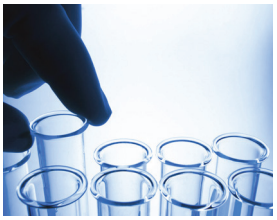
LW Scientific

MX5 Centrifuge

Instruction Manual





The MX5 Centrifuge is intended for use as a Class 1 Medical Device

MKT-7.5.3-L-234 | Rev 5

P. 770.270.1394 F. 770.270.2389 865 Marathon Parkway Lawrenceville GA 30046

Unpacking and Set up

This symbol refers to hazards that may be encountered when using this product.

CAUTION means that damage to product or environment could occur.

What's included:

- MX5 Centrifuge
- Rotor Wrench
- Rotor
- 3-prong AC Power Cord
- Two 5-amp 250v Fuses (Pre-installed)
- Manual Lid Release Tool
- Motor Shaft Nut (holds rotor in place)

1. LW Scientific packs each MX5 centrifuge with utmost care. All units undergo a QC check prior to shipping from LW Scientific headquarters in Lawrenceville, GA to ensure proper operation. Examine the outer and inner containers for any visible damage, and retain the packing material. If there is visible damage, please contact the shipper or your distributor, as our warranty does not cover shipping damage.

2. Remove the centrifuge from the shipping container and inspect for possible shipping damage. **DO NOT OPERATE THE CENTRIFUGE AT THIS POINT.**

3. Please read and complete the warranty form online at LWScientific.com/warranty_form. The warranty form documents your purchase. Failure to fill out the warranty form may void any warranty claims on the unit.

4. Place the centrifuge on a sturdy, level surface. Plug the power cord into the appropriate power outlet.

5. Turn the power on with the **ON/OFF** switch on the back of the unit. The LCD display will illuminate. **DO NOT OPERATE THE CENTRIFUGE AT THIS POINT.**

6. The lid on the MX5 centrifuge remains locked while at rest and while spinning. To open the lid while at rest, push the **STOP/OPEN** button, then press on the lid within 3 seconds to release the lid lock. After 3 seconds, the lid will relock. If power fails, the lid can be manually opened by inserting the Manual Lid Release Tool into the release hole on the front right side and left side of the unit. See page 5 for detailed instructions.

7. Inspect the chamber. Remove all packing material from the chamber, install the rotor, and ensure that all the tube shields are in place. Make sure that no tube shields or tube cushions or other pieces have fallen loose into the bowl. Make sure that the rotor nut is tight using the included Rotor Wrench. **DO NOT OPERATE THE CENTRIFUGE AT THIS POINT.**

8. Various rotors utilize various inserts and tube shields. Make sure all inserts and shields are balanced across from each other on the rotor at all times. Proceed to "Operation".

WARNING: Ensure the rotor is securely fixed to the rotor shaft. Failure to properly secure rotor could lead to personal injury or damage to the centrifuge.

Operation

Buttons

SET: Change parameters
ENTER: Enter parameter changes
▲: Up
▼: Down
RCF / RPM: Toggle display of Relative Centrifugal Force (g) / Speed (rpm)
START: Start a cycle
SHORT SPIN: Instantaneous centrifugation. With the lid closed, press the Short Spin button. The machine will begin a short cycle. The short cycle ends with the release of the Short Spin button.
STOP / OPEN: Stop a cycle / open lid

Display

SPEED: Displayed in rpm
TIME: Time in MIN:SEC
ROTOR: ID number of rotor: Calculates RCF Reference table on page 7
PROG: Allows recall of 1-9 programs with specific cycle parameters to include rotor ID
ACC: Acceleration Rate 1-9, 1 is slowest, 9 is quickest
DEC: Deceleration Rate 1-9, 1 is slowest, 9 is quickest
LID STATUS: Open symbol:

Closed symbol:

SETTING TIME, SPEED, OTHER PARAMETERS:

- Press **SET** button multiple times to reach each parameter (the parameter will flash)
- Use **UP/DOWN** arrows to set each parameter (such as **SPEED** and **TIME**)

- **ROT** (rotor): Select the appropriate rotor number (see page 7) for accurate RCF calculations
- **PROG** (memory): Save various memory settings by choosing a **PROG** number to save the speed, time, and rotor settings that are showing on the screen. Up to 9 memory settings can be set
- **ACC** (acceleration: 1 for slowest and 9 for fastest
- **DEC** (deceleration): 1 for slowest and 9 for fastest

At any point, press **ENTER** to save all settings on the display.

To recall a memory setting, simply press the **SET** button 5 times until **PROG** is flashing, then hit the **UP/DOWN** buttons to choose from 1-9 memory settings. Press **ENTER** again to recall the memory settings.

Operation Continued

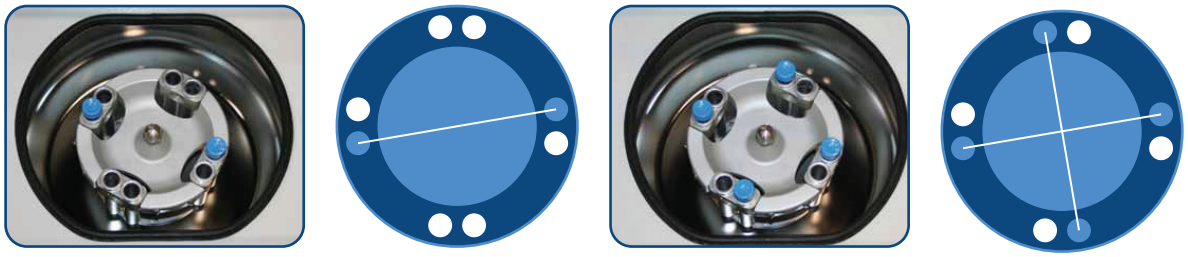
1. Do not insert test tubes at this time. Close the lid, and press down until you hear the lid lock click. Set the speed to "1,000" rpm and the time to "5:00" minutes.

2. Start the unit by pressing the **START** button. The unit should come up to speed with a smooth sound and little or no vibration. If there is excessive vibration or noise, shut off the unit immediately, check the troubleshooting tips (see page 8), and contact LW Scientific if not resolved.

3. Now turn the speed up to the highest setting of "5000" rpm and check for smooth sound and little vibration. The unit is now ready to be loaded. **NOTE**: If there is excessive vibration or noise, shut off the unit immediately and contact LW Scientific.

4. **ALWAYS BALANCE THE LOAD.** Be certain to balance tubes of equal weight across from each other on the rotor. You can only balance 2, 4, 6, or 8 tubes at a time on an 8-place rotor and similarly even increments in a 24-place bucket rotor. If you need to spin only one tube, you must use another tube filled with similarly equal fluid (or water) to balance the rotor. If spinning fecals, use the same fecal solution in the balance tube, because water is much lighter than dense fecal solutions (for Fecal Hints, please contact LW Scientific). Proper balancing will improve sample separation and will extend the life of the centrifuge. Spinning out-of-balance loads may break tubes and can cause damage to the unit which will not be covered under warranty.

5. **BALANCING INSTRUCTIONS**. To balance the rotor, make sure that the test tubes are across from each other. An imaginary line from test tube to test tube should cross over the center rotor nut for proper balance.



When spinning fecals with a cover slip on the test tube, use the 4 place configuration. This will ensure cover slips have the proper force to stay on the test tube.

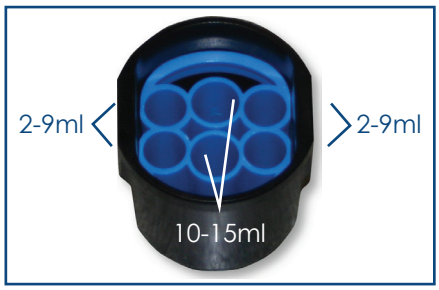
6. **ALWAYS MAKE SURE TUBES ARE SUPPORTED FROM THE BOTTOM**, using proper tube shields and/or rubber tube cushions. Only microtubes (1ml-2ml) are intended to hang from their cap/rim (microtubes use optional GREEN tube shield inserts). All other tubes must be supported from the bottom. Never allow a test tube (2.5ml and larger) to hang by its cap on the rim of the tube shield, which can cause the stopper top to pop off and the tube to break as it hits the bottom of the shield. The cap may also cause damage inside the bowl. Damage due to improper loading will not be covered under warranty.

7. **KNOW THE G-FORCE LIMITS OF YOUR TUBES**. The MX5 at full speed will produce enough g-force to break some low-cost types of tubes. Be certain that you are not exceeding the recommended g-forces for the brand of tubes that you are using.

8 **NEVER FORCE A TUBE INTO THE SHIELDS.** Tubes should fit easily into and out of the tube shield.

*Please see Figure 1 for tube requirements of the 24-place bucket rotor.

Figure 1



9 Once loaded, select the desired speed and time and start the centrifuge. The MX5 cannot be opened while spinning. Once the unit has come to a complete stop, a BEEP will sound. To open the lid, press the **STOP/OPEN** button and then press downward on the lid within 3 seconds to release. The lid will relock after 3 seconds for safety.

WARNING: Failure to secure rotor could lead to personal injury or damage to the centrifuge.
CAUTION: Spinning unbalanced loads could damage the unit and destroy samples.

Care and Maintenance

With proper care and maintenance, your MX5 centrifuge will provide years of laboratory service. Please follow these guidelines:

1 Use only high quality test tubes. Lower quality or inexpensive glass or plastic tubes may fracture and release their contents into the tube chamber. Make sure you know the maximum force allowed for the tubes you are spinning.

2 Never force a tube into the tube shield. The tube shields and cushions were designed to accommodate most common sizes of tubes.

3 Keep the tube shields clean. If a tube breaks inside a shield, clean all the debris from the shield and bowl and disinfect.

4 Motor and electrical maintenance: The MX5 uses a maintenance-free brushless motor and its bearings are permanently lubricated. It should not need servicing for the life of the unit. Likewise, the electrical components were designed for high reliability and should not need regular service. However, if repairs are needed, please contact LW Scientific.

5 The unit is equipped with double lid latches. In the event that there is a power loss or the lid release isn't working properly, you can access the chamber manually. To access the chamber, utilize the included metal rod. This fits the access port on the right and left side of the unit. Carefully insert the metal rod through the right-side access port, and slide in until you feel it mate with the right-side latch mechanism. Carefully press and release on the right side until the lid opens on the right. This may require gently pushing and lifting on the lid as the release key is inserted. Repeat this process on the left side to release the left-side latch.

If you have questions, contact LW Scientific service.

Because of the safety issues with high g-forces in a centrifuge, it is recommended that rotors, buckets, and tube shields be inspected every 6 months for corrosion and fatigue. If there is any indication of wear, the rotor, buckets, and tube shields should be removed from service. Contact LW Scientific for return instructions, so the rotor can be evaluated by an LW Scientific technician for repair or replacement. It is also recommended that after 2 years of service rotors, buckets, and tube shields be returned to LW Scientific for inspection. Following these procedures will ensure safety of lab personnel as well as extend the life of the centrifuge.

Rotor Configurations

MX5 centrifuge with 8-Place 15ml Swing-Out Rotor
M5C-08SU-15T1
- Spins 8, 1ml-15ml tubes
- Maximum 5,000rpm / 4,220g

MX5 centrifuge with 24-Place 15ml Angled Rotor
M5C-24AU-15T1
- Spins 24, 3ml-15ml tubes
- Maximum 5,000rpm / 3,494g

MX5 centrifuge with Swing-Out Bucket Rotor & 24-place test tube inserts
M5C-BKSU-15T1
- Includes 4, 6-place 3ml-10ml inserts
- Spins 24, 3ml-10ml tubes
- Spins 8, 15ml conical tubes
- Maximum 5,000rpm / 4,081g

MX5 centrifuge with Swing-Out Bucket Rotor & 4-place 50ml test tube inserts
M5C-BKSU-50T1
- Spins 4, 2-place 50ml tubes
- Maximum 5,000rpm / 4,081g

Crit Carrier Inserts
CNP-04CC-PR77
- Spins up to 8, 75mm standard microhematocrit tubes
- Includes EZ Reader Card

IRAP Angled Rotor for Equine applications
C5P-RT04-IRFT & (4) C5P-TBS7-60IR
- Spins 4, 60ml IRAP tubes

FAT Angled Rotor for fat transfer
C5P-RT04-IRFT & (4) C5P-TBS7-60FT
- Spins 4, 60ml tubes

Rotor Selection

For Accurate G-Force Calculation	ID #	Max G-force
8-place swing-out rotors (151mm radius) - Default setting	1	4,220g
8-place swing-out rotors with small tube sleeve insert (117mm radius)	2	3,270g
Bucket rotor (146mm radius)	3	4,081g
Angled 24-place rotor & IRAP / Fat (125mm radius)	4	3,494g
Unused	5	N/A

G-Force

		8-place Swing-Out Rotor Large Metal Shields (151mm radius)	**8-place Swing-Out Rotor** Small Black Shields (117mm radius)	**Bucket Rotor** Various Inserts (146mm radius)	**Angled 24-Place Rotor** Large Metal Shields (125mm radius)
RPM's		**G-Force**	**G-Force**	**G-Force**	**G-Force**
1,000		168	131	163	140
1,300	Fecals	285	221	276	263
1,600	Urine / Semen	432	335	418	358
2,000		675	523	653	559
2,500		1,055	818	1,020	873
3,000		1,519	1,177	1,469	1,258
3,500		2,068	1,602	2,000	1,712
4,000	Blood	2,701	2,093	2,612	2,236
4,500		3,418	2,649	3,306	2,830
5,000		4,220	3,270	4,081	3,494

Recommended Fluid Speeds and Times

Blood	3,000 rpm (or higher)	(1,500+ g)	10 min (or less)	**Serum separations take less time with higher rpm*
Fecals	1,300 rpm	(280 g)	6 min.	
Semen	1,600 rpm	(400 g)	10 min.	
Urine	1,600 rpm	(400 g)	5 to 10 min.	

Specifications

Speed Range:	100-5,000 rpm
Max Force:	4,220 g-force
Max Volume:	240 ml (24-place) 120 ml (8-place)
Fuses:	Two 5 amp / 250 v
Motor:	Brushless DC

Unit (No rotor)

Height:	11.5" (292 mm)
Length:	16.5" (419 mm)
Width:	15.75" (400 mm)
Weight:	43.0 lb (19.5 kg)

Troubleshooting

Imbalance:
(1) Ensure the weight of each sample is equal to or within 1.5g of the opposing sample.
(2) Ensure the rotor is properly seated and secure.
(3) Ensure the rotor, tube shields / buckets and components are clean and free of any debris.
(4) If tube cushions are used, ensure they are properly spaced and balanced.

Lid latch issue:
(1) Ensure the lid is completely closed and latched. The lid display icon will show open or closed.
(2) If the lid display icon does not change states, there may be an issue with the lid safety switch. Parts and service are available from LW Scientific.

Electronic failure:
(1) Ensure voltage is present at outlet.
(2) Ensure the power switch is turned on.
(3) Ensure the fuses are good. Replace if necessary.
(4) No display. User interface board (UIB) may have failed. Parts and service are available from LW Scientific.
(5) If display illuminates, but there is a no spin condition, there may be an issue with the MCB (Motor Control Board). Parts and service are available from LW Scientific.

Motor failure:
(1) The connecting wires from the from the MCB (Motor Control Board) to the motor may be off.
(2) The motor has failed. Parts and service are available from LW Scientific.
(3) The MCB has failed. Parts and service are available from LW Scientific.

Fault Code	Failure	Possible Causes	Solutions
E1	Unbalanced	Improper loading	Make sure load is balanced
E2	Over Max Speed	Speed is above max rated speed of rotor	Reduce acceleration level; check wires to motor
E3	Lid Open	Lid not fully closed	Check lid latch and lid latch sensor
E4	Hall Element	Hall sensor in motor not reading	Check wires from motor to control board
E5	Over Power	Input voltage is over 110V or 240V	Check wall voltage to centrifuge
E6	Over Current	Max current draw has been exceeded	Reduce ACC and DEC; replace drive board
E7	No Speed	Speed not detected	Check motor connections; replace motor
E8	Main Contact	Motor control board or user interface board inoperable	Check ribbon cable; replace motor control board
E9	Brake Over Voltage	Line voltage exceded or brake resistor failure	Check brake resistor; reduce deceleration
E11	Lack of Speed	Hall sensor in motor not reading	Replace motor or replace motor control board

Tips for Success

G-Force and Spin Time are the most important considerations for proper fluid separations. G-force is a function of radius and speed, and varies with different centrifuges and rotor configurations. The following are commonly recommended separation settings. Please refer to your tube manufacturer and/or medical procedures manuals for the correct G-force and spin times for each fluid, tube type, and procedure.

Blood can be separated at G-forces between 1,000g and 4,220g, and at spin times between 15 minutes and 3 minutes depending upon tube type and procedure. Common routine blood separations are performed at 1,500g - 2,000g (3,000-4,000 rpm) for 8-10 minutes, and platelet-poor-plasma separations are done at 4,200g (5,000 rpm) in 6-8 minutes.

Blood	3,000 rpm (or higher)	(1,500+ g)	10 min (or less)	*Serum separations take less time with higher rpm
Fecals	1,300 rpm	(280 g)	6 min.	
Semen	1,600 rpm	(400 g)	10 min.	
Urine	1,600 rpm	(400 g)	5 to 10 min.	

Warning: Some types of tubes cannot withstand the high G-forces produced at full speed in the MX5, and tube breakage may result from improper speed settings.