. RCF ²⁾	2,415	2,325	2,325	2,451	2,325	2,325	2,361	2,451	2,308	2,451	
radius in mm	135	130	130	137	130	130	132	137	129	137	
temperature in °C ¹⁾	-15	-15	-15	-15	-15	-15	-15	-15	-17	-15	
Carrier											
boring Ø x L in mm	14.6 x 78	17.6 x 78	17.6 x 78	14.6 x 78	17.6 x 78	17.6 x 78	14.6 x 74	13.5 x 78	17.6 x 71.5	26 x 78	
vessels per rotor	40	28	28	40	28	28	20	28	16	8	
Cat. No.	1741	1742	1742	1741	1742	1742	1370 ⁴⁾	1739	1369 ⁴⁾	1745	

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

4) Please remove spacer.

5) Tested by the TÜV in conformity with DIN EN 61010, section 2-020.

16) Packed in units of 10 pieces.

20) This combination permits no Vacutainers made of glass.

— Swing-out rotor, 4-place | 1624

Rotor		Bucket	
max. RPM max. RCF	4,000 min ⁻¹ 1,968	Cat. No.	1366
max. capacity	48 x 4 ml		
run-up run-down, braked in sec	22 25		
angle max. noise level	90° 48 dB (A)		
temperature in °C	-15		
Cat. No.	1624		



	microliter tubes	Rhesus	tubes ²⁾
Vessels			
capacity in ml	1.5	2.0	1
Ø x L in mm	11 x 38	11 x 38	6 x 45
max. RCF ²⁾	1,968	1,968	1,950
radius in mm	110	110	109
Adapter			
boring Ø x L in mm	11.5 x 38	11.5 x 38	6.5 x 23
vessels per rotor	36	36	120
Cat. No.	5277	5277	1357

— Swing-out rotor, 4-place | 1624

Rotor		Bucket	
max. RPM max. RCF ²⁾	4,000 min ⁻¹ 2,665	Lid bioseal ⁵⁾	1492
max. capacity	4 x 100 ml	Cat. No.	1481
run-up run-down, braked in sec	20 25		
angle max. noise level	90° 58 dB (A)		
temperature in °C	-15		
Cat. No.	1624		



	Pediatric	microliter tubes	Rhesus	tubes ²⁾											
Vessels															
capacity in ml	0.5	1.5	2.0	1	3	4	5	6	7	9	15	25	50	85	100
Ø x L in mm	10.7 x 46	11 x 38	11 x 38	6 x 45	10 x 60	10 x 88	12 x 75	12 x 82	12 x 100	14 x 100	17 x 100	24 x 100	34 x 100	38 x 106	44 x 100
max. RCF ²⁾	2,379	2,451	2,451	2,594	2,630	2,630	2,558	2,558	2,558	2,540	2,540	2,433	2,415	2,612	2,558
radius in mm	133	137	137	145	147	131	143	143	143	142	142	136	135	146	143
Adapter															
boring Ø x L in mm	11.2 x 38	11.2 x 38	11.2 x 38	6.5 x 34	10.5 x 43	13.4 x 45	13.4 x 45	13.4 x 45	13.4 x 45	17.6 x 89	17.6 x 89	25.2 x 77	35.2 x 75	38.5 x 92	45.9 x 98
vessels per rotor	20	20	20	108	36	20	20	20	20	16	16	4	4	4	4
Cat. No.	1351	1351	1351	1339	1343	1383	1383	1383	1383	1329	1329	1330	1331	1396	0761

Swing-out rotor, 4-place | 1624



Rotor

max. RPM max. RCF	4,000 min ⁻¹ 2,665
max. capacity	4 x 100 ml
run-up run-down, braked in sec	20 25
angle max. noise level	90° 58 dB (A)
temperature in °C	-15

Cat. No. 1624



Bucket

Lid bioseal ⁵⁾	1492
Cat. No.	1481



blood collection / urine vessels

Vessels

capacity in ml	1.1–1.4	2.7–3	4.5–5	2.6–2.9	4.9	4–8.5	7.5–8.2	9–10	10	1.6–5	4–7	4–7	8.5–10
Ø x L in mm	8 x 66	11 x 66	11 x 92	13 x 65	13 x 90	15 x 75	15 x 92	16 x 92	15 x 102	13 x 75	13 x 100	16 x 75	16 x 100
max. RCF ²⁾	2,576	2,558	2,558	2,558	2,558	2,576	2,576	2,540	2,665	2,558	2,558	2,522	2,522
radius in mm	144	143	143	143	143	144	144	142	149	143	143	141	141



Adapter

boring Ø x L in mm	9 x 47	13.4 x 45	13.4 x 45	13.4 x 45	13.4 x 45	15.6 x 47	15.6 x 47	17.6 x 89	17.6 x 89	13.4 x 45	13.4 x 45	16.5 x 52	16.5 x 52
vessels per rotor	28	20	20	20	20	16	16	16	16	20	20	16	16
Cat. No.	1457	1383	1383	1383	1383	1459	1459	1329	1329⁴⁾	1383	1383	1348	1348

tubes with screw cap

Vessels

capacity in ml	15	50	12	25	30	50	10	30	50	85	30
Ø x L in mm	17 x 120	29 x 115	17 x 100	25 x 90	25 x 110	29 x 115	16 x 80	26 x 95	29 x 107	38 x 106	44 x 105
max. RCF ²⁾	2,665	2,665	2,665	2,343	2,665	2,665	2,522	2,451	2,630	2,612	2,540
radius in mm	149	149	149	131	149	149	141	137	147	146	142



Adapter

boring Ø x L in mm	17 x 90	30 x 90	17 x 80	26 x 72	26 x 80	29.5 x 80	16.5 x 52	26 x 83	29 x 93	38.5 x 92	45.9 x 98
vessels per rotor	4	4	4	4	4	4	16	4	4	4	4
Cat. No.	1347	1384	6311	1363	1365	6318	1348	4417	4416	1396	0765

0534⁶⁾
chrome
bath tube

Spacer

- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.
- 3.) When using these tubes, bucket 1752 or 5051 cannot be closed with lid 1751 or 5053.
- 4) Please remove the spacer.
- 5) Tested by the TÜV in conformity with DIN EN 61010, section 2-020.
- 6) A rubber stopper for closing the tube for agitating or mixing is available under Cat. No. 0535. The tube may not be centrifuged with the stopper.

Swing-out rotor, 4-place | 1324

Rotor

max. RPM max. RCF	4,500 min ⁻¹ 3,328
max. capacity	4 x 100 ml
run-up run-down, braked in sec	27 30
angle max. noise level	90° 58 dB (A)
temperature in °C	-6
Cat. No.	1324



Bucket

Lid bioseal ⁵⁾	1492
Cat. No.	1490



Vessels

capacity in ml	0.5	1.5	2.0	1	3	4	5	6	7	9	15	25	50	85	100
Ø x L in mm	10.7x46	11x38	11x38	6x45	10x60	10x88	12x75	12x82	12x100	14x100	17x100	24x100	34x100	38x106	44x100
max. RCF ²⁾	2,966	3,056	3,056	3,237	3,283	3,283	3,192	3,192	3,192	3,170	3,170	3,034	3,011	3,260	3,192
radius in mm	131	135	135	143	145	145	141	141	141	140	140	134	133	144	141



Adapter

boring Ø x L in mm	11.2 x 38	11.2 x 38	11.2 x 38	6.5 x 34	10.5 x 43	10.5 x 43	13.4 x 45	13.4 x 45	13.4 x 45	17.6 x 89	17.6 x 89	25.2 x 77	35.2 x 77	38.5 x 92	45.9 x 100.5
vessels per rotor	20	20	20	108	36	36	20	20	20	16	16	4	4	4	4
Cat. No.	1351	1351	1351	1339	1343	1343	1383	1383	1383	1329	1329	1330	1331	1396	0761

Vessels

	blood collection / urine vessels													-
capacity in ml	1.1–1.4	2.6–2.9	4.9	2.7–3	4.5–5	4–5.5	7.5–8.2	9–10	10	1.6–5	4–7	4–7	8.5–10	15
Ø x L in mm	8 x 66	13 x 65	13 x 90	11 x 66	11 x 92	15 x 75	15 x 92	16 x 92	15 x 102	13 x 75	13 x 100	16 x 75	16 x 100	17 x 120
max. RCF ²⁾	3,215	3,192	3,192	3,192	3,192	3,215	3,215	3,170	3,328	3,192	3,192	3,147	3,147	3,328
radius in mm	142	141	141	141	141	142	142	140	147	141	141	139	139	147



Adapter

boring Ø x L in mm	9 x 47	13.4 x 45	13.4 x 45	13.4 x 45	13.4 x 45	15.6 x 47	15.6 x 47	17.6 x 89	17.6 x 89	13.4 x 45	13.4 x 45	16.5 x 52	16.5 x 52	17 x 90
vessels per rotor	28	20	20	20	20	16	16	16	16	20	20	16	16	4
Cat. No.	1457	1383	1383	1383	1383	1459	1459	1329	1329 ⁴⁾	1383	1383	1348	1348	1347

Vessels

	tubes with screw cap											- 6)
Kapazität in ml	15	30	50	12	25	30	50	10	30	50	85	30
Ø x L in mm	17 x 120	25 x 110	29 x 115	17 x 100	25 x 90	25 x 110	29 x 115	16 x 80	26 x 95	29 x 107	38 x 106	44 x 105
max. RCF ²⁾	3,328	3,328	3,328	3,328	2,920	3,328	3,328	3,147	3,056	3,283	3,260	3,170
radius in mm	147	147	147	147	129	147	147	139	135	145	144	140



Adapter

boring Ø x L in mm	17 x 107	26 x 80	30 x 90	17 x 80	26 x 72	26 x 80	29.5 x 80	16.5 x 52	26 x 83	29 x 93	38.5 x 92	45.9 x 100.5
vessels per rotor	12	4	4	4	4	4	4	16	4	4	4	4
Cat. No.	1356	1365	1384	6311	1363	1365	6318	1348	4417	4416	1396	0765

— Swing-out rotor, 4-place | 1324

Rotor

max. RPM max. RCF	4,500 min ¹ 3,305
max. capacity	4 x 50 ml
run-up run-down, braked in sec	27 30
angle max. noise level	90° 54 dB (A)
temperature in °C	-6
Cat. No.	1324



Bucket

Cat. No.



1398



Vessels

capacity in ml	9	15	4–4,5	9–10	10	4–7	8,5–10	15	50	12	50
Ø x L in mm	14x100	17x100	15x75	16x92	15x102	16x75	16x100	17 x 120	29 x 115	17 x 100	29 x 115
max. RCF ²⁾	3,192	3,192	2,875	3,192	3,192	3,034	3,034	3,305	3,260	3,192	3,260
radius in mm	141	141	127	141	141	134	134	146	144	141	144



Adapter

boring Ø x L in mm	17.5x81	17.5x81	17.5x81	17.5x81	17.5x81	17.5x81	17.5x81	17x100	30x98	17.5x81	30x98
vessels per rotor	16	16	16	16	16	16	16	16	4	16	4
Cat. No.	1482A	1482A	1482A	1482A	1482A	1482A	1482A	1483A	1484	1482A	1484 ⁴⁾

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

4) Please remove spacer.

— Swing-out rotor, 8-place | 1611



Rotor

max. RPM max. RCF	4,000 min ⁻¹ 2,415
max. capacity	8 x 15 ml
run-up run-down, braked in sec	20 20
angle max. noise level	90° 48 dB (A)
temperature in °C ¹⁾	-16

Cat. No. 1611



	tubes ²⁾					blood collection / urine vessels								
Vessels														
capacity in ml	5	6	7	10	15	2.6 – 2.9	2.7 – 3	4 – 5.5	4.5 – 5	7.5 – 8.2	1.6 – 5	4 – 7	4 – 7	8.5 – 10
Ø x L in mm	12/13 x 75	12 x 82	12 x 100	13 x 100	17 x 100	13 x 65	11 x 66	15 x 75	11 x 92	15 x 92	13 x 75	13 x 100	16 x 75	16 x 100
max. RCF ²⁾	1,914	1,914	2,415	2,415	2,415	1,914	1,914	1,914	2,415	2,415	1,914	2,415	1,914	2,415
radius in mm	107	107	135	135	135	107	107	107	135	135	107	135	107	135
Bucket														
boring Ø x L in mm	13 x 53	13 x 53	13.2 x 81	13.2 x 81	17.5 x 81	13 x 53	13 x 53	17.5 x 53	13.2 x 81	17.5 x 81	13 x 53	13.2 x 81	17.5 x 53	17.5 x 81
vessels per rotor	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Cat. No.	1131-A	1131-A	1643	1643	1644	1131-A	1131-A	1132-A	1643	1644	1131-A	1643	1132-A	1644

— Swing-out rotor, 12-place | 1628



Rotor

max. RPM max. RCF ²⁾	5,000 min ⁻¹ 4,193
max. capacity	12 x 15 ml
run-up run-down, braked in sec	16 16
angle max. noise level	55° / 60° / 80° 54 dB (A)

Cat. No. 1628



	tubes ²⁾			blood collection / urine vessels								
Vessels												
capacity in ml	5	10	15	2.6 – 2.9	2.7 – 3	4 – 5.5	7.5 – 8.2	1.6 – 5	4 – 7	8.5 – 10		
Ø x L in mm	12/13 x 75	17 x 100	17 x 100	13 x 65	11 x 66	15 x 75	15 x 92	13 x 75	16 x 75	16 x 100		
max. RCF ²⁾	3,466	3,522	4,193	3,466	3,466	3,522	4,193	3,466	3,522	4,193		
radius in mm	124	126	150	124	124	126	150	124	126	150		
temperature in °C ¹⁾	-10	-10	-10	-15	-15	-15	-10	-15	-15	-10		
Bucket												
boring Ø x L in mm	13.2 x 53	17.5 x 53	17.5 x 79	13.2 x 53	13.2 x 53	17.5 x 53	17.5 x 79	13.2 x 53	17.5 x 53	17.5 x 79		
vessels per rotor	12	12	12	12	12	12	12	12	12	12		
Cat. No.	1127-A	1122	1621	1127-A	1127-A	1122	1621	1127-A	1122	1621		

- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

— Swing-out rotor, 8-place | 1617



Rotor

max. RPM max. RCF	5,000 min ⁻¹ 3,857
max. capacity	8 x 50 ml
run-up run-down, braked in sec	20 19
angle max. noise level	45° 50 dB (A)
temperature in °C ¹⁾	-10
Cat. No.	1617

tubes with
screw cap



Vessels

capacity in ml	15	50
Ø x L in mm	17 x 120	29 x 115
max. RCF ²⁾	3,857	3,857
radius in mm	138	138



Adapter

boring Ø x L in mm	17 x 84	30 x 94.5
vessels per rotor	8	8
Cat. No.	1462-A	-



— Swing-out rotor, 6-place | 1619



Rotor

max. RPM max. RCF	4,000 min ⁻¹ 2,701
max. capacity	6 x 50 ml
run-up run-down, braked in sec	20 22
angle max. noise level	90° 50 dB (A)
temperature in °C ¹⁾	-15
Cat. No.	1619

tubes with
screw cap



Vessels

capacity in ml	15	50
Ø x L in mm	17 x 120	29 x 115
max. RCF ²⁾	2,701	2,701
radius in mm	151	151



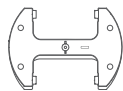
Adapter

boring Ø x L in mm	17 x 84	30 x 87.5
vessels per rotor	6	6
Cat. No.	1462-A	-



- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

Swing-out rotor, 2-place | 1460



Rotor

max. RPM max. RCF	4,000 min ⁻¹ 2,218
max. capacity	10 plates
run-up run-down, braked in sec	40 45
angle max. noise level	90° 55 dB (A)
temperature in °C ¹⁾	-6
Cat. No.	1460



	MTP	CP	DWP	MS	PCR plate, 96 wells	PCR strips
Vessels						
capacity in ml	-	-	-	-	-	0.2
W x D x H in mm	128x86x15	128x86x22	128x86x44.5	128x86x46	124x82x20	-
max. RCF ²⁾	2,433	2,433	2,433	2,433	2,433	2,433
radius in mm	136	136	136	136	136	136
+						
Bucket						
boring Ø x L in mm	-	-	-	-	-	-
vessels per rotor	10	8	2	2	2	24 x 8
Cat. No.	1453-A	1453-A	1453-A	1453-A	1453-A + 1485	1453-A + 1485

Swing-out rotor, 24-place | 1555



Rotor

max. RPM max. RCF	13,000 min ⁻¹ 18,327
max. capacity	24 x 2 ml
run-up run-down, braked in sec	36 31
angle	90°
temperature in °C ¹⁾	3
Cat. No.	1555

Lid bioseal[®],
phenol-resistant

Cat. No.





INCLUSIVE

















	microliter tubes					
Vessels						
capacity in ml	0.2	0.4	0.5	0.8	1.5	2
Ø x L in mm	6x18	6x45	8x30	8x45	11x38	11x38
max. RCF ²⁾	18,327	18,327	18,327	18,327	18,327	18,327
radius in mm	97	97	97	97	97	97
+						
Adapter						
boring Ø x L in mm	6x40	6x40	8x40	8x40	10.2x19.3	11.5x38.5
vessels per rotor	24	24	24	24	24	24
Cat. No.	2024	2024	2023	2023	2031⁷⁾	-



- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.
- 5) Tested by TÜV in conformity with DIN EN 61010, section 2-020.
- 7) For centrifugation at high speeds, we recommend to use conical, phenol-resistant adapters. Cat. No. 2031.

Rotor		+	Lid bioseal[®], phenol-resistant		INCLUSIVE
	max. RPM max. RCF				
	max. capacity				
	run-up run-down, braked in sec				
	angle max. noise level				
	temperature in °C ¹⁾				
Cat. No.	1552				

















	microliter tubes						Pediatric
Vessels							
	capacity in ml	0.2	0.4	0.5	0.8	1.5	2
	Ø x L in mm	6x18	6x45	8x30	8x45	11x38	11x38
	max. RCF ²⁾	24,900	24,900	24,900	24,900	24,900	23,755
	radius in mm	87	87	87	87	87	83
Adapter							
	boring Ø x L in mm	6x40	6x40	8x40	8x40	10.2x19.3	11.2x42.6
	vessels per rotor	24	24	24	24	24	12
	Cat. No.	2024	2024	2023	2023	2031¹⁷⁾	-
							0788¹⁷⁾

— Angle rotor, 30-place | 1553


Rotor		+	Lid bioseal[®], phenol-resistant		INCLUSIVE
	max. RPM max. RCF				
	max. capacity				
	run-up run-down, braked in sec				
	angle				
	temperature in °C ¹⁾				
Cat. No.	1553				



	microliter tubes						Pediatric
Vessels							
	capacity in ml	0.2	0.4	0.5	0.8	1.5	2
	Ø x L in mm	6x18	6x45	8x30	8x45	11x38	11x38
	max. RCF ²⁾	21,713	21,713	21,713	21,713	21,713	20,818
	radius in mm	97	97	97	97	97	93
Adapter							
	boring Ø x L in mm	6x40	6x40	8x40	8x40	10.2x19.3	11.2x40.9
	vessels per rotor	30	30	30	30	30	15
	Cat. No.	2024	2024	2023	2023	2031¹⁷⁾	-
							0788¹⁷⁾

- 1) For cooled versions: Lowest temperature achievable with precooling and max. speed.
- 2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.
- 5) Tested by TÜV in conformity with DIN EN 61010, section 2-020.
- 7) For centrifugation at high speeds, we recommend to use conical, phenol-resistant adapters. Cat. No. 2031.
- 17) Packed in units of 15 pieces.

Angle rotor, 8-place | 1551

	
Rotor	
max. RPM max. RCF	13,000 min ⁻¹ 13,604
max. capacity	8 x PCR-Strips
run-up run-down, braked in sec	36 31
angle max. noise level	45° 58 dB (A)
temperature in °C ¹⁾	-4
Cat. No.	1551



Lid bioseal[®],
phenol-resistant


Cat. No.




INCLUSIVE



- PCR-Strips

	
Vessels	
capacity in ml	0.2
Ø x L in mm	6x18
max. RCF ²⁾	13,604
radius in mm	64

Angle rotor, 18-place | 1627

	
Rotor	
max. RPM max. RCF	14,150 min ⁻¹ 22,161
max. capacity	18x5 ml
run-up run-down, braked in sec	35 32
angle	45°
temperature in °C ¹⁾	2
Cat. No.	1627



Lid bioseal[®],
phenol-resistant


Cat. No.



INCLUSIVE



-


	
Vessels	
capacity in ml	5
Ø x L in mm	17x59
max. RCF ²⁾	22,161
radius in mm	18

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

5) Tested by TÜV in conformity with DIN EN 61010, section 2-020.

Angle rotor, 6-place | 1556

Rotor	
max. RPM max. RCF	9.000 min ⁻¹ 10.595
max. capacity	6 x 94 ml
run-up run-down, braked in sec	36 32
angle max. noise level	35° 60 dB (A)
temperature in °C ¹⁾	0
Cat. No.	1556

+






























Lid bioseal[®], phenol-resistant



Cat. No.




INCLUSIVE



	microliter tubes		tubes ²⁾				blood collection / urine vessels				tubes with screw cap				
Vessels															
capacity in ml	1.5	2	15	50	50	85	7.5-8.2	9-10	10	8.5-10	15	50	10	30	50
Ø x L in mm	11 x 38	11 x 38	17 x 100	35 x 105	34 x 100	38 x 101	15 x 92	16 x 92	15 x 102	16 x 100	17 x 120	29 x 115	16 x 80	26 x 95	29 x 107
max. RCF ²⁾	10,324	10,324	10,052	10,414	10,414	10,595	10,052	10,052	10,052	10,052	10,052	10,052	10,414	9,690	10,142
radius in mm	114	114	111	115	115	117	111	111	111	111	111	111	115	107	112
+															
Adapter															
boring Ø x L in mm	11.4 x 39	11.4 x 39	17.5 x 78	35 x 89	35 x 89	-	17.5 x 78	17.5 x 78	17.5 x 78	17.5 x 78	17 x 106	29.8 x 97	16.5 x 72	26 x 85	29 x 92
vessels per rotor	24	24	6	6	6	6	6	6	6	6	6	6	12	6	6
Cat. No.	1449	1449	1478	1463	1463	-	1478	1478	1478	1478	1466	1454	1477	1447	1446

	tubes with screw cap	
Vessels		
capacity in ml	85	94
Ø x L in mm	38 x 106	38 x 102
max. RCF ²⁾	10,595	10,595
radius in mm	117	117

+		
Adapter		
boring Ø x L in mm	-	-
vessels per rotor	6	6
Cat. No.	-	-

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

5) Tested by TÜV in conformity with DIN EN 61010, section 2-020.

Angle rotor, 12-place | 1613



Rotor

max. RPM max. RCF	6,000 min ⁻¹ 4,146
max. capacity	12 x 15 ml
run-up run-down, braked in sec	15 15
angle max. noise level	35° 50 dB (A)
temperature in °C ¹⁾	-16
Cat. No.	1613



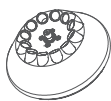
	Pediatric	microliter tubes			tubes ²⁾			blood collection / urine vessels							
Vessels															
capacity in ml	0.5	1.5	2.0	4	5	6	15	1.1 – 1.4	2.6 – 2.9	2.7 – 3	4.5 – 5	4.9	7.5 – 8.2	9 – 10	10
Ø x L in mm	10.7 x 46	11 x 38	11 x 38	10 x 88	12/13 x 75	12 x 82	17 x 100	8 x 66	13 x 65	11 x 66	11 x 92	13 x 90	15 x 92	16 x 92	15 x 102
max. RCF ²⁾	2,777	2,737	2,737	3,502	3,300	3,300	4,146	3,300	3,300	3,300	4,146	4,146	4,146	4,146	4,146
radius in mm	69	68	68	87	82	82	103	82	82	82	103	103	103	103	103
+															
Adapter															
boring Ø x L in mm	11 x 35	11 x 35	11 x 35	11.5x67.5	13.5 x 59	13.5 x 59	17.7 x 88	13.5 x 59	13.5 x 59	13.5 x 59	17.7 x 88	17.7 x 88	17.7 x 88	17.7 x 88	17.7 x 88
vessels per rotor	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Cat. No.	2 x 1063-6 (6 pcs.)			6305	1054-A	1054-A	-	1054-A	1054-A	1054-A	-	-	-	-	-

	blood collection / urine vessels					
Vessels						
capacity in ml	1.6 – 5	4 – 7	8	8.5 – 10	5	15
Ø x L in mm	13 x 75	13 x 100	16 x 125	16 x 100	17 x 59	17 x 120
max. RCF ²⁾	3,300	4,146	4,146	4,146	3,180	4,146
radius in mm	82	103	103	103	79	103
Adapter						
boring Ø x L in mm	13.5 x 60	17.7 x 88	17.7 x 88	17.7 x 88	17.7 x 88	17.7 x 88
vessels per rotor	12	12	6	12	12	6
Cat. No.	1054-A	-	-	-	-	-

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

Angle rotor, 12-place | 1615



Rotor

max. RPM max. RCF	12,000 min ⁻¹ 16,582
max. capacity	12 x 15 ml
run-up run-down, braked in sec	40 40
angle max. noise level	35° 52 dB (A)
temperature in °C ¹⁾	-2
Cat. No.	1615



	Pediatric			microliter tubes				tubes ²⁾				blood collection / urine vessels					
Vessels																	
capacity in ml	0.5	1.5	2.0	4	5	6	15	1.1 - 1.4	2.6 - 2.9	2.7 - 3	4.5 - 5	4.9	7.5 - 10	10			
Ø x L in mm	10.7 x 46	11 x 38	11 x 38	10 x 88	12/13 x 75	12 x 82	17 x 100	8 x 66	13 x 65	11 x 66	11 x 92	13 x 90	15/16 x 92	15 x 102			
max. RCF ²⁾	11,108	10,947	10,947	14,006	13,201	13,201	16,582	13,201	13,201	13,201	16,582	16,582	16,582	16,582			
radius in mm	69	68	68	87	82	82	103	82	82	82	103	103	103	103			
Adapter																	
boring Ø x L in mm	11 x 35	11 x 35	11 x 35	11.5 x 67.5	13.5 x 59	13.5 x 59	17.7 x 88	13.5 x 59	13.5 x 59	13.5 x 59	17.7 x 88	17.7 x 88	17.7 x 88	17.7 x 88			
vessels per rotor	12	12	12	12	12	12	12	12	12	12	12	12	12	12			
Cat. No.	2 x 1063-6 (6 pcs.)			6305	1054-A	1054-A	-	1054-A	1054-A	1054-A	-	-	-	-			

	blood collection / urine vessels			-	-
Vessels					
capacity in ml	1.6 - 5	4 - 7	8.5 - 10	8	5
Ø x L in mm	13 x 75	13 x 100	16 x 100	16 x 125	17 x 59
max. RCF ²⁾	13,201	16,582	16,582	16,582	12,718
radius in mm	82	103	103	103	79
Adapter					
boring Ø x L in mm	13.5 x 59			17.7 x 88	17 x 25
vessels per rotor	12	12	12	6	12
Cat. No.	1054-A	-	-	-	1064

1647 ²⁵⁾

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

25) Adapter (set), 6-place: For conical 15 ml tubes with screw cap, remove carriers from rotor and replace them with adapters.

Angle rotor, 8-place | 1418

Rotor



max. RPM max. RCF	4,500 min ⁻¹ 3,305
max. capacity	8 x 50 ml
run-up run-down, braked in sec	30 31
angle max. noise level	45° 54 dB (A)
temperature in °C ¹⁾	-5
Cat. No.	1418



Vessels

	tubes ²⁾		blood collection / urine vessels										tubes with screw cap			
capacity in ml	5	15	1.1–1.4	2.6–2.9	2.7–3	9–10	1.6–5	4–7	8.5–10	12	15	50	12	50	50	50
Ø x L in mm	12/13x75	17x100	8x66	13x65	11x66	16x92	13x75	13x100	16x100	17x102	17x120	29x115	17x100	29x115	29x107	29x107
max. RCF ²⁾	2,762	3,215	2,762	2,762	2,762	3,215	2,762	3,215	3,215	3,215	3,283	3,147	3,215	3,147	3,147	3,147
radius in mm	122	142	122	122	122	142	122	146	142	142	145	139	142	139	139	139
	+ 1054-A	+ 0716	+ 1054-A	+ 1054-A	+ 1054-A	+ 0716	+ 1054-A	+ 0716	+ 0716	+ 0716	+ E2109	+ E2110-A	+ 0716			
Carrier																
boring Ø x L in mm	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	17.4x91	30.2x92	17.4x91	30.2x92	30.2x92	30.2x92
vessels per rotor	32	32	32	32	32	32	32	32	32	32	32	8	32	8	8	8
Cat. No.	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1468	1467	1468	1468	1468

1) For cooled versions: Lowest temperature achievable with precooling and max. speed.

2) Please note that the RCF values indicated refer only to rotor performance. The max. permissible RCF of tubes used should be verified with the individual manufacturers. The max. RCF for glass tubes annotated with footnote 2) is 4,000.

— Certifications / Registrations

Product certification:



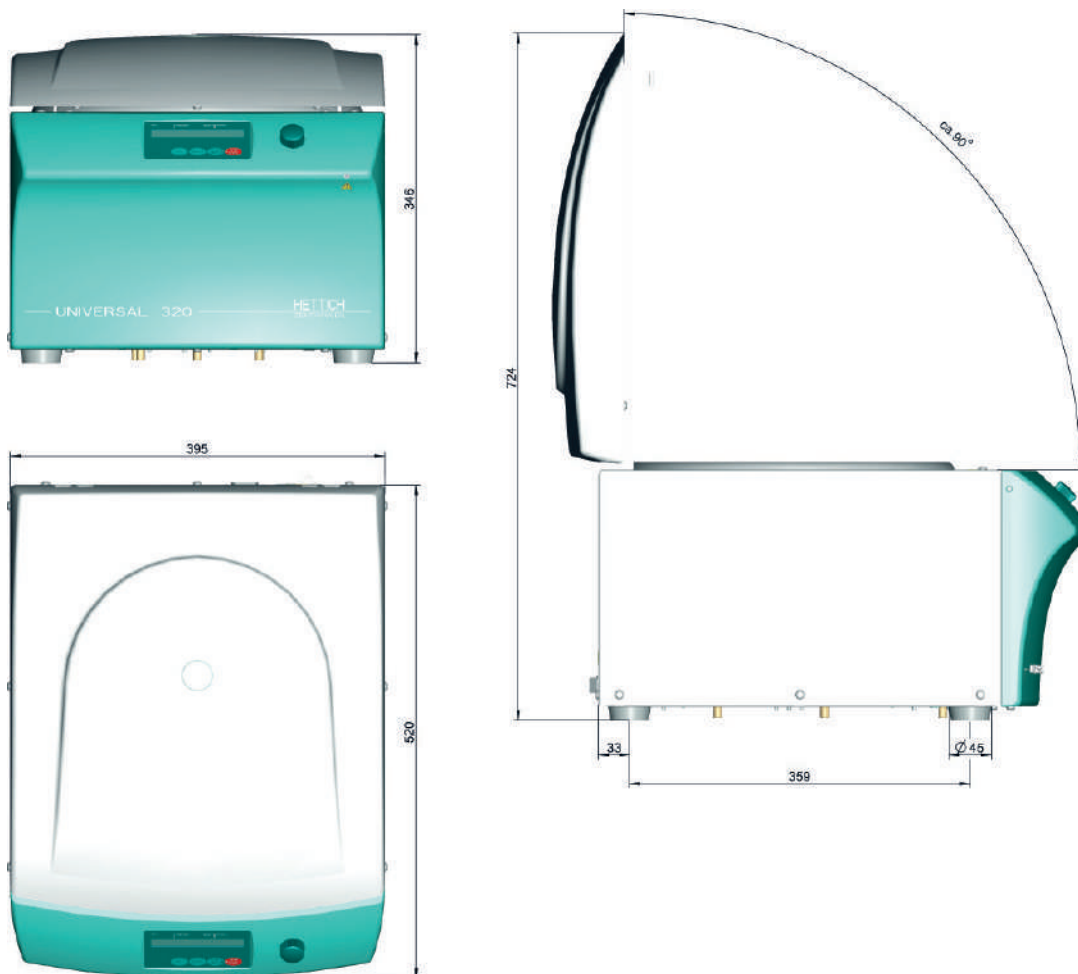
Product registration:



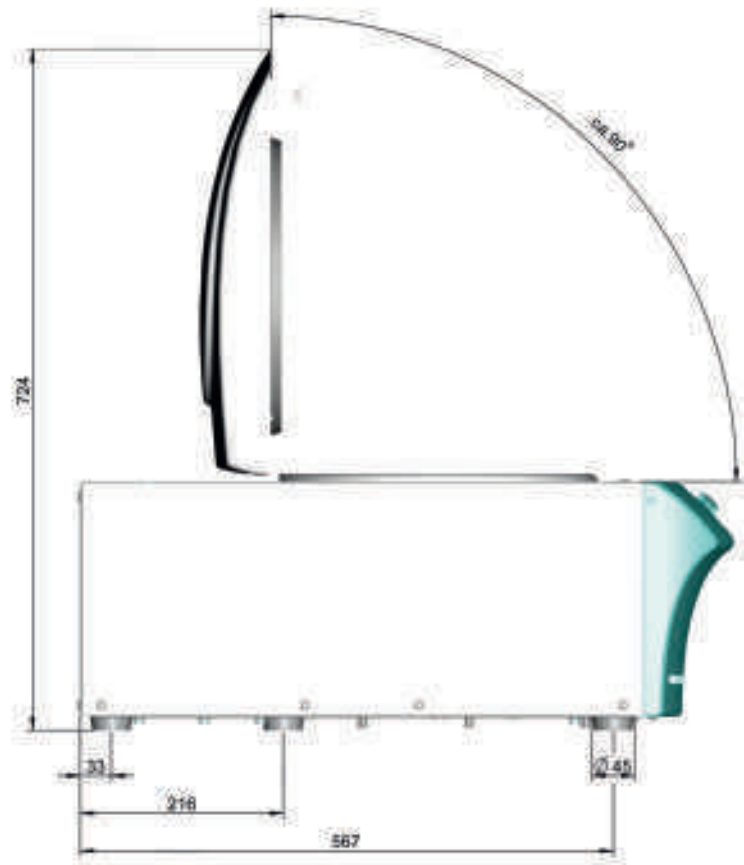
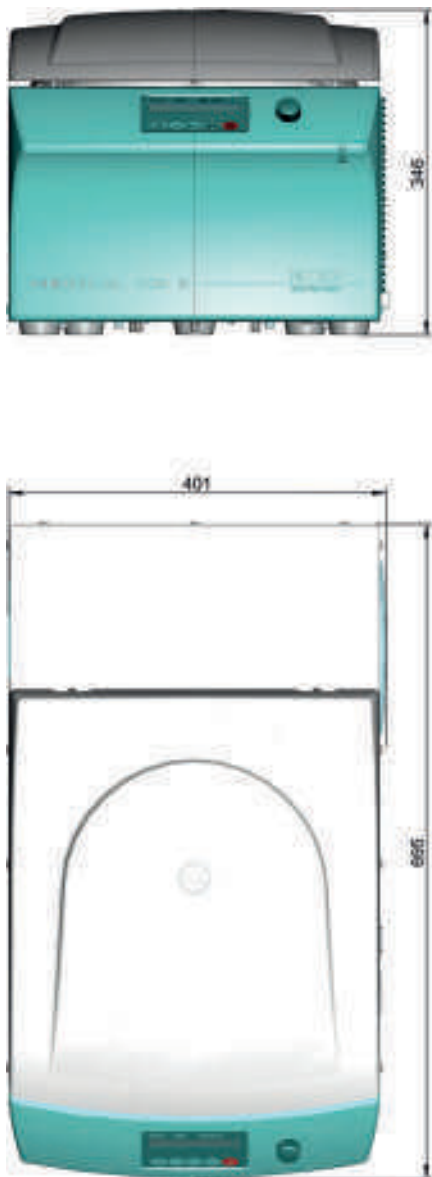
Company certifications:



— Dimensions – UNIVERSAL 320



— Dimensions – UNIVERSAL 320 R



Operating instructions

UNIVERSAL 320 / 320 R



Translation of the original operating instructions

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1 About this document

1.1 Use of this document

- Read this document carefully and in full before commissioning the device for the first time.
Observe other enclosed instruction sheets where necessary.
- This document is part of the device and must be kept within easy reach.
- This document must be included if the device is passed on to a third party.
- The current version of the document in the available languages can be found on the manufacturer's website: ➡ <https://www.hettichlab.com/de/download-center/>







1.2 Gender reference

The employed masculine or feminine language form is to facilitate reading. In the spirit of equal treatment, corresponding terms apply in principle to all genders and do not imply any valuation.

1.3 Symbols and labels in this document

General symbols

The following markers are used in this document to highlight instructions, results, listings, references and other elements:

Marker	Explanation
1.  2.  3.  ... 	Step-by-step instructions
	Results of action steps
	References to sections of the document and other applicable documents
■ ... ■ ...	Listings without a fixed order
[Buttons]	Controls (for example: buttons, switches)
'Indicator'	Indicator elements (for example: signal lights, screen elements)

2 Safety

2.1 Intended use

Intended use

The centrifuge **UNIVERSAL 320 / 320 R** is an in vitro diagnostic medical device according to the In Vitro Diagnostic Medical Devices Regulation (EU) 2017/746.

The device is used to separate samples of human origin into their constituent parts for subsequent further processing. The user can set each of the variable physical parameters within the limits set by the device.

The centrifuge may only be used by qualified personnel in closed laboratories. The centrifuge is only intended for the use referred to above. Intended use also includes observing all instructions in the user manual and compliance with inspection and maintenance. Any other use or use beyond this scope is considered improper. Andreas Hettich GmbH shall not be liable for any damage arising from such non-compliant use.

Non-intended use

- The centrifuge is not suitable for use in explosive or radioactive, or biologically or chemically-contaminated atmospheres.
- The user must take appropriate actions when centrifuging hazardous substances or mixtures of substances that are toxic, radioactive or contaminated with pathogenic microorganisms.
The manufacturer generally recommends using only centrifuge tubes with special screw caps designed for use with hazardous substances. Use sealable centrifuge tubes with a biosafety system for materials of risk groups 3 and 4.
- The manufacturer does not recommend centrifugation of flammable or explosive materials.
- The manufacturer does not recommend centrifugation of materials that react chemically with one another with high activation energy.

Foreseeable misuse

The manufacturer recommends using only accessories approved that it has approved for the intended purpose.
Only operate the centrifuge under supervision.

2.2 Personnel requirements

Required qualifications

The user has read the Operating Manual in full and familiarised themselves with the device.



NOTICE

Damage to the device by unauthorised personnel

- Tampering with and modifications to devices by unauthorised persons are at the operating organisation's own risk and will result in the loss of all warranty and liability claims.

Trained user

The user has been educated and trained in laboratory work and is able to carry out the work assigned to them, and to recognise and prevent potential hazards independently.

Personal protective equipment

Lack of personal protective equipment or unsuitable personal protective equipment increases the risk of impaired health and injury.

- Only use personal protective equipment that is in proper condition.
- Only use personal protective equipment that is adapted to the person (correct size, for example).
- Observe instructions on other protective equipment for specific activities.

2.3 Operator's responsibility



Follow the instructions in this document for proper and safe use of the device.

Keep the user manual for future reference.

Provide information

- Following the instructions in this document will help:
 - To avoid dangerous situations.
 - To minimise repair costs and downtime.
 - To increase the reliability and service life of the device.
- The operator is responsible for compliance with company regulations, standards and national laws.
- Note and keep the revision of the document separate from the document. If lost, the document can be replaced in the correct revision.
- Keep the user manual available at the place where the device is used.
- Pass the user manual on to the buyer when the device is sold.

Personnel training

Lack of knowledge when working with the device may result in serious injury or death.

- Instruct personnel on their tasks and the associated risks in accordance with the instruction.

2.4 Safety instructions



Reporting of events and incidents

In the event of incidents or notifiable events involving the device or its accessories, these must be reported to the manufacturer and, where applicable, to the competent authority where the user and/or the patient is registered.

Manufacturer:

Andreas Hettich GmbH

Föhrenstrasse 12

78532 Tuttlingen, Germany

Phone: +49 7461 705 0

E-mail: info@hettichlab.com



DANGER

Risk of contamination

Inadequate cleaning or failure to observe the cleaning instructions can lead to contamination risks.

- Observe national and local regulations on safety and accident prevention.
- Observe cleaning instructions.
- Wear personal protective equipment when cleaning the device.
- Comply with laboratory regulations (e.g. TRBAs, the German Protection against Infection Act, hygiene plan) for handling biological agents.



DANGER

Risk of fire and explosion

Risk of accidents, injuries or damage to property due to fire or explosion.

- Observe regulations and directives for handling chemicals and hazardous substances.
- Do not use corrosive chemicals.
- Do not use dangerous chemicals.
- Do not use corrosive extraction agents.
- Do not use strong acids.



WARNING

Risk of injury

Inadequate or late maintenance can result in injuries.

- Observe maintenance intervals.
- Check the device for visible damage or defects.
If any visible damage or defects are present, immediately remove the device from service and inform a service technician.



WARNING

Risk of electric shock

Liquids that penetrate the device may cause electric shocks.

- The device must be protected from external contact with liquids.
- Do not pour any liquids inside the device.
- The original transport packaging must be used when transporting the device.



WARNING

Contamination with hazardous substances and substance mixtures

Observe the following actions for substances and substance mixtures that are toxic, radioactive and/or contaminated with pathogenic microorganisms:

- As a rule, use only centrifuge tubes with special screw caps for hazardous substances.
- Use sealable centrifuge tubes with a biosafety system for materials of risk groups 3 and 4.
- If no biosafety system is used, the device is not micro-biologically tight in the sense of standard EN / IEC 61010-2-020.
- Contact the manufacturer if necessary.


WARNING
Risk of injury and device damage due to the rotor

A loose rotor can cause injuries and device damage.

- Check that the rotor is firmly seated.
- Follow maintenance intervals.


CAUTION
Risk of injury

Long hair and clothing can get caught in the rotor during manual movement.

- Tie long hair back.
- Do not allow garments to hang in the centrifuging chamber.


NOTICE
Damage

Incorrect voltage or frequency.

- Only operate the device according to the specifications on the rating plate.
- Compliance with the instructions for use.


NOTICE
Damage

Aborting the program early can cause damage to the device and samples.

- Do not switch off, perform an emergency release or pull out the mains plug.

3 Device overview

3.1 Technical data

Manufacturer	Andreas Hettich GmbH D-78532 Tuttlingen	
Model	UNIVERSAL 320	
Type	1401	1401-01
Mains voltage ($\pm 10\%$)	200-240 V 1~	100-127 V 1~
Mains frequency	50-60 Hz	50-60 Hz
power consumption	400 VA	400 VA
Power consumption	2.0 A	4.0 A
max. capacity	4 x 200 ml	
max. permissible density	1.2 kg/dm ³	

max. speed (RPM)	16000		
max. acceleration (RCF)	24900		
max. kinetic energy	9800 Nm		
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	No		
Ambient conditions (EN / IEC 61010-1):			
Installation site	indoors only		
Altitude	up to 2000 m above sea level		
Ambient temperature	2 °C to 35 °C		
Humidity	maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.		
Overvoltage category (IEC 60364-4-443)	II		
Pollution level	2		
Device protection class	I not suitable for use in potentially explosive atmospheres.		
EMC:			
Emitted EM interference, EM interference immunity	EN / IEC 61326-1 Class B	FCC Class B	
Noise level (rotor-dependent)	≤68 dB(A)		
Dimensions:			
Width	401 mm		
Depth	529 mm		
Altitude	346 mm		
Weight	approx. 31 kg		
Manufacturer	Andreas Hettich GmbH D-78532 Tuttlingen		
Model	UNIVERSAL 320 R		
Type	1406		1406-01
Mains voltage (±10%)	200-240 V 1~	240 V 1~	115-127 V 1~

Mains frequency	50 Hz	60 Hz	60 Hz
power consumption	800 VA		950 VA
Power consumption	4.0 A		8.0 A
Refrigerant	R452A		
max. capacity	4 x 200 ml		
max. permissible density	1.2 kg/dm³		
max. speed (RPM)	16000		
max. acceleration (RCF)	24900		
max. kinetic energy	9800 Nm		
Obligation to perform checks (DGUV Rules 100-500) (valid only in Germany)	No		
Ambient conditions (EN / IEC 61010-1):			
Installation site	indoors only		
Altitude	up to 2000 m above sea level		
Ambient temperature	5 °C to 35 °C		
Humidity	maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C.		
Overvoltage category (IEC 60364-4-443)	II		
Pollution level	2		
Device protection class	I not suitable for use in potentially explosive atmospheres.		
EMC:			
Emitted EM interference, EM interference immunity	EN / IEC 61326-1 Class B		FCC Class B
Noise level (rotor-dependent)	≤64 dB(A)		
Dimensions:			
Width	407 mm		
Depth	698 mm		

Altitude	346 mm
Weight	approx. 52 kg

Rating plate

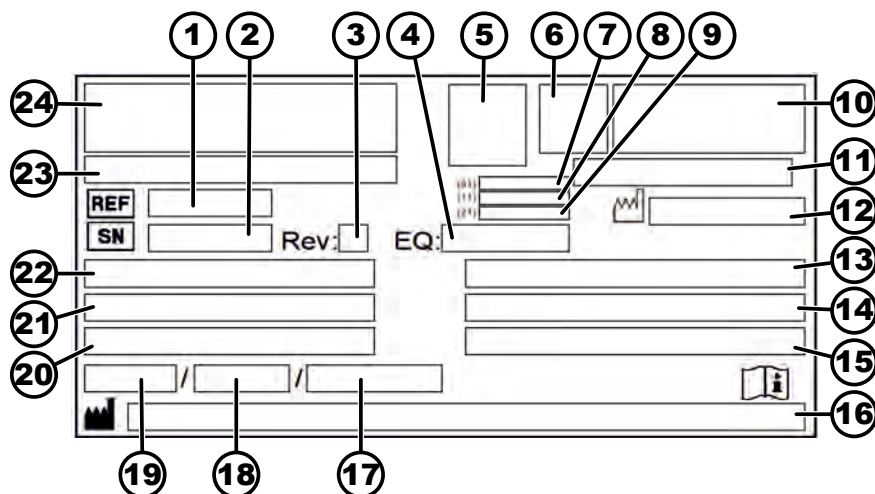





Fig. 1: Rating plate

- 1 Item number
- 2 Serial number
- 3 Revision
- 4 Equipment number
- 5 Data matrix code
- 6 any labelling indicating whether medical device or in vitro diagnostic medical device
- 7 Global Trade Item Number (GTIN)
- 8 Date of manufacture
- 9 Serial number
- 10 any EAC mark, CE mark
- 11 Country of manufacture
- 12 Date of manufacture
- 13 Mains frequency
- 14 Maximum kinetic energy
- 15 Maximum permissible density
- 16 Manufacturer's address
- 17 any Coolant circuit pressure
- 18 any Coolant capacity
- 19 any Coolant type
- 20 Revs per minute
- 21 Performance values
- 22 Mains voltage
- 23 any Device designation
- 24 Manufacturer's logo

3.2 Certifications and logos

Certifications

 <p>ISO 9001 Certified Quality Management System www.tuvsud.com/ms-cert</p>	<p>ISO 9001 Quality management system in accordance with ISO 9001</p>
 <p>ISO 14001 Certified Environmental Management System www.tuvsud.com/ms-cert</p>	<p>ISO 14001 Environmental management in accordance with ISO 14001</p>
	<p>EN ISO 13485 Quality management in accordance with ISO 13485</p>

Logos

	<p>Made in Germany Device was developed and made in Germany.</p>
---	--

3.3 European registration

Device conformity

Device conformity according to EU directives.



Single Registration Number

SRN: DE-MF-000010680

Basic-UDI-DI

Basic-UDI-DI	Device assignment
040506740100139R	UNIVERSAL 320 / 320 R (in vitro diagnostic medical device)

3.4 Important labels on the packaging



TOP

This is the correct upright position of the shipping container for transport and/or storage.



FRAGILE GOODS

The contents of the shipping container are fragile, so it must be handled with care.



PROTECT FROM MOISTURE

Protect the transport packaging from moisture and keep it in a dry environment.



TEMPERATURE LIMITATION

The shipping container must be stored, transported and handled within the indicated temperature range (-20 °C to +60 °C).



HUMIDITY LIMITATION

The shipping container must be stored, transported and handled within the indicated air humidity range (10 % to 80 %, non-condensing).



STACK LIMITATION BASED ON QUANTITY

Maximum number of identical packages that may be stacked on the lowest package, "n" standing for the number of packages allowed. The lowest package is not included in "n".

3.5 Important labels on the device



The signs on the device must not be removed or covered, or have anything pasted over them.



Attention, general danger area.

Ensure you read the instructions for commissioning and operation and observe the safety instructions before using the device.



Biohazard warning.



Direction of rotation of the rotor.

The orientation of the arrow indicates the rotor's direction of rotation.



Symbol for the separate collection of electrical and electronic equipment, in accordance with Directive 2012/19/EU (WEEE).

Use in European Union countries, Norway and Switzerland.

3.6 Operating and indicator elements

3.6.1 Control

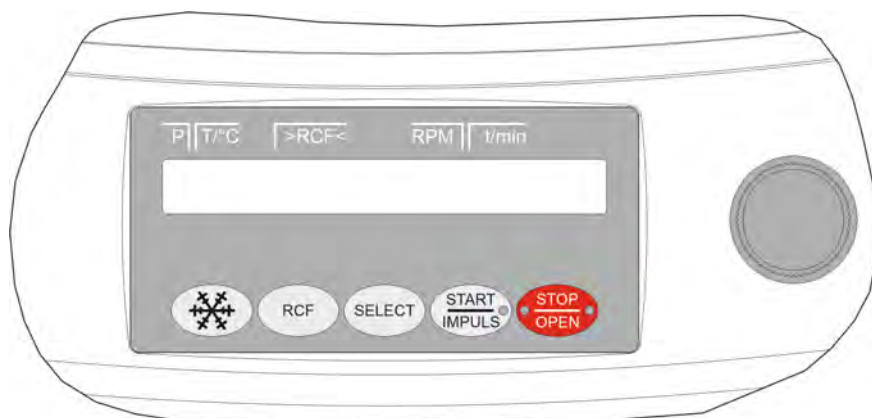


Fig. 2: Control (device with cooling)

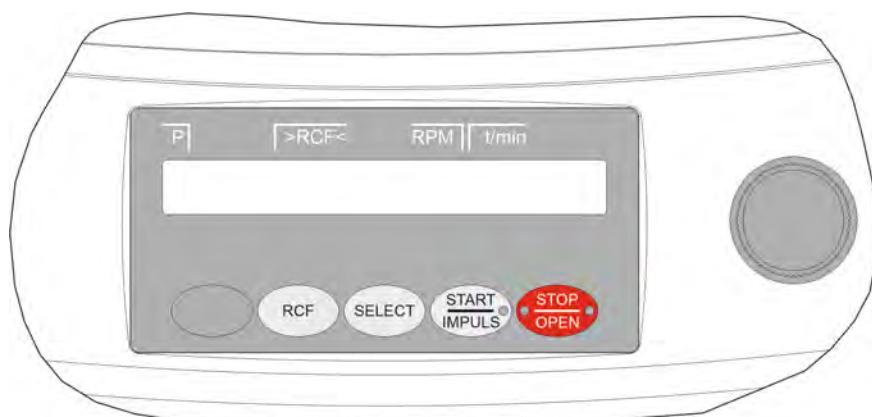


Fig. 3: Control (device without cooling)

3.6.2 Indicator elements



Fig. 4: [START/IMPULS] button

- The button lights up during the centrifugation run for as long as the rotor is not yet at a standstill.



Fig. 5: [STOP/OPEN] button

- The right side of the button lights up when the centrifuge is in ramp-down. The rotor has not yet stopped.
- The left side of the button lights up when the rotor is stationary.
- The light on the left side of the button goes out when the lid is unlocked.

3.6.3 Controls



Fig. 6: [Rotary knob]

- Setting the individual parameters.
Turning anticlockwise decreases the value.
Turning clockwise increases the value.



Fig. 7: [Mains switch]

- Switch the device on and off.



Fig. 8: [Cooling] button

- Start the centrifugation run to pre-cool the rotor (only for centrifuges with cooling).
- The precooling speed is adjustable. The default value is 10,000 RPM.



Fig. 9: [RCF] button

- Toggle between RCF indicator and RPM indicator.
- Relative centrifugal force, RCF.
The RCF is displayed in brackets > <.
- Speed, RPM.



Fig. 10: [SELECT] button

- Selecting the individual parameters.
- Scroll forward in the menus.



Fig. 11: [START/IMPULSE] button

- Start centrifugation run.
- Short-term centrifugation. The centrifugation run takes place as long as the button is being pressed.
- Save entries and changes.



Fig. 12: [STOP/OPEN] button

- End the centrifugation run.
The rotor coasts to a stop with the preselected ramp-down parameter.
- Pressing the button twice triggers the quick stop function.
- Unlock the lid.
- Exit parameter input and the menus.

3.7 Original spare parts

Use only original spare parts from the manufacturer and approved accessories.

3.8 Scope of delivery

The following accessories are supplied with the centrifuge:

- 1 hex key (SW5 x 100)
- 1 grease for the trunnions

- 1 power cable
- 1 user manual
- 1 instruction sheet, transport lock

Rotors and the corresponding accessories are supplied depending on the order.

3.9 Returns

An original Return Material Authorisation (RMA) form from the manufacturer must always be requested for a return. Secure and reliable acceptance and booking in of the goods with the manufacturer is not possible without an original RMA form from the manufacturer. The Return Material Authorisation (RMA) form contains a Declaration of No Objection (UBE), which must be completed in full and enclosed with the return.

If the device and/or accessories are returned to the manufacturer, the complete return shipment must be cleaned and decontaminated by the sender. If returns are not cleaned and/or decontaminated or are insufficiently cleaned and/or decontaminated, this will be performed by the manufacturer and charged to the sender.

The original transport locks must be attached for return shipment, see ➔ *Chapter 4 'Transport and storage' on page 17*. The device must be shipped in its original packaging.

4 Transport and storage

4.1 Transport and storage conditions

Transport conditions



NOTICE

Damage

The device may be damaged if it is not secured during transport.

- Secure the transport locks before transport.
- Observe the transport instructions.



NOTICE

Danger due to condensation in the event of temperature differences

Moisture may damage electrical components.

- Ensure that all surfaces are dry prior to commissioning or maintenance.
- If the temperature changes, wait until the device or component has become acclimatised.
- Prevent moisture from penetrating into sensitive components.
- If moisture forms, switch off the device immediately and allow it to dry properly.

- Before transporting, fasten the transport lock and disconnect the device from the mains socket.
- The transport temperature must be between -20 °C and +60 °C.
- Humidity must not be condensing. Humidity must be between 10% and 80%.

- Be aware of the weight of the device.
- When transporting using a transport aid (e.g., a pallet truck), the transport aid must be able to carry at least 1.6 times the transport weight of the device.
- Secure the device to prevent it tipping over and falling down during transport.
- Never transport the device sideways or upside down.

Storage conditions

- The device must be stored in the original packaging.
- Only store the device in dry rooms.
- The storage temperature must be between -20 °C and +60 °C.
- Humidity must not be condensing. Humidity must be between 10% and 80%.

4.2 Fastening the transport lock

Personnel:

- Trained user

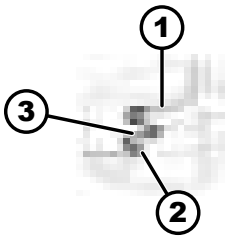
1. ➤ Open the lid.

2. ➤ For UNIVERSAL 320 R:

Check the bellows (3) underneath the motor cover for correct seating.

The bellows (3) must be placed over the edge of the motor cover (1) and over the edge of the centrifuging chamber (2).

3. ➤ Close the lid.



- 1 Motor cover
- 2 Edge of the centrifuging chamber
- 3 Bellows

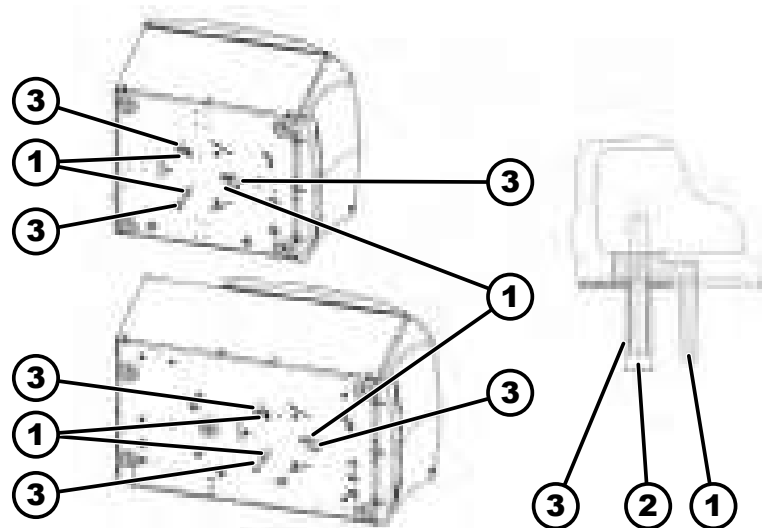


Fig. 13: Transport lock

- 1 Transport lock
- 2 Screw
- 3 Spacer sleeve

4. ➤ Lay the device down on its right-hand side.

5. ➤ Insert 3 transport locks (1).

6. ➤ Screw in 3 screws (2) with spacer sleeves (3).

5 Commissioning

5.1 Unpacking the centrifuge

**CAUTION**

Danger of crushing due to parts falling out of the transport packaging.

- Keep the device balanced during the unpacking process.
- Only open the packaging at the points provided for this purpose.

**CAUTION**

Risk of injury from lifting heavy loads.

- Provide an adequate number of helpers.
- Note the weight. See ➔ *Chapter 3.1 'Technical data' on page 9.*

**NOTICE**

Damage to the device due to improper lifting.

- Do not lift the centrifuge by the control panel or the control panel holder.

Personnel:

- Trained user

1. ➤ Unscrew the screws on the lid of the wooden packaging and store them.
2. ➤ Remove the lid.
3. ➤ Unscrew the screws on the side panels of the wooden packaging and store them.
4. ➤ Remove the side panels.
5. ➤ Remove padding and strips.
6. ➤ Remove the device and accessories by lifting them up out of the box.
7. ➤ Place the device on a stable and level surface.

5.2 Removing the transport lock

Personnel:

- Trained user

The lid is closed.

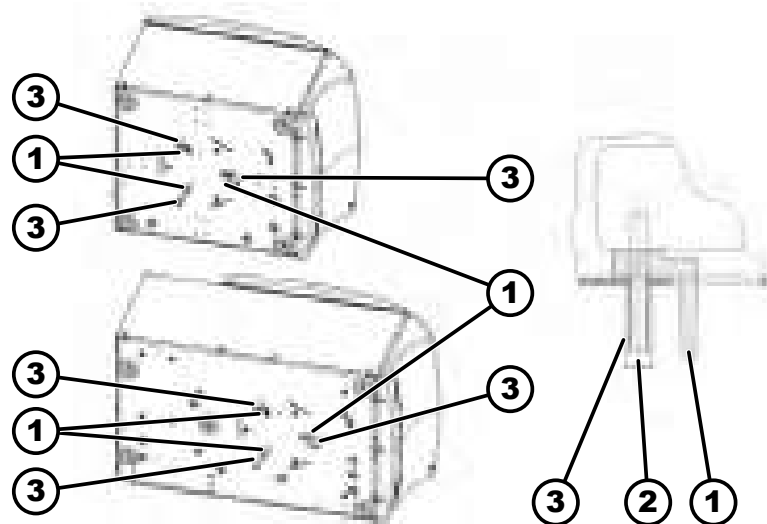


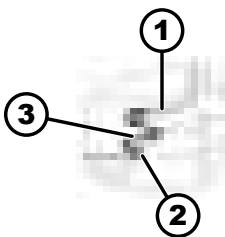
Fig. 14: Transport lock

- 1 Transport lock
- 2 Screw
- 3 Spacer sleeve

1. Lay the device down on its right-hand side.
2. Unscrew 3 screws (2) with 3 spacer sleeves (3).
3. Remove 3 transport locks (1).
4. Keep the screws, spacer sleeves and transport locks in a safe place.
5. Place the device upright.
6. Open the lid.
7. For UNIVERSAL 320 R:

Check the bellows (3) underneath the motor cover for correct seating.

The bellows (3) must be placed over the edge of the motor cover (1) and over the edge of the centrifuging chamber (2).



- 1 Motor cover
- 2 Edge of the centrifuging chamber
- 3 Bellows

5.3 Setting up and connecting the centrifuge

Setting up the centrifuge



WARNING

Risk of injury

Due to insufficient clearance from the centrifuge.

- As per EN / IEC 61010-2-020, no persons, hazardous materials or objects may be present within a safety zone of 300 mm around the centrifuge during a centrifugation run.
- Maintain a distance of 300 mm from the ventilation slots and ventilation openings of the centrifuge.
- The centrifuge's ventilation openings must never be blocked.

**CAUTION****Risk of crushing and damage**

Changes in position caused by vibration may cause the device to fall.

- Place the device on a stable and level surface.
- Select an installation area that is capable of bearing the weight of the device.
- Observe national and local regulations on safety and accident prevention.

**NOTICE****Damage**

Any deviation from the external temperature conditions will result in damage to the samples and device.

- Comply with the maximum and minimum permissible ambient temperatures.
- Avoid placing the device next to heat sources.
- Do not place the device in direct sunlight.
- Protect the device from frost.
- Maintain the required clearance around the device.

Personnel:

- Trained user

1. ➤ Place the device on a stable and level surface.
2. ➤ Maintain a distance of 300 mm around the device.
3. ➤ Comply with the ambient conditions in the technical data (➔ *Chapter 3.1 'Technical data' on page 9*).

Connecting the centrifuge**NOTICE****Damage**

Property damage caused by unauthorised personnel.

- Do not allow persons without the appropriate authorisation to perform any work on or make changes to devices.
- Only authorised personnel may carry out maintenance and repairs.
- Obtain the manufacturer's approval or guidance before carrying out any work on the device.

**NOTICE****Danger due to condensation in the event of temperature differences**

Moisture may damage electrical components.

- Ensure that all surfaces are dry prior to commissioning or maintenance.
- If the temperature changes, wait until the device or component has become acclimatised.
- Prevent moisture from penetrating into sensitive components.
- If moisture forms, switch off the device immediately and allow it to dry properly.

Personnel:

- Trained user

1. ➤ A type B residual current circuit breaker must be used if the device is additionally protected with a residual current circuit breaker in the building installation.

When using a different type, the residual current circuit breaker may either not switch off the unit if there is a fault on the unit, or it may switch off the unit even though there is no fault on the unit.

2. ➤ Check whether the mains voltage and mains frequency match the specification on the rating plate.
3. ➤ Connect the device to a standard mains socket using the mains cable.

5.4 Switching the centrifuge on and off.

Switching the centrifuge on

Personnel:

- Trained user

- Set the mains switch to */I/*.

- ➡ The buttons flash, depending on the centrifuge type.

The following indicators appear one after the other, depending on the centrifuge type:

- the centrifuge model and program version
- When the lid is closed: 'OPEN OEFFNEN' indicator
- When the lid is open: The last centrifugation data used.

Switching off the centrifuge

The rotor is stationary.

- Set the mains switch to */0/*.

6 Operation

6.1 Opening and closing the lid

Opening the lid

Personnel:

- Trained user

The centrifuge is switched on

The rotor is stationary.

- ➔ Press the *[STOP/OPEN]* button.
 - ➡ The lid unlocks by means of a motor.
- The light on the left side of the *[STOP/OPEN]* button goes out.

Closing the lid



CAUTION

Crushing hazard when closing the lid.

Danger of fingers getting crushed when the closing motor pulls the lid against the seal.

- No parts of the operator's body should be in the hazard zone of the lid when closing the lid.
- To close the lid, press on the lid from above.



NOTICE

Damage to the device caused by the lid slamming.

- Close the lid slowly.
- Do not slam the lid.



*When the left side of the *[STOP/OPEN]* button flashes, press the *[STOP/OPEN]* button so that the motorised lid lock assumes the home position (open).*

Personnel:

- Trained user
- ➔ Close the lid and press the front edge of the lid down gently.
 - ➡ The lid locks using a motor.
- The left side of the *[STOP/OPEN]* button lights up.

6.2 Removing and installing the rotor

Removing the rotor with a clamping nut

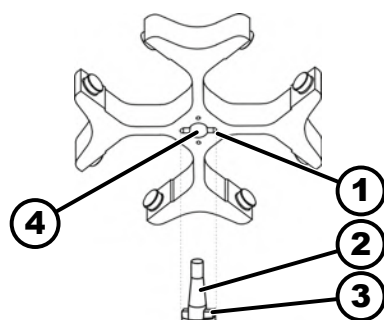


Fig. 15: Rotor installation and removal

- 1 Groove
- 2 Motor shaft
- 3 Driver
- 4 Hole

Personnel:

- Trained user
- 1. ➔ Open the lid.
- 2. ➔ Loosen the rotor clamping nut using the supplied spanner.
 - ➡ After passing the working point for lifting the rotor, the rotor detaches from the cone of the motor shaft (2).
- 3. ➔ Turn the clamping nut until the rotor can be lifted off the motor shaft.
- 4. ➔ Remove the rotor.

Installing the rotor with a clamping nut

Personnel:

- Trained user

The lid is open.

1. ➤ Clean the motor shaft (2) and rotor hole (4).
2. ➤ Lightly grease the motor shaft (2), see ➔ Chapter 8.2 'Instructions for cleaning and disinfection' on page 37.
3. ➤ Place the rotor vertically on the motor shaft (2).
The driver (3) of the motor shaft must be in the groove (1) of the rotor. The orientation of the groove is marked on the rotor.
4. ➤ Hand-tighten the rotor clamping nut using the supplied spanner.
5. ➤ Check that the rotor is firmly seated.

Removing the rotor without a clamping nut

Removing the rotor

Personnel:

- Trained user

- Hold the rotor by the rotary handle (1) of the lid and lift it off the hub (2).

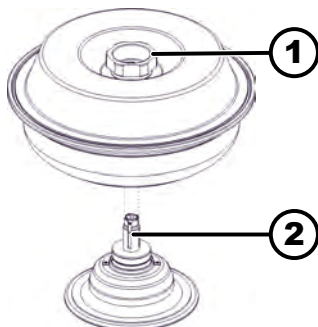
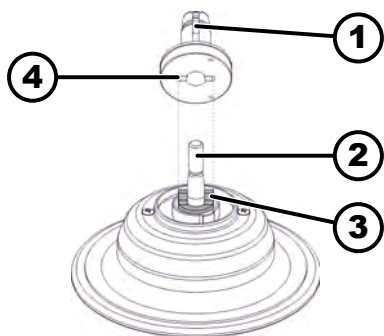


Fig. 16: Rotor installation and removal

- 1 Rotary handle
- 2 Hub

Removing the hub



1. ➤ Open the lid.
2. ➤ Unscrew the clamping nut.
➔ After passing the working point for lifting the rotor, the hub (1) detaches from the cone of the motor (2).
3. ➤ Remove the hub.

Fig. 17: Hub installation and removal

- 1 Hub
- 2 Motor shaft
- 3 Driver
- 4 Groove

Installing the rotor without a clamping nut

Installing the hub

Personnel:

- Trained user

1. ➤ Open the lid.
2. ➤ Clean the motor shaft (2) and rotor hole.
3. ➤ Lightly grease the motor shaft (2), see ➡ Chapter 8.2 'Instructions for cleaning and disinfection' on page 37.
4. ➤ Place the hub (1) vertically on the motor shaft (2).
The driver (3) of the motor shaft must be in the groove (4) of the hub.
Check that the hub is firmly seated.
5. ➤ Hand-tighten the clamping nut of the hub using the supplied hex key.
6. ➤ Check that the hub is firmly seated.

Installing the rotor

1. ➤ Clean the hub (2).
2. ➤ Lift the rotor by the rotary handle and place it vertically on the hub (2).
3. ➤ Push the rotor down as far as it will go.

6.3 Inserting and removing buckets

Inserting buckets



NOTICE

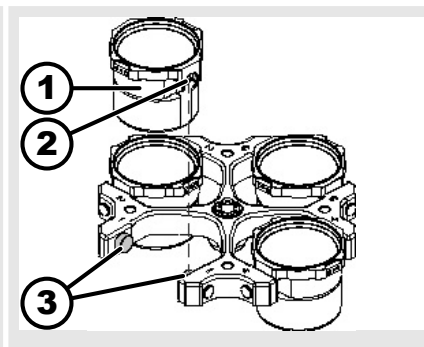
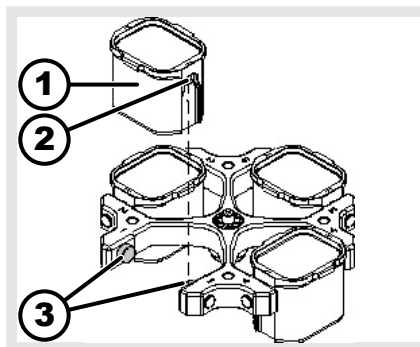
Damage to the device due to imbalances caused by incorrect loading of the rotor.

- Load all swing-out rotor locations with the same buckets.



Buckets marked with the number of the rotor location may only be used there.

Buckets marked with a set number may only be used together.



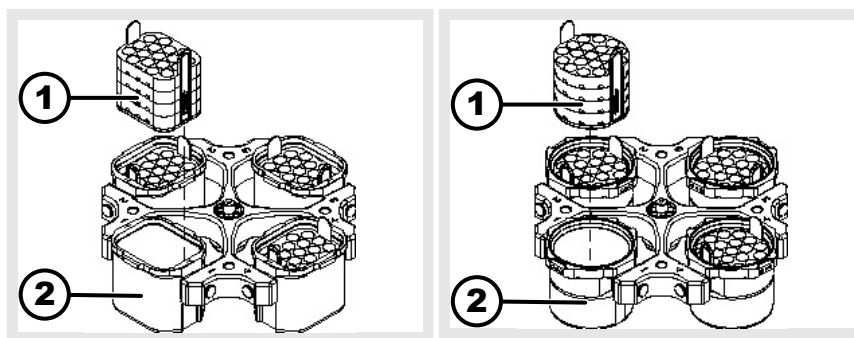
1. ➤ Check that the rotor is firmly seated.
2. ➤ Grease the trunnions (3).
3. ➤ Insert the bucket (1) into the rotor from above. The trunnions (3) must be in the grooves (2).
4. ➤ Push the bucket (1) down as far as it will go.

Removing the bucket

- Pull the bucket (1) vertically upwards out of the rotor.

6.4 Inserting and removing adapters

Inserting



the adapter

➔ Insert the adapter (1) vertically into the bucket (2) from above.

removing

➔ Remove the adapter (1) vertically upwards out of the bucket (2).

Adapter with positioning pin

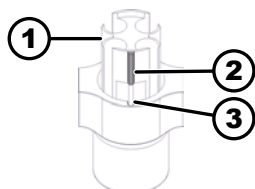


Fig. 18: Adapter with positioning pin

- 1 Inserting
- 2 Positioning pin
- 3 Inserting

the groove

➔ Insert the adapter (1) into the bucket
The positioning pin (2) must be in the groove (3) of the bucket.

removing

➔ Remove the adapter (1) vertically upwards out of the bucket.

6.5 Loading

Filling centrifuge tubes



WARNING

Risk of injury from contaminated sample material.

Contaminated sample material escapes from the sample tube during centrifugation.

- Use centrifuge tubes with special screw caps for hazardous substances.
- For risk group 3 and 4 materials, use a biosafety system in addition to the sealable centrifuge tubes (see WHO's 'Laboratory Biosafety Manual').



NOTICE

Damage to the device due to highly corrosive substances.

Highly corrosive substances may impair the mechanical strength of rotors, buckets and accessories.

- Do not centrifuge highly corrosive substances.



Standard glass centrifuge tubes can be loaded up to RCF 4000 (DIN 58970 part 2).

Personnel:

- Trained user

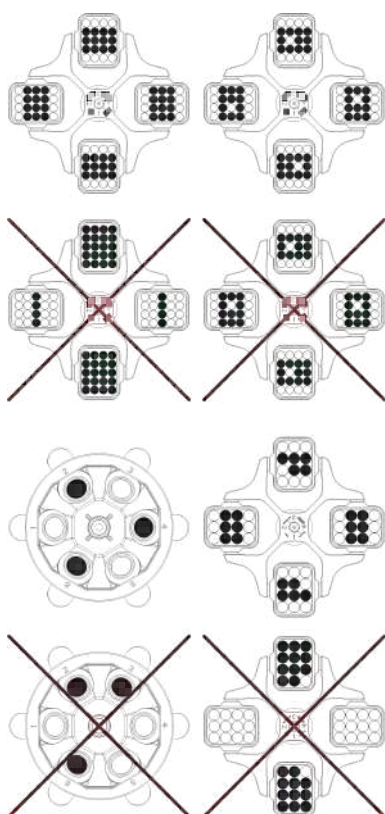
➔ Fill centrifuge tubes outside the centrifuge.

The maximum capacity of the centrifuge tubes specified by the manufacturer must not be exceeded.

With angle rotors, the centrifuge tubes must only be filled to the extent that no liquid can be ejected from the tubes during the centrifugation run.

It must be ensured that there is a uniform fill level in the tubes in order to keep the weight differences in the centrifuge tubes as low as possible.

Loading swing-out rotors



Personnel:

- Trained user

1. ➔ Check that the rotor is firmly seated.

2. ➔ The centrifuge tubes must be distributed symmetrically across all rotor locations.

The weight of the permissible filling capacity is indicated on each rotor. The weight must not be exceeded.

No liquid must be allowed to enter the buckets and the centrifuging chamber when loading the buckets and swinging them out during the centrifugation run.

For containers with rubber inserts, there must always be the same number of rubber inserts under the centrifuge tubes.

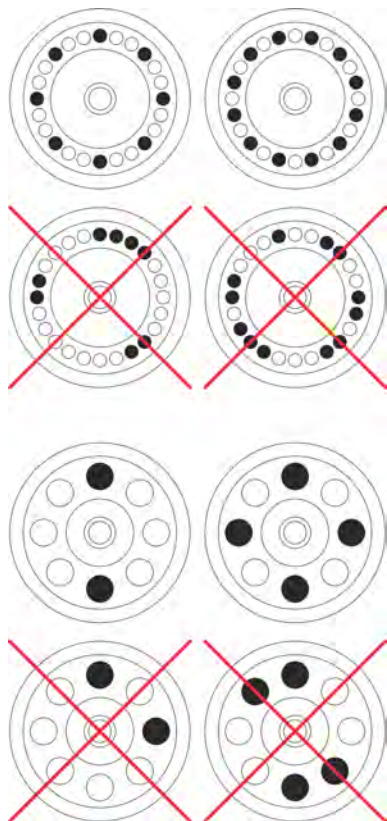
All rotor locations must be filled with the same buckets. Certain buckets are marked with the number of the rotor location. The buckets must only be inserted in the corresponding rotor location.

Buckets marked with a set number (e.g. S001/4) may only be used in the set.

Loading the angle rotors

Personnel:

- Trained user



1. ➤ Check that the rotor is firmly seated.
2. ➤ The centrifuge tubes must be distributed evenly over all locations on the rotor.

No liquid must be allowed to enter the rotor and the centrifuging chamber when loading the rotor.

With rotors, the centrifuge tubes must only be filled to the extent that no liquid can be ejected from the tubes during the centrifugation run.

The weight of the permissible filling capacity is indicated on each rotor. The weight must not be exceeded.

6.6 Opening and closing the biosafety system

6.6.1 Explanation

The user must take appropriate actions when centrifuging hazardous substances or mixtures of substances that are toxic, radioactive or contaminated with pathogenic microorganisms.

Centrifuge tubes with special screw caps for hazardous substances must always be used.

For materials of risk group 3 and 4, a biosafety system must be used in addition to the sealable centrifuge tubes (see the World Health Organisation's "Laboratory Biosafety Manual").

In a biosafety system, a bioseal (sealing ring) prevents droplets and aerosols from escaping.

If the bucket of a biosafety system is used without the lid, the sealing ring must be removed from the bucket to prevent damage to the sealing ring during the centrifugation run.

Damaged biosafety systems are no longer microbiologically tight.

If no biosafety system is used, a centrifuge is not microbiologically tight in the sense of the EN / IEC 61010-2-020 standard.

Storage of biosafety systems

Biosafety systems must only be stored with the lid open to avoid damage to the sealing rings during storage.

6.6.2 Lid with screw cap and hole

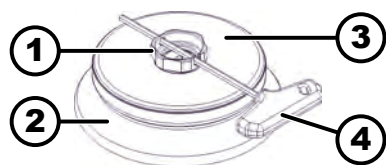


Fig. 19: Biosafety system

- 1 Rotary handle
- 2 Rotor
- 3 Lid
- 4 Key

Closing

1. ➤ Place the lid (3) centrally on the rotor (2).
2. ➤ Insert the supplied key (4) into the hole in the rotary handle (1).
3. ➤ Turn the lid (3) at the key (4) clockwise until it is tightly closed.

Opening

1. ➤ Insert the supplied key (4) into the hole in the rotary handle (1).
2. ➤ Turn the lid (3) at the key (4) anticlockwise until it is open.
3. ➤ Remove the lid (3) from the rotor (2).

6.6.3 Lid with bracket and spring-type lock

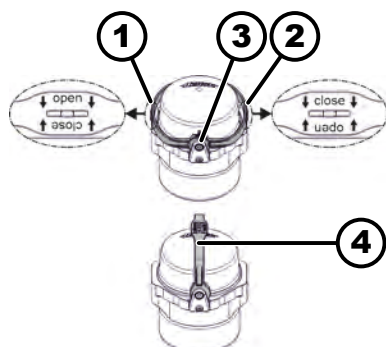


Fig. 20: Biosafety system

- 1 Bracket position "open"
- 2 Bracket opening operations
- 3 Bracket position "close"
- 4 Bracket carrying position

Closing

1. ➤ Swivel the bracket to the "'open'" position (1).
The arrows of the labelling must point downwards so that the word "open" is legible.
2. ➤ Place the lid centrally on the bucket.
The two pins of the lid must be in the two openings of the bracket (2).
3. ➤ Swivel the bracket to the "'close'" position (3).
The arrows of the labelling must point downwards so that the word "close" is legible.
The bracket must rest on the bucket so that the bucket can swing out during the centrifugation run.

4. ➤ For transport or when inserting and removing the bucket, swing the bucket into the carrying position (4) and hold the bucket by the bracket.
 - The tightness of the biosafety system is also guaranteed in the carrying position.

Do not rock the biosafety system back and forth during transport, otherwise leak-tightness is no longer ensured.

Opening

1. ➤ Swivel the bracket to the "open" position (1).
The arrows of the labelling must point downwards so that the word "open" is legible.
2. ➤ Remove the lid from the bucket.

6.6.4 Lid with screw cap

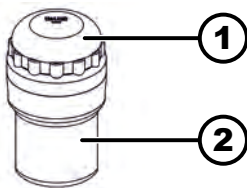


Fig. 21: Biosafety system

- 1 Lid
- 2 Bucket

Closing

1. ➤ Place the lid (1) centrally on the bucket (2).
2. ➤ Turn the lid (1) clockwise until it is tightly closed.

Opening

1. ➤ Turn the lid (1) anticlockwise until it is open.
2. ➤ Remove the lid (1) from the bucket (2).

6.7 Centrifugation

6.7.1 Centrifugation in continuous operation

Personnel:

- Trained user

1. ➤ Set minutes and seconds at '∞' or retrieve a continuously running program.
2. ➤ Press the [START/IMPULS] button.
 - The centrifugation run is started.
 - The [START/IMPULSE] button lights up during the centrifugation run.
 - The timing starts at '00:00'.
 - The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the elapsed time are displayed during the centrifugation run.
3. ➤ Press the [STOP/OPEN] button to cancel the centrifugation run.
 - Ramp-down takes place with the set brake level. The brake level is displayed.
 - An audible signal sounds when the rotor comes to a standstill.
 - 'OPEN OEFFNEN' is displayed.

6.7.2 Centrifugation with time preselection

Personnel:

- Trained user

1. ➤ Set centrifugation parameters or retrieve a program.
2. ➤ Press the *[START/IMPULS]* button.
 - ➡ The centrifugation run is started.

The *[START]* button lights up during the centrifugation run.

The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the remaining time are displayed during the centrifugation run.
3. ➤ Ramp-down takes place with the selected brake level after the time has elapsed or if the centrifugation run is cancelled.
 - ➡ The brake level is displayed.

An audible signal sounds when the rotor comes to a standstill.

'OPEN OEFFNEN' is displayed.

The right side of the *[STOP/OPEN]* button lights up when the centrifuge is in ramp-down.

The left side of the *[STOP/OPEN]* button lights up when the rotor is at a standstill.

The light on the *[START/IMPULS]* button and the right side of the *[STOP/OPEN]* button go out.

6.7.3 Short-term centrifugation

Personnel:

- Trained user

1. ➤ Press and hold the *[START/IMPULS]* button.
 - ➡ The *[START/IMPULS]* button lights up during the centrifugation run.

Timing starts at 00:00.

The rotor speed or the RCF value, the temperature in the centrifuging chamber (only for centrifuges with cooling) and the elapsed time are displayed during the centrifugation run.
2. ➤ Release the *[START/IMPULSE]* button to end the centrifugation run.
 - ➡ Ramp-down takes place with the set brake level. The brake level is displayed.

An audible signal sounds when the rotor comes to a standstill.

'OPEN OEFFNEN' is displayed.

6.8 Quick stop function

Personnel:

- Trained user

- Press the *[STOP/OPEN]* button twice.
 - ➡ Ramp-down with brake level "9" (shortest ramp-down time) is displayed and executed.

7 Software operation

7.1 Centrifugation parameters

7.1.1 Relative centrifugal force, RCF

The relative centrifugal force RCF is dependent on the speed and the centrifuging radius.

The relative centrifugal force RCF is stated as a multiple of the acceleration due to gravity (g).

The relative centrifugal force RCF is a dimensionless numerical value and is used to compare the separation and sedimentation performance.

$$RCF = \left(\frac{RPM}{1000} \right)^2 * r * 1,118$$

$$RPM = \sqrt{\frac{RCF}{r * 1,118}} * 1000$$

RCF = relative centrifugal force

RPM = Speed

r = centrifuging radius in mm = distance from the centre of the axis of rotation to the bottom of the centrifuge tube.

7.1.2 Centrifugation of substances or mixtures of substances with a density higher than 1.2 kg/dm³

The density of the substances or mixtures of substances must not exceed 1.2 kg/dm³ during centrifugation at maximum speed. The maximum permissible speed must be reduced for substances or substance mixtures with a higher density. The permissible speed can be calculated using the following formula:

$$\text{Reduced speed } (n_{red}) = \sqrt{\frac{1,2}{\text{Greater density [kg/dm}^3\text{]}}} * \text{maximum speed [RPM]}$$

For example: Maximum speed 4000 RPM, density 1.6 kg/dm³

$$n_{red} = \sqrt{\frac{1,2(\text{kg/dm}^3)}{1,6(\text{kg/dm}^3)}} * 4000 \text{ RPM} = 3464 \text{ RPM}$$

If, in exceptional cases, the maximum load indicated on the bucket is exceeded, the speed must also be reduced. The permissible speed can be calculated using the following formula:

$$\text{Reduced speed } (n_{red}) = \sqrt{\frac{\text{maximum load [g]}}{\text{actual load [g]}}} * \text{maximum speed [RPM]}$$

For example: Maximum speed 4000 RPM, maximum load 300 g, actual load 350 g

$$n_{red} = \sqrt{\frac{300 \text{ g}}{350 \text{ g}}} * 4000 \text{ RPM} = 3703 \text{ RPM}$$





Please contact the manufacturer if you are not sure.

7.2 Programming






7.2.1 Write protection for programs

The programs can be protected to prevent unintentional changes.







When the rotor is at a standstill, write protection can be enabled or disabled as follows:

1.  Press and hold the *[SELECT]* button.
 - ➡ 'SOUND/BELL' is displayed after 8 seconds.
2.  Press the *[SELECT]* button.
 - ➡ 'LOCK' is displayed.
3.  Use *[Rotary knob]* to set 'OFF' or 'ON'.
 - OFF = The programs are not write-protected
 - ON = The programs are write-protected
4.  Press the *[START/IMPULS]* button.
 - ➡ The setting is stored.
 - If ON is set: '*** lock ***' is displayed briefly.
 - If OFF is set: '*** ok ***' is displayed briefly.

7.2.2 Opening or loading programs

1.  Use the *[SELECT]* button to select the 'PROG RCL' parameter.
2.  Use the *[Rotary knob]* to set the desired program location.
3.  Press the *[START/IMPULS]* button.
 - ➡ '*** ok ***' is displayed briefly.
 - The centrifugation data of the desired program location is displayed
4.  To check the parameters: Press the *[SELECT]* button several times.
5.  To exit the parameter indicator: Press the *[OPEN/STOP]* button or do not press any button for 8 seconds.

7.2.3 Entering or changing programs

1.  Retrieve program.
2.  If required: Press the *[RCF]* button to toggle between RPM and RCF indicator ('>' '<').
3.  If required: Press the *[SELECT]* button to select the desired parameter and set it with the *[Rotary knob]*.
 - The parameters t/min and t/sec must be set to 0 using the *[Rotary knob]* to set continuous operation. Continuous operation is shown in the indicator with '∞'.
4.  Use the *[SELECT]* button to select the 'PROG STO' parameter.
5.  Use the *[Rotary knob]* to set the desired program location.
6.  Press the *[START/IMPULS]* button.
 - ➡ Settings are stored in the desired program location.
 - '*** ok ***' is displayed briefly.
 - The settings are always stored in program location # if the *[START/IMPULS]* button is pressed without the 'PROG STO' parameter being selected.

7.3 Rotor detection

- Rotor detection is performed after starting a centrifugation run.
- If the rotor has been changed, the centrifugation run is cancelled after rotor detection. The rotor code (rot) is displayed.
- If the maximum speed of the rotor used is less than the set speed, the speed is limited to the maximum rotor speed.

7.4 Cooling (for centrifuges with cooling)





7.4.1 Instructions, cooling

The temperature setpoint can be adjusted from -20 °C to +40 °C.
The lowest achievable temperature is rotor dependent.

7.4.2 Standby cooling

After a centrifugation run, standby cooling is delayed and the display shows '*Deckel entriegelt*'.



The delay time is adjustable from 1 to 5 minutes, in 1-minute increments. It is preset to 1 minute.

- The rotor is stationary.
- The lid is open
- 1.  Press and hold the *[Cooling]* button.
 - ➡ '*t/min = X*' is displayed after 8 seconds.
- 2.  Use the *[Rotary knob]* to set the delay time.
- 3.  Press the *[START/IMPULS]* button.
 - ➡ The setting is stored.
 - **** ok ***** is displayed briefly.
- 4.  Press the *[STOP/OPEN]* button twice or wait 8 seconds to exit the menu.

7.4.3 Precooling the rotor




Starting

The rotor is stationary.

1.  Press the *[Cooling]* button.
2.  Press the *[STOP/OPEN]* button.
 - ➡ Precooling of the rotor is terminated.
 - Ramp-down takes place with the selected brake level.
 - The brake level is displayed.

Set

The precooling speed is adjustable from 500 RPM up to the maximum rotor speed in increments of 10 RPM. It is preset to 10000 RPM.

- The rotor is stationary.
- The lid is open.
- 1.  Press and hold the *[Cooling]* button.
 - ➡ '*t/min = X*' is displayed after 8 seconds.
- 2.  Press the *[Cooling]* button.
 - ➡ Precooling speed '*RPM = XXXX*' is displayed.
- 3.  Use the *[Rotary knob]* to set the precooling speed.

4. ➤ Press the *[START/IMPULS]* button.
 - The setting is stored.
 - *** ok **** is displayed briefly.
5. ➤ Press the *[STOP/OPEN]* button twice or wait 8 seconds to exit the menu.

7.5 Machine Menu

7.5.1 Querying system information

Parameter query

The rotor is stationary.

1. ➤ Press and hold the *[SELECT]* button for 8 seconds.
 - *'SOUND/BELL'* is displayed.
2. ➤ Press the *[SELECT]* button repeatedly until *'FU/CCI -S.'* is displayed.
Program version for the frequency inverter
3. ➤ Press the *[SELECT]* button repeatedly until *'HOURS'* is displayed.
Internal operating hours (the time during which the centrifuge was switched on)
4. ➤ Turn to the right with the *[Rotary knob]*.
 - *'STARTS'* is displayed.
 - Number of centrifugation runs
5. ➤ Turn to the right with the *[Rotary knob]*.
 - *'ROTORCHG1'* is displayed.
 - Internal operating hour of the last rotor change
6. ➤ Turn to the right with the *[Rotary knob]*.
 - *'ROTORCHG2'* is displayed.
 - Internal operating hour of the penultimate rotor change
7. ➤ Turn to the right with the *[Rotary knob]*.
 - *'OPhoursCHG'* is displayed.
 - Internal operating hour of the last operating hours change
8. ➤ Turn to the right with the *[Rotary knob]*.
 - *'IMBALCHG'* is displayed.
 - Internal operating hour of the last imbalance cut-off change
9. ➤ Turn to the right with the *[Rotary knob]*.
 - *'OffsetCHG'* is displayed.
 - Internal operating hour of the last offset adjustment
10. ➤ Press the *[STOP/OPEN]* button to exit the menu.

7.5.2 Querying operating hours

The rotor is stationary.

1. ➤ Press and hold the *[SELECT]* button.
 - *'SOUND/BELL'* is displayed after 8 seconds.
2. ➤ Press the *[SELECT]* button repeatedly until *'CONTROL.'* is displayed.
 - *'CONTROL.'* and the operating hours are displayed.
3. ➤ Press the *[STOP/OPEN]* button to exit the menu.

7.5.3 Audible signal

7.5.3.1 General

The audible signal sounds:

- after a problem occurs in the 2 s interval.
- after completion of the centrifugation run and rotor standstill in the 30 s interval.

Opening the lid or pressing any button stops the audible signal.

7.5.3.2 Setting an audible signal

1. ➔ Press and hold the *[SELECT]* button.
 - ➔ 'SOUND / BELL ON' or 'SOUND / BELL OFF' is displayed after 8 seconds.
2. ➔ Use *[Rotary knob]* to set 'OFF' or 'ON'.
 - OFF = audible signal disabled
 - ON = audible signal enabled
3. ➔ Press the *[START/IMPULS]* button.
 - ➔ The setting is stored.
 - **** ok **** is displayed briefly.

8 Cleaning and care

8.1 Overview table

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8	Cleaning and care					36
8.3	Cleaning					37
8.3	Cleaning the device		X			37
8.3	Cleaning biosafety systems			X		38
8.3	Cleaning accessories			X		38
8.4	Disinfection					38
8.4	Disinfecting the device	X				38
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8.5	Maintenance					39
8.5	Greasing the rubber seal of the centrifuging chamber			X		39
8.5	Greasing the rubber seal of the biosafety system			X		39
8.5	Trunnion greasing			X		39

Chap.	Task to execute	if required	daily	weekly	Annually	Page
8.5	Checking the accessories			X		39
8.5	Checking the biosafety system			X		39
8.5	Centrifuging chamber damage inspection				X	39
8.5	Greasing the motor shaft				X	39
8.5	Accessories with a limited service life	X				40
8.5	Replacing centrifuge tubes	X				40

8.2 Instructions for cleaning and disinfection



DANGER

Risk of contamination

Inadequate cleaning or failure to observe the cleaning instructions can lead to contamination risks.

- Observe national and local regulations on safety and accident prevention.
- Observe cleaning instructions.
- Wear personal protective equipment when cleaning the device.
- Comply with laboratory regulations (e.g. TRBAs, the German Protection against Infection Act, hygiene plan) for handling biological agents.

- The device and its accessories must not be cleaned in dishwashers.
- Only perform hand cleaning and liquid disinfection.
- The water temperature must not exceed 25 °C.
- To prevent any corrosion due to use of detergents or disinfectants, it is essential to follow the special application instructions provided by the manufacturers of the detergent or disinfectant.

Disinfectant:

- Surface disinfectant (not disinfectant for hands or instruments)
- Ethanol as the sole active substance.
Do not use an ethanol-propanol mixture to disinfect the viewing window in the lid of the device.
- Concentration is not less than 30 %
- pH: 6 – 8
- Non-corrosive

8.3 Cleaning

Cleaning the device

1. ➤ Open the lid.
2. ➤ Switch off the device and disconnect it from the power supply.
3. ➤ Remove accessories.

4. ➤ Clean the centrifuge housing and the centrifuging chamber with soap or a mild detergent and a damp cloth.
5. ➤ Remove any detergent residues with a damp cloth after using detergents.
6. ➤ The surfaces must be dried immediately after cleaning.
7. ➤ Dry the centrifuging chamber with an absorbent cloth if condensation forms.

Cleaning biosafety systems

1. ➤ Clean the biosafety system using the detergent and a damp cloth.
2. ➤ Remove any detergent residues with a damp cloth after using detergents.
3. ➤ Dry the accessories immediately after cleaning using a lint-free cloth and oil-free compressed air. Dry all cavities completely using oil-free compressed air.

Cleaning accessories

1. ➤ Clean the accessories using the detergent and a damp cloth.
2. ➤ Remove any detergent residues with a damp cloth after using detergents.
3. ➤ Dry the accessories immediately after cleaning using a lint-free cloth and oil-free compressed air. Dry all cavities completely using oil-free compressed air.

8.4 Disinfection



Disinfection must always be preceded by cleaning of the components concerned.

See ➔ Chapter 8.3 'Cleaning' on page 37



Disinfectant concentration and application time according to the manufacturer's instructions.

Disinfecting the device



CAUTION

Risk of injury due to ingress of water or other liquids.

- Protect the device against external liquids.
- Do not disinfect the device using spray.

1. ➤ Open the lid.
2. ➤ Switch off the device and disconnect it from the power supply.
3. ➤ Remove accessories.
4. ➤ Clean the housing and centrifuging chamber using disinfectant.
5. ➤ Remove any disinfectant residues with a damp cloth after using disinfectants.
6. ➤ The surfaces must be dried immediately after cleaning.

Disinfecting the accessories

1. ➤ Disinfect the accessories using the disinfectant.
2. ➤ Wet all cavities with bubble-free disinfectant.

3. ➤ Remove the disinfectant residues or leave them to dry after using disinfectants.

Autoclaving

The following accessories may be autoclaved at 121 °C / 250 °F (20 min):

- Swing-out rotors
- Aluminium angle rotors
- Metal buckets
- Lid with bioseal
- Inserting

No statement can be made about the resulting degree of sterility.

The lids of the rotors and bucket must be removed before autoclaving.

Autoclaving accelerates the ageing of materials. It may cause changes in colour. After autoclaving, the rotors and accessories are to be visually inspected for damage and any damaged parts are to be replaced immediately.

The sealing ring in question is to be replaced if there are signs of cracking, embrittlement or wear. For lids with non-replaceable sealing rings, the whole lid must be replaced.

The sealing rings must be replaced after autoclaving to ensure the tightness of the biosafety systems.

8.5 Maintenance

Greasing the rubber seal of the centrifuging chamber

- Rub the sealing ring lightly with a rubber care product.

Greasing the rubber seal of the biosafety system

- Rub the sealing ring lightly with a rubber care product.

Trunnion greasing

1. ➤ Remove accessories.
2. ➤ Clean the trunnions.
3. ➤ Remove any detergent residues with a damp cloth after using detergents.
4. ➤ Grease the trunnions and suspension with Hettich Tubenfett 4051.
5. ➤ Excess grease in the centrifuging chamber must be removed.

Checking the accessories

1. ➤ The accessories shall be checked for wear and corrosion damage.
2. ➤ Check that the rotor is firmly seated.

Checking the biosafety system

1. ➤ Visually check all parts of the biosafety system for damage.
2. ➤ Check the correct installation position of the sealing ring(s) of the biosafety system.
3. ➤ Replace the damaged parts of the biosafety system.
4. ➤ Replace the sealing ring in question immediately if there are signs of cracking, embrittlement or wear. For lids with non-replaceable sealing rings, the whole lid must be replaced.

Centrifuging chamber damage inspection

- Check the centrifuging chamber for damage.

Greasing the motor shaft

1. ➤ Remove accessories.

2. ➤ Clean the motor shaft.
3. ➤ Remove any detergent residues with a damp cloth after using detergents.
4. ➤ Grease the motor shaft with Hettich Tubenfett 4051.
5. ➤ Excess grease in the centrifuging chamber must be removed.

Accessories with a limited service life

The use of certain accessories is time-limited. For safety reasons, the accessories must no longer be used when either the maximum number of permissible run cycles marked on them or the expiry date marked on them has been reached.

- The maximum permissible number of run cycles or the expiry date can be seen on the accessories.

Replacing centrifuge tubes



CAUTION

Risk of injury from broken glass.

Broken glass may cause glass splinters and contaminated liquids to be found inside the centrifuge.

- Wear cut-resistant gloves.
- Wear protective goggles and a face mask.

Broken parts of the tube, glass splinters and spilled centrifuge material must be removed completely in the event of leakage or if a centrifuge tube breaks. Glass splinters that are not removed will cause further glass breakage.

The rubber inserts and the plastic sleeves of the rotors must be replaced after a glass breakage.

Disinfection must be carried out if the material is infectious.


9 Troubleshooting

9.1 Fault description

Customer service must be notified if the fault cannot be rectified based on the fault table. State the centrifuge type and serial number. Both numbers can be seen on the type plate of the centrifuge.

* Error number does not appear on the display.

Fault description	Cause	Remedy
no display	No power. Overcurrent protection fuse has tripped.	<ul style="list-style-type: none"> ■ Check the supply voltage. ■ Set the mains switch to <i>/I/</i>.
TACHO - ERROR 1, 2, 96	Tacho defective. Motor, electronics defective.	<ul style="list-style-type: none"> ■ Open the lid. ■ Set the mains switch to <i>/O/</i>. ■ Wait at least 10 seconds. ■ Turn the rotor vigorously by hand. ■ Set the mains switch to <i>/I/</i>. The rotor must rotate while switching on.
IMBALANCE 3*	The rotor is unevenly loaded.	<ul style="list-style-type: none"> ■ Open the lid. ■ Check the loading of the rotor. ■ Repeat the centrifugation run.

Fault description	Cause	Remedy
CONTROL - ERROR 4, 6	Lid lock error.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
CONTROL - ERROR 8	Lid lock error	<ul style="list-style-type: none"> ■ Open the lid. ■ Set the mains switch to [0]. ■ Wait at least 10 seconds. ■ Turn the rotor vigorously by hand. ■ Set the mains switch to [I]. The rotor must rotate while switching on.
N > MAX 5	Overspeed.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
N < MIN 13	Underspeed.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
MAINS INTERRUPT 11*	Loss of mains power during the centrifugation run. The centrifugation run was not completed.	<ul style="list-style-type: none"> ■ Open the lid. ■ Press the [START/IMPULS] button. ■ If required: Repeat the centrifugation run.
ROTORCODE 10.1, 10.2	Rotor coding error.	<ul style="list-style-type: none"> ■ Open the lid.
CONTROL-ERROR 21, 22, 25, 27, 29	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
CONTROL-ERROR 23	Error/defect in control panel.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SER I/O-ERROR 30, 31, 33, 36	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
°C * -ERROR 51-53, 55	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
FU/CCI-ERROR 60-64, 67, 68, 82-86	Error/defect in electronics/motor.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SYNC-ERROR 90	Error/defect in electronics.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
SENSOR-ERROR 91-93	Error/defect in imbalance sensor.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
KEYBOARD-ERROR	Error/defect in control panel.	<ul style="list-style-type: none"> ■ Perform a MAINS RESET.
NO ROTOR	No rotor installed.	<ul style="list-style-type: none"> ■ Open the lid and install the rotor.
N > ROTOR MAX	Speed in the selected program greater than the maximum rotor speed.	<ul style="list-style-type: none"> ■ Check and correct the speed.
N > ROTOR MAX	The rotor has been changed. The built-in rotor has a higher maximum speed than the previously used rotor, and it has not yet been detected by the rotor detection function.	<ul style="list-style-type: none"> ■ Set a speed up to the maximum speed of the previously used rotor. Press the [START/IMPULS] button to perform rotor detection.
 The left half of the display lights up.	-	<ul style="list-style-type: none"> ■ Notify customer service.

9.2 Performing a MAINS RESET

1. ➤ Set the mains switch to [0].
2. ➤ Wait 10 seconds.
3. ➤ Set the mains switch to [I].

9.3 Emergency release

The lid cannot be unlocked by the motor in the event of a power failure. Emergency unlocking by hand must be performed.



! WARNING

Risk of electric shock due to maintenance and servicing work on live device.

- Disconnect the device from the mains before carrying out repairs and maintenance.



WARNING

Danger of cutting and crushing due to moving rotor.

- Do not open the lid until the rotor has stopped.

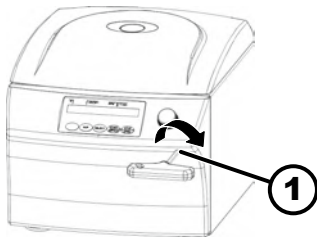


Fig. 22: Emergency release

1 Hole

Personnel:

- Trained user

1. ➤ Look through the window in the lid to ensure that the rotor is stationary.
2. ➤ Insert the hex key horizontally into the hole (1) and turn clockwise until the lid opens.
3. ➤ Remove the hex key from the hole (1).
4. ➤ Check whether the left side of the [STOP/OPEN] button flashes when power is restored.

When the left side of the [STOP/OPEN] button flashes, press the [STOP/OPEN] button so that the motorised lid lock assumes the home position (open) again.

10 Disposal

10.1 General instructions



The device can be disposed of via the manufacturer.

A Return Material Authorisation (RMA) form must always be requested for a return.

If necessary, contact the Technical Service Department of the manufacturer:

- **Andreas Hettich GmbH**
- Föhrenstraße 12
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! WARNING

Risk of soiling and contamination

Damage to the environment and health due to improper disposal.

- Observe national and local environmental protection and disposal regulations to ensure proper disposal or recycling. Separate metals, non-metals, composite materials and auxiliary materials by type and dispose of them in an eco-friendly manner.
- The device may only be disassembled and disposed of by trained and authorised service technicians.

The device is intended for the commercial sector ("Business to Business" - B2B).

According to Directive 2012/19/EU, the devices may no longer be disposed of with household waste.

The devices are assigned to the following groups according to the Stiftung Elektro-Altgeräte Register (EAR (German foundation under civil law)):

- Group 1 (heat exchangers)
- Group 4 (large devices)

The crossed-out wheellie bin symbol indicates that the device must not be disposed of with household waste. Regulations governing disposal of such devices may differ in individual countries. If necessary, contact the supplier.



Fig. 23: Household waste ban

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Déclaration de conformité UE

EU Declaration of conformity

du fabricant

of the manufacturer

Andreas Hettich GmbH • Föhrenstrasse 12 • D-78532 Tuttlingen • Germany
SRN: DE-MF-000010680

Par la présente, nous déclarons sous notre responsabilité, sans participation d'un organisme notifié, que le dispositif désigné :

We hereby declare under our responsibility without involvement of a notified body that the designated device:

Type de dispositif **Centrifugeuse de paillasse**
Nom **UNIVERSAL 320**
UNIVERSAL 320 R
UDI-DI de base **040506740100139R**
GMDN **36465**
Classification **Dispositif de diagnostic**
in vitro,
classe A (annexe VIII, règle 5)
Conformément au **règlement (UE) 2017/746**
annexe IX

Type of device **benchtop centrifuges**
Name **UNIVERSAL 320**
UNIVERSAL 320 R
Basic UDI-DI **040506740100139R**
GMDN **36465**
Classification **In vitro diagnostic, class A**
(Annex VIII, Rule 5)
according to **Regulation (EU) 2017/746**
Annex IX

avec les accessoires évalués comme conformes au dispositif d'après la liste d'accessoires de la documentation technique correspondante, satisfait aux dispositions pertinentes du règlement (UE) 2017/746 relatif aux dispositifs de diagnostic in vitro.

and its accessories, which are listed in the related technical documentation and whose conformity has been assessed together with the device, complies with the relevant provisions of the Regulation (EU) 2017/746 on in vitro diagnostic devices.

utilisation conforme aux dispositions

La centrifugeuse **UNIVERSAL 320 / UNIVERSAL 320 R** est un dispositif de diagnostic in vitro conformément au règlement relatif aux dispositifs de diagnostic in vitro (UE) 2017/746.

Intended use

The centrifuge **UNIVERSAL 320 / UNIVERSAL 320 R** is an in vitro diagnostic medical device according to the In vitro Diagnostic Medical Devices Regulation (EU) 2017/746.

Le dispositif sert à centrifuger ainsi qu'à enrichir des échantillons d'origine humaine pour un traitement ultérieur à des fins de diagnostic. L'utilisateur peut régler les paramètres physiques modifiables concernés dans les limites définies par le dispositif.

The device is used for centrifuging and enriching sample material of human origin for subsequent further processing for diagnostic purposes. The user can set each of the variable physical parameters within the limits set by the device.

La centrifugeuse peut être utilisée uniquement par un personnel qualifié dans des laboratoires fermés. La centrifugeuse est destinée uniquement à la fonction citée ci-dessus. L'utilisation conforme aux dispositions comprend le respect de toutes les indications énoncées dans le mode d'emploi et le respect des consignes d'inspection et de maintenance.

The centrifuge may only be used by qualified personnel in closed laboratories. The centrifuge is only intended for the use referred to above. Intended use also includes observing all instructions in the Operating Manual and compliance with the required inspection and maintenance work.

Toute utilisation différente ou dépassant ce cadre

est considérée comme non conforme. La société Andreas Hettich GmbH n'est pas responsable des dommages qui en résultent.

Le dispositif satisfait également aux dispositions applicables des directives et règlements européens suivants

- 2006/42/CE « Directive relative aux machines »
- 2014/30/UE « Directive CEM »
- 2014/35/UE « Directive basse tension »
- 2011/65/UE « Directive RoHS »
(sans intervention d'un organisme notifié)
- (CE) 1907/2006 « Règlement REACH »
(sans intervention d'un organisme notifié)

Normes appliquées :
voir la liste des normes appliquées qui fait partie de la documentation technique.

Tuttlingen, 25.11.2024



Klaus-Günter Eberle
Gérant, Chief Executive Officer

Any other use or use beyond this is considered improper. Andreas Hettich GmbH shall not be liable for any damage arising from this.

The device also complies to the applicable provisions of the following European directives, ordinances and standards

- 2006/42/EC "Directive on machinery"
- 2014/30/EU "EMC Directive"
- 2014/35/EU „Low Voltage Directive“
- 2011/65/EC "RoHS Directive"
(without involvement of a notified body)
- (EC) 1907/2006 „Regulation on REACH“
(without involvement of a notified body)

Standards applied:
See the list of applied standards that forms part of the technical documentation.



La présente déclaration de conformité est valable du 25/11/2024
3 au 24/10/2025

This declaration of conformity is valid from 25.11.2024 until 24.10.2025