



## STANDARD OPERATING PROCEDURE

<b>SOP NUMBER</b> <b>FSN-006-01</b>	<b>SOP TITLE</b> <b>OPERATING PROCEDURE FOR SIGMA 2-16P CENTRIFUGE</b>
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**PART 1**

<b>Author</b>	
<b>Pierre Micallef</b> Lab Manager – RSSD	

**PART 2**

<b>Approver</b>	<b>Approver</b>
<b>Prof. Vasilis Valdramidis</b> Associate Professor – Food Sciences & Nutrition	<b>Joseph Mark Gatt</b> Assist. Lab Manager – Faculty of Health Sciences
<b>Approver</b>	<b>Approver</b>
<b>Aaron Busuttil</b> Lab Officer – Food Sciences & Nutrition	<b>Louis Coleiro</b> Health & Safety Officer
<b>Approver</b>	<b>Approver</b>
<b>Deborah Duca</b> Senior Manager – RSSD	<b>Dr. Claire Sillato Copperstone</b> Head of Dept. – Food Sciences & Nutrition

**PART 3**

<b>Authorizer</b>	<b>Date of Issue:</b>
<b>Dr. Axel Steuwer</b> Director – Research Support Services Directorate	<b>Date of next revision:</b>

**PART 4 (To be filled in by OOS, QSU or RSSD)**

<input type="checkbox"/> This procedure has been revised and is no longer valid as from:  (Write date)	<input type="checkbox"/> Date of NEXT REVISION is extended until:  (Max. 4 years)	<input type="checkbox"/> SOP rendered obsolete on:  (Write date)
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## 1. Reason for revision

- 1.1. Not applicable. New SOP

## 2. Purpose and scope

- 2.1. The SOP is intended to provide a guideline to the proper use of the centrifuge together with any safety precautions that need to be observed during its operation and maintenance. However it is imperative to note that in no way does this procedure replace either the manufacturer's detailed User Operating Manual (which should also be readily accessible in the lab) or a proper on-site training by qualified staff on how to operate the autoclave.
- 2.2. Within the scope of implementation of this SOP are all laboratory personnel authorized and trained to use the autoclave.

## 3. Definitions

- 3.1. SOP – Standard Operating Procedure

## 4. Responsibilities

### 4.1. User's Responsibilities

The user is responsible for ensuring that:

- the centrifuge is used only for the purpose that it was originally intended for.
- the centrifuge is used only if it is in a perfect running state.
- any problems that can affect safety are immediately reported to the Head of Lab.
- a record is entered in the Log book each time the centrifuge is used or any service intervention is made to it as per SOP ZRH-OP-002.

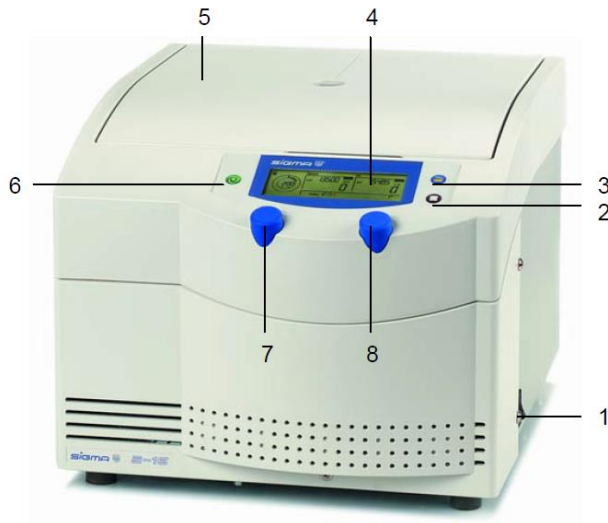
## 5. Health and Safety Requirements

- 5.1 Operators must check the centrifuge, rotor and accessories for external signs of damage prior to start-up. Do not use the centrifuge with rotors and accessories that have not been approved by the manufacturer.
- 5.2 Ensure that the rotor is correctly fitted and loaded symmetrically at equal weights.
- 5.3 The load of the rotor (as defined in the engraving on the rotor or bucket) and the maximum speed must not be exceeded.
- 5.4 Do not open the lid or reach into the chamber when the rotor is still in motion.
- 5.5 Disinfect and sterilize internal accessories properly before any service intervention.
- 5.6 Spin infectious material in sealed rotors and buckets only in order to prevent the material from leaking into the centrifuge and from spreading of aerosols to the environment.
- 5.7 Materials that chemically react with each other with a high level of energy are prohibited.  
*(Please refer to the Operator's Manual -Section 2.5, for a detailed list full safety precautions and hazards that need to be observed prior to use of the centrifuge.)*

## 6. Procedure

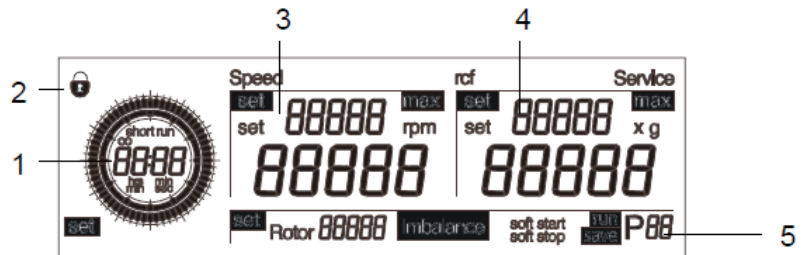
### 6.1 Operation and Display

- 1 Mains Power Switch
- 2 Stop Key
- 3 Lid Key
- 4 Display
- 5 Lid
- 6 Start Key
- 7 Left rotary knob
- 8 Right rotary knob



Total view of the centrifuge (Diagram 1)


- 1 Time field
- 2 "Lock" symbol for lockdown.
- 3 Speed field
- 4 RCF field
- 5 Field for rotor selection, imbalance indication, run mode and program selection



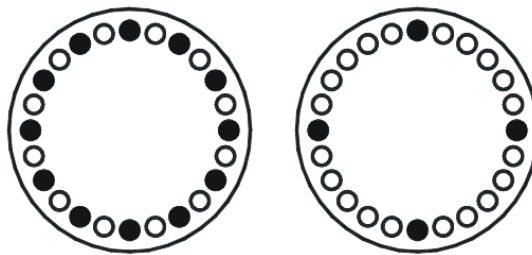
Display options – completely active (Diagram 2)

6.1.1 The following parameters can be set:

- Speed in steps of 100 or 1 rpm
- Relative centrifugal force RCF in steps of 1 or 10 x g
- Time between 10 sec and 11h 59min max.
- Continuous run
- Short run
- Rotor preselection
- Acceleration and deceleration curves
- Storage and call-up of programs

- 6.1.2 The centrifuge can only be started when the lid is properly closed and only be opened when the rotor has stopped. If the lid is opened by way of the emergency release system during operation, the centrifuge will immediately switch off and decelerate brakeless.
- 6.1.3 Power **ON** the centrifuge (Diagram 1) – all of the operating keys and displays will be illuminated for a short time. It is now ready for operation whereby parameters can be changed by way of the two rotary knobs.
- 6.1.4 Press the illuminated lid key  (Diagram 1) to open the lid with the centrifuge at a standstill and load the rotor.
- 6.1.5 Load the rotor ensuring this is done symmetrically. The "Imbalance" display may light up or emit a sound in order to indicate that the centrifuge is in the inadmissible imbalance range. If the rotor is loaded unevenly, the drive will be switched off in the acceleration phase or during the run. The message "Imbalance" and the error number "46" will then flash on the display. The lid opens automatically after the rotor has come to a standstill. In both cases, loading has to be checked and balanced.

Some configuration examples for a fixed angle rotor are depicted below:



Fixed angle rotor loading examples (24 x 2.2 ml)

*(Since a different array of rotor options is available, please refer to the Operating Manual- Sections 5.2.3 and 5.2.4 for a full and detailed description on how to load the rotor for each of the different categories.)*

- 6.1.6 Once the rotor has been loaded, close the lid again by pressing down on the two sides to ensure that both of the lid locks snap into place.
- 6.1.7 **TIME:** Select the desired run duration by turning the left rotary knob till the word "Set" appears in the lower left display "Time field" (Diagram 2) and select this by pressing the right knob once. Whilst flashing, continue turning the right rotary knob until the desired duration is displayed and press this knob a second time to confirm the input.
- 6.1.8 **SPEED:** Select the desired speed (Revs per minute) by turning the left rotary knob till the word "Set" appears in the field "Speed" (Diagram 2) and select this by pressing the right knob once. Whilst flashing, continue turning the right rotary knob until the desired speed is displayed and press this knob a second time to confirm the selected value.


6.1.9 **RCF:** Select the desired acceleration that the sample needs to be subjected to by turning the left rotary knob till the word "Set" appears in the field "RCF" (Diagram 2) and select this by pressing the right knob once. Whilst flashing, continue turning the right rotary knob until the desired RCF is displayed and press this knob a second time to confirm the selected value.


6.1.10 **ROTOR:** After inserting the rotor, the rotor ID will be automatically displayed. The rotor can however also be preselected manually as follows. Select the desired rotor needed by turning the left rotary knob till the word "Set" appears in the field "Rotor" (Diagram 2) and select this by pressing the right knob once. Whilst flashing, continue turning the right rotary knob until the desired rotor number is displayed and press this knob a second time to confirm the selected value.

**Note:** If the rotors 12072 or 12107 are not preselected:

- rotor 12072 will be automatically displayed as 12073
- rotor 12107 will be automatically displayed as 12133

*(Details on how to change the default increments for Time, Speed and RCF can be found in the Operator's Manual - Section 5.3)*

6.1.11 Press the **Start** key  (Diagram 1) when this is illuminated in order to start a centrifugation run. The process will automatically come to an end once the pre-set time has been reached.

6.1.12 At the end of the run, the lid can be opened by pressing the Lid key  again.

### Options

The centrifuge is also equipped with an option for **Automatic-Lid Opening** function that allows the lid to open automatically at the end of the operation.


- **To activate:** Press the Lid Key three times when the lid is open and on the third time hold it down for approx. two seconds.
- **To deactivate:** proceed the same way in order to deactivate the function.

After every change, the current status of the setting is displayed in the form of a message running on the display ("Auto-Lid-Open on" or "off").

(Note that the end of operation sound signal can also be deactivated by pressing the Lid Key five times and holding it for approx. 2 seconds on the fifth time.)

- **Short Run:** allows the centrifuge to accelerate at maximum power until the maximum speed is reached. To do so:
  - (i) Keep the Start key pressed until required. The message "Short run" and actual duration is shown in the Time display.
  - (ii) When the Start key is released, the centrifuge decelerates at maximum power to a standstill.
- **Continuous Run:** allows for an unlimited runtime in which the centrifuge accelerates during the run until the set speed is reached. To do so:

- (i) Starting with the time setting 0:10, turn the knob anticlockwise until the message "cont" and the symbol "∞" is displayed.
- (ii) The centrifuge keeps spinning indefinitely until it is stopped manually.

6.1.13 To interrupt a centrifugation run prematurely, press the **Stop**  key (Diagram 1). If you wish to interrupt the stop command and restart centrifugation, press the Start key again during the deceleration process.

The centrifuge also allows for extending both the acceleration time (**Softstart**) and the deceleration time (**Softstop**).

*(Details on how to perform both these functions can be found in the Operator's Manual - Section 5.2.7.2)*

## 6.2 Program

6.2.1 Up to 50 different programs can be saved and called up again at a later stage:

### ***To save current settings:***

At standstill, turn the left rotary knob till the word "Save" appears in the display and select by pressing down the right rotary knob once. Whilst flashing continue to turn the right rotary knob until the desired program (empty storage location numbers flash) is displayed and press this knob a second time to confirm the input.

### ***To recall a stored program:***

At standstill, turn the left rotary knob till the word "Run" appears in the display and select by pressing down the right rotary knob once. Whilst flashing, continue to turn the right rotary knob until the desired pre-program is displayed and press this knob a second time to confirm the input.

## 6.3 Maintenance

6.3.1 Check all of the safety-relevant parts of the centrifuge at least once per month for any visible signs of damage (e.g. cracks, corrosion). This applies particularly to the following:

- Concentricity of the motor shaft:
- Visual inspection: Slowly rotate the rotor by hand without the rotor tie down screw. If the motor shaft does not turn around on a perpendicular axis, the motor and motor shaft must be replaced.
- Refit the rotor correctly after visual inspection (Refer to Operating Manual - Section see 5.2.3).
- Auditory inspection: Check the unit for atypical running noises.
- Fastening of the trunnion pins (hinges) in the rotor.
- Screw connections.

6.3.2 Open the centrifuge when it is not in use so that moisture can evaporate. This prevents the increased wear of the motor bearings.

- 6.3.3 Use only soap water or other mold cleaning agents (pH 6-8) for routine cleaning of the centrifuge.

*(Refer to the Operating Manual – Section 7.1 for a detailed overview of the care and maintenance procedures for all accessories of the centrifuge.)*

#### 6.4 Spillages and decontamination

- 6.4.1 If the centrifuge/ rotor has been contaminated with toxic or pathogenic substances clean the chamber immediately with a suitable decontamination agent after having carefully removed all liquids with a cloth. Wear the necessary personal protective equipment and gloves when carrying out the cleaning process and autoclave the cloth prior to disposal.
- 6.4.2 When autoclaving of the rotor chamber and internal accessories is considered necessary to ensure sterilization, refer to Appendix 1 for the correct parameters to apply.
- 6.4.3 IMPORTANT: Never carry out any repairs on the centrifuge before it has been properly and fully disinfected and sterilized.

#### 7. References

- 7.1. Operating Manual “Sigma Laboratory Centrifuge 2-16P”; Serial Number 120756; Edition 04/2007.
- 7.2. SOP-ZRH-OP-002: Equipment Log Book.

#### 8. List of Appendices/Worksheets

- 8.1. Appendix 1 – Autoclaving settings for rotors and accessories.

**Appendix 1**

**Autoclaving settings for rotor chambers and accessories**

Accessories	max. temp. °C	min. time min	max. time min	max. cycles
Glass tubes	134-138	3	40	-
Polycarbonate tubes	115-118	30	40	20
Polypropylene tubes	115-118	30	40	30
Teflon tubes	134-138	3	5	100
Aluminum rotors	134-138	3	5	-
Polycarbonate/Polyallomer lids for angle rotors	115-118	30	40	20
Polysulfone lids for angle rotors	134-138	3	5	100
Aluminum buckets	134-138	3	5	-
Polycarbonate caps for buckets	115-118	30	40	50
Polypropylene caps for buckets	115-118	30	40	50
Polysulfone caps for buckets	134-138	3	5	100
Rubber adapters	115-118	30	40	-
Rubber cushions	115-118	30	40	-
Round carriers made of polypropylene	115-118	30	40	-
ditto, made of polyallomer and polycarbonate	115-118	30	40	-
Rectangular carriers made of polypropylene	115-118	30	40	-
ditto, made of polyallomer and polycarbonate	115-118	30	40	-