




Centrifuge 5418/5418 R

Operating manual

eppendorf



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You will find a detailed description of these figures in your language in Chapters 2.1 and 4.1/5.1.

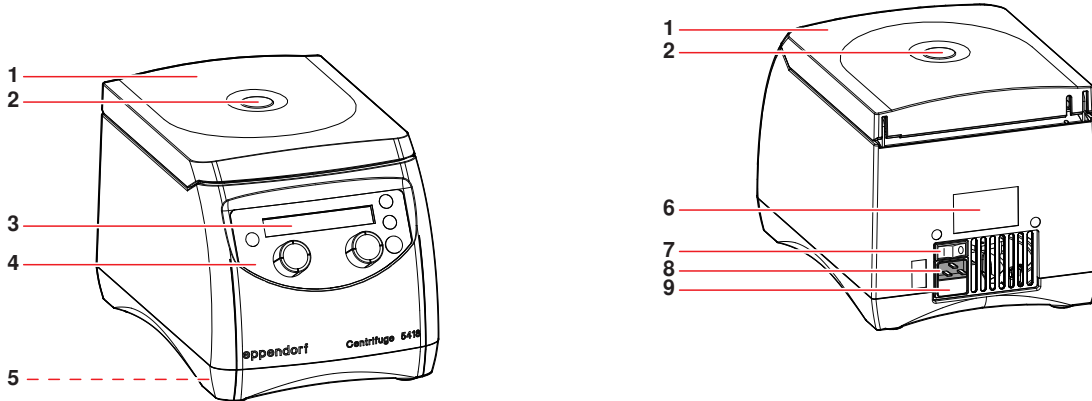


Fig. 1: Front and rear view of the Centrifuge 5418

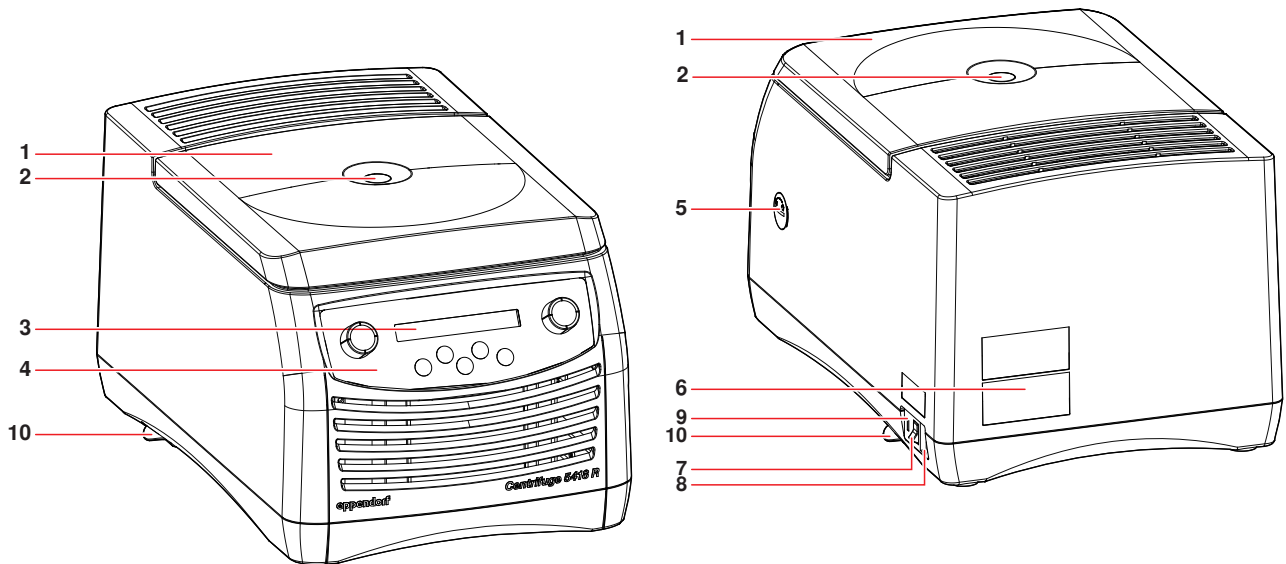


Fig. 2: Front and rear view of the Centrifuge 5418 R

| | |
|-------------------------|----------------------------|
| 1 Centrifuge lid | 2 Monitoring glass |
| 3 Display | 4 Control panel |
| 5 Emergency lid release | 6 ID plate |
| 7 Mains switch | 8 Mains connection |
| 9 Fuse holder | 10 Condensation water tray |

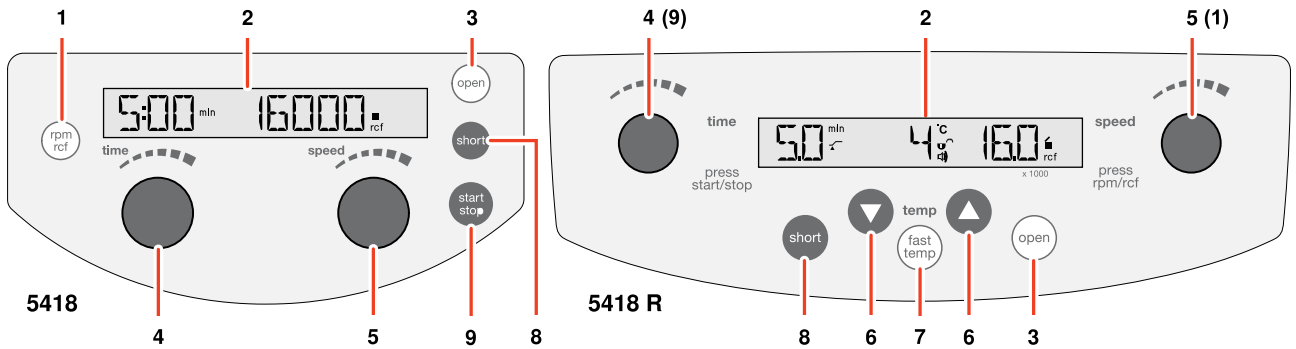


Fig. 3: Control panel of the Centrifuge 5418 and Centrifuge 5418 R.

| | |
|--|--|
| 1 Switch the displayed centrifuging speed (rpm/rcf) | 2 Display |
| 3 Release lid | 4 Adjust the centrifuging duration Only 5418 R: Press the time dial to start and stop centrifugation. |
| 5 Set the speed of centrifugation Only 5418 R: Press the speed dial to switch the displayed centrifugation speed (rpm/rcf). | 6 Adjust the temperature (only 5418 R) |
| 7 Start the temperature control run fast temp (only 5418 R) | 8 Short spin centrifugation |
| 9 Start and stop centrifugation | |

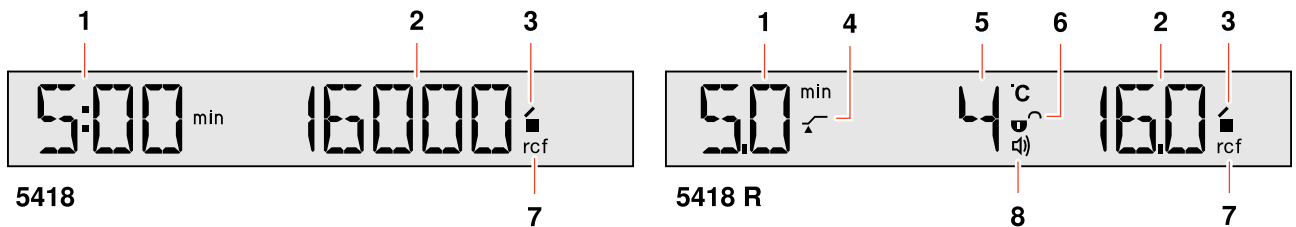


Fig. 4: Display of the Centrifuge 5418 and Centrifuge 5418 R.

| | |
|--|---|
| 1 Centrifuging duration | 2 g-force (rcf) or speed (rpm) |
| 3 Status of the centrifuge | 4 At set rpm (only 5418 R) |
| 5 Temperature (only 5418 R) | 6 Status of the key lock (only 5418 R) |
| 7 Status of the centrifugation speed display | 8 Status of the loudspeaker (only 5418 R) |

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1 User instructions

1.1 Using this manual

- ▶ Please read this operating manual completely before using the device for the first time.
- ▶ Please view this operating manual as part of the product and keep it somewhere easily accessible.
- ▶ When passing the device on to third parties, be sure to include this operating manual.
- ▶ If this manual is lost, please request another one. The current version can be found on our website www.eppendorf.com.

1.2 Warning signs and hazard icons

1.2.1 Hazard symbols


| | | | |
|--|---------------------------------|--|----------------------------|
|  | Biological hazard |  | Danger of explosion |
|  | Danger of electric shock |  | Danger of crushing |
|  | General danger |  | Material damage |

1.2.2 Degrees of danger

The degree of danger is a part of a safety note and distinguishes the possible results of non-observance from each other.

| | |
|----------------|---|
| DANGER | <i>Will</i> lead to severe injuries or death. |
| WARNING | <i>Can</i> lead to severe injuries or death. |
| CAUTION | Can lead to light to moderate injuries. |
| NOTICE | Can lead to material damages. |

1.3 Symbols used

| Depiction | Meaning |
|---|--|
| ▶ | You are requested to perform an action. |
| 1. 2. | Perform these actions in the sequence described. |
| • | List. |
| Text | Terms and key names from the software. |
|  | References useful information. |

1.4 Abbreviations used

| | |
|------------|----------------------------|
| PCR | Polymerase chain reaction |
| rcf | Relative centrifugal force |
| rpm | Revolutions per minute |
| UV | Ultraviolet radiation |

2 Product description

2.1 Main illustration

The depiction of the Centrifuge 5418 / 5418 R can also be found on the front fold-out page (see Fig. 1 + 2).

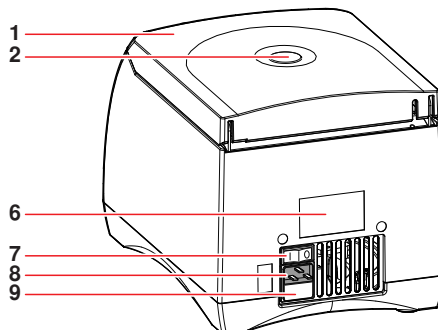
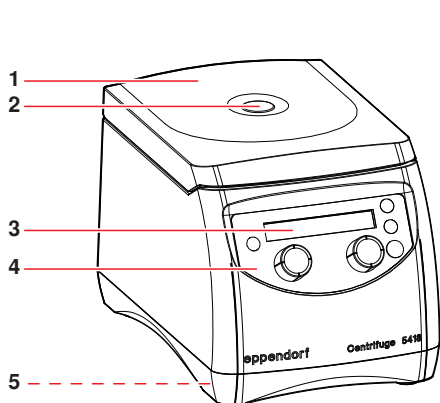


Fig. 1: Front and rear view of the Centrifuge 5418

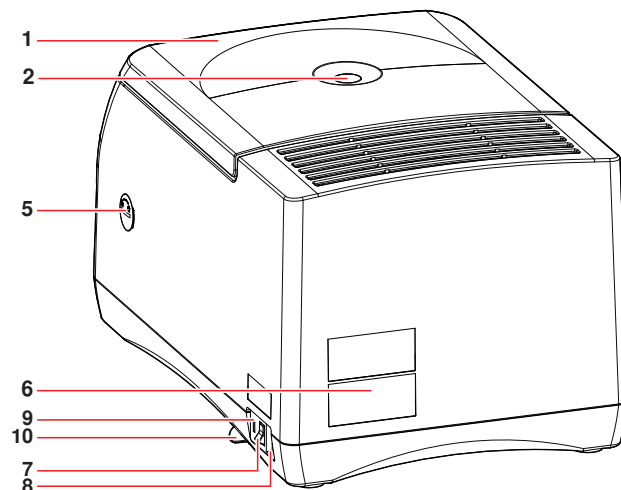
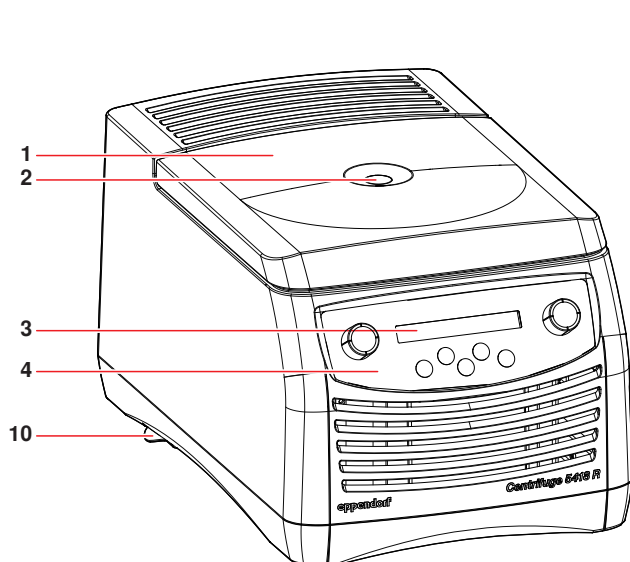


Fig. 2: Front and rear view of the Centrifuge 5418 R

| | |
|---|---|
| <p>1 Centrifuge lid</p> | <p>2 Monitoring glass Visual control for rotor stop or option for speed control via stroboscope.</p> |
| <p>3 Display Depiction of the current centrifuging parameters and device settings (see Fig. 4 on p. 17).</p> | <p>4 Control panel For operating the centrifuge (see Fig. 3 on p. 17).</p> |
| <p>5 Emergency lid release (see <i>Emergency lid release</i> on p. 29)</p> | <p>6 ID plate</p> |
| <p>7 Mains switch Switch for switching the device on and off. Switch position 0: The device is switched off. Switch position I: The device is switched on.</p> | <p>8 Mains connection Connection socket for the mains cable supplied.</p> |
| <p>9 Fuse holder</p> | <p>10 Condensation water tray (only 5418 R)</p> |

2 Product description

2.2 Delivery package

2.2.1 Centrifuge 5418

| Quantity | Order No. (International) | Order No. (North America) | Description |
|----------|------------------------------|------------------------------|---|
| 1 | - | - | Centrifuge 5418 See the <i>Ordering Information</i> chapter for corresponding device version, equipment and order number |
| 1 or | 5425 351.003 5425 353.006 | 022668188 022668226 | Fuses 2.5 AT (230 V), 2 pieces 5 AT UL (100 V/120 V), 2 pieces |
| 1 | 5416 301.001 | 022634305 | Rotor key Standard |
| 1 | 5703 350.102 | 022639609 | Captain Eppi rotor key holder 1 piece |
| 1 | - | - | Mains cable |
| 1 1 | 5401 900.022 5401 900.030 | 5401900022 5401900030 | Operating manual Centrifuge 5418/5418 R Languages: EN, DE, FR, ES, IT, PT Languages: DA, FI, EL, NL, SV (230 V devices only) |

2.2.2 Centrifuge 5418 R

| Quantity | Order No. (International) | Order No. (North America) | Description |
|----------|------------------------------|------------------------------|---|
| 1 | - | - | Centrifuge 5418 R See the <i>Ordering Information</i> chapter for corresponding device version, equipment and order number |
| 1 or | 5425 351.003 5426 355.100 | 022668188 022668200 | Fuses 2.5 AT (230 V), 2 pieces 6.25 AT (100 V/120 V), 2 pieces |
| 1 | 5416 301.001 | 022634305 | Rotor key Standard |
| 1 | 5401 850.076 | 5401850076 | Tray for condensation water |
| 1 | - | - | Mains cable |
| 1 1 | 5401 900.022 5401 900.030 | 5401900022 5401900030 | Operating manual Centrifuge 5418/5418 R Languages: EN, DE, FR, ES, IT, PT Languages: DA, FI, EL, NL, SV (230 V devices only) |

2.3 Features

The compact and easy-to-use Centrifuge 5418 / 5418 R has a capacity of 18 x 2 mL and reaches a maximum of 16,873 x g / 14,000 rpm. The microcentrifuge is equipped with an aerosol-tight standard rotor for centrifugation of the following tubes:

- Micro test tubes (0.2 to 2.0 mL)
- Microtainers (0.6 mL)
- Spin columns (1.5/2.0 mL)

The Centrifuge 5418 R has an additional temperature control function for centrifugation between 0°C and +40°C. The **fast temp** function can be used to start a temperature control run without samples to adjust the rotor chamber incl. rotor and adapters quickly to the set target temperature.

2 Product description

2.4 Rotor FA-45-18-11

Before use of sample tubes, please note the manufacturer's specifications with regard to centrifugation resistance (max. rcf).

| | Max. capacity | Max. g-force (rcf) or speed (rpm) without adapter | Max. load per rotor bore ⁽¹⁾ | Notes |
|--------------------------|--|---|---|---|
| | | Acceleration / deceleration time ⁽²⁾ | | |
| Rotor FA-45-18-11 | 18 micro test tubes of 1.5/2.0 mL each or spin columns. | 16,873 x g / 14,000 rpm | 3.75 g | <ul style="list-style-type: none"> Aerosol-tight⁽³⁾ rotor lid (aluminum). |
| | With adapters: <ul style="list-style-type: none"> 0.2 mL PCR tubes 0.4 mL/0.5 mL micro test tubes 0.6 mL Microtainers | 5418: 16 s / 18 s 5418 R: 13 s / 13 s | | |

(1) Maximum load per rotor bore for adapter + tube + content.

(2) According to DIN 58 970 (device version: 230 V, 50 to 60 Hz).

(3) Aerosol tightness tested and certified by the Centre for Emergency Preparedness and Response, Health Protection Agency, Porton Down (UK) (see certificate at the end of this operating manual).

Rotor code:

All Eppendorf® rotors are identified using a simple, alphanumeric format that represents the technical specifications in a uniform series of letters and numbers.

2.4.1 Rcf display and calculation



Use the **rpm/rcf** key to switch the display of centrifugation speed between rcf and rpm. **Only 5418 R:** For speeds ≤ 800 rpm only the lowest adjustable g-force (100 x g) is displayed upon switching. The exact g-force (rcf) can be determined using the formula given below.

Ensure that the g-force (rcf) displayed upon switching is standardized to suit the rotor without an adapter. When adapters are used, you can achieve the following maximum g-forces (rcf) at maximum speed (rpm):

| Adapters | Max. centrifugation radius r_{\max} [cm] | Max. g-force (rcf) |
|-----------------------------|--|--------------------|
| without adapter | 7.7 | 16,873 |
| for 0.2 mL PCR tubes | 5.6 | 12,271 |
| for 0.4 mL micro test tubes | 7.7 | 16,873 |
| for 0.5 mL micro test tubes | 6.6 | 14,462 |
| for 0.6 mL Microtainers | 7.7 | 16,873 |

To determine the g-force (rcf) for a specific adapter, you can calculate per DIN 58 970 using the following formula:

$$rcf = 1.118 \cdot 10^{-5} \cdot n^2 \cdot r_{\max}$$

n: revolutions per minute (rpm)

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

Example

The 0.2 mL adapter has a maximum radius of 5.6 cm. At 5,000 rpm a maximum g-force of 1,565 x g is reached.

3 Safety

3.1 Intended use

The Centrifuge 5418 / 5418 R is intended exclusively for indoor use and for separating aqueous solutions and suspensions of various densities in approved test tubes.



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, function and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of incorrect or non-recommended accessories and spare parts or from the improper use of such equipment.

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

3.2 User profile

This device may only be operated by correspondingly trained specialist staff. This staff must have carefully read the operating manual and be familiar with the function of the device.

3.3 Application limits

3.3.1 Declaration concerning the ATEX directive (94/9/EC)



Danger of explosion!

- ▶ Do not operate the device in areas where work is completed with explosive substances.
- ▶ Do not use this device to process any explosive, radioactive or highly reactive substances.
- ▶ Do not use this device to process any substances which could create an explosive atmosphere.

Due to its design and the environmental conditions on the inside of the device, the Centrifuge 5418 / 5418 R is not suitable for use in a potentially explosive atmosphere.

The device must therefore only be used in a safe environment, such as in the open environment of a ventilated laboratory or an extractor hood. The use of substances which may contribute to a potentially explosive atmosphere is not permitted. The final decision with regard to the risks connected with the use of such substances is the responsibility of the user.

3.3.2 Maximum service life for accessories



Risk of injury from chemically or mechanically damaged accessories.

Even minor scratches and cracks can result in serious internal material damage.

- ▶ Protect all parts from mechanical damage.
- ▶ Check accessories regularly.
- ▶ Do not use rotors or buckets with signs of corrosion or mechanical damage (e.g. deformations).
- ▶ Do not use accessories whose maximum service life has been exceeded.

| Accessory | Maximum service life from first commissioning |
|---|--|
| Rotor lid | 3 years Requirement: The "click" when turning the rotor lid screw is still audible. |
| Plastic adapters | 1 year |
| Outer sealing ring of the aerosol-tight rotor | 50 autoclave cycles |

For the rotor described here there is no limit for its service life, as long as the following conditions are met: proper use, recommended maintenance and undamaged condition.

The date of manufacture is stamped on the rotors in the format 03/07 (= March 2007). This is for information only and does not have any reference to the service life.

3 Safety

3.4 Information on product liability

In the following cases, the protection provided by the device may be impaired. The liability for the function of the device passes to the operator if:

- The device is not used in accordance with the operating manual.
- The device is used outside of the range of application described in the preceding chapters.
- The device is used with accessories or consumables (e.g., tubes) which are not recommended by Eppendorf.
- The device is maintained or repaired by persons not authorized by Eppendorf.
- The owner has made unauthorized modifications to the device.

3.5 Warnings for intended use

Read the operating manual first and observe the following general safety instructions before using the Centrifuge 5418 / 5418 R.

3.5.1 Personal injury or damage to the equipment



Electric shock from damage to device or mains cable.

- ▶ Only switch on the device if the device and the mains cable are undamaged.
- ▶ Only use devices that have been properly installed or repaired.



Lethal voltages inside the device.

- ▶ Ensure that the housing is always closed and undamaged so that no parts inside the device can be contacted by accident.
- ▶ Do not remove the housing of the device.
- ▶ Do not allow any liquids to enter the inside of the housing.
- ▶ Do not allow the device to be opened by anyone except service personnel who have been specifically authorized by Eppendorf.



Risk from incorrect supply voltage

- ▶ Only connect the device to voltage supplies which correspond with the electrical requirements on the nameplate.



Damage to health due to handling infectious liquids and pathogenic germs.

- ▶ Observe the national regulations for handling these substances, the biological security level of your laboratory, the material safety data sheets and the manufacturer's application notes.
- ▶ For the centrifugation of these substances, use suitable aerosol-tight closure systems.
- ▶ When working with pathogenic germs belonging to a higher risk group, more than one aerosol-tight bioseal must be used.
- ▶ Wear your personal protective equipment (PPE).
- ▶ Follow the instructions regarding hygiene, cleaning and decontamination.
- ▶ For complete instructions regarding the handling of germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (Source: World Health Organization, current edition of the Laboratory Biosafety Manual).



Centrifuge lid can crush. Keep hands clear.

- ▶ When opening or closing the device lid, do not reach between the lid and device or into the latching mechanism of the lid.
- ▶ Always open the centrifuge lid completely to prevent it from falling.

3 Safety



NOTICE!

Damage to device by spilling liquids in the rotor or rotor chamber

1. Switch the device off.
2. Disconnect the device from the power supply.
3. Clean the device and the accessories carefully 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 to ensure that the intended method will not damage the device.



NOTICE!

Damage to electronic components through formation of condensation.

After the device has been moved from a cool to a warmer environment, condensation can form inside the device.

- ▶ Wait at least three hours before connecting it to the power supply.
- ▶ **Only 5418:** Alternative: let the device run for half an hour just before a short transport.

3.5.2 Incorrect handling of the centrifuge



NOTICE!

Damage from knocking against or moving the device during operation.

A rotor banging against the rotor chamber wall can cause considerable damage to the device and rotor.

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

3.5.3 Incorrect handling of the rotors



CAUTION!

Risk of injury from improperly attached rotors and rotor lids.

- ▶ Centrifuge only with the rotor and rotor lid firmly tightened.
- ▶ If unusual noises occur when the centrifuge starts, the rotor or the rotor lid may not be properly secured. Stop centrifugation immediately by pressing the **start/stop** key.



CAUTION!

Risk of injury from asymmetric loading of rotors.

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



CAUTION!

Risk of injury from overloaded rotor.

The Centrifuge 5418 / 5418 R is designed for the centrifugation of material with a max. density of 1.2 g/mL at maximum speed and volume and/or load.

- ▶ Observe the information on each rotor relating to maximum load (adapter, tube and contents) per rotor bore and make sure it is not exceeded.



NOTICE!

Damage to rotors from aggressive chemicals.

Rotors are high-quality components which withstand extreme stresses. This stability can be impaired by aggressive chemicals.

- ▶ Avoid the use of aggressive chemicals, including strong and weak alkali, strong acids, solutions with mercury, copper and other heavy metal ions, halogenated hydrocarbons, concentrated saline solutions and phenol.
- ▶ If the rotor is contaminated by aggressive chemicals, clean it immediately using a neutral cleaning agent. This applies to the rotor bores in particular.

3 Safety

3.5.4 Extreme strain on the centrifuging tubes



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 rcf.



Risk from damaged tubes.

Damaged tubes must not be used, as this could cause further damage to the device and the accessories and loss of the samples.

- ▶ Before use, carry out a visual check of all tubes for any damage.



Risk from open tube lids.

Open tube lids can break off during centrifugation and cause damage to the rotor as well as to the centrifuge.

- ▶ Carefully close all tube lids before centrifuging.



Hazard to plastic tubes from organic solvents.

When using organic solvents (e.g. phenol, chloroform) the density of plastic tubes is reduced, i.e., the tubes could get damaged.

- ▶ Follow the manufacturer's information about the chemical resistance of tubes.



Sample tubes heat up.

In uncooled centrifuges the temperature in the rotor chamber, rotor and sample can rise to above 40°C dependent on the run time, g-force (rcf) or speed (rpm) and ambient temperature.

- ▶ Note that this can reduce the centrifugation resistance of the sample tubes.
- ▶ Please note the temperature resistance of the samples.

3.5.5 Aerosol-tight centrifugation



Risk to health due to limited aerosol tightness with incorrect rotor/rotor lid combination.

Aerosol-tight centrifugation is guaranteed only if the rotors and rotor lids intended for this purpose are used. These are always indicated by the prefix **FA**.

- ▶ Always use rotors and rotor lids marked aerosol-tight together for aerosol-tight centrifugation.
- ▶ Only use aerosol-tight rotor lids in combination with rotors which are marked on the rotor lid.







Risk to health due to limited aerosol tightness in the event of incorrect use.

Autoclaving, mechanical stresses and contamination by chemicals or other aggressive solvents can impair the aerosol-tightness of the rotors and rotor lid.

- ▶ Regularly check that the seals of aerosol-tight rotor lids are undamaged.
- ▶ Only use aerosol-tight rotor lids with undamaged and clean gaskets.
- ▶ Thinly brush the threads of the rotor lid screw with pivot grease (order no. Int.: 5810 350.050 / North America: 022634330) after every proper autoclaving (121°C, 20 min.). Do not apply the pivot grease to the gaskets.
- ▶ Replace the outer sealing ring of the rotor after 50 autoclave cycles.
- ▶ Aerosol-tight rotors should **never** be stored with rotor lids screwed on.

3 Safety

3.6 Safety instructions on the device

| Depiction | Meaning | Location |
|--|---|--|
|  | WARNING General hazard point. Follow the operating manual. | 5418: Rear of the device 5418 R: Right side of the device |
|  ALWAYS FASTEN THE ROTOR SECURELY WITH THE ATTACHED ROTOR WRENCH | CAUTION Always tighten up the rotor using the rotor key supplied. | Top of device, below the centrifuge lid. |
|  ALWAYS CLOSE TUBES!  ALWAYS USE ROTOR LID WHEN USING SPIN COLUMNS! | CAUTION Close all tubes and use a rotor lid. | Top of device, below the centrifuge lid. |

4 Installation

4.1 Selecting the location



NOTICE!

If a fault occurs, objects in the immediate vicinity of the devices could get damaged.

- ▶ In accordance with the recommendations of EN 61010-2-020, leave a safety distance of **30 cm** clear around the device during operation.



NOTICE!

Damage from overheating.

- ▶ Do not place the device close to sources of heat (e.g., radiator, drying cabinet).
- ▶ Do not expose the device to direct sunlight.
- ▶ Ensure free circulation of air by maintaining a distance of at least 30 cm on all sides of the device from adjacent devices or the wall and keep the underside of the device clear.
- ▶ Make sure that the vents in the device are always free of obstruction.

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

- Suitable power connection as per the name plate (230 V/120 V/100 V).
- Stable, horizontal and resonance-free lab bench. Weight of the device: 7.7 kg (5418) or 22 kg (5418 R).
- A well ventilated environment which is protected from direct sunlight to prevent the device from heating up more.

4.2 Installing the instrument



NOTICE!

Centrifuge 5418 R: Compressor damage after improper transport.

- ▶ Only switch on the centrifuge 4 hours after installation.

Perform the following steps in the sequence described.

1. Place the device on a suitable lab bench.
2. Allow the device to warm up for at least 3 hours (5418) or 4 hours (5418 R) to the ambient temperature to prevent damage to the electronic components from condensation and damage to the compressor (only 5418 R).
3. Check that the mains voltage and frequency match the requirements on the device type plate.
4. Connect the centrifuge to the mains and switch it on using the mains power switch on the right side of the device.
 - The display is active.
 - Lid opens automatically
5. Use the details included in the scope of delivery to check that the delivery is complete.
6. Check all parts for any transport damage. Contact your dealer if any damage is found.
7. **Only 5418 R:** Insert the condensation water tray at the side of the device into the holder provided (see Fig. 2 on p. 8).



Retain the packaging material and the transport protection device for subsequent transport or storage. See also the instructions relating to transport (see p. 30).

5 Operation

5.1 Overview of operating controls

Before using the Centrifuge 5418 / 5418 R for the first time, familiarize yourself with the operating controls and the display.

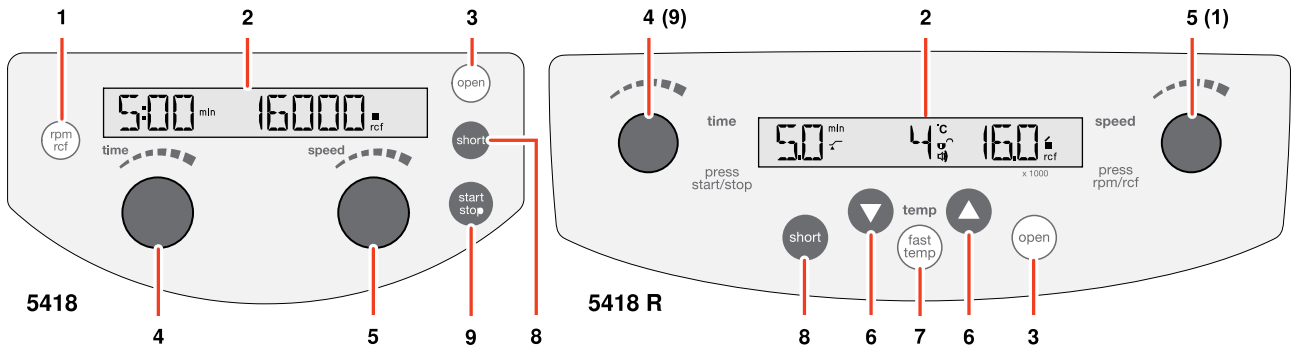


Fig. 3: Control panel of the Centrifuge 5418 and Centrifuge 5418 R.

| | |
|--|--|
| 1 Switch the displayed centrifuging speed (rpm/rcf) (see <i>Rcf display and calculation on p. 10</i>) | 2 Display |
| 3 Release lid | 4 Adjust the centrifuging duration Only 5418 R: Press the time dial to start and stop centrifugation. |
| 5 Set the speed of centrifugation Only 5418 R: Press the speed dial to switch the displayed centrifugation speed (rpm/rcf). | 6 Adjust the temperature (only 5418 R) |
| 7 Start the temperature control run fast temp (only 5418 R) | 8 Short spin centrifugation (see <i>Short spin centrifugation on p. 23</i>) |
| 9 Start and stop centrifugation | |

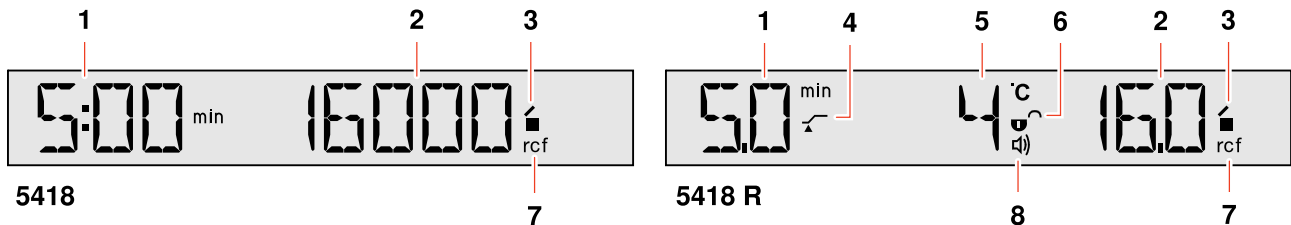


Fig. 4: Display of the Centrifuge 5418 and Centrifuge 5418 R.

| | |
|---|---|
| 1 Centrifuging duration | 2 g-force (rcf) or speed (rpm) 5418 R: Set value x 1000 |
| 3 Status of the centrifuge <ul style="list-style-type: none"> ☐: Centrifuge lid unlocked. ■: Centrifuge lid locked. ■ (Flashing): centrifuging in progress. | 4 At set rpm (only 5418 R) <ul style="list-style-type: none"> ↗: Start of run time when reaching 95% of the preset g-force (rcf) or speed (rpm). ↘: Start of run time immediately. |
| 5 Temperature (only 5418 R) | 6 Status of the key lock (only 5418 R) <ul style="list-style-type: none"> 🔒: Centrifuging parameters cannot be modified unintentionally. 🔓: No key lock. |
| 7 Status of the centrifugation speed display rcf: g-force (relative centrifugal force) rpm: revolutions per minute | 8 Status of the alarm (only 5418 R) <ul style="list-style-type: none"> 🔔: Switched on. No symbol: switched off. |

5 Operation

5.2 Preparing for centrifugation

5.2.1 Switching on the centrifuge

1. Switch the centrifuge on, using the mains switch.
After switching on at the mains power switch, the centrifuge lid opens automatically.
2. Open the closed centrifuge lid by pressing the **open** key.
The parameter settings of the last run are displayed.

5.2.2 Inserting the rotor



NOTICE!

If handled incorrectly, the rotor can fall over.

The rotor lid screw may become loose if it is used to retain the rotor.

- ▶ Always grasp the rotor with both hands for holding or transport.

1. Place rotor vertically onto the motor shaft.
2. Insert the rotor key supplied into the rotor nut.
3. Turn rotor key **clockwise** until the rotor nut is firmly tightened.

5.2.3 Loading the rotor



CAUTION!

Risk of injury from asymmetric loading of rotors.

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



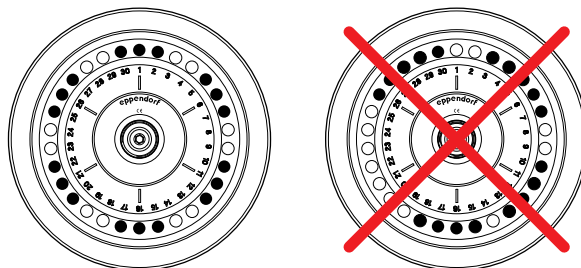
CAUTION!

Risk from damaged or overloaded tubes!

- ▶ When loading the rotor, note the safety instructions with regard to hazards from overloaded or damaged tubes (see *Warnings for intended use on p. 12*)

To load the rotor, proceed as follows:

1. Check the maximum load (adapter, tube and contents) per rotor bore.
The maximum load is 3.75 g per rotor bore. This information can also be found on the rotor.
2. Load rotor and adapters only with the tubes intended for them.
3. Insert tubes opposite each other in pairs into the rotor bores. For symmetrical loading, tubes that are opposite each other must be of the same type and contain the same filling quantity.



In order to minimize weight differences between filled sample tubes, we recommend taring with a scale. This will reduce wear on the drive and cut running noise.

5 Operation

5.2.4 Closing the rotor lid



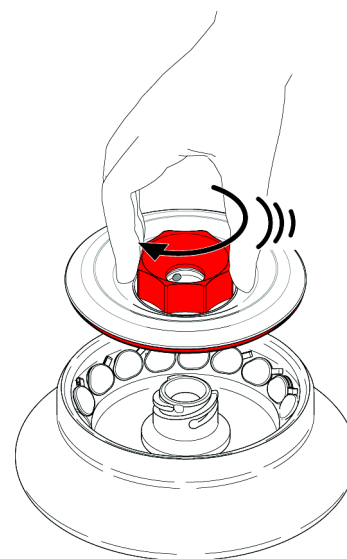
With the rotor FA-45-18-11 centrifugation is also possible without a rotor lid.

Please also note:

- The tube lids must be closed securely.
- Without the rotor lid, the rotor is not aerosol-tight.
- The centrifugation is slightly louder.
- Spin columns must always be centrifuged with a rotor lid.

1. Check that the outer sealing ring is fitted properly in the groove.
2. Fit the rotor lid vertically on the rotor.
3. Lock the rotor by turning the red rotor lid screw clockwise beyond an audible *click* until it can be turned no further.

The rotor is not properly closed until an audible *click* is heard!



5.2.5 Closing the centrifuge lid



WARNING!

Centrifuge lid can crush. Keep hands clear.

- ▶ When opening or closing the device lid, do not reach between the lid and device or into the latching mechanism of the lid.
- ▶ Always open the centrifuge lid completely to prevent it from falling.

1. Check correct attachment of rotor and rotor lid.
2. Push down the centrifuge lid until the lid latch engages and the lid is automatically closed. The centrifuge will close automatically.

The display shows the symbol .

Only 5418: The **open** key lights blue.

5 Operation

5.3 Cooling (only 5418 R)

5.3.1 Temperature adjustment

- ▶ Set the temperature using the **temp** arrow keys from 0°C to +40°C.

5.3.2 Temperature display

| | |
|--------------------------|--------------------|
| If the rotor is stopped: | Set temperature |
| During centrifugation: | Actual temperature |

5.3.3 Temperature monitoring

After the set temperature has been reached the centrifuge responds as follows to temperature fluctuation during centrifugation:

| Deviation from the target value | Action |
|---------------------------------|---|
| $\Delta T > 3^\circ\text{C}$ | Temperature display flashes. |
| $\Delta T > 5^\circ\text{C}$ | Periodic warning sound and visual indication Error 18 . Centrifugation is stopped automatically. |

5.3.4 Fast Temp

This function can be used to start a temperature control run directly without samples with a rotor and temperature-specific speed in order to quickly adjust the rotor chamber, incl. rotor and adapters, up to the set target temperature.

Requirement

- The centrifuge is switched on.
- The rotor and rotor lid are properly attached.
- The centrifuge lid is closed.
- The temperature and g-force (rcf) or speed (rpm) are set for the subsequent centrifugation (see *Centrifugation on p. 21*).

1. Press the **fast temp** key.

The display shows **FT** as well as the current temperature and g-force (rcf) or speed (rpm).

The temperature control run ends automatically when the target temperature has been reached. A periodic signal tone sounds.

The cooling time from room temperature (~ 23 °C) to 4°C takes approx. 16 min.

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

After the set temperature has been reached and the temperature control run is complete, the centrifuge keeps the rotor chamber, with the centrifuge lid closed, at the set temperature, if the temperature is below the ambient temperature. Irrespective of the target temperature, however, this continuous cooling does not go below 4°C to prevent the rotor chamber from freezing.



The centrifuge stops the run automatically when the rotor has reached the set temperature. Therefore, there may be a delay between the display of the achieved set temperature and the automatic end of the temperature control run.

5 Operation

5.3.5 Continuous cooling

When the rotor is stopped the rotor chamber is kept at the target temperature when the following prerequisites are met:

- The centrifuge is switched on.
- The centrifuge lid is closed.
- The target temperature is below the ambient temperature.

During continuous cooling the following applies:

- The target temperature is displayed.
- Irrespective of the target temperature, continuous cooling does not go below 4 °C to prevent the rotor chamber and the samples from freezing and increased condensation in the device.
- Because the rotor does not rotate during this process the temperature adjustment is slower.

To end continuous cooling, open the centrifuge lid.

If the centrifuge is not used for more than 8 hours, the continuous cooling is switched off automatically. This protects against ice formation in the rotor chamber and in the tubes as well as increased condensation in the device.

The display shows the set temperature of the rotor chamber.

With **fast temp** you can quickly reach the desired temperature again (see p. 20).

5.4 Centrifugation



CAUTION!

Risk from incorrectly-loaded rotors and damaged/overloaded tubes!

- ▶ Before commencing centrifugation, follow the safety instructions relating to hazards from asymmetrically loaded and/or overloaded rotors and from overloaded, damaged and/or open tubes (see *Warnings for intended use on p. 12*).



CAUTION!

Risk of injury from improperly attached rotors and rotor lids.

- ▶ Centrifuge only with the rotor and rotor lid firmly tightened.
- ▶ If unusual noises occur when the centrifuge starts, the rotor or the rotor lid may not be properly secured. Stop centrifugation immediately by pressing the **start/stop** key.

Before using the Centrifuge 5418 / 5418 R for the first time, familiarize yourself with the operating controls and the display (see *Overview of operating controls on p. 17*).

Each of the centrifuging variants described here must be preceded by the preparation described above (see *Preparing for centrifugation on p. 18*).

Only 5418 R: Please also note the instructions on cooling (see p. 20).

5.4.1 Centrifuging with time preset

Perform the following steps in the sequence described.

1. Use **time** to set the run time.
2. **Only 5418 R:** Use **temp** to set the temperature.
3. Use **speed** to set the g-force (rcf) or speed (rpm).
4. Press **start/stop** to start centrifuging.

5 Operation

During centrifugation

- In the display **■** flashes while the rotor is running.
- The remaining run time is displayed in minutes, in 30s increments below ten minutes. The last minute is counted down in seconds.
- **Only 5418 R:** The actual temperature is displayed.
- The current g-force (rcf) or rotor speed (rpm) is displayed.
- The **fast temp** (only 5418 R), **open** and **short** keys are blocked during centrifugation.
- During the run you can modify the total run time, the temperature (only 5418 R), the speed and the rpm/rcf display. **Only 5418 R:** To change the centrifugation parameters, press the **short** key first.

The values flash in the display during the change. The new parameters are adopted immediately. When the time is changed during a run, the time which has already elapsed is taken into account. Note that the shortest new total run time which can be set is the time which has already elapsed plus 2 minutes.

- You can also terminate the centrifugation before the set run time has elapsed by pressing the **start/stop** key.

End of centrifugation

- After completion of the set time, the centrifuge stops automatically. During braking the elapsed centrifugation time is displayed flashing. When the rotor stops a signal tone is sounded.
- **Only 5418:** The centrifuge lid opens automatically. The display shows the symbol **☑**.
- **Only 5418 R:** The centrifuge lid remains closed to maintain the sample temperature. You can open it by pressing the **open** key.

5. Remove centrifuge contents.

5.4.2 Centrifuging in continuous operation

Perform the following steps in the sequence described.

1. Use **time** to set the continuous run.
The continuous run function can be set above 9:59 h or under 30 s (5418) or above 99 min or under 0.5 min (5418 R). The timer shows **oo** to indicate continuous operation.
2. **Only 5418 R:** Use the **temp** arrow keys to adjust the temperature.
3. Use **speed** to set the g-force (rcf) or speed (rpm).
4. Press **start/stop** to start centrifuging.
In the display **■** flashes while the rotor is running.
Time is counted upwards, first in 30-second increments and then in minute increments from ten minutes.
5. Press **start/stop** to end centrifuging after the desired time period.
 - During the braking process, centrifuging duration flashes in the display.
 - When the rotor stops a signal tone is sounded.
 - **Only 5418:** The centrifuge lid opens automatically. The display shows the symbol **☑**.
 - **Only 5418 R:** The centrifuge lid remains closed to maintain the sample temperature. You can open it by pressing the **open** key.
6. Remove centrifuge contents.

5 Operation

5.4.3 Short spin centrifugation



5418: You can carry out a short spin run with the maximum g-force (rcf) or speed (rpm).

5418 R: You can carry out a short spin run with the currently set, or maximum, g-force (rcf) or speed (rpm). Set this short spin mode as described in the following section.

Selecting short spin mode (only 5418 R)

1. Press the **short** key while the centrifuge lid is open.
The current mode is displayed:
 - Display **1 – 14 t** (run at preselected speed)
 - Display **14 t** (run at maximum speed of 14,000 rpm)
2. When the centrifuge lid is open, press the **short** key for longer than 2 s to switch between these modes.

Performing short spin centrifugation

1. **Only 5418 R:** A short run at preselected g-force (rcf) or speed (rpm) can be set directly using the **speed** dial.
2. **Only 5418 R:** Use the **temp** arrow keys to adjust the temperature.
3. Start short spin run: Hold down the **short** key.
 - In the display  flashes while the rotor is running.
 - The time is counted upwards in seconds.
 - During short run centrifuging all other keys are blocked.
4. End short spin run: Release the **short** key.
 - During the braking process, centrifuging duration flashes in the display.
 - **Only 5418:** The centrifuge lid opens automatically. The display shows the symbol .
 - **Only 5418 R:** The centrifuge lid remains closed to maintain the sample temperature. You can open it by pressing the **open** key.
5. Remove centrifuge contents.



During the braking process, centrifuging can be restarted up to two more times by pressing the **short** key again.








5.4.4 Removing the rotor

1. Turn the rotor nut **counterclockwise** using the rotor key supplied.
2. Remove rotor by lifting vertically.
3. **Only 5418 R:** Switch off the centrifuge after use and empty the condensation water tray (pull out from the left or right side of the device). Leave centrifuge lid fully opened and protect it against closing.

5.5 Standby mode (only 5418)

If the centrifuge has not been used for 15 min, it switches to standby mode. The **EP** logo then appears in the display. When a button or knob is used or the centrifuge lid is closed, the centrifuge is reactivated and ready for operation.

5.6 Special functions (only 5418 R)

| Function | Status of centrifuge lid | Press > 2 s key | Display |
|------------------------------------|--|---------------------|---|
| Modify parameter during the cycle. |  closed | short | Flashes 5 s |
| Enable/disable signal tone. |  open | open |  |
| Enable/disable key lock. |  open | short + open |  |
| At set rpm (Fig. 4 on p. 17) |  open | time |  |

6 Maintenance

6.1 Prepare cleaning / disinfection

Clean at least once a week and clean if the accessible surfaces of the device and its accessories are acutely 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 shipping on p. 26*) when the device is sent to the authorized Technical Service for repairs.

The procedure described in the following chapter applies for the cleaning as well as for the disinfection or decontamination. The additional required steps are described in the following table:

| Cleaning | Disinfecting / decontamination |
|--|--|
| <ol style="list-style-type: none"> For cleaning the accessible surfaces of the device and the accessories use a mild cleaning fluid. Carry out the cleaning as described in the following chapter. | <ol style="list-style-type: none"> 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. Carry out the disinfection or decontamination as described in the following chapter. 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.

6.2 Perform cleaning / disinfection



DANGER!

Electric shock as a result of penetration of liquid.

- ▶ Switch off the device and disconnect it from the power supply before starting cleaning or disinfecting.
- ▶ Do not allow any liquids to enter the inside of the housing.
- ▶ Do not complete a spray disinfection on the housing.
- ▶ Only reconnect the device to the power supply once it is completely dry.



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 becomes contaminated with aggressive chemicals, clean it immediately with a mild cleaning agent.



NOTICE!

Corrosion from aggressive cleaning agents and disinfectants.

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



NOTICE!

Damage from UV and other high-energy radiation.

- ▶ Do not use UV, beta, or gamma radiation or any other high-energy radiation source for disinfecting.

6 Maintenance



Autoclave

Rotor, rotor lid and adapter can be autoclaved (121 °C, 20 min).

After a maximum of 50 autoclave cycles, replace the sealing ring in the lid groove of the aerosol-tight rotor lid.



Aerosol-tightness

Check that the seals are intact before use.

Replace the sealing ring in the lid groove of the aerosol-tight rotor lid when worn. Replace the rotor lids of aerosol-tight rotors when the sealing ring on the lid screw is worn. The sealing rings require regular care to protect the rotors.

Aerosol-tight rotors should never be stored with lids screwed on!

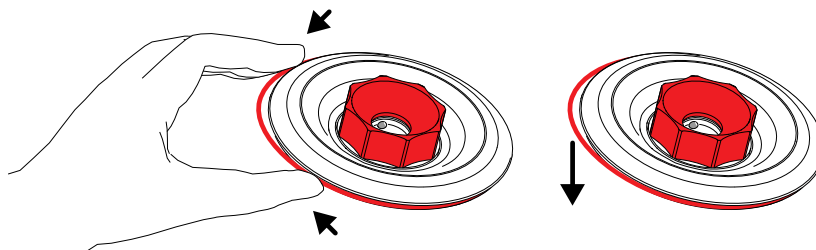
In order to prevent damage, lightly lubricate the lid thread of the aerosol-tight rotors with pivot grease (order no. Int.: 5810 350.050 / North America: 022634330) on a regular basis.

6.2.1 Clean/disinfect device

1. Switch off the device from the mains power switch while the lid is opened and remove the mains power switch from the power supply.
2. Unscrew the rotor nut by turning it counterclockwise with the rotor key.
3. Remove rotor.
4. Use the agents specified above (see p. 24) to clean and disinfect the device and the rotor chamber.
5. Wipe all accessible surfaces of the device and the accessories, including the power cable, with a moist cloth.
6. Thoroughly clean the rubber seals of the rotor chamber with water.
7. Rub the dry rubber seals with glycerine or talcum powder to prevent them from becoming brittle. Other components of the device, such as the lid latch, must not be lubricated.
8. Clean the motor shaft with a soft, dry and lint-free cloth.
9. Check device and accessories for corrosion and damage.

6.2.2 Clean/disinfect rotor

1. Clean rotor, rotor lid and adapters with the aforementioned agents and disinfect them (see p. 24).
2. Use a bottle brush to clean and disinfect the rotor bores.
3. In order to clean and disinfect the rotor lid, remove the sealing ring. Clean the groove and the sealing ring below it as well.



4. Rinse rotor, rotor lid and adapters thoroughly with water. Pay particular attention to the rotor bores of the fixed-angle rotors.
5. Place rotor and accessories onto a cloth to dry. Place fixed angle rotors with the rotor bores facing downwards to allow the bores to dry as well.
6. Correctly reinsert the sealing ring of the rotor lid in the clean and dry groove.
7. Clean the rotor cone with a soft, dry and lint-free cloth and inspect for damage.
8. Place the dry rotor onto the motor shaft.
9. Tighten the rotor nut firmly by turning it clockwise with the rotor key.

6 Maintenance

6.3 Additional service instructions for Centrifuge 5418 R

- ▶ Empty and clean the condensation water tray regularly and especially after liquid spillage in the rotor chamber. Pull out the condensation water tray from the left or right side of the centrifuge.
- ▶ Clear the rotor chamber regularly of ice formations by thawing, either by leaving the centrifuge lid open or carrying out a brief temperature control run at approx. 30 °C.
- ▶ Wipe up condensate in the rotor chamber. To do so, use a soft absorbent cloth.
- ▶ Remove dust deposits from the ventilation slits of the centrifuge using a brush or swab at the latest every six months. First switch off the device and remove the power plug.

6.4 Glass breakage



Note when using glass tubes that the danger of breakage of glass increases with an increasing g-force (rcf) or speed (rpm). Please note the manufacturer's information on the recommended centrifugation parameters (loading and speed).

Broken glass scratches the surfaces of the rotor chamber and the accessories (rotor, rotor lid and adapter) so that their chemical resistance is reduced. Therefore, a fine, black metal abrasion develops in the rotor chamber due to the air turbulence which, in addition to causing damage to the rotor chamber and the accessories, can also contaminate the samples.

- ▶ Carefully remove all splinters and glass powder from the rotor chamber and accessories (rotor, rotor lid and adapter) when breakage of glass occurs.
- ▶ If required, replace the adapters to prevent any further damage.
- ▶ Check rotor bores regularly for residues or damage.

6.5 Fuses

The fuse holder is located under the mains power socket (5418) or on the left next to the mains switch (5418 R).

1. Disconnect the mains plug.
2. Remove the fuse holder.
Both fuses are now accessible and can be replaced.

6.6 Decontamination before shipping

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



Risk to health from contaminated device

1. Follow the instructions in the decontamination certificate. It is available in PDF format on our homepage (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you want to dispatch.
3. Enclose the fully-completed decontamination certificate for returned goods (including the serial number of the device) with the dispatch.

7 Troubleshooting

If the suggested measures fail repeatedly, please contact Technical Service. You can find the contact addresses at the end of this operating manual or on the Internet under www.eppendorf.com.

7.1 General errors

| Symptom / message | Cause | Remedy |
|--|--|---|
| No display. | No mains connection. | ▶ Check the mains power connection. |
| No display. | Power failure. | ▶ Check the mains fuse for the device (see <i>Fuses on p. 26</i>). ▶ Check the mains fuse for the laboratory. |
| Lid of the device cannot be opened. | Rotor is still running. | ▶ Wait for the rotor to stop. |
| Lid of the device cannot be opened. | Power failure. | 1. Check the mains fuse for the device (see <i>Fuses on p. 26</i>). 2. Check the mains fuse for the laboratory. 3. Activate the emergency lid release (see p. 29). |
| Device cannot be started. | Lid of the device is not closed. | ▶ Close the lid of the device. |
| Device shakes when it starts up. | Rotor is unsymmetrically loaded. | 1. Stop the device and load symmetrically. 2. Restart the device. |
| Centrifuge brakes during a short run centrifugation, although the short key is pressed. | The short key was released briefly more than twice (protective function for the drive). | ▶ Press the short key continuously during a short run centrifugation. |
| Temperature display flashes. (only 5418 R) | Temperature variation from nominal value: $\Delta T > 3^{\circ}\text{C}$. | ▶ Check the settings. ▶ Check unhindered air circulation through the vents. ▶ Thaw ice or switch off device and allow it to cool down. |

7.2 Error messages

If one of the following error messages appears, proceed as follows:

1. Remove fault (see Remedies).
2. If necessary, repeat centrifugation.

| Symptom / message | Cause | Remedy |
|---|---|--|
| LID ERROR (5418) / LID (5418 R) | Centrifuge lid cannot be locked. | ▶ Try to close the centrifuge lid again. |
| LID ERROR (5418) / LID (5418 R) | Centrifuge lid cannot be released. | 1. Switch the device off and back on. 2. Press the open key. If the error occurs again: 1. Switch off the centrifuge. 2. Activate the emergency lid release (see <i>Emergency lid release on p. 29</i>). |
| LID ERROR (5418) / LID (5418 R) | Centrifuge lid must not be released during a run. | ▶ Wait for the rotor to stop. |

7 Troubleshooting

| Symptom / message | Cause | Remedy |
|--|---|--|
| INT | Mains power failure during a run. | ▶ Check the mains connection. |
| NO RPM (5418) / Error 3 (5418 R) | Error in speed measuring system or drive overheated. | ▶ Leave the device switched on until the error message disappears (10 s or 6 min). |
| Error 5 (only 5418 R) | Prohibited opening of lid or lid switch is defective during a run. | <ol style="list-style-type: none"> 1. Wait for the rotor to stop. 2. Open and close again the lid of the device. 3. Repeat the run. |
| Err 6 (5418) / Error 6 (5418 R) | Drive error. | <ul style="list-style-type: none"> ▶ Repeat the run. ▶ If this error message appears again, switch centrifuge off and back on again after > 20 s. |
| Error 6 (only 5418 R) | Drive overheated. | ▶ Allow the drive to cool down for at least 15 min. |
| Err 7 (5418) / Error 7 (5418 R) | Major deviation in the speed control. | <ol style="list-style-type: none"> 1. Wait for the rotor to stop. 2. Tighten the rotor. |
| Err 8 (5418) / Error 8 (5418 R) | Drive error. | <ol style="list-style-type: none"> 1. Wait for the rotor to stop. 2. Repeat the run. |
| Err 9 to 17 (5418) / Error 9 to 17 (5418 R) | Electronics error. | ▶ Switch the centrifuge off and back on again after > 20 s. |
| Error 18 (only 5418 R) | Too high temperature variation from nominal value in the rotor chamber. | <ul style="list-style-type: none"> ▶ Check the settings. ▶ Check unhindered air circulation through the vents. ▶ Thaw ice or switch off device and allow it to cool down. |
| Error 19 (only 5418 R) | Cooling circuit is overheated. | ▶ Check unhindered air circulation through the vents and allow device to cool down. |
| Error 20 (only 5418 R) | Temperature sensor in rotor chamber faulty. | ▶ Switch the centrifuge off and back on again after > 20 s. |
| Error 21 (only 5418 R) | Temperature sensor at capacitor faulty. | ▶ Switch the centrifuge off and back on again after > 20 s. |
| Error 24 (only 5418 R) | Cooling unit fault, e.g., overheating. | ▶ Allow the centrifuge to cool down and repeat the run. |

7 Troubleshooting

7.3 Emergency lid release

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



Risk of injury from rotating rotor.

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

7.3.1 Centrifuge 5418

1. Disconnect the mains plug.
2. Loosen the plastic cover for the emergency lid release.
This is located behind the front left device foot in the base plate (Fig. 1 on p. 8).
3. Pull the cord vertically downwards.
The centrifuge lid is unlocked.
4. Before closing the centrifuge lid again: push the cord completely into the housing and insert the plastic cover in the base plate.

7.3.2 Centrifuge 5418 R

1. Disconnect the mains plug.
2. Rotate the plastic cover of the emergency lid release 45° counterclockwise with a suitable tool (e.g. screwdriver) and remove it.
The plastic cover is located on the right side of the device (Fig. 2 on p. 8).
3. Enter the centrifuge rotor key into the hexagonal opening at rear until some resistance can be felt.
4. **Slightly press** and turn the rotor key clockwise.
This will release the centrifuge lid.
5. Open the centrifuge lid.
6. Remove the rotor key and put the plastic cover back on rotating it 45° clockwise.

8 Transport, storage and disposal

8.1 Transport

- ▶ Only transport the device in the original packaging.
- ▶ Use a transport aid for transporting over longer distances.

| | Air temperature | Rel. humidity | Air pressure |
|------------------------|-----------------|---------------|---------------|
| General transportation | -25 to 60 °C | 10 to 75% | 30 to 106 kPa |
| Air freight | -20 to 55 °C | 10 to 75% | 30 to 106 kPa |

8.2 Storage

| | Air temperature | Rel. humidity | Air pressure |
|-----------------------------|-----------------|---------------|---------------|
| In transport packaging | -25 to 55 °C | 10 to 75% | 70 to 106 kPa |
| Without transport packaging | -5 to 45 °C | 10 to 75% | 70 to 106 kPa |

8.3 Disposal

In case the product is to be disposed of, the relevant legal regulations must be observed.

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

The disposal of electrical devices is regulated within the European Community by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE).

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



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

9 Technical data

9.1 Power supply

Tab. 1: Centrifuge 5418

| | |
|---|--|
| Mains power connection | 230 V, 50 to 60 Hz 120 V, 50 to 60 Hz 100 V, 50 to 60 Hz |
| Current consumption: | 1.4 A (230 V) 2.8 A (120 V) 3.4 A (100 V) |
| Power consumption: | max. 170 W |
| EMC: Interference emission (radio interference) | EN 61326 - category B |
| EMC: Noise immunity | EN 61326 - performance characteristic B |
| Overvoltage category: | II |
| Fuses: | 2.5 AT (230 V) 5.0 AT (120 V / 100 V) |

Tab. 2: Centrifuge 5418 R

| | |
|---|--|
| Mains power connection | 230 V, 50 to 60 Hz 120 V, 50 to 60 Hz 100 V, 50 to 60 Hz |
| Current consumption: | 1.4 A (230 V) 2.8 A (120 V) 3.0 A (100 V) |
| Power consumption: | max. 320 W |
| EMC: Interference emission (radio interference) | EN 61326 - category B |
| EMC: Noise immunity | EN 61326 - performance characteristic B |
| Overvoltage category: | II |
| Fuses: | 2.5 AT (230 V) 6.25 AT (120 V / 100 V) |

9.2 Ambient conditions

| | |
|--------------------------|---|
| Environment: | For indoor use only. |
| Ambient temperature: | Centrifuge 5418: 2 to 40°C Centrifuge 5418 R: 15 to 35°C |
| Max. relative humidity: | 75 %, non-condensing humidity. |
| Atmospheric pressure: | Use up to an altitude of 2000 m above MSL. |
| Degree of contamination: | 2 |

9 Technical data

9.3 Weight / dimensions

Tab. 3: Centrifuge 5418

| | |
|-----------------------|---|
| Dimensions: | Width: 208 mm (8.19 in.) Depth: 300 mm (11.8 in.) Height: 210 mm (8.27 in.) |
| Weight without rotor: | 7.7 kg |
| Noise level: | < 51 dB(A) * |

Tab. 4: Centrifuge 5418 R

| | |
|-----------------------|---|
| Dimensions: | Width: 298 mm (11.73 in.) Depth: 463 mm (18.23 in.) Height: 250 mm (9.84 in.) |
| Weight without rotor: | 22 kg |
| Noise level: | < 57 dB(A) * |

*) The noise level was measured frontally in a sound measuring room with accuracy class 1 at a distance of 1 m from the device and at lab bench height.

9.4 Application parameters

| Rotor | Acceleration and deceleration times according to DIN 58 970 | |
|--|---|---|
| FA-45-18-11 | 5418: 230 V: 16 s / 18 s 120 V: 16 s / 18 s 100 V: 18 s / 18 s | 5418 R: 230 V: 13 s / 13 s 120 V: 13 s / 13 s 100 V: 13 s / 13 s |
| These values were calculated at 23°C. | | |
| Run time: (5418) | 30 s to 9:59 h, as well as infinity (∞), adjustable up to 10 min in 30 s increments, thereafter in 1 min increments. | |
| Run time: (5418 R) | 0.5 min to 99 min, as well as infinity (∞), adjustable up to 10 min. in 0.5 min. increments, thereafter in 1 min. increments. | |
| Temperature: (only 5418 R) | 0°C to 40°C | |
| Relative centrifugal force (RZB or rcf): | 1 to 16,873 x g, adjustable in 100 x g increments. | |
| Speed: | 100 to 14,000 rpm, adjustable in 100 rpm increments. | |
| Max. load: | 18 micro test tubes of 2.0 mL each. | |
| Max. kinetic energy: | 2,600 Nm | |
| Test log mandatory: | No | |
| Permitted density of the material for centrifuging (at max. g-force (rcf) or speed (rpm) and max. load): | 1.2 g/mL | |

10 Ordering information

10.1 Centrifuge 5418

| Order No. (International) | Order No. (North America) | Description |
|------------------------------|------------------------------|--|
| 5418 000.017 - | 022620321 022620304 | Centrifuge 5418 with rotor FA-45-18-11 incl. rotor lid 230 V / 50 - 60 Hz 120 V / 50 - 60 Hz, with US-plug |

10.2 Centrifuge 5418 R

| Order No. (International) | Order No. (North America) | Description |
|------------------------------|------------------------------|---|
| 5401 000.013 - | 5401000013 5401000137 | Centrifuge 5418 R with rotor FA-45-18-11 incl. rotor lid 230 V / 50 Hz 120 V / 50 - 60 Hz, with US-plug |

10.3 Accessories

| Order No. (International) | Order No. (North America) | Description |
|--|-------------------------------------|--|
| 5418 707.005 | 022652061 | Rotor FA-45-18-11 aerosol-tight*, angle 45°, 18 places, max. tube diameter 11 mm, incl. rotor lid (aluminum) |
| 5418 708.001 | 022652087 | Rotor lid for FA-45-18-11 aerosol-tight*, aluminum |
| 5418 709.008 | 022652109 | Seal for rotor lid FA-45-18-11 5 pieces |
| 5425 715.005 5425 717.008 5425 716.001 | 022636260 022636243 022636227 | Adapter used in FA-45-18-11 for 0.2 mL PCR tubes, set of 6 for 0.4 mL tubes, set of 6 for 0.5 mL tubes and 0.6 mL Microtainer, set of 6 |
| 5416 301.001 | 022634305 | Rotor key Standard |
| 5703 350.102 | 022639609 | Captain Eppi rotor key holder 1 piece |
| 5401 850.076 | 5401850076 | Tray for condensation water (only 5418 R) |

*) Aerosol tightness tested and certified by the Centre of Emergency Preparedness and Response, Health Protection Agency, Porton Down (UK).

10.4 Fuses

10.4.1 Fuses for Centrifuge 5418

| Order No. (International) | Order No. (North America) | Description |
|------------------------------|------------------------------|---|
| 5425 351.003 5425 353.006 | 022668188 022668226 | Fuses 2.5 AT (230 V), 2 pieces 5 AT UL (100 V/120 V), 2 pieces |

10.4.2 Fuses for Centrifuge 5418 R

| Order No. (International) | Order No. (North America) | Description |
|------------------------------|------------------------------|---|
| 5425 351.003 5426 355.100 | 022668188 022668200 | Fuses 2.5 AT (230 V), 2 pieces 6.25 AT (100 V/120 V), 2 pieces |

11 Declarations and Certificates

EG-Konformitätserklärung EC Conformity Declaration

Das bezeichnete Produkt entspricht den einschlägigen grundlegenden Anforderungen der aufgeführten EG-Richtlinien und Normen. Bei einer nicht mit uns abgestimmten Änderung des Produktes oder einer nicht bestimmungsgemäßen Anwendung verliert diese Erklärung ihre Gültigkeit.

The product named below fulfills the relevant fundamental requirements of the EC directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Produktbezeichnung, Product name:

Centrifuge 5418 / 5418 R

einschließlich Zubehör / including accessories

Produkttyp, Product type:

Laborzentrifuge / Laboratory Centrifuge

Einschlägige EG-Richtlinien/Normen, Relevant EC directives/standards:

2006/95/EG, EN 61010-1, EN 61010-2-20

2004/108/EG, EN 55011/B, EN 61000-6-1, EN 61000-3-2, EN 61000-3-3, EN 61326-1

98/79/EG, EN 14971, EN 61010-2-101, EN 61326-2-6



Vorstand, Board of Management:

08.10.2009

Hamburg, Date:



Projektmanagement, Project Management:



eppendorf

Eppendorf AG · Barkhausenweg 1 · 22339 Hamburg · Germany

11 Declarations and Certificates

Certificate of Compliance

Certificate Number 090905 - E215059
 Report Reference E215059, June 17th, 2005
 Issue Date 2005 September 9

Page 1 of 2



Issued to: **EPPENDORF A G**
BARKHAUSENWEG 1
22339 HAMBURG GERMANY


This is to certify that representative samples of **Centrifuge**
Model 5418

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: See Addendum for Standards

Additional Information: ELECTRICAL RATING:
 Voltage: 120 V ac
 Frequency: 50-60 Hz
 Current: 2.6 A
 Power: 170 W

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.

The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers:  the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product

Issued by: *Walter Hofmair*
Walter Hofmair, Senior Project Engineer
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 Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc.
 For questions in Germany, you may call +49 0 6102 369 0.

Reviewed by: *Manfred Müller*
Manfred Müller, Senior Project Engineer
 UL International Germany GmbH

11 Declarations and Certificates

Certificate of Compliance

Certificate Number 090905 - E215059
Report Reference E215059, June 17th, 2005
Issue Date 2005 September 9

Page 2 of 2



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

Standards:

UL 61010A-1 - Electrical Equipment for Laboratory Use; Part 1: General Requirements;
UL 61010A-2-020 -Electrical Equipment for Laboratory Use; Part 2: Particular Requirements for Laboratory Centrifuges;
CSA C22.2 No. 1010.1-92 - SafetyRequirements for Electrical Equipment for Measurement, Control and Laboratory Use; Part 1: General Requirements;
CSA C22.2 No. 1010.2.020-92, CSA C22.2 No. 1010.2.020A-97 - Part 2: Particular Requirements for Laboratory Centrifuges
UL 61010-1 Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements
CSA22.2 No. 61010-1 - Electrical Equipment for Measurement, Control, and Laboratory Equipment - Part 1: General Requirements

Issued by:

Walter Hofmair, Senior Project Engineer

UL International Germany GmbH

Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc.UL International Germany GmbH

Reviewed by:

Manfred Müller, Senior Project Engineer

UL International Germany GmbH

11 Declarations and Certificates

Certificate of Compliance

Certificate Number **20091023-E215059**
 Report Reference **E215059, 2001 April 5**
 Issue Date **2009 October 23**

Page 1 of 1



Issued to: **EPPENDORF A G**

BARKHAUSENWEG 1
22339 HAMBURG GERMANY


This is to certify that representative samples of **LABORATORY USE ELECTRICAL EQUIPMENT**
5415R, 5418R

Have been investigated by Underwriters Laboratories Inc.® (UL) or any authorized licensee of UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: **UL 3101-1, First Edition**
UL 3101-2-20, First Edition
CAN/CSA-C22.2 No. 1010.1-92
CAN/CSA-C22.2 No.1010.2.020-92, CAN/CSA-C22.2 No. 1010.2.020A-97

Additional Information: **See UL On-line Certification Directory at WWW.UL.COM for additional information**

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.

The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers:  the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product

| | |
|--|--|
| <p>Issued by:</p> <p>Thomas Huber, Engineer Underwriters Laboratories Inc.</p> | <p>Reviewed by:</p> <p>Walter Hofmair, Staff Engineer Underwriters Laboratories Inc.</p> |
|--|--|

11 Declarations and Certificates

Centre of Emergency Preparedness and Response
Health Protection Agency
Porton Down
Salisbury
Wiltshire SP4 0JG
United Kingdom



Certificate of Containment Testing

Containment Testing of Rotor
FA 45-18-11 (5418 707.102-02, 50 x
autoclaved at 121°C for 20 minutes)
Eppendorf Centrifuge 5418 / 5418R

Report No. 73-08 C

Report prepared for: Eppendorf AG, Hamburg, Germany
Issue Date: 10th March 2008 (amended 24th Sept 2009)

Test Summary

Rotor FA 45-18-11 (5418 707.102-02, 50 x autoclaved at 121°C for 20 minutes) was containment tested in the Eppendorf 5418 / 5418R centrifuge, using Annex AA of IEC 1010-2-20. The rotor was shown to contain a spill within the rotor.

Report Written By

Anna May

Report Authorised By

[Signature]

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