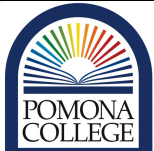


| | | | |
|---|---|----------------------------------|-----------|
|  | Environmental Analysis Teaching and Research Laboratory | Date: 09/XX/2014 | Number: X |
| | Standard Operating Procedure | Title: mySPIN 12 Microcentrifuge | |
| | Approved By: TBD | Revision Date: November 11, 2016 | |

1. Scope and Application

1.1 The scope of this SOP is to train researchers in how to effectively use the Microcentrifuge system.

1.2 As a researcher, the microcentrifuge is an essential part of the lab. This device will allow for the spinning of relatively small amounts of liquid samples at speeds reaching tens of thousands of g-force.

2. Summary of Method

2.1 This SOP provides instructions on how to use the Thermo Scientific mySPIN 12 Microcentrifuge.

2.2 This SOP also provides some guidance on how to troubleshoot an issue should any problems arise.

Contents

| | | |
|-----------|---|----------|
| 1 | Scope and Application | 1 |
| 2 | Summary of Method | 1 |
| 3 | Acknowledgements | 3 |
| 4 | Definitions | 3 |
| 5 | Biases and Interferences | 3 |
| 6 | Health and Safety | 3 |
| 7 | Personnel & Training Responsibilities | 3 |
| 8 | Required Materials and Apparati | 4 |
| 9 | Reagents and Standards | 4 |
| 10 | Estimated Time | 4 |
| 11 | Sample Collection, Preservation, and Storage | 4 |

| | |
|--|----------|
| 12 Procedure | 4 |
| 13 Data Analysis and Calculations | 6 |
| 14 Error Status | 6 |
| 15 Trouble Shooting | 7 |
| 16 Balancing the Rotor | 8 |
| 17 Rotor Installation and removal | 8 |
| 18 QC/QA Criteria | 8 |
| 19 References | 8 |

3. Acknowledgements

3.1 As usual we acknowledge the students who have tried to follow and made suggestions on how to improve this guide. In particular, Edinam E, etc.

4. Definitions

4.1 When looking at the display of the microcentrifuge there are several terms that will be displayed on the front panel. They are as follows.

- Lid Open: Indicates the lid is open
- Ready: Unit is ready to centrifuge
- Spin Up: The centrifuge cycle is starting and is increasing in speed
- Spinning: The centrifuge is running in Standard mode
- Spin Down: The centrifuge cycle is slowing down
- Stopped: The centrifuge cycle has stopped
- Completed: The centrifuge cycle has finished
- Quick Spin: When the quick spin sign flashes on the panel the centrifuge is running in quick spin mode
- Error: The centrifuge has encountered an error

5. Biases and Interferences

5.1 Biases and interferences can come from...

6. Health and Safety

6.1 Describe the risk...

Safety and Personnel Protective Equipment

7. Personnel & Training Responsibilities

7.1 Researchers training is required before the procedures in this method can be used...

7.2 Researchers using this SOP should be trained for the following SOPs:

- SOP01 Laboratory Safety
- SOP02 Field Safety

8. Required Materials and Apparati

8.1 Item 1 w/catalog number!

8.2 Item 2

9. Reagents and Standards

10. Estimated Time

10.1 This procedure requires XX minutes...

11. Sample Collection, Preservation, and Storage

12. Procedure

Prior to Using

12.1 Turn the power switch on the rear to the ON position. The unit will initialize.

12.2 Press the OPEN button. The lid should pop up slightly. Lift the front of the lid and gently up and backward until approximately 90 degrees vertical.

12.3 Remove any remianing packaging materials.

12.4 Verify that the rotor is installed correctly. Do not run without the rotor being installed. Close the lid.

12.5 Press the START/STOP button, the rotor should should spin up to the present speed. If there is a smooth whirring sound and the unit accelerates with little or no vibration, the minicentrifuge is ready to use. If there are loud or unusal sounds, or excessive vibration, DO NOT OPERATE. Contact Thermo Fisher Scientific service.

12.6 At the set time, the rotor will spin down, stop and the unit will emit a beep when the cycle is complete.

General Operation

12.7 The following steps are for general usage of the microcentrifuge

- 1. Turn the power switch on the back of the unit ON. The unit intialize.

- 2. To open the lid, press the OPEN button. The lid should pop up slightly. Lift the front of the lid gently up and backward until approximately 90 degrees vertical.
- 3. On benchtop, prepare samples tubes in a rack so that tubes are filled to equal levels. Close tube lids.
- 4. Install tubes in the rotor in a balanced manner. Instructions on proper balancing are to follow.
- 5. Set the appropriate time by pressing the TIME UP/DOWN button.
- 6. Set the appropriate rpm by pressing the SPEED UP/DOWN button.
- 7. Place the standard rotor cover on the rotor to limit noise and aspiration of liquids that may escape from tubes.
- 8. Close Lid and press down until locked. The Display should read "READY".
- 9. Press START/STOP. The rotor should spin up to the user set speed.
- 10. At a determined time the rotor will spin down and stop at the present time.
- 11. The unit will then emit a beep when the cycle is complete.
- 12. To open the lid, press the OPEN button.

Quick Spin Operation

12.8 The following are instructions on how to use the Quick Spin operation

- 1. Prepare the unit for centrifugation as in the General Operation section
- 2. Press QUICK SPIN button with the rotors speed set previously
- 3. The timer will begin counting
- 4. Once enough time has elapsed for your needs, release the QUICK SPIN button. The rotor will spin down, stop and the unit will emit a beep when the cycle is complete.
- 5. To open the lid, press the OPEN button.

Other Functions

12.9 To change between RPM and RCF, prior to a spin cycle, press both the SPEED UP and DOWN buttons simultaneously. This will convert the speed setting to the other.

12.10 If for any reason you need to stop the cycle quickly, press and hold the START/STOP button. The cycle will stop more rapidly than normal. CAUTION this may disturb the contents of the tube during the quick stop process.

13. Data Analysis and Calculations

14. Error Status

14.1 If an error happens, the unit will beep and the display will indicate the error. The following delineates the possible error statuses.

Motor Overload

14.2 If you receive a Motor Overload error, this means something is interfering with the rotor. To fix this, clear the rotor and reset.

User Stop

14.3 If you receive a User Stop error, this means you have held down the START/STOP and implemented a quick stop.

Balance

14.4 If you receive a Balance error, inspect the tubes for equal tube filling or improper placement. Once you have determined everything is correct, rerun the microcentrifuge.

14.5 If the balance error continues to happen, remove the tubes and determine if the balance error still persists with an empty rotor.

14.6 If the error continues to persist, inspect the rotor for improper installation.

Temperature

14.7 If you receive a Temperature error the unit has exceeded the normal operating temperature.

14.8 To rectify this, turn off the unit and allow it to cool.

Excessive Tilt

14.9 If you receive a Excessive Tilt error the unit has experienced a non-normal tilt event. In this case, make sure the unit is placed on a level surface. Once corrected, rerun.

Lid Fail

14.10 If you receive a Lid Fail error this means the lid has opened during the cycle.

14.11 To rectify this check for proper operation of the lid lock mechanism. The lid should stay locked during the entire cycle.

Rotor Lock

14.12 If you receive a Rotor Lock error this means the unit has experienced a problem with the rotor.

14.13 To rectify this, correct the rotor interference. Once corrected, rerun.

15. Trouble Shooting

No Power Present

15.1 If there is no power present verify that the AC adapter is fully plugged into the wall and rear of the unit. Additionally, verify that the power switch is turned on.

Unit not operating normally

15.2 In the case where the unit or display is not functioning normally, turn off the unit, wait for 2 minutes, and turn the power back on.

Excessive vibration/ noise

15.3 If your unit is making excessive vibrations or noise, inspect the tubes for equal fill or improper placement. Inspect the rotor for improper installation. Finally, remove the tubes and determine if the noise persists with an empty rotor.

Lid will not close

15.4 If the lid of the unit will not close, verify that nothing is blocking the lid from fully closing. After which, verify that nothing has fallen into the lock mechanism opening.

Lid will not open

15.5 If you for any reason you need to manually open the lid to access tubes due to an error or power loss, please perform the following:

15.6 1. Turn off the unit and remove the power cord.

15.7 2. Make sure the rotor has stopped completely.

15.8 3. Use a thin rod and insert it into the opening on the button.

15.9 4. Press gently but firmly. You will feel a mechanical movement within the unit and the lid will release.

15.10 5. Remove the rod, set the unit on the feet.

15.11 6. Remove your tubes and reclose the lid.

16. Balancing the Rotor

16.1 Tubes of equal weight and size should be placed opposite each other. Use additional sample or water in other tubes to provide a balanced rotor. Examples of proper sample balancing are shown in the figures below.

17. Rotor Installation and removal

17.1 To remove the rotor do as follows.

- 1. With one hand, grasp the rotor. With the other hand, unscrew the center knob counter clockwise until it disengages from the motor shaft.
- 2. Pull up on the center knob firmly. The rotor should easily lift off of the motor drive.

17.2 To install the rotor do as follows.

- 1. Check to make sure the bands on the rotor are in the slots.
- 2. Set rotor onto the motor drive and push down until seated.
- 3. With one hand, grasp the rotor. With the other hand, screw the center knob clockwise until it engages the motor shaft. Keep turning the knob until it tightens.
- 4. Do not overtighten the knob.

18. QC/QA Criteria

19. References

19.1 APHA, AWWA. WEF. (2012) Standard Methods for examination of water and wastewater. 22nd American Public Health Association (Eds.). Washington. 1360 pp. (2014).