eppendorf

Centrifuge 5910 R

Original instructions

5942 900.025-02/082019

Table of contents

1 Operating instructions

1.1 Using this manual

- Read this operating manual completely before using the device for the first time. Observe the instructions for use of the accessories where applicable.
- This operating manual is part of the product. Please keep it in a place that is easily accessible.
- Enclose this operating manual when transferring the device to third parties.
- The current version of the operating manual for all available languages can be found on our webpage www.eppendorf.com/manuals.

1.2 Danger symbols and danger levels

1.2.1 Danger symbols

The safety instructions in this manual have the following danger symbols and danger levels:

1.2.2 Danger levels

DANGER	*Will* lead to severe injuries or death.
WARNING	*May* lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

1.3 Symbols used

Depiction	Meaning
1. 2.	Actions in the specified order
▸	Actions without a specified order
•	List
Text	Display or software texts
	Additional information

1.4 Abbreviations used

MTP
Microplate

PCR
Polymerase Chain Reaction

rcf
Relative centrifugal force : *g*-force in m/s²

rpm
Revolutions per minute

UV
Ultraviolet radiation

2 Safety

2.1 Intended use

The Centrifuge 5910 R is used for the separation of aqueous solutions and suspensions of different densities in approved sample tubes.

The Centrifuge 5910 R is exclusively intended for use indoors. All country-specific safety requirements for operating electrical equipment in the laboratory must be observed.

2.2 User profile

The device and accessories may only be operated by trained and skilled personnel.

Before using the device, read the operating manual and the instructions for use of the accessories carefully and familiarize yourself with the device's mode of operation.

2.3 Information on product liability

In the following cases, the designated protection of the device may be affected. Liability for any resulting damage or personal injury is then transferred to the owner:

- The device is not used in accordance with the operating manual.
- The device is used outside of its intended use.
- The device is used with accessories or consumables that are not recommended by Eppendorf.
- The device is maintained or repaired by persons not authorized by Eppendorf AG.
- The user makes unauthorized changes to the device.

2.4 Application limits

2.4.1 Declaration concerning the ATEX directive (2014/34/EU)

DANGER! Risk of explosion.

- Do not operate the device in areas where explosive substances are handled.
- Do not use this device to process any explosive or highly reactive substances.
- Do not use this device to process any substances which may generate an explosive atmosphere.

Due to its design and the environmental conditions inside the device, the Centrifuge 5910 R is not suitable for use in a potentially explosive atmosphere.

The device may only be used in a safe environment, such as in the open environment of a ventilated laboratory or a fume hood. The use of substances that may contribute to a potentially explosive atmosphere is not permitted. The final decision on the risks associated with the use of such substances lies with the user.

2.5 Warnings for intended use

2.5.1 Personal injury or damage to device

WARNING! Electric shock due to damage to the device or mains/power cord.

- Only switch on the device if the device and mains/power cord are undamaged.
- Only operate devices which have been installed or repaired properly.
- In case of danger, disconnect the device from the mains/power supply voltage. Disconnect the mains/power plug from the device or the earth/grounded socket. Use the isolating device intended for this purpose (e.g. the emergency switch in the laboratory).

WARNING! Lethal voltages inside the device.
If you touch any parts which are under high voltage you may experience an electric shock. Electric shocks cause injuries to the heart and respiratory paralysis.

- Ensure that the housing is closed and undamaged.
- Do not remove the housing.
- Ensure that no liquids can penetrate the device.

Only authorized service staff may open the device.

WARNING! Danger due to incorrect voltage supply.

- Only connect the device to voltage sources which correspond with the electrical requirements on the name plate.
- Only use earth/grounded sockets with a protective earth (PE) conductor.
- Only use the mains/power cord supplied.

WARNING! Damage to health due to infectious liquids and pathogenic germs.

- When handling infectious liquids and pathogenic germs, observe the national regulations, the biosafety level of your laboratory, the material safety data sheets, and the manufacturer's application notes.
- Use aerosol-tight sealing systems for the centrifugation of these substances.
- When working with pathogenic germs which belong to a higher risk group, more than one aerosol-tight bioseal must be used.
- Wear your personal protective equipment.
- For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, the current edition).

WARNING! Risk of injury from rotating rotor.
If the emergency release of the lid is activated, the rotor may continue to rotate for several minutes.

- Wait for the rotor to stop before activating the emergency release.
- To check, look through the monitoring glass in the centrifuge lid.

WARNING! Risk of injury due to defective gas spring(s).
A defective gas spring is an insufficient support for the centrifuge lid. There is a risk of crushing fingers or limbs.

- Ensure that the centrifuge lid can be opened completely and that it will remain in this position.
- Regularly check all gas springs for their proper function.
- Have defective gas springs replaced immediately.
- Have gas springs replaced by a service technician every 2 years.

WARNING! Risk of injury from chemically or mechanically damaged accessories.
Even minor scratches and cracks can lead to severe internal material damage.

- Protect all accessory parts from mechanical damage.
- Inspect the accessories for damage before each use. Replace any damaged accessories.
- Do not use accessories that have exceeded their maximum service life.

CAUTION! Poor safety due to incorrect accessories and spare parts.
The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, functioning and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of accessories and spare parts other than those recommended, or from the improper use of such equipment.

- Only use accessories and original spare parts recommended by Eppendorf.

NOTICE! Damage to the device due to spilled liquids.

1. Switch off the device.
2. Disconnect the device from the mains/power supply.
3. Carefully clean the device and the accessories in accordance with the cleaning and disinfection instructions in the operating manual.
4. If a different cleaning and disinfecting method is to be used, contact Eppendorf AG to ensure that the intended method will not damage the device.

NOTICE! Damage to electronic components due to condensation.
Condensate may form in the device when it has been transported from a cool environment to a warmer environment.

- After installing the device, wait for at least 4 h. Only then connect the device to the mains/power line.

NOTICE! Centrifuge 5910 R: Compressor damage after improper transport.

- Wait 4 hours before switching on the centrifuge after setting it up.

2.5.2 Incorrect handling of the centrifuge

NOTICE! Damage from knocking against or moving the device during operation.
A rotor that hits against the rotor chamber wall will cause considerable damage to the device and rotor.

- Do not move or knock against the device during operation.

2.5.3 Incorrect handling of the rotors

WARNING! Risk of injury from improperly attached rotors and rotor lids.

- Only centrifuge with the rotor and rotor lid firmly tightened.
- If unusual noises occur when the centrifuge starts, the rotor or rotor lid may not be attached properly. Stop the centrifugation immediately.

CAUTION! Risk of injury due to asymmetric loading of a rotor.

- Always load all positions of a swing-bucket rotor with buckets.
- Load buckets symmetrically with identical tubes or plates.
- Only load adapters with suitable tubes or plates.
- Always use tubes or plates of the same type (weight, material/density and volume).
- Check that loading is symmetrical by balancing the adapters and tubes or plates used with a balance.

CAUTION! Risk of injury from overloaded rotor.
The centrifuge is designed for the centrifugation of material with a maximum density of 1.2 g/mL at maximum speed and filling volume and/or load.

- Do not exceed the maximum load of the rotor.

CAUTION! Risk of injury due to chemically damaged rotor lids or caps.
Transparent rotor lids or caps made of PC, PP or PEI may lose their strength if exposed to organic solvents (e.g., phenol, chloroform).

- If rotor lids or caps have come into contact with organic solvents, clean them immediately.
- Regularly check the rotor lids and caps for damage and cracks.
- Replace any rotor lids or caps that show cracks or milky stains immediately.

NOTICE! Damage to rotors from aggressive chemicals.
Rotors are high-quality assemblies which can withstand extreme stresses. This stability can be impaired by aggressive chemicals.

- Avoid using aggressive chemicals such as strong and weak alkalis, strong acids, solutions with mercury ions, copper ions and other heavy metal ions, halogenated hydrocarbons, concentrated saline solutions and phenol.
- If it is contaminated by aggressive chemicals, clean the rotor and especially the rotor bores immediately using a neutral cleaning agent.
- Due to the manufacturing process, color variations may occur on PTFE coated rotors. These color variations do not affect the service life or resistance to chemicals.

NOTICE! If handled incorrectly, the rotor may fall.
The swing-bucket rotor may fall if the buckets are used as handles.

- Remove the buckets before inserting and/or removing a swing-bucket rotor.
- Always use both hands to carry the rotor cross.

NOTICE! If handled incorrectly, the rotor may fall.

- Always grasp the F-48x15 rotor with both hands.
- In order to hold the rotor safely, you may have to remove 3 to 4 opposite sleeves from the outer row.

NOTICE! Buckets swinging out in the wrong direction.
If the wrong adapters are used for 500 mL Corning flasks, the buckets of the swing-bucket rotor may swing out in the wrong direction. If the buckets swing out in the wrong direction, this may lead to sample loss or damage to the centrifuge.

- Therefore, only use the Eppendorf adapters for 500 mL Corning flasks intended for this purpose.

2.5.4 Extreme strain on the centrifucation tubes

CAUTION! Risk of injury from overloaded tubes.

- Note the loading limits specified by the tube manufacturer.
- Only use tubes which are approved by the manufacturer for the required *g*-forces (rcf).

NOTICE! Risk from damaged tubes.
Damaged tubes must not be used, as this could cause further damage to the device and the accessories as well as sample loss.

- Visually check all tubes for damage before use.

NOTICE! Danger due to deformed or embrittled tubes. Autoclaving at excessive temperatures can lead to plastic tubes becoming brittle and deformed.
This could cause damage to the device and the accessories and sample loss.

- Observe the temperatures specified by the manufacturer when autoclaving tubes.
- Do not use deformed or brittle tubes.

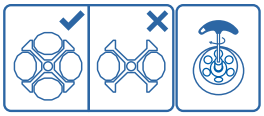
NOTICE! Danger due to open tube lids.
Open tube lids may break off during centrifugation and damage both the rotor and the centrifuge.

- Carefully seal all tube lids before centrifuging.

NOTICE! Damage to plastic tubes due to organic solvents.
When using organic solvents (e.g., phenol, chloroform), the strength of plastic tubes may be reduced and the tubes may become damaged.

- Observe the manufacturer’s information on the chemical resistance of the tubes.

2.6 Safety instructions on the device and accessories

Symbol	Meaning	Location
	**NOTICE** ▸ Observe the safety instructions in the operating manual.	Right side of the device
	▸ Observe the operating manual.	Right side of the device
	▸ Always load all 4 positions of the swing-bucket rotor with buckets. ▸ Always tighten the rotor with the enclosed rotor key.	Inside of the centrifuge lid
	Warning of biological risks when handling infectious liquids or pathogenic germs.	Aerosol-tight fixed-angle rotors: rotor lid Aerosol-tight buckets: cap

3 Product description

3.1 Product overview

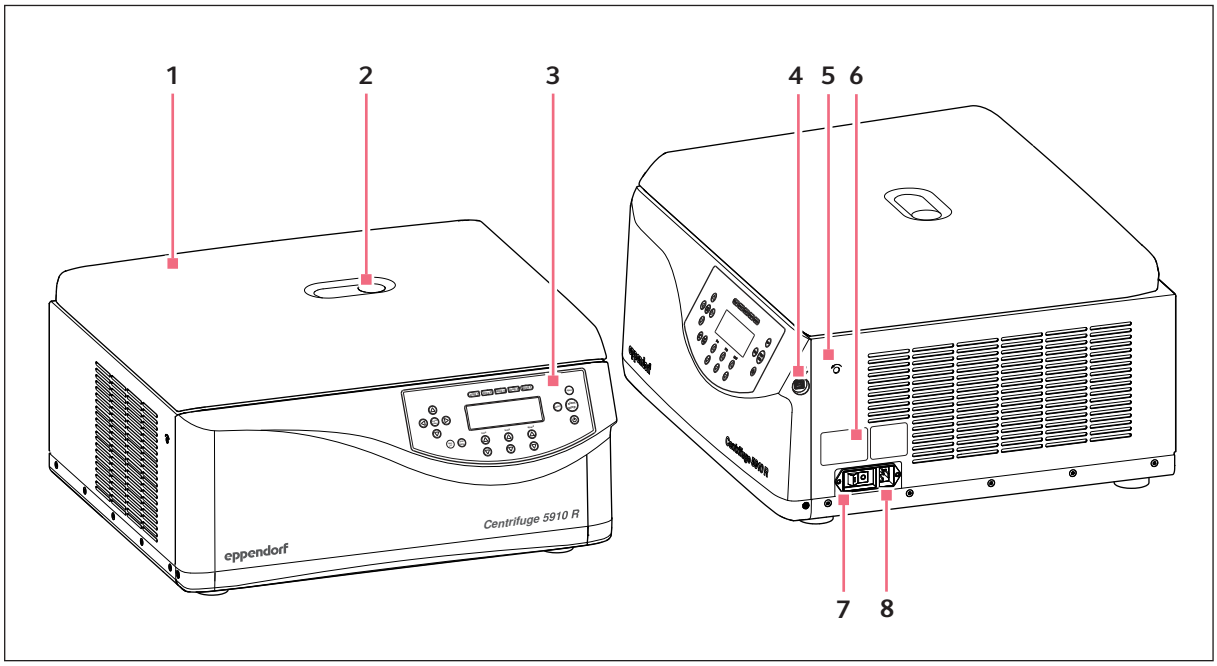


Fig. 3-1: Centrifuge 5910 R: Front and side view

1 Centrifuge lid

2 Monitoring glass
Visual control for rotor stop or speed control option using stroboscope

3 Control panel
Display and keys for operating the centrifuge.

4 USB interface
Only for Technical Service: interface for software updates.

5 Emergency release

6 Name plate

7 Mains/power switch
Switch for switching the centrifuge on and off.

8 Mains/power cord socket
Connection for the mains/power cord supplied.

3.2 Delivery package

1	Centrifuge 5910 R
1	Rotor key
1	Mains/power cord
1	Directions

- Check whether the delivery is complete.
- Check all parts for any transport damage.
- To safely transport and store the device, retain the transport box and packing material.

3.3 Features

The versatile Centrifuge 5910 R has a capacity of up to 4 × 1000 mL and reaches a maximum of 22132 × *g* or 14000 rpm. You can select from a wide variety of rotors to centrifuge the following tubes for various applications:

- Micro test tubes (0.2 mL to 5.0 mL)
- Microtainers
- Spin columns
- Cryogenic tubes
- Conical tubes (15 mL, 50 mL)
- Bottles (175 mL to 1000 mL)
- Microplates
- PCR plates
- Deepwell plates
- Slides (with CombiSlide adapter)
- Blood collection systems

Handling the centrifuge is facilitated by:

- Automatic rotor detection with rotational speed limit
- Automatic rotor imbalance detection
- Clear digital display

The centrifuge has 99 program slots for user-defined settings and 10 different acceleration and braking ramps.

The possibility of setting the radius manually ensures maximum rcf accuracy.

The Centrifuge 5910 R also features a temperature control function for centrifuging at temperatures from -11 °C to 40 °C. Use the **FastTemp** function to start a temperature control run without samples to bring the rotor chamber incl. rotor, buckets and adapters to the set target temperature quickly. Continuous cooling also maintains the temperature in the rotor chamber with the centrifuge lid closed when the centrifuge is not in use.

3.4 Name plate

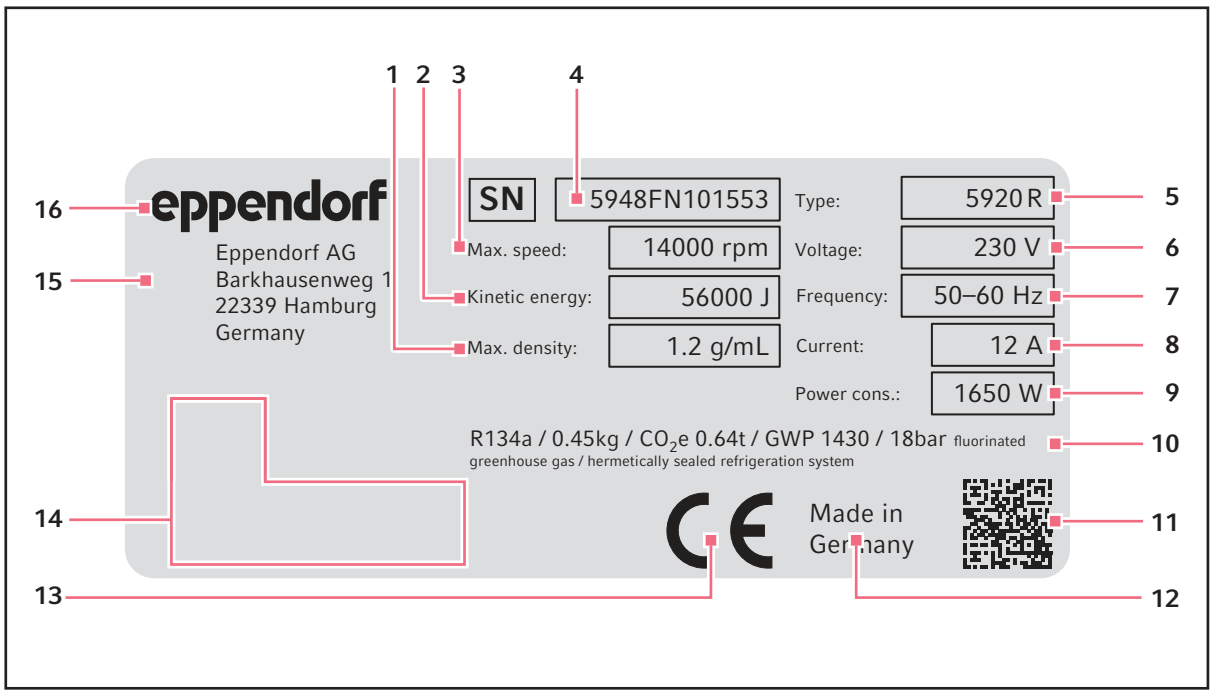


Fig. 3-2: Eppendorf AG device identification (example)

1 **Maximum density of the material for centrifuging**

2 **Maximum kinetic energy**

3 **Maximum speed**

4 **Serial number**

5 **Product name**

6 **Rated voltage**

7 **Rated frequency**

8 **Maximum rated current**

9 **Maximum rated power**

10 **Information on the refrigerant (refrigerated centrifuges only)**

11 **Data matrix code for serial number**

12 **Designation of origin**

13 **CE marking**

14 **Certification marks and symbols (device-specific)**

15 **Manufacturer's address**

16 **Manufacturer**

Tab. 3-1: Certification marks and symbols (device-specific)

Symbol/certification mark	Meaning
SN	Serial number
	Symbol for waste electrical and electronic equipment (WEEE) according to EU Directive 2012/19/EU, European Community
c UL US LISTED	UL listing certification mark: Declaration of conformity, USA
FC	Certification mark for electromagnetic compatibility according to the *Federal Communications Commission*, USA
	Certification mark for compliance with "China-RoHS" thresholds according to SJ/T 11364 *Marking for the restriction of the use of hazardous substances in electrical and electronic products* standard, People's Republic of China
EAC	Conformity with the relevant directives for the Eurasian Economic Union

4 Installation

4.1 Selecting the location

WARNING! Risk of fire.
High power input to the centrifuge can lead to an overload in unsecured power networks.

- Only connect the centrifuge to an electric circuit that has its own protection.
- Do not connect any devices to the circuit other than the centrifuge.
- Only use the mains/power cord supplied.

NOTICE! If an error occurs, objects in the immediate vicinity of the device may become damaged.

- In accordance with the recommendations of EN 61010-2-020, leave a safety clearance of **30 cm** around the device during operation.
- Please remove all materials and objects from this area.

NOTICE! Damage due to overheating.

- Do not install the device near heat sources (e.g. heating, drying cabinet).
- Do not expose the device to direct sunlight.
- Ensure unobstructed air circulation. Maintain a clearance of at least 30 cm (11.8 in) around all ventilation gaps.

NOTICE! Radio interference.
For devices with Class A noise emission in accordance with EN 61326-1/EN 55011, the following applies: This devices has been developed and tested in accordance with CISPR 11 Class A. The device may cause radio interference in domestic environments and is not intended for use in residential areas. The device cannot ensure adequate protection of radio reception in residential areas and domestic environments.

- If necessary, take appropriate measure to eliminate the interferences.

Mains/power connection for centrifuges: Operation of the centrifuge is only permitted in building installations that comply with the applicable national regulations and standards. In particular, it must be ensured that there are no impermissible loads on the supply lines and assemblies that are located upstream of the internal protection of the device. This can be ensured by additional circuit breakers or other suitable safety elements in the building installation.

The mains/power switch and the disconnecting device of the mains/power line must be easily accessible during operation (e.g. a residual current circuit breaker).

Select the location of the device according to the following criteria:

- Mains/power connection in accordance with the name plate.
- Minimum distance to other devices and walls: 30 cm (11.8 in).
- A resonance-free bench with a horizontal and even work surface which is designed to support the weight of the device.
- The surrounding area must be well ventilated.
- The location is protected against direct sunlight.

▸ Do not use this device near strong electromagnetic sources (e.g., unshielded high frequency sources) as they could impede proper functioning of the device.

4.2 Preparing installation

The weight of the centrifuge is 109.0 kg (240.3 lb).

CAUTION! Risk of injury when lifting and carrying heavy loads

▸ Use a lifting aid for the installation of the device.

Unpacking the centrifuge

1. Loosen the straps.
2. Lift the carton upward and remove it.
3. Remove accessories.
4. Remove the transport securing devices.
5. Remove the plastic sleeve.
6. Lift the centrifuge using a suitable mechanical lifting aid.
7. Place the device on a suitable lab bench.

4.3 Installing the instrument

Prerequisites

The device is on a suitable lab bench.

WARNING! Danger due to incorrect voltage supply.

- Only connect the device to voltage sources which correspond with the electrical requirements on the name plate.
- Only use earth/grounded sockets with a protective earth (PE) conductor.
- Only use the mains/power cord supplied.

NOTICE! Damage to electronic components due to condensation.
Condensate may form in the device when it has been transported from a cool environment to a warmer environment.

- After installing the device, wait for at least 4 h. Only then connect the device to the mains/power line.

NOTICE! Compressor damage after improper transport.

- After installation, wait 4 hh before switching on the centrifuge.

1. Let the device warm up to ambient temperature.
2. Connect the centrifuge to the mains/power line and switch it on at the mains/power switch.
   - The LED next to the **Standby** ⏻ key lights up.
   - The display is active.
   - The device is initialized, this may cause a clicking noise.
3. Open the centrifuge lid with the **open** key.

5 Operation
5.1 Operating controls

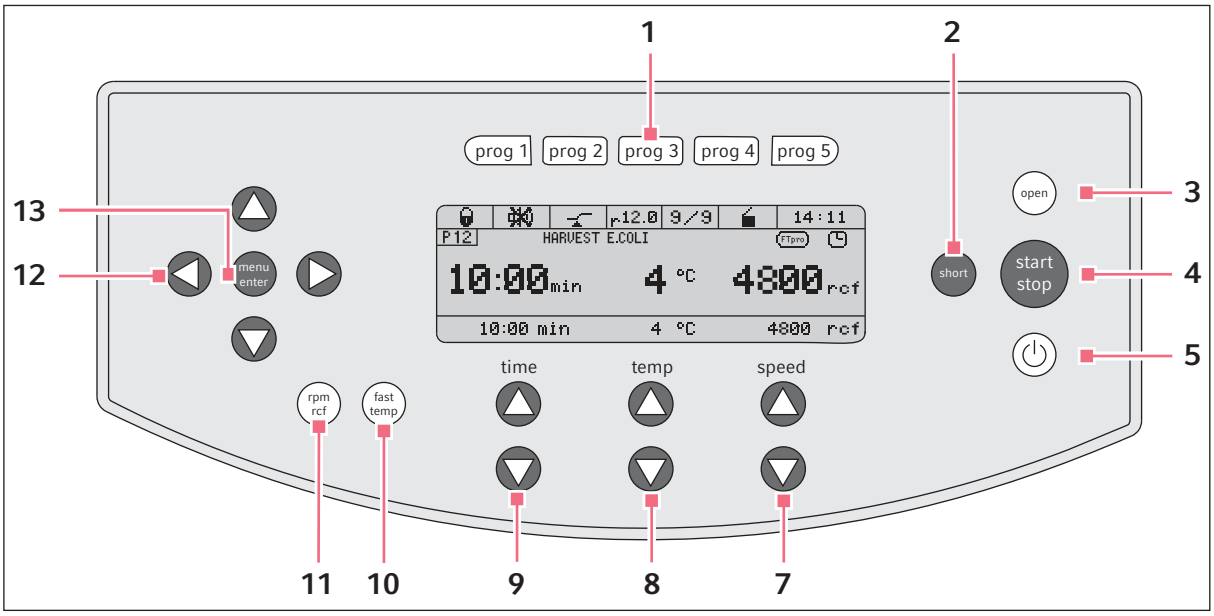


Fig. 5-1: Operating controls Centrifuge 5910 R

1 Program keys
Press the program key: load program
Touch and hold the program key for 2 s: save current parameters

2 short key
Short spin centrifugation

3 open key
Release centrifuge lid

4 start/stop key
Start and stop centrifugation

5 Standby ⏻ key
Activate/deactivate standby mode
Key lights up green: Centrifuge is ready for operation.
Key lights up red: Standby mode is active.

6 Display

7 Arrow keys speed
Set the speed of centrifugation
Touch and hold the arrow key: quick setting

8 Arrow keys temp
Setting the temperature
Touch and hold the arrow key: quick setting

9 Arrow keys time
Set the centrifugation time
Touch and hold the arrow key: quick setting

10 fast temp key
Start FastTemp temperature control run

11 rpm/rcf key
Switch display of centrifugation speed (rpm or rcf)

12 Arrow keys menu
Navigating the menu

13 menu/enter key
Open the menu
Confirm your selection

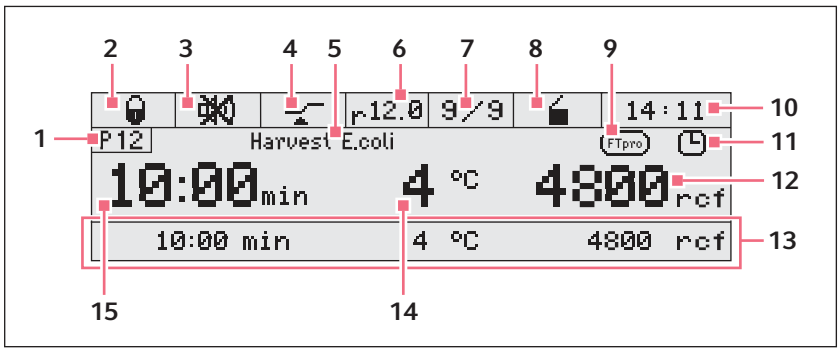


Fig. 5-2: Display Centrifuge 5910 R

1 Program number

2 Key lock
Key lock is activated: parameters cannot be changed.
No key lock.

3 Speaker
Speaker is switched on.
Speaker is switched off.

4 At set rpm function
: The set run time will be counted down when 95 % of the specified *g*-force (rcf) or speed (rpm) has been reached.
: Time counting begins immediately.

5 Program name

6 Radius

7 Ramps
Acceleration and braking of the rotor.

8 Status of the centrifuge
Centrifuge lid is unlocked.
Centrifuge lid is locked.
(flashing): centrifugation in progress.

9 FastTemp pro
FTpro FastTemp pro has been enabled. The start time and the temperature of the temperature control run are programmed.

10 Time

11 Timer
Timer set: delayed start (in programs only).

12 *g*-force (rcf) or speed (rpm)
Actual value

13 Set value row
Set values for centrifugation time, temperature, speed of centrifugation. It is visible if *Extended display* has been enabled in the settings.

14 Temperature
Actual value

15 Centrifugation time
Actual value

5.2 Switching on the centrifuge

1. Switch on the centrifuge using the mains/power switch or the **Standby** ⏻ key.
   The device is initialized, this may cause a clicking noise.
   The parameter settings of the last run are displayed.
2. Press the **open** key to open the closed centrifuge lid.

5.3 Initial steps

5.3.1 Setting the menu language

1. Open menu: press the **menu/enter** key.
2. Use the menu arrow keys to select *Settings*. Confirm with the **menu/enter** key.
3. Use the menu arrow keys to select *Language*. Confirm with the **menu/enter** key.
4. Use the menu arrow keys to select *Deutsch*, *Francais*, *English* or *Espanol*. Confirm with the **menu/enter** key.

   A checkmark appears in front of the selected language. The setting takes effect immediately.
5. To exit the menu, press the left menu arrow key ◂ several times.

5.3.2 Setting date and time

1. Open menu: press the **menu/enter** key.
2. Use the menu arrow keys to select *Settings*. Confirm with the **menu/enter** key.
3. Use the menu arrow keys to select *Date/Time*. Confirm with the **menu/enter** key.
4. Use the menu arrow keys to select *International Time* or *US-Time (AM/PM)*. Confirm with the **menu/enter** key.
5. Set the date and time with the menu arrow keys. Confirm with the **menu/enter** key.
6. To exit the menu, press the left menu arrow key ◂ several times.

The time does not change automatically from summer time to winter time.

5.4 Replacing the rotor

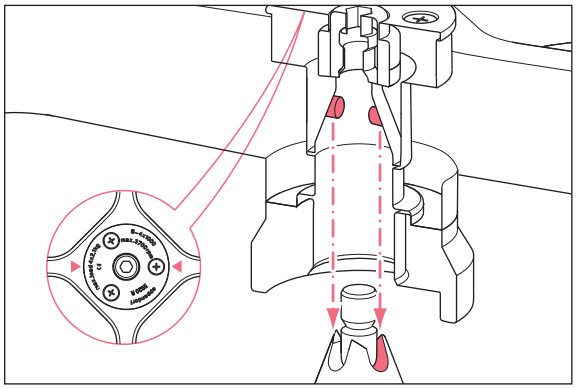
NOTICE! If handled incorrectly, the rotor may fall.
The swing-bucket rotor may fall if the buckets are used as handles.

- Remove the buckets before inserting and/or removing a swing-bucket rotor.
- Always use both hands to carry the rotor cross.

NOTICE! Risk of material damage due to improper rotor insertion.
The motor shaft or bearing may become damaged if the rotor falls into the motor shaft guides in an uncontrolled manner when it is inserted.

- Hold the rotor with both hands.
- Guide the rotor onto the motor shaft.

5.4.1 Inserting the rotor



1. Place the rotor vertically onto the motor shaft from the top.
   The arrows on the rotor show the position of the pegs. The pegs of the rotor must fit into the motor shaft guides. If required, lift the rotor and place it onto the motor shaft again.
2. Insert the rotor key supplied into the rotor nut.
3. Turn rotor key **clockwise** until the rotor nut is firmly tightened.

5.4.2 Removing the rotor

1. Turn the rotor nut **counterclockwise** using the rotor key supplied.
2. Remove rotor by lifting it vertically.

5.4.3 Triggering rotor detection

CAUTION! Risk of injury when turning the rotor manually.

- When turning a swing-bucket rotor, pay special attention to ensure that your fingers do not get jammed or get caught on the swinging buckets.

The centrifuge detects a newly inserted rotor if the rotor is moved at low speed.

- In order to trigger rotor detection manually, turn the rotor **counterclockwise** by hand.
  - The name of the rotor appears in the display.
  - If the *g*-force (rcf) or speed (rpm) has been set higher, it will be limited to the maximum value of the rotor.

Triggering rotor detection using short-spin centrifugation

- Press and hold the **short** key until the name of the rotor appears on the display.

If you start centrifuging immediately after a rotor change, then the centrifuge has not yet detected the new rotor. If the set *g*-force/speed is higher than the maximum permitted *g*-force/speed of the new rotor, the following message appears in the display:

rpm/rcf too high!
[START] Centrifugation at ### rpm/### rcf
◄ ► Change parameters.

- The message shows the maximum permitted *g*-force/speed of the new rotor.
- The rotor is not stopped, but it is held at a speed of 700 rpm.
- You have 15 seconds to adopt the *g*-force/speed or to change it.

- Adopt the displayed *g*-force/speed for the run: Press the **start/stop** key.
- To change the *g*-force or speed for the run: use the arrow keys **speed** to set a different value.

If you do not adopt or change the *g*-force/speed within 15 s, the centrifuge will stop running. The display shows the error message *Hint C*.

- After each rotor change, check whether the new rotor is detected by the device.
- Check the set *g*-force (rcf) and/or speed (rpm) and adjust it, if required.

5.5 Loading a fixed-angle rotor

CAUTION! Risk of injury due to asymmetric loading of a rotor.

- Load rotors symmetrically with identical tubes.
- Only load adapters with suitable tubes.
- Always use the same type of tubes (weight, material/density and volume).
- Check symmetric loading by balancing the adapters and tubes used with a balance.

1. Check the maximum payload (adapter, tube and contents) for each rotor bore.
2. Load rotors and adapters only with the tubes intended for them.
3. To ensure symmetrical loading, insert sets of two tubes in opposite bores. Tubes located opposite each other must be of the same type and contain the same filling quantity.

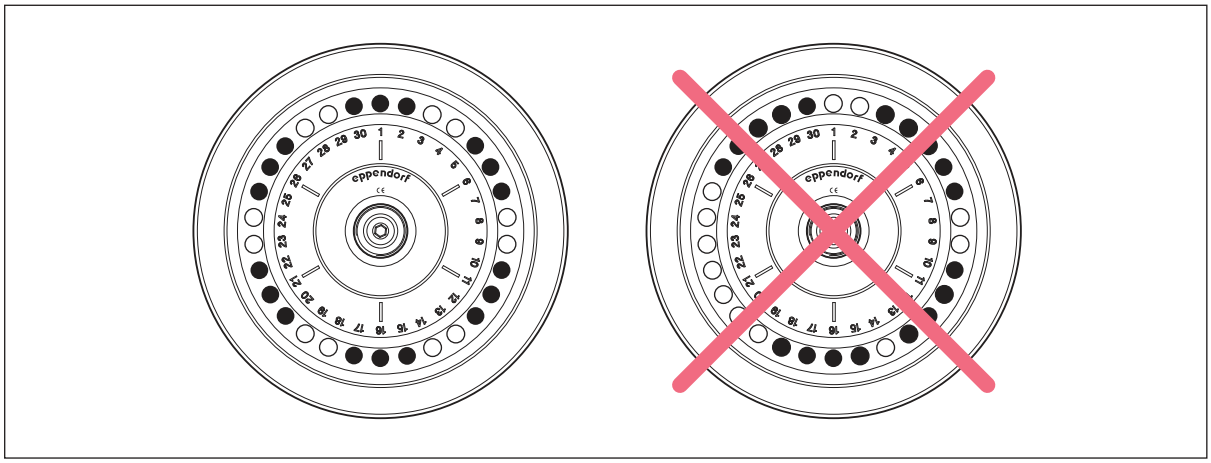


Fig. 5-3: Symmetrical loading of a fixed-angle rotor

To keep the weight differences between the filled tubes low, we recommend taring with a balance. This will reduce wear on the drive and reduce operating noise.

5.5.1 Closing the rotor lid

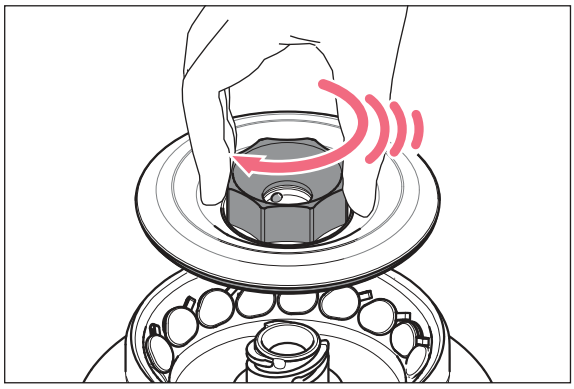
Use matching rotor lids

- Fixed-angle rotors may only be operated with the appropriate rotor lid in each case. The rotor name on the rotor must correspond to the rotor name on the rotor lid.
- To carry out an aerosol-tight centrifugation, an aerosol-tight rotor (label: **red ring**) and the corresponding aerosol-tight rotor lid (label: **aerosol-tight** and **red lid screw**) must be used.

1. Fit the rotor lid vertically onto the rotor.
2. Turn the rotor lid screw clockwise to seal the rotor.

5.5.2 Closing the QuickLock rotor lid

Aerosol-tight rotors have a QuickLock rotor lid.



1. Check the correct positioning of the external sealing ring in the groove.
2. Place the rotor lid on the rotor in a vertical motion.
3. To lock the rotor, turn the red rotor lid screw clockwise as far as it will go, and after an audible "click" is heard.

The rotor is correctly locked after the audible "click" is heard!

5.6 Loading a swing-bucket rotor

CAUTION! Risk of injury due to asymmetric loading of a rotor.

- Always load all positions of a swing-bucket rotor with buckets.
- Load buckets symmetrically with identical tubes or plates.
- Only load adapters with suitable tubes or plates.
- Always use tubes or plates of the same type (weight, material/density and volume).
- Check that loading is symmetrical by balancing the adapters and tubes or plates used with a balance.

NOTICE! Material damage due to incorrect equipping of the swing-bucket rotor.
Incomplete equipping of the swing-bucket rotor or an uneven load will reduce the life span of the rotor and the corresponding buckets considerably.

- Always load all positions of a swing-bucket rotor with buckets.
- Load opposite buckets with the same weight (adapter, tubes, or plates and content).

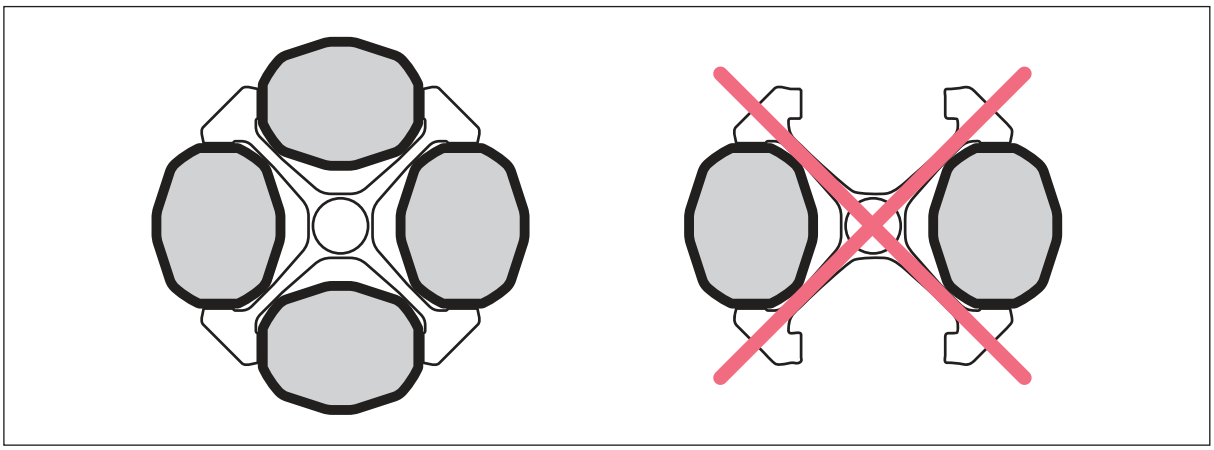


Fig. 5-4: Swing-bucket rotors: Loading all positions with buckets

5.6.1 Inserting the bucket in the swing-bucket rotor

Prerequisites

- The combination of rotor, bucket and adapter has been approved by Eppendorf.
- Buckets that are located opposite each other belong to the same weight class. The weight class is engraved in the sides of the groove: e.g., *68*.
- Matching and tested tubes and plates.

The swing-bucket rotor runs more smoothly if all buckets are loaded symmetrically and with the same weight.

▸ To reduce noise and vibrations, load the buckets of the swing-bucket rotor with the same weight.

1. Check that the bucket grooves are clean. Use pivot grease to lightly lubricate the grooves.
2. Hang the buckets into the rotor.
   All rotor positions must be equipped with buckets.
3. Check to see if all buckets are completely hung and can freely swing out.
4. Check the maximum load per bucket (adapter, vessel or plate and contents) and the loading height.
5. Load the buckets symmetrically.

▸ When using a vessel type or plate type for the first time, carry out a brief test run at low speed (e.g., 1000 rpm).

5.6.2 Performing an imbalance calibration

Carry out a manual imbalance calibration when you use a tube or plate for the first time. Always carry out a manual imbalance calibration when you use tubes with a length of > 100 mm.

▸ Inserting plates and/or tubes.

▸ Swing the buckets manually up to 90°.
  - Bucket swings freely.
  - The tubes do not touch the rotor cross.

5.6.3 Loading buckets symmetrically

5.6.3.1 Equipping buckets with vessels

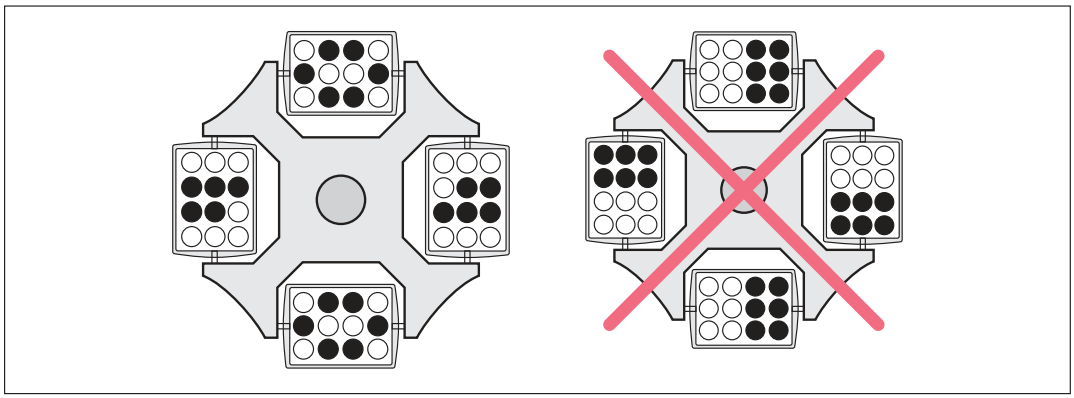


Fig. 5-5: Swing-bucket rotors: Incomplete, but symmetric loading of the buckets.

The loading shown on the right-hand side is incorrect as it places an uneven load on the pegs of the rotor.

- To reduce vibrations and noise, load all buckets of the swing-buckets rotor equally.

5.6.3.2 Loading plates symmetrically

NOTICE! Filling the plates too high can cause overflowing.
During the run the meniscuses in the tubes along the edges of the plates are at an angle. This is due to the centrifugal forces and cannot be avoided.

- Fill the plate wells to a maximum of 2/3 of the maximum filling volume.

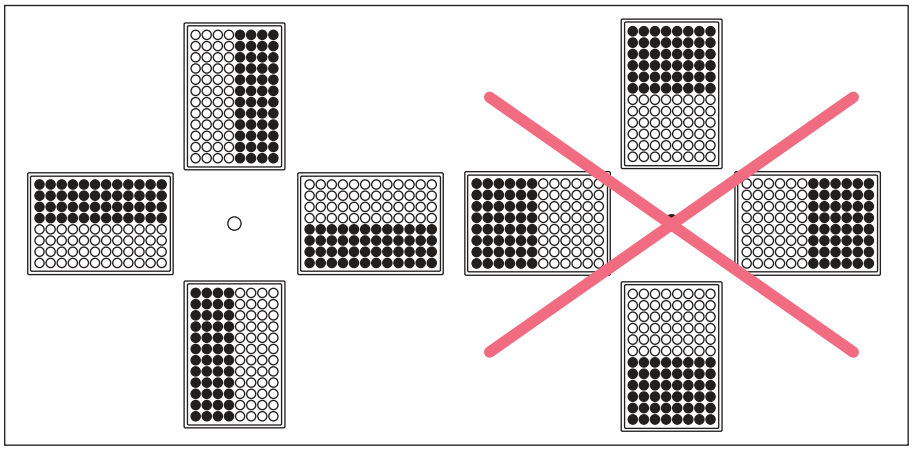


Fig. 5-6: Swing-bucket rotors: Symmetrical loading of plates

- In order to avoid imbalances, always load the plates symmetrically.

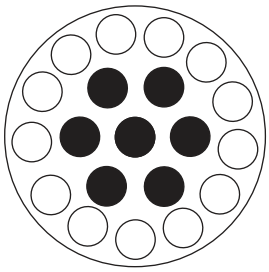
The plate loading shown on the right-hand side is incorrect as the plate buckets will not swing properly if loaded in this way.

5.6.3.3 Rotor S-4×750: Equipping the adapter with vessels > 119 mm

NOTICE! Broken glass due to incorrect loading.
If the tubes in a bucket are too long, the swinging tubes will touch the rotor cross and may get damaged or destroyed.

- Equip buckets of swing-bucket rotors in such a way that they can swing out freely.
- If necessary, load only the inner bores of the adapter.
- If using tubes longer than 100 mm: always perform a manual swing-out test.

If the adapter 16 × 75 mm – 100 mm (order number 5825 736.001) is equipped with vessels > 119 mm, e.g., BD 8 mL Vacutainer, this will result in danger of glass breakage.

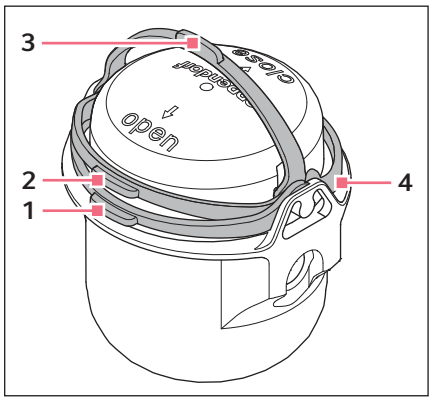


- Only equip the inner bores.

5.6.4 Closing the bucket with the cap

NOTICE! Damage to the cap hook.
If the cap is not fitted correctly on the bucket, the sealing clamp may break during closing.

- Before you fold the sealing clamp, check that the cap is positioned correctly.



1. Fold the cap clamp to the **open** position (1).
2. Place the cap on the bucket and push the cap down in such a way that the clamp is lifted slightly (2).
3. To transport the bucket, fold the clamp to the carrying position (3).
4. To seal the bucket so that it is aerosol-tight, fold the clamp beyond the latch into the **close** position.
   The clamp has only been folded correctly if there is an audible *click* (4).

5.6.5 Mixed equipping with different buckets

Mixed equipping of swing-bucket rotors with different buckets is possible if these are intended for the rotor. Buckets that are located opposite each other must be of the same type.

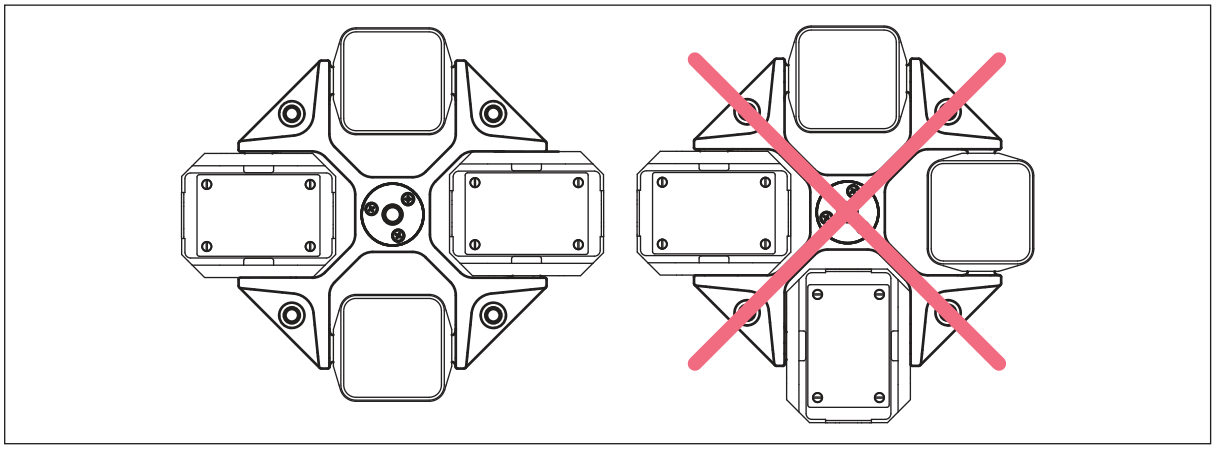


Fig. 5-7: Mixed equipping of a swing-bucket rotor

5.7 Closing the centrifuge lid

WARNING! Risk of injury when opening or closing the centrifuge lid
There is a risk of crushing your fingers when opening or closing the centrifuge lid.

- ▸ Do not reach between the device and centrifuge lid when opening or closing the centrifuge lid.
- ▸ Do not reach into the locking mechanism of the centrifuge lid.
- ▸ Open the centrifuge lid fully to ensure that the centrifuge lid cannot slam shut.

1. Check that the rotor is attached correctly.
2. Press the centrifuge lid down until it is gripped by the lid latch. The lid will be closed automatically.
   - The LED next to the **open** key lights up in blue.
   - The ∎ symbol appears on the display.

5.8 Aerosol-tight centrifugation

WARNING! Risk of damage to health due to limited aerosol tightness with incorrect rotor/ rotor lid combinations.
Aerosol-tight centrifugation is guaranteed only if the rotors and rotor lids intended for this purpose are used. The designation of aerosol-tight fixed-angle rotors always starts with **FA**. In addition, the aerosol-tight rotors and rotor lids of this centrifuge are marked with a red ring on the rotor and a red rotor lid screw.

- Always use rotors and rotor lids marked aerosol-tight together for aerosol-tight centrifugation. The details specifying in which centrifuge the aerosol-tight rotors and rotor lids may be used can be found on the rotor and on the top of the rotor lid.
- Only use aerosol-tight rotor lids in combination with the rotors that are specified on the rotor lid.
- Only use aerosol-tight buckets with the corresponding caps.

WARNING! Risk to health due to limited aerosol tightness when used incorrectly.
Mechanical stresses and contamination by chemicals or other aggressive solvents may impair the aerosol tightness of the rotors and rotor lids. Autoclaving at excessive temperatures can lead to vessels, adapters and rotor lids becoming brittle and deformed.

- Check the integrity of the seals of the aerosol-tight rotor lids or caps before each use.
- Only use aerosol-tight rotor lids or caps if the seals are undamaged and clean.
- Do not exceed temperatures of 121°C or a time of more than 20 min. while autoclaving.
- After each proper autoclaving process (121 °C, 20 min.), coat the threads of the rotor lid screw with a thin layer of pivot grease (order no. Int. 5810 350.050, North America 022634330).
- For QuickLock rotor lids, only the seal must be replaced after 50 autoclaving cycles.
- Replace aerosol-tight rotor caps after 50 autoclaving cycles.
- **Never** store aerosol-tight rotors or buckets closed.

The aerosol tightness of rotors, rotor lids, buckets and caps has been tested and certified according to Annex AA of IEC 61010-2-020.

5.8.1 Aerosol-tight centrifugation in a fixed-angle rotor

To ensure aerosol tightness, the following applies:
- Replace aerosol-tight rotor lids without exchangeable seal and cap after 50 autoclaving cycles.
- Replace the seal of aerosol-tight rotor lids with exchangeable seal (e.g. QuickLock rotor lids) after 50 autoclaving cycles.

5.9 Centrifugation

Prerequisites

- The centrifuge is switched on.
- The rotor has been inserted and attached correctly.
- The rotor has been loaded correctly.
- The rotor lid has been mounted correctly.
- Buckets can swing out freely.
- The centrifuge lid is closed.

WARNING! Risk of injury from improperly attached rotors and rotor lids.

- ▸ Only centrifuge with the rotor and rotor lid firmly tightened.
- ▸ If unusual noises occur when the centrifuge starts, the rotor or rotor lid may not be attached properly. Stop the centrifugation immediately.

5.9.1 Centrifugation with time setting

Setting the centrifugation parameters

1. Set the centrifugation time with the **time** arrow keys.
2. Set the temperature with the **temp** arrow keys.
3. Set the rotational speed (rpm) or *g*-force (rcf) with the **speed** arrow keys.
   If the speed is set via the *g*-force (rcf): check the radius (see *Setting the radius on p. 40)*.

Starting the centrifugation run

4. To start the centrifugation run, press the **start/stop** key.

Display during centrifugation

- ↻ flashes in the display when the rotor is running.
- Remaining run time in minutes. The last minute is counted down in seconds.
- Current temperature in the rotor chamber.
- Current *g*-force (rcf) and/or speed (rpm).
- Target values for centrifugation time, temperature and centrifugation speed in the target value row (if activated).

During the run you can change the following parameters:

- Centrifugation time: The shortest new run time that can be set must be 2 min above the elapsed time.
- Temperature
- Speed
  During the run you can switch between the display of the *g*-force and the speed, using the **rpm/rcf** key.
- Radius
- Acceleration ramp/braking ramp

The following keys are blocked during centrifugation:

- **Standby** ⏻ key
- **open** key
- **short** key
- **prog 1** to **prog 5** program keys

5.9.2 End of centrifugation

▸ Press the **start/stop** key to end centrifugation before the set time.

- After completion of the set time, the centrifuge stops automatically.
- During the braking process, the elapsed running time flashes on the display.
- The signal sounds when the rotor is stopped.
- Time counter after rotor stop: A window on the display counts the time from the rotor stop to 10:00 h. Additionally, *> 10:00 h* is displayed.
- The LED of the **open** key flashes. The centrifuge lid remains sealed. Press the **open** key to open the lid.

5.9.3 Centrifuging in continuous operation

Setting up a continuous run

1. In order to centrifuge without any time limits, use the **time** arrow keys to select the setting *oo* (▼ below 10 s or ▲ above 99:59 h).
2. Set the temperature with the **temp** arrow keys.
3. Set the rotational speed (rpm) or *g*-force (rcf) with the **speed** arrow keys.
   If the speed is set via the *g*-force (rcf): check the radius (see *Setting the radius on p. 40)*.
4. To start the centrifugation run, press the **start/stop** key.
   - ↻ flashes in the display when the rotor is running.
   - The cycle time is counted up.
   - Current temperature in the rotor chamber.
   - Current *g*-force (rcf) and/or speed.
5. Press the **start/stop** key to end the centrifugation.
   - During the braking process, the elapsed running time flashes on the display.
   - The signal sounds when the rotor is stopped.
6. Press the **open** key to open the lid.

5.9.4 Short run centrifugation

Setting in the menu item *Short spin*:
- *Maximum speed*: Short spin centrifugation at the maximum speed of the inserted rotor.
- *Current speed*: Short spin centrifugation at a freely selected speed.

The short spin centrifugation runs as long as the **short** key is pressed.

1. For short-spin centrifugation with *Current speed* only: Set the rotational speed (rpm) or *g*-force (rcf) with the **speed** arrow keys.
2. Set the temperature with the **temp** arrow keys.
3. Press and hold the **short** key to start short-spin centrifugation.
   - ↻ flashes in the display when the rotor is running.
   - All other keys are disabled during short spin centrifugation.
4. To end short run centrifugation, release the **short** key.
   During the braking process, the elapsed running time flashes on the display.
5. Press the **open** key to open the lid.

The set acceleration ramp/braking ramp is disabled during short run centrifugation.

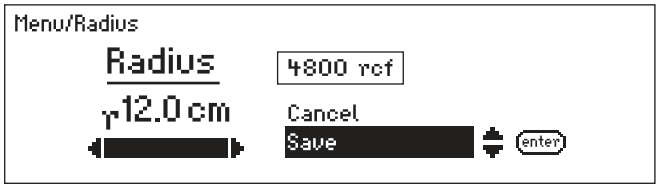
5.9.5 Setting the radius

Prerequisites
The centrifuge has detected the rotor.

The value for the radius is set to the maximum radius of the rotor.

As a standard, the conversion from speed to *g*-force is based on the biggest radius of the rotor. If you are using an adapter for tubes, you can adjust the value for the radius manually. You can find the value for the radius of an adapter in a rotor in the Technical data of the rotor.

1. Press the **menu/enter** key. Use the menu arrow keys to select *Radius*. Confirm with the **menu/enter** key.



   The display shows the maximum radius of the rotor and the *g*-force (rcf) in accordance with the set speed.
2. Use the menu arrow keys ◂ or ▸ to set the radius for the adapter.
   The *g*-force (rcf) is adjusted to the value of the radius.
3. Select *Save* with the menu arrow keys ◂ or ▸. Confirm with the **menu/enter** key.
4. To exit the menu, press the left menu arrow key ◂ several times.

5.9.6 Setting the acceleration ramp and braking ramp

You can set the acceleration and deceleration times in levels from 0 to 9.
- Level 9: shortest acceleration time/deceleration time (setting on delivery).
- Level 0: longest acceleration time/deceleration time.

1. Press the **menu/enter** key. Use the menu arrow keys to select *Ramps*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys ▲ or ▼ to select *Accel. ramp* or *Braking ramp*.
3. Use the menu arrow keys ◀ or ▶ to select the level.
4. Select *Save* with the menu arrow keys ◀ or ▶. Confirm with the **menu/enter** key.

5.9.7 Setting the start of time counting (*At set rpm* function)

You can specify when time counting should begin:
- Time counting begins immediately: *At set rpm* > *Off* (setting on delivery).
- Time counting starts when 95 % of the speed has been reached: *At set rpm* > *On*

1. Press the **menu/enter** key. Use the menu arrow keys to select *At set rpm*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys ▲ or ▼ to select *Off* or *On*. Confirm with the **menu/enter** key.

   The display shows or .

5.10 Cooling

The centrifuge cools or maintains the set temperature is the following requirements are met:
- The centrifuge is switched on.
- The centrifuge lid is closed.
- Only during continuous cooling: The set temperature is lower than the ambient temperature.

- The temperature that can actually be reached depends on the rotor and the set rotational speed.
- If the rotor stops (continuous cooling), cooling is slower than during centrifugation or a temperature control run.

5.10.1 Setting the temperature

1. To set the temperature, use the **temp** arrow keys to select a temperature between -11 °C and 40 °C.
2. Set the run time and *g*-force (rcf) or speed (rpm). Press the **start/stop** key to start the centrifugation.

The temperature can be changed during centrifugation.

5.10.2 Temperature display

Temperature display if the rotor stops:	Set temperature
Temperature display during centrifugation:	Actual temperature

When the *Display* > *Extended display* setting is activated, the display shows the target values for centrifugation time, temperature and centrifugation speed in the target value row.

5.10.3 Temperature monitoring

After the set temperature has been reached, the centrifuge reacts to temperature deviations during centrifugation as follows:

- Deviation from the set temperature > ±3 °C:
  Temperature display flashes.
- Deviation from the set temperature > ±5 °C:
  The display shows *ERROR 18*. Centrifugation is stopped automatically.

During temperature control, a hissing noise may occur. This noise does not impair the function of the centrifuge.

5.10.4 Temperature control run FastTemp

Prerequisites

- The centrifuge is switched on.
- Rotor and rotor lid are correctly mounted.
- The centrifuge lid is closed.
- The temperature and *g*-force (rcf) or speed (rpm) have been set for the upcoming centrifugation.

With the FastTemp function, you can immediately start a temperature run without samples, at rotor-specific or temperature-specific speeds. This will quickly bring the rotor chamber, including rotor and adapter, up to the set target temperature.

1. Set the temperature with the **temp** arrow keys.
2. Press the **fast temp** key.

The display shows the following information:

- *FastTemp*
- Duration of the temperature control run
- Actual temperature in the rotor chamber
- The optimum speed (rpm) calculated for the temperature control run or the *g*-force (rcf).

3. The temperature control run FastTemp automatically ends when the target temperature has been reached.

   The signal sounds 5 times.

Press the **start/stop** key to end the temperature control run early.

- The centrifuge only stops the run once the rotor has reached the set temperature. Therefore, there may be a delay between the display of the achieved target temperature and the automatic end of the temperature control run.
- The target temperature can be changed during the temperature control run, using the **temp** arrow keys. Duration and speed are adjusted automatically.

FastTemp with aerosol-tight buckets
A temperature control run with aerosol-tight buckets takes longer and may lead to a vacuum in the bucket. To achieve better cooling of the bucket and the adapter, centrifugation can be carried out without cap during a FastTemp run.

- Do not seal aerosol-tight buckets during a FastTemp run.
- If the caps cannot be undone due to a vacuum, do not pull on the sealing clamps or hooks to loosen the cap. Adjust the temperature of the buckets to ambient temperature so that the caps can be removed easily.

5.10.5 FastTemp pro: automatic temperature control run with programmed start time

Prerequisites

- The centrifuge switches on and/or is in the standby mode at the set time.
- The rotor and rotor lid are properly attached.
- The centrifuge lid is closed.

You can set the FastTemp temperature control run to start automatically at a set time. Two options are available:

- *FastTemp pro* > *One time use*: The temperature control run starts once at the set time.
- *FastTemp pro* > *Repeated use*: The temperature control run starts at the set time on the set weekday and repeats indefinitely on each additional weekday that was set.

The selection between *One time use* and *Repeated use* only appears when the FastTemp pro function has not been activated yet. If this is not the case, you can edit or delete the programmed start time.

Programming a single temperature control run

1. Press the **menu/enter** key. Use the menu arrow keys to select *Cooling System* > *FastTemp pro*.
2. Use the menu arrow keys to select *One time use*. Confirm with the **menu/enter** key.
3. Set the date, time and temperature with the menu arrow keys. Confirm with the **menu/enter** key.
   The display shows an overview of the current settings.
4. Use the menu arrow keys to select *Save*. Confirm with the **menu/enter** key.

Programming repeated temperature control runs

1. Press the **menu/enter** key. Use the menu arrow keys to select *Cooling System* > *FastTemp pro*.
2. Use the menu arrow keys to select *Repeated use*. Confirm with the **menu/enter** key.
3. Activate or deactivate the weekdays with **menu/enter**. Select *Next* and confirm with **menu/enter**.
4. Set the date, time and temperature with the menu arrow keys. Confirm with the **menu/enter** key.
   The display shows an overview of the current settings.
5. Use the menu arrow keys to select *Save*. Confirm with the **menu/enter** key.

- When FastTemp pro is activated, the FTpro symbol appears on the display while an automatic start of a temperature control run is still outstanding.
- The temperature control run starts automatically at the selected time.
- After a one-off programmed temperature control run, the following symbol is extinguished FTpro. If there are several programmed temperature control runs, the FastTemp pro function remains active indefinitely.

If the centrifuge is running at the programmed time, the temperature control run cannot be started automatically.

Deactivating FastTemp pro

1. Press the **menu/enter** key. Use the menu arrow keys to select *Cooling System* > *FastTemp pro*.
2. Use the menu arrow keys to select *Delete*. Confirm with the **menu/enter** key.

5.10.6 Continuous cooling

Prerequisites

- The centrifuge is switched on.
- The centrifuge lid is closed.
- The set temperature is lower than the ambient temperature.

Continuous cooling maintains the rotor chamber at the set temperature if the rotor stops.

- During continuous cooling the display shows the set temperature.
- To prevent the rotor chamber from freezing or condensation from forming, the temperature does not go below 4 °C , irrespective of the set temperature.
- If the rotor stops, temperature control is slower than during centrifugation or a temperature control run.

ECO shut-off

ECO shut-off: Continuous cooling is switched off if the centrifuge is not used for longer than the preset time. The centrifuge switches to standby mode.

- Default setting: Continuous cooling ends after 8 h.
- Continuous cooling can be limited to 1 h, 2 h or 4 h.
- ECO shut-off can be switched off (continuous cooling set to endless operation).

Limit continuous cooling to 1 h (2 h, 4 h, 8 h)

1. Press the **menu/enter** key. Use the menu arrow keys to select *Cooling System* > *Continuous cooling*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select *Eco shut-off*. Confirm with the **menu/enter** key.
3. Select *1 h*, *2 h, 4 h or 8 h*. Confirm with the **menu/enter** key.

   Continuous cooling ends after the preset time. The centrifuge switches to standby mode.

5.10.7 Endless operation of continuous cooling

The ECO shut-off function can be switched off. Continuous cooling is changed to endless operation.

- Endless operation can shorten the service life of the compressor.
- The rotor chamber may freeze.

1. Press the **menu/enter** key. Use the menu arrow keys to select *Cooling System* > *Continuous cooling*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select ∞. Confirm with the **menu/enter** key.

Ending continuous cooling

3. Open the centrifuge lid to end continuous cooling.

5.11 Switching off the centrifuge

1. Open the centrifuge lid.
   Residual moisture can evaporate. Pressure is taken off the gas springs.
2. Remove rotor lids from fixed-angle rotors and aerosol-tight caps from buckets.
   Aerosol-tight accessories may not be stored when they are connected.
3. Switch off the centrifuge using the mains/power switch.

6 Device settings

6.1 Standby mode

The centrifuge automatically switches from the ready state to the standby mode if the following prerequisites are met:

- The centrifuge is not used during the defined time period.
- The centrifuge lid is open.

Standby mode

- The LED next to the **Standby** ⏻ key lights up red.

Ready state

- The centrifugation parameters are displayed.
- The LED next to the **Standby** ⏻ key lights up green.

You can switch between the standby mode and ready state at any time when centrifugation is not performed by pressing the **Standby** ⏻ key.

6.1.1 Switching on the standby mode

1. Press the **menu/enter** key. Use the menu arrow keys to select *Settings* > *Standby*.
2. Use the menu arrow keys to select *OnOff* or *Set time*. Confirm with the **menu/enter** key.
   If *Standby* > *Set time* is selected, the time period can be selected after which the centrifuge is to switch to standby mode (1 min to 60 min).

6.2 Key lock

When the key lock has been enabled, the centrifugation time, the temperature, the *g*-force (rcf) and/or RPM, the acceleration ramp/braking ramp and the status of the At set rpm function cannot be changed accidentally.

1. To enable the key lock, press the **menu/enter** key. Use the menu arrow keys to select *Key lock*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select *On*. Confirm with the **menu/enter** key.
   A tick appears in front of the selected setting. The setting takes effect immediately.
3. To exit the menu, press the left menu arrow key ◂ several times.

6.3 Display

Standard display	When the centrifuge stands still, the set values are displayed and during centrifuging the actual values of the centrifugation parameters are displayed.
Extended display	The set value row is shown on the lower edge of the display.

6.3.1 Showing the set value row

1. Press the **menu/enter** key. Use the menu arrow keys to select *Settings* > *Display*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select *Extended display*. Confirm with the **menu/enter** key.
   A tick appears in front of the selected setting. The setting takes effect immediately.
3. To exit the menu, press the left menu arrow key ◂ several times.

6.3.2 Setting the contrast

1. Press the **menu/enter** key. Use the menu arrow keys to select *Settings* > *Contrast*. Confirm with the **menu/enter** key.
2. Change parameters with the menu arrow keys ◂ or ▸.
3. Select *Save*. Confirm with the **menu/enter** key.

6.4 Speaker

6.4.1 Switching the loudspeaker on/off

1. Press the **menu/enter** key. Use the menu arrow keys to select *Settings* > *Alarm*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select *On* or *Off*. Confirm with the **menu/enter** key.
   A tick appears in front of the selected setting. The setting takes effect immediately.
3. To exit the menu, press the left menu arrow key ◂ several times.

6.4.2 Setting the volume

1. Press the **menu/enter** key. Use the menu arrow keys to select *Settings* > *Volume*. Confirm with the **menu/enter** key.
2. Change parameters with the menu arrow keys ◂ or ▸.
3. Select *Save*. Confirm with the **menu/enter** key.

6.5 Calling up device information

- Press the **menu/enter** key. Use the menu arrow keys to select *Information* > *Device Information*. Confirm with the **menu/enter** key.
  Device name, serial number and firmware version are displayed.

6.6 Cycle count

Each centrifugation run during which the rotor is accelerated and braked is counted as a cycle, independent of the speed and the duration of the centrifugation run.

The usual service life of a rotor is 7 years or a maximum of 100000 cycles (see p. 73). If you expect a rotor to exceed the maximum number of cycles before the end of the 7 years, use the cycle counter as an aid.

The centrifuge detects the rotor type, but not each individual rotor. The displayed number of cycles does not give reliable information on the actual service life of a rotor.

Using the cycle counter is recommendable under the following conditions:
- Only one rotor of a rotor type is used in the centrifuge. There are no rotors of the same type in one centrifuge.
- The rotor is only used in one centrifuge. It is not used in parallel in different centrifuges.

6.6.1 Notes on reaching the maximum number of cycles

CAUTION! Danger due to material fatigue.
If the service life is exceeded, it cannot be guaranteed that the material of the rotors and the accessories will withstand the stresses during centrifugation.

▸ Do not use accessories that have exceeded their maximum service life.

Before the maximum number of cycles of a rotor is reached, a pop-up window will appear that the rotor must be replaced.

At the following 3 times, a pop-up window will appear that the maximum number of cycles has been reached:
- 2000 cycles before reaching the maximum number of cycles
- 1000 cycles before reaching the maximum number of cycles
- 400 cycles before reaching the maximum number of cycles

▸ Confirm with the **menu/enter** key.

▸ Press the **start/stop** key to start the centrifugation.

If the maximum number of cycles has been reached, a warning will appear before each run.

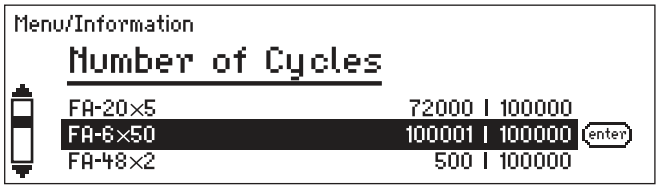
- Confirm with the **menu/enter** key.
- Replace the rotor.

6.6.2 Resetting the number of cycles

After a rotor has reached the maximum number of cycles and has been replaced, the number of cycles must be reset for the rotor type.

1. Press the **menu/enter** key. Use the menu arrow keys to select *Information* > *Number of Cycles*. Confirm with the **menu/enter** key.

   The display shows the rotor type, the cycles run and the maximum cycles.



2. Select a rotor with the ▲ or ▼ menu arrow keys. Confirm with the **menu/enter** key.
3. Select *Reset* with the ◀ or ▶ menu arrow keys. Confirm with the **menu/enter** key.

   The display shows:
   Reset cycles?
   yes/*no*

4. Select *yes*. Confirm with the **menu/enter** key.

   The number of cycles for the rotor type will be reset to 1.

6.6.3 Changing the number of cycles

The *Number of Cycles* > *Change* function is intended for authorized service personnel only.

7 Programs

7.1 Saving the program

The Centrifuge 5910 R has more than 99 programmable memory locations.

For each program, you can define the parameters centrifugation time, temperature and speed as well as separate settings for radius, acceleration ramps/braking ramps and the start of time counting (At set rpm function). With the timer function, you can delay the start time by up to 60 min, for instance, to bridge an incubation period.

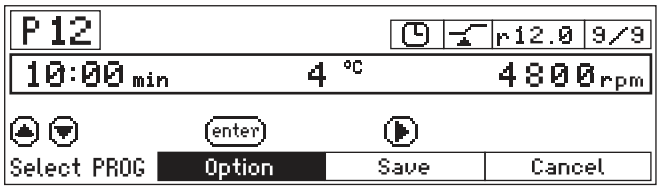
Option	Value
Radius [cm]	Radius in [cm] The centrifuge must have detected the rotor.
Accel. ramp	0 to 9
Braking ramp	0 to 9
At set rpm	*Off* *On*
Timer [min]	1 min to 60 min

7.1.1 Creating a program

Prerequisites

- The centrifuge has detected the rotor.
- Rotor stop.

1. Press the **menu/enter** key. Use the menu arrow keys to select *Programs* > *Save program*. Confirm with the **menu/enter** key.
2. Set the centrifugation time with the **time** arrow keys.
3. Set the temperature with the **temp** arrow keys.
4. Set the speed (rpm) or the *g*-force (rcf) with the **speed** arrow keys.



Defining additional options of the program

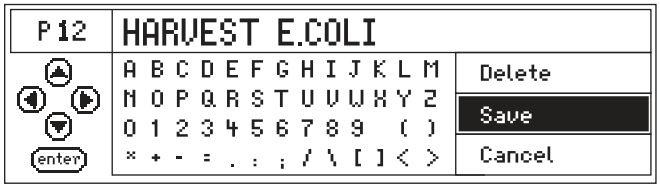
5. Select *Options* using the right menu arrow key ▸. Confirm with the **menu/enter** key.
6. Select an option, for instance, *Accel. ramp*, with the menu arrow keys ◂ or ▸.
7. Change parameters with the menu arrow keys ◂ or ▸. Confirm with the **menu/enter** key.

Saving the program

8. Use the menu arrow keys to select an empty program space.
9. Use the menu arrow keys to select *Save*. Confirm with the **menu/enter** key.
   - The program is saved in the program space (without a program name).
   - The display shows the message *Assign a program name?*

Allocating a program name

10. Confirm with *yes*.



11. Select letters or numbers with the menu arrow keys and confirm with the **menu/enter** key.

    The program name can have a maximum of 15 characters.
    To delete individual characters, select *Delete*and press the **menu/enter** key.

12. Use the menu arrow keys to select *Save*. Confirm with the **menu/enter** key.

    The display shows the program with all settings.

If the message *Assign a program name?* is discarded with *no*, a name is generated from the program number, e.g. *Prog. 12*.

7.1.2 Quick save with program keys

To save the current settings quickly, you can use the program keys.

▸ Keep one of the program keys **prog 1** to **prog 5** pressed for 2 seconds.
   - A signal tone sounds.
   - The LED above the program key lights blue.
   - The parameters of the program are saved.

prog 1 to **prog 5** cover the program spaces 1 to 5. The programs are saved without a program name.

7.2 Loading a saved program

7.2.1 Loading program prog 1 to prog 5

1. In order to call up a program on the program spaces 1 to 5, press one of the program keys **prog 1** to **prog 5**.
   - The LED above the program key lights blue.
   - The display shows the parameters of the program.

2. Start the program: press the **start/stop** key.

7.2.2 Loading a program from the program list

Prerequisites

- The rotor which is suitable for the program is inserted.
- The centrifuge has detected the rotor.

1. Press the **menu/enter** key. Select *Programs* > *Load program*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys ◂ or ▸ to select the program space. Confirm with the **menu/enter** key.
   The display shows the parameters of the program.
3. Start the program: press the **start/stop** key.

7.2.2.1 Error messages

If a run is started although the rotor is not compatible with the parameters of a program, notes on the possible causes will appear:

Speed is flashing in the display

g-force/speed is flashing in the display: *g*-force/speed of the selected program exceeds the maximum *g*-force/speed of the rotor.

▸ Correct the value for *g*-force/speed.

If the run is started without correcting the *g*-force/speed, the following message will appear:
rpm/rcf too high!
[START] Centrifugation at ### rpm/### rcf
◂ ▸ *Change parameters.*

- The message shows the maximum permitted *g*-force/speed of the rotor.
- The rotor is not stopped, but it is held at a speed of 700 rpm.
- You have 15 seconds to adopt the *g*-force/speed or to change it.

▸ Adopt the displayed *g*-force/speed for the run: press the **start/stop** key.

▸ Change the *g*-force or speed for the run: use the arrow keys **speed** to set a different value.

If you do not adopt or change the *g*-force/speed within 15 s, the centrifuge will stop running.

Radius is flashing in the display

Radius is flashing in the display: The radius of the selected program is larger than the maximum radius of the rotor.

- Correct the value for radius.

If the run is started without correcting the radius, the following message will appear:
Hint D
Radius not permissible.
Change rotor.

7.2.3 Editing programs

1. Load the program with the program keys: *Menu* > *Programs* > *Load program*. Confirm with the **menu/enter** key.
2. Select a program with the menu arrow keys ◂ or ▸. Confirm with the **menu/enter** key.
   The display shows the parameters of the program.
3. Press the **menu/enter** key. Use the menu arrow keys to select *Programs* > *Save program*. Confirm with the **menu/enter** key.
   The next available program space is suggested.
4. Change parameters and options (see *Creating a program on p. 51)*.
5. Select *Save*. Confirm with the **menu/enter** key.
   The display shows the message *Keep program name?*
6. To change the program name, discard the message with *no* and change the program name.

7.3 Deleting a program

Programs 1 to 5 cannot be deleted. All parameters of these programs can be modified and overwritten.

1. To delete a program from program spaces 6 to 99: press the **menu/enter** key. Select *Programs* > *Delete program*. Confirm with the **menu/enter** key
2. Use the menu arrow keys ◂ or ▸ to select the program space. Confirm with the **menu/enter** key.
   The display shows the message *Delete program?*
3. Select *yes*. Confirm with the **menu/enter** key.

8 Maintenance

8.1 Service

WARNING! Risk of injury due to defective gas spring(s).
A defective gas spring is an insufficient support for the centrifuge lid. There is a risk of crushing fingers or limbs.

- Ensure that the centrifuge lid can be opened completely and that it will remain in this position.
- Regularly check all gas springs for their proper function.
- Have defective gas springs replaced immediately.
- Have gas springs replaced by a service technician every 2 years.

WARNING! Risk of fire or electrical shock

- Have the centrifuge's electrical safety, especially the paths for the protective connections, checked every 12 months by trained and skilled personnel.

We recommend to have the centrifuge and the associated rotors checked by Technical Service during a service at least every 12 months. Please note the country-specific regulations.

8.2 Preparing cleaning/disinfection

- Clean all accessible surfaces of the device and the accessories at least weekly and when contaminated.
- Clean the rotor regularly. This way the rotor is protected and the durability is prolonged.
- Furthermore, observe the notes on decontamination (see *Decontamination before shipment on p. 61)* when the device is sent to the authorized Technical Service for repairs.

The procedure described in the following chapter applies to the cleaning as well as to the disinfection or decontamination. The table below describes the steps required on top of this:

Cleaning	Disinfecting/decontamination
1. Use a mild cleaning fluid to clean the accessible surfaces of the device and the accessories. 2. Carry out the cleaning as described in the following chapter.	1. Choose the disinfection method which corresponds to the legal regulations and guidelines in place for your range of application. For example, use alcohol (ethanol, isopropanol) or alcohol-based disinfectants. 2. Carry out the disinfection or decontamination as described in the following chapter. 3. Then clean the device and the accessories.

If you have any further questions regarding the cleaning and disinfection or decontamination or regarding the cleaning fluid to be used, contact the Eppendorf AG Application Support. The contact details are provided on the back of this manual.

8.3 Cleaning/disinfection

DANGER! Electric shock due to the ingress of liquid.

- Switch off the device and disconnect it from the mains/power line before starting cleaning or disinfection.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not perform a spray clean/spray disinfection on the housing.
- Only reconnect the device to the mains/power line when it is completely dry, both inside and outside.

WARNING! Risk to health due to limited aerosol tightness when used incorrectly.
Mechanical stresses and contamination by chemicals or other aggressive solvents may impair the aerosol tightness of the rotors and rotor lids. Autoclaving at excessive temperatures can lead to vessels, adapters and rotor lids becoming brittle and deformed.

- Check the integrity of the seals of the aerosol-tight rotor lids or caps before each use.
- Only use aerosol-tight rotor lids or caps if the seals are undamaged and clean.
- Do not exceed temperatures of 121°C or a time of more than 20 min. while autoclaving.
- After each proper autoclaving process (121 °C, 20 min.), coat the threads of the rotor lid screw with a thin layer of pivot grease (order no. Int. 5810 350.050, North America 022634330).
- For QuickLock rotor lids, only the seal must be replaced after 50 autoclaving cycles.
- Replace aerosol-tight rotor caps after 50 autoclaving cycles.
- **Never** store aerosol-tight rotors or buckets closed.

NOTICE! Danger due to deformed or embrittled tubes. Autoclaving at excessive temperatures can lead to plastic tubes becoming brittle and deformed.
This could cause damage to the device and the accessories and sample loss.

- Observe the temperatures specified by the manufacturer when autoclaving tubes.
- Do not use deformed or brittle tubes.

NOTICE! Damage from the use of aggressive chemicals.

- Do not use any aggressive chemicals on the device or its accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenol.
- If the device has been contaminated by aggressive chemicals, clean it immediately using a mild cleaning agent.

NOTICE! Corrosion due to aggressive cleaning agents and disinfectants.

- Do not use any corrosive cleaning agents, aggressive solvents or abrasive polishes.
- Do not incubate the accessories in aggressive cleaning agents or disinfectants for longer periods.

NOTICE! Damage from UV and other high-energy radiation.

- Do not use UV, beta, gamma, or any other high-energy radiation for disinfection.
- Avoid storage in areas with strong UV radiation.

Autoclaving
Fixed-angle rotors, rotor lids, adapters, and buckets can be autoclaved (121 °C, 20 min).
Rotor crosses of swing-bucket rotors cannot be autoclaved.
After a maximum of 50 autoclaving cycles, the aerosol-tight caps and, for QuickLock rotors, the seals must be replaced.

Aerosol tightness
Check that the seals are intact before use.
Replace the rotor lids with screw cap when the sealing rings on the lid screw and in the lid groove become worn.
Regular care of the sealing rings is necessary in order to protect the rotors.
Aerosol-tight rotors should never be stored with the lids screwed on!
In order to prevent damage, lightly grease the lid threads of aerosol-tight rotors regularly with pivot grease (order no. int.: 5810 350.050/North America: 022634330).

8.3.1 Cleaning and disinfecting the device

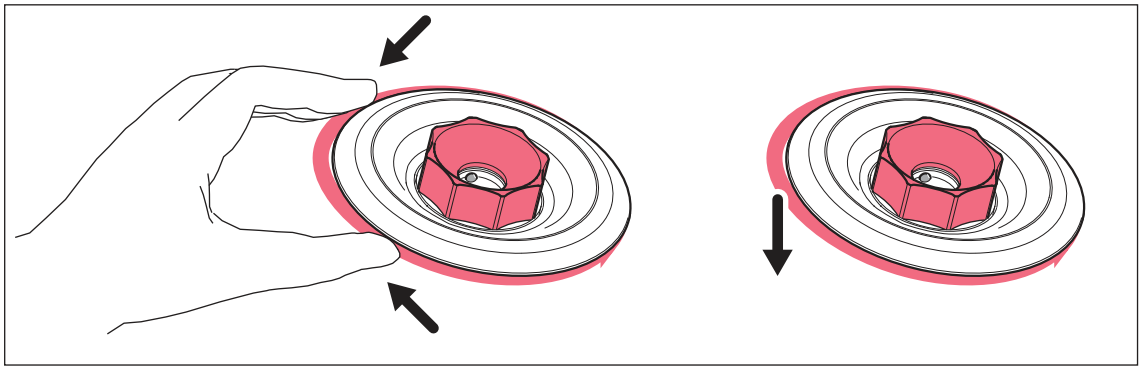
Recommended cleaning agents:
- Alcohol 70 % (ethanol, isopropanol)
- Mild, neutral cleaning agent

1. Open the lid. Switch the device off at the mains/power switch. Disconnect the mains/power plug from the voltage supply.
2. Remove the rotor.
3. Clean and disinfect all accessible surfaces of the device, including the power cable, using a damp cloth and the recommended cleaning agents.
4. Thoroughly clean the rubber seal of the rotor chamber with water.
5. Rub the dry rubber seal with glycerol or talcum powder to prevent it from becoming brittle. Other components of the device, such as the motor shaft and rotor cone, must not be lubricated.
6. Clean the motor shaft with a soft, dry, lint-free cloth. Do not grease the motor shaft.
7. Check the motor shaft for damage.
8. Check the device for corrosion and damage.
9. Leave the centrifuge lid open when the device is not being used.
10. Only reconnect the device to the mains/power supply if it is fully dry on the inside and outside.

8.3.2 Cleaning and disinfecting the rotor

1. Inspect the rotor and accessories for damage and corrosion. Do not use damaged rotors or accessories.
2. Clean and disinfect the rotors and accessories with the recommended cleaning agents.
3. Clean and disinfect the rotor bores with a bottle brush.
4. Clean and disinfect the rotor lid.

   QuickLock rotor lids: Remove the sealing ring. Clean the sealing ring and the groove below it.



5. Rinse the rotors and accessories thoroughly with distilled water. Rinse the rotor bores of fixed-angle rotors particularly thoroughly.

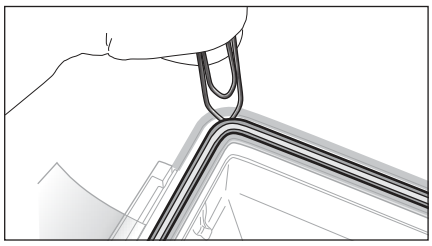
   Do not immerse the rotor in liquid as liquid can get trapped inside the cavities.

6. Place the rotors and accessories on a towel to dry. Place the fixed-angle rotors with the rotor bores facing down so the bores can dry.
7. Coat the sealing ring of the rotor lid with a thin layer of pivot grease and Correctly reinsert it in the clean and dry groove.
8. Clean the rotor cone with a soft, dry, lint-free cloth. Do not lubricate the rotor cone.
9. Inspect the rotor cone for damage.
10. Place the dry rotor onto the motor shaft.
11. Tighten the rotor nut firmly by turning it **clockwise** with the rotor key.
12. Leave the rotor lid open when the rotor is not being used.

8.3.3 Changing the seal of the aerosol-tight cap (S-4×Universal, S-4×750, S-4×500 and S-4×400)

To clean the aerosol-tight cap, remove the seal of the aerosol-tight cap.

8.3.3.1 Removing the seal



1. Use a blunt lever to lift the seal out of the groove (e.g., use the round side of a paper clip).
   Make sure not to damage the seal with the wire ends.
2. Carefully lift the seal out of the groove.

8.3.3.2 Inserting the seal

NOTICE! Faulty sealing if the seal is handled incorrectly.

- Insert the seal evenly.
- Do not pull the seal lengthwise.

1. Check that the seal is not damaged.
   Do not use any damaged, discolored or dirty seals.
2. Place the seal on the groove and slightly press it into the groove.
3. Place the cap on the bucket and close it completely.
4. Remove the cap and check the correct positioning of the seal.

If the seal is too long or too short, remove the seal from the groove. Insert the seal again.

8.4 Additional care instructions for refrigerated centrifuges

- Regularly free the rotor chamber from ice formations by thawing, by either leaving the centrifuge lid open or by performing a short temperature control run at approx. 30 °C.
- To take pressure off the gas spring(s), leave the centrifuge lid open if the centrifuge is not used for a longer period.
  Residual moisture can escape.
- Wipe up the condensation water in the rotor chamber. Use a soft, absorbent cloth for this.
- No later than every 6 months, remove any dust deposits from the ventilation slits of the centrifuge using a brush or swab. First switch off the device and remove the power plug.

8.5 Cleaning glass breakage

When using glass tubes there is a risk of glass breakage in the rotor chamber. The resulting glass splinters are swirled around in the rotor chamber during centrifugation and have a sandblasting effect on the rotor and accessories. The smallest glass particles become lodged in the rubber parts (e.g., the motor guide, the rotor chamber seal, and the rubber mats of adapters).

NOTICE! Glass breakage in the rotor chamber
Glass tubes in the rotor chamber may break if the *g*-force is too high. Broken glass can damage the rotor, accessories and samples.

- Please note the manufacturer's information on the recommended centrifugation parameters (load and speed).

Effects of glass breakage in the rotor chamber:

- Fine black metal abrasion in the rotor chamber (in metal rotor chambers)
- The surfaces of the rotor chamber and accessories are scratched.
- The chemical resistance of the rotor chamber is reduced.
- Contamination of samples
- Wear on rubber parts

How to proceed in case of glass breakage

1. Remove all splinters and glass powder from the rotor chamber and accessories.
2. Thoroughly clean the rotor and rotor chamber. Thoroughly clean the bores of the fixed-angle rotors, in particular.
3. If required, replace the rubber mats and adapters to prevent any further damage.
4. Regularly check the rotor bores for deposits and damage.

8.6 Resetting the excess current switch

Thermal excess current switches are mounted as fuses. If the excess current protection is triggered, they set the switch to OFF. However, they do not automatically switch it on again.

To switch on the excess current switch again, proceed as follows:

1. Switch off the centrifuge using the mains/power switch.
2. Wait for at least 20 s and switch on the centrifuge again.

The excess current switch is reactivated and the centrifuge is ready for operation.

8.7 Decontamination before shipment

If you are shipping the device to the authorized Technical Service for repairs or to your authorized dealer for disposal please note the following:

WARNING! Risk to health from contaminated device.

1. Observe the information in the decontamination certificate. It is available as a PDF document on our webpage (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you are going to dispatch.
3. Include the fully completed decontamination certificate in the shipment.

9 Troubleshooting

If you cannot remedy an error with the recommended measures, please contact your local Eppendorf partner. The contact addresses can be found on the Internet at www.eppendorf.com.

9.1 General errors

Problem	Cause	Solution
No display.	No mains/power connection.	▸ Check the mains/power connection.
	Mains/power outage.	▸ Check the fuse of the device. ▸ Check the mains/power fuse of the laboratory.
The centrifuge lid cannot be opened.	Rotor is still running.	▸ Wait for rotor to stop.
	Mains/power outage.	1. Disconnect the mains/power plug. 2. Let the thermal fuse in the mains/ power switch cool off for at least 15 min. 3. Check the mains/power fuse of the laboratory. 4. Actuate emergency release.
The centrifuge cannot be started.	Centrifuge lid is not closed.	▸ Closing the centrifuge lid.
Centrifuge shakes when it starts up.	Rotor is asymmetrically loaded.	1. Stop the centrifuge and load the rotor symmetrically. 2. Re-start the centrifuge.
Centrifuge brakes during short spin centrifugation even though the **short** key is pressed.	The **short** key was released briefly more than twice (protective function for the drive).	▸ Press and hold the **short** key during a short spin centrifugation.
Temperature display flashes.	Temperature deviation from set value: > ±3 °C.	▸ Check the settings. ▸ Wait until the set temperature has been reached. ▸ Check unhindered air circulation through the air slots. ▸ Thaw ice or switch off device and allow it to cool down.

9.2 Error messages

If an error message appears, proceed as follows:
1. Remedy the fault as described in the “Remedy" column.
2. To clear the error message from the display, press the **open** key.
3. If necessary, repeat centrifugation.

Problem	Cause	Solution
Hint A *Lid latch*	Centrifuge lid will not lock.	▸ Try again to close centrifuge lid.
Hint B *Imbalance*	Rotor is asymmetrically loaded.	▸ Load the rotor symmetrically and balance it. ▸ Swing-bucket rotor: Apply a thin layer of pivot grease to the pegs.
Hint C *Rotor detection*	Speed (rpm) or *g*-force (rcf) is higher than the maximum speed (rpm) or the *g*-force (rcf) of the rotor.	1. Correct rpm/rcf. 2. Repeat the run.
Hint D *Rotor detection*	• The radius of the selected program is larger than the maximum radius of the rotor. • The rotor is not compatible with the program.	▸ Change the radius. ▸ Replace the rotor.

Problem	Cause	Solution
ERROR 1 *Rotor detection*	Rotor not detected.	▸ Check rotor. ▸ If this error message appears again, test the rotor detection with a different rotor.
ERROR 2 *Electronics fault*	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge.
ERROR 3 *Speed check*	Error in the rotational speed measurement system.	▸ Insert and tighten rotor. ▸ Wait for displayed time to elapse. ▸ Let the centrifuge stand while switched on until the error message disappears.
ERROR 5 *Electronics fault*	Prohibited opening of lid during a run or lid switch is defective.	1. Wait for rotor to stop. 2. Open and close again the lid of the device. 3. Repeat the run.

Problem	Cause	Solution
ERROR 6 *Drive fault*	• Error in the drive electronics. • Drive is overheated.	▸ Repeat the run. If the error message appears again: 1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge. If the error message appears again: ▸ Let the drive cool down for at least 15 min.
	• Emergency release was actuated during a run.	▸ Wait for rotor to stop.
ERROR 7 *Speed check*	Deviation in the speed control.	1. Wait for rotor to stop. 2. Tighten the rotor.
ERROR 9 – *ERROR 14*	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge.
ERROR 16 – *ERROR 17* *Electronics fault*	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge.
ERROR 18, *ERROR 20* *Room Temp. of rotor chamber*	Deviation from target temperature in the rotor chamber.	▸ Allow the device to cool down and repeat cycle.
ERROR 22 *Electronics fault*	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge.
ERROR 25 *Power failure*	Mains/power failure during a run.	▸ Check the power supply.
ERROR 26 – *ERROR 27* *Electronics fault*	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on centrifuge.
ERROR 28 *Electronics fault*	Electronics fault.	▸ Press the **open** key.
ERROR 30 *Lid latch*	Centrifuge lid will not lock.	▸ Try again to close centrifuge lid.
	Centrifuge lid cannot be released.	▸ Switch the device off and back on. If the error occurs again: 1. Switch off the device. 2. Activate the emergency lid release.
	Centrifuge lid has not been opened wide enough.	▸ Open the centrifuge lid wider by hand.

9.3 Emergency release

If the centrifuge lid cannot be opened, you can activate the emergency release manually.

WARNING! Risk of injury from rotating rotor.
If the emergency release of the lid is activated, the rotor may continue to rotate for several minutes.

- Wait for the rotor to stop before activating the emergency release.
- To check, look through the monitoring glass in the centrifuge lid.

Use the rotor key delivered with the Centrifuge 5910 R for the emergency release. Carry out the following steps on both the left side and right side of the centrifuge.

1. Pull out the mains/power plug and wait for the rotor to stop.
2. Insert the rotor key into the hexagonal opening on one side of the centrifuge until noticeable resistance can be felt.
3. Slightly press and turn the rotor key **counterclockwise**.
4. Insert the rotor key into the hexagonal opening on the opposite side of the centrifuge until noticeable resistance can be felt.
5. Slightly press and turn the rotor key **counterclockwise**.
   This will release the centrifuge lid.
6. Open the centrifuge lid.

10 Transport, storage and disposal

10.1 Transport

- Remove the rotor from the centrifuge before transport.
- Use the original packing for transport.

	Air temperature	Relative humidity	Atmospheric pressure
General transport	-25 °C – 60 °C	10 % – 75 %	30 kPa – 106 kPa
Air freight	-20 °C – 55 °C	10 % – 75 %	30 kPa – 106 kPa

10.2 Storage

	Air temperature	Relative humidity	Atmospheric pressure
In transport packing	-25 °C – 55 °C	10 % – 75 %	70 kPa – 106 kPa
Without transport packing	-5 °C – 45 °C	10 % – 75 %	70 kPa – 106 kPa

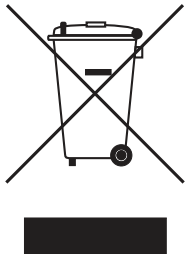
10.3 Disposal

If the product needs to be disposed of, the relevant legal regulations must be observed.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2012/19/EU pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. To document this, they have been marked with the following marking:



Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

11 Technical data

11.1 Power supply

Mains/power connection	230 V, 50 Hz – 60 Hz 120 V, 50 Hz – 60 Hz 100 V, 50 Hz – 60 Hz
Current consumption	230 V: 10.5 A 120 V: 12 A 100 V: 15 A
Power consumption	230 V: Maximum 1650 W 120 V: Maximum 1440 W 100 V: Maximum 1500 W
EMC: Noise emission (radio interference)	230 V: EN 61326-1/EN 55011 – Class A 120 V: CFR 47 FCC Part 15 – Class A 100 V: EN 61326-1/EN 55011 – Class A
EMC: Noise immunity	EN 61326-1
Overvoltage category	II
Degree of pollution	2

11.2 Weight/dimensions

Dimensions	Width: 71.5 cm (28.1 in) Depth: 62.0 cm (24.4 in)/66 cm (26.0 in) Height: 36.8 cm (14.5 in)
Weight without rotor	109.0 kg (240.3 lb)

Rotor weights:		Accessories without caps:	
S-4×Universal	6790 g	Universal bucket	920 g
S-4×750	5100 g	Round bucket	605 g
		DWP bucket	700 g
S-4×500	5400 g	Bucket	585 g
		Flex bucket	810 g
		Form bucket 7x50	880 g
S-4×400	5200 g	Round bucket	490 g
FA-6×250	5450 g		
FA-6×50	3450 g		
FA-48×2	2500 g		
FA-20×5	2800 g		
FA-30×2	1800 g		
F-48×15	2100 g	Sleeve	30

11.3 Noise level

The noise level was measured frontally in a sound measuring chamber with accuracy class 1 (DIN EN ISO 3745) at a distance of 1 m from the device and at lab bench height.

	Swing-bucket rotor	Fixed-angle rotor
Noise level at maximum rotor speed		
	< 53 dB(A) (S-4×Universal) < 57 dB(A) (S-4×750)	< 59 dB(A) (FA-6×50)

11.4 Ambient conditions

Environment	For indoor use only
Ambient temperature	10 °C – 35 °C
Relative humidity	10 % – 75 %, non-condensing
Atmospheric pressure	79.5 kPa – 106 kPa Use up to a height of 2 000 m above sea level.

11.5 Application parameters

Cycle time	10 s – 99:59 h, infinite (∞), • 10 s – 2 min: can be set in increments of 10 s • 2 min – 10 min: can be set in increments of 30 s • 10 min – 99:59 h: can be set in increments of 1 min
Temperature	-11 °C – 40 °C
Relative centrifugal force	1 × *g* – 22132 × *g* • 1 × *g* – 3000 × *g*: can be set in increments of 10 × *g* • 3000 × *g* – 22132 × *g*: can be set in increments of 100 × *g*
Rotational speed	10 rpm – 14000 rpm • 10 rpm – 5000 rpm: can be set in increments of 10 rpm • 5000 rpm – 14000 rpm: can be set in increments of 100 rpm
Maximum load	Fixed-angle rotor: 6 × 250 mL Swing-bucket rotors: 4 × 1000 mL
Maximum kinetic energy	36400 J
Permitted density of the material for centrifuging (at maximum *g*-force (rcf) or rotational speed (rpm) and maximum load)	1.2 g/mL
Inspection obligation in Germany	yes

11.6 Acceleration and deceleration times

The following table shows the approximate acceleration and deceleration times according to DIN 58970 for the rotors of the Centrifuge 5910 R. The data was determined at maximum load of the rotor. Fluctuations may occur depending on the condition of the device and the load.

- Level 9: shortest acceleration time/deceleration
- Level 0: longest acceleration time/deceleration time (with the brake off)

Rotor		0	1	2	3	4	5	6	7	8	9
S-4×Universal (230 V, 120 V)	Acceleration time	506 s	294 s	208 s	144 s	108 s	86 s	80 s	73 s	68 s	64 s
	Deceleration time	1609 s	706 s	264 s	182 s	122 s	92 s	75 s	63 s	57 s	49 s
	Tolerance	–	–	±5 %*							
S-4×Universal (100 V)	Acceleration time	911 s	484 s	329 s	225 s	159 s	124 s	107 s	92 s	83 s	73 s
	Deceleration time	1351 s	495 s	275 s	182 s	123 s	89 s	77 s	66 s	61 s	58 s
	Tolerance	–	–	±5 %*							
S-4×750 (230 V, 120 V)	Acceleration time	406 s	257 s	184 s	123 s	91 s	71 s	57 s	49 s	43 s	36 s
	Deceleration time	1017 s	383 s	235 s	157 s	106 s	82 s	69 s	54 s	44 s	35 s
	Tolerance	–	–	±5 %*							
S-4×750 (100 V)	Acceleration time	951 s	491 s	365 s	238 s	163 s	118 s	102 s	85 s	74 s	61 s
	Deceleration time	1223 s	494 s	220 s	149 s	102 s	78 s	63 s	52 s	46 s	39 s
	Tolerance	–	–	±5 %*							
S-4×500 (230 V, 120 V)	Acceleration time	345 s	218 s	157 s	104 s	77 s	60 s	48 s	41 s	35 s	28 s
	Deceleration time	771 s	360 s	200 s	131 s	95 s	71 s	53 s	44 s	39 s	30 s
	Tolerance	–	–	±5 %*							
S-4×500 (100 V)	Acceleration time	880 s	455 s	339 s	221 s	152 s	110 s	92 s	79 s	67 s	52 s
	Deceleration time	932 s	375 s	204 s	138 s	96 s	71 s	57 s	49 s	40 s	34 s
	Tolerance	–	–	±5 %*							

Rotor		0	1	2	3	4	5	6	7	8	9
S-4×400 (230 V, 120 V)	Acceleration time	406 s	260 s	180 s	120 s	86 s	63 s	54 s	43 s	38 s	30 s
	Deceleration time	860 s	386 s	220 s	156 s	108 s	77 s	65 s	52 s	45 s	35 s
	Tolerance	–	–	±5 %*							
S-4×400 (100 V)	Acceleration time	1132 s	583 s	433 s	282 s	193 s	139 s	115 s	97 s	81 s	62 s
	Deceleration time	861 s	370 s	228 s	159 s	112 s	80 s	67 s	57 s	48 s	38 s
	Tolerance	–	–	±5 %*							
FA-6×50 (230 V, 120 V)	Acceleration time	351 s	239 s	167 s	115 s	85 s	63 s	55 s	46 s	40 s	34 s
	Deceleration time	686 s	330 s	215 s	154 s	107 s	77 s	62 s	49 s	41 s	31 s
	Tolerance	–	–	±5 %*							
FA-6×50 (100 V)	Acceleration time	619 s	414 s	280 s	190 s	136 s	102 s	87 s	71 s	62 s	53 s
	Deceleration time	750 s	338 s	215 s	154 s	109 s	79 s	65 s	52 s	43 s	32 s
	Tolerance	–	–	±5 %*							
FA-20×5 (230 V, 120 V)	Acceleration time	304 s	205 s	140 s	95 s	70 s	51 s	44 s	36 s	32 s	26 s
	Deceleration time	605 s	290 s	190 s	133 s	93 s	69 s	56 s	44 s	39 s	28 s
	Tolerance	–	–	±5 %*							
FA-20×5 (100 V)	Acceleration time	486 s	324 s	227 s	153 s	109 s	82 s	69 s	57 s	49 s	39 s
	Deceleration time	723 s	296 s	194 s	136 s	95 s	69 s	57 s	45 s	38 s	28 s
	Tolerance	–	–	±5 %*							
FA-48×2 (230 V, 120 V)	Acceleration time	251 s	169 s	117 s	80 s	58 s	44 s	37 s	30 s	28 s	22 s
	Deceleration time	546 s	235 s	151 s	107 s	77 s	55 s	46 s	37 s	32 s	24 s
	Tolerance	–	–	±5 %*							
FA-48×2 (100 V)	Acceleration time	382 s	249 s	175 s	118 s	88 s	64 s	55 s	46 s	34 s	32 s
	Deceleration time	565 s	226 s	153 s	111 s	80 s	57 s	47 s	38 s	33 s	24 s
	Tolerance	–	–	±5 %*							

Rotor		0	1	2	3	4	5	6	7	8	9
FA-30×2 (230 V, 120 V)	Acceleration time	245 s	164 s	114 s	77 s	57 s	44 s	37 s	31 s	26 s	21 s
	Deceleration time	359 s	224 s	147 s	103 s	74 s	51 s	43 s	35 s	29 s	23 s
	Tolerance	–	–	±5 %*							
FA-30×2 (100 V)	Acceleration time	373 s	242 s	170 s	115 s	85 s	63 s	54 s	45 s	33 s	30 s
	Deceleration time	463 s	223 s	148 s	106 s	75 s	54 s	44 s	35 s	30 s	22 s
	Tolerance	–	–	±5 %*							
F-48×15 (230 V, 120 V)	Acceleration time	205 s	137 s	95 s	63 s	45 s	34 s	29 s	24 s	21 s	18 s
	Deceleration time	397 s	196 s	117 s	82 s	56 s	40 s	34 s	28 s	23 s	18 s
	Tolerance	–	–	±5 %*							
F-48×15 (100 V)	Acceleration time	284 s	190 s	128 s	87 s	62 s	48 s	41 s	33 s	30 s	25 s
	Deceleration time	362 s	185 s	120 s	84 s	59 s	43 s	36 s	29 s	24 s	19 s
	Tolerance	–	–	±5 %*							

* 5 s minimum

11.7 Service life of accessories

CAUTION! Danger due to material fatigue.
If the service life is exceeded, it cannot be guaranteed that the material of the rotors and the accessories will withstand the stresses during centrifugation.

- Do not use accessories that have exceeded their maximum service life.

Eppendorf states the maximum service life of rotors and accessories in cycles and years. The number of cycles is decisive. If determination of the number of cycles is not possible, the service life in years applies.

Each centrifugation run in which the rotor is accelerated and braked is counted as a cycle, independent of the speed and the duration of the centrifugation run.

For the following rotors, the service life is based on the following standard laboratory day: Use for 25 cycles per day on 5 days a week, 52 weeks a year.

Fixed-angle rotor	Centrifuge	Max. service from the first commissioning onward	
		in cycles	in years
F-48×15	5910 R	100000	15
FA-6×50	5910 R, 5920 R	100000	15
FA-20×5	5910 R, 5920 R	100000	15
FA-30×2	5910 R	100000	15
FA-48×2	5910 R/5920 R	100000	15
FA-6×250	5910 R	50000	7
S-4×400	5910 R	100000	15
S-4×500	5910 R	100000	15
S-4×750	5910 R/5920 R	100000	15
S-4×Universal	5910 R	50000	7

Unless stated otherwise (in the manual of the centrifuge, indication of the number of cycles on the rotor, in the instructions for use of the rotor), all other rotors and rotor lids can be used over the entire service life of the centrifuge if the following prerequisites are met:

- proper use
- recommended maintenance
- undamaged condition

Accessories	Max. service from the first commissioning onward
Aerosol-tight rotor lids with an exchangeable seal (e.g., QuickLock rotor lids)	3 years (replace seals every 50 autoclaving cycles)
Aerosol-tight rotor lids without exchangeable seal	3 years or 50 autoclaving cycles, whichever occurs first
Non-aerosol-tight rotor lids	3 years
Aerosol-tight caps made of PP, PC, PEI	3 years or 50 autoclaving cycles, whichever occurs first
Adapter	1 year

The date of manufacture is stamped on the rotors in the format *03/15* or *03/2015* (= March 2015). On the inside of the plastic rotor lid, the date of manufacture is stamped in the form of a clock.

To ensure aerosol tightness, the following applies:

- ▸ Replace aerosol-tight rotor lids without exchangeable seal and cap after 50 autoclaving cycles.
- ▸ Replace the seal of aerosol-tight rotor lids with exchangeable seal (e.g. QuickLock rotor lids) after 50 autoclaving cycles.

12 Rotors for the Centrifuge 5910 R

Eppendorf centrifuges may only be operated with rotors that are intended for use with the corresponding centrifuge.

- Only use rotors that are intended for use with the corresponding centrifuge.

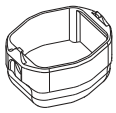
Please note the manufacturer's information on the centrifugation resistance of the sample tubes used (maximum *g*-force).

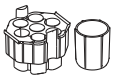
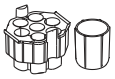
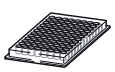
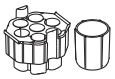
For ordering information, refer to the English and German version of the operating manual.

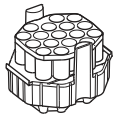
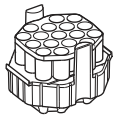
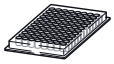
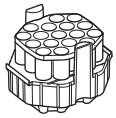
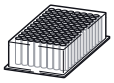
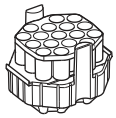
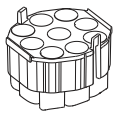
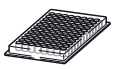
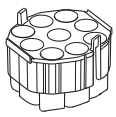
Technical data of the rotors and adapters and the order numbers of the adapters can be found in chapter *Rotors for the Centrifuge 5910 R* of the English version of the operating manual.

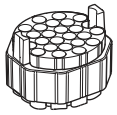
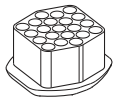
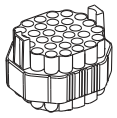
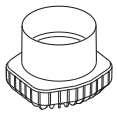
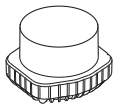
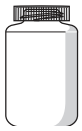
12.1 Rotor S-4×Universal

12.1.1 Swing-bucket rotor S-4×Universal with 4 universal buckets

			Max. *g-force*:	4347 × *g*
			Max. speed:	4500 rpm
Rotor S-4×Universal	**Universal bucket and aerosol-tight cap**		Max. load per bucket (adapter, tube and contents):	1595 g

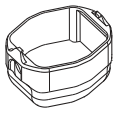
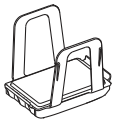
Tube	**Tube** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Diameter** **Max. tube length with/without cap**	**Max. *g-force*** **Max. speed** **Radius**
	Conical tube 50 mL 7/28	 5910 751.001	Conical Ø 29 mm 121 mm/124 mm	4324 × *g* 4500 rpm 19.1 cm
	Wide-neck bottle 250 mL 1/4	 5910 751.001	Flat Ø 62 mm 139 mm/146 mm	4234 × *g* 4500 rpm 18.7 cm
	Microplate 96/384 wells 1/4	 5910 751.001	Flat –/16 mm	2604 × *g* 4500 rpm 11.5 cm

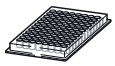
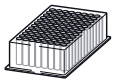
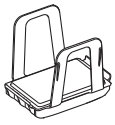
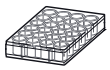
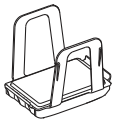
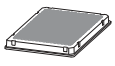
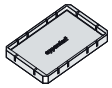
Tube	Tube Capacity Number per adapter/rotor	Adapter Order no. (international)	Bottom shape Diameter Max. tube length with/without cap	Max. *g-force* Max. speed Radius
	Eppendorf Tubes 5 mL 16/64	 5910 752.008 (without upper part)	Conical Ø 17 mm 122 mm/124 mm	4324 × *g* 4500 rpm 19.1 cm
	Conical tube 15 mL 17/64	 5910 752.008	Conical Ø 17 mm 122 mm/124 mm	4324 × *g* 4500 rpm 19.1 cm
	Microplate 96/384 wells 1/4	 5910 752.008 (without upper part)	Flat ? mm/64 mm	3237 × *g* 4500 rpm 14.4 cm
	Deepwell plate 96 wells 1/4	 5910 752.008 (without upper part)	Flat ? mm/64 mm	3237 × *g* 4500 rpm 14.3 cm
	Conical tube 50 mL 9/36	 5910 769.008	Conical Ø 29 mm (Load 5 inner bores only)/116 mm	4347 × *g* 4500 rpm 19.2 cm
	Microplate 96/384 wells 1/4	 5910 769.008	Flat 16 mm/??16 mm	2604 × *g* 4500 rpm 11.5 cm

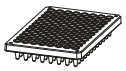
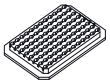
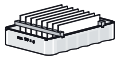
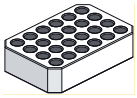
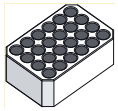
Tube	Tube Capacity Number per adapter/rotor	Adapter Order no. (international)	Bottom shape Diameter Max. tube length with/without cap	Max. *g-force* Max. speed Radius
	Round-bottom tube 7.5 mL – 12 mL (Ø 16 × 75 mm – 100 mm) Ø 16 mm 26/104	 5910 754.000	Round Ø 16 mm 118 mm/120 mm	4302 × *g* 4500 rpm 19.0 cm
	Tube 9 mL (Ø 17.5 mm × 100 mm) 21/84	 5910 762.003	Round Ø 17.5 mm 118 mm/120 mm	4256 × *g* 4500 rpm 18.8 cm
	Round-bottom tube 4 mL – 8 mL (Ø 13 × 75 mm – 100 mm) 30/120	 5910 755.007	Round Ø 13 mm 117 mm/119 mm	4302 × *g* 4500 rpm 19.0 cm
	Conical tube 500 mL Corning 1/4	 5910 760.000	Conical Ø 96 mm –/148 mm	4234 × *g* 4500 rpm 18.7 cm
	Wide-neck bottle 750 mL 1/4	 5910 757.000	Flat Ø 102 mm 135 mm/139 mm	4256 × *g* 4500 rpm 18.8 cm
	Wide-neck bottle 1000 mL 1/4	 5910 756.003	Flat Ø 119 mm 132 mm/138 mm	44569 × *g* 4256 rpm 18.8 cm

12.1.2 Swing-bucket rotor S-4×Universal with 4 universal buckets and a plate carrier

Always use the plate carrier for centrifugation of the following plates and tubes. Use a plate carrier and an adapter if necessary.

			Max. *g-force*:	3849 × *g*
			Max. speed:	4500 rpm
Rotor S-4×Universal	**Universal bucket with plate carrier**		Max. load per bucket (adapter, tube and contents):	1 595 g

Plate/tube	**Plate** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Max. loading height with/ without cap**	**Max. *g-force*** **Max. speed** **Radius**
	Microplate 96/384 wells 5/20	 5910 753.004	Flat 66 mm/80 mm	3849 × *g* 4500 rpm 17.0 cm
	Deepwell plate 96 wells 1/4	 5910 753.004	Flat 66 mm/80 mm	3849 × *g* 4500 rpm 17.0 cm
	Cell-culture plate 1/4	 5910 753.004	Flat 66 mm/80 mm	3849 × *g* 4500 rpm 17.0 cm
	Kit 1/4	 5910 753.004	Flat –/80 mm	3849 × *g* 4500 rpm 17.0 cm
	PCR plate 384 wells 1/4	Plate carrier +  5825 713.001	Flat 66 mm/80 mm	3645 × *g* 4500 rpm 16.1 cm

Plate/tube	**Plate** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Max. loading height with/ without cap**	**Max. *g-force*** **Max. speed** **Radius**
	PCR plate 96 wells 1/4	Plate carrier +  5825 711.009	Conical 66 mm/80 mm	3690 × *g* 4500 rpm 16.3 cm
Slide	CombiSlide 12 slides 12/48	Plate carrier +  5825 706.005	Flat 66 mm/80 mm	3758 × *g* 4500 rpm 16.6 cm
	IsoRack 24 × 0.5 mL micro test tubes 1/4	Plate carrier +  5825 708.008	Open Ø 6 mm 66 mm/80 mm	3690 × *g* 4500 rpm 16.3 cm
	IsoRack 24 × 1.5/2 mL micro test tubes 1/4	Plate carrier +  5825 709.004	Open Ø 11 mm 66 mm/80 mm	3600 × *g* 4500 rpm 15.9 cm

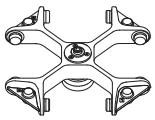
12.2 Rotor S-4×750

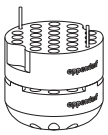
12.2.1 Swing-bucket rotor S-4×750 with 4 750 mL round buckets

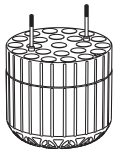
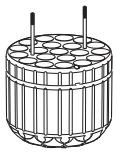
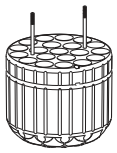
Influence of speed on the temperature with device version 120 V

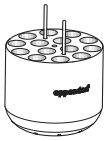
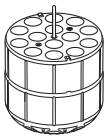
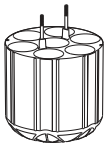
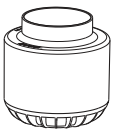
To safely maintain a temperature of 4 °C at an ambient temperature of 23 °C, the speed must be reduced to 4400 rpm.

Speed	Temperature
4400 rpm	≤ 4 °C
4700 rpm	≤ 6 °C

			Max. *g-force*:	100 V: 4031 × *g*	120 V/230 V: 4816 × *g*
			Max. speed:	100 V: 4300 rpm	120 V/230: 4700 rpm
Rotor S-4×750	**Round bucket 750 mL**	**Aerosol-tight cap**	Max. load per bucket (adapter, tube and contents):	1000 g	1000 g

Tube	Tube Capacity Tubes per adapter/rotor	Adapter Order no. (international)	Bottom shape Tube diameter Max. tube length with/ without cap	Max. *g-force* Max. speed Radius 100 V	 120 V/230 V
	Micro test tube 1.5 mL/2 mL 50/200	 5825 740.009	Open Ø 11 mm 39 mm	Top: 3059 × *g* Bottom: 4010 × *g* 4300 rpm Top: 14.8 cm Bottom: 19.4 cm	Top: 3655 × *g* Bottom: 4791 × *g* 4700 rpm Top: 14.8 cm Bottom: 19.4 cm
	Round-bottom tube Ø 12 mm × 75 mm 27/108	 5825 747.003	Round Ø 12 mm 113 mm/ 120 mm	3845 × *g* 4300 rpm 18.6 cm	4594 × *g* 4700 rpm 18.6 cm

Tube	Tube Capacity Tubes per adapter/rotor	Adapter Order no. (international)	Bottom shape Tube diameter Max. tube length with/ without cap	Max. *g-force* Max. speed Radius 100 V	 120 V/230 V
	Round-bottom tube 4 mL – 8 mL (Ø 13 mm × 75 mm – 100 mm) 23/92	 5825 738.004	Round Ø 13 mm 113 mm/ 121 mm	3824 × *g* 4300 rpm 18.5 cm	4569 × *g* 4700 rpm 18.5 cm
	Eppendorf Tubes 5 mL 14/56	 5825 734.009 (without upper part)	Conical Ø 17 mm 65 mm	3886 × *g* 4300 rpm 18.8 cm	4643 × *g* 4700 rpm 18.8 cm
	Round-bottom tube 7.5 mL – 12 mL (Ø 16 mm × 75 mm – 100 mm) 20/80	 5825 736.001	Round Ø 16 mm 120 mm/ 125 mm	3845 × *g* 4300 rpm 18.6 cm	4594 × *g* 4700 rpm 18.6 cm
	Round-bottom tube 8 mL – 16 mL 7/28 (Load inner bores only (see p. 32)) 5825 736.001		Round Ø 16 mm (Do not use an aerosol-tight cap.)/125 mm	3845 × *g* 4300 rpm 18.6 cm	4594 × *g* 4700 rpm 18.6 cm
	Tube 9 mL (Ø 17.5 mm × 100 mm) 20/80	 5825 743.008	Round Ø 17.5 mm 112 mm/ 117 mm	3824 × *g* 4300 rpm 18.5 cm	4569 × *g* 4700 rpm 18.5 cm

Tube	Tube Capacity Tubes per adapter/rotor	Adapter Order no. (international)	Bottom shape Tube diameter Max. tube length with/ without cap	Max. *g-force* Max. speed Radius 100 V	 120 V/230 V
	Round-bottom tube 14 mL 14/56	 5825 748.000	Round Ø 17.5 mm 106 mm	3824 × *g* 4300 rpm 18.5 cm	4569 × *g* 4700 rpm 18.5 cm
	Conical tube 15 mL 14/56	 5825 734.009	Conical Ø 17 mm × 104 mm 120 mm/ 125 mm	3886 × *g* 4300 rpm 18.8 cm	4643 × *g* 4700 rpm 18.8 cm
	Conical tube (skirted) 30 mL 	 5825 755.006	Conical Ø 25 mm 114 mm/ 119 mm	3742 × *g* 4300 rpm 18.1 cm	4470 × *g* 4700 rpm 18.1 cm
	Conical tube 50 mL 7/28	 5825 733.002	Conical Ø 29 mm 116 mm/ 122 mm	3866 × *g* 4300 rpm 18.7 cm	4618 × *g* 4700 rpm 18.7 cm
	Conical tube (skirted) 50 mL 5/20	 5825 732.006	Conical Ø 29 mm 116 mm/ 122 mm	3659 × *g* 4300 rpm 17.7 cm	4371 × *g* 4700 rpm 17.7 cm
	Wide-neck bottle/conical tube 175 mL – 250 mL 1/4	 5825 741.005	Flat Ø 62 mm 125 mm/ 145 mm	3786 × *g* 4300 rpm 18.3 cm	4519 × *g* 4700 rpm 18.3 cm

Tube	**Tube** **Capacity** **Tubes per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. tube length with/ without cap**	**Max. *g-force*** **Max. speed** **Radius** **100 V**	 **120 V/230 V**
	Conical tube 500 mL Corning 1/4	 5825 745.000	Conical Ø 96 mm (Do not use an aerosol-tight cap.)/147 mm	3845 × *g* 4300 rpm 18.6 cm	4594 × *g* 4700 rpm 18.6 cm
	Wide-neck bottle 750 mL 1/4	 5825 744.004	Flat Ø 102 mm 150 mm/ 150 mm	3824 × *g* 4300 rpm 18.5 cm	4569 × *g* 4700 rpm 18.5 cm

12.2.2 Swing-bucket rotor S-4×750 with 4 plate buckets

Always use the plate carrier for centrifugation of the following plates and tubes. Use the plate carrier and adapter if necessary.

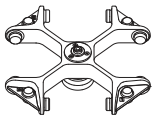
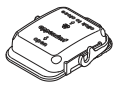
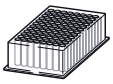
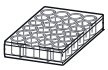
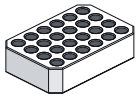
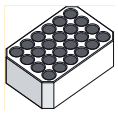
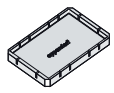
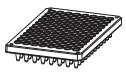
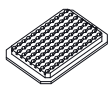
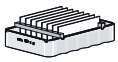
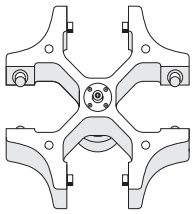
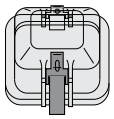
			Max. *g-force*:	100 V: 3328 × *g*	120 V/230 V: 3976 × *g*
			Max. speed:	100 V: 4300 rpm	120 V/230: 4700 rpm
Rotor S-4×750	**Plate bucket** (always use with a plate carrier)	**Aerosol-tight cap**	Max. load per bucket (adapter, tube and contents):	450 g	450 g

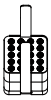
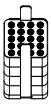
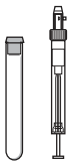
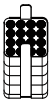
Plate	**Plate** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Max. loading height**	**Max. *g-force*** **Max. speed** **Radius** 100 V	 120 V/230 V
	Microplate 96/384 wells 4/16	 5820 756.004	Flat 47 mm/64 mm	3328 × *g* 4300 rpm 16.1 cm	3976 × *g* 4700 rpm 16.1 cm

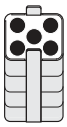
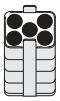
Plate	Plate Capacity Number per adapter/rotor	Adapter Order no. (international)	Bottom shape Max. loading height	Max. *g-force* Max. speed Radius	
	Deepwell plate 96 wells 1/4	 5820 756.004	Flat 47 mm/64 mm	3328 × *g* 4300 rpm 16.1 cm	3976 × *g* 4700 rpm 16.1 cm
	Cell-culture plate 2/8	 5820 756.004	Flat 47 mm/64 mm	3328 × *g* 4300 rpm 16.1 cm	3976 × *g* 4700 rpm 16.1 cm
	Kit 1/4	 5820 756.004	Flat 47 mm/64 mm	3328 × *g* 4300 rpm 16.1 cm	3976 × *g* 4700 rpm 16.1 cm
	IsoRack 24 × 0.5 mL micro test tubes 1/4	Plate carrier +  5825 708.008	Open Ø 6 mm 47 mm/64 mm	3183 × *g* 4300 rpm 15.4 cm	3803 × *g* 4700 rpm 15.4 cm
	IsoRack 24 × 1.5/2 mL micro test tubes 1/4	Plate carrier +  5825 709.004	Open Ø 11 mm 47 mm/64 mm	3101 × *g* 4300 rpm 15.0 cm	3704 × *g* 4700 rpm 15.0 cm
	PCR plate 384 wells 1/4	Plate carrier +  5825 713.001	Flat 47 mm/64 mm	3142 × *g* 4300 rpm 15.2 cm	3754 × *g* 4700 rpm 15.2 cm
	PCR plate 96 wells 1/2	Plate carrier +  5825 711.009	Conical 47 mm/64 mm	3183 × *g* 4300 rpm 15.4 cm	3803 × *g* 4700 rpm 15.4 cm
Slide	CombiSlide 12 slides 12/48	Plate carrier +  5825 706.005	Flat 47 mm/64 mm	3245 × *g* 4300 rpm 15.7 cm	3877 × *g* 4700 rpm 15.7 cm

12.3 Rotor S-4×500

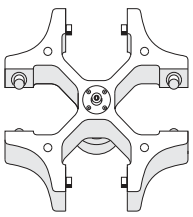
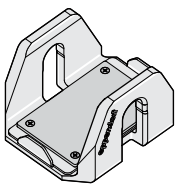
12.3.1 Swing-bucket rotor S-4×500 with 4 500 mL rectangular buckets

			Max. *g-force*:	3220 × *g*
			Max. rotational speed:	4000 rpm
Rotor S-4×500	**Rectangular bucket 500 mL**	**Aerosol-tight cap**	Max. load per bucket (adapter, tube and contents):	780 g

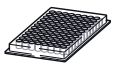
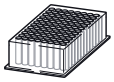
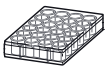
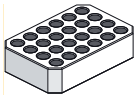
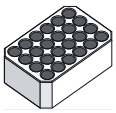
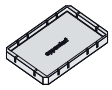
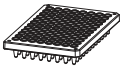
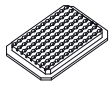
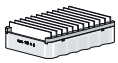
Tube	**Tube**	**Adapter**	**Bottom shape**	**Max. *g-force***
	Capacity		**Tube diameter**	**Max. speed**
	Tubes per adapter/ rotor	**Order no. (international)**	**Max. tube length with/without cap**	**Radius**
	Micro test tube 1.5/2 mL 20/80	 5810 745.004	Flat Ø 11 mm 43 mm/43 mm	2950 × *g* 4000 rpm 16.5 cm
	Blood collection tube 1.2 mL – 5 mL 20/80	 5810 746.000	Flat Ø 11 mm 108 mm/108 mm	3000 × *g* 4000 rpm 16.8 cm
	Tube 2.6 mL – 5 mL 25/100	 5810 720.001	Flat Ø 13 mm 107 mm/108 mm	3000 × *g* 4000 rpm 16.8 cm
	Tube 2.6 mL –7 mL 18/72	 5810 747.007	Flat Ø 13 mm 108 mm/108 mm	3000 × *g* 4000 rpm 16.8 cm
	Blood collection tube 3 mL – 15 mL 16/64	 5810 748.003	Flat Ø 16 mm 108 mm/108 mm	3000 × *g* 4000 rpm 16.8 cm
	Tube 7 mL – 17 mL 16/64	 5810 721.008	Flat Ø 17.5 mm 118 mm/118 mm	3000 × *g* 4000 rpm 16.8 cm

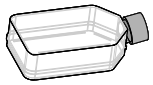
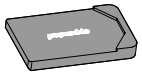
Tube	Tube	Adapter	Bottom shape	Max. *g-force*
	Capacity		**Tube diameter**	**Max. speed**
	Tubes per adapter/ rotor	**Order no. (international)**	**Max. tube length with/without cap**	**Radius**
	Conical tube 15 mL 12/48	 5810 722.004	Conical Ø 17.5 mm 119 mm/121 mm	3100 × *g* 4000 rpm 17.3 cm
	Conical tube 50 mL 5/20	 5810 723.000	Conical Ø 31 mm 116 mm/122 mm	3100 × *g* 4000 rpm 17.3 cm
	Midi Parasep (R) 5/20	 5810 723.000	Conical Ø 31 mm 116/122 mm	3100 × *g* 4000 rpm 17.3 cm
	Conical tube, skirted 50 mL 5/20	 5810 739.004 5804 737.008	Flat Ø 31 mm –/119 mm	3100 × *g* 4000 rpm 17.3 cm
	Bottles 180 mL – 250 mL 1/4	 5825 722.000	Flat Ø 62 mm –/133 mm	3100 × *g* 4000 rpm 17.3 cm
	Wide-neck bottle, rectangular 500 mL –/4	–	Flat 83 mm 134 mm/134 mm	3220 × *g* 4000 rpm 18.0 cm

12.3.2 Swing-bucket rotor S-4×500 with 4 MTP/Flex buckets

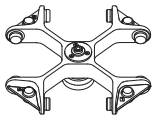
		Max. *g-force*:	2900 × *g*
		Max. rotational speed:	4000 rpm

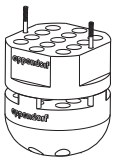
Rotor S-4x500	**MTP/Flex buckets**	Max. load per bucket (adapter, tube and contents): 380 g

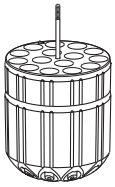
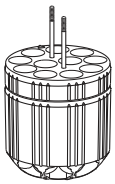
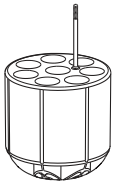
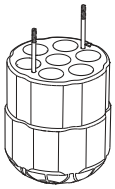
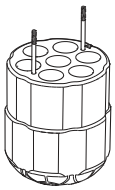
Tube	**Plate** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. loading height**	**Max. *g-force*** **Max. speed** **Radius**
	Microplate 96/384 wells 4/16	–	Flat – 60 mm	2900× *g* 4000 rpm 16.3 cm
	Deepwell plate 96 wells 1/4	–	Flat – 60 mm	2900 × *g* 4000 rpm 16.3 cm
	Cell-culture plate 2/8	–	Flat – 60 mm	2900 × *g* 4000 rpm 16.3 cm
	Kit 1/4	–	Flat – 60 mm	2900 × *g* 4000 rpm 16.3 cm
	IsoRack 24 × 0.5 mL micro test tubes 1/4	 5825 708.008	Flat Ø 6 mm 60 mm	2700 × *g* 4000 rpm 15.0 cm
	IsoRack 24 × 1.5/2 mL micro test tubes 1/4	 5825 709.004	Flat Ø 11 mm 60 mm	2600 × *g* 4000 rpm 14.6 cm
	PCR plate 384 wells 1/4	 5825 713.001	Flat – 60 mm	2700 × *g* 4000 rpm 15.8 cm
	PCR plate 96 wells 1/4	 5825 711.009	Flat – 60 mm	2600 × *g* 4000 rpm 16.1 cm
Slide	CombiSlide 12 slides 12/48	 5825 706.005	Flat – 60 mm	1000 × *g* 2372 rpm 15.9 cm

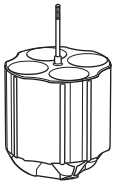
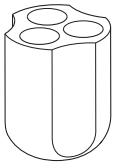
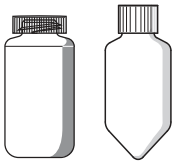
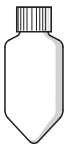
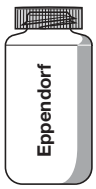
Tube	Plate	Adapter	Bottom shape	Max. *g-force*
	Capacity		**Tube diameter**	**Max. speed**
	Number per adapter/rotor	**Order no. (international)**	**Max. loading height**	**Radius**
	Cell culture bottle with/without filter 25 cm^2: Sarstedt 83.1810.002/ 83.1810 Greiner Bio-One 690175/690160 TPP 90026/90025 IWAKI 3102-025 1/4	 5825 719.000	Flat – 60 mm	1000 × *g* 2501 rpm 14.3 cm

12.4 Rotor S-4×400

			Max. *g-force*:	5263 × *g*
			Max. speed:	5100 rpm
Rotor S-4×400	**Round bucket 400 mL**	**Aerosol-tight cap**	Max. load per bucket (adapter, tube and contents):	570 g

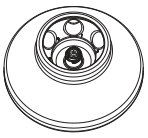
Tube	Tube	Adapter	Bottom shape	Max. *g-force*
	Capacity		**Diameter**	**Max. speed**
	Tubes per adapter/ rotor	**Order no. (international)**	**Max. tube length with/without cap**	**Radius**
	Micro test tube 1.5 mL/2 mL 26/104	 5910 708.009	Open Ø 11 mm 39 mm	Top: 3897 × *g* Bottom: 5147 × *g* 5100 rpm Top: 13.4 cm Bottom: 17.7 cm
	Round-bottom tube Ø 12 mm × 75 mm 17/68	 5910 711.000	Round Ø 12 mm 112 mm/118 mm	5002 × *g* 5100 rpm 17.2 cm

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Diameter** **Max. tube length with/without cap**	**Max. *g-force*** **Max. speed** **Radius**
	Round-bottom tube 4 mL – 8 mL (Ø 13 mm × 75 mm – 100 mm) 15/60	 5910 703.007	Round Ø 13 mm 105 mm/119 mm	4973 × *g* 5100 rpm 17.1 cm
	Round-bottom tube 7.5 mL – 12 mL (Ø 16 mm × 75 mm – 100 mm) 11/44	 5910 704.003	Round Ø 16 mm 115 mm/122 mm	5031 × *g* 5100 rpm 17.3 cm
	Round-bottom tube 9 mL (Ø 17.5 mm × 100 mm) 8/32	 5910 709.005	Round Ø 17.5 mm 115 mm/122 mm	5031 × *g* 5100 rpm 17.3 cm
	Eppendorf Tubes 5 mL 7/28	 5910 702.000 (without upper part)	Conical Ø 17 mm 126 mm/133 mm	5234 × *g* 5100 rpm 18.0 cm
	Conical tube 15 mL 7/28	 5910 702.000	Conical Ø 17 mm 126 mm/133 mm	5234 × *g* 5100 rpm 18.0 cm

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Diameter** **Max. tube length with/without cap**	**Max. *g-force*** **Max. speed** **Radius**
	Conical tube 50 mL 4/16	 5910 701.004	Conical Ø 29 mm 117 mm/125 mm	5205 × *g* 5100 rpm 17.9 cm
	Conical tube (skirted)		Conical	4943 × *g*
	50 mL		Ø 29 mm	5100 rpm
	3/12	5910 712.006	120.5 mm/122 mm	17.0 cm
	Wide-neck bottle/ conical tube 175 mL – 250 mL 1/4	 5910 705.000	Flat For conical tubes, additionally use the manufacturer's adapter. Ø 62 mm 129 mm/138 mm	5060 × *g* 5100 rpm 17.4 cm
	Conical tube 175 mL – 225 mL 1/4	 5910 714.009	Conical Ø 62 mm 137 mm/143 mm	5263 × *g* 5100 rpm 18.1 cm
	Wide-neck bottle		Flat	5030 × *g*
	400 mL (gray lid)		Ø 62 mm	5100 rpm
	1/4	5910 706.006	121 mm/129 mm	17.3 cm

12.5 Rotor FA-6×50

Aerosol-tight fixed-angle rotor for 6 conical tubes

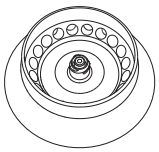
	Max. *g*-force:	20130 × *g*
	Max. rotational speed:	12100 rpm
Rotor FA-6×50	Max. load (adapter, tube and contents):	6 × 75 g

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. tube length with rotor lid**	**Max. *g*-force** **Max. rotational speed** **Radius**
	Round-bottom tube 16 mL 1/6	 5820 720.000	Round Ø 18.1 mm 107 mm	19642 × *g* 12100 rpm 12.0 cm
	Round-bottom tube 2.6 mL – 5 mL (Ø 13 mm × 75 mm) 1/6	 5820 726.008	Round Ø 13.5 mm –	19642 × *g* 12100 rpm 12.0 cm
	Round-bottom tube 4 mL – 8 mL (Ø 13 mm × 100 mm) 1/6	 5820 725.001	Round Ø 13.5 mm 119 mm	19642 × *g* 12100 rpm 12.0 cm
	Eppendorf Tubes 5 mL 1/6	 5820 730.005	Conical Ø 17 mm –	19806 × *g* 12100 rpm 12.1 cm
	Round-bottom tube 5.5 mL – 10 mL (Ø 16 mm × 75 mm) 1/6	 5820 728.000	Round Ø 16 mm –	19642 × *g* 12100 rpm 12.0 cm

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. tube length with rotor lid**	**Max. *g*-force** **Max. rotational speed** **Radius**
	Round-bottom tube 7.5 mL – 12 mL (Ø 16 mm × 100 mm) 1/6	 5820 727.004	Round Ø 16.4 mm 119 mm	19642 × *g* 12100 rpm 12.0 cm
	Tube 9 mL 1/6	 5820 729.007	Round Ø 16.4 mm 112 mm	19642 × *g* 12100 rpm 12.0 cm
	Conical tube 15 mL 1/6	 5820 717.009	Conical Ø 17 mm 125 mm	19642 × *g* 12100 rpm 12.0 cm
	Round-bottom tube 30 mL 1/6	 5820 721.006	Round Ø 25.7 mm 104 mm	17187 × *g* 12100 rpm 10,5 cm
	Conical tube 35 mL 1/6	 5820 722.002	Conical Ø 28.7 mm 113 mm	18333 × *g* 12100 rpm 11.2 cm
	Conical tube 50 mL 1/6	–	Conical Ø 29.6 mm 127 mm	20133 × *g* 12100 rpm 12.3 cm

12.6 Rotor FA-20×5

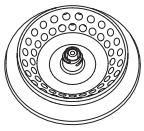
Aerosol-tight fixed-angle rotor for 20 tubes

	Max. *g*-force:	20913 × *g*
	Max. rotational speed:	13100 rpm
Rotor FA-20×5	Max. load (adapter, tube and contents):	20 × 9.5 g

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter**	**Max. *g*-force** **Max. rotational speed** **Radius**
	HPLC vial 1/20	 5820 770.007	Ø 11 mm	17076 × *g* 13100 rpm 8.9 cm
	Cryo tube 1.0 mL/2.0 mL 1/20	 5820 769.009	Ø 13 mm	18802 × *g* 13100 rpm 9.8 cm
	Micro test tube 1.5 mL/2.0 mL 1/20	 5820 768.002	Open Ø 11 mm	18227 × *g* 13100 rpm 9.5 cm
	Eppendorf Tubes 5 mL –/20		Conical Ø 17 mm	20913 × *g* 13100 rpm 10,9 cm

12.7 Rotor FA-48×2

Aerosol-tight fixed-angle rotor for 48 micro test tubes

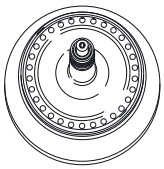
	Max. *g-force*: Outer ring Inner ring	 22132 × *g* 19502 × *g*
	Max. rotational speed:	14000 rpm
Rotor FA-48×2	Max. load (adapter, tube and contents):	48 × 3.75 g

Tube	**Tube** **Capacity** **Tubes per adapter/ rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter**	**Max. *g*-force** **Outer ring** **Inner ring** **Max. rotational speed** **Radius** **Outer ring** **Inner ring**
	PCR tube 0.2 mL 1/48	 5425 715.005	Conical Ø 6 mm	17530 × *g* 14901 × *g* 14000 rpm 8 cm 6.8 cm
	Micro test tube 0.4 mL 1/48	 5425 717.008	Conical Ø 6 mm	22132 × *g* 19502 × *g* 14000 rpm 10.1 cm 8.9 cm
	Micro test tube 0.5 mL 1/48	 5425 716.001	– Ø 8 mm	19722 × *g* 17092 × *g* 14000 rpm 9 cm 7.8 cm
	Microtainers 0.6 mL 1/48	 5425 716.001	– Ø 8 mm	22132 × *g* 19502 × *g* 14000 rpm 10.1 cm 8.9 cm

Tube	Tube Capacity Tubes per adapter/ rotor	Adapter Order no. (international)	Bottom shape Tube diameter	Max. *g*-force Outer ring Inner ring Max. rotational speed Radius Outer ring Inner ring
	Micro test tube 1.5 mL/2 mL –/48		Round Ø 11 mm	22132 × *g* 19502 × *g* 14000 rpm 10.1 cm 8.9 cm

12.8 Rotor FA-30×2

Aerosol-tight fixed-angle rotor for 30 micro test tubes

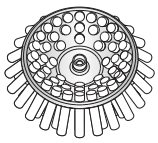
	Max. *g-force*:	20984 × *g*
	Max. rotational speed:	13700 rpm
Rotor FA-30×2	Max. load (adapter, tube and contents):	30 × 3.5 g

Tube	Tube Capacity Tubes per adapter/ rotor	Adapter Order no. (international)	Bottom shape Tube diameter	Max. *g*-force Max. rotational speed Radius
	Micro test tube 1.5/2 mL –/30	–	– Ø 11 mm	20984 × *g* 13700 rpm 10.0 cm
	PCR tube 0.2 mL 1/30	 5425 715.005	Conical Ø 6 mm	15948 × *g* 13700 rpm 7.6 cm
	Micro test tube 0.4 mL 1/30	 5425 717.008	Conical Ø 6 mm	20817 × *g* 13700 rpm 9.7 cm

Tube	Tube Capacity Tubes per adapter/ rotor	Adapter Order no. (international)	Bottom shape Tube diameter	Max. *g*-force Max. rotational speed Radius
	Micro test tube 0.5 mL 1/30	 5425 716.001	Open Ø 8 mm	18400 × *g* 13700 rpm 8.6 cm
	Microtainers 0.6 mL 1/30	 5425 716.001	Open Ø 8 mm	20817 × *g* 13700 rpm 9.7 cm

12.9 Rotor F-48×15

Fixed-angle rotor with 48 steel cores

	Max. *g*-force	5005 × *g*
	Max. rotational speed	5500 rpm
Rotor F-48×15	Max. load (sleeve, adapter, tube and contents)	48 × 56 g

Tube	Tube Capacity Tubes per adapter/ rotor	Adapter	Bottom shape Tube diameter Max. tube length	Max. *g-force* Max. speed Radius
	Tube 7.5 to 12 mL 1/48	 5702701.009	Flat Ø 16 mm 127 mm	5005 × *g* 5500 rpm 14.8 cm
	Conical tube 15 mL 1/40	 5702708.003	Conical Ø 17 mm 127 mm	5005 × *g* 5500 rpm 14.8 cm

12.10 Rotor FA-6x250

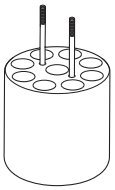
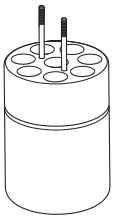
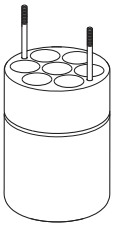
Max. *g-force*: 15050 x *g*

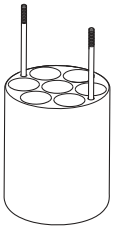
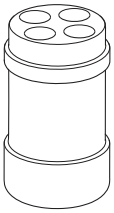
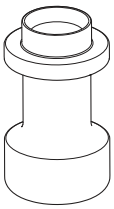
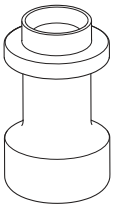
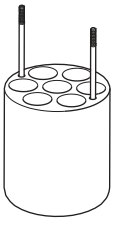
Max. speed: 10100 rpm

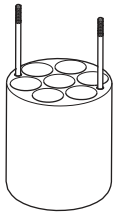
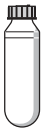
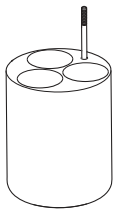
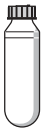
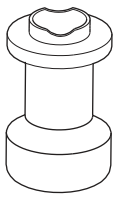
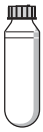
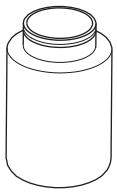
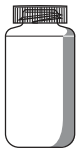
Max. load (adapter, tube and contents): 6 x 365 g

Required software version 1.5

Permitted density of the material for centrifuging (*at maximum g-force* (rcf) or speed (rpm) and maximum load): 1.0 g/mL

Tube	**Tube** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. tube length**	**Max. *g-force*** **Max. speed** **Radius**
	Round-bottom tube Ø 12 mm × 75 mm 9/54	 5920 765.000	Round Ø 12 mm 114 mm	14370 × *g* 10100 rpm 12.6 cm
	Round-bottom tube 4 mL – 8 mL (Ø 13 × 75 mm – 100 mm) 8/48	 5920 763.008	Round Ø 13 mm 114 mm	14256 × *g* 10100 rpm 12.5 cm
	Round-bottom tube 7.5 mL – 12 mL (Ø 16 × 75 mm – 100 mm) 7/42	 5920 762.001	Round Ø 16 mm 115 mm	14256 × *g* 10100 rpm 12.5 cm

Tube	**Tube** **Capacity** **Number per adapter/rotor**	**Adapter** **Order no. (international)**	**Bottom shape** **Tube diameter** **Max. tube length**	**Max. *g-force*** **Max. speed** **Radius**
	Tube 9 mL (Ø 17.5 mm × 100 mm) 7/42	 5920 764.004	Round Ø 17.5 mm 112 mm	14370 × *g* 10100 rpm 12.6 cm
	Conical tube 15 mL 4/24	 5920 761.005	Conical Ø 17 mm 122 mm	13686 × *g* 10100 rpm 12 cm
	Conical tube 50 mL 1/6	 5920 760.009	Conical Ø 30 mm 125 mm	12545 × *g* 10100 rpm 11 cm
	Conical tube (skirted) 50 mL 1/6	 5920 766.007	Conical, skirted Ø 30 mm 125 mm	12317 × *g* 10100 rpm 10.8 cm
	Round-bottom tube 10 mL 7/42	 5920 769.006	Round Ø 17 mm 115 mm	14370 × *g* 10100 rpm 12.6 cm

Tube	Tube Capacity Number per adapter/rotor	Adapter Order no. (international)	Bottom shape Tube diameter Max. tube length	Max. *g-force* Max. speed Radius
	Round-bottom tube 16 mL 7/42	 5920 770.004	Round Ø 18 mm 115 mm	14370 × *g* 10100 rpm 12.6 cm
	Round-bottom tube 30 mL 3/18	 5920 767.003	Round Ø 26 mm 116 mm	14256 × *g* 10100 rpm 12.5 cm
	Round-bottom tube 50 mL 1/6	 5920 771.000	Round Ø 29 mm 125 mm	12659 × *g* 10100 rpm 11.1 cm
	Round-bottom tube 85 mL 1/6	 5920 768.000	Round Ø 38 mm 118 mm	12887 × *g* 10100 rpm 11.3 cm
	Wide-neck bottle 250 mL flat 6		Flat Ø 62 mm 135 mm	15054 × *g* 10100 rpm 13.2 cm

13 Ordering information

13.1 Rotors and accessories

The order numbers for the adapters can be found in the "Rotors for Centrifuge 5910 R" chapter (see p. 75).

13.1.1 Rotor S-4×Universal

Order no. (International)	Order no. (North America)	Description
5895 200.001	5895200001	**Rotor S-4×Universal** incl. universal buckets
5910 751.001	5910751001	**adapter** for 7 conical tubes 50 mL oder 1 bottle 250 mL oder 1 microplate for 50 mL conical tubes, for rotor S-4×universal set of 2
5910 752.008	5910752008	**adapter** for 17 x 15 mL oder 16 x 5 mL oder 1 microplate for 5 mL Tubes, für Rotor S-4×Universal set of 2
5910 753.004	5910753004	**adapter** for 5 MTP, DWP, PCR Platten, for Rotor S-4×Universal set of 2
5910 754.000	5910754000	**adapter** for 26 x 7,5 mL - 12 mL round-bottom tubes, for rotor S-4×Universal set of 2
5910 755.007	5910755007	**adapter** for 30 round-bottom tubes 4 mL - 8 mL, for rotor S-4×universal set of 2
5910 756.003	5910756003	**adapter** 1000 mL, flat bottom, for rotor S-4×universal, set of 2 for 1000 mL wide-neck bottle, 2 pieces
5910 757.000	5910757000	**adapter** 750 mL, bottle, for rotor S-4×universal set of 2
5910 758.006	5910758006	**adapter** für 46 Tubes 12 x 75 mm, 5 mL FACS, for Rotor S-4×Universal set of 2
5910 762.003	5910762003	**adapter** for 21 x 9 mL tubes, for rotor S-4×Universal set of 2
5910 764.006	5910764006	**adapter** for 7 x 50 mL conical tubes, skirted, for rotor S-4×Universal set of 2
5910 769.008	5910769008	**Adapter** for 9 x 50 mL conical tubes, for rotor S-4×Universal set of 2

13.1.2 Rotor S-4×750

Order no. (International)	Order no. (North America)	Description
		Rotor S-4×750
5895 120.008	5895120008	incl. round bucket
		Round bucket S-4×750
5895 123.007	5895123007	2 pieces
5895 122.000	5895122000	4 pieces
		Aerosol-tight cap
		Rotors S-4-104, S-4×750, S-4×1000, round bucket 750 mL/ 1000 mL
5820 747.005	5820747005	2 pieces
		Sealings for aerosol-tight caps
		Rotors S-4-104, S-4×750, S-4×1000, round bucket 750 mL/ 1000 mL
5820 749.008	5820749008	4 pieces
		Sealings for aerosol-tight caps
		Rotor S-4×Universal-Large, rotor S-4×universal, universal buckets
5920 754.009	5920754009	4 pieces

Order no. (International)	Order no. (North America)	Description
		Rotor S-4×750
5895 128.009	5895128009	incl. plate bucket
		Plate bucket (aerosol-tight capable)
		for Rotor S-4×750
5895 125.000	5895125000	2 pieces
5895 124.003	5895124003	4 pieces
		Aerosol-tight cap
		Rotors S-4-104, S-4x750, Plate Bucket
5820 748.001	5820748001	2 pieces
		Sealings for aerosol-tight caps
		Rotors S-4-104, S-4×750, S-4×1000, Plate/Tube Bucket
5820 780.002	5820780002	4 pieces
		Plate carrier
		Rotor S-4-104, S-4×750
5820 756.004	5820756004	2 pieces

13.1.3 Rotor S-4×500

Order no. (International)	Order no. (North America)	Description
		Rotor S-4×500
		for 500 mL rectangular buckets or MTP/Flex-buckets
5895 170.005	5895170005	incl. 4 × 500 mL rectangular buckets
5895 171.001	5895171001	without bucket
		Rectangular bucket 500 mL
5810 730.007	022638629	Set of 4
		MTP/Flex buckets
		for use with IsoRack and cell culture flask adapters as well as MTP and DWP
5810 742.005	022638866	2 pieces
5810 741.009	022638840	4 pieces

13.1.4 Rotor S-4×400

Order no. (International)	Order no. (North America)	Description
		Rotor S-4×400
5895 180.000	5895180000	incl. round bucket 400 mL
5895 181.007	5895181007	without bucket
		Round bucket S-4×400
5895 183.000	5895183000	2 pieces
5895 182.003	5895182003	4 pieces
		Aerosol-tight cap
		Rotor S-4×400, round buckets 400 mL
5910 700.008	5910700008	2 pieces
		Sealings for aerosol-tight caps
		Rotor S-4×400, r ound buckets 400 mL
5910 710.003	5910710003	2 pieces

13.1.5 Rotor FA-6×50

Order no. (International)	Order no. (North America)	Description
		Rotor FA-6×50
		aerosol-tight, 6 × 50 mL conical tubes
5895 150.004	5895150004	incl. aerosol-tight rotor lid
		Rotor lid FA-6×50
5895 151.000	5895151000	aerosol-tight, aluminum
		Seal for rotor lid
		FA-45-18-11 (5418/5418 R), FA-45-6-30 (5804/5804 R/5810/ 5810 R), FA-6×50 (5910 R, 5920 R)
5418 709.008	022652109	5 pieces

13.1.6 Rotor FA-20×5

Order no. (International)	Order no. (North America)	Description
5895 130.003	5895130003	**Rotor FA-20×5** aerosol-tight, 20 × 5 mL tubes incl. aerosol-tight rotor lid
5895 131.000	5895131000	**Rotor lid FA-20×5** aerosol-tight, aluminum
5409 718.002	5409718002	**Seal for rotor lid** FA-45-20-17 (5804/5804 R/5810/5810 R), FA-20x5 (5910 R, 5920 R) 5 pieces

13.1.7 Rotor FA-48×2

Order no. (International)	Order no. (North America)	Description
5895 135.005	5895135005	**Rotor FA-48×2** aerosol-tight, 48 × 1,5/2 mL tubes incl. aerosol-tight rotor lid
5895 136.001	5895136001	**Rotor lid FA-48×2** aerosol-tight, aluminum
5820 767.006	5820767006	**Seal for rotor lid** FA-45-24-11-Kit (5427 R/530/5430 R), FA-45-48-11 (5427 R/5430/5430 R, 5804/5804 R/5810/5810 R), FA-30x2 (5910 R, 5920 R), FA-48x2 (5910 R, 5920 R) 5 pieces

13.1.8 Rotor FA-30×2

Order no. (International)	Order no. (North America)	Description
5895 155.006	5895155006	**Rotor FA-30×2** aerosol-tight, 30 × 1,5/2 mL tubes incl. aerosol-tight rotor lid
5895 156.002	5895156002	**Rotor lid FA-30×2** aerosol-tight, aluminum
5820 767.006	5820767006	**Seal for rotor lid** FA-45-24-11-Kit (5427 R/530/5430 R), FA-45-48-11 (5427 R/5430/5430 R, 5804/5804 R/5810/5810 R), FA-30x2 (5910 R, 5920 R), FA-48x2 (5910 R, 5920 R) 5 pieces

13.1.9 Rotor F-48×15

Order no. (International)	Order no. (North America)	Description
5895 160.000	5895160000	**Rotor F-48×15** for 48 × 15 mL conical tubes incl. 48 steel sleeves and adapters
5820 774.002	5820774002	**Steel sleeves and adapter** for vessels 15 mL for rotors F-35-48-17 (5804/5804 R/5810/5810 R) , F-48×15 (5910 R) (5804/5804 R/5810/5810 R) , F-48×15 (5910 R)

13.1.10 Rotor FA-6x250

Order no. (International)	Order no. (North America)	Description
5895 175.007	5895175007	**FA-6x250 rotor** for 6 x 250 mL tubes, incl. QuickLock rotor cover, aerosol-tight, Centrifuge 5910 R/5920 R
5895 176.003	5895176003	**QuickLock rotor cover** aerosol-tight, replacement part for FA-6x250 rotor
5895 177.000	5895177000	**Seal for rotor lid** 5 pieces

13.2 Accessories

Order no. (International)	Order no. (North America)	Description
0113 005.106	–	**Rotor key**
		Mains/power cord
0113 204.486	–	230 V/50 Hz, Europe
0113 204.680	–	230 V/50 Hz, GB/HK
0013 613.953	–	230 V/50 Hz, CN
0113 204.699	–	230 V/50 Hz, AUS
0113 205.105	–	230 V/50 Hz, ARG
5810 350.050	022634330	**Pivot grease** Tube 20 mL

eppendorf

Declaration of Conformity

The product named below fulfills the requirements of directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product name:

Centrifuge 5910 R

including components

Product type:

Centrifuge

Relevant directives / standards:

2006/42/EC:	EN ISO 12100
2014/35/EU:	EN 61010-1, EN 61010-2-020, IEC 61010-1, IEC 61010-2-020
	UL 61010-1, UL 61010-2-020
	CAN/CSA C22.2 No. 61010-1, CAN/CSA C22.2 No. 61010-2-020
2014/30/EU:	EN 61326-1, EN 55011
	47 CFR FCC part 15
2014/68/EU:	EN 378-1, EN 378-2
2011/65/EU:	EN 50581

Person authorized to compile
the technical file acc. to 2006/42/EC: Dr. Reza Hashemi
Executive Director Portfolio Management Centrifugation
Eppendorf AG

Hamburg, November 20, 2017

Dr. Wilhelm Plüster
Management Board

Dr. Reza Hashemi
Portfolio Management

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ISO 9001 Certified

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5942 900 327-00

CERTIFICATE OF COMPLIANCE

Certificate Number	2017-08-21-E215059
Report Reference	E215059-D1002-1/A0/C0-ULCB
Issue Date	2017-08-21
Issued to:	EPPENDORF A G
Applicant Company:	BARKHAUSENWEG 1 22339 HAMBURG GERMANY
Listed Company:	Same as Applicant
This is to certify that representative samples of	Laboratory centrifuge 5942 (5910 R)
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29 2016, CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 29 2016, IEC 61010-1:2010 (Third Edition)
Additional Standards:	IEC 61010-2-020:2016 (Third Edition, issue date 2016-05-01), CAN/CSA-C22.2 NO. 61010-2-020:2017 (Third Edition, issue date 2017-01-01), UL 61010-2-020 (Third Edition, issue date 2016-12-15).
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database for additional information.

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Bruce Mahrenholz, Assistant Chief Engineer, Global Inspection and Field Services, UL LLC

Joseph Hussey, Sr. Manager, Director of Sales - Canada, UNDERWRITERS LABORATORIES OF CANADA INC.

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Certificate of Containment Testing

Containment Testing of Caps (5820 741.309-00) for Rotor S-4x750 with Roundbuckets (5895 102.115-00) in the Eppendorf 5920/R Bench Top Centrifuge

Report No. 14/014

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 26th June 2014

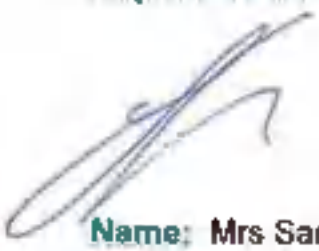
Test Summary

Caps (5820 741.309-00) for rotor S-4x750 with Roundbuckets (5895 102.115-00) were containment tested in the Eppendorf 5920/R bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed rotor was shown to contain a spill within the centrifuge.

Report Written By

Name: Mr Matthew Hewitt
Title: Biosafety Scientist

Report Authorised By



Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

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Certificate of Containment Testing

Containment Testing of Rotor S-4x750 (5895 120.105-00) with Plate Buckets (5895 124.119-00*) and Caps (5895 104.304-00#) in an Eppendorf Bench Top Centrifuge

Report No. 14/043 B

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor S-4x750 (5895 120.105-00) with Plate Buckets (5895 124.119-00*) and Caps (5895 104.304-00#) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed buckets were shown to contain a spill.

Report Written By

Anna Moy

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 126.009, 5895 124.003, 5895 125.000
# Part no. will form part of catalogue number 5895 111.009

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Certificate of Containment Testing

Containment Testing of Rotor S-4x750 (5895 120.105-00) with Plate Buckets (5895 124.119-00*) and Caps (5820 743.301-00#) in an Eppendorf Bench Top Centrifuge

Report No. 14/043 A

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor S-4x750 (5895 120.105-00) with Plate Buckets (5895 124.119-00*) and Caps (5820 743.301-00#) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed buckets were shown to contain a spill.

Report Written By

Anna Moy

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 128 009; 5895 124 003; 5895 125 000
# Part no. will form part of catalogue number 5820 748 001

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Certificate of Containment Testing

Containment Testing of Rotor FA-6x50 (5895 150.101-00*) in an Eppendorf Bench Top Centrifuge

Report No. 14/029 A

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor FA-6x50 (5895 150.101-00*) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed rotor was shown to contain a spill.

Report Written By

Anna May

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 150.004

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Certificate of Containment Testing

Containment Testing of Rotor FA-20x5 (5895 130.100-00*) in an Eppendorf Bench Top Centrifuge

Report No. 14/029 B

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor FA-20x5 (5895 130.100-00*) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed rotor was shown to contain a spill.

Report Written By

Anna May

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 130.003

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Certificate of Containment Testing

Containment Testing of Rotor FA-48x2 (5895 135.102-00*) in an Eppendorf Bench Top Centrifuge

Report No. 14/029 C

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor FA-48x2 (5895 135.102-00*) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed rotor was shown to contain a spill.

Report Written By

Anna Moy

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 135.005

Public Health England

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Certificate of Containment Testing

Containment Testing of Rotor FA-30x2 (5895 155.103-00*) in an Eppendorf Bench Top Centrifuge

Report No. 14/029 D

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 17th February 2015

Test Summary

Rotor FA-30x2 (5895 155.103-00*) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2006 (2nd Ed.). The sealed rotor was shown to contain a spill.

Report Written By

Anna Moy

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
Title: Senior Biosafety Scientist

* Part no. will form part of catalogue number 5895 155.006

Public Health England

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Certificate of Containment Testing

Containment Testing of Rotor FA-6x250 (5895 175.104-00*) with Lid (5895 175.309-00#) in an Eppendorf Bench Top Centrifuge

Report No. 18/030 B

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 24 January 2019

Test Summary

Rotor FA-6x250 was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2016 (3rd Ed.). The sealed rotor was designed to prevent any spill reaching the rotor lid and therefore preventing migration of spores across the seal.

Report Written By

Anna Moy

Name: Ms Anna Moy
Title: Biosafety Scientist

Report Authorised By

Name: Mrs Sara Speight
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* Part no. will form part of catalogue number 5895 175.007
\# Part no. will form part of catalogue number 5895 176.003

Public Health England

Public Health England
Microbiology Services
Porton Down
Salisbury
Wiltshire
SP4 0JG

Certificate of Containment Testing

Containment Testing of Rotor S-4x400 (5895 180.108-00) with Roundbucket (5895 182.119-00*) and Caps (5910 700.105-00#) in an Eppendorf Bench Top Centrifuge

Report No. 17/006 A

Report Prepared For: Eppendorf AG, Hamburg, Germany

Issue Date: 28 June 2017

Test Summary

Rotor S-4x400 (5895 180.108-00) with Roundbucket (5895 182.119-00*) and Caps (5910 700.105-00#) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2016 (3rd Ed.). The sealed buckets were shown to contain a spill.

Report Written By

Anna May

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* Part no. will form part of catalogue number 5895 180.000; 5895 182.003; 5895 183.000
# Part no. will form part of catalogue number 5910 700.008

Public Health England

Public Health England
Microbiology Services
Porton Down
Salisbury
Wiltshire
SP4 0JG

Certificate of Containment Testing

Containment Testing of Rotor S-4x500 (5895 170.102-00) with Rectangle Buckets (5810 719.119-02*) and Caps (5810 724.104-00#) in an Eppendorf Bench Top Centrifuge

Report No. 17/006 B

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 18 September 2017

Test Summary

Rotor S-4x500 (5895 170.102-00) with Rectangle Buckets (5810 719.119-02*) and Caps (5810 724.104-00#) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2016 (3rd Ed.). The sealed buckets were shown to contain a spill.

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* Part no. will form part of catalogue number 5895 170.005, 5810 730.007
# Part no. will form part of catalogue number 5810 742.007

Public Health England

Public Health England
Microbiology Services
Porton Down
Salisbury
Wiltshire
SP4 OJG

Certificate of Containment Testing

Containment Testing of Rotor S-4xuniversal (5895 200.109-00) with Universal Buckets (5895 202.101-00*) and Caps (5910 750.120-00#) in an Eppendorf Bench Top Centrifuge

Report No. 17/006 C

Report Prepared For: Eppendorf AG, Hamburg, Germany
Issue Date: 18 September 2017

Test Summary

Rotor S-4xuniversal (5895 200.109-00) with Universal Buckets (5895 202.101-00*) and Caps (5910 750.120-00#) was containment tested in an Eppendorf bench top centrifuge, using Annex AA of IEC 61010-2-020:2016 (3rd Ed.). The sealed buckets were shown to contain a spill.

Report Written By

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* Part no. will form part of catalogue number 5895 200.001; 5895 202.004; 5895 203.000
# Part no. will form part of catalogue number 5910 750.005