thermoscientific

# Thermo Scientific Medispin Small Benchtop Centrifuge

## Instructions for Use

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ThermoFisher SCIENTIFIC

# Table of Contents

# Preface

Before using the centrifuge, read through this instruction manual carefully and follow the instructions to keep yourself and your environment safe.

Not following the instructions and safety information in this instruction manual will result in the expiration of the sellers warranty.

## Intended Use

This centrifuge is intended to be used as a laboratory equipment to separate sample mixtures of different densities.

This centrifuge can be used as an In-Vitro diagnostics device, if used together with IVD tubes, to separate blood into its components such as serum and plasma for further clinical diagnostic analysis.

The centrifuge has to be operated by a trained individual such as a clinical laboratory technologist or a trained laboratory technician.

## Signal Words and Colors

| | |
|---|---|
| **WARNING** | Indicates a hazardous situation that, if not avoided, could result in death or serious injury. |
| **CAUTION** | Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury (e.g. sample loss). |
| **NOTICE** | Indicates information considered important, but not hazard-related (e.g. messages relating to property damage). |

# Safety Instructions

WARNING

**Observe the safety instructions. Not following these instructions can cause damage like harm by mechanical impact, electrical shock, infection and loss of sample.**

The centrifuge is to be used for its intended use only. Improper use can cause damage, contamination, and injuries with fatal consequences.

The centrifuge must be operated by trained personnel only.

It is the obligation of the operator to make sure that the proper protective clothing is used. Mind the “Laboratory Biosafety Manual” of the World Health Organization (WHO) and the regulations in your country.

As safety zone maintain a clear radius of at least 30 cm around the centrifuge. Do not place any dangerous substances within this safety zone.

Set up in a well-ventilated environment, on a horizontally leveled and rigid surface with adequate load-bearing capacity.

Do not modify the centrifuge and its accessories in any unauthorized way.

The centrifuge housing is not to be opened by the operator.

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WARNING

**Risk of damage due to incorrect power supply.**

Make sure that the centrifuge is plugged only into a power outlet that has been properly grounded.

Do not use a power cord with inadequate rating.

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WARNING

**Risk from handling hazardous substances.**

Especially when working with corrosive samples (salt solutions, acids, bases), the accessories and the centrifuge have to be cleaned thoroughly.

Do not centrifuge explosive or flammable materials or substances.

Extreme care should be taken with highly corrosive substances that can cause damage and impair the mechanical stability of the rotor. These should only be centrifuged in fully sealed tubes.

The centrifuge is neither inert nor protected against explosion. Never use the centrifuge in an explosion-prone environment.

Do not centrifuge toxic or radioactive materials or any pathogenic micro-organisms without suitable safety precautions.

When centrifuging any hazardous materials mind the “Laboratory Biosafety Manual” of the World Health Organization (WHO) and any local regulations. When centrifuging microbiological samples from the Risk Group II (according to the “Laboratory Biosafety Manual” of the World Health Organization (WHO)), aerosol-tight biological seals have to be used. Visit the Internet page of the World Health Organization (www.who.int) for the “Laboratory Biosafety Manual”. For materials in a higher risk group, extra safety measures must be taken.

If toxins or pathogenic substances have contaminated the centrifuge or its parts, appropriate disinfection measures have to be taken. [→ 🗎 49]

If a hazardous situation occurs, turn off the power supply to the centrifuge and leave the area immediately.

Make sure to use the proper accessories for your applications to avoid hazardous contamination.

In any case of severe mechanical failure, such as rotor or bottle crash, personnel should be aware that the centrifuge is not aerosol-tight. Leave the room immediately.

Contact customer service. Allow some time for the aerosols to settle before you open the centrifuge after a crash.

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WARNING

**Risk of contamination.**

Potential contaminations will not remain in the centrifuge while the device is operated.

Take appropriate protection measures to prevent spread of contaminations.

A centrifuge is not a closed containment.

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WARNING

**Serious injuries can occur if you touch a spinning rotor with your hands or tools.**

Never open the centrifuge door until the rotor has come to a complete stop and this has been confirmed on the user interface.

The emergency door release may be used in emergencies only to recover the samples from the centrifuge, e.g. during a power failure. [→ 🗎 52]

Do not open the centrifuge while it is running.

In any case of severe mechanical failure, such as rotor or bucket crash, the centrifuge is not aerosol-tight.

In case of rotor failure the centrifuge can be damaged. Leave the room. Inform customer service.

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CAUTION

**Safety can be impaired by wrong loading and worn accessories.**

Use only a properly installed rotor that is safely locked onto the spindle. [→ 🗎 29]

Do not use rotors, buckets or components which show any signs of cracks. Contact customer service for further advice or inspections.

Use only with rotors which have been loaded properly.

Never overload the rotor.

Always balance the samples.

Use only rotors and components for this centrifuge which have been approved by Thermo Fisher Scientific. Exceptions to this rule are commercially available glass or plastic centrifuge lab ware, provided they have been designed to fit the rotor or the adapter cavities and are approved for the speed or the RCF value of the rotor.

---

CAUTION

**Physical harm caused by ignoring operative basics.**

Never use the centrifuge if parts of its casing are damaged or missing.

Do not move the centrifuge while it is running.

Do not lean on the centrifuge.

Do not place anything on top of the centrifuge during a run.

Implement measures which ensure that no one can approach the centrifuge for longer than absolutely necessary while it is running.

---

CAUTION

**Due to air friction sample integrity may be affected.**

The temperature of the rotor may rise significantly while the centrifuge is spinning.

Ventilated units lead to a heat up of the rotor above the ambient temperature.

Refrigerated units can have a deviation from displayed and set temperature to the sample temperature.

Make sure the centrifuge temperature control capabilities meet your application specification. If necessary make a test run.

---

NOTICE

**To shut down the centrifuge:**

Press the STOP key to shut down the centrifuge.

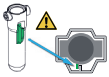
Turn off the centrifuge at the power switch. The grounded power outlet should be well accessible and located outside of the safety zone.

Pull out the power plug or disconnect the power supply in an emergency.

## Service Lifetime

The centrifuge is designed for 10 years or 140 000 cycles of service, whichever is first. Usage beyond these limits might affect the safety of the centrifuge housing or the lid latch system.
The rotor is designed for 5 years or 60 000 cycles of service, whichever is first. Usage beyond these limits might lead to rotor failure, sample loss and damage to the centrifuge. Instructions on tracking rotor lifetime: [→ 41].

## Symbols Used on Centrifuge and Accessories

| | | | |
|---|---|---|---|
|  | General hazard |  | Hot surface |
|  | Biological hazard |  | Hazards described within the manual |
|  | This symbol demands to disconnect AC mains power before transporting or servicing the centrifuge. |  | This symbol demands to make sure that a swing out bucket is installed correctly with its fin. |
|  | Refer to instruction manual | | |

# Symbols Used in the Instruction Manual

| | | | |
|---|---|---|---|
|  | General hazard |  | Electrical hazard |
|  | Biological hazard |  | Indicates information considered important, but not hazard-related. |

# Technical Specifications

## Technical Data

### Thermo Scientific Medispin Centrifuge

| | |
|---|---|
| Environmental Conditions | For interior use<br>Altitudes of up to 3 000 m above sea level<br>Max. relative humidity 80 % up to 31 °C;<br>decreasing linearly to 50 % relative humidity at 40 °C |
| Environmental Conditions during Storage and Shipping | Temperature: -10 °C to +55 °C<br>Humidity: 15 % to 85 % |
| Permissible Ambient Temperature during Operation | +2 °C to +40 °C |

| | |
|---|---|
| Heat Dissipation | 0.123 kWh; 419.7 Btu/h; 442.8 kJ/h |
| Overvoltage Category | II |
| Pollution Degree | 2 |
| IP | 20 |
| Running Time | 99 min; hold |
| Maximum Speed $n_{max}$ | 4 900 rpm |
| Minimum Speed $n_{min}$ | 300 rpm |
| Maximum RCF Value at $n_{max}$ | |
| Fixed Angle Setup | 3 114 x g |
| Swing Out Setup | 3 490 x g |
| Noise Level at Maximum Speed[1] | < 56 dB (A) |
| Maximum Kinetic Energy | 680 J |

| | |
|---|---|
| Dimensions | |
| Height (open door / closed door) | 510 mm / 240 mm |
| Width | 325 mm |
| Depth | 450 mm |
| Weight[2] | 15.5 kg |

[1] Front Side Measurement, 1 m in front of the instrument at 1.6 m height.

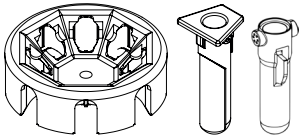
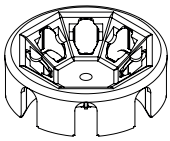
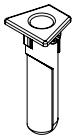
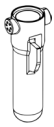
[2] Without Rotor.

## Thermo Scientific DualSpin Rotor

| | |
|---|---|
| Maximum Permissible Load | 8 x 30 g |
| Maximum Allowed Imbalance | 10 g |
| Maximum Speed $n_{max}$ | 4 900 rpm |
| Maximum RCF-Value at $n_{max}$ | |
| Fixed Angle Setup | 3114 x g |
| Swing Out Setup | 3490 x g |
| Max. Cycle Number | 60000 |
| Radius max. / min. | |
| Fixed Angle Setup | 116 mm / 37 mm |
| Swing Out Setup | 130 mm / 42 mm |
| Angle | |
| Fixed Angle Setup | 45° |
| Swing Out Setup | 12 - 87° |
| Acceleration / Braking Time* | |
| Fixed Angle Setup | 24 s / 37 s |
| Swing Out Setup | 24 s / 31 s |
| Autoclavable | No |

* Deceleration time at standard profile.

# Rotor and Accessories

| Article No. | Description | Graphic |
|---|---|---|
| 75008810 | Thermo Scientific DualSpin rotor (1x) with fixed angle buckets (8x) and swinging buckets (8x) |  |
| 75008813 | Thermo Scientific DualSpin rotor body (1x) |  |
| 75008815 | Fixed angle buckets (8x) |  |
| 75008816 | Swing out buckets (8x) |  |
| 50148478 | Rotor locking nut |  |
| 75008817 | Spacers (green, 8x) |  |
| 75008818 | Spacers (yellow, 8x) |  |
| 50149182 | Hex key (tool for emergency lid lock) |  |

# Directives, Standards and Guidelines

| Region | Directive | Standard |
|---|---|---|
| **Japan**<br>100 V, 50 / 60 Hz | **PMDA listed** | IEC 61010-1<br>IEC 61010-2-020<br>IEC 61010-2-101<br>IEC 61326-2-6<br>IEC 61326-1 Class B<br>EN ISO 14971<br>ISO 13485 |

The IVD medical equipment complies with the emission and immunity requirements described in IEC 61326-2-6.

**NOTICE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

# Mains Supply

The following table contains an overview of the electrical connection data. This data is to be taken into consideration when selecting the electrical power outlet.

| **Unit** | Thermo Scientific Medispin small benchtop centrifuge | | |
|---|---|---|---|
| Article No. | 75008802 | 75008801 | 75008800 |
| Mains Voltage | 100 V ±10% | 120 V ±10% | 220-230 V ±10% |
| Frequency | 50 / 60 Hz | 60 Hz | 50 / 60 Hz |
| Rated Current | 1.7 A | 1.8 A | 1.1 A |
| Power Consumption | 100 W | 130 W | 130 W |
| Equipment Fuse | 6.3 AT | 4 AT | 2 AT |
| Building Fuse | 16 AT | 16 AT | 16 AT |

# Transport and Set Up

## Before Setting Up

1. Check the centrifuge and the packaging for any shipping damage. Inform the shipping company and Thermo Fisher Scientific immediately if any damage is discovered.
2. Remove the packaging.

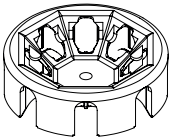
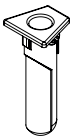
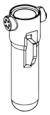
   **NOTICE** Dispose of the packaging. Do not reuse it.
3. Use the packing list below when unpacking to verify that the complete unit has been received. Do not discard packing materials until all you are sure that the delivery is complete and undamaged.

### Items Supplied

The Thermo Scientific™ Medispin™ small benchtop centrifuge is supplied with a rotor and 2 bucket sets.

| NOTICE | The graphics in the following table are for visual identification only and do not show the items supplied in real life size. |
|---|---|

| NOTICE | The rotor is factory-preinstalled and tightened inside the centrifuge using the rotor locking nut. To check the rotor and the rotor locking nut for completeness, connect the centrifuge to the power supply [→ 19], power it up and open the centrifuge door. [→ 28] |
|---|---|

| Article No. | Item | Graphic | Quantity |
|---|---|---|---|
| | **Centrifuge** | | |
| | Thermo Scientific Medispin small benchtop centrifuge | | 1 |
| | Power cord | | 1 |
| | **Rotor** | | |
| 75008810 | Thermo Scientific™ DualSpin™ rotor (factory installed) with fixed angle and swinging buckets sets, including: |  | 1 |
| | Fixed angle buckets |  | 8 |
| | Swing out buckets |  | 8 |
| 50148478 | Rotor locking nut (factory installed) |  | 1 |
| 75008817 | Spacers (short & green) |  | 8 |
| 75008818 | Spacers (long & yellow) |  | 8 |
| 50149182 | Hex key (tool for emergency lid lock) |  | 1 |
| | | | |
| | Printed manual | | 1 |
| | Manual stored on USB flash drive | | 1 |

If any parts are missing, please contact the nearest Thermo Fisher Scientific representative.

# Location

**CAUTION**

UV rays reduce the stability of plastics.

Do not subject the centrifuge, rotor and plastic accessories to direct sunlight.

The centrifuge is only to be operated indoors.

The set-up location must fulfill the following requirements:

- A safety zone of at least 30 cm must be maintained around the centrifuge. People and hazardous substances must be kept out of this safety zone while centrifuging.
- The supporting structure must be stable and free of resonance.
- The supporting structure must be suitable for horizontal setup of the centrifuge.
- The centrifuge must not be exposed to heat and strong sunlight.
- The set-up location must be well-ventilated at all times.
- Do not use the device in close proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), as these can interfere with the proper operation. The electromagnetic environment should be evaluated prior to the operation of the device.

# Transporting

**WARNING**

The centrifuge can be damaged by impact.

Do not operate the centrifuge if an impact occurred.

**CAUTION**

Do not use a damaged rotor.

Replace the rotor if it was dropped.

Using a damaged rotor can cause a crash.

**NOTICE**

Always remove buckets before transporting the centrifuge.

Buckets can fall into the rotor chamber.

Always make sure that the buckets are in correct position before operation.

The centrifuge is lightweight and can be handled by one person alone.

Transport the centrifuge upright and with the centrifuge door closed.

# Leveling

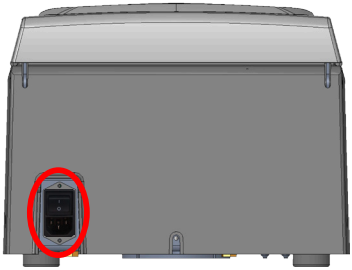
The centrifuge is to be placed on horizontal and level supporting structures or benching. If necessary level the supporting structures or benching to level the centrifuge.

Horizontal level has to be checked after moving the centrifuge to a new location.

Do not put any objects below the centrifuge feet to level the device.

# Mains Connection

**CAUTION** Plug the centrifuge only into a power outlet that has been properly grounded.



1. Turn off the power switch located on the back side.
2. Check whether the power cord complies with the safety standards of your country.
3. Make sure that the voltage and frequency correspond to the figures on the rating plate.
4. Connect the centrifuge to the power outlet using the power cord supplied.

# Storage

**WARNING**

When moving the centrifuge and accessories into storage, clean and additionally disinfect or decontaminate the entire system if biological or chemical substances were used. If in doubt contact Thermo Fisher Scientific customer service.

- The centrifuge must be cleaned and if necessary disinfected and decontaminated.
- The centrifuge, rotor, buckets and accessories have to be thoroughly dried before storage.
- Store the centrifuge in a clean, dust-free location.
- Be sure to place the centrifuge upright on its feet.
- Do not store the centrifuge in direct sunlight.

# Shipping

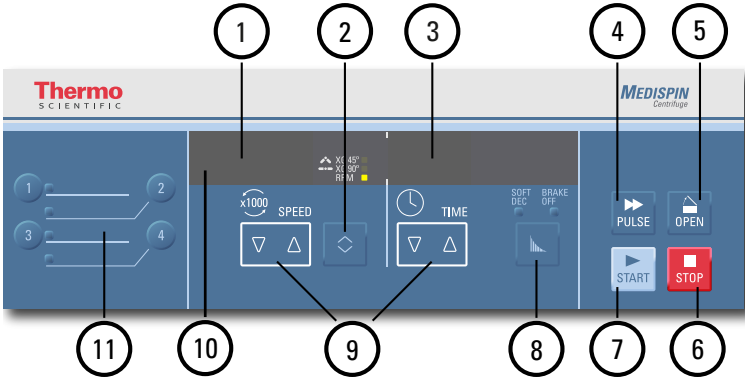
**WARNING**

Before shipping the centrifuge and accessories you have to clean and additionally disinfect or decontaminate the entire system if biological or chemical substances were used. In doubt contact Thermo Fisher Scientific customer service.

Before shipping the centrifuge please keep the following in mind:

- The centrifuge must be cleaned and decontaminated.
- The decontamination must be confirmed with a decontamination certificate. [→ 67]

# Control Panel




| No. | Function | Display Controls |
|---|---|---|
| 1 | Speed / RCF Value | The speed (rpm) or RCF value (x g) is displayed here. The RCF value (x g) can be set for the fixed angle buckets (45°) or the swing out buckets (90°). RPM can be set for all bucket set ups. |
| 2 | TOGGLE Key for Speed / RCF Value | Use the TOGGLE key to change the display mode. (XG 45° / XG 90° / RPM). |
| 3 | Running Time | The running time is displayed here. |
| 4 | PULSE Key | Press the PULSE key to immediately start the centrifugation run and accelerate up to the maximal permissible end speed. Releasing the key initiates a stopping process according to the set deceleration profile. |
| 5 | OPEN Key | Press the OPEN key to activate the door release (possible only if device is switched on and if the rotor is fully stopped). [→ 28] |
| 6 | STOP Key | Press the STOP key to manually end the centrifugation run. |
| 7 | START Key | Press the START key to start a centrifugation run. |
| 8 | Profile Key | Press the key to select “standard” (no LED), “soft dec” or “brake off”. |
| 9 | Arrow Keys | Use these keys in order to modify the displayed value of TIME and SPEED. |
| 10 | Run Indicator | The LED is active when the rotor is spinning. The LED is inactive when the rotor is in standstill. |
| 11 | Program Keys | Use the Program Keys to save and load programs. [→ 25] |

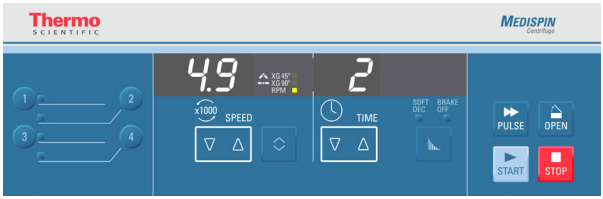
# Control Panel Settings

The centrifuge always shows the actual operating values. Only when changing speed and time the centrifuge will show the set parameters. The centrifuge will show “0” for speed and time while it is switched on and not operating. An animation will be shown while the centrifuge is spinning.

## Select RPM/RCF

Speed is shown in Revolutions Per Minute (RPM) multiplied with one thousand (x 1000).

Example for 4900 rpm:




RCF stands for Relative Centrifugal Force and allows better transfer of protocols between centrifuges and rotors of differing size.

Ensure that the rpm or RCF is set correctly.

To save selected parameters as a program: [→ 25].

1. Press the TOGGLE key below the SPEED display to cycle through the RPM / RCF selection.

   The RPM / RCF selection is divided into “RPM”, “XG 90°” and “XG 45°”.

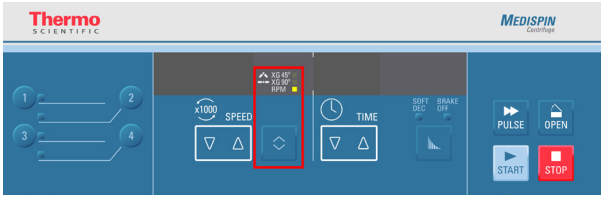
| | |
|---|---|
| RPM | Shows the speed in rpm for all bucket set ups. |
| XG 90° | Shows the RCF value in x g for swing out buckets. |
| XG 45° | Shows the RCF value in x g for fixed angle buckets. |

   “XG 90°” and “XG 45°” are available to set the correct RCF for centrifugation with the swing out or the fixed angle buckets. You can also use a mixed bucket set up. That will only show the correct RCF setting for one type of buckets.

   **NOTICE** If you switch from rpm to x g it is possible that the value displayed differs slightly from the exact mathematical calculated value due to rounding effects.

   The LED light indicates the selection.

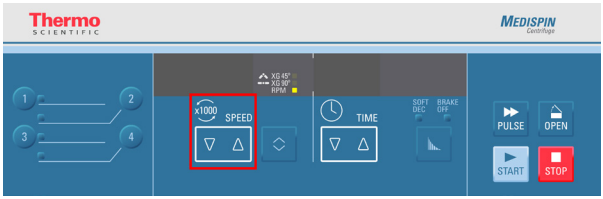
   You can switch between rpm and RCF during a run by pressing the TOGGLE key.




2. Press the SPEED arrow keys. This changes the set centrifugation speed.

   RPM will change in steps of 100 rpm. RCF will change in steps of 100 x g. Keeping a SPEED arrow key pressed will change the speed until the limiting values are reached.

   The centrifuge automatically saves the chosen value after 5 seconds or when you change other settings.




### Explanation of RCF-Value

The relative centrifugal force (RCF) is given as a multiple of the force of gravity g. It is a unit less numerical value which is used to compare the separation or sedimentation capacity of various centrifuges, since it is independent of the type of device. Only the centrifuging radius and the speed are used for calculation:

$RCF = 11.18 \times \left(\frac{n}{1000}\right)^2 \times r$

r = centrifuging radius in cm

n = rotational speed in rpm

The maximum RCF value is related to the maximum radius of the tube opening.

Remember that this value is reduced depending on the tubes and buckets used.

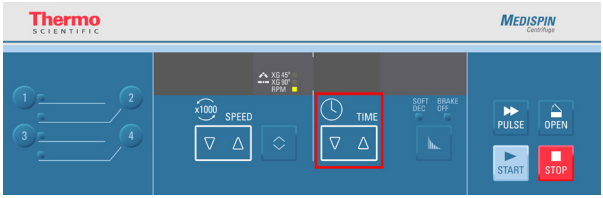
This can be accounted for in the calculation above if required.

## Select Runtime

Press the TIME arrow keys. This changes the set centrifugation time.

First runtime will change in steps of single minutes. Holding the key pressed will change the runtime by steps of single minutes. This will continue until the limit of 99 minutes is reached. Keeping the arrow keys pressed at the limits will switch to “hd”. [→ 44]

The centrifuge automatically saves the chosen value after 5 seconds or when you change other settings.




To save selected parameters as a program: [→ 25].

## Continuous Operation

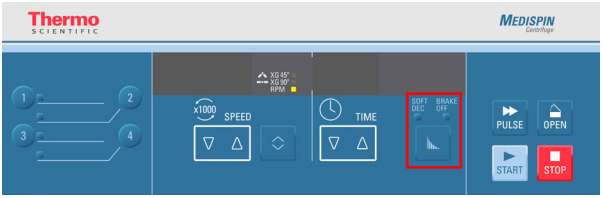
1. Keep one of the TIME arrow keys pressed until “hd” is displayed.
2. The centrifuge automatically saves the chosen value after 5 seconds or when you change other settings.

## Acceleration / Deceleration Profiles

The centrifuge offers you 1 profile for acceleration (standard) and 3 profiles for deceleration (standard, soft and brake-off). The acceleration profile cannot be changed. The setting is displayed with the LEDs above the Profile Key.

| LED Light Settings | Description |
|---|---|
| OFF (LED Lights off) | Deceleration with max. power |
| SOFT DEC | Deceleration = soft |
| BRAKE OFF | Deceleration = no brake |

Press the Profile Key to cycle through and set the available profiles. The LEDs show the chosen settings. The last profile is saved if you restart the centrifuge. The deceleration profile can be changed at any time.




To save selected parameters as a program: [→ 25].

# Programs

The centrifuge is able to save up to 4 programs. It is only possible to save a program if the centrifuge is switched on.

Loading or saving of programs is not possible if the centrifuge is spinning.

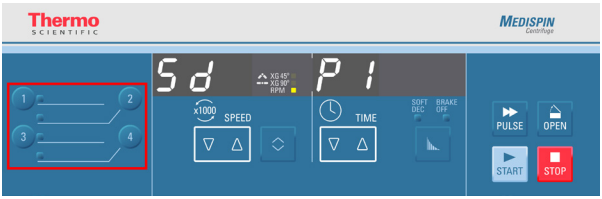
## Saving a Program

Modify the speed and time to the desired setting.

Press and hold the desired program key for more than 3 seconds.

The display shows “Sd” (saved) and “P” (program) with the chosen number, for example “Sd P1” (saved program 1).

One long acoustic signal can be heard when the program is saved.



## Selecting a Program

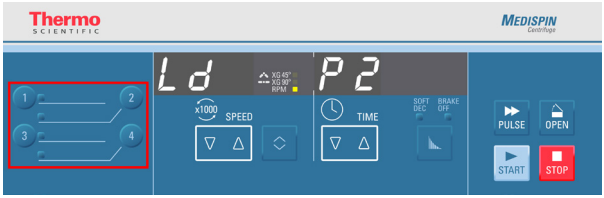
Press the program key of the desired program.

The program settings are shown.

The display shows “Ld” (loaded) and “P” (program) with the chosen number, for example “Ld P2” (load program 2).

3 short acoustic signals can be heard when the program is loaded.

The centrifuge now uses the program settings for operation until they are changed.

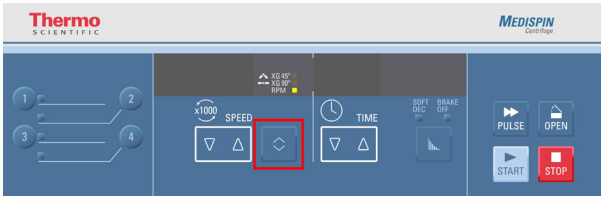



To save selected parameters as a program: [→ 25].

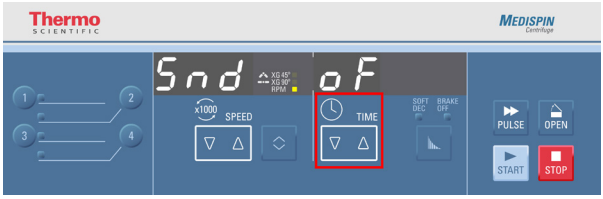
# Acoustic Signals

The centrifuge gives acoustic signals by default. The acoustic signals can be activated or deactivated all together.

1. Keep the TOGGLE key pressed when you turn on the centrifuge.




2. Press the TIME arrow keys to switch on or off the acoustic signals.




3. Press the STOP key to confirm and exit.

# Error

Accompanying all error messages, a warning signal is given out. Press any key to silence the warning signal.

# Operation

## Switching on the Centrifuge

Turn on the power switch on the back side of the centrifuge.

The centrifuge door opens automatically if the centrifuge was closed with power switched on.

## Opening the Centrifuge Door

**CAUTION**

Open the centrifuge only after the rotor has stopped spinning. The display shows the current speed also during a failure.

In case of a power failure the time until the rotor is in standstill is at least 5 min.

Never reach into the rotor chamber while the rotor is spinning.

The centrifuge door can only be opened when the centrifuge is switched on.

Press the OPEN key on the control panel.

If an error occurs, e.g. during a power failure, it is possible to open the centrifuge door using the mechanical emergency lid lock: [→ 52].

# Rotor Installation

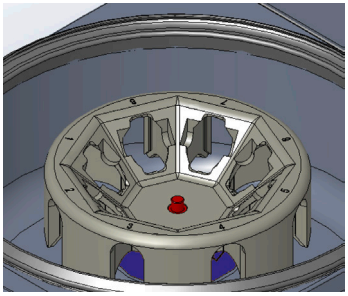
| | |
|---|---|
| ⚠ CAUTION | The rotor must turn freely and the rotor locking nut must be tight.<br>Check the locking nut regularly to ensure that it is properly tight.<br>If the rotor is not installed correctly, the rotor can crash. |

| | |
|---|---|
| ⚠ CAUTION | Do not use a damaged rotor.<br>Replace the rotor if it was dropped.<br>Using a damaged rotor can cause a crash. |

| | |
|---|---|
| ⚠ CAUTION | Do not use damaged buckets.<br>Using damaged buckets can cause a crash. |

**NOTICE** The rotor is factory installed.

Put the rotor body on the motor shaft. Make sure that the thread of the motor shaft is accessible. If rotor body is installed correctly the motor shaft has to be even with the inner rotor topside.

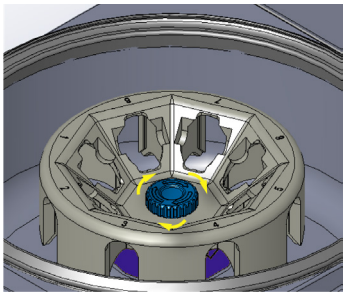


Put the rotor locking nut on the thread of the motor shaft.

Turn the rotor locking nut clockwise.

Tighten the rotor locking nut with your hand.

Make sure that the rotor locking nut is tight by turning it one more complete turn when the rotor locking nut starts to be tight.



## Installation of Fixed Angle Buckets

Put the fixed angle buckets into the rotor body.

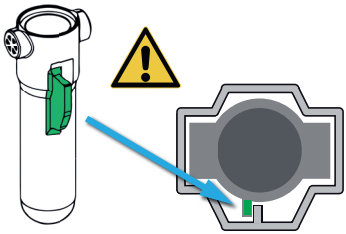
If necessary to get smaller tubes in position, use the spacers (75008818 and 75008817) according to the tubes used.

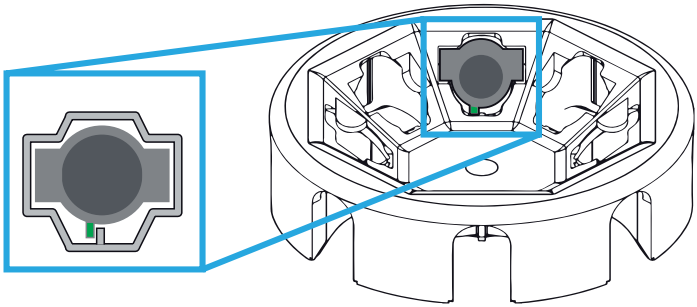
## Installation of Swing Out Buckets

Put the swing out buckets into the rotor body.

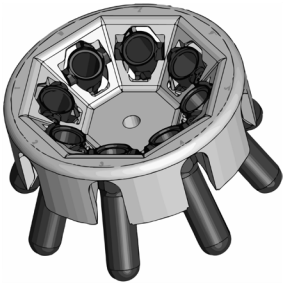
Make sure that the bucket is installed correctly with its fin.

Make sure that the swinging buckets can swing freely by moving them carefully with your hand.





If necessary to get smaller tubes in position, use the spacers (75008818 and 75008817) according to the tubes used.



# Rotor Temperature Range

| | |
|---|---|
| CAUTION | Operate the rotor in a temperature range between -9 °C and 40 °C only. Pre-cooling in a freezer below -9 °C is not allowed. |

| | |
|---|---|
| NOTICE | The rotor can warm up at high ambient temperatures. Temperatures above 42 °C can damage blood samples. If necessary let the rotor cool down between two runs. |

# Rotor Loading

| | |
|---|---|
| CAUTION | An unbalanced rotor can lead to a crash.<br>All buckets and tubes necessary for a balanced rotor must be in position before the rotor is started.<br>Always use a balanced rotor. |

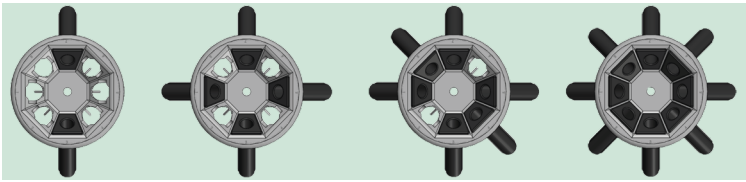
| | |
|---|---|
| CAUTION | Always make sure that the buckets are aligned and the tubes cannot touch each other or the rotor locking nut during centrifugation. |

Make sure that opposite positions are always balanced. Balance opposite loads to ensure safe and smooth operation.

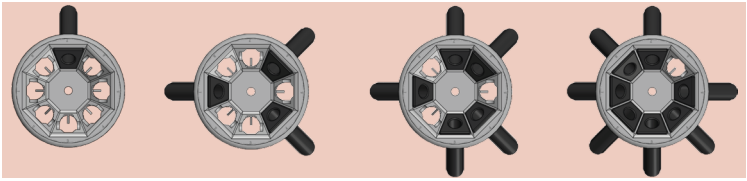
The pictures shown are examples for correct and incorrect loading.

## Fixed Angle Buckets

Correct ✓

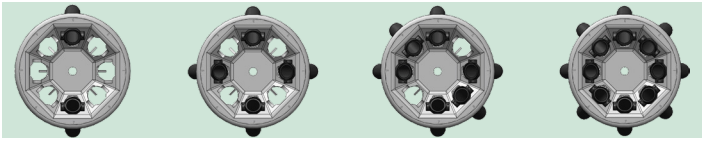


Incorrect ×

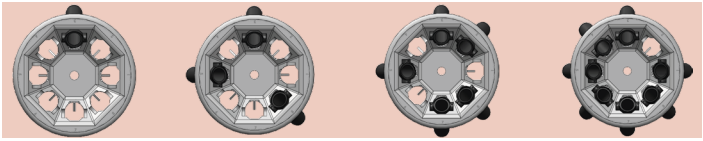


## Swing Out Buckets

Correct ✓

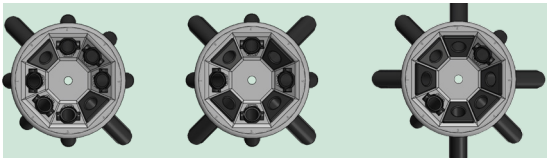


Incorrect ×

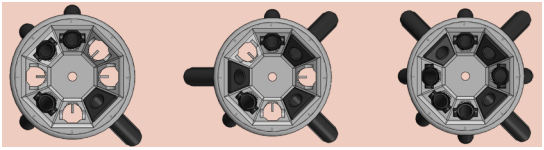


### Mixed Bucket Set Up

Correct ✓



Incorrect ×



## Maximum Loading

The rotor can run at high speeds. Each rotor is specifically designed to run at its maximum speed with a defined load. The safety system of the centrifuge requires that you do not overload the rotor. The rotor is designed to work with solution with a density of up to 1.2 g/ml. Above this density or if total load is above the maximum weight the following steps should be taken:

- Reduce the fill level.
- Reduce the speed.

Use the table or the formula:

$$n_{adm} = n_{max} \sqrt{\frac{Maximum\ permissible\ Load}{Effective\ Load}}$$

$n_{adm}$ = admissible speed

$n_{max}$ = maximum speed

Once the rotor has been properly installed, the power switch turned on and the centrifuge door closed, you may start centrifuging.

## Tube and Spacer Guide

**CAUTION** Always make sure that the buckets are aligned and the tubes cannot touch each other or the rotor locking nut during centrifugation.

This guide provides information on which tubes and spacers can be used in the fixed angle and the swing out buckets. The tubes listed should be checked for proper position and be used according to the specifications of their manufacturers as well as the safety precautions and operating limits described in this manual.

Care should be taken to ensure that the tubes used in the centrifuge are:

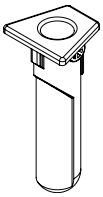
- Rated to or above the selected rcf to be spun at.
- They are being used at or above there minimum fill volume.
- They are not being used above their design life (age or number of runs).
- They are inspected for damage.
- They are not overloaded.

Refer to manufacturers data sheets for further information.

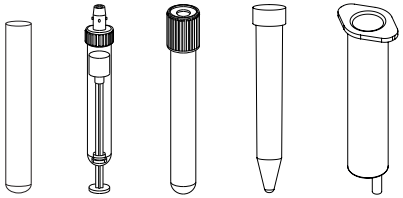
**CAUTION** Make sure that the length and width of the tubes are fitting into the adapter and cavities. Do not use tubes that are too short or too thick for the adapter and the cavities.

## Fixed Angle Bucket

**Fixed Angle Bucket**

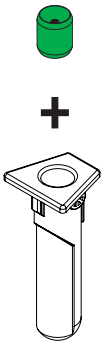


**Direct Fit** (no spacer necessary)



| Tube Type | Volume | Diameter | Length |
|---|---|---|---|
| Sarstedt™ S-Monovette™ blood tube | 4.5 – 5.0 ml | 11 mm | 92 mm |
| Sarstedt S-Monovette blood tube | 4.9 ml | 13 mm | 90 mm |
| Sarstedt V-Monovette™ urine tube (round base) | 6.0 ml | 13 mm | 100 mm |
| Sarstedt V-Monovette urine tube (round base) | 9.5 ml | 15 mm | 100 mm |
| Sarstedt V-Monovette urine tube (conical base) | 10.0 ml | 15 mm | 100 mm |
| BD™ Vacutainer™ blood tube | 3.5 – 7.0 ml | 13 mm | 100 mm |
| BD Vacutainer blood tube | 7.5 – 10.0 ml | 16 mm | 100 mm |
| BD CPT tube | 4.0 ml | 13 mm | 100 mm |
| BD CPT tube[1] | 8.0 ml | 16 mm | 125 mm |
| BD urine tube | 8.0 ml | 16 mm | 100 mm |
| Greiner™ VACUETTE™ tube | 5.0 – 6.0 ml | 13 mm | 100 mm |
| Greiner VACUETTE tube | 8.0 – 9.0 ml | 16 mm | 100 mm |
| Glass tubes (DIN) | 7.0 ml | 12 mm | 100 mm |
| Glass tubes (DIN) | 15.0 ml | 16 mm | 100 mm |
| Glass tubes | 15.0 ml | 16 mm | 125 mm |
| Glass tubes | 10.0 ml | 16 mm | 100 mm |
| Open tube | 15.0 ml | 17 mm | 100 mm |
| Conical cell culture tube | 15.0 ml | 17 mm | 120 mm |
| Standard syringe | 10.0 ml | 17.5 mm | 85 mm |
| Generic tube[2] | - | 17.5 mm | 105 – 125 mm |

**Fixed Angle Bucket**

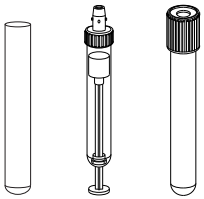


**Green Spacer**

| Tube Type | Volume | Diameter | Length |
|---|---|---|---|
| Sarstedt S-Monovette blood tube | 7.5 – 8.2 ml | 15 mm | 92 mm |
| Sarstedt S-Monovette blood tube | 9.0 – 10.0 ml | 16 mm | 92 mm |
| Generic tube[2] | - | 17.5 mm | 90 – 100 mm |

**Fixed Angle Bucket**

**Yellow Spacer**



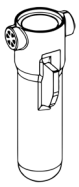
| Tube Type | Volume | Diameter | Length |
|---|---|---|---|
| Sarstedt S-Monovette blood tube | 1.2 – 1.4 ml | 8 mm | 66 mm |
| Sarstedt S-Monovette blood tube | 2.6 – 4.3 ml | 13 mm | 65 mm |
| Sarstedt S-Monovette blood tube | 2.7 – 3.0 ml | 11 mm | 66 mm |
| Sarstedt S-Monovette blood tube | 2.7 – 4.3 ml | 13 mm | 75 mm |
| Sarstedt S-Monovette blood tube | 4.0 – 5.0 ml | 15 mm | 75 mm |
| Sarstedt V-Monovette urine tube | 4.0 ml | 13 mm | 75 mm |
| BD Vacutainer blood tube | 2.0 – 4.5 ml | 13 mm | 75 mm |
| BD urine tube | 4.0 ml | 13 mm | 75 mm |
| Greiner VACUETTE tube | 2.0 – 4.0 ml | 13 mm | 75 mm |
| Open tube | 5.0 ml | 12 mm | 75 mm |
| Blood/Urine tube | 4.0 – 7.0 ml | 16 mm | 75 mm |
| Generic tube[2] | - | 17.5 mm | 77 – 90 mm |

[1] Maximum weight at 30 g. For more weight reduce speed according to the formula [→ 🗎 34].

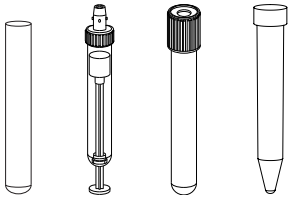
[2] Any tube types which match the dimension stated in table.

## Swing Out Bucket

**Swing Out Bucket**



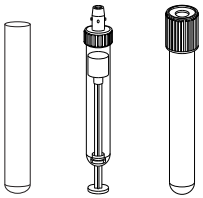
**Direct Fit** (no spacer necessary)



| Tube Type | Volume | Diameter | Length |
|---|---|---|---|
| Sarstedt S-Monovette blood tube | 4.5 – 5.0 ml | 11 mm | 92 mm |
| Sarstedt S-Monovette blood tube | 4.9 ml | 13 mm | 90 mm |
| Sarstedt S-Monovette blood tube | 7.5 – 8.2 ml | 15 mm | 92 mm |
| Sarstedt S-Monovette blood tube | 9.0 – 10.0 ml | 16 mm | 92 mm |
| Sarstedt V-Monovette urine tube (round base) | 6.0 ml | 13 mm | 100 mm |
| Sarstedt V-Monovette urine tube (conical base) | 9.5 ml | 15 mm | 100 mm |
| Sarstedt V-Monovette urine tube (round base) | 10.0 ml | 15 mm | 100 mm |
| BD Vacutainer blood tube | 3.5 – 7.0 ml | 13 mm | 100 mm |
| BD Vacutainer blood tube | 7.5 – 10.0 ml | 16 mm | 100 mm |
| BD CPT tube | 4.0 ml | 13 mm | 100 mm |
| BD urine tube | 8.0 ml | 16 mm | 100 mm |
| Greiner VACUETTE tube | 5.0 – 6.0 ml | 13 mm | 100 mm |
| Greiner VACUETTE tube | 8.0 – 9.0 ml | 16 mm | 100 mm |
| Glass tubes (DIN) | 7.0 ml | 12 mm | 100 mm |
| Glass tubes (DIN) | 15.0 ml | 16 mm | 100 mm |
| Glass tubes | 10.0 ml | 16 mm | 100 mm |
| Open tube | 15.0 ml | 17 mm | 100 mm |
| Generic tube[2] | - | 17 mm | 95 – 110 mm |

**Swing Out Bucket**

**Green Spacer**



| Tube Type | Volume | Diameter | Length |
|---|---|---|---|
| Sarstedt S-Monovette blood tube | 1.2 – 1.4 ml | 8 mm | 66 mm |
| Sarstedt S-Monovette blood tube | 2.6 – 4.3 ml | 13 mm | 65 mm |
| Sarstedt S-Monovette blood tube | 2.7 – 3.0 ml | 11 mm | 66 mm |
| Sarstedt S-Monovette blood tube | 2.7 – 4.3 ml | 13 mm | 75 mm |
| Sarstedt S-Monovette blood tube | 4.0 – 5.0 ml | 15 mm | 75 mm |
| Sarstedt V-Monovette urine tube | 4.0 ml | 13 mm | 75 mm |
| BD Vacutainer blood tube | 2.0 – 4.5 ml | 13 mm | 75 mm |
| BD urine tube | 4.0 ml | 13 mm | 75 mm |
| Greiner VACUETTE tube | 2.0 – 4.0 ml | 13 mm | 75 mm |
| Open tube | 5.0 ml | 12 mm | 75 mm |
| Blood/Urine tube | 4.0 – 7.0 ml | 16 mm | 75 mm |
| Generic tube[2] | - | 17 mm | 77 – 85 mm |

[2] Any tube types which match the dimension stated in table.

## Checking the Rotor Lifetime

**NOTICE** The cycle counter is counting the centrifuge runs. The cycle counter can not detect changed or replaced rotors and buckets.

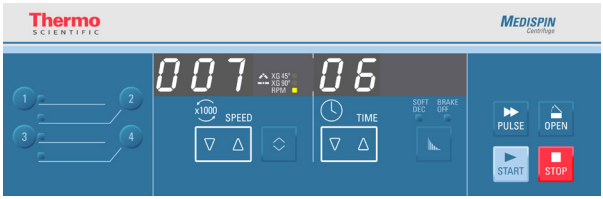
The lifetime of rotor and buckets depends on the amount of physical load. Do not exceed the number of cycles recommended for rotor and buckets.

The maximum number of cycles is given in the table stating the rotor specifications. [→ 12]

The maximum number of cycles for buckets is marked on the buckets themselves.

You can check the number of cycles on the centrifuge display. When switching on the centrifuge hold the STOP key pressed. After software version and NVRAM version the actual number of cycles is shown.


When this screen shows the counted cycles will be shown within a few seconds.




This screen shows the actual cycle numbers. The example shown states 706 cycles.

### Service Life Example

| Usage profile | Maximum service life at 60000 cycles |
|---|---|
| Frequent use: 23 runs / day, 220 days / year | 5 years |

# Closing the Centrifuge Door

**CAUTION**

Do not operate the centrifuge without rubber gasket in the rotor chamber.

Spillage can occur if the centrifuge is operated without rubber gasket.

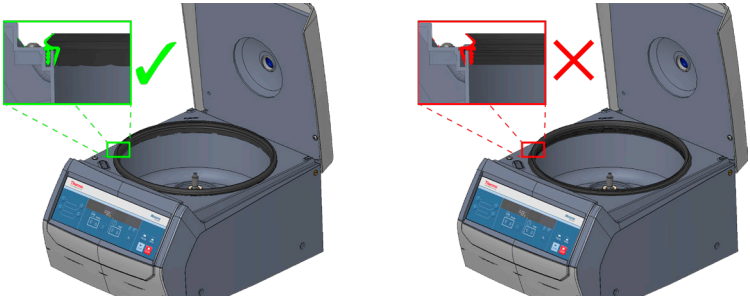
A hazardous situation caused by biological or chemical substances can occur.

**NOTICE**

If the centrifuge door is closed and the display shows “OPEN”, the centrifuge is not ready to be operated.

Press the OPEN key and lift the centrifuge door manually. Then close the centrifuge door. The centrifuge should now show the actual operating values.

If not, contact customer service.



Make sure that the rubber gasket of the rotor chamber is in position.

Close the centrifuge door by pressing down on it lightly.

One lock closes the centrifuge door completely. The door should audibly click into place.

**NOTICE** Do not slam the centrifuge door.

# Centrifugation

**CAUTION**

If scraping noises occur, press the STOP key to shut down the centrifuge. Pull out the power plug or disconnect the power supply in an emergency.

Replace damaged buckets before the next run.

**NOTICE**

If you perceive a banging noise and the centrifuge starts to shake, a bucket may have dropped out of its position because it was installed incorrectly.

Press the STOP key to shut down the centrifuge.

Make sure that the bucket is not damaged before using it again. Install it correctly if it can be used.

## Before a Run

1. Read and observe the precautions and the safety instructions in this instruction manual.
2. Check the rotor and all accessories for damages such as cracks or scratches.
3. Check the rotor chamber and the centrifuge spindle.
4. Check the rotor suitability. [→ 55]
5. Make sure that the buckets are in correct position.
6. Set the parameters for the centrifugation. [→ 22]

## Starting the Centrifugation

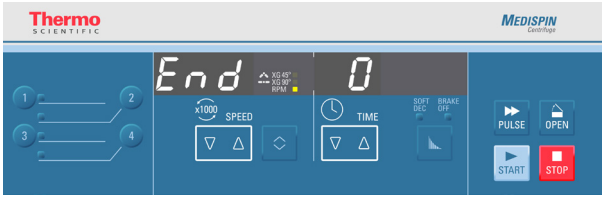
Check the set parameters for the centrifugation, especially when programs are used.

Press the START key. The centrifuge accelerates to the pre-set speed with the time display active.

An animation of a circle is shown while the rotor is spinning.

## Stopping the Centrifugation

When a centrifugation run is finished and the centrifuge shows “END”, this indicates that the selected parameters were reached.




### With Set Time

If the time is set, the centrifuge will run at the selected speed until the set time is reached. It will then automatically decelerate, stop and beep.

Press the OPEN key to open the centrifuge door.

Press the STOP key to manually stop during the centrifugation.

### Continuous Operation

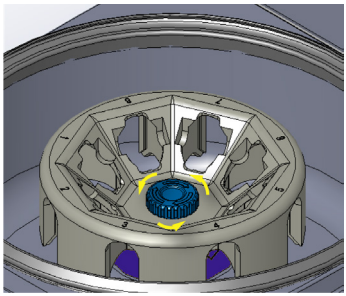
If you selected continuous operation [→ 24], you will have to stop the centrifugation manually by pressing the STOP key.

The centrifuge will decelerate at the set rate and beep, when the rotor has stopped.

Press the OPEN key to open the centrifuge door.

## Removing the Rotor

Turn the rotor locking nut counterclockwise (the opposite direction as marked on the rotor locking nut). Remove the rotor from the motor shaft.



## Switching off the Centrifuge

To switch off the centrifuge push the power switch to “0”.

# Maintenance and Care

**CAUTION**

Do not use a rotor or accessories with signs of damage.

Make sure that rotor, buckets and accessories are within their service lifetime (age and cycles).

It is recommended to check rotors and accessories within a yearly routine inspection to ensure safety.

**CAUTION**

Do not autoclave the rotor and accessories.

Temperatures above 40 °C can damage the material of the rotor and the accessories.

## Cleaning Intervals

For the sake of personal, environmental, and material protection, it is your duty to clean and if necessary disinfect the centrifuge on a regular basis.

| Maintenance | Recommended Interval |
|---|---|
| Rotor chamber (bowl) | Daily or when polluted |
| Rotor | Daily or when polluted |
| Accessories | Daily or when polluted |
| Cabinet | Once per month |

# Basics

**CAUTION**

Not rated procedures or agents could deteriorate the materials of the centrifuge and lead to malfunction.

Refrain from using any other cleaning or decontamination procedure than those recommended here if you are not entirely sure that the intended procedure is safe for the equipment.

Use only approved cleansers.

If in doubt, contact the manufacturer of the cleaning agent.

**NOTICE**

When you clean the rotor put the rotor locking nut on the thread of the motor shaft and tighten it lightly counterclockwise.

- Use warm water with a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agents.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Remove rotor and clean bowl with a small amount of cleaning agent, applied to a clean cloth.
- Use a soft brush without metal bristles to remove stubborn residue.
  Afterwards rinse with a small amount of distilled water and remove any excess with absorbent towels.
- Use only disinfectants with a pH of 6-8.
- After thoroughly cleaning rotor and accessories, they should be inspected for damage and wear.

## Plastic Parts

Check for signs of plastic crazing, fading, bruising or cracking.

**CAUTION**

Do not run any rotor or accessories with sign of damage.

Ensure that the rotor and accessories are within the service life and number of cycles.

It is recommend that you have rotors and accessories inspected yearly as part of your routine service to ensure safety.

# Cleaning

| | |
|---|---|
| ⚠ CAUTION | Do not autoclave the rotor or accessories.<br>Do not clean the rotor or accessories in a dishwasher.<br>Temperatures above 40 °C can damage the material. |

| | |
|---|---|
| ⚠ CAUTION | Before using any cleaning methods except those recommended by the manufacturer, users should check with the manufacturer of the cleaning agents that the proposed method will not damage the equipment. |

| | |
|---|---|
| ⚠ CAUTION | Drive and door lock can be damaged by entering liquids. Do not allow liquids, especially organic solvents, to get on the drive shaft, the drive bearings or the centrifuge door locks.<br>Organic solvents break down the grease in the motor bearing. The drive shaft could lock up. |

Clean as follows:

1. Clean rotor and accessories outside of the centrifuge bowl.
2. Separate rotor and accessories to allow thorough cleaning.
3. Rinse rotor and accessories with warm water and a neutral detergent that is suitable for use with the materials. If in doubt contact the manufacturer of the cleaning agents.
4. Use a soft brush without metal bristles to remove stubborn residue.
5. Rinse rotor and accessories with distilled water.
6. Place the rotor and buckets on a plastic grate with cavities pointing down, to allow fully drain and dry.
7. Dry rotor and accessories after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 40 °C. If drying boxes are used, the temperature must never exceed 40 °C, since higher temperatures could damage the material and shorten the lifetime of the parts.

   Once clean and dry, inspect rotor and accessories.

# Disinfection

**WARNING**

Hazardous infection is possible when touching the contaminated rotor and centrifuge parts. Infectious material can get into the centrifuge when a tube breaks or as a result of spills.

In case of contamination, make sure that others are not put at risk.

Disinfect the affected parts immediately.

**CAUTION**

Equipment can be damaged by inappropriate disinfection methods or agents.

Before using any cleaning or disinfection methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Observe the safety precautions and handling instructions for the cleaning agents used.

The rotor chamber and the rotor should be treated preferably with a neutral disinfectant.

Contact the Service Department of Thermo Fisher Scientific for questions regarding the use of other disinfectants. [→ 47]

Disinfect as follows:

1. Disinfect rotor and accessories outside of the centrifuge bowl.
2. Separate rotor and accessories to allow thorough disinfection.
3. Treat rotor and accessories according to the instructions for the disinfectant. Adhere strictly to the given application times.

   Be sure the disinfectant can drain off the rotor.
4. Rinse rotor and accessories thoroughly with water.
5. Place the rotor on a plastic grate with his cavities pointing down, to allow fully drain and dry.
6. Dispose the disinfectant according to the applicable guidelines.
7. Clean the rotor after disinfecting. [→ 48]

# Decontamination

**WARNING**

Radiation is possible when touching the contaminated rotor and centrifuge parts. Radioactive material can get into the centrifuge when a tube breaks or as a result of spills.

In case of contamination, make sure that others are not put at risk.

Decontaminate the affected parts immediately.

**CAUTION**

Equipment can be damaged by inappropriate decontamination methods or agents.

Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Observe the safety precautions and handling instructions for the cleaning agents used.

For general radioactive decontamination use a solution of equal parts of 70 % ethanol, 10 % SDS (Sodium Dodecyl Sulfate) and water.

Decontaminate as follows:

1. Decontaminate rotor and accessories outside of the centrifuge bowl.
2. Separate rotor and accessories to allow thorough decontamination.
3. Treat rotor and accessories according to the instructions for the decontamination solution. Adhere strictly to the given application times.

   Be sure the decontamination solution can drain off the rotor.
4. Rinse the rotor first with ethanol and then with deionized water.

   Adhere strictly to the given application times.
5. Be sure the decontamination solution can drain off the rotor.

   Rinse the rotor and accessories thoroughly with water.
6. Place the rotor on a plastic grate with his cavities pointing down, to allow fully drain and dry.
7. Dispose of the decontamination solution according to the applicable guidelines.
8. Clean the rotor after disinfecting. [→ 48]

# Service of Thermo Fisher Scientific

Thermo Fisher Scientific recommends having the centrifuge and accessories serviced once a year by an authorized service technician. The service technician checks the following

- electrical equipment;
- suitability of set-up site;
- centrifuge door lock and safety system;
- rotor;
- fixation of rotor and centrifuge spindle;
- protective casing.

Before service, centrifuge and rotors should be thoroughly cleaned and decontaminated to ensure full and safe inspection can be completed.

Thermo Fisher Scientific offers inspection and service contracts for this work. Any necessary repairs are performed for free during the warranty period and afterwards for a charge.

This is only valid if the centrifuge has only been maintained by an authorized Thermo Fisher Scientific service technician.

# Shipping and Disposal

**WARNING**

When removing the centrifuge and accessories from use for disposal you have to clean and additionally disinfect or decontaminate the entire system if biological or chemical substances were used. In doubt contact Thermo Fisher Scientific customer service.

For the disposal of the centrifuge mind the regulations in your country. Contact Thermo Fisher Scientific Customer Service for the disposal of the centrifuge. For contact information check the back page of this manual or visit www.thermofisher.com/centrifuge.

For the countries of the European Union the disposal is regulated by the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU.

Mind the information on transporting and shipping [→ 18], [→ 20].

# Troubleshooting

## Mechanical Emergency Door Release

**CAUTION**

A spinning rotor can cause serious injuries when touched. In case of power failure the rotor can still be spinning.

Wait 10 minutes to be sure that the rotor has stopped spinning.

Do not open the centrifuge before the rotor has stopped. Do not touch the spinning rotor. Do not brake the rotor using hands or other tools.

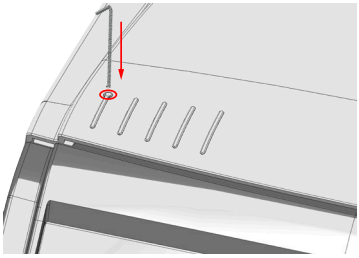
During a power failure, you will not be able to open the centrifuge door with the regular electric door release. A mechanical override is provided to allow sample recovery in the case of an emergency. This is only to be used in emergencies and after the rotor has come to a complete stop.

Always wait until the rotor has come to a stop without braking. The brake does not work during a power failure. The braking process lasts much longer than usual. Wait 10 minutes to be sure that the rotor can stop spinning.

Proceed as follows:

1. Make sure the rotor has stopped (view port in the centrifuge door).
2. Pull out the power plug. Keep the centrifuge horizontal at all times.
3. Push the hex key (50149182) straight down through the hole in the centrifuge door until the locking mechanism releases it.

   Remove the hex key and open the centrifuge door.



4. Reconnect the centrifuge to the power supply. Switch on the centrifuge.

# Troubleshooting by Guide

**NOTICE** If you encounter problems that are not described in the following, contact customer service.

For error numbers that are not described in detail in the table, follow this procedure:

1. Restart the centrifuge.
2. If the error message shows up again, contact customer service.

| Error number | Description | Troubleshooting |
|---|---|---|
| E-24 | Centrifuge door cannot be opened | Check if the centrifuge door is closed correctly.<br>Restart the centrifuge.<br>If the error message shows up again, contact customer service. |
| E-27 | Centrifuge door cannot be closed. | Close the centrifuge door with pressure.<br>Restart the centrifuge.<br>If the error message shows up again, contact customer service. |
| E-29 | Drive not starting | Make sure that no objects are within the rotor chamber.<br>Make sure that the motor can spin by turning the drive with your hands.<br>Restart the centrifuge.<br>If the error message shows up again, contact customer service. |

| Error number | Description | Troubleshooting |
|---|---|---|
| E-31 | Drive temperature high | CAUTION<br>Hot metal parts!<br>Check if the centrifuge is accessible.<br>Be sure that the room temperature is within the limits.<br>Remove the rotor.<br>Let the centrifuge cool down for 30 minutes.<br>If the error message shows up again, contact customer service. |
| E-40 | Acceleration is too low | Make sure that the rotor is correctly loaded and balanced.<br>Make sure that no objects are within the rotor chamber.<br>Make sure that the AC mains power supply meets the electrical requirements.<br>Restart the centrifuge.<br>If the error message shows up again, contact customer service. |

## When to Contact Customer Service

If you need to contact customer service, please provide the order no. and the serial no. of your centrifuge. This information can be found on the nameplate.

In addition customer service also needs the software ID and the NVRAM ID. Both are shown by holding the STOP key pressed when switching on the centrifuge.

# Chemical Compatibility Chart

## Chemical Compatibily Chart

| CHEMICAL / MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Noryl™ | Polyamide/Nylon | PET, Polyclear™, Clear Crimp™ | Polyalomer | Polycarbonate | Polyester, Glass Thermoset | Polythermide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-mercaptoethanol | S | S | U | / | S | M | S | / | S | U | S | S | U | S | S | / | S | S | S | S | U | S | S | S | S | S | S |
| Acetaldehyde | S | / | U | U | / | / | / | M | / | U | / | / | / | M | U | U | U | M | M | / | M | S | U | / | S | / | U |
| Acetone | M | S | U | U | S | U | M | S | S | U | U | S | U | S | U | U | U | S | S | U | U | S | M | M | S | U | U |
| Acetonitrile | S | S | U | / | S | M | S | / | S | S | U | S | U | M | U | U | / | S | M | U | U | S | S | S | S | U | U |
| Alconox™ | U | U | S | / | S | S | S | / | S | S | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S | S | U |
| Allyl Alcohol | / | / | / | U | / | / | S | / | / | / | / | S | / | S | S | M | S | S | S | / | M | S | / | / | S | / | / |
| Aluminum Chloride | U | U | S | S | S | S | U | S | S | S | S | M | S | S | S | S | / | S | S | S | S | S | M | U | U | S | S |
| Formic Acid (100%) | / | S | M | U | / | / | U | / | / | / | / | U | / | S | M | U | U | S | S | / | U | S | / | U | S | / | U |
| Ammonium Acetate | S | S | U | / | S | S | S | / | S | S | S | S | S | S | S | U | / | S | S | S | S | S | S | S | S | S | S |
| Ammonium Carbonate | M | S | U | S | S | S | S | S | S | S | S | S | S | S | U | U | / | S | S | S | S | S | S | M | S | S | S |
| Ammonium Hydroxide (10%) | U | U | S | U | S | S | M | S | S | S | S | S | / | S | U | M | S | S | S | S | S | S | S | S | S | M | S |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Norel™ | Polyamide/Nylon | PET™, Polyclear™, Clear Crimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polyetherimide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonium Hydroxide (28 %) | U | U | S | U | S | U | M | S | S | S | S | S | U | S | U | M | S | S | S | S | S | S | S | S | S | M | S |
| Ammonium Hydroxide (conc.) | U | U | U | U | S | U | M | S | / | S | / | S | U | S | U | U | S | S | S | S | / | S | S | S | S | / | U |
| Ammonium Phosphate | U | / | S | / | S | S | S | S | / | S | / | S | / | S | S | S | / | S | M | U | / | S | S | M | S | S | S |
| Ammonium Sulfate | U | M | S | / | S | S | U | S | S | S | S | S | S | S | S | S | / | S | S | U | / | S | S | U | S | S | U |
| Amyl Alcohol | S | / | M | U | / | / | S | S | / | M | / | S | / | M | S | S | S | S | M | U | / | U | / | S | S | / | M |
| Aniline | S | S | U | U | S | U | S | M | S | U | U | U | U | U | U | U | / | S | M | U | U | S | S | S | S | U | S |
| Sodium Hydroxide (<1 %) | U | / | M | S | S | S | / | / | S | M | S | S | / | S | M | M | S | S | S | U | U | S | M | S | S | / | U |
| Sodium Hydroxide (10 %) | U | / | M | U | / | / | U | / | M | M | S | S | U | S | U | U | S | S | S | U | U | S | M | S | S | / | U |
| Barium Salts | M | U | S | / | S | S | S | S | S | S | S | S | S | S | S | M | / | S | S | S | S | S | S | S | S | S | S |
| Benzene | S | S | U | U | S | U | M | U | S | U | U | S | U | U | U | M | U | M | U | U | S | U | U | S | U | S | S |
| Benzyl Alcohol | S | / | U | U | / | / | M | M | / | M | / | S | U | U | U | U | U | U | U | / | M | S | M | / | S | / | S |
| Boric Acid | U | S | S | M | S | S | U | S | S | S | S | S | S | S | S | S | U | S | S | S | S | S | S | / | S | S | S |
| Cesium Acetate | M | / | S | / | S | S | S | / | S | S | S | S | / | S | S | / | / | S | S | S | S | S | S | M | S | S | S |

# Chemical Compatibily Chart

| CHEMICAL / MATERIAL | ALUMINUM | ANODIC COATING FOR ALUMINUM | BUNA N | CELLULOSE ACETATE BUTYRATE | POLYURETHANE ROTOR PAINT | COMPOSITE CARBON FIBER/EPOXY | DELRIN™ | ETHYLENE PROPYLENE | GLASS | NEOPRENE | NORYL™ | POLYAMIDE/NYLON | PET™, POLYCLEAR™,CLEAR CRIMP™ | POLYALLOMER | POLYCARBONATE | POLYESTER, GLASS THERMOSET | POLYETHERIMIDE | POLYETHYLENE | POLYPROPYLENE | POLYSULFONE | POLYVINYL CHLORIDE | RULON A™, TEFLON™ | SILICONE RUBBER | STAINLESS STEEL | TITANIUM | TYGON™ | VITON™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CESIUM BROMIDE | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | M | S | S | S |
| CESIUM CHLORIDE | M | S | S | U | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | M | S | S | S |
| CESIUM FORMATE | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | M | S | S | S |
| CESIUM IODIDE | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | M | S | S | S |
| CESIUM SULFATE | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | M | S | S | S |
| CHLOROFORM | U | U | U | U | S | S | M | U | S | U | U | M | U | M | U | U | U | M | M | U | U | U | S | U | U | M | S |
| CHROMIC ACID (10 %) | U | / | U | U | S | U | U | / | S | S | S | U | S | S | U | M | U | S | S | U | M | S | U | U | S | S | S |
| CHROMIC ACID (50 %) | U | / | U | U | / | U | U | / | / | / | S | U | S | S | U | M | U | M | S | U | M | S | / | U | M | / | S |
| CRESOL MIXTURE | S | S | U | / | / | / | S | / | S | U | U | U | U | U | U | U | / | / | U | U | / | U | S | S | S | U | S |
| CYCLOHEXANE | S | S | S | S | / | S | S | U | S | U | S | S | U | U | U | U | M | S | M | U | M | M | U | S | M | U | S |
| DEOXYCHOLATE | S | S | S | S | / | S | S | / | S | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | S | S | S |
| DISTILLED WATER | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| DEXTRAN | M | S | S | S | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M | S | S | S |

# Chemical Compatibily Chart

| CHEMICAL / MATERIAL | ALUMINUM | ANODIC COATING FOR ALUMINUM | BUNA N | CELLULOSE ACETATE BUTYRATE | POLYURETHANE ROTOR PAINT | COMPOSITE CARBON FIBER/EPOXY | DELRIN™ | ETHYLENE PROPYLENE | GLASS | NEOPRENE | NORYL™ | POLYAMIDE/NYLON | PET™, POLYCLEAR™,CLEAR CRIMP™ | POLYALLOMER | POLYCARBONATE | POLYESTER, GLASS THERMOSET | POLYETHERIMIDE | POLYETHYLENE | POLYPROPYLENE | POLYSULFONE | POLYVINYL CHLORIDE | RULON A™, TEFLON™ | SILICONE RUBBER | STAINLESS STEEL | TITANIUM | TYGON™ | VITON™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIETHYL ETHER | S | S | U | U | S | S | S | U | S | U | U | S | U | U | U | U | U | U | U | U | U | S | S | S | S | M | U |
| DIETHYL KETONE | S | / | U | U | / | / | M | / | S | U | / | S | / | M | U | U | U | M | M | / | U | / | / | / | S | U | U |
| DIETHYLPYRO-CARBONATE | S | S | U | / | S | S | S | / | S | U | U | S | U | S | U | / | / | S | S | S | M | S | S | S | S | S | S |
| DIMETHYLSULFOXIDE | S | S | U | U | S | S | S | / | S | U | S | S | U | S | U | / | / | S | M | S | U | S | S | S | S | U | U |
| DIOXANE | M | S | U | U | S | S | M | M | S | U | S | S | U | M | U | / | / | M | M | M | M | U | S | S | S | U | U |
| FERRIC CHLORIDE | U | U | S | / | / | / | M | S | / | M | / | S | / | S | / | / | / | S | S | / | / | / | M | U | S | / | S |
| ACETIC ACID (GLACIAL) | S | S | U | U | S | S | U | M | S | U | S | U | U | U | U | U | M | S | S | S | / | / | U | U | S | / | U |
| ACETIC ACID (5 %) | S | S | M | S | S | S | M | S | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S | M | S | S | M |
| ACETIC ACID (60 %) | S | S | U | U | S | S | U | / | S | M | S | U | U | M | U | S | M | S | S | M | S | M | S | U | S | M | U |
| ETHYL ACETATE | M | M | U | U | S | S | M | M | S | S | U | S | U | M | U | U | / | S | S | S | U | U | S | M | S | U | U |
| ETHYL ALCOHOL (50 %) | S | S | S | S | S | S | M | S | S | S | S | S | U | S | U | S | S | S | S | S | S | S | S | M | S | M | U |
| ETHYL ALCOHOL (95 %) | S | S | S | U | S | S | M | S | S | S | S | S | U | S | U | U | / | S | S | M | S | S | S | U | S | M | U |
| ETHYLENE DICHLORIDE | S | / | U | U | / | / | S | M | / | U | U | S | U | U | U | U | U | U | U | / | U | S | U | / | S | / | S |

# Chemical Compatibily Chart

| CHEMICAL / MATERIAL | ALUMINUM | ANODIC COATING FOR ALUMINUM | BUNA N | CELLULOSE ACETATE BUTYRATE | POLYURETHANE ROTOR PAINT | COMPOSITE CARBON FIBER/EPOXY | DELRIN™ | ETHYLENE PROPYLENE | GLASS | NEOPRENE | NORYL™ | POLYAMIDE/NYLON | PET™, POLYCLEAR™,CLEAR CRIMP™ | POLYALLOMER | POLYCARBONATE | POLYESTER, GLASS THERMOSET | POLYETHERIMIDE | POLYETHYLENE | POLYPROPYLENE | POLYSULFONE | POLYVINYL CHLORIDE | RULON A™, TEFLON™ | SILICONE RUBBER | STAINLESS STEEL | TITANIUM | TYGON™ | VITON™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ETHYLENE GLYCOL | S | S | S | S | S | S | S | S | S | S | S | S | / | S | U | S | S | S | S | S | S | S | S | M | S | M | S |
| ETHYLENE OXIDE VAPOR | S | / | U | / | / | U | / | / | S | U | / | S | / | S | M | / | / | S | S | / | U | S | U | S | S | S | U |
| FICOLL-HYPAQUE™ | M | S | S | / | S | S | S | / | S | S | S | S | / | S | S | / | S | S | S | / | S | S | S | M | S | S | S |
| HYDROFLUORIC ACID (10 %) | U | U | U | M | / | / | U | / | / | U | U | S | / | S | M | U | S | S | S | M | S | M | U | S | U | / | / |
| HYDROFLUORIC ACID (50 %) | U | U | U | U | / | / | U | / | / | U | U | U | U | S | U | U | U | S | S | S | U | S | U | U | U | / | M |
| HYDROCHLORIC ACID (CONC.) | U | U | U | U | / | U | U | M | / | U | M | U | U | M | U | U | U | / | S | / | S | U | S | U | U | / | / |
| FORMALDEHYDE (40 %) | M | M | M | S | S | S | S | M | S | S | S | S | M | S | S | S | U | S | S | M | S | M | S | M | S | M | U |
| GLUTARALDEHYDE | S | S | S | S | / | / | S | / | S | S | S | S | S | S | S | S | / | S | S | / | S | / | S | S | S | / | / |
| GLYCEROL | M | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | / | S | / | S | S | S | S | S | S | S |
| GUANIDINE HYDROCHLORIDE | U | U | S | / | S | S | S | / | S | S | S | S | S | S | S | S | / | / | S | / | S | S | S | U | S | S | S |
| HAEMO-SOL™ | S | S | S | / | / | / | S | / | S | S | S | S | S | S | S | S | / | / | S | / | S | S | S | S | S | S | S |
| HEXANE | S | S | S | / | S | S | S | / | S | S | U | S | U | M | U | S | S | U | S | / | S | M | S | S | S | U | S |
| ISOBUTYL ALCOHOL | / | / | M | U | / | / | S | S | / | U | / | S | U | S | S | M | S | S | S | / | S | S | S | / | S | / | S |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Noryl™ | Polyamide/Nylon | PET™, Polyclear™, Clear Grimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polyetherimide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Isopropyl Alcohol | M | M | M | U | S | S | S | S | S | U | S | S | U | S | U | M | S | S | S | S | S | S | S | M | M | M | S |
| Iodoacetic Acid | S | S | M | / | S | S | S | / | S | M | S | S | M | S | S | / | M | S | M | / | S | S | M | S | S | M | M |
| Potassium Bromide | U | S | S | / | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S | / | S | S | S | M | S | S | S |
| Potassium Carbonate | M | U | S | S | S | S | S | / | S | S | S | S | S | S | U | S | S | S | S | S | S | S | S | S | S | S | S |
| Potassium Chloride | U | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | S | S | S | S | S | S | S | U | S | S | S |
| Potassium Hydroxide (5 %) | U | U | S | S | S | / | M | / | S | S | S | S | S | S | U | S | S | S | S | S | S | M | S | U | M | S | U |
| Potassium Hydroxide (conc.) | U | U | M | U | / | / | M | / | M | S | S | / | U | M | U | U | / | S | M | S | M | U | U | / | U | / | U |
| Potassium Permanganate | S | S | S | / | S | S | S | / | S | S | S | U | S | S | S | M | / | S | M | S | U | S | / | S | S | U | S |
| Calcium Chloride | M | U | S | S | S | S | S | S | S | S | S | S | S | S | M | S | / | S | S | S | S | S | S | M | S | S | S |
| Calcium Hypochlorite | M | / | U | / | S | M | M | S | / | M | / | S | / | S | M | S | / | S | M | S | M | S | S | U | S | / | S |
| Kerosene | S | S | S | / | S | S | S | U | S | M | U | S | U | M | M | S | / | M | M | M | S | U | S | S | S | U | S |
| Sodium Chloride (10 %) | S | / | S | S | S | S | S | S | / | / | / | S | S | S | S | S | / | S | S | S | S | / | S | S | M | / | S |
| Sodium Chloride (sat'd) | U | / | S | U | S | S | S | / | / | / | / | S | S | S | S | S | / | S | S | / | S | / | S | S | M | / | S |

# Chemical Compatibily Chart

| CHEMICAL / MATERIAL | ALUMINUM | ANODIC COATING FOR ALUMINUM | BUNA N | CELLULOSE ACETATE BUTYRATE | POLYURETHANE ROTOR PAINT | COMPOSITE CARBON FIBER/EPOXY | DELRIN™ | ETHYLENE PROPYLENE | GLASS | NEOPRENE | NORYL™ | POLYAMIDE/NYLON | PET™, POLYCLEAR™,CLEAR CRIMP™ | POLYALLOMER | POLYCARBONATE | POLYESTER, GLASS THERMOSET | POLYETHERIMIDE | POLYETHYLENE | POLYPROPYLENE | POLYSULFONE | POLYVINYL CHLORIDE | RULON A™, TEFLON™ | SILICONE RUBBER | STAINLESS STEEL | TITANIUM | TYGON™ | VITON™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CARBON TETRACHLORIDE | U | U | M | S | S | U | M | U | S | U | U | S | U | M | U | S | S | M | M | S | M | M | M | M | U | S | S |
| AQUA REGIA | U | / | U | U | / | / | U | / | / | / | / | / | U | U | U | U | U | U | U | / | / | / | / | / | / | / | M |
| SOLUTION 555 (20 %) | S | S | S | / | / | / | S | / | S | S | S | S | S | S | S | / | / | S | U | S | / | S | S | S | S | S | S |
| MAGNESIUM CHLORIDE | M | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | U | S | S | S | S | M | S | S | S |
| MERCAPTOACETIC ACID | U | S | U | / | S | M | S | / | S | M | S | U | U | U | U | / | S | U | M | U | S | M | S | S | S | S | S |
| METHYL ALCOHOL | S | S | S | U | S | S | M | S | S | S | S | S | U | S | U | M | S | S | S | S | S | S | S | M | S | M | U |
| METHYLENE CHLORIDE | U | U | U | U | M | S | S | U | S | U | U | S | U | U | U | U | U | M | U | S | U | S | S | M | U | S | U |
| METHYL ETHYL KÉTONE | S | S | U | U | S | S | M | S | S | U | U | S | U | S | U | U | U | S | S | S | U | S | S | S | S | U | U |
| METRIZAMIDE™ | M | S | S | / | S | S | S | / | S | S | S | S | / | S | S | S | / | / | S | S | S | S | S | M | S | S | S |
| LACTIC ACID (100 %) | / | / | S | / | / | / | / | / | / | M | S | U | / | S | S | S | S | M | U | S | / | M | S | S | S | / | S |
| LACTIC ACID (20 %) | / | / | S | S | / | / | / | / | / | M | S | M | / | S | S | S | S | S | S | S | S | M | S | S | S | / | S |
| N/BUTYL ALCOHOL | S | / | S | U | / | / | S | / | / | S | M | / | U | S | M | S | S | S | S | M | M | M | S | / | S | / | S |
| N/BUTYL PHTHALATE | S | S | U | / | S | S | S | / | S | U | U | S | U | U | U | M | / | U | U | S | U | S | M | M | S | U | S |

## Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Noryl™ | Polyamide/Nylon | PET™, Polyclear™, Clear Grimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polyetherimide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N, N-Dimethylformamide | S | S | S | U | S | M | S | / | S | S | U | S | U | S | U | U | / | S | S | U | U | S | M | S | S | S | U |
| Sodium Borate | M | S | S | S | S | S | S | S | S | S | S | U | S | S | S | S | / | S | S | S | S | S | S | M | S | S | S |
| Sodium Bromide | U | S | S | / | S | S | S | / | S | S | S | S | S | S | S | S | / | S | S | S | S | S | S | M | S | S | S |
| Sodium Carbonate (2 %) | M | U | S | S | S | S | S | S | S | S | S | S | S | S | U | S | S | S | S | S | S | S | S | S | S | S | S |
| Sodium Dodecyl Sulfate | S | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S |
| Sodium Hypochlorite (5 %) | U | U | M | S | S | M | U | S | S | M | S | S | S | M | S | S | S | S | M | S | S | M | S | U | S | M | S |
| Sodium Iodide | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | S | / | S | S | S | S | S | S | M | S | S | S |
| Sodium Nitrate | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | / | S | S | S | S | S | U | S | S | S | S |
| Sodium Sulfate | U | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | M | S | S | S |
| Sodium Sulfide | S | / | S | S | / | / | / | S | / | / | / | S | S | S | U | U | / | / | S | / | / | / | S | S | M | / | S |
| Sodium Sulfite | S | S | S | / | S | S | S | S | M | S | S | S | S | S | S | M | / | S | S | S | S | S | S | S | S | S | S |
| Nickel Salts | U | S | S | S | S | S | / | S | S | S | / | / | S | S | S | S | / | S | S | S | S | S | S | M | S | S | S |
| Oils (Petroleum) | S | S | S | / | / | / | S | U | S | S | S | S | U | U | M | S | M | U | U | S | S | S | U | S | S | S | S |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Norel™ | Polyamide/Nylon | PET™, Polyclear™, Clear Crimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polyetherimide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oils (Other) | S | / | S | / | / | / | S | M | S | S | S | S | U | S | S | S | S | U | S | S | S | S | / | S | S | M | S |
| Oleic Acid | S | / | U | S | S | S | U | U | S | U | S | S | M | S | S | S | S | S | S | S | U | S | M | U | S | M | M |
| Oxalic Acid | U | U | M | S | S | S | U | S | S | S | S | S | U | S | U | S | S | S | S | S | U | S | S | U | M | S | S |
| Perchloric Acid (10 %) | U | / | U | / | S | U | U | / | S | M | M | / | / | M | U | S | S | M | S | / | M | S | U | / | S | / | S |
| Perchloric Acid (70 %) | U | U | U | / | / | U | U | / | S | U | M | U | U | M | U | U | S | M | M | U | M | U | U | S | U | U | S |
| Phenol (5 %) | U | S | U | / | S | M | M | / | S | U | M | U | U | S | U | M | S | M | S | U | U | S | U | M | M | M | S |
| Phenol (50 %) | U | S | U | / | S | U | M | / | S | U | M | U | U | U | U | U | S | U | M | U | U | S | U | U | U | M | S |
| Phosphoric Acid (10 %) | U | U | M | S | S | S | U | S | S | S | S | U | / | S | S | S | S | S | S | S | S | S | U | M | U | S | S |
| Phosphoric Acid (conc.) | U | U | M | M | / | / | U | S | / | M | S | U | U | M | M | S | S | S | M | S | M | S | U | M | U | / | S |
| Physiologic Media (Serum, Urine) | M | S | S | S | / | / | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| Picric Acid | S | S | U | / | S | M | S | S | S | M | S | U | S | S | S | U | S | S | S | S | U | S | U | M | S | M | S |
| Pyridine (50 %) | U | S | U | U | S | U | U | / | U | S | S | U | U | M | U | U | / | U | S | M | U | S | S | U | U | U | U |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Aluminum | Anodic Coating for Aluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Noryl™ | Polyamide/Nylon | PET™, Polyclear™, Clear Grimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polyetherimide | Polyethylene | Polypropylene | Polysulfone | Polyvinyl Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rubidium Bromide | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | S | S | S |
| Rubidium Chloride | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | S | S | S |
| Sucrose | M | S | S | / | S | S | S | / | S | S | S | S | S | S | S | / | / | S | S | S | S | S | S | S | S | S |
| Sucrose, Alkaline | M | S | S | / | S | S | S | / | S | S | S | S | S | U | S | / | S | S | S | S | S | S | S | M | S | S |
| Sulfosalicylic Acid | U | U | S | S | S | S | S | / | S | S | S | U | S | S | S | / | S | S | S | S | S | S | U | S | S | S |
| Nitric Acid (10 %) | U | S | U | S | S | U | U | / | S | U | S | U | / | S | S | S | S | S | S | S | M | S | M | S | S | S |
| Nitric Acid (50 %) | U | S | U | M | S | U | U | / | S | U | S | U | S | M | M | U | M | M | M | U | U | S | U | S | M | S |
| Nitric Acid (95 %) | U | / | U | U | / | U | U | / | / | U | U | U | U | M | U | U | U | U | M | U | U | S | U | S | / | S |
| Hydrochloric Acid (10 %) | U | U | M | S | S | S | U | / | S | S | S | U | U | S | U | S | S | S | S | S | S | S | U | M | S | S |
| Hydrochloric Acid (50 %) | U | U | U | U | S | U | U | / | S | M | S | U | U | M | U | U | S | S | S | S | M | S | U | U | M | M |
| Sulfuric Acid (10 %) | M | U | U | S | S | U | U | / | S | S | M | U | S | S | S | S | S | S | S | S | U | S | U | U | S | S |
| Sulfuric Acid (50 %) | M | U | U | U | S | U | U | / | S | S | M | U | U | S | U | U | U | S | S | S | U | S | U | U | M | S |
| Sulfuric Acid (conc.) | M | U | U | U | / | U | U | M | / | / | M | U | U | S | U | U | U | M | S | U | M | S | U | U | / | S |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | ALUMINUM | ANODIC COATING FOR ALUMINUM | BUNA N | CELLULOSE ACETATE BUTYRATE | POLYURETHANE ROTOR PAINT | COMPOSITE CARBON FIBER/EPOXY | DELRIN™ | ETHYLENE PROPYLENE | GLASS | NEOPRENE | NORYL™ | POLYAMIDE/NYLON | PET™, POLYCLEAR™,CLEAR CRIMP™ | POLYALLOMER | POLYCARBONATE | POLYESTER, GLASS THERMOSET | POLYETHERIMIDE | POLYETHYLENE | POLYPROPYLENE | POLYSULFONE | POLYVINYL CHLORIDE | RULON A™, TEFLON™ | SILICONE RUBBER | STAINLESS STEEL | TITANIUM | TYGON™ | VITON™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STEARIC ACID | S | / | S | / | / | / | S | M | S | S | S | S | / | S | S | S | S | S | S | S | S | S | S | M | S | S | S |
| TETRAHYDROFURAN | S | S | U | U | S | U | M | U | S | U | U | S | U | U | U | / | M | U | S | U | U | S | U | S | S | U | U |
| TOLUENE | S | S | U | U | S | S | M | U | S | U | U | S | U | U | U | S | U | M | U | U | U | S | U | S | U | U | M |
| TRICHLOROACETIC ACID | U | U | U | / | S | S | U | M | S | U | S | U | U | S | M | / | M | S | U | U | U | S | U | U | U | M | U |
| TRICHLOROETHANE | S | / | U | / | / | / | M | U | / | U | / | S | U | U | U | U | U | U | U | U | U | S | U | / | S | / | S |
| TRICHLOROETHYLENE | / | / | U | U | / | / | / | U | / | U | / | S | U | U | U | U | U | U | U | U | U | S | U | / | U | / | S |
| TRISODIUM PHOSPHATE | / | / | / | S | / | / | M | / | / | / | / | / | / | S | / | / | S | S | S | / | / | S | / | / | S | / | S |
| TRIS BUFFER (NEUTRAL PH) | U | S | S | S | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | / | S | S | S | S | S | S |
| TRITON X/100™ | S | S | S | / | S | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| UREA | S | / | U | S | S | S | S | / | / | / | / | S | S | S | M | S | S | S | S | / | S | S | S | M | S | / | S |
| HYDROGEN PEROXIDE (10 %) | U | U | M | S | S | U | U | / | S | S | S | U | S | S | S | M | U | S | S | S | S | S | S | M | S | U | S |
| HYDROGEN PEROXIDE (3 %) | S | M | S | S | S | / | S | / | S | S | S | S | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S |
| XYLENE | S | S | U | S | S | S | M | U | S | U | U | U | U | U | U | M | U | M | U | U | U | S | U | M | S | U | S |

# Chemical Compatibily Chart

| CHEMICAL \ MATERIAL | Alluminum | Anodic Coating for Alluminum | Buna N | Cellulose Acetate Butyrate | Polyurethane Rotor Paint | Composite Carbon Fiber/Epoxy | Delrin™ | Ethylene Propylene | Glass | Neoprene | Noryl™ | Polyamide/Nylon | PET[1], Polyclear™, Clear Crimp™ | Polyallomer | Polycarbonate | Polyester, Glass Thermoset | Polythermide | Polyethylene | Polypropylene | Polysulfone | Polyvynil Chloride | Rulon A™, Teflon™ | Silicone Rubber | Stainless Steel | Titanium | Tygon™ | Viton™ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zinc Chloride | U | U | S | S | S | S | U | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | U | S | S | S |
| Zinc Sulfate | U | S | S | / | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |
| Citric Acid (10 %) | M | S | S | M | S | S | M | S | S | S | S | S | S | S | S | S | M | S | S | S | S | S | S | S | S | S | S |

[1] Polyethlyeneterephtalate

S – Satisfactory.

M – Moderate attack, may be satisfactory for use in centrifuge depending on length of exposure, speed involved, etc.; suggest testing under actual conditions of use.

U – Unsatisfactory, not recommended.

/ – Performance unknown; suggest testing, using sample to avoid loss of valuable material.

**NOTICE** Chemical resistance data is included only as a guide to product use. Because no organized chemical compatibility data exists for materials under the stress of centrifugation, when in doubt we recommend pretesting sample lots.

# Declaration of Decontamination

**NOTICE** Thermo Fisher Scientific representatives will indicate on a customer service repair report if decontamination was required, and if so, what the contaminate was and what procedure was used. If no decontamination was required, it should be stated so.

Print or copy the page with the decontamination certificate. Then complete and attach it to the equipment before shipping for service.

## Instructions

When an instrument that has been used with radioactive, pathogenic, or otherwise hazardous materials requires servicing by Thermo Fisher Scientific personnel either at the customer's laboratory or at Thermo Fisher Scientific facilities, the following procedure must be complied with to insure safety of our personnel:

1. The instrument or part to be serviced shall be cleaned of all blood and other encrusted material and decontaminated prior to servicing by our representative. No radioactivity shall be detectable by survey equipment.

2. A Decontamination Certificate shall be completed and attached to the instrument or part.

If an instrument or part to be serviced does not have a Decontamination Certificate attached to it, and, in our opinion, presents a potential radioactive or biological hazard, our representative will not service the equipment until proper decontamination and certification has been completed.

If an instrument is received at our Service facilities and, in our opinion, poses a radioactive or biological hazard, the sender will be contacted for instructions as to disposition of the equipment. Disposition costs will be borne by the sender.

Copy or print this Decontamination Certificate. Additional Decontamination Certificates are available from your local technical or customer service representative. In the event these certificates are not available, a written statement certifying that the instrument or part has been properly decontaminated and outlining the procedures used will be acceptable.

## Decontamination Certificate

DECONTAMINATION

CERTIFIED BY _____ TITLE/POSITION _____

PHONE _____ FAX _____

DEPARTMENT _____ INSTITUTION _____

ADDRESS _____ CITY _____

STATE _____ ZIP _____

INSTRUMENT _____ SERIAL NUMBER _____

ROTOR _____ SERIAL NUMBER _____

PART _____ PART NUMBER _____

HAZARDOUS CONTAMINANTS(S) _____

DECONTAMINATION DATE _____

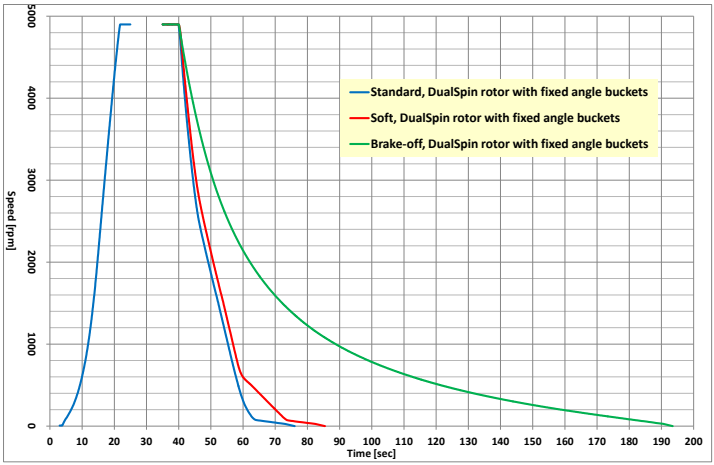
DECONTAMINATION METHOD(S) _____

DECONTAMINATION CERTIFIER'S SIGNATURE _____DATE _____

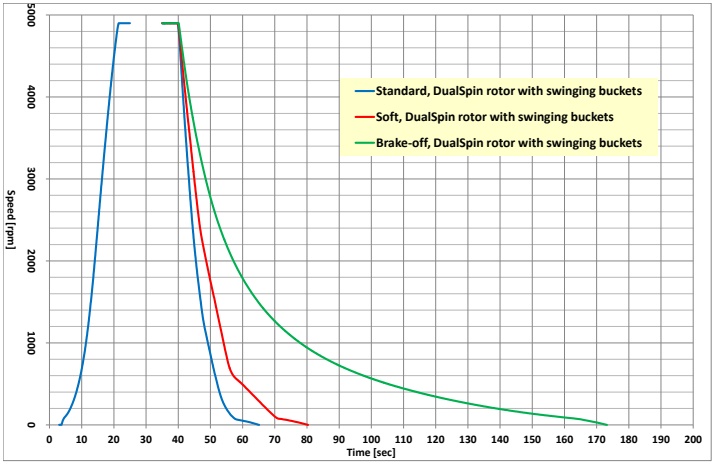
# Acceleration/Deceleration Profiles

The diagrams shown are both based on a fully loaded rotor operated at rated voltage. Your actual operating results may differ, depending on the operating conditions. Therefore, the diagrams are for reference purposes only.

## Fixed Angle




## Swing Out



# Index

thermoscientific

CE IVD

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Germany

**thermofisher.com/centrifuge**



Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.
Shown pictures within the manual are examples and may differ considering the set parameters and language.

en

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50151770 is the original instruction manual.

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