



8200 Planetary Mill

High-Energy Planetary Ball Mill

Operating Manual

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1.0 Introduction

The Spex 8200 Planetary Mill grinds samples with a mechanical motion rotating the jar in one direction while the platform, planetary wheel (often referred to as the sun wheel) is rotated in the opposite direction. The mechanical milling is performed at a 2:1 ratio causing the jar to rotate twice for every single rotation of the sun wheel. As the jar is moved, the relative centrifugal force is transferred to the grinding balls causing them to move in a circular motion, into each other and against the jar wall, grinding the sample. Generally, the grinding jar and grinding balls are made from the same material.

The 8200 Planetary Mill is used for pulverizing rocks, minerals, sand, cement, slag, ceramics, glass, and other brittle to hard samples.

Functionally described as a high-shearing or a high-energy ball mill, the 8200 Planetary Mill is capable of rapidly rotating a jar in a circular motion several hundred times a minute. This multipurpose mill is capable of rapidly reducing hard and brittle samples to analytical fineness, blending powders or making emulsions.

The 8200 Planetary Mill also features a touch screen display, sleek modern design, forced-air cooling, a safety interlock, and a choice of hardened steel or stainless steel grinding jars and media, which are purchased separately.

The jar, containing the sample and grinding media, is secured in the clamp and moved energetically in a circular motion. The circular motion is combined with the rotating movement of the sun wheel, so that the jar appears to be resembling a planetary movement as it moves. During each rotation of the jar, the balls impact the sample and the walls of the jar, both milling and mixing the sample. Because of the amplitude and velocity of the clamp's movement, each ball develops high centrifugal forces, enough to pulverize the toughest rocks, minerals and ceramics.

1.1 Disclaimer

While many materials can be safely ground and/or mixed in the 8200 Planetary Mill, some materials pose hazards and are not appropriate for use with the Planetary Mill. Reactive materials can generate heat and pressure and are not suitable for use in a closed vessel such as the Planetary Mill jar. Spex is available to offer guidance to our customers. However, users are responsible for knowledge and understanding of the potential hazards of the material with which they are working.

Grinding jars do not provide an airtight seal. Purging a jar with an inert gas prior to grinding will not ensure exclusion of oxygen.

2.0 Specifications

Type of Mill	Planetary ball mill, high-energy ball mill
Grinding Containers	Canister type jar with multiple balls
Display	Touch screen
Grinding Mechanism	Grinding balls of hardened steel or stainless steel
Capacity	One 500 mL jar or one 250 mL jar
Clamp Speed	Adjustable range: 300 to 600 rpm
Clamp and Sun Wheel Motion	Circular. Clamp and sun wheel rotate in opposite directions at a 2:1 ratio
Electrical Specifications	CE approved. 115 V/230 V, 50/60 Hz
Power Cord	115 V/60 Hz model: 3-prong grounded plug supplied 230 V/50 Hz model: 2-prong European plug supplied
Circuit Breaker	Same as ON/OFF switch
Safety Features	Door locks while running. Interlock prevents mill from running if door is not closed. Manual door release latch on top of the unit.
Run Timer	Maximum 99 hours (1 cycle), maximum 20 hours (2 – 5 cycles)
Motor	1 ½ HP Maximum speed: 3500 rpm Maximum power: 220 V
Environment	For indoor use only at a maximum altitude of 6,600 ft (2000 m). Operate at ambient conditions between 40 °F (5 °C) and 104 °F (40 °C), with maximum relative humidity 80% below 88 °F (31 °C) decreasing linearly to 50% at 104 °F (40 °C). Main supply voltage fluctuations up to 10% of nominal voltage (115 or 230 volts AC RMS). Pollution degree 1: none or only dry, conductive pollution occurs.
Weight	250 lb (113 kg) (empty without jar)
Dimensions	21 in x 22 in x 15 in (54 cm x 56 cm x 38 cm)

Table 1. Grinding Jars and Grinding Balls Available

Part #	Description	Part #	Description
8211	Hardened Steel Grinding Jar, 250 mL	8227B-30	Stainless Steel Grinding Balls, 30 mm
8221	Hardened Steel Grinding Jar, 500 mL	8227B-40	Stainless Steel Grinding Balls, 40 mm
8217	Stainless Steel Grinding Jar, 250 mL	8221B-10	Hardened Steel Grinding Balls, 10 mm
8227	Stainless Steel Grinding Jar, 500 mL	8221B-20	Hardened Steel Grinding Balls, 20 mm
8227B-10	Stainless Steel Grinding Balls, 10 mm	8221B-30	Hardened Steel Grinding Balls, 30 mm
8227B-20	Stainless Steel Grinding Balls, 20 mm	8221B-40	Hardened Steel Grinding Balls, 40 mm

Table 2. Jar Sieves and Jar O-Rings

Part #	Description	Part #	Description
8240	Jar Sieve for 250 mL Jar	8211S	O-Ring for 250 mL Jar
8245	Jar Sieve for 500 mL Jar	8221S	O-Ring for 500 mL Jar

3.0 Unpacking

At the factory, the Planetary Mill is adjusted and tested for proper operation, and carefully packaged for shipping. Upon receipt, carefully inspect the exterior of the packing crate. If there is any visible damage, notify Spex and file a claim with the carrier immediately.

To unpack the Planetary Mill, loosen and remove the eight wing nuts on the lower edge of the crate (two on each side) and lift the crate sleeve off the base (this is a 2-person job). Remove loose items from the crate. Remove any protective plastic cover from the mill. Remove the four hexagonal shipping feet from the bottom of the crate, unscrewing the hex head screw using a 9/16 in wrench.

CAUTION: The Planetary Mill weights about 250 pounds (113 kg). Be sure to have a mechanical hoist or lifting equipment on hand when moving the unit.

Follow a logical sequence of steps as you inspect the unit (Figures 1 and 2). For example:

1. Inspect the outside of the cabinet for any visible damage.
2. Inspect the electrical input module and on/off switch for any visible damage.
3. Ensure that the door mechanism is working properly (Section 9.2).
4. Open the door and inspect the interior of the Planetary Mill.
5. Check that the clamp has not been damaged.
6. Inspect the accessory pack. Compare with the packing list.

If everything seems to be in proper order, store the crate and packaging materials in case there is a need to return the unit for service or repair.



Figure 1. Planetary Mill (front view)

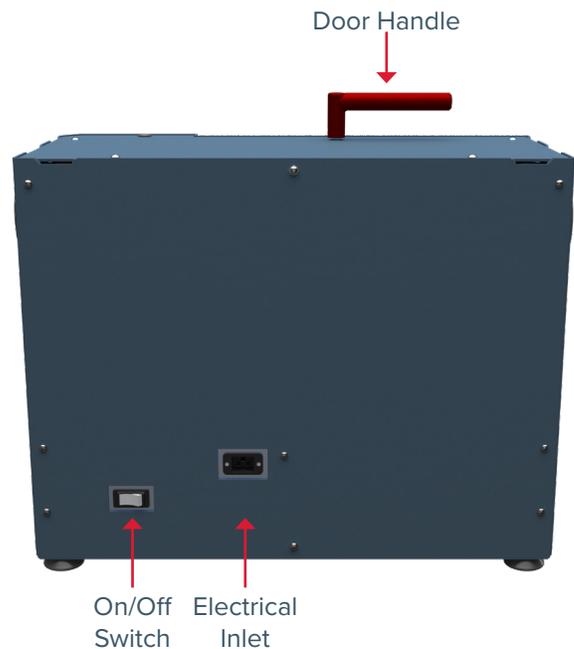


Figure 2. Planetary Mill (back view)

4.0 Setting Up

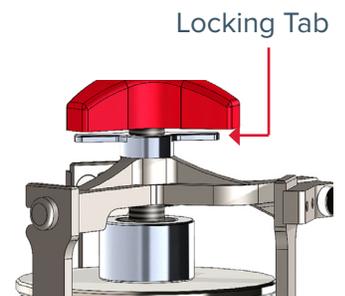
The 8200 Planetary Mill weighs 250 lb (113 kg). The door rotates to open and close from left to right with the handle atop the mill. The electrical input module/power cord receptacle is located on the rear of the Planetary Mill cabinet towards the bottom (Figure 2). The power on/off button is on the rear next to the electrical inlet. The manual door release latch is located on the top of the unit at the top right. The touch screen control panel is affixed to the front side of the unit. Above the display of the control panel is an emergency stop button (in red) and a USB port (black screw-off knob) to export run history or upgrade system software (Figure 1).

4.1 Electrical Connection

The on/off switch (controlling power to the motor and timer), is located at the back of the unit. To turn on the power, press down-left the bar (I) side of the switch. Before plugging in the mill, set the power to off by pressing down right the circle (O) side of the on/off switch, then plug the power cord into the mill's power inlet. Plug the mill into a standard 3-prong grounded electrical outlet; the AC input module and the on/off switch (which also serves as a circuit breaker) are on the back of the cabinet.

4.2 Standard Safety Features

Clamp Locking Tab: The clamp is opened and closed by a knob on the end of its threaded shaft. Whenever the clamp is closed on a jar, lock the clamp by first tightening the locking tab clockwise against the clamp Y-bar (the locking tab is on the shaft between the knob and the clamp Y-crossbar). When opening the clamp, first loosen the locking tab.



4.3 CE Safety Features

CE directives require that electricity to the motor and timer be interrupted whenever the door is open, and that the clamp must stop completely before the door can open.

Safety Interlock: Cuts off power to the motor when the door is open. DO NOT disconnect or damage this switch.

Time-Delay Rotary Latch: Keeps the door closed while the mill is running, and for 5 seconds after the end of the run. The Time Delay Rotary Latch, on the right side panel, is powered by an internal motor to engage the latch actuator in the door. When the mill is started, the Time Delay Rotary Latch locks the door immediately and there is a delay before the motor starts. When the timer reaches zero at the end of a run, the motor stops, the timer displays RUN COMPLETE, and the latch stays locked for 5 seconds. At the end of 5 seconds, the latch unlocks and the timer resets.

NOTE: Never try to force open the door before the Time Delay Rotary Latch unlocks.

4.4 General Safety



CAUTION: Every effort has been made to ensure the 8200 Planetary Mill operates at a moderate noise level. The intensity of noise is directly impacted by the type of grinding jar, number of balls, size of balls and sample hardness. Ear protection is recommended.

5.0 Touch Screen Display

The 8200 Planetary Mill is programmed and operated through a series of touch screen displays. Transition between screens, and all programming and operating commands, are done by touching the screen with a fingertip or stylus. **Do not use a sharp point as this can damage or deface the screen.**

5.1 Logo Screen

When the power is switched ON at the front of the mill, “Please Wait” appears during start-up as the software loads. Then the Spex logo is displayed and a brief animated representation of the Planetary Mill logo. After the animation has finished, the screen will switch to the Home screen (Figure 3). From the Home screen, the Control Panel, Run History and Settings can be accessed by touching the buttons displayed.



Figure 3. Home Screen

5.2 Control Panel

The **Control Panel** displays the programmed run parameters, and the Date and Time at the bottom right of the screen (Figure 4). Changes to the run settings are made from this screen.

To recall stored run protocols, touch the **Store/Recall** button located at the bottom right of the screen (see section 5.4 for more information on Saved Protocols).

The **Home** screen icon can be found on all screens (e.g. **Control Panel**) positioned at the top right of the screen.

Touching the **Home** icon allows the user to return to the **Home** screen.

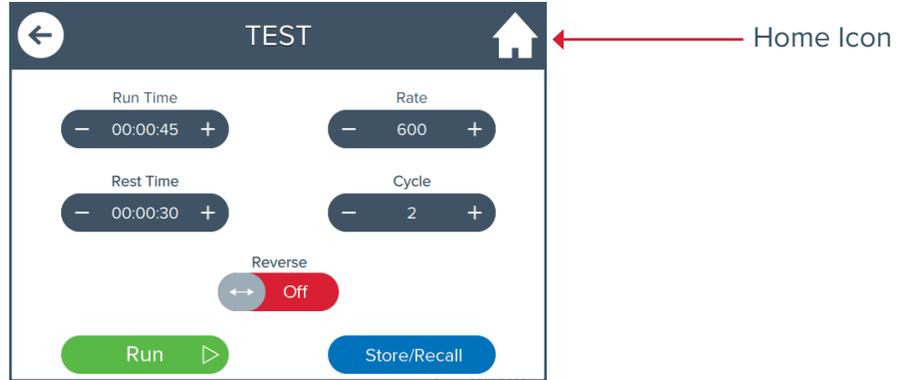


Figure 4. Control Panel

The following sequence of events will occur from the current settings in Figure 4. **Note:** Reverse directional motion is off. Turning on the reverse motion (and running for 2 or more cycles) will reverse the planetary wheel (opposite direction), causing the jar to rotate in the opposite direction. Reversing the motion can improve the efficiency of the grind, allowing the balls to scrape the wall of the jar to remove caked material.

1. Cycle 1 – unit runs for 2 minutes at a rate of 600 rpm.
2. Rest time – the unit is inactive for 30 seconds allowing the sample to dissipate the frictional heat from the grinding balls.
3. Cycle 2 – unit runs for another 2 minutes at a rate of 600 rpm. Note: If reverse was on (active), the planetary wheel would reverse every other cycle.
4. The run protocol is complete after Cycle 2.

In the **Control Panel**, to change the settings of a selected field such as, Run Time, Cycles, Rest Time, and Speed, press the (+) or (–) buttons on the Control Panel screen. The (–) buttons decrease the number displayed on and the (+) buttons increase the number displayed.

5.2.1 Starting a Programmed Run

To run the program displayed on the **Control Panel** screen, touch the **Run** button. The Planetary Mill can be stopped, paused and restarted in the middle of a grinding program from the button selections on the right of the screen.

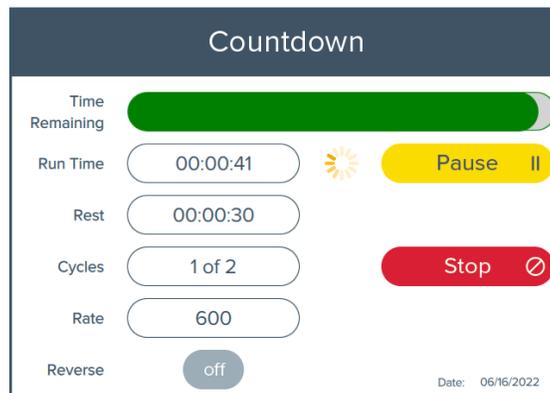


Figure 5. Run Screen

During the **Run Time** stage, the **Time** counts down the time for the preprogrammed run in 1 second increments. To pause program, touch the **Pause** button. To continue the program, touch the **Resume** button (appears when paused). To abort the program, touch the **Stop** button. To start a new program, touch the **Run** button.

5.2.2 Stopping or Pausing a Run

To stop a program, touch the **Stop** button on the **Run** screen (Figure 5), the button will dim or turn a muted red and the program will end. If the **Run** button is touched after the program has stopped, then the entire program will start over.

To pause during a grinding program, touch the **Pause** button. **Note: The Pause button will have a dimmed or muted yellow appearance for a few seconds after the Run button is touched which indicates it is inactive. After 5 seconds it will turn a brighter yellow indicating it is active.** The run will hold the settings at that moment (elapsed time, cycle, etc.). At this point, the door to the sample area can be opened. To resume the program, close door and touch the **Resume** button. This will restart the program at the point at which it was paused. Alternatively, pressing **Stop** will end the program.

5.3 Changing Settings

To change parameters (run time, rest time, cycles, and rate), touch the plus (+) or minus (-) buttons on the **Control Panel** screen (Figure 4). Touching the plus increases the parameter, while touching the minus decreases the parameter. Tap or hold the plus or minus buttons until the desired number is reached. The changes will appear in the area between the arrows (Figure 4). The maximum run time is 99 hours for 1 cycle. If running 2–10 cycles, the maximum run time per cycle is 10 hours. The minimum rest is 15 seconds per cycle for 2–10 cycles. To run a program with the new settings, touch the **Run** button.

Note: If the run parameters are changed to a protocol and not saved then (MOD) will appear to the right of the protocol name at the top center of the screen.

5.4 Saved Protocols

The **Saved Protocols** screen is shown in Figure 7. Up to 20 protocols can be saved for simple and fast recall, increasing productivity, and reducing operator error.

A saved program retains the settings for number of cycles, run time, rest time between cycles, and rate. Be sure to adjust the rate to the desired setting after recalling a stored program.

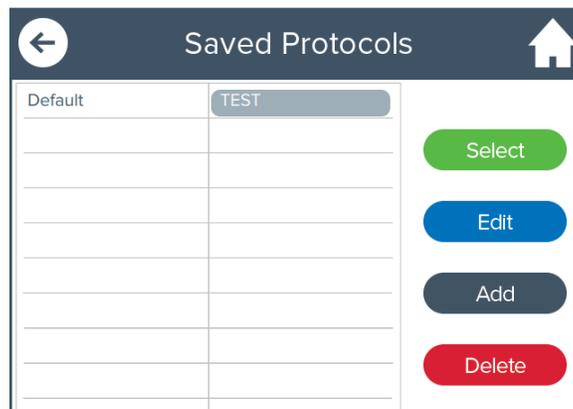


Figure 7. Saved Protocols Screen

The Default protocol recalls the last programmed run setting that was not saved. The Default protocol can be changed without saving the new settings, as described in section 5.4. At the top left on the Saved Protocols screen is the back arrow button. Touching the back arrow button returns the user to the previous screen.

5.4.1 Recalling a Protocol

To recall a stored program, touch the **Store/Recall** button on the **Control Panel** screen (Figure 4). In the **Saved Protocols** screen, select the protocol to highlight the box. Then touch **Select** to send protocol to the **Control Panel** screen.

5.4.2 Storing a New Protocol

To store a new program, touch the **Store/Recall** button on the **Control Panel** screen (Figure 4). In the **Saved Protocols** screen, touch the **Add** button as shown in Figure 7. This will bring up the Keyboard screen, a simplified version of the standard keyboard for a computer.



Figure 8. Keyboard Screen

The **Clear** key deletes whatever has been entered in the label box. Touching the **Done** key enters the label shown in the box.

Touch the **Save** button to save the label shown in the box. The label will appear as the name of the program on the **Saved Protocols** screen (Figure 7).

The **Cancel** key does not change anything on the screen, but returns the display to the **Saved Protocols** screen.

To run the newly saved protocol, touch the protocol to highlight the box. Then touch **Select** to send the protocol to the **Control Panel** screen. Review the parameters and touch the **Run** button to initiate the protocol.

5.4.3 Edit a Protocol

To edit a saved protocol, touch the protocol name to highlight the box on the **Saved Protocol** screen (Figure 7), then touch the **Edit** button. From the **Edit Protocol** screen, change the name by touching inside the box. This will bring up the Keyboard screen, follow the instructions listed in the Storing a Protocol section 5.4.2. The run time, rate, rest time, and cycles can also be adjusted in the Edit Protocol screen.

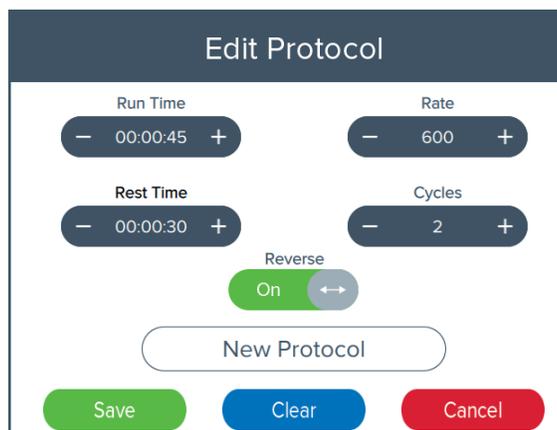


Figure 9. Edit Protocol Screen

5.4.4 Delete a Protocol

To delete a saved program, touch the protocol name to highlight the name on the Saved Protocols screen (Figure 7). Then touch the **Delete** button. A pop-up window opens confirming to delete this protocol. Touch Yes to delete the protocol or touch No to keep the saved protocol.

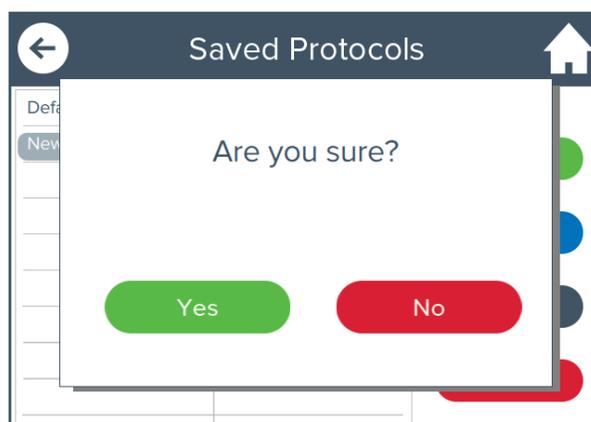


Figure 10. Delete Confirmation Screen

5.4.5 Modify a Recalled Protocol

Once a saved protocol is recalled to the Control Panel screen, the user can modify the parameters by using the left and right arrows. If the protocol is modified, (MOD) will appear next to the protocol name, e.g. Shale Rock (MOD).

6.0 Loading the Grinding Jar

Before using a planetary mill grinding jar, check to make sure that it is clean and that the O-ring is in good condition. The sample should be crushed to proper feed size before it is loaded into the jar, approximately ¼-inch to ½-inch for the steel jars.

Place the sample in the grinding jar **FIRST**, then the grinding balls and apply the cover (firmly seated). Do not overload the grinding jar. Recommended sample amounts for 500 mL jar (100 g to 225 g) and for 250 mL (50 g to 100 g). Additional information on grinding and mixing is in Section 9.1.

7.0 Locking the Grinding Jar in the Clamp



Lock the Clamp Assembly before running the unit. It is essential that samples are securely locked into the clamp assembly before operation.

The clamp locking knob is the most critical component of the Planetary Mill, as it must be carefully adjusted to hold the jar firmly in place. The rotation motion of the clamp is extremely vigorous. The jar must be held securely in the clamp during operation to prevent damage and leakage.

The clamp base has two different size pins, designed to specifically fit in the two holes on the bottom of the jar. To place a jar in the clamp, loosed the locking tab on the threaded shaft, and unscrew the locking knob with a few turns (counter-clockwise). Rotate the moveable arm clockwise (downward) unclamping it from the Y-cross bar, lift the locking knob assembly upward as shown in Figure 11. When placing the jar in the clamp, make sure the pins are fitting in the proper holes. Once the jar is seated in the clamp base it should not be able to twist.

To lock the jar in the clamp, lower the locking knob assembly, rotate the moveable arm counter-clockwise (upward) to engage the arm opening into the Y-cross bar pin (Figure 12). Turn the locking knob clockwise to secure the jar and tighten the locking tab by turning clockwise.

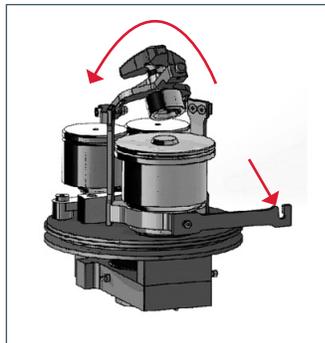


Figure 11. Opening the Clamp

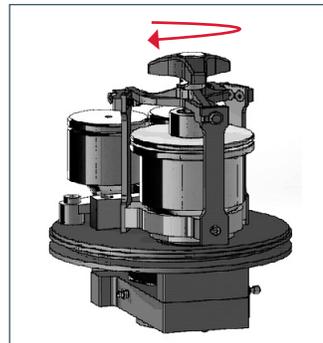


Figure 12. Locking the Clamp

8.0 Balancing the Jar

8.1 Adjusting the counterweight

The counterweight is set at the manufacturing facility to balance the stainless steel 500 mL jar with eight 30 mm stainless steel balls. Turning the knob (Figure 13) clockwise increases the counterweight. Furthermore, turning the knob counter-clockwise decreases the counterweight.

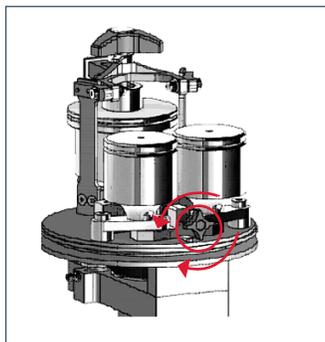


Figure 13. Counterweight

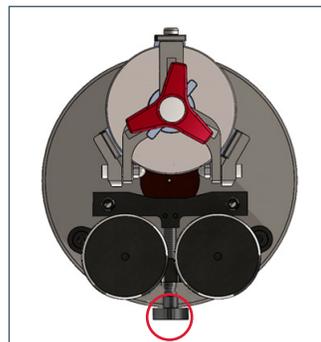


Figure 14. Counterweight (top view)

Note: If the counterweight is not properly balanced, the unit may vibrate or shake vigorously. If this occurs, turn the unit off by pressing the Stop button on the touch screen or hitting the red Emergency Stop button (red button above the display).

The mill will not run if the Emergency Stop button is pushed in. To disengage the Emergency Stop button, turn it clockwise until the button pops out.

Table 3. Weight of jars and stainless steel balls.

Description	Jar Weight with Lid	Ball Weight per Ball
Stainless Steel Grinding Jar, 500 mL	9.9 lb	–
Stainless Steel Grinding Jar, 250 mL	7.2 lb	–
Stainless Steel Grinding Balls 40 mm	–	0.575 lb
Stainless Steel Grinding Ball, 30 mm	–	0.242 lb
Stainless Steel Grinding Ball, 20 mm	–	0.070 lb
Stainless Steel Grinding Ball, 10 mm	–	0.0089 lb

Table 4. Suggested number of balls per grinding jar based on sample weight.

Stainless Steel Jar	Sample Weight	40 mm Stainless Steel Balls	30 mm Stainless Steel Balls	20 mm Stainless Steel Balls	10 mm Stainless Steel Balls
500 mL	100 – 225 g	4	8	20	100
250 mL	50 – 100 g	–	4	10	50

After the sample jar is loaded and secured into the clamp mechanism and the counterweight properly adjusted, close the door. Grasp the handle and rotate clockwise to slide the door to the closed position (Figure 15).



Figure 15. Closing the Door

9.0 Operation

Before operating the Planetary Mill, make sure it is plugged in and turned on. The power cord inlet is located on the rear of the cabinet. The white on/off button is located on the rear of the cabinet (Figure 2).

The following steps outline a standard operating cycle:

1. Load sample and balls in grinding jar
2. Firmly place lid on the grinding jar
3. Clamp the jar in place
4. Confirm balance setting and close the door
5. Set the timer
6. Set the number of cycles
7. Set reverse option to on or off
8. Set the pause time
9. Set the run speed
10. Press the green Run button to start a run
11. When the run is complete, open the door
12. Unclamp the jar

9.1 Mixing and Grinding

For samples that cake during mixing, a slurry with water or alcohol may be helpful. Water may be removed afterwards by drying the sample in the jar in a very low temperature oven. If caking is due to static charge, a small amount of cellulose (10%) can be added to the jar. Dry grinding is the simplest approach and most often used.

If a sample is not being ground fine enough, the user can decrease the amount of sample, increase grinding time, use a denser grinding medium, and/or add a grinding aid or liquid. Wet grinding keeps the sample from caking and will give a smaller final particle size, but there are hindrances; an extra drying step is required, the fluid used for wet grinding must be chosen carefully not to alter the sample or attack the jar, all have gaskets and are watertight.

None of the jars are inherently gas-tight. Limited results can be achieved by loading and unloading the jar in a glove box under inert gas.

CAUTION: Always use grinding balls that match the material of the jar (e.g. hardened steel balls for a hardened steel jar, stainless steel for stainless steel, etc.). This will limit contamination.

9.1.1 Grinding Hints

For any grinding jar, the smaller the initial sample size, the finer it can be ground in a given time. Unless a sample cakes during grinding, the longer it is ground, the finer it will get. Particle size can almost always be lowered further by reducing the sample size or lengthening the grinding time, or both.

Dry grinding is relatively efficient for most brittle materials, but at small particle sizes (below 50 microns) there is a tendency for particles to agglomerate or cake. There are many grinding aids to prevent caking. Water, alcohol, solvents, and other liquids can be added to create slurries whose medial particle size after grinding can be well below 10 microns, but for most analytical techniques the liquid must be removed before analysis.

9.2 Operating the Door

To close the cabinet, grasp the handle and rotate clockwise to slide the door to the closed position (Figure 16). The door must remain closed during a run.

To open the cabinet, grasp the handle and rotate counter-clockwise to slide open the door to its open position.



Figure 16. Door Operation

9.2.1 Manual Door Release Latch

To open the cabinet if the power to the Planetary Mill fails, insert the manual key tool into the hole atop the cabinet, (right side) index lever to release and rotate the red door handle at the same time to open the door.

9.3 Running the Planetary Mill

Press the green **Run** button to initiate a programmed run. The screen will display a countdown of the time remaining in a run as shown in Figure 17. The Planetary Mill will stop automatically at the end of the run. When the grinding program has ended, the screen will display **Run Complete**. Touch the screen to return to the **Control Panel**.

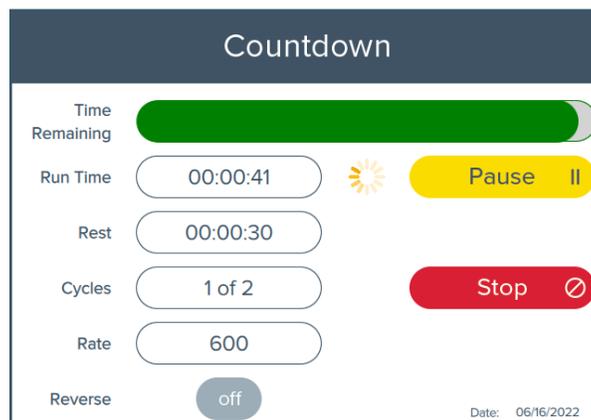


Figure 17. Run Screen

To stop the Planetary Mill during a run, press the **Stop** button on the screen. If the door lock fails and the door opens, the screen will display a **Door Open** message as shown in Figure 18. The timer will maintain the time remaining in the run. To restart, close the door and press the green **Resume** button to finish the run. To abort the run and restart the timer, press the red **Stop** button. The **Door Open** message will disappear once the door is closed.

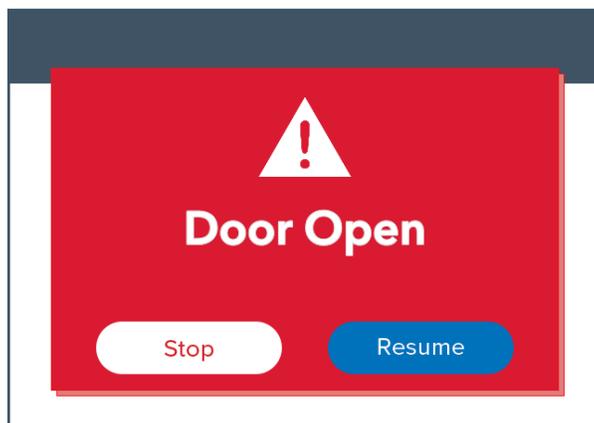


Figure 18. Door Open Message

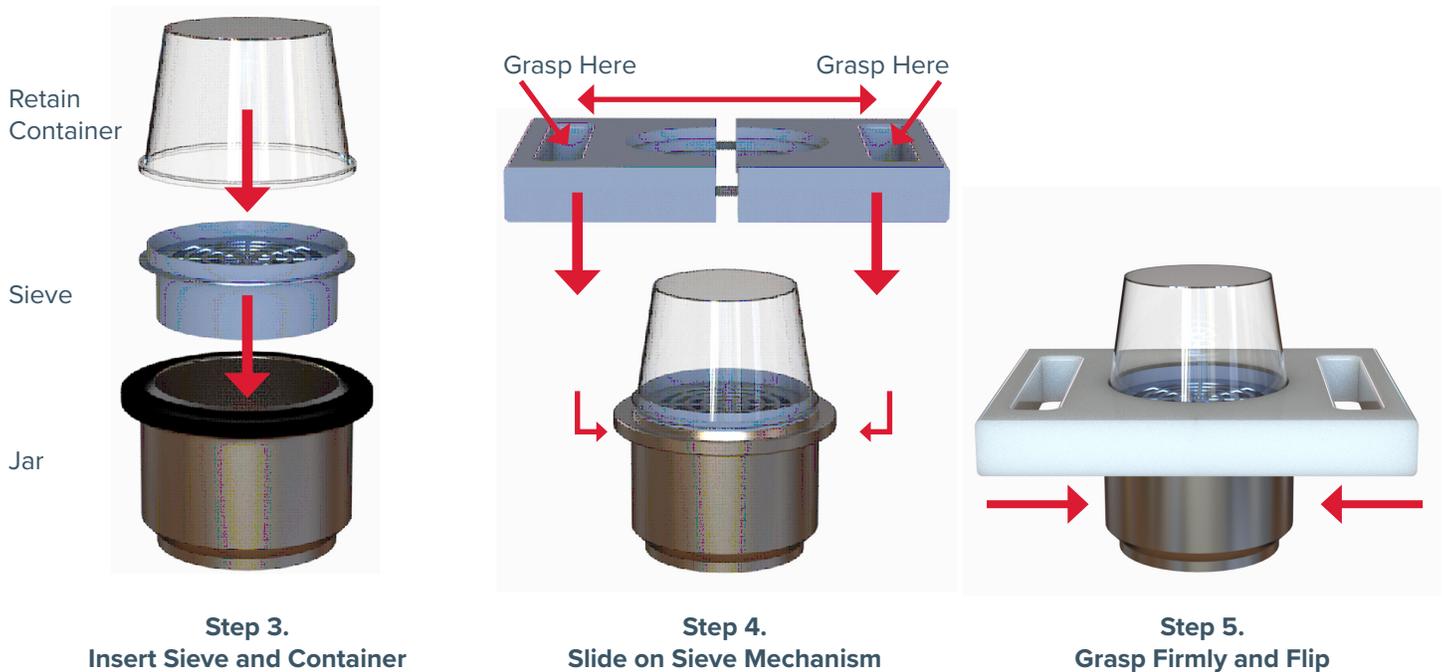
9.4 Emptying and Cleaning the Grinding Jar



CAUTION: The jar can become extremely hot after grinding. If the run time is longer than 5 minutes, it is recommended to allow the jar to cool for 10 to 20 minutes before opening. Carefully pry open the jar using the opening tool. **Tip:** If jar is too warm to touch, use gloves that are heat resistant.

The 500 mL grinding jar can be emptied by using the sieve attachment to separate the grinding balls from the ground sample. Follow the steps below to attach the sieve and sample collection jar to the grinding jar.

1. After the jar is cool to the touch, remove the lid using the lid opening tool.
2. Scrape (with spatula) any loose powder on the lid into the retain container.
3. Insert the sieve into the jar and place the retain container on top, as shown below.
4. Slide the sieve handle mechanism over the jar and retain container, locking them together.
5. Firmly grasp and invert the assembly (flipping over), and gently tap on the benchtop to shake loose the powder into the retain container.
6. Remove the sieve handle and carefully lift grinding jar off of the retain container.
7. Remove the sieve containing the grinding balls.
8. Scrape (with spatula) any loose powder from the jar into the retain container.
9. Apply jar lid and label (with sample ID).



Warning: Finely pulverized sample always presents a respiratory hazard; a dust mask or other protection should be worn when working with it.

Grinding jars should be cleaned after use. Methods include wiping with a damp paper towel, blowing out with an air hose, rinsing with water or alcohol, etc. Most of these methods are not very effective, and blowing the dust out of a jar with an air hose certainly causes a respiratory hazard. We recommend a 3-minute period of grinding with a mixture of clean quartz stone, hot water, and soap or laboratory detergent. The residue is easily and safely washed out of the jar, which then may be dried.

Technicians who are particularly concerned about cross-contamination may adopt the “grind and discard” technique. After sample A has been ground and the grinding jar nominally cleaned, a portion of sample B is ground and discarded, and the jar cleaned again. Now it should be possible to grind a portion of sample B without contaminating it with sample A.

If a cleaned grinding jar will not be used immediately, store in a plastic bag. Hardened steel grinding jars should always be dried and stored carefully, as they are prone to surface rusting.

9.5 Safety Recommendations

The Planetary Mill is intended for use only by qualified and trained personnel. For questions about the operation, maintenance or service of the 8200 Planetary Mill, contact us at +1.855.GET.SPEX or +1.732.623.0465.

Every effort has been made to ensure that the Planetary Mill is safe to operate. However, the safety protection provided by the unit may be impaired if the Planetary Mill is operated in a manner other than what is described in this manual. In addition, the Planetary Mill should only be used with accessories provided by, or recommended by, Spex and must be used in the intended manner. Use of accessories not recommended by Spex may negatively affect the safety protection provided by the unit and may void the warranty.

Do not use the 8200 Planetary Mill with hazardous materials for which the unit was not designed. Be aware of the hazards of the materials that are being used, particularly in the event of a spill. For instance, use of a flammable liquid could create a fire hazard if a sample is spilled.

10.0 System Settings

To access the **Settings** screen, touch the icon on the **Home** screen (Figure 3). The firmware can be upgraded, diagnostics viewed/exported, and files exported (run history, protocols), and protocols imported. Time display can also be changed from 12-hour to 24-hour, and time and date can be entered or changed (Figure 19). Touch inside the window to change the date or time. A pop-up window opens to enter the time or date. Touch the **Set** button to confirm the change. Select 12- or 24-hour time, which will be displayed on the Run screen. Touching the back arrow button returns the user to the previous screen.

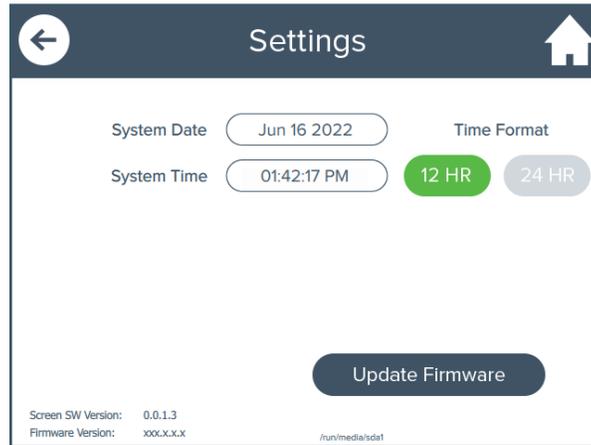


Figure 19. Settings Screen

10.1 Run History

To recall the run history, go to the **Home** screen and touch the **Run History** button. The date, time, user, run label, and run protocol data are stored on this screen (Figure 20). The run history can be exported to computer devices via the USB port located on front of unit. **Note: The Export History button will have a dimmed or muted appearance which indicates it is inactive. After a flash drive or USB cable (connected to computer device) is inserted into the port, the button will turn brighter indicating it is active.** To export run history, touch the **Export History** button at the bottom right of the screen. To clear run history or delete run history permanently from data storage, touch the **Clear History** button at the bottom left of the screen. To return to the **Home** screen, touch the back arrow at the top left of the screen.



Figure 20. Run History

11.0 Maintenance

The 8200 Planetary Mill has been designed to provide trouble free operation over a long period of time. To assure proper performance, an important factor is overall cleanliness. Any spilled powders or liquids should be wiped up immediately. This should minimize the buildup of any powders or residue. To maintain the exterior of the unit, first disconnect the 8200 Planetary Mill, then spray it with a mild window cleaner or similar product and wipe it down.

Note: Always unplug the Planetary Mill before any cleanup or maintenance work.

The threads of the clamp screw should also be kept clean to prevent wear. If the drive belt becomes loose, tighten it by moving the motor back; loosen the motor mounting bolts, move the motor and tighten the bolts. If the drive belt breaks or becomes heavily worn, replace it. A properly tensioned drive belt can be depressed about ½-inch midway between the sprockets.

The flywheel and motor sprockets should be checked from time to time to make sure that they are tight on their shafts; if either sprocket loosened, it must be realigned with the other and the set screws tightened.

The sealed ball bearings in the clamp are lubricated for life and require no maintenance. The shaft bearings of the motor are lubricated for ten years of intermittent use or one year of heavy use.

The 8200 Planetary Mill is intended for intermittent use with running times that are typically 1 to 5 minutes long. Under those conditions, it should run for many years without maintenance other than described above. Prolonged periods (over 100 minutes) of continuous running, as when the mill is used for mechanical alloying, require extra maintenance. The 8200 Planetary Mill is warranted against defects of materials and workmanship for one (1) year from date of shipment. However, extreme uses of the mill, such as mechanical alloying, may modify or void the warranty. Contact us for information about operating your mill under unusual circumstances.

11.1 Technical Support

For questions about the operation, maintenance or service of the 8200 Planetary Mill, contact us at +1.855.GET.SPEX or +1.732.623.0465.

12.0 Error Messages

12.1 Door Error

If the door lock fails while the Planetary Mill is running, the mill will stop running and the screen will display a **Door Open** message. The timer will maintain the time remaining in the run. To restart, close the door and press the blue **Resume** button to finish the run. To end the run and reset the timer, press the red **Stop** button. The **Door Open** message will disappear once the door is closed.

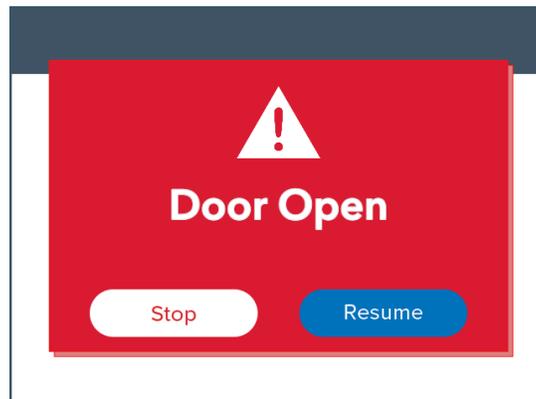


Figure 21. Door Open Message

12.2 Motor Rate Error

If a **Motor Rate Error** message appears on the screen, this indicates the Planetary Mill is not operating within an acceptable range of the set rate. Press the red **Stop** button to discontinue operation and contact a Spex Service Technician at +1.855.GET.SPEX or +1.732.623.0465 for assistance.

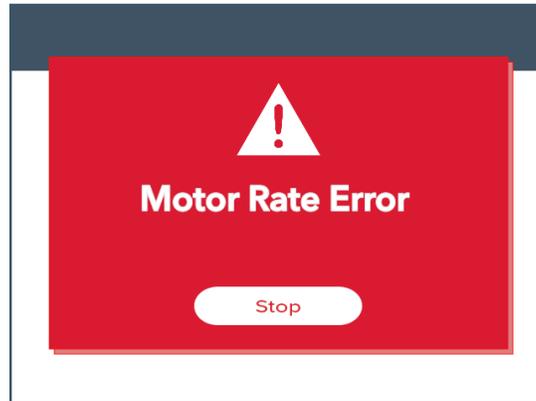


Figure 22. Motor Rate Error

12.3 Motor Home Error

If a **Motor Home Error** message appears on the screen, this indicates that the clamp mechanism did not move to its home position (front center of door opening).

Turn off power to the unit and disconnect the electrical cord. Wait a few minutes, reconnect the electrical cord and turn on power to the unit. If issue persists, contact Spex.

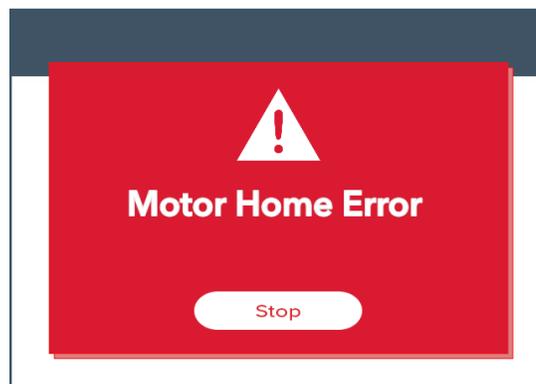


Figure 23. Motor Home Error

12.4 Latch Error

If a **Latch Error** message appears on the screen (Figure 24), this indicates that the door interlock cannot engage. If the door cannot be locked when Start is pressed, the motor will not start and Latch Error will appear on the display. When this happens, open and close the door, then press Stop to clear Latch Error from the display, and restore the timer setting. Only when the timer setting is restored can the Planetary Mill be started again.

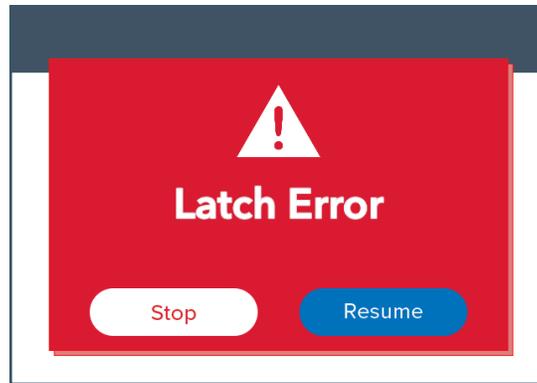


Figure 24. Latch Error

13.0 Troubleshooting

Table 5. Troubleshooting

Problem	Possible Cause	Possible Solution
The unit does not turn on	No power	Make sure power cord is plugged into outlet and inlet
	No power	Check outlet for power and correct as required
	Circuit breaker tripped	Turn unit OFF then ON
		Call Spex for service or repair
Unit does not run but has power	Emergency stop button pushed in	Turn button clockwise until it pops out
Unit does not run. Display shows Error: Door Failure	Safety interlock switch	Make sure the door is completely closed. Press Stop to clear display
Display shows Error: Mech Failure	Mechanical issue	Inspect the interior for loose connections. Turn power OFF then ON
Display reads Run Complete , but door is locked	Door opened too soon	Wait 5 seconds before opening door
Door does not open	Rotary latch stuck	Shut off power, see section 9.2.1, investigate problem
Grinding balls don't move inside jar	Too much sample	Decrease sample load
Excessive vibration	Counterweight not properly balanced	Adjust counterweight
Clamp loosens during run	Locking tab loose	Tighten locking tab
V-belt loose or worn	Motor loose or misaligned	Align motor pulley with flywheel, replace V-belt if necessary. Tighten down motor.
	Pulleys loose or out of alignment	
Mill becomes noisy after long use	Loose bearings	Check bearings, replace if necessary

14.0 Warranty

Spex guarantees its products against defects in materials or workmanship for one (1) year from the date of original shipment. Repairs, replacements or parts are guaranteed for 30 days or for the remaining original warranty period (whichever is greater) for the item that was repaired or replaced. Items not produced by Spex carry the manufacturer's warranty only.

The warranty excludes wear parts. These are parts that wear out through normal use and must be replaced periodically for proper operation. Planetary Mill wear parts include the timing belt. If this or other parts require service, contact Spex to arrange a return shipment.

Wear Parts	
Part #	Description
99721	Timing Belt

The customer pays return freight for warranty claims. If the warranty claim is valid, Spex will pay return freight to the customer. However, Spex reserves the right to judge whether a malfunction during the warranty period is due to defects in materials or workmanship, or to wear, negligence or misuse.

14.1 Product Specifications

Every effort has been made to provide complete and accurate product operation and information in this manual. However changes may be made from time to time to improve performance of this product, so specifications are subject to change without notice. Therefore, slight changes that are not reflected in the current illustrations should be considered minor and inconsequential for the purposes of this operating manual.

14.2 To Arrange a Return Shipment

We want you to be satisfied with whatever you purchase from Spex. Please bring any problem to our attention, but please DO NOT RETURN any item before contacting Spex for a Return Authorization Number and instructions. Unauthorized returns will be refused. Cost for all return transportation is the responsibility of the customer. Credit for returned merchandise will be issued only after goods have been received and inspected. Returned goods are subject to a 25% restocking charge.

15.0 Instrument Disposal

In accordance to the EU directive 2012/19/EU covering Waste Electrical and Electronic Equipment, all equipment with the disposal symbol must not be disposed of with general waste.

Throughout the European community, guidelines regarding disposal regulations may vary from territory to territory. Contact the national legislation or local authority for more information on proper disposal of all equipment with this symbol.



Disposal Label
Located on back of unit

16.0 Contact Us

Within the United States, contact us at +1.732.623.0465, fax +1.732.906.2492, sampleprep@antylia.com, or spexsampleprep.com.

Outside the United States, contact the Spex SamplePrep representative from whom you purchased your equipment.

Spex is an Antylia Scientific company.

spexsampleprep.com

Phone: +1.732.549.7144
spexsales@antylia.com

Connect with us

