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**CLEMENTS**

proven through performance

# Orbital 360 Benchtop Centrifuge

**CEN 91705**  
220-240V 50/60Hz



## User Manual

Manual No. CEN 91705 017  
Issue 1

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## **Safety**

Thank you for purchasing this Clements Orbital 360 Centrifuge. For your safety it is imperative that this unit only be operated by authorised personnel in accordance with the instructions as described in this manual. Operated in this way, the Orbital 360 Centrifuge will provide the standard of service specified.

Due to continual improvements in product design, the Orbital 360 Centrifuge may vary in detail from the descriptions in this manual. In the event of further questions please contact your local distributor or BMDi TUTA Healthcare direct.

User Manual Orbital 360 Centrifuge

Manual Number CEN 91705 017 Issue 1

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## **Description**

The Orbital 360 Centrifuge is a versatile, compact and reliable benchtop centrifuge. It is designed for clinical and small laboratory applications where precise digital control of speed and time is required.

## **Features**

- Brushless DC motor technology for low maintenance operation
- Accurate digital control of speed and time for repeatable processing
- High visibility backlit LCD display with touch control panel
- Electronic lid interlock to ensure that centrifuge can be started and run only with lid locked
- Stainless steel bowl
- Adjustable acceleration and deceleration for sensitive samples
- Concurrent display of rpm and RCF
- 25 user programs
- Simultaneous display of all parameters
- Previous parameters maintained through power off/on

## Specifications

Speed Range	100 to 5000 rpm
Maximum RCF	4100 x g
Speed Accuracy	±50 rpm
Time Range	1 to 99 minutes
Angle Rotors	24 x 10 ml
Swing-out Rotors	4 x 50 ml 12 x 15 ml 24 x 5 ml
Power Requirement	220-240V 50/60Hz 5A
Electrical Protection	Class I
Noise	< 65dB(A)
Dimensions	370 (W) x 250 (H) x 432 (D) mm
Weight	15kg
Environment	Indoor 10 to 35°C, RH < 85%

## Package Contents

Item	Description	Qty
CEN 91705	Cell Cycle 360 Centrifuge 240V 50Hz	1
CEN 91700 036	Tool, Rotor Screwdriver, Philips Head, 110 x 5.5mm	1
CEN 91700 037	Tool, Lid Release Screwdriver, Philips Head, 120 x 2.9mm	1
CEN 91700 038	Lead, Mains Power, IEC Socket – Earthed Australian Plug	1
CEN 91700 040	Kit, Fuse, 5 x 20mm, T5.0A 250V (Pack 4)	1

## **Warnings and Cautions**

For safe operation ensure that users read, understand and observe the instructions and recommendations in this user manual.

### **Power**

Ensure that the mains power supply matches that shown on the rating label of the centrifuge.

### **Flammable Samples**

The centrifuge is not flameproof. Do not use flammable samples in the centrifuge. Do not store flammable or volatile material within 300mm of the centrifuge.

### **Biohazardous Samples**

Local protocols must be observed when handling potentially biohazardous materials. Carriers with aerosol protection are to be used.

### **Fluid Spill**

Do not allow fluids to enter the centrifuge. If a spill occurs wipe clean, paying attention to the nature of the material.

### **Balancing**

The centrifuge must always be run with a full complement of buckets or carriers. Balance samples either *by eye* or by weighing. Fill unused tubes with an equivalent amount of fluid as in sample tube.

### **Operating**

Do not stand within 300mm of centrifuge while it is running.  
Do not move centrifuge while the rotor is spinning.  
Do not open lid while rotor is spinning.  
Do not attempt to stop rotor by hand.

## **Installation**

### **Unpacking**

Keep centrifuge horizontal while removing it from carton. Retain packaging for transporting centrifuge. With power off, release lid lock by inserting manual release tool in small hole on top right hand side of centrifuge. Keep tool parallel to front of panel and press release plate. Remove tool.

Remove packing, carriers etc from centrifuge bowl. Ensure that bowl is clean.

### **Location**

The centrifuge should be placed on a solid level surface in a well ventilated area. The back of the centrifuge must be at least 10cm away from any wall or vertical surface.

### **Power Requirements**

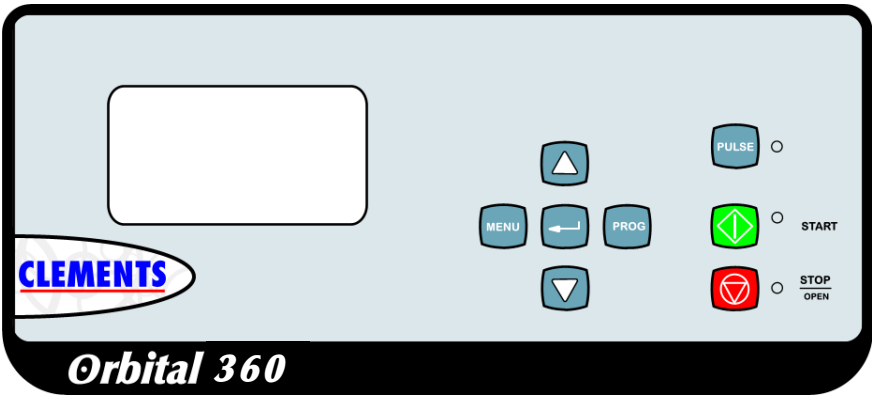
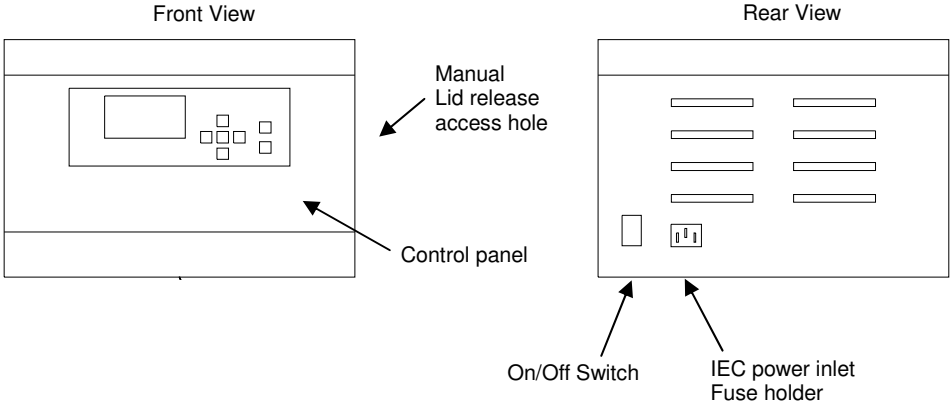
Before connecting the centrifuge to the mains power supply, ensure that the electricity supply conforms to the requirements for voltage and frequency shown on the rating label on the back of the unit.

The power supply should be stable, clean and free of surges and brownouts.

Connect the centrifuge to the mains power supply using the supplied earthed power cable.

For extended periods of non-use, switch off main power switch on rear panel of centrifuge.




**Controls**



Condition	LCD Display Shows
In Spin Cycle	Actual and Set Values of Speed / RCF and Time Remaining
Setting Mode	Set Values of Parameter
Error	Error code n of form En



## Controls

Item	Function
On/Off Switch	Switches mains power to centrifuge.
IEC Inlet	Mains power inlet. Also contains fuse holder.
Lid release access hole	Access for manual lid release tool. Centrifuge must be disconnected from power.
<b>STOP / OPEN</b> Button	Stops spin cycle. When rotor has stopped acts as lid release button. Cancels error condition.
<b>START</b> Button	Starts spin cycle.
<b>PULSE</b> Button	Spins rotor when held down.
<b>ENTER</b> Button 	Enters and saves changed parameters. Exits parameter setting mode. Selects user program. Exits program mode.
<b>INC</b> Button 	Increases value of set parameters.
<b>DEC</b> Button 	Decreases value of set parameters.
<b>PROG</b> Button	Enters user program mode. Times out after 5 seconds.
<b>MENU</b> Button	Steps through parameter change menu in circular fashion. Times out after 5 seconds.
<b>SPIN LED</b> (Green)	Indicates that spin cycle is in progress.
<b>STOP LED</b> (Red)	Flashing - indicates that spin cycle is stopping. Continuous - indicates that rotor has stopped.

## **Operation**

### **Rotor Fitting**

1. Open lid and switch off centrifuge.
2. Remove carriers from rotor.
3. While supporting rotor with one hand, unscrew (CCW) rotor-retaining cap screw.
4. Lift off rotor being careful not to bend or apply side load to motor shaft.
5. Select a compatible rotor, align the slot in the rotor shaft with the drive pin in the motor shaft and fit together.
6. Fit cap screw and washer to rotor.
7. While supporting rotor with one hand, hand tighten (CW) rotor-retaining cap screw - again being careful not to bend or apply side load to motor shaft..
8. Confirm that rotor rotates smoothly and evenly by hand.

### **Carrier Fitting** (swing-out style rotors)

1. Fit a full complement of compatible carriers to the rotor.
2. Ensure that carriers are fully seated and can swing freely.
3. Switch centrifuge power on.

### **Tube Fitting**

Select a full complement of compatible tubes with an RCF rating in excess of the maximum RCF of the centrifuge.

### **Balancing of Samples**

It is important that the samples are correctly balanced within the centrifuge prior to starting the unit. For correct balance there are two requirements:

1. Balance the weight of the samples
2. Balance the location of the samples

## 1. Balance the weight of the samples

For every sample in the centrifuge there must be a balancing sample of equal weight. The samples may be balanced 'by eye' i.e. two samples appear to contain the same volume and are therefore approximately the same weight.

Where delicate samples are involved, it is recommended that the samples be placed in Tube Carriers and balanced by weighing them. This will ensure that vibration during the centrifugation process will be kept to a minimum.

## 2. Balance the location of the samples

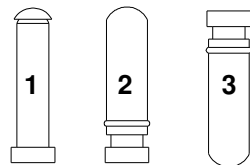
The samples must be placed on the Rotor so that the weight of the samples is equally distributed. To do this the equally weighted samples must be placed in diametrically opposite positions on the rotor.

**Note:** Even though the Orbital 360 is designed to absorb considerable out-of-balance forces, running the centrifuge with out-of-balance samples will cause excessive vibration. This will disturb the samples, affect the overall performance of the unit and may lead to mechanical damage.

## Cushion Fitting

To ensure that the cushions are correctly fitted it is recommended that the cushion be fitted to the tube while it is inverted. The carrier (or carrier plus hanger) is placed over the tube and cushion – still inverted. The assembly is fitted to the rotor. Confirm that all tubes are at the same height by observing the graduation marks at the open end of the carrier

Note that this should be done every time that a tube is placed in a carrier. A cushion that was previously correctly placed in the carrier can momentarily adhere to the tube as it is withdrawn and then sit at an angle.



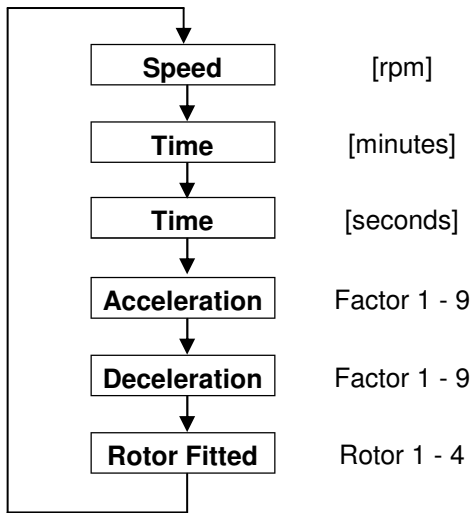
## Parameter Setting Menu

Press **MENU** to select parameter setting mode.

Each press of the **MENU** button advances to the next parameter.

Press **ENTER** to save the parameters and exit the parameter setting mode.

Parameter setting mode is automatically cancelled after a 5 second timeout with no button pressed.



## Set Rotor Fitted

**Note: It is essential that the rotor setting matches the rotor fitted. Otherwise the rotor could be subject to speeds in excess of its rating leading to damage to the rotor.**

1. Ensure the rotor is stopped.
2. Press the **MENU** button until the rotor field is highlighted.
3. Press the **INC** or **DEC** buttons until the rotor number matches the rotor that is fitted to the centrifuge. See table page 15.
4. Press the **ENTER** button to save the setting.

### **Set Speed**

1. Press **MENU** button until speed field is highlighted.
2. Press **INC** or **DEC** to select required speed. Note that speed changes in steps of 100rpm and will auto-increment or auto-decrement if the **INC** or **DEC** button is held down. (The speed will be limited to the maximum permitted for the selected rotor.)
3. Press the **ENTER** button to save the setting.

### **Set Time**

1. Press **MENU** button until minutes or seconds of time field is highlighted.
2. Press **INC** or **DEC** to select required time. Note that time changes in steps of 1 and will auto-increment or auto-decrement if the **INC** or **DEC** button is held down.
3. Press the **ENTER** button to save the setting.

### **Set Acceleration Profile**

1. Press the **MENU** button until the acceleration field is highlighted.
2. Press the **INC** or **DEC** buttons to select the required acceleration profile. Acceleration profiles range from a minimum of 1 to a maximum of 9. The default acceleration profile is 6.
3. Press the **ENTER** button to save the setting.

### **Set Deceleration Profile**

1. Press the **MENU** button until the deceleration field is highlighted.
2. Press the **INC** or **DEC** buttons to select the required deceleration profile. Deceleration profiles range from a minimum of 1 to a maximum of 9. The default deceleration profile is 5.
3. Press the **ENTER** button to save the setting.

## **User Programs**

There are 15 user programs available that each store a complete set of parameters (i.e. speed, time, acceleration, deceleration and rotor) for a particular centrifugation process.

User programs are *viewed* or *selected* in program mode which is accessed via the **PROG** button.

User programs are *altered* in parameter setting mode which is accessed via the **MENU** button. Alterations are made to the *currently selected* user program.

### **View User Program**

1. Press **PROG** button. Press **INC** or **DEC** buttons to increment or decrement program number. (Holding **INC** or **DEC** buttons down will auto-increment or auto-decrement the selected value.)
2. With no button pressed for 5 seconds unit will time out and revert to previously selected user program.

### **Select User Program**

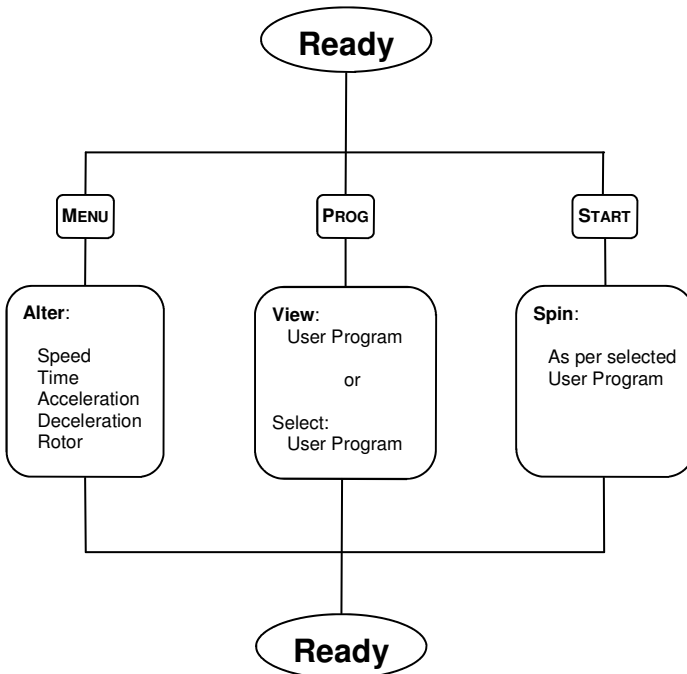
1. Press **PROG** button. Press **INC** or **DEC** buttons to increment or decrement program number. (Holding **INC** or **DEC** buttons down will auto-increment or auto-decrement the selected value.)
2. Press **ENTER** to make the displayed user program the currently selected user program.

### **Alter User Program**

1. Select the required user program using the steps in *Select User Program* above.
2. Press **MENU** to select parameter setting mode.
3. Each press of the **MENU** button advances to the next parameter.
4. Alter the required parameters as described on the previous page.
5. Press **ENTER** to save the parameters and exit the parameter setting mode.
6. Parameter setting mode is automatically cancelled after a 5 second timeout with no button pressed.

**Warning**  
**Rotor selected must match rotor fitted.**

Pay particular attention to ensuring that the rotor set in the user program selected matches the actual rotor fitted. Otherwise the rotor could be subject to speeds in excess of its rating leading to damage to the rotor.



## Operation Summary

See previous sections for details of individual steps.

1. Confirm that correct rotor is selected.
2. Load a balanced and evenly distributed set of sample tubes.
3. Close lid.
4. Confirm acceleration and deceleration profiles.
5. Set required speed.
6. Set required spin time.
7. Press START button.
  - The rotor will automatically accelerate to the set speed using the set acceleration profile.
  - The rotor will spin for the set time with the time display counting down to zero.
  - The rotor will automatically decelerate to zero using the set deceleration profile.
  - When the rotor has stopped the beeper will signal the end of the spin cycle.
8. Press the STOP / OPEN button to unlock the lid.

**Note: For repeat operations using the same settings, the only steps required are to load the samples, close the lid and press the START button.**

**The previous settings are automatically restored at power-on.**

## Rotor Setting

Rotor	Type	Carriers / Tubes	Max rpm	Max x g	Rotor Setting
CEN 91700 001	Angle	24 x 10ml	4000	2850	1
CEN 91700 002	Swing	12 x 15ml	5000	4100	2
CEN 91700 003	Swing	24 x 5ml	5000	4100	4
CEN 91700 004	Swing	4 x 50ml	4200	2760	3



**Angle Rotor CEN 91700 001**

**24 x 10ml Tubes**

**Max rpm: 4000**

**Max RCF: 2850**

**Rotor Setting: 1**



**Swing Rotor CEN 91700 002**

**12 x 15ml Carriers**

**Max Speed: 5000rpm**

**Max RCF: 4100**

**Rotor Setting: 2**



**Swing Rotor CEN 91700 003**

**24 x 5ml Carriers**  
**Max Speed: 5000rpm**  
**Max RCF: 4100**  
**Rotor Setting: 4**



**Swing Rotor CEN 91700 004**

**4 x 50ml Carriers**  
**Max Speed: 4200rpm**  
**Max RCF: 2760**  
**Rotor Setting: 3**



## Accessories and Spares

### Accessories

CEN 91700 001	Angle Rotor for 24 x 10ml Tubes for Orbital 360
CEN 91700 002	Swing Rotor with 12 x 15ml Carriers for Orbital 360
CEN 91700 003	Swing Rotor with 24 x 5ml Carriers for Orbital 360
CEN 91700 004	Swing Rotor with 4 x 50ml Carriers for Orbital 360
CEN 91700 034	Kit, Adaptor 50 - 15ml / 8.5ml (Pack 4)
CEN 91700 035	Kit, Adaptor 50 - 6ml (Pack 4)

### Spares

CEN 91700 005	Motor Drive PCB Assembly for Orbital 360
CEN 91700 009	DC Brushless Motor for Orbital 360 (240V)
CEN 91700 010	Hinge set for Orbital 360
CEN 91700 011	Electronic Lid Lock for Orbital 360 (240V)
CEN 91700 012	Power Transformer for Orbital 260/360 (240V)
CEN 91700 013	Carrier Set 12 x 15ml for Swing Rotor CEN 91700 002 for Orbital 360
CEN 91700 014	Carrier Set 24 x 5ml for Swing Rotor CEN 91700 003 for Orbital 360
CEN 91700 015	Carrier Set 4 x 50ml for Swing Rotor CEN 91700 004 for Orbital 360
CEN 91705 017	User Manual for Orbital 360
CEN 91700 040	Kit, Fuse, 5 x 20mm, T5.0A 250V (Pack 4)
CEN 91700 041	Seal, Bowl, Rim for 360 Centrifuge
CEN 91700 046	Kit, Rubber Motor Mount (Pack 3) inc Screws (6)
CEN 91700 052	LCD Display PCB for LCD Orbital 360
CEN 91700 053	Control PCB for LCD Orbital 360
CEN 91700 054	Control Panel Decal for LCD Orbital 360

## **Cleaning**

Spills must be cleaned up immediately. The centrifuge should be regularly cleaned to maintain its appearance and to ensure that dust or other damaging materials do not build up and affect the performance of the unit.

- Before cleaning the centrifuge disconnect it from the mains power supply.
- Clean the exterior surfaces using a proprietary furniture polish with a clean soft cloth .
- Wipe the bowl and rotor with a clean soft cloth dampened in a solution of warm water and a mild detergent. (If moisture can be wrung from the cloth, it is wet, not damp.)
- Most sterilising agents at their standard cleaning dilution can be used on the bowl.
- Remove cleaning agent residue by wiping with a dry paper towel.
- Solvent-based cleaning agents and abrasive cleaning agents should never be used on the Orbital 360.

## **Maintenance**

The Orbital 360 is designed to provide extended and reliable operation. To ensure proper operation and maximise the life of the centrifuge the following requirements must be observed:

- The centrifuge should be inspected by authorised service personnel every six months as part of your routine maintenance plan
- Confirm that lid interlock prevents starting when lid is unlocked and also prevents opening lid before rotor has stopped
- Using an optical tachometer confirm that the speed remains within specification
- Use only genuine Clements spare parts

## Fuse Replacement

1. Switch off mains power to centrifuge using switch on rear panel.
2. Remove power cable from centrifuge IEC mains power inlet.
3. Slide out fuse holder and remove blown fuse from U-shaped holder.
4. Replace fuse with one matching fuse rating on rating label.  
(A spare fuse is normally fitted to the fuse holder.)

## Error Conditions

Error Code	Fault	Action
E4	Lid not closed when <i>START</i> button pressed	Close lid. Adjust <i>Lid Closed</i> limit switch.
E6	Overspeed condition: Incorrect rotor setting Power control PCB fault Motor fault	<b>++ SWITCH OFF ++</b> Verify correct rotor setting Replace power PCB Replace motor
E7	Underspeed condition: Mains power fault Power control PCB fault Tachometer circuit fault	<b>++ SWITCH OFF ++</b> Check transformer Replace power control PCB Check tachometer circuit
E9	Communication fault: Fault in cable between display PCB and power control PCB	<b>++ SWITCH OFF ++</b> Check cable and connections

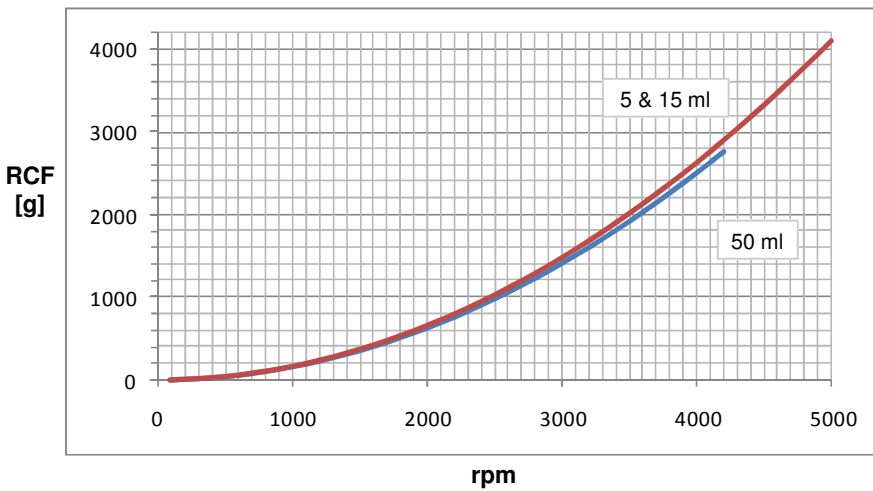
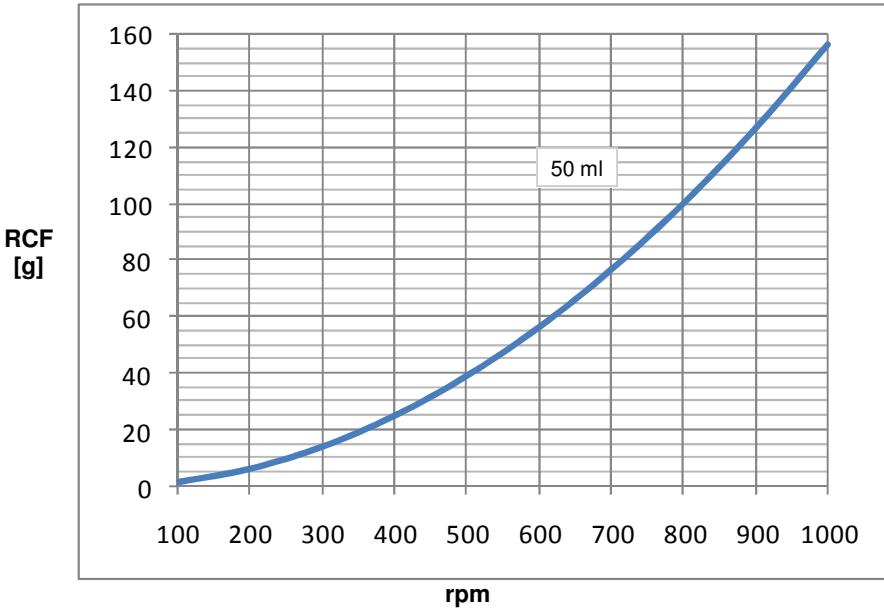
**Note:**

**When error conditions E6, E7 or E9 occur, the centrifuge must be SWITCHED OFF and the fault corrected before proceeding.**

## Troubleshooting

Symptom	Possible Cause	Action
LCD display not lit when power switched on.	Power cable not plugged in securely.	Plug in power cable.
	No power supply.	Confirm power supply.
	Fuse has blown.	Replace fuse.
	Loose connecting cables.	Check and re-seat connectors.
Rotor does not spin when <i>START</i> button pressed.	Lid not closed.	Close lid.
	Loose connecting cables.	Check and re-seat connectors.
	Power transformer fault.	Replace power transformer.
	Motor fault.	Replace motor.
	PCB fault.	Replace PCB.
Excessive vibration.	Imbalanced carriers or sample tubes.	Rebalance.
	Broken sample tube.	Clean and replace sample tube.
	Unequal weight samples.	Make samples equal weight.
	Damaged platform shock absorber.	Replace shock absorber.

### RCF Graphs









## **Warranty**

BMDi TUTA Healthcare Pty Ltd warrants that this product is free from defects in workmanship and materials for a period of 12 months from the date of shipment by BMDi TUTA Healthcare or its authorised agent to the purchaser. Subject to the conditions of this warranty, if the product fails to operate for any reason within the warranty period and the product is returned to the place of purchase at the purchaser's expense, BMDi TUTA Healthcare will repair or replace the product free of charge.

If a valid warranty claim is made within 30 days from the date of shipment, then BMDi TUTA Healthcare will also reimburse the purchaser for reasonable freight costs in returning the product to the place of purchase.

## **Conditions of Warranty**

1. The product must be returned to the place of purchase with proof of purchase.
2. This warranty is only available to the original purchaser of the product.
3. The product must not have had its serial number removed, defaced or changed, its casing opened, its power supply altered or have been tampered with in any other way.
4. This warranty does not cover :
  - inadequate or incorrect site preparation;
  - improper installation;
  - connection to the wrong voltage;
  - failure of the product due to misuse;
  - the use or operation of the product outside of the physical, electrical or environmental specifications of the product;
  - use in a manner or environment in which the product is not designed to be used;
  - improper adjustment, calibration or operation by the purchaser;
  - the use of accessories including consumables, hardware or software which were not manufactured or approved in writing by BMDi TUTA Healthcare ;

- any modifications of the product which were not authorised in writing by BMDi TUTA Healthcare ;
  - any contamination or leakages caused or induced by the purchaser; and
  - inadequate or improper maintenance of the product.
5. This warranty does not cover normal wear and tear.
  6. BMDi TUTA Healthcare will not be responsible for damage or loss caused during shipping.
  7. In Australia, apart from any warranties implied by the Trade Practices Act 1974 all other warranties expressed or implied and whether arising by virtue of statute or otherwise are hereby excluded.
  8. Outside Australia, all other warranties expressed or implied and whether arising by virtue of statute or otherwise (including any warranties implied by the Vienna Convention) are hereby excluded.
  9. BMDi TUTA Healthcare's obligations under this warranty are limited to the repair or replacement of the product, within the terms of this warranty and the total liability of BMDi TUTA Healthcare for loss or damage of every kind whether arising pursuant to the terms of the sale of the product or otherwise in connection with the product is limited to the amount paid by the purchaser to BMDi TUTA Healthcare for the product.
  10. Apart from any liability imposed by Part VA of the Trade Practices Act, BMDi TUTA Healthcare accepts no other liability for any loss or damage occasioned (including consequential loss or damages) in any way as a result of the use of the product.
  11. The warranty does not extend to cover damage to the following parts as they are inherently prone to wear :
    - motor brushes
  12. This warranty does not extend to cover corrosion due to any cause nor to any damage to painted or anodised surfaces.
  13. BMDi TUTA Healthcare will give the purchaser the benefit of any manufacturer's warranty in respect of any components in the product which were not manufactured by BMDi TUTA Healthcare , if such a manufacturer's warranty is available.

