AWEL CENTRIFUGES

User Manual

C 12, C 20/20-R & C 48/48-R Models

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CONTENTS

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User Manual C 12 – 20/20-R – 48/48-R Models

1. WARRANTY

AWEL centrifuges are warranted for two years by NuAire.
This warranty applies if:
- The centrifuge is used conforming to the instructions in the user manual.
- The electrical installation at the site of the centrifuge conforms to the IEC recommendations.

AWEL International declines all responsibility for damage caused by use not conforming to instructions, failure to carry out maintenance operations and any unauthorized modification.

Conforming to instructions for use comprises respecting instructions in the user manual and a carrying out of inspections and maintenance.

READ THIS USER MANUAL BEFORE THE FIRST OPERATION OF THE MACHINE

2. GENERAL

2.1. Environment See Section 4.3.1 Environment

2.2. Technical specifications

C 12 model

Maximum capacity	4 x 125 ml swing-out rotor	
Maximum speed	4,000 rpm swing-out rotor	
Maximum RCF	3000 x g swing-out rotor	
Timer range	0min 00s to 9h 59min and Hold	
External dimensions HxWxD	280 x 420 x 520 mm	
Power supply	230 V ± 10% 50 Hz 120 V ± 10% 60 Hz	
Version	230 V	120 V
Nominal Current	3.5 A	7 A
Dissipated Heat	1194 BTU/hr	1194 BTU/hr
Maximum Noise	≤ 62 dB(A)	
Model Description C 12 Version 230V 50Hz C 12 Version 120V 60Hz	Catalog Numbers AW-C-012-CVE AW-C-012-CV	
Packaging HxWxD (Recyclable packaging)	18” x 24” x 25-5/8” (460 x 610 x 650 mm)	
Weight (gross/net)	110 / 123 lbs. (50 / 56 kg)	

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C 20 & C 20-R models

Maximum capacity		4 x 200 ml swing-out rotor			
Maximum speed		4,400 rpm swing-out rotor			
Maximum RCF		3,500 x g swing-out rotor			
Temperature Display		-20° C to 60°C (refrigerated version)			
Timer range		0min 00s to 9h 99min and Hold			
External dimensions HxWxD C 20 model C 20-R model		11” x 16-1/2” x 20-1/2” (280 x 420 x 520 mm) 11” x 16-1/2” x 28” (280 x 420 x 710 mm)			
Power supply		230 V ± 10% 50 Hz 120 V ± 10% 60 Hz			
Model		C 20		C 20-R	
Version		230 V	120 V	230 V	120 V
Nominal Current		3.5 A	7 A	5 A	10 A
Dissipated Heat		1194 BTU/hr		2729 BTU/hr	
Refrigerant / Load				R404A	350 g
Maximum Noise		≤ 62 dB(A)		≤ 60 dB(A)	
Model Description C 20 Version 230V 50/60Hz C 20-R Version 230V 50Hz C-20-R Version 220V 60Hz C 20 Version 120V 60Hz C 20-R Version 120V 60Hz		Catalog Numbers AW-C-020-CVE AW-C-020-CRE AW-C-020-CRF AW-C-020-CV AW-C-020-CR			
Packaging HxWxD (Recyclable packaging)	C 20 C 20-R	18” x 24” x 25-5/8” (460 x 610 x 650 mm) 18” x 24” x 35” (460 x 610 x 890 mm)			
Weight (gross/net)	C 20 C 20-R	110 / 123 lbs. (50 / 56 kg) 154 / 174 lbs. (70 / 79 kg)			

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C 48 & C 48-R models

Maximum capacity		4 x 400 ml swing-out rotor			
Maximum speed		4,500 rpm swing-out rotor			
Maximum RCF		3,820 x g swing-out rotor			
Temperature Display		-20° C to 60°C (refrigerated version)			
Timer range		0min 00s to 9h 99min and Hold			
External dimensions HxWxD C 48 model C 48-R model		11” x 16-1/2” x 20-1/2” (280 x 420 x 520 mm) 11” x 16-1/2” x 28” (280 x 420 x 710 mm)			
Power supply		230 V ± 10% 50 Hz 120 V ± 10% 60 Hz			
Model		C48		C48-R	
Version		230 V	120 V	230 V	120 V
Nominal Current		3.5 A	7 A	5 A	10 A
Dissipated Heat		1194 BTU/hr		2729 BTU/hr	
Refrigerant / Load				R404A	350 g
Maximum Noise		≤ 62 dB(A)		≤ 60 dB(A)	
Model Description C 48 Version 230V 50/60Hz C 48-R Version 230V 50Hz C 48-R Version 220V 60Hz C 48 Version 120V 60Hz C 48-R Version 120V 60Hz		Catalog Numbers AW-C-048-CVE AW-C-048-CRE AW-C-048-CRF AW-C-048-CV AW-C-048-CR			
Packaging HxWxD (Recyclable packaging)	C 48 C 48-R	18” x 24” x 25-5/8” (460 x 610 x 650 mm) 18” x 24” x 35” (460 x 610 x 890 mm)			
Weight (gross/net)	C 48 C 48-R	110 / 123 lbs. (50 / 56 kg) 154 / 174 lbs. (70 / 79 kg)			

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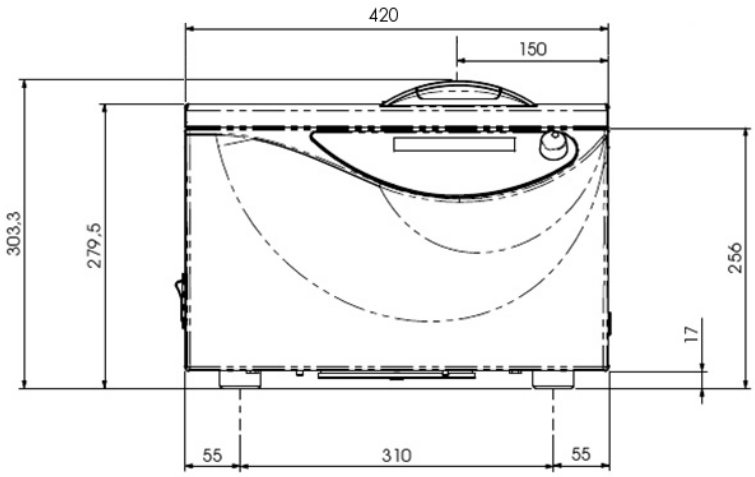
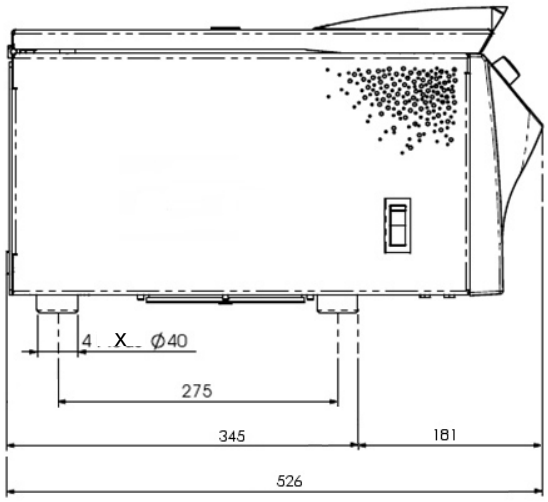
2.3. Dimensions / Positions of the feet

- Front View

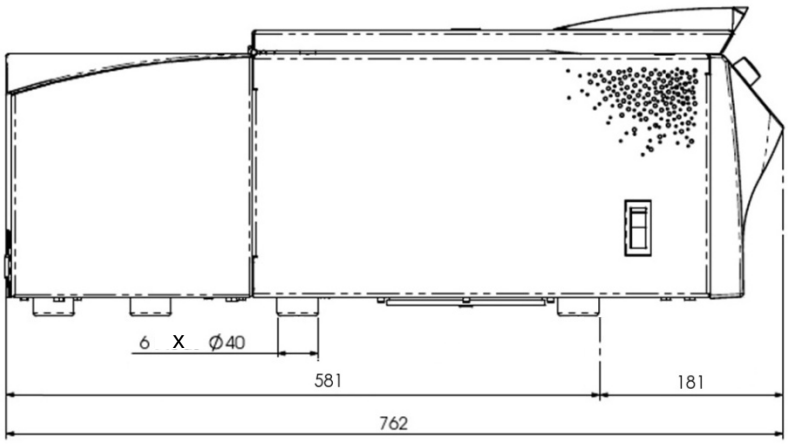


- Side View

Ventilated model



Refrigerated Model



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2.4. Accessory table

C 12 model

Cat N°	Description	Radius (mm)	Max. Speed (rpm)	RCF (x g)	Max. Vol. (ml)
AW-R-012-SO	**SO-125** Swing-out rotor	162	4000	3000	4x85 ml
AW-B-012-RB	**N-125** Set of 4 buckets				
AW-L-016-RB	**BL-125** Set of 4 sealing lids				
AW-I-012-05	Set of 4 inserts, capacity 4 x 5-7ml collection tubes/insert	160	4000	2862	/
AW-I-012-10	Set of 4 inserts, capacity 4 x 10ml collection tubes/insert	158	4000	2826	/
AW-I-012-15	Set of 4 inserts, capacity 1 x 15ml conical bottom tube/insert	160	4000	2862	/
AW-I-012-50	Set of 4 inserts, capacity 1 x 50ml conical bottom tube /insert	160	4000	2862	/
AW-R-012-CA	**A20-32.15** Angle rotor, capacity 32 tubes 15ml	120/140	4000	2140/2500	32x15 ml

C 20 & C 20-R models

Cat N°	Description	Radius (mm)	Max. Speed (rpm)	RCF (x g)	Max. Vol. (ml)
AW-R-020-SO	**SO-200** Swing-out rotor	162	4400	3500	4x200 ml
AW-B-020-RB	**N-200** Set of 4 buckets				
AW-L-016-RB	**BL-200** Set of 4 sealing lids				
AW-I-020-02	Set of 4 inserts, capacity 7 x 1.5ml microtubes/insert	151	4400	3268	/
AW-I-020-5P	Set of 4 inserts, capacity 12 x 5ml tubes/insert	158	4400	3420	/
AW-I-020-5C	Set of 4 inserts, capacity 6 x 5-7ml collection tubes/insert	159	4400	3441	/
AW-I-020-5B	Set of 4 inserts, capacity 7 x 5-7ml BD & Greiner collection tubes/insert	159	4400	3441	/
AW-I-020-5T	Set of 4 inserts, capacity 9 x 5-7ml Terumo collection tubes/insert	158	4400	3420	/
AW-I-020-10	Set of 4 inserts, capacity 6 x 10ml collection tubes/insert	158	4400	3420	/
AW-I-020-11	Set of 4 inserts, capacity 7 x 10ml BD collection tubes/insert	158	4400	3420	/
AW-I-020-15	Set of 4 inserts, capacity 3 x 15ml conical bottom tubes/insert	162	4400	3500	/
AW-I-020-50	Set of 4 inserts, capacity 1 x 50ml conical bottom tubes /insert	159	4400	3441	/
AW-I-020-22	Set of 4 inserts, capacity 4 x conical bottom tubes dia.22mm /insert	158	4400	3420	/
AW-R-020-CA	**A20-32.15** Angle rotor, capacity 32 tubes 15ml	120/140	4400	2590/3030	32x15 ml

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C 48 & C 48-R models

Cat N°	Description	Radius (mm)	Max. Speed (rpm)	RCF (x g)	Max. Vol. (ml)
AW-R-048-SO	**SO-400** Swing-out rotor	169	4500	3820	4x250 ml
AW-B-048-RB	**N-400S** Set of 4 buckets				
AW-L-048-RB	**BL-400S** Set of 4 sealing lids				
AW-I-048-02	Set of 4 inserts, capacity 13 x 1.5ml microtubes/insert	158	4500	3577	/
AW-I-048-5C	Set of 4 inserts, capacity 14 x 5-7ml collection tubes/insert	161	4500	3645	/
AW-I-048-5B	Set of 4 inserts, capacity 15 x 5-7ml BD collection tubes/insert	161	4500	3645	/
AW-I-048-5T	Set of 4 inserts, capacity 19 x 5-7ml Terumo collection tubes/insert	162	4500	3668	/
AW-I-048-10	Set of 4 inserts, capacity 12 x 10ml collection tubes/insert	161	4500	3645	/
AW-I-048-15	Set of 4 inserts, capacity 7 x 15ml conical bottom tubes/insert	166	4500	3758	/
AW-I-048-53	Set of 4 inserts, capacity 3 x 50ml conical bottom tubes /insert	168	4500	3803	/
AW-I-048-54	Set of 4 inserts, capacity 4 x 50ml conical bottom tubes /insert	168	4500	3803	/
AW-I-048-22	Set of 4 inserts, capacity 8 x conical bottom tubes dia.22mm /insert	164	4500	3713	/
AW-R-048-CA	**A48-32.15** Angle rotor, capacity 32 tubes 15ml	120/140	4400	2590/3030	32x15 ml

2.5. Packing list

- Centrifuge C model
- Power cord (mains cable)
- User manual
- Allen wrench for manual unlocking of the cover
- Pipe wrench for unlocking accessories
- Food quality container of grease
- Quick Start Guide

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Safety rules

The operator must respect the following precautions:

- Do not attempt to open the cover while the display indicates that the end of the centrifugation run has not been reached.
- Do not attempt to override the lid locking system during operation of the centrifuge. (See section 3.3.2).
- Use only an electrical socket with a ground (an earth) connection that corresponds to the indications on the manufacturer's plate on the centrifuge.
- Install the centrifuge in a well-ventilated space on a rigid, horizontal support that can absorb vibration generated by the centrifuge.
- Do not lean over the centrifuge during a centrifugation run.
- Do not remain within the clearance envelope (30 cm around the centrifuge) longer than necessary for service reasons.
- Do not place potentially dangerous material within the operating space.
- Use accessories sealed against aerosols when centrifuging and material that presents a biological risk.
- Check the mounting and balancing of the rotor before starting this centrifugation run
- Take care to maintain and check the accessories. (See section 7)
- Keep the centrifugation chamber clean and dry.
- Check that bottles and tubes can withstand centrifugation, chemical resistance to the products centrifuged and mechanical resistance to the centrifugal force applied to them.
- When moving the centrifuge from a cold environment to a warmer environment, condensation can form inside the centrifuge. Leave the centrifuge to warm up for three hours before use.
- If the centrifuge is used in a manner not specified in the present manual, the protection provided by the equipment may be impaired.

2.6. Correct use

Laboratory centrifuges are used to separate substances of different densities by the application of centrifugal force. In particular, they enable biological samples to be prepared and treated before analysis within the framework of in vitro diagnostics.

Centrifuges are designed for interior use by personnel trained to use them.

2.6.1. Practical notes on centrifugation

- Check that the centrifuge is stable and horizontal.
- Check that the rotor is correctly fitted before starting a centrifugation run.
- Check that tubes can resist the maximum centrifugal force applied (See section 2.4 Accessory tables).
- Check that tubes are in good condition -- eliminate damaged tubes.
- During operation, the centrifuge must not be moved or knocked.
- Use only the rotors and accessories authorized by the manufacturer (See section 2.4 Accessory tables).
- Balance the rotor
- For swing out rotors, always puts all the buckets and inserts (even empty) in their dedicated location.
- **Respect the maximum density of 1.2 g/ml, particularly when using maximum speed.**
- Limit the volume if the density is exceeded

2.6.2. Actions forbidden during centrifugation

It is forbidden to centrifuge the following material:

- Inflammable or explosive material.
- Material that could react chemically with sufficient force to create danger.

The centrifuge is not designed to operate in an explosive environment.
It is forbidden to centrifuge toxic or radioactive material or material contaminated by pathogenic microorganisms in containers that are not sealed against aerosols and, if necessary, radiation.
It is forbidden to use rotors and accessories having exceeded the maximum usable lifetime of 10 years, or 35,000 runs (1) in normal use condition & maintenance, or showing signs of wear, traces of corrosion or mechanical faults. (1) On 1st of 2 terms expired.

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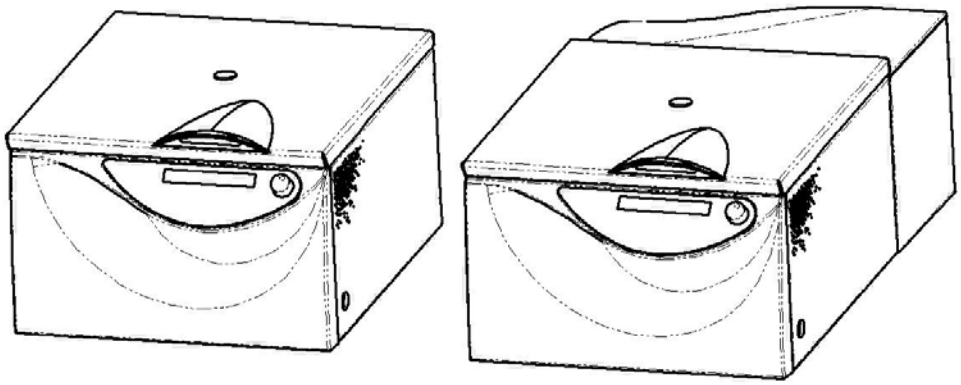
3. DESCRIPTION OF THE CENTRIFUGE

3.1. General view



Ventilated model Refrigerated model

3.2. Controls and Display

3.3. Safety devices

3.3.1. Device for closing and locking the lid

C series centrifuges are fitted with a device for locking the lid to ensure the safety of the operator.

The centrifugation run can only start once the lid is correctly shut and locked.
During the run it is impossible to open the lid. This is only unlocked once the rotating accessories have come to a complete stop.

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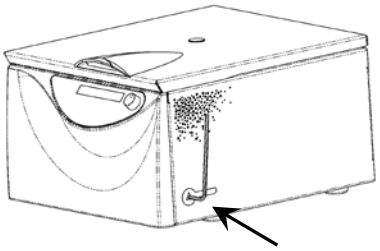
3.3.2. Manual unlocking of the lid

Only in case of electrical problem

Manual unlocking of the lid must be carried out by a person trained in the use of the centrifuge and understanding the mechanical risks:
- Risks of wounding if the operator attempts to brake the rotor manually during rotation.
- Risk of the projection of aerosols in the case of broken tubes within the centrifugation chamber.

In the case of a power outage (power cut), wait 15 minutes before attempting to unlock the lid manually: the rotating rotor will decelerate without braking.



Equipment: Allen wrench provided.

- Put the main switch in position O.
- Insert the unlocking device in the hole situated on the lower right side of the centrifuge punching the sticker.
- Connect the wrench and turn it clockwise: the closing mechanism will unlock the lid that will lift slightly.
- Lift the lid manually.

After a manual unlocking, the message "Press Lid Button" is displayed. Press the  key to reinitialize the locking device.

Contact an AWEL certified technician for the locking device check, and the replacement of the sticker.

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4. INSTALLATION AND SETTING UP

Transporting the equipment over a long distance must be done by mechanized means, handled by personnel trained in its use.

4.1. Unpacking the centrifuge

Remove the centrifuge from its packaging by lifting it, holding the lower part.
Beware: refrigerated models require two persons for this operation.
Remove the other items from the packaging: power cable, manual, tools. Check that nothing remains in the packaging before disposing of it. The packaging is made of card that can be recycled and should be treated in the appropriate way.

4.2. Load lifting

2 people are necessary to lift and manipulate the centrifuge.
WARNING: Manipulate the centrifuge handling underneath, and not the front panel.

4.3. Installation

4.3.1. Environment

Avoid corrosive, high humidity atmosphere.
Avoid direct sunlight that could result in heating of the instrument.

WARNING: The centrifuge is not designed to operate in an explosive environment.

Environmental conditions:
- To be used inside
- Standard operating temperature: 25°C
- Maximum relative humidity of 80% for temperatures up to 31°C decreasing linearly to 50 percent relative humidity at 40°C.
- Maximum altitude: 2000 m:

Maximum performance is assured within the temperature range 15° C. to 25° C.

Electrical environment:

Installation category:	2
Pollution degree:	2

EMC Performance:

Conforms to EN61326-1 ED. 2006 concerning Emissions and Immunity.

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4.3.2. Power supply

Check that the electrical supply corresponds to the indications on the manufacturer's plate.

Reference	Model	Power supply	Frequency
AW-C-012-CVE	C 12	230 V ± 10%	50 Hz
AW-C-012-CV	C 12	120 V ± 10%	60 Hz
AW-C-020-CVE	C 20	230 V ± 10%	50 Hz
AW-C-020-CV	C 20	120 V ± 10%	60 Hz
AW-C-020-CRE	C 20-R	230 V ± 10%	50 Hz
AW-C-020-CRF	C 20-R	220 V ± 10%	60 Hz
AW-C-020-CR	C 20-R	120 V ± 10%	60 Hz
AW-C-048-CVE	C 48	230 V ± 10%	50 Hz
AW-C-048-CV	C 48	120 V ± 10%	60 Hz
AW-C-048-CRE	C 48-R	230 V ± 10%	50 Hz
AW-C-048-CRF	C 48-R	220 V ± 10%	60 Hz
AW-C-048-CR	C 48-R	120 V ± 10%	60 Hz

Power supply to the instrument must be provided by a socket with a ground (an earth) connection and a protective device ensuring that the power is automatically cut in case of a fault in the insulation.
A supply fitted with a differential circuit breaker of a suitable rating satisfies this requirement.
To allow electrical isolation of the device, the socket must be readily identifiable and within easy reach of the operator.

The electrical installation must include an emergency stop switch enabling the supply to be cut in the case of irregular operation. This switch must be placed at a distance from the centrifuge (outside the limits of the centrifuge operating space) and preferably outside of the room in which the centrifuge is placed.

4.3.3. Place of installation

Place the centrifuge on its support or on a flat, horizontal bench that is fixed and can support its weight (see section 2.2 Technical specifications).
Take care to mark out an operating space, 30 cm all around the instrument.
Do not block the ventilation slots on the sides of the instrument, towards the front.
Leave at least 35 mm space behind the centrifuge, and 50 mm on each side.

Mount a rotor in the centrifuge (see section 4.4.3 Installing a rotor). Place a spirit level on the rotor and check the flatness in two directions at 90° to each other.
Adjust the support or bench if necessary.

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4.4. Use

4.4.1. Switching on the centrifuge

The switch/circuit breaker for switching on the centrifuge is found on the front left-hand side of the instrument.

4.4.2. Lid opening

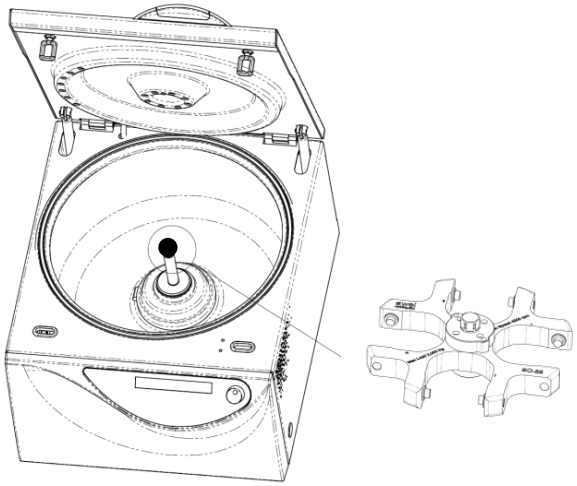
The centrifuge that you have purchased is equipped with a motorized lid lock. Manually lift the lid to open completely. For the first start, the centrifuge is delivered with its lid opened. It may be that after a prolonged storage of the machine, the gas springs have a longer response time. The first opening may be less straightforward. In this case, do some manual movements with the lid in order to properly activate the opening mechanism.

If the lid is closed, press the lid button  and support the lid with the left hand if necessary.

4.4.3. Installing a rotor

4.4.3.1. Rotor mounting

Position the rotor over the drive shaft.



Depending on the centrifuge model, rotors are distinguished with the locking nut.
C 12 & C 48 / 48-R models: Nut **with** grooves.
C 20 / 20-R models: Nut **without** grooves.

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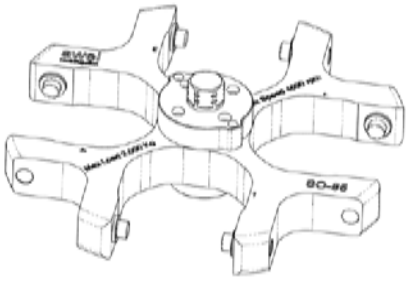
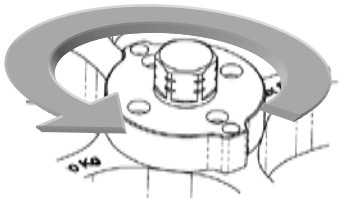
Tighten the locking nut with the supplied wrench:

- In the **counterclockwise** direction for C 12 & C 48 / 48-R models:

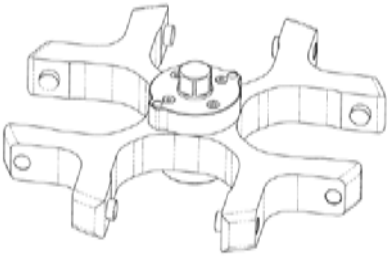


Rotor mounting nut for C 12 & C 48 / 48-R models

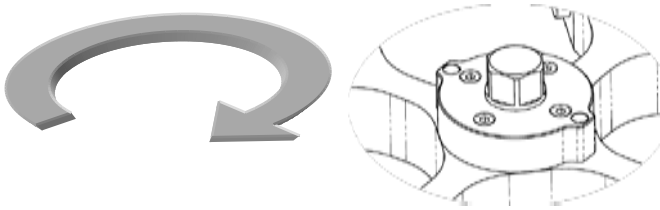


Rotor mounting

- In the **clockwise** direction for C 20 / 20-R models:



Rotor mounting nut for C 20 / -R models



Rotor mounting

4.4.3.2. Rotor dismounting

Unlock the rotor from the shaft by using the pipe wrench delivered with the centrifuge:

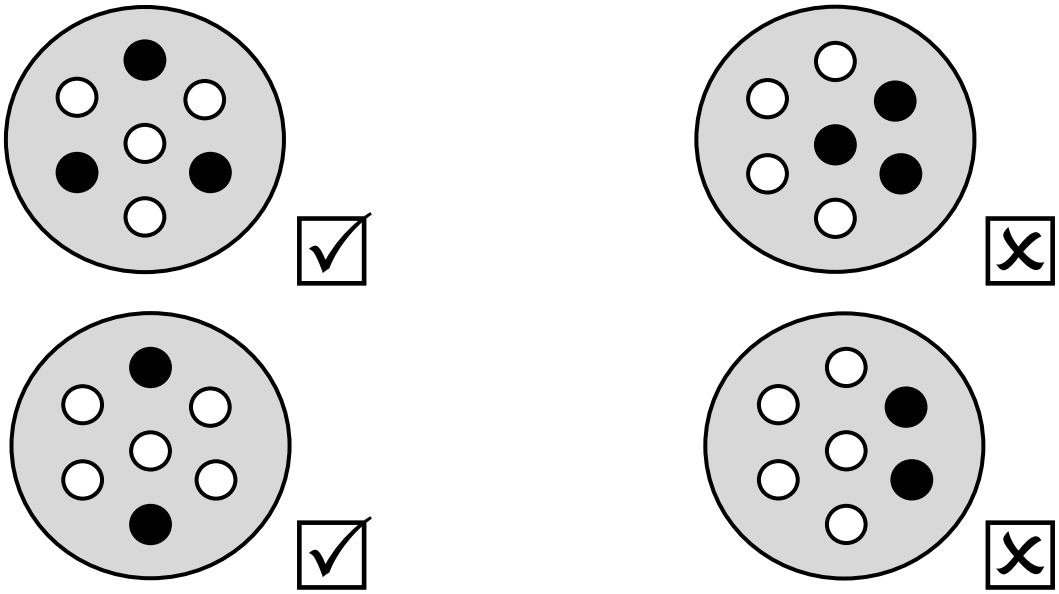
- Turn **clockwise** for C 12 & C 48 / 48-R models
- Turn **counterclockwise** for C 20 / 20-R models

4.4.4. Loading the rotor

For swing out rotors, always puts all the buckets and inserts (even empty) in their dedicated location.

Rotors must be balanced for load about a symmetrical axis: the contents of each pocket in the rotor or insert must be balanced in weight with that of the diametrically opposite position.
The tubes or bottles must be balanced by pairs that are placed opposite each other. In the case of an odd number of tubes, balance the last one by adding a tube, filled with water, of the same total weight.

Bucket static balancing:



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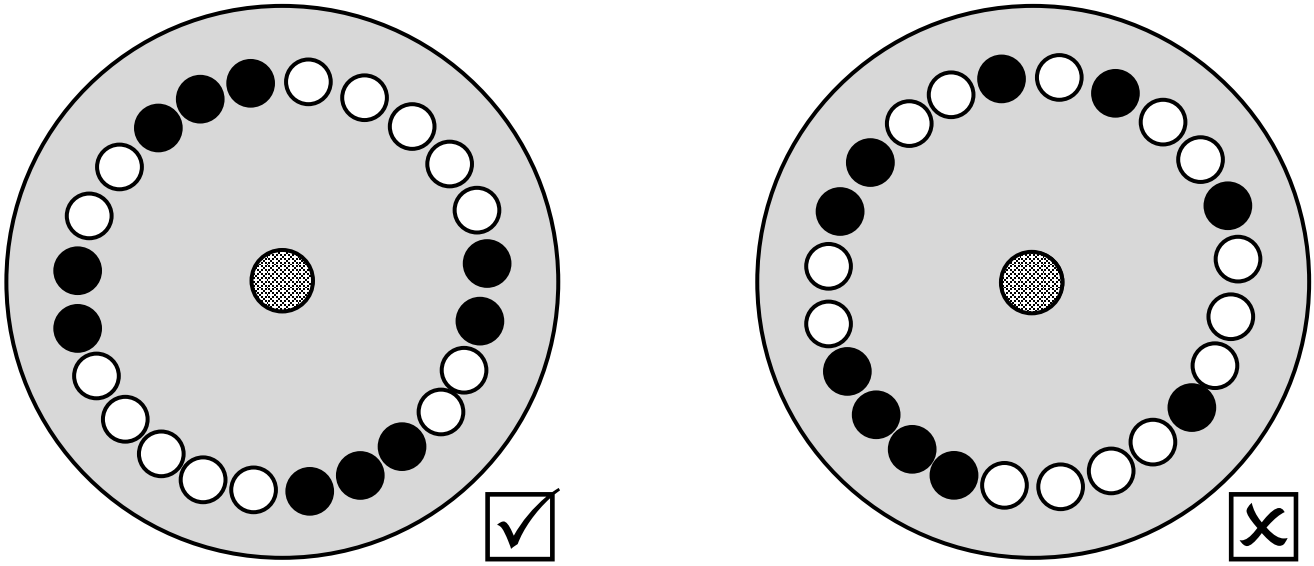
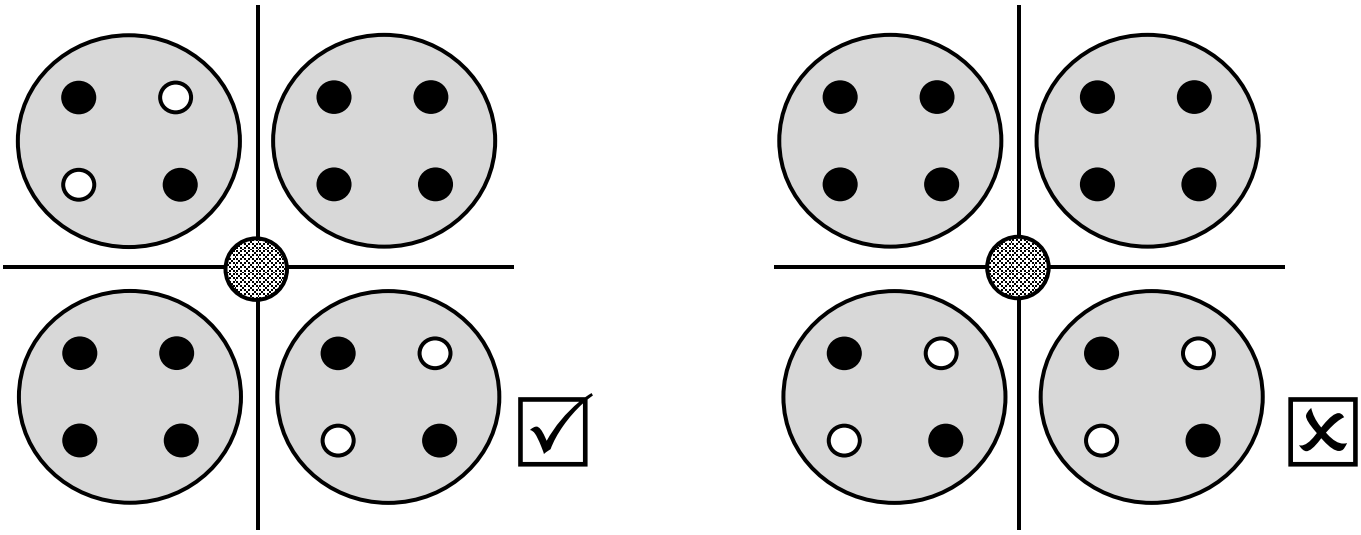
Angular rotor dynamic balancing:



Swing-out rotor dynamic balancing:



The centrifuge can tolerate an imbalance of 10 g.

Important Note: The imbalance detection system automatically shuts down the centrifuge in case of excessive imbalance (> 25 g) and displays the error code Err01. Moderate imbalance (10 to 25 g) generates vibrations that can cause or stop by detecting imbalance (Err01) or a cap at low speed.

An excessive imbalance is likely to seriously damage the rotor and the centrifuge.

4.4.5. Closing the lid

Once the rotor has been loaded**,** to close the lid, put your hand on the blue handle, and lower the lid. Keep pressing the lid during the blinking of the handle. A buzzer sounds for the interlock. You can release the lid which is now locked.

Warning: Place the hand flat on the top of the lid while pushing it.

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4.4.6. Detection of locking failure

The locking device is designed to be closed in a determined time.
If not detected in 2 seconds, the locking device motor disengages to allow the obstacle to be released. The display indicates "Press Lid Button ".

Once cleared, press the  key to reinitialize the lock.

If the obstacle is more than 6 mm, the lock is not activated.

A pinch hazard is eliminated by detection of locking failure device: If closed on the fingers, pressing occurs then relaxes, opening the lid.

4.4.7. Automatic speed limitation

If the set speed is too high corresponding to the installed rotor, the spinning speed is automatically limited.
In this case, the spinning flash turns differently, and 3 "beep" sounds are regularly emitted: The speed setting is adjusted to the maximum allowed for the rotor installed.

4.4.8. Detection of end of run - AWELight™

To visually identify the end of a cycle, the light in the handle flashes.

The  and  keys also flash, indicating the possibility to open the lid, or to start a new cycle.

AWELight™ Device

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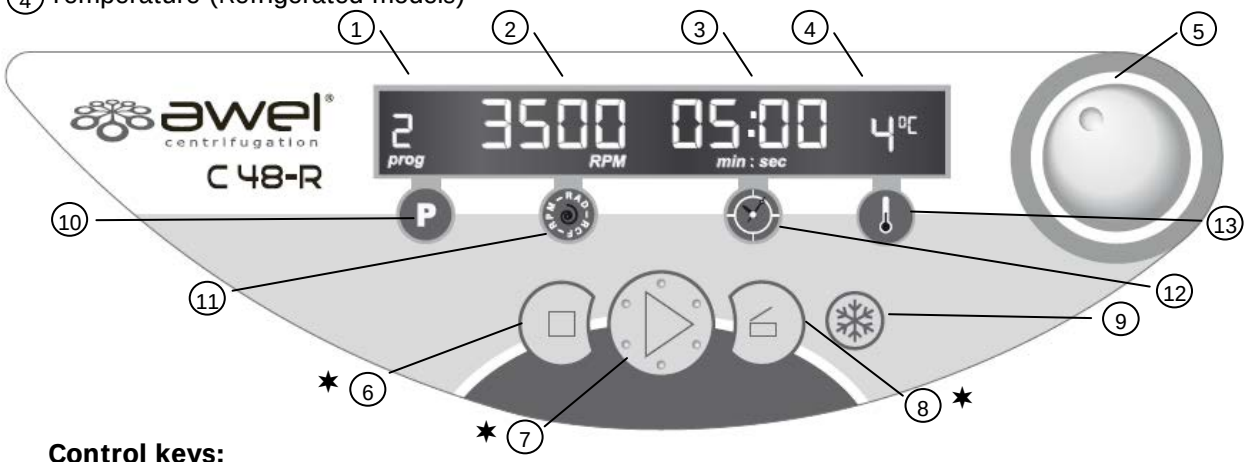
5. CONTROL PANEL

Display:

1. Program Number
2. Speed / Radius / RCF (Relative Centrifugal Force)
3. Time
4. Temperature (Refrigerated models)



Control keys:

5. Adjustment knob

6. Stop and Escape
7. Start
8. Open Lid / Lock Program
9. Pre-Cool (Refrigerated models)

10. Access to the numerotation of the program
11. Access to the number of revolutions / minute
12. Access to the duration of the cycle.
13. Access to the temperature control

✶ Intuitive keys:
For an easier use of the control keys, keys ⑥, ⑦ and ⑧ brighten up when the control is possible.

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6. PROGRAMMING

6.1. Parameter values

Parameter values are entered directly with the help of the specific key and the value adjustment knob.

6.1.1. Speed (rpm) / Relative Centrifugal Force (RCF) / Radius

6.1.1.1. Centrifuge acceleration formula

$$RCF_{(G)} = \frac{\pi^2 N^2 r}{9.10^5 g}$$

N: Rotation speed, in rotation / minute (rpm)
r: Radius, in mm
g: 9.81 m.s-²
F: Centrifuge acceleration, or g number

Approximation:

$$F = 1.118 \times r \times \left(\frac{N}{1000} \right)^2$$

To calculate Speed from Relative Centrifugal Force:

$$N = 1000 \times \sqrt{\frac{F}{1.118 \times r}}$$

6.1.1.2. Selection of Speed –Radius - Relative Centrifugal Force

Repeated pressing on the  key enables the speed, centrifugation radius and relative centrifugal force to be displayed successively.

6.1.1.3. Programming the speed (rpm) and centrifugal force (RCF)

Select the speed (rpm) or relative centrifugal force (RCF) using the  key.
Press the key firmly until the display goes to programming mode: only the rpm value appears in a violet color. Repeated pressing on the key enables the speed, centrifugation radius and relative centrifugal force to be displayed successively.

Select the required value with the help of the knob while in programming mode. The new value is automatically saved after 5 seconds or if the key for another parameter is pressed.
Do not forget to set the radius value (RAD) of the mounted rotor, to obtain the speed (RPM) or the centrifuge acceleration (RCF) required.
Refer to the accessories table to determine the maximum speed.
If the set speed is too high corresponding to the installed rotor, the spinning speed is automatically limited.
In this case, the spinning flash turns differently, and 3 "beep" sounds are regularly emitted: The speed setting is adjusted to the maximum allowed for the rotor installed.

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6.1.2. Time

6.1.2.1. Programming the Time

Press the Time key  firmly until the display of the time goes to programming mode: only the time value appears in a violet color. Select the required time value with the help of the knob while in programming mode. Selectable range: From 0min0s in steps of 10 seconds then from 1h00min to 99h59min in steps of 1 minute. The new value is automatically saved after 5 seconds or if the key for another parameter is pressed.

6.1.2.2. Continuous centrifugation (Hold) mode

Select the value "--: --".

Start the run by pressing the Start button  . The centrifuge runs until the Stop button  is pressed.

6.1.3. Temperature

6.1.3.1. Pre-cooling

Press the  key to start a pre-cool cycle: 2000 rpm, 15 minutes, +4°C.

6.1.3.2. Programming Temperature

Press the  key until the display of the temperature goes to programming mode: only the temperature is displayed in violet. Select the required value with the help of the knob while in programming mode. The new value is automatically saved after 5 seconds or if the key for another parameter is pressed.

6.1.3.3. Instantaneous temperature reading

It is possible to read the instantaneous temperature in the lower part of the bowl, when the rotor is stopped.

Keep pressed the  key. The value is displayed in blue.

6.2. Creating / Modification of a program

6.2.1. Creating a program

After switching on, the centrifuge displays the last program used.

Select the program number by pressing the  key, (short press). The program numbers will appear sequentially when turning the knob. Stop turning the knob once the required number is displayed. The word “prog” stops flashing after five seconds.
Enter the values for the different parameters as indicated above.

To memorize the program, hold the  key pressed in. The display becomes green for a few seconds to confirm that the values have been saved.

6.2.2. Locking a program

The program created can be locked in order to protect it against accidental modification.

Press the Lid key  for 3 seconds. The display becomes red and displays “protected” to indicate that the program has been locked.

To unlock a program: recall the program. Press the Lid key  for 3 seconds. The display becomes green and displays “unprotected” to indicate that the program has been unlocked.

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6.2.3. Program selection

Recall the program by pressing the  key, (short press). The program numbers will appear sequentially when turning the knob.
Stop turning the knob once the required number is displayed. The word “prog” stops flashing after 5 seconds. The centrifuge is ready to start the selected program.
Note: The numbers of locked programs appear in red.

6.2.4. Modification of a program

Recall the program (§ 6.2.3). Modify the value(s) required. Press the  key for a long time. The display becomes green for several seconds to confirm that the values have been saved.

6.3. Using a program

After having defined the parameters, fitted and correctly loaded the rotor, then closed the lid, press the  key to launch the selected program, or a routine configuration.

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7. CARE AND MAINTENANCE

7.1. Daily care and cleaning

7.1.1. External body

Wipe off marks from the paintwork of the external body and keyboard using an absorbent paper and lightly wetted with an alcohol-water solution or a quaternary ammonium compound.

7.1.2. Bowl and accessories

Keep the centrifugation bowl and accessories clean and dry.
NEVER USE CHLORINATED PRODUCTS (bleach, quaternary ammonium chloride...).

7.2. Weekly care and cleaning

Wash the rotors with clean or distilled water. Dry them carefully, particularly the parts that are not easy to access. When necessary, use a hairdryer to completely dry the small diameter pockets in the rotor. Do not forget to clean the central part of the rotor with a soft, non-metallic brush.
After cleaning, add a light film of silicone (using a spray), or lanolin to the surface of the rotor and in the pockets. This precaution will extend the life of metallic accessories.

Swing-out rotors: Check the greasing of the pins on which the buckets swing. Replace this regularly -- at least once per month -- in order to ensure that the buckets swing freely. Spread on a little grease by hand.

WARNING: Failure to grease correctly could create an imbalance related to one or more buckets not swinging. Use Food quality grease only.

7.3. Storage of accessories

Never leave a wet or moist rotor on a metallic surface, even stainless steel (risk of corrosion).

Unused rotors and accessories should be placed on a non-metallic grid with pockets/openings pointing downwards, in order that any liquid or condensate can drain out.
Take care to clean and dry rotors that will be stored for weeks or months before use. Cover them with a fine layer of silicone grease, using a spray.
Equally, rotors stored in a cold room must be protected against humidity by a layer of silicone grease.

7.4. Action to be taken in the case of broken glass or accidental spillage

Before any intervention, switch off and unplug the centrifuge. The user is responsible for the decontamination, in case of spilling contaminated liquid in the centrifuge.

7.4.1. Material presenting no toxic, biological or radioactive risk

Wear protective gloves to avoid any risk of injury and a mask in case of airborne contaminants.
Dismount the rotor. Remove all debris and mop up spillages using compresses or absorbent paper. Deal with all waste using the correct means for material that can stab, cut or slice.

7.4.2. Material presenting a biological risk

Transport the sealed accessory (rotor, bucket together with its sealed lid) to the inside of a microbiological safety cabinet. Open it and dispose of the contents into an autoclave bag. Clean and rinse the accessory in the safety cabinet and place it in the second autoclave bag. Autoclave the two bags for 15 minutes at 122.5°C / 252.5°F, or according to the appropriate protocol for the material centrifuged. Deal with the bag containing the broken tubes according to the method for treating cutting, slicing contaminated waste. Remove the cleaning residues from the accessory according to the protocol for eliminating biological waste from the laboratory.

7.4.3. Material presenting a radioactive risk

Comply with the decontamination protocol in use in the laboratory.

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7.4.4. Material presenting a toxic risk

Comply with the decontamination protocol in use in the laboratory.

7.5. Sterilization and disinfection of the centrifuge and its accessories

Comply with the decontamination protocol in use in the laboratory
The following solutions are recommended:

- **70% Ethanol in water solution**
- **Non-halogenated quaternary ammonium solutions**

For autoclavable accessories: autoclave at 121°C/252°F for 15 minutes. (Refer to the accessories documentation for the autoclaving possibility)
When autoclaved, lids, seals, buckets and rotors should be separated from each other.

The use of other products is subject to the prior agreement of AWEL International.
Before using any cleaning or decontaminating methods except those recommended here above, users should check with AWEL International that the proposed method will not damage the equipment.

7.6. Checks and tests on accessories

These checks help in providing operator safety.

All accessories:
Carry out regularly - at least once per month - a visual inspection of rotors and accessories.
Check for traces of corrosion, wear and surface faults (scratches, cracks).
Replace the accessory if there is a significant fault.

Sealed accessories:
Check the airtight seals and replace them after they have been autoclaved 10 times.
Check the sealing lids. Replace them if the color has changed, they have become opaque or if there are significant scratches.

7.7. Yearly maintenance

It is recommended to have a functional check (Greasing of the motor shaft, of the locking device, readability of the stickers), a security check (Continuity of the grounding (earthing), locking), and a performance check of the centrifuge at least once a year.
Check that the ground (earth) continuity of the machine is still properly ensured by the power cord and the wall outlet to which it is connected.
No access to the inside the centrifuge is authorized. Maintenance is carried out by an AWEL certificated technician.

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8. TROUBLESHOOTING

Displayed	Fault	Cause	Centrifuge Response	Action
"Err 001"	Imbalance	Poor loading of rotating accessories (unbalanced)	Braking to a complete stop	Reload the rotating accessory and restart the centrifugation. An imbalance higher than or equal to 15 g is forbidden.
"Lid OPEn"	Lid open	The lid has been unlocked manually during rotation (abnormal and dangerous handling)	Power to the motor is cut immediately and the rotor turns freely until it stops	Wait until the complete stop. Switch off the centrifuge for several seconds then switch it on again, press the lock/unlock key to open the lid, close the lid again and restart the centrifugation. If the problem persists, contact the AWEL service department.
		The "locked position" detectors are defective or badly adjusted		
"Err 003" (Refrigerated centrifuge)	Bowl temperature too high	The set temperature is too high	Braking to a complete stop	Check the conditions of use (set temperature below 60°C and ambient temperature below or equal to 25°C). Once the correct conditions of use have been checked and/or re-established, restart the centrifugation. If the problem persists, contact the AWEL service department.
		The ambient temperature is too high		
		The cooling system is faulty		
		The temperature detector is faulty or badly connected		
"Err 004"	Motor temperature too high	The ambient temperature is too high	Braking to a complete stop	Check the ambient temperature: it must be below or equal to 25°C. Let the centrifuge cool for 1h. Once the correct conditions of use have been checked and/or re-established, restart the centrifugation. If the problem persists, contact the AWEL service department.
		The motor temperature detector is faulty or badly connected		
		The motor is damaged		
"Err 005" / count down	No speed signal	Rotating accessory jammed in the bowl	Rotor turns freely until it stops; impossible to open the lid before the end of the countdown (30s)	Check that the loading of the rotating accessory does not exceed its specifications and that no obstacle to rotation has become accidentally lodged in the bowl. Restart the centrifugation once these checks have been carried out. If the problem persists, contact the AWEL service department. **Important:** Do not attempt to refit by yourself a magnet that has become detached from the rotating accessory: a special type of glue must be used and the operation carried out by an engineer trained by AWEL.
		Excessive loading		
		Rotating accessory incompatible with the centrifuge		
		Defective power board / cabling / or motor		
		Missing magnet on a rotating accessory		

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Displayed	Fault	Cause	Centrifuge Response	Action
"Err 006" / count down	Irregular speed signal	Rotating accessory incompatible with the centrifuge Missing magnet Major imbalance of the rotating assembly	Rotor turns freely until it stops; impossible to open the lid before the end of the countdown (900s, 15mn)	Check on the state and the type of a rotating accessory. Check that the accessory is correctly loaded (balanced). Restart the centrifugation once these checks have been carried out. If the problem persists, contact the AWEL service department. **Important:** Do not attempt to refit by yourself a magnet that has become detached from the rotating accessory: a special type of glue must be used and the operation carried out by an engineer trained by AWEL.
"Err 007"	Not used	Not used	Not used	Not used
"Err 008"	Lid Switch error	The 2 Lid switches are seen “closed” at the same time	Impossible to start the centrifuge till the problem is solved	Try to open or close the Lid again, check that nothing is inserted in the right locking system hole. Switch the unit OFF wait a few seconds and switch it ON again. If the problem persists, contact he AWEL service department
"Err 009"	AWELine error	The centrifuge is not properly installed, the centrifuge has been shocked / moved while powered, or the previous run stops because of a high imbalance	Impossible to start the centrifuge till the problem is solved	Wait 1mn, and try to start the centrifuge again, if Err 09 is still displayed, check that the centrifuge is properly installed (level), If leveling is not correct, turn the unit OFF, adjust its level, turn the unit ON and wait 1mn before starting the centrifuge again. If Err 09 is still there, check that no other appliances induces vibrations on the table. If not, contact AWEL service department.
"Err 010"	Lid board Error	It is not possible to communicate with the Lid board	Braking to a complete stop	Wait for full stop if centrifuge was rotating. Turn it OFF, wait a few seconds, turn it ON. Try to start the cycle. If the problem persists, contact AWEL service department

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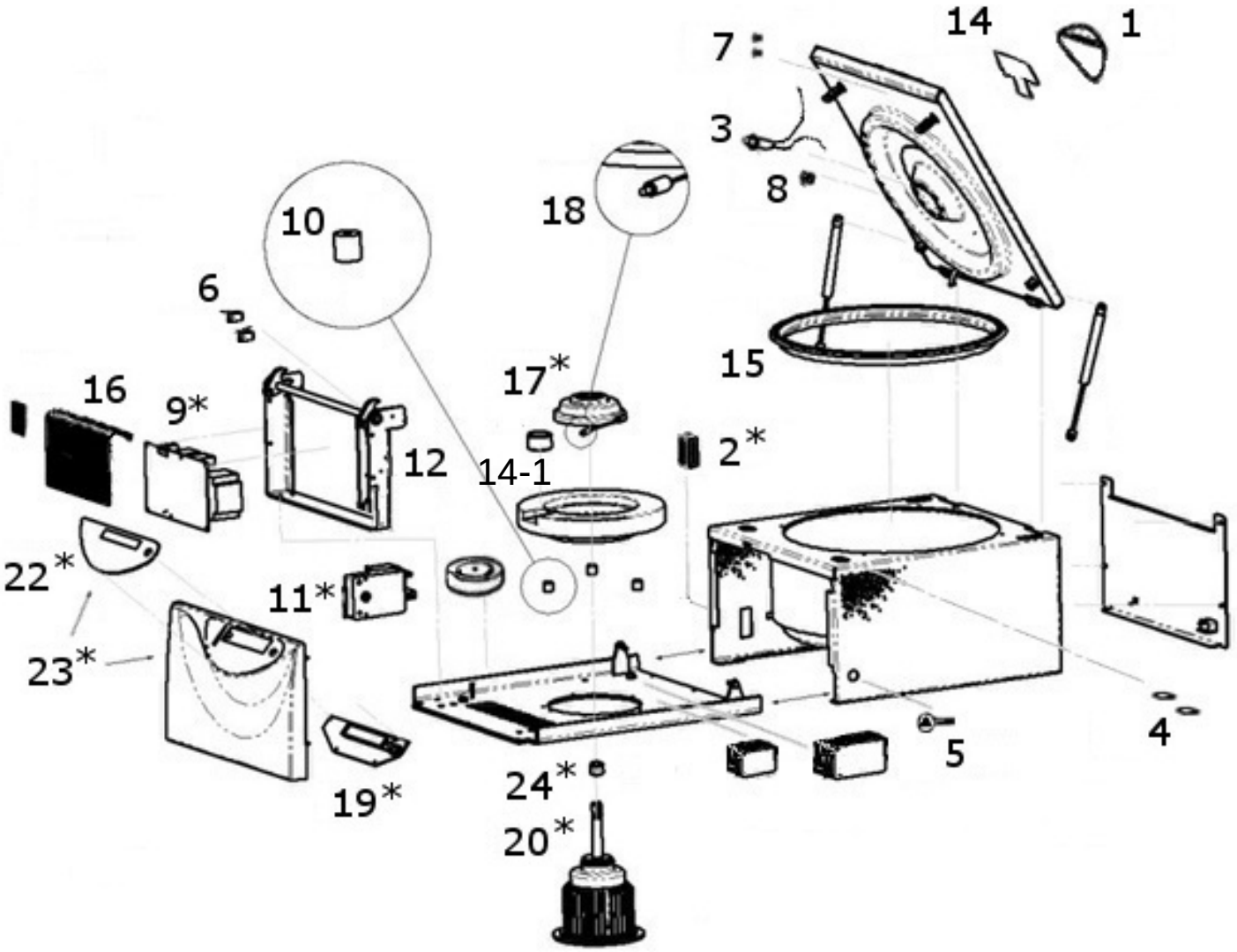
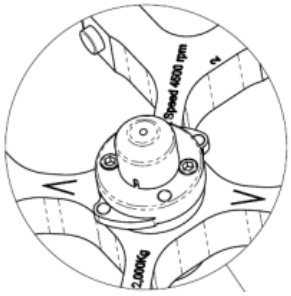
9. SPARE PARTS



Exploded view of an AWEL centrifuge

Rotor Locking devices

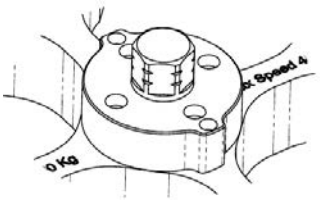
AWELock™ device



21*

AWELock™

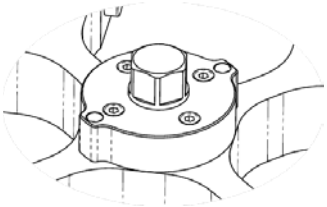
C series device – C 12/C 48/-R



21*

C 12/C48/C 48-R models

C series device – C 20/-R



21*

C 20/C 20-R models

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Part #	English Designation	Désignation en Français	Item
40000001	Blue Handle kit	Kit poignée bleue	1
40000002	Power switch 6A (230V)	Interrupteur / Disjoncteur 6A (230V)	2*
40000003	Power switch 10A (120V)	Interrupteur / Disjoncteur 10A (120V)	2*
40000004	Pot of Food Quality Grease	Pot de graisse de qualité alimentaire	
40000005	Tachometer sensor kit	Kit capteur tachymètre	3
40000006	Tool box kit	Kit boîte à outils	
40000007	Rubber Lip kit	Kit passe-gâche	4
40000008	Unlocking keyhole sticker	Autocollant clé déverrouillage	5
40000009	Lock Switch kit	Kit Switch serrure	6
40000010	Decontamination kit	Kit de décontamination	
40000011	Lid handle clip kit	Kit clips poignée couvercle	7
40000012	Inner black cap	Bouchon intérieur noir	8
40000013	Connexion kit R-Link	Kit de connexion R-Link	
40000014	Kit of lid & arrow stickers for C 20/-R & MF	Kit étiquettes Couvercle & Flèche C20/-R & MF	
40000015	Knob	Molette	
40010001	Stickers kit for C 12 / C 48	Kit étiquettes C 12 / C 48	
40100001	Power board kit 230V/50Hz	Rack puissance 230V/50Hz Ph1 kit	9*
40100002	Power board kit 120V/60Hz	Rack puissance 120V/60Hz Ph1 kit	9*
40100003	Shock Absorber kit	Kit plots amortisseurs	10
40100004	Fuses kit 230V/50Hz	Kit fusibles 230V/50Hz	
40100005	Fuses kit 120V/60Hz	Kit fusibles 120V/60Hz	
40100006	Motoreducer lock 230V/50Hz	Motoréducteur 230V/50Hz	11*
40100007	Motoreducer lock 120V/60Hz	Motoréducteur 120V/60Hz	11*
40100008	Lock without motoreducer kit	Kit Serrure sans motoréducteur	12
40100009	Springs kit	Kit vérins	13
40100010	Lid board kit	Kit Carte couvercle	14
40100011	Imbalance kit	Kit balourd	14-1
40100013	Upper bowl seal	Joint de cuve-couvercle	15
40100014	Protection shield kit	Kit écran de protection	16
40101001	Inner bowl seal (Ventilated)	Joint fond de cuve (Ventilé)	17*
40102001	Refrigeration group 230V/50Hz	Groupe froid 230V/50Hz	
40102002	Refrigeration group 120V/60Hz	Groupe froid 120V/60Hz	
40102003	Fan motor kit 230V/50Hz	Kit ventilateur 230V/50Hz	
40102004	Fan motor kit 120V/60Hz	Kit ventilateur 120V/60Hz	
40102005	Compressor kit 230V/50Hz	Kit compresseur 230V/50Hz	
40102006	Compressor kit 120/60Hz	Kit compresseur 120V/60Hz	
40102007	Temperature probe kit	Kit sonde de température	18
40102008	Bowl inner seal (refrigerated)	Joint fond de cuve (Réfrigéré)	17*

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Part #	English Designation	Désignation en Français	Item
40110001	C12 Display board kit	Kit Carte afficheur C12	19*
40110002	C20/-R Display board kit	Kit Carte afficheur C20/-R	19*
40110003	C48/-R Display board kit	Kit Carte afficheur C48/-R	19*
40110004	C12 & C48/-R Motor kit	Kit moteur C12 & C48/-R	20*
40110005	C20/-R Motor kit	Kit moteur C20/-R	20*
40110006	C12 & C48 Rotor fixation kit	Kit fixation rotor pour C12 & C48/-R	21*
40110007	C20/-R & MF Rotor fixation kit	Kit fixation rotor pour C20/-R & MF	21*
40111001	C 12 Keypad	Clavier C 12	22*
40111002	C 20 Keypad	Clavier C 20	22*
40111003	C 48 Keypad	Clavier C 48	22*
40111004	C 12Front panel	Face avant C 12	23*
40111005	C 20Front panel	Face avant C 20	23*
40111006	C 48Front panel	Face avant C 48	23*
40112001	C 20-R Keypad	Clavier C 20-R	22*
40112002	C 48-R keypad	Clavier C 48-R	22*
40112003	C20R Front panel	Face avant C 20-R	23*
40112004	C48R Front panel	Face avant C 48-R	23*
40120001	MF 20/-R Display board kit	Kit Carte afficheur MF 20/-R	19*
40120002	MF 48/-R Display board kit	Kit Carte afficheur MF 48/-R	19*
40120003	MF 20/-R Motor kit	Kit moteur MF 20/-R	20*
40120004	MF 48/-R Motor kit	Kit moteur MF 48/-R	20*
40120005	MF 20 AWELock™ kit	Kit AWELock™ MF 20	21*
40120006	MF 48 AWELock™ kit	Kit AWELock™ MF 48	21*
40120007	MF 20 Motor Shaft Ring & spring kit	Kit Bague arbre moteur MF 20	24*
40120008	MF 48 Motor Shaft Ring & spring kit	Kit Bague arbre moteur MF 48	24*
40121001	MF 20 keypad	Clavier MF 20	22*
40121002	MF 48 Keypad	Clavier MF 48	22*
40121003	MF 20 Front panel	Face avant MF 20	23*
40121004	MF 48 Front panel	Face avant MF 48	23*
40122001	MF 20-R keypad	Clavier MF 20-R	22*
40122002	MF 48-R Keypad	Clavier MF 48-R	22*
40122003	MF 20-R Front panel	Face avant MF 20-R	23*
40122004	MF 48-R Front panel	Face avant MF 48-R	23*
(*)	Depending on model	Selon modèle	

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10. DISPOSAL

Information concerning the disposal of electrical and electronic equipment in the European Union.
Electrical equipment is governed by national rules based on European Directive 2002/96/CE relating to electrical and electronic equipment waste (EEEW).

To conform to this directive, all equipment delivered after 13 August 2005 in the business-to-the business sector -- to which this centrifuge belongs (category 8, Medical Devices) -- must not be disposed of with domestic waste.

To facilitate their identification, the equipment concerned is provided with the following symbol:

The regulations related to the disposal of such waste vary from one country to another within the EU and we invite you to contact your local supplier.

11. CERTIFICATE OF DECONTAMINATION /RETURNS FORM

Equipment will not be accepted without a returns form and the certificate of decontamination which must be fixed to the outside of the packaging.
In the absence of a certificate of decontamination the instrument will be decontaminated by an external organization and the operation will be invoiced to the sender.

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CERTIFICATE OF DECONTAMINATION

I, the undersigned,

First name: ……

Surname: ……

Title: ……

Company: ……

Address: ……

Post Code: ……

City: ……

Certify that the equipment described below:

Brand: ……

Model: ……

Serial Number: ……..

Has been decontaminated according to the following protocol:

Decontaminating agent: ……..

Method: ……..

Contact time: ……..

Carried out by: ……..

Checked by: ……..

Date: ……

Date: Signature:

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RETURN FORM

Date: .....

Company: .....

Contact: .....

Address: .....

.....

.....

Telephone: .....

Fax: .....

E-mail: .....

Equipment returned: .....

Brand: .....

Model: .....

Serial N°: .....

Under Guarantee: YES ☐ NO ☐

Contract N°: .....

Reason for returning: .....

.....

.....

.....

.....

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12. LOGBOOK

Example of table to trace the use of the centrifuge and its accessories.

Date	Operator	rpm	RCF	Time	T°C	Rotor	Incidents

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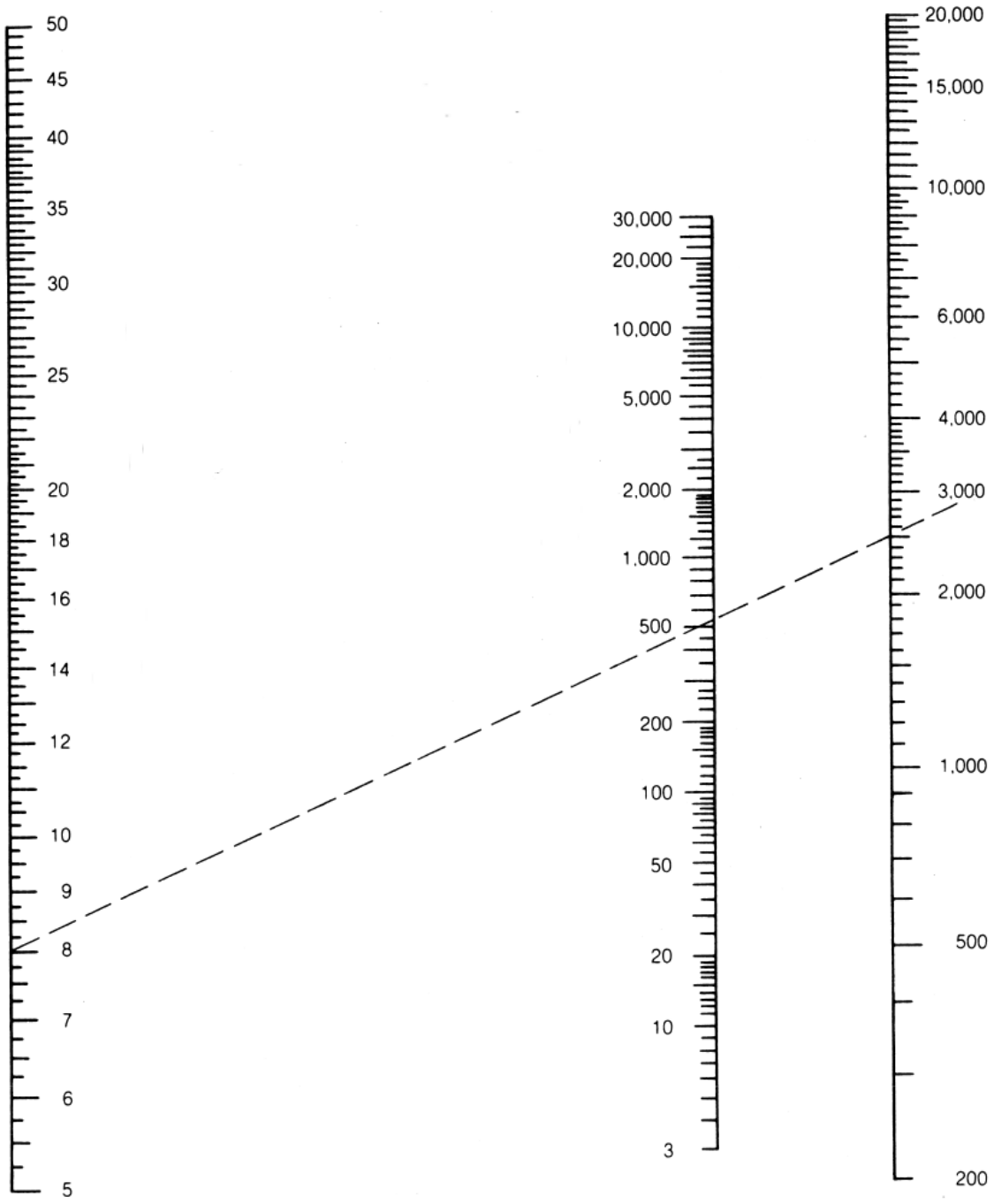
13. NOMOGRAM



Example :
The relative centrifugal force (RCF) at a radial distance of 8cm from the center of centrifuge spindle when operating at a speed of 2500 rpm, may be determined by placing a straight edge on the nomogram connecting the 8cm point on the Radius Scale (on the left), with the 2500 rpm point on the Speed Scale (on the right). The point of intersection on the Relative Centrifugal Force Scale (in the middle), or 550g is the relative centrifugal force.

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