












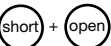







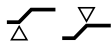
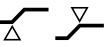
# Centrifuge 5702 / Centrifuge 5702 R / Centrifuge 5702 RH

Instruction Manual · Mode d'emploi succinct · Instrucciones breves

**eppendorf**

# Centrifuge 5702 / 5702 R / 5702 RH

## Shortcuts

Task	Lid	Press	Display 5702	Display 5702 R / 5702 RH	Instruction manual
Parameter change during centrifugation	 closed	 > 2 sec	Display flashes 5 sec	Display flashes 5 sec	3.8
Brake ON / OFF	 open	 > 5 sec	br on br OF	br on br OF 	3.12
Signal ON / OFF	 open	 > 2 sec	b on b OF		3.14
Parameter lock ON / OFF	 open	 > 2 sec	Lo on Lo OF		3.15
Program (only Centrifuge 5702 R / RH)	  open	1. set parameter  or  > 2 sec	-	prog 1 prog 2	3.16
At set rpm	 open	 > 2 sec			3.13

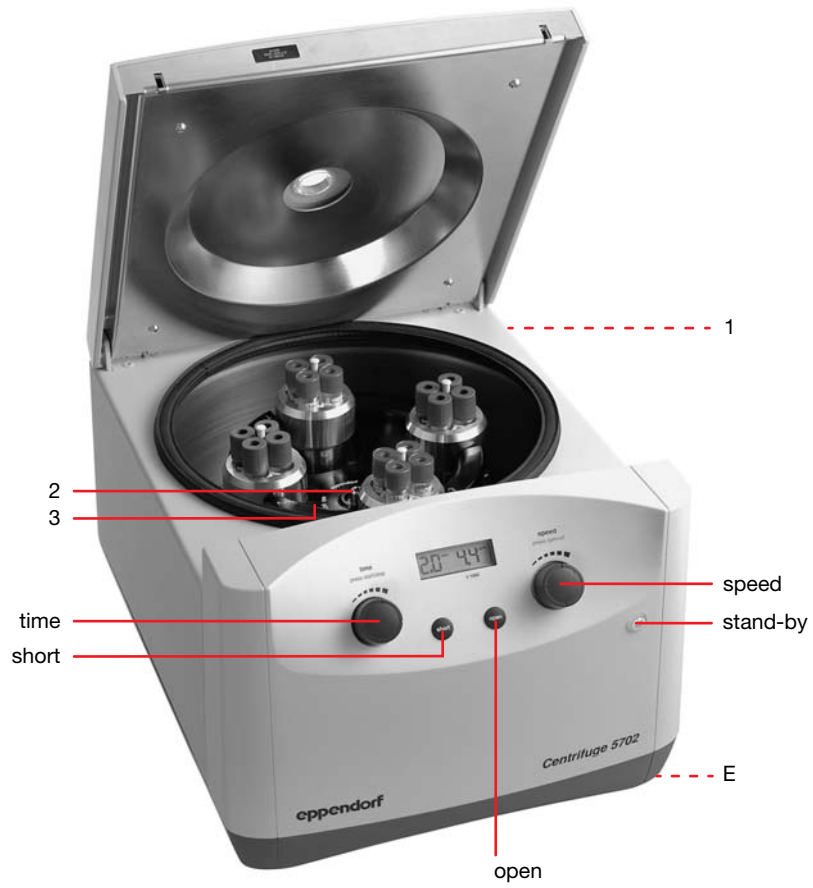
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# Centrifuge 5702

Fig. 1

Figure 1

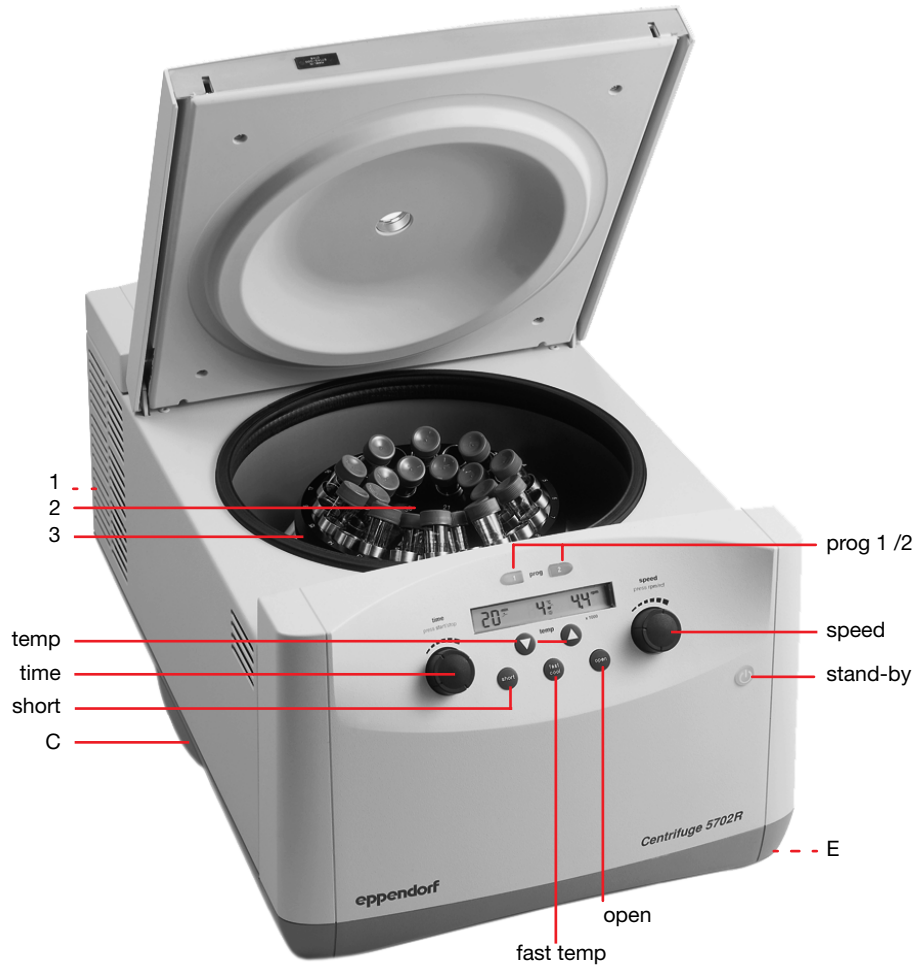


- 1 Mains switch and plug
- 2 Rotor nut
- 3 Rotor
- E Emergency lid release

# Centrifuge 5702 R

Fig. 2

Figure 2



- 1 Mains switch and plug
- 2 Rotor nut
- 3 Rotor
- E Emergency lid release
- C Condensation water tray (only 5702 R)

Front of the Centrifuge 5702 RH is structurally identical to that of the 5702 R.

# Centrifuge 5702 / 5702 R / 5702 RH

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# 1 Introduction

The Centrifuge 5702 is a non-refrigerated, the Centrifuge 5702 R a refrigerated, and the Centrifuge 5702 RH a refrigerated and heatable bench-top centrifuge for use by trained professionals in routine, training and research laboratory work in the biosciences, industry, hospitals, and the chemistry field. Its varying rectangular buckets, round buckets and adapters make it specially well suited to centrifugation of blood sampling systems, Falcons® and centrifuge tubes. The following rotors are available for the Centrifuge 5702, the Centrifuge 5702 R and the Centrifuge 5702 RH:

Fixed-angle rotor F-35-30-17	with a capacity of 30 x 15 ml centrifuge tubes.
Fixed-angle rotor F-45-24-11	with a max. capacity of 24 x 1.5 / 2.0 ml in micro test tubes.
Fixed-angle rotor F-45-18-17-Cryo	with a max. capacity of 18 x cryotubes (max. Ø 17 mm).
Swing-bucket rotor A-4-38	with a max. capacity of 4 x 85 ml in round buckets and 4 x 90 ml in rectangular buckets.
Swing-bucket rotor A-8-17	with a max. capacity of 8 x 15 ml.

**Before using the centrifuge 5702 / 5702 R / 5702 RH for the first time, please read the operating manual.**



You will see this symbol on your centrifuge and at a number of points throughout this manual. The texts it highlights are relevant to safety. Use the centrifuge only after having read the safety notices.

## 1.1 Delivery package

- 1 Centrifuge 5702 non-refrigerated or 1 Centrifuge 5702 R refrigerated with condensation water tray or
- 1 Centrifuge 5702 RH refrigerated and heatable, each without rotor
- 1 power cable
- 1 operating manual
- 1 rotor key
- 1 set of fuse

## 1.2 Installing the device



- **For 5702 R / RH only:** In order to prevent damage to the compressor following improper transport, the device may not be switched on until four hours after setting up.
- For the Centrifuge 5702 only: Please remove the transport safety device and keep it for possible use if the device is subsequently moved again.
- Place the centrifuge on a solid, flat, non-resonant lab bench. For the Centrifuge 5702 R / RH, the condensation water tray should be inserted from the side (see cover flap).
- The surrounding area must be well ventilated and protected against direct sunlight. To ensure that the ventilation of the device is not impaired, a fundamental clearance of 30 cm to the side and a min. of 15 cm to the back wall must be maintained. This is especially important for the refrigeration capacity of the 5702 R / RH.
- During centrifugation, according to the recommendations set out in EN 61010-2-020 a safety clearance of 30 cm must be maintained around the centrifuge within which there are no objects which may be destroyed and so cause further damage.
- Please ascertain that the mains power supply and the power frequency are compatible with the information given on the device ID plate.
- Now connect the centrifuge to the power supply and switch it on at the main power switch (on the rear side, see cover flap). The centrifuge is now ready for operation. The Stand-by button lights up green and the display is active.
- Before starting, check that the rotor is firmly seated.

## 2 Safety precautions and applicational limitations



For your personal safety, please be sure to comply with the following regulations unconditionally:

- The centrifuge 5702 / 5702 R / 5702 RH must only be used for the specified applications (see Introduction). It must not be operated in explosive atmospheres. Explosive or highly reactive substances must not be centrifuged.
- When being moved from the cool room to a normal lab environment, the centrifuge must either warm up for half an hour in the cool room first or it must warm up for at least 3 hours in the lab before being connected to the supply system, in order to prevent damage by condensation.
- The centrifuge must not be moved or knocked while in operation.
- Improperly installed or serviced centrifuges must not be operated. Repairs may only be carried out by Service personnel authorized by Eppendorf. Use only original Eppendorf spare parts and rotors.
- When handling toxic, radioactive liquids or pathogenic microorganisms of risk group II (see World Health Organization: Laboratory Biosafety Manual) comply with the relevant national regulations. Bioseals are a part of biological safety systems, which are not able to guarantee the safety of people and the environment on their own when handling pathogenic microorganisms. When working with pathogenic organisms of a higher risk group, more than one aerosol-tight bioseal must be provided for. If the named liquids are spilled in the rotor or rotor chamber, the centrifuge must be thoroughly and professionally cleaned. Before using any cleaning or decontamination method other than that set out in section 4, "Maintenance and cleaning", please consult Eppendorf to ensure the intended method will not damage the device.
- Rotors must always be properly secured. The centrifuge may only be operated with the rotor firmly tightened. For mechanical stability, all the places on the rotor must be fitted with identical buckets.
- The rotor may only be loaded symmetrically. Opposing tubes should be of the same type and be filled equally. On the rotor you will find information concerning the weight that a completely filled bucket may not exceed.
- In any event, tubes should be subjected to a visual examination for material damage before being centrifuged. Damaged tubes may not be centrifuged, as tubes breaking can cause further damage to the centrifuge and its accessories in addition to loss of samples.
- Rotors showing clear signs of corrosion or mechanical damage must not be used. Check the accessories regularly.
- Rotors are high-grade components which have to withstand extreme stresses and strains. Aluminum rotors are largely protected from corrosion by the most common laboratory chemicals by means of an anodized coating, though the protection is not unlimited. Protect the rotors from mechanical damage. Even minor scratches or cracks can result in serious internal material damage. Avoid damaging the rotors by the use of aggressive chemicals, such as: strong and weak alkalis, strong acids, solutions of mercury, copper and other heavy metal ions, chlorinated hydrocarbons, concentrated salt solutions and phenol. If the rotor is contaminated by aggressive substances, clean it **immediately** with a **neutral** rinsing solution.
- The material being centrifuged may not exceed a density of 1.2 g/ml at maximum rotation speed. If the rotor is run for a lengthy period of time, or more often with short centrifugation runs the sample tubes will become hot. Keep within the limits specified by the tube manufacturers.
- Seal the tube lid down tight before centrifuging. The lids of unclosed tubes may rip off during centrifugation and damage the centrifuge.
- When using organic solvents (e.g. phenol, chloroform) the durability of plastic tubes may be impaired.
- When closing the centrifuge lid do not place your fingers between the lid and the centrifuge, otherwise they may be trapped.

The following rotors and accessory buckets have a maximum service life of 7 years:

A-4-38	22 63 904-8 and 22 63 906-4
A-8-17	22 63 950-1

The date of manufacture is engraved on them in the format 10/01 (October 2001).

Transparent aerosol-tight caps made of polycarbonate have a maximum service life of 3 years.

The date of manufacture is embossed on them in the form of a clock



Aerosol tight caps may lose their sealing strength when exposed to organic solvents (e.g. phenol, chloroform).

Check the aerosol-tight caps regularly for changes or cracking. Aerosol-tight caps showing cracks or other changes must be replaced immediately.



**Rotors, caps or buckets which have been damaged by chemical or mechanical factors or which have passed their maximum service life may no longer be used!**


## 3 Operation

### 3.1 Functional and operator control elements

Refer to the frontal view on the first inside cover page of this manual.

Fig. 1: Front view of the Centrifuge 5702.

Fig. 2: Front view of the Centrifuge 5702 R. Front of the Centrifuge 5702 RH is structurally identical to that of the 5702 R

<b>time</b>	-	Time dial and Start / Stop button
<b>short</b>	-	Short run button
<b>speed</b>	-	Speed selector dial and rpm/rcf button
	-	Stand-by button
<b>open</b>	-	Lid release
<b>1</b>	-	Line socket with fuse set and main power switch, device identification plate with power supply ratings (rear).
<b>E</b>	-	Emergency lid release on underside with pull cord

**For the Centrifuge 5702 R / 5702 RH only:**

<b>temp</b>	-	Temperature selection buttons
<b>fast temp</b>	-	Controlled temperature button
<b>prog 1</b>	-	Program button 1
<b>prog 2</b>	-	Program button 2
<b>C</b>	-	Condensation water tray

### 3.2 Fitting and removing the rotors

When fitting the rotor, follow the marking triangles on each side of the rotor nut ► ◄. They indicate the direction of the groove on the underside of the rotor, and are needed to position the rotor safely.

To insert the rotor rotate the driver pin of the motor shift longitudinally.

Fit the rotor onto the motor shaft so the marking triangles point in the same direction as the motor shaft driver pin. Tighten the rotor nut by turning them clockwise using the rotor key supplied. If the rotor nut does not tighten easily, check whether the rotor has caught on the motor shaft driver pin.

To release the rotor turn the rotor nut anticlockwise using the rotor key.

### 3.3 Loading the rotors

The rotors and buckets (round and rectangular) must be loaded symmetrically. The adapters must be loaded only with the specified tubes. Minimize the difference in weight between the filled sample tubes. This will reduce wear on the drive and cut running noise. The centrifuges 5702 / 5702 R / 5702 RH have an automatic imbalance detector, which shuts down the centrifuge if the weight differences are excessive. This is indicated by the error message "Inb" in the display.



The maximum weight for a fully loaded bucket is indicated on each rotor.



## 3 Operation

### 3.4 Fixed-angle rotor

The fixed-angle rotor **F-35-30-17** can be loaded with 15 ml Falcons® and 15 ml round bottom centrifuge tubes. It is available in the 10 and 30 position versions. Please use only swing-bucket rotor A-4-38 with round buckets and the appropriate adapters for centrifuging blood sampling systems.

Before centrifuging the Falcons®, place their plastic adapters in the tube holders. The adapters prevent the Falcons® from being destroyed. For the centrifugation of round bottom tubes made of Duran® glass, round rubber pads are required to prevent the tubes from cracking. Make sure a rubber pad is placed under each glass tube before centrifuging.

In order to avoid breakage of the tubes when using centrifuge tubes of glass, polystyrene or similar materials, please observe the limiting data with reference to endurance specified by the manufacturer.

The maximum load capacity for Falcons® is 20 x 15 ml; for 15 ml round bottom centrifuge tubes 30 x 15 ml. The rotor can be loaded with a combination of 15 ml Falcons® and 15 ml round bottom centrifuge tubes. The maximum capacity is then 20 x 15 ml Falcons® and 10 x 15 ml round bottom centrifuge tubes.

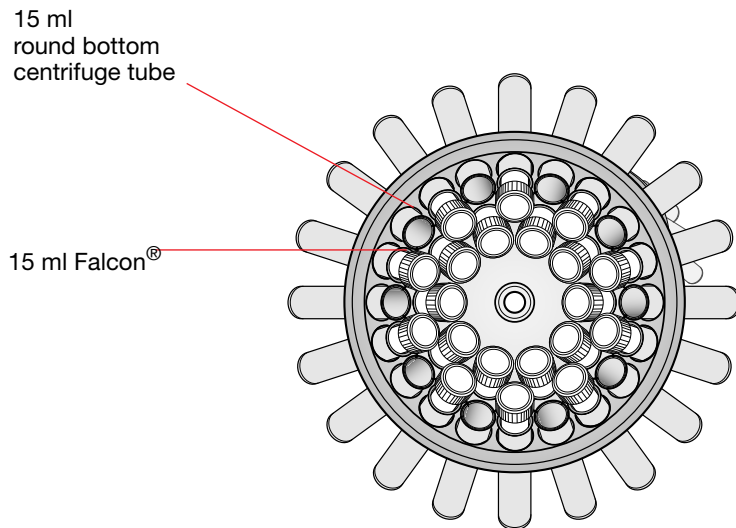


Fig.3: Loading of rotor F-35-30-17 with 15 ml Falcons® and 15 ml round bottom centrifuge tubes



The specified max. weight of 56 g imprinted on the rotor is the gross weight rating including the tube holder, adapter, tubes and contents. Always weigh the tube holder and the load together.

A maximum of 24 1.5/2.0 ml test tubes can be centrifuged in rotor **F-45-24-11**. If the appropriate adapters are used, it is also possible to load it with 0.2 ml PCR tubes, 0.4 ml test tubes, 0.5 ml test tubes and 0.6 ml Microtainers®.

Fixed-angle rotor **F-45-18-17-Cryo** can be equipped with cryotubes (max. diameter 17 mm or 13 mm with adapters) and sealable centrifuge tubes (max. diameter 16.5 mm or 12.2 mm with adapters). In each of these cases, max. tube length is 50 mm.

Maximum load (adapter, tube and contents) per bore is 3.75 g on rotor F-45-24-11 and 8.7 g on rotor F-45-18-17-Cryo. When loading the rotors, ensure that the tubes are inserted in the bores of the rotor opposite one another in pairs. To ensure that the rotor is loaded symmetrically, the tubes opposite one another need to contain approximately the same filling quantity.

Fixed-angle rotors are operated without a rotor lid.

## 3 Operation

### 3.5 Swing-bucket rotors

The swing-bucket rotor **A-4-38** can be equipped with round or rectangular buckets. Round buckets and the associated adapters (see ordering information) are conceived for the centrifugation of Falcons<sup>®</sup>, blood withdrawal systems and other centrifuging tubes with round bottoms. Rectangular buckets and associated adapters (see ordering information) are conceived for the centrifugation of glass centrifugation tubes.



Use only the rotor / bucket (round or rectangular) / adapter combinations approved by Eppendorf. Check that all buckets are fully attached, lubricated lightly and can swing out freely. If you use overlength tubes, it is essential to carry out a manual swing test with empty tubes! When the rectangular buckets are not completely filled, insert the adapters so that the bolts of the rotor A-4-38 are symmetrically loaded. Avoid unbalanced loading of the inner adapter bores, pointing to the rotor nut, since this could cause overshooting of the rectangular buckets.

For mechanical stability, all the places must be fitted with identical buckets. The buckets are sorted by weight. The weight class is embossed on the side of the bucket: e.g. 90 (the last 2 digits in grams). Opposing buckets must be of the same weight class. When reordering, please quote the weight class required.

Before inserting the buckets in the grooves, make sure the grooves are clean. Dirty grooves or pegs will prevent the buckets from swinging out evenly.

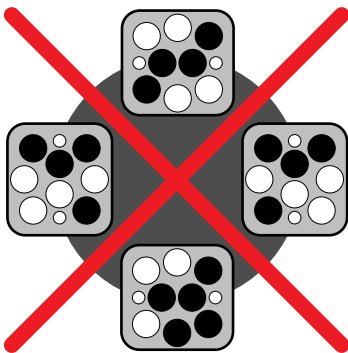


Fig. 4:  
Rotor and buckets symmetrically loaded.

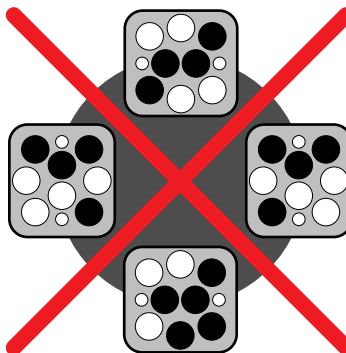


Fig. 5:  
Rotor and buckets asymmetrically loaded. Not permitted, because the pegs of the buckets are subject to differing loads.

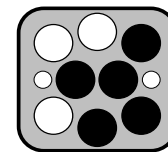


Fig. 6:  
Adapter loaded asymmetrically. Not permitted, because the pegs of the bucket are not uniformly loaded and the loading of the adapter bores pointing to the rotor nut could cause overshooting of the rectangular buckets.

The specified max. weight of 400 g imprinted on the rotor is the gross weight rating of a bucket (including adapter, tubes and contents).

The maximum load (adapter, tubes and contents) of the round bucket is 190 g. The maximum load (adapter, tubes and contents) of the rectangular bucket is 240 g.

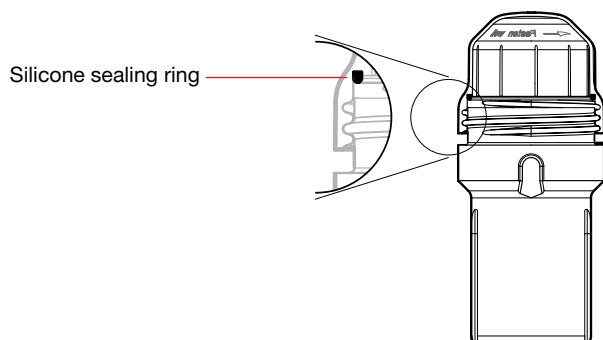
A maximum of 8 x 15 ml Falcons<sup>®</sup> or 8 x 15 ml tubes of Duran<sup>®</sup> glass can be centrifuged in the rotor **A-8-17**. Prior to the centrifugation of 15 ml Falcons<sup>®</sup>, please insert the provided plastic adapter into the rotor. Prior to the centrifugation of tubes of Duran<sup>®</sup> glass, please insert the round rubber plate into the rotor. Please make certain prior to centrifugation that such a rubber plate is found under every glass tube. In order to avoid breakage of the tubes when using centrifuge tubes of glass, polystyrene or similar materials, please observe the limiting data with reference to endurance specified by the manufacturer.

Only load the rotor symmetrically, so that the rotor and the pivots are evenly loaded during centrifugation. The maximum load (adapter, tubes and contents) of the rotor A-8-17 is 8 x 38 g. The maximum permissible tube length is 120 mm.

## 3 Operation

### 3.6 Operation of round bucket with aerosol-tight caps


The inner part of the aerosol-tight cap is equipped with a silicone sealing ring. Never remove this sealing ring from the cap. Whenever using the cap, make sure that the sealing ring is undamaged and sits uniformly in the groove.





The round bucket and the aerosol-tight cap are autoclavable (121 °C, 20 minutes). The aerosol-tight cap, including the silicone sealing ring, is subject to natural wear and must be replaced when visual inspection reveals wear.

When handling the aerosol-tight cap, remember that polycarbonate has limited chemical resistance to phenol.

### 3.7 Centrifugation with timer setting

Switch on the centrifuge, with the mains power switch if necessary, and then with the  switch. The nominal values of the last run are displayed. Load the rotor symmetrically and close down the centrifuge lid.

- time** - Alters the running time.
- speed** - Alters the speed in increments of 100 1/min or rcf.
- start** - Starts the run. The  symbol flashes while the rotor is running.
- stop** - Stops the centrifuge. The  symbol appears briefly as soon as the rotor comes to a standstill.
- stand-by** - Centrifuge switched to stand-by mode.
- open** - Releases the lid latch.
- temp** - Changes the nominal temperature value (for 5702 R / 5702 RH only)

While the centrifuge is running the remaining time is displayed. The last minute is counted down in seconds. When the preset time elapses the centrifuge stops automatically and emits a signal tone to indicate the centrifugation is finished.

The lid of the non-refrigerated Centrifuge 5702 opens automatically following centrifugation. The lid of the refrigerated Centrifuge 5702 R / 5702 RH remains closed to maintain the sample temperature and can be opened with the OPEN button.

When you switch off the centrifuge 5702 / 5702 R / 5702 RH at the main power switch the display goes blank after a few seconds' delay.

### 3.8 Changing the centrifugation parameters during the run

The timer setting, the rotation speed and the temperature (only 5702 R / 5702 RH) can be changed during the run by briefly pressing the SHORT button. The display begins flashing. You can then set the new centrifugation parameters with the TIME and SPEED and the TEMP dial adjusters. The new centrifugation parameters are programmed after 5 seconds.

### 3.9 Short centrifugation

- short** - Press this button with the lid closed to start a short run at maximum speed. The centrifuge stops when you release the SHORT button again.

## 3 Operation

### 3.10 Continuous running

- time** - The continuous run function is set by turning the TIME dial to either above 99 minutes or below 0.5 minutes. The timer displays "oo" to indicate that continuous running is active. The time is counted upward in minutes.
- stop** - Ends continuous running

### 3.11 Rcf display and calculation

- SPEED** - Press the dial to toggle the display between 1/min (rpm) and (rcf) and vice versa.

Note that the rcf (g-force) indicated when the display is switched is standardized to 15 ml Falcon® tubes in the rotor A-4-38. At 4,400 1/min you can achieve the following maximum rcf with the various adapters.

Rotor	Adapter	Max. centrifuging radius (cm) $r_{\max}$	Max. rcf (g-force), rounded
<b>A-4-38 Round bucket</b>	1.1 – 1.4 ml	13.2	2,850
	2 – 7 ml	13.2	2,850
	2.6 – 7 ml	13.2	2,850
	4 – 10 ml	13.2	2,850
	9 – 15 ml	13.0	2,800
	<b>15 ml Falcon®</b>	<b>13.7</b>	<b>3,000</b>
	25 ml	13.5	2,900
	50 ml Falcon®	13.5	2,900
<b>A-4-38 Rectangular bucket</b>	5 – 7 ml	12.7	2,750
	9 ml	12.7	2,750
	15 ml	12.7	2,750
	20 ml	12.7	2,750
	25 ml	12.7	2,750
<b>A-8-17</b>	15 ml Falcon®	12.8	2,770
	15 ml DIN-Gefäß	12.8	2,770
<b>F-35-30-17 Outer ring</b>	15 ml	12.7	2,750
	15 ml Falcon®	12.7	2,750
<b>F-35-30-17 Inner Ring</b>	15 ml	10.7	2,300
	15 ml Falcon®	10.7	2,300
<b>F-45-24-11</b>	0.2 ml	6.6	1,430
	0.4 ml	8.2	1,770
	0.5/0.6 ml	7.4	1,600
	1.5/2.0 ml	8.2	1,770
<b>F-45-18-17-Cryo</b>	without adapter	9.1	1,970
	with adapter	8.9	1,930

To ascertain the maximum rcf for a specific adapter you can apply the following formula as per DIN 58 970:

$$\text{rcf} = 1,118 \cdot 10^{-5} \cdot n^2 \cdot r_{\max}$$

n: rotational speed in 1/min


$r_{\max}$ : max. centrifuging radius in cm

Example: The 85 ml adapter has a maximum radius of 13.5 cm. At 4,000 rpm a maximum rcf of 2,415 x g is reached.

## 3 Operation

### 3.12 Adjusting the acceleration and braking ramps


When working with Ficoll® density gradients or other sensitive applications (e.g. certain types of blood and urine centrifugations) slower acceleration and braking ramps can be switched on for the Centrifuge 5702 / 5702 R / 5702 RH. This makes the centrifuge accelerate and decelerate gently. This guarantees optimal centrifugation results.


Press the SHORT key for longer than 5 seconds while the centrifuge lid is open. On the Centrifuge 5702, the text in the display changes from "br on" (brake on) to "br OF" (brake off). The symbol  appears in the display of Centrifuges 5702 R / RH. The slower acceleration and braking ramps are now activated. The current status will be displayed when the SHORT button is pressed for less than 5 seconds while the centrifuge lid is open.

To switch faster acceleration and braking back on, press the short key for longer than 5 seconds again while the centrifuge lid is open. The "br on" message appearing briefly in the display signals the reactivation of the faster acceleration and braking ramps.


### 3.13 At set rpm

For centrifugation, time can be counted either immediately from the start or not until attainment of the preset speed.

Pressing the START / STOP button for longer than 2 seconds with the centrifuge lid open switches the "at set rpm" mode, symbolized by the pictogram .

To exit the "at set rpm" mode again and begin counting down the centrifugation time immediately after starting the centrifuge, press the START / STOP button again for longer than 2 seconds with the centrifuge lid open until the pictogram  is displayed.


### 3.14 Activating and deactivating the signal tone

Press and hold down the OPEN button for longer than 2 seconds with the centrifuge lid open to toggle between "b on" (signal tone on) and "b OF" (signal tone off). Press the OPEN button for less than 2 seconds with the centrifuge lid open to display the current status. With the Centrifuge 5702 R / 5702 RH the selected signal tone is symbolized by the pictogram .


The current status is shown when the OPEN button is pressed for less than 2 seconds while the centrifuge lid is open (Centrifuge 5702).

### 3.15 Parameter lock

To secure the centrifuge parameters against unintentional adjustment, the Centrifuge 5702 and the Centrifuge 5702 R / 5702 RH allows you to lock in the parameters you need.

Press and hold down OPEN- and SHORT-button simultaneously for at least 5 seconds with the centrifuge lid open. After 5 seconds the dial adjuster is disabled and the centrifugation parameters are locked against unintentional adjustment. "Lo on" appears in the display of the Centrifuge 5702. In the display of the Centrifuge 5702 R / 5702 RH the locked parameters are symbolized by an additional pictogram . The preset parameters can then no longer be altered, whether the centrifuge is running or not. The START/STOP button can still be used to start and stop the centrifuge however. It is also still possible to switch the signal tone and rcf switch on and off.

With the Centrifuge 5702 R / 5702 RH it is also possible to additionally lock a program called up against unintentional resetting. A program already written is called up through the program buttons and then – as described above – the program buttons and dial adjustor setting deactivated.

To enable the dial adjuster again, press and hold down OPEN- and SHORT-button simultaneously for 5 seconds with the centrifuge lid open. The display shows "Lo OF" or  (5702 R / 5702 RH). The current status ("Lo on") can be displayed on the Centrifuge 5702 by briefly pressing the SHORT and OPEN buttons while the lid is open.

## 3 Operation

### 3.16 Programming (for 5702 R / 5702 RH only)

With the Centrifuge 5702 R / 5702 RH it is possible to store up to two permanent programs (only during standstill):

First set the required program data with the TIME and SPEED dial adjustors. The function "at set rpm" and the switched-off braking function can also be stored if necessary in the permanent program.

- PROG 1 or 2** – Hold down for 2 seconds until the program button is no longer flashing and lights up continuously. A brief signal will sound. The program is now stored.

### 3.17 Program selection (for 5702 R only)

Program selection is only possible during stillstand.

- PROG 1 or 2** – Pressing once calls up the required program. The button for the program activated lights up in blue.

If dial adjustors or buttons are required for the program setting, the program remains unchanged.

The text "Pr 1" (Program 1) or "Pr 2" (Program 2) appears in the centrifuge display.

Exit the program by again pressing the program button. The blue lighting of the button extinguishes and the centrifugation parameters can be set freely again.

### 3.18 Refrigeration (for 5702 R only)

- temp** – The nominal temperature value can be set with the arrow keys from – 9 °C to + 40 °C. During stillstand, the nominal temperature setting and the current temperature in the rotor chamber are displayed alternately. With the centrifuge running, only the current temperature in the rotor chamber is displayed.  
A deviation of more than  $\pm 3$  °C from the temperature set is signalled during the run.
- fast temp** – starts a controlled temperature run with a centrifuge-specific rotation speed, in order to quickly reach the selected temperature in the rotor. During the FAST TEMP run, "FA" appears in the display, as well as the present temperature and the fixed optimal rotational speed. The run ends automatically or by pressing the STOP button. A signal tone sounds periodically.
- Stand-by refrigeration** – With closed centrifuge lid the rotor chamber is refrigerated before and after a run to the selected nominal temperature if this is less than the ambient temperature. Since there is no rotation of the rotor, the temperature adaptation takes place slowly. If the centrifuge was in standby refrigeration over a longer time or at low temperatures, start a brief FAST TEMP run before inserting the samples in order to prevent the samples from freezing.

If the centrifuge is not used for more than 8 hours or the lid is not opened, the refrigeration switches off to protect the device.

**Remark:** In cases of higher ambient temperature, temporary air noises may occur until the desired temperature is attained. These are a sign of high refrigeration capacity. Block the ventilation slots under no circumstances!

For ambient temperatures below 18 °C a warming-up time of 1 hour is required before operating.

## 3 Operation

### 3.19 Heating and refrigeration (5702 RH)

In the case of the Centrifuge 5702 RH, we are dealing with a benchtop centrifuge with a regulated heating and cooling system. The Centrifuge 5702 RH can be refrigerated or heated precisely within a temperature range from  $-9\text{ }^{\circ}\text{C}$  to  $+42\text{ }^{\circ}\text{C}$ . By way of preprogrammed temperature profiles, it is possible to set optimized temperature arcs for the available swing-bucket and fixed angle rotors. This enables exact temperature control even for sensitive samples.

#### Setting the preprogrammed temperature profiles:

Pressing the Fast Temp key while the centrifuge lid is open results in the display of the set rotor with the corresponding temperature profile. Using the arrow keys it is possible to select other temperature profiles. The displays appearing stand respectively for the following rotors:

Display	Rotor
ro F 35	Fixed-angle rotor F-35-30-17
ro F 24	Fixed-angle rotor F-45-24-11
ro F 18	Fixed-angle rotor F-45-18-17-Cryo
ro A4 rE	Swing-bucket rotor A-4-38 with rectangular buckets
ro A4 ro	Swing-bucket rotor A-4-38 with round buckets
ro A8	Swing-bucket rotor A-8-17
ro AL L	General temperature profile for all rotors

After 5 seconds a selected temperature profile will be automatically adopted and the display will return to the operating status.

- temp**
  - The temperature nominal value can be set using the arrow keys. During the rest period of the centrifuge, the current temperature and the temperature nominal value are displayed alternately (current temperature short, temperature nominal value long). Only the current temperature is displayed during the run. A deviation of the set temperature nominal value of more than  $\pm 3\text{ }^{\circ}\text{C}$  is signalled during the run by a blinking temperature display
- fast temp**
  - Starts a temperature control run in order to reach the preselected temperature as quickly as possible. During the temperature control run, "FA" appears in the display, as well as the current temperature and the optimum rotational speed. Refrigeration runs at less than room temperature are automatically carried out with a rotor-specific, low rotational speed, while heating runs are carried out initially with a maximum and then with a nominal rotational speed. For runs with precisely controlled temperatures, we recommend starting a short Fast Temp run immediately prior to centrifugation. This prevents an overshooting of the temperature in the rotor chamber, such as can sometimes occur after longer standby periods.
- Stand-by Heating and refrigeration**
  - The rotor chamber is heated or cooled to the selected nominal temperature both before and after a run with the lid closed. Because the rotor does not thereby rotate, the temperature adjustment occurs slowly. The current temperature in the rotor chamber is displayed. For runs with precise temperature control following longer standby periods, we recommend starting a brief Fast Temp run immediately prior to centrifugation. This prevents potential overshooting of the temperature in the rotor chamber.

### 3.20 Opening the centrifuge in case of power failure

Pull the power plug and wait for the rotor to come to a stop (this may take as long as 5 minutes!). Emergency lid release on underside of device by pull cord: In front of the front right suction foot there is a small white plastic cap in the base plate (see "E" in figures 1 and 2, cover flap). Remove the cap and draw the cord out straight downward.

Please be sure to later make certain that the cord is pushed back completely into the housing before closing the lid. Press the plastic button into the baseplate again.

### 3.21 Device fuses

The fuse box is located under the main power plug. The fuse box can be removed from the rear. The two fuses can be replaced (see Ordering information).

## 4 Maintenance and cleaning

### 4.1 Device

The outer surfaces of the centrifuge and the rotor chamber should be cleaned regularly with warm rinsing solution. Before cleaning, unplug the power plug, then take off the rotor and clean it separately. The rotor chamber should be cleaned only with a damp cloth. Use only **neutral** agents for cleaning and disinfection (e.g. Extran neutral, 70 % alcohol, Meliseptol<sup>®</sup>, Sterillium<sup>®</sup>). Do not allow any liquid to get into the gap at the motor shaft outlet. To ensure the long life and safe operation of your centrifuge, avoid aggressive chemicals which may damage the rotor, buckets and rotor chamber. Check your unit once a month for corrosion and damage.

The rubber seals in the rotor chamber should be rinsed off thoroughly with water and rubbed with glycerin after each clean.

### 4.2 Rotors

The rotors, buckets, tube holders and adapters should be cleaned once a month or when necessary with a neutral cleaning agent (e. g. Extran<sup>®</sup> neutral, RBS<sup>®</sup> neutral, Teepol 610 S, 70 % alcohol, Meliseptol<sup>®</sup>, Sterillium<sup>®</sup>) to prevent residues of the material being centrifuged from changing the properties of the centrifuge and its accessories. The rotor must be taken off for this.

Never place components in disinfectants or cleaning agents which contain sodium hypochlorite/chlorine or are oxidants. This will cause the material to change. Disinfection with glutaraldehyde solution is possible. We recommend Cidex<sup>®</sup> activated glutaraldehyde solution. The plastic adapters and rubber plates are dishwasher safe.

Check the tube holders and buckets for residues and corrosion. For thorough cleaning, remove the rubber plates from tube holders and buckets and clean all parts separately.

Then refit the rotor and bolt it into place with the supplied rotor key. Check the rotor, tube holders and buckets once a month for mechanical damage.

All rotors, buckets, adapters, caps and tube holders can be autoclaved (121 °C, 20 min).

The aerosol-tight cap, including silicon sealing ring, rubber plates, rectangular bucket adapters and replacement ring are subject to normal wear and must be replaced when a visual inspection reveals wear.

Do not unbolt the rectangular bucket adapters from each other.

On the swing-bucket rotor make sure, in particular, that the pegs and grooves of the buckets are free of dirt. They should be lightly lubricated with pivot grease (provided with each swing-bucket rotor) so the buckets can swing freely.

The aerosol-tight buckets must not be stored with their caps sealed!

### 4.3 Refrigerated centrifuges

Clean condensation water and ice buildup regularly from the rotor chamber (by defrosting), using a soft, absorbent towel. Regularly empty and clean the condensation water collector. Remove this from the left. Please clean the condensation water drain regularly.

### 4.4 Glass breakage

When centrifuging glass tubes, be aware that as speed/rcf increases, so the risk of glass breaking becomes greater. Please note the manufacturer's instructions pertaining to maximum load for centrifuge tubes. In the event of glass breakage, carefully remove all splinters and all ground glass from the rotor, the buckets, the adapters and the rotor chamber. You may need to replace the rubber plates and adapters to prevent further damage.

Fine splinters of glass may otherwise scratch the surface of the rotors and buckets, reducing their resistance to chemicals. The air eddies in the rotor chamber produce a very fine black cloud of abraded metal which, in addition to causing damage to the rotor chamber, rotor, buckets and adapters, also results in samples becoming contaminated.

Check the rotor bores regularly for residues and damage.

### 4.5 Returning of the device

When returning centrifuges, please ensure that the devices have been decontaminated and thereby do not present a health risk to our Service staff.

You will find additional information and a blank of the decontamination confirmation at [www.eppendorf.com](http://www.eppendorf.com). Do also consult your laboratory safety officer about a suitable decontamination method.

Please fill out the decontamination confirmation and place it together with the device when it is to be sent back to Eppendorf.



## 5 Troubleshooting guide

Error	Cause	Remedy
Stand-by button lit red.	Centrifuge not ready.	Press STANDBY button.
No display.	No power.	Plug power cable in on both ends.
	Power failure.	Check power fusing of lab / device.
Lid will not open.	Power failure.	Emergency lid release (see section 3.20).
	Rotor still running.	Wait for rotor to stop.
Centrifuge shakes when starting up.	Rotor unevenly loaded.	Stop centrifuge and load evenly.
Centrifuge will not start.	Lid not closed.	Press lid down or press OPEN button.
Display: <b>LID</b>	Lid not released.	Press lid down tight, press Start/Stop or emergency lid release.
	Lid not locked.	Close lid again.
<b>Lo on</b> (only 5702)	Centrifugation parameters locked against adjustment.	With open centrifuge lid simultaneously press SHORT and OPEN for 5 seconds (see 3.15) if parameters should be readjusted.
<b>P 1</b> <b>P 2</b>	Program 1 or 2 is called up.	Press illuminated program button to exit the program level (if required).
<b>FA</b>	Display indicates a FAST TEMP run.	The run can be interrupted with the START / STOP button if required.
<b>Inb</b>	Rotor unevenly loaded.	Check loading and repeat run.
<b>Int</b>	Power failure during run.	Check power plug. Wait for rotor to come to a stop. Repeat run.
<b>Er 2</b>	Unbalanced rotor switch defective.	Inform Service.
<b>Er 3</b>	Error in speed system.	Leave device switched on until error message disappears (up to 5 min).
<b>Er 5</b>	Lid switch.	Close lid, restart.
<b>Er 6</b>	Drive error.	Repeat run.
<b>Er 7</b>	Overspeed.	Error in drive or speed measurement system.
<b>Er 8</b>	Drive error.	Repeat run.
<b>Er 9 – 25</b>	Electronics error.	Repeat run.
<b>Er 18</b>	Temperature deviation > 5 °C fr. nominal value.	Nominal value setting too low or refrigeration defective.
<b>Er 19</b>	Refrigeration unit overheated.	Make sure that the air circulation through the cooling slots is not impaired.
<b>Er 23</b> (only 5702)	Motor overheating.	Allow motor to cool.
<b>Er 24</b>	Fault in the refrigeration unit.	At start of operation: contact Service. After longer running time: allow centrifuge to cool down.

If the suggested remedy repeatedly fails, please contact Service.

## 6 Technical data

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Technical data

	<b>Centrifuge 5702</b>	<b>Centrifuge 5702 R / 5702 RH</b>
Line connection:	230 V / 50 – 60 Hz 120 V / 50 – 60 Hz 100 V / 50 – 60 Hz	230 V / 50 – 60 Hz 120 V / 50 – 60 Hz 100 V / 50 – 60 Hz
Power output:	200 W	380 W
Max. speed:	4 400 rpm	4 400 rpm
Max. centrifugal acceleration:	3 000 rcf	3 000 rcf
Max. load:	4 x 90 ml	4 x 90 ml
Max. kinetic energy:	2 280 Nm	2 280 Nm
Permissible density of material being centrifuged:	1.2 g/ml	1.2 g/ml
Ambient temperature:	2 – 40 °C	10 – 40 °C
Max. rel. air humidity:	75 %	75 %
Positioning height:	max. 2000 m above NSL	max. 2000 m above NSL
Dimensions:	Height: 241 mm Depth: 395 mm Width: 320 mm	Height: 265 mm Depth: 580 mm Width: 380 mm
Weight excluding rotor:	20 kg	36 kg
Startup time (230 V):	< 25 sec	< 25 sec
Deceleration time:	< 25 sec	< app. 25 sec
Startup time (100 V / 120 V):	< 25 sec	< 25 sec
Deceleration time:	< 25 sec	< app. 25 sec
Fuses:	2.5 A time-lag 230 V 5.0 A time-lag 120 V / 100 V	2.5 A time-lag 230 V 5.0 A time-lag 120 V 6.0 A time-lag 100 V
Noise level:	< 58 dB (A)	< 54 dB (A), steady state at 4 °C; 23 °C ambient temperature, empty rotor
Overvoltage category:	II	II
Degree of contamination:	2	2

Technical specifications subject to change!

## 7 Ordering information

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<b>Centrifuge 5702</b> 120 V / 50 – 60 Hz, without rotor	022626001
<b>Centrifuge 5702 R</b> 120 V / 50 – 60 Hz, without rotor	022626205
<b>Centrifuge 5702 RH</b> 230 V / 50 – 60 Hz, without rotor	022626213
<b>Fixed-angle rotor and accessories</b>	
Fixed-angle rotor F-35-30-17 Aluminum, 30 places, angle 35°, for mounting of 15 ml Falcons® or 15 ml round bottom centrifuge tubes, complete with stainless steel tube holders for 30 places	022639404
10 places	022639421
Tube holders (stainless steel), for rotor F-35-30-17, for mounting of 15 ml Falcons® or 15 ml round bottom centrifuge tubes, set of 10	022639439
Adapter, conical, to support 15 ml Falcons®, for rotor F-35-30-17, set of 10	022639447
Rubber pad for 15 ml round bottom centrifuge tubes, set of 10	022639455
Fixed-angle rotor F-45-24-11 Aluminum, angle 45°, 24 places, max. Ø 11 mm for mounting of 1.5/2.0 ml micro test tubes	022639471
Adapter for 0.2 ml PCR tubes, for rotor F-45-24-11, set of 6	022636260
Adapter for 0.4 ml micro test tubes, for rotor F-45-24-11, set of 6	022636243
Adapter for 0,5 ml micro test tubes and 0.6 ml Microtainer®, for rotor F-45-24-11, set of 6	022636227
Fixed-angle rotor F-45-18-17-Cryo Aluminum, angle 45°, 18 places, max. Ø 17 mm for mounting of cryotubes (max. Ø 17 mm) and centrifuge tubes which can be sealed (max. Ø 16.5 mm), max. length in mm: 50	022639480
Adapter for cryotubes (max. Ø 13 mm) and centrifuge tubes which can be sealed (max. Ø 12.2 mm), max. length in mm: 50	022639498
<b>Swing-bucket rotors and accessories</b>	
Swing-bucket rotor 4 x 85 ml, type A-4-38, aluminum, incl. 4 round buckets	022639048
Swing-bucket rotor 4 x 85 ml, type A-4-38, aluminum, excluding round buckets	022638064
Round bucket 85 ml for A-4-38, set of 4	022639081
Round bucket 85 ml for A-4-38, set of 2	022639099
Caps, aerosol tight, for round bucket 85 ml, set of 2	022639293
Adapter for standard tubes and blood sampling systems for round bucket 85 ml 2 adapters 5 x 1.1 – 1.4 ml (Ø adapter bore x max. vessel length in mm: 8.5 x 100)	022639285

## 7 Ordering information

2 adapters 5 x 2 – 7 ml	(12.5 x 100)	022639102
2 adapters 4 x 2.6 – 7 ml	(13.5 x 100)	022639242
4 adapters 4 x 4 – 10 ml	(16 x 100)	022639269
9 adapters 4 x 9 – 15 ml	(17.5 x 100)	022639129
2 adapters 1 x 15 ml Falcon®	(17.2 x 121)	022639188
2 adapters 2 x 15 ml Falcon® *	(17.2 x 121)	022639200
2 adapters 1 x 25 ml	(25 x 100)	022639145
2 adapters 1 x 50 ml Falcon®	(30 x 115)	022639226
2 adapters 1 x 85 ml	(38 x 106)	022639161
Rectangular bucket 90 ml for A-4-38, set of 4		022639307
Rectangular bucket 90 ml for A-4-38, set of 2		022639315

\* Do not use with aerosol tight caps.

### Adapter for standard tubes for rectangular buckets

2 adapters 10 x 5 – 7 ml	022639323
2 adapters 8 x 9 ml	022639340
2 adapters 6 x 15 ml	022639366
2 adapters 4 x 20 ml	022639382
2 adapters 2 x 25 ml	022639391
Swing-bucket rotor type A-8-17	022639501
Adapter, conical, to support 15 ml Falcons®, for rotor A-8-17, set of 8	022639528
Rubber pad for 15 ml round bottom centrifuge tubes, set of 8	022639510
Set of fuses for 5702 / 5702 R 230 V (2 x 2.5 A time-lag)	022375890
for 5702 / 5702 R 120 V (2 x 5 A time-lag)	022377302

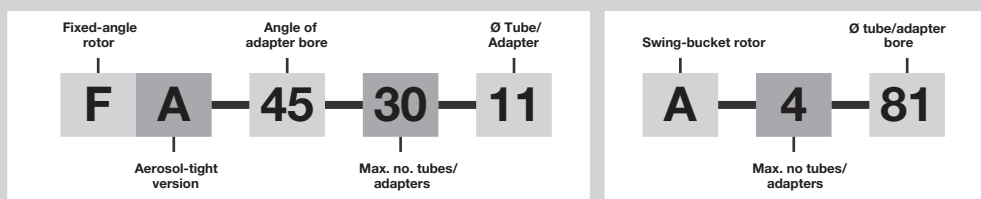
### Important note:

Please use the original accessories recommended by Eppendorf. Using spare parts or disposables which we have not recommended can reduce the precision, accuracy and life of the centrifuges. We do not honor any warranty or accept any responsibility for damage resulting from such action.

Falcon®:	Registered trademark of Becton Dickinson
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### Rotor code

All Eppendorf rotors are designated according to a simple, logical system which describes the technical specifications as a uniform series of numbers and letters e.g.:



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