



VS1000

VariSifter™

Operation & Set-up Manual



QAQC LAB

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SPECIFICATIONS

Thanks to the VariSifter's™ internal converter, a single model can be used in any of the following power environments:

- 120V/60Hz
- 120V/50Hz
- 240V/50Hz
- 240V/60Hz

MATERIALS OF CONSTRUCTION

- Stainless Steel Test Table
- Steel Cabinet and Frame
- Baked Powder Finish Throughout
- Acrylic Sieve Frames, Spacers, and Top Cone
- Metal Column Lock
- Aluminum Fines Collector Holder

PHYSICAL DIMENSIONS

WEIGHT-----	35 lb (16 kg)
CABINET DIMENSIONS-----	23" h x 10" w x 12" d
-----	61 cm x 25 cm x 31 cm

OPERATING CONDITIONS

This device will function properly at any non-condensing humidity level within the temperature limits of 0° to 120°F (18° to 49°C). However, for test repeatability, it is recommended the ambient temperature and humidity be controlled. The sieves and accessories used with this device should never be subjected to temperatures above +125°F (52°C) or below -45°F (-43°C).

External vibrations of a low energy level will have little effect upon the accuracy of the test results. For optimum results, the device should be operated on a stable, level surface. This practice will help ensure an even layer of particles on each sieve.

OPERATING INSTRUCTIONS

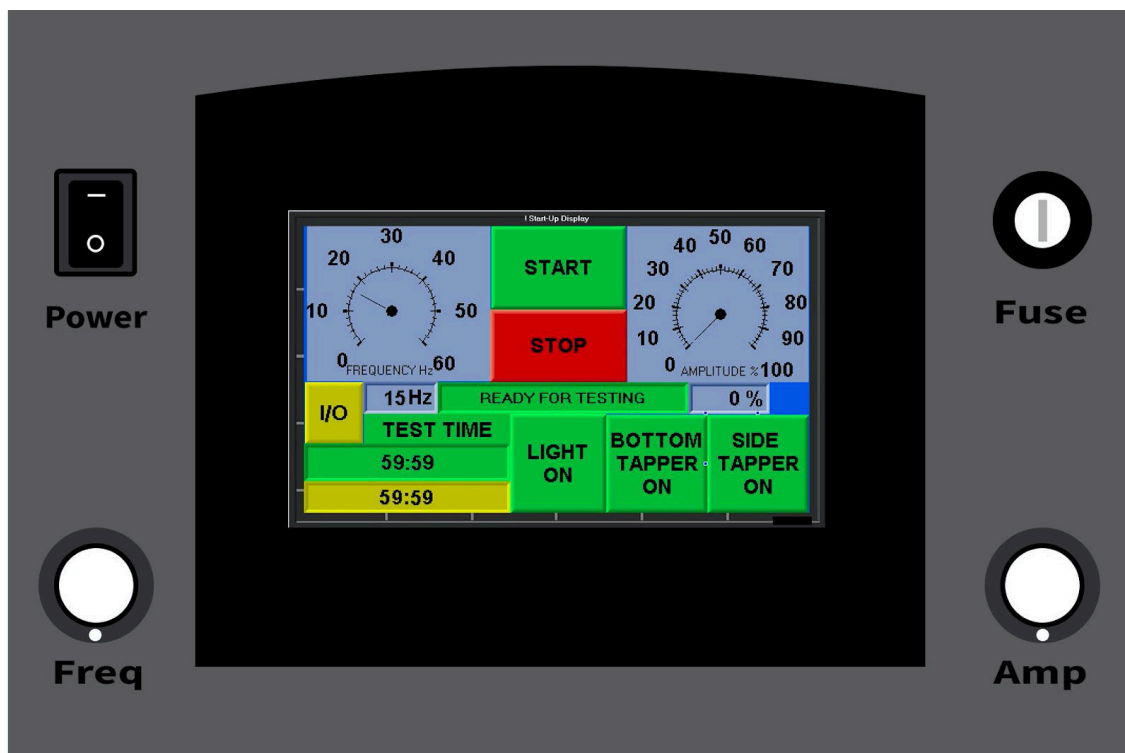
INSTALLATION

Place the VariSifter™ on a level surface for operation. Observe the ambient temperature and humidity guidelines outlined in the specifications section.

ELECTRICAL CONNECTION

Plug the power cord into the socket in the rear of the unit and then into the power source. The VariSifter™ has an internal power converter to accommodate various power environments. (120V/50Hz, 120V/60Hz, 220V/50Hz, 220V/60Hz)

VariSifter™ SONIC SEPARATOR CONTROL PANEL



FREQUENCY CONTROL

Frequency (Hz) of each test may be customized from 15Hz up to 60Hz by turning the Frequency knob (**Freq**) on the left side of the control panel. A read-out of the setting will display on the touch screen both in the analog expression and digitally. This setting will vary the number of “tries” per second the sample particles experience.

START/STOP

After programming the desired test time, hit the **START** button to begin your test and the timer will begin to count down. The **STOP** button will interrupt the test, but retain the remaining test time on the countdown. To completely abort a test and reset the timer, press and hold the **STOP** button for two seconds.



AMPLITUDE CONTROL

Amplitude is adjustable from 0 - 100 by turning the Amplitude knob (**Amp**) on the right side of the control panel. The read-out (expressed as a percentage of power) shows both in analog and digitally. The amplitude will vary the intensity of the sound wave used thereby adjusting the amount of "lift" applied to particles in the test stack. The optimum amplitude for the sample will depend upon the density of the particles, static electric charges, agglomeration, etc. Observing the sample during setting the amplitude is key in achieving the optimum amplitude for any given test. The ideal amplitude has been achieved when the heaviest particles are rolling on the sieve surface and no particles are arcing higher than half the height of the sieve surface.

MANUAL I/O TESTING SCREEN

The **I/O** screen is a troubleshooting module that will be helpful in the event of malfunctions. Advantech/W.S. Tyler telephone or email support can assist with walking through the Manual I/O Testing Screen buttons, if necessary.



MACHINE STATUS INDICATOR

- "READY FOR TESTING" – Displays when the test stack is properly in position
- "TEST STACK NOT IN POSITION" – If the test stack kicks out of position a long series of beeps will be emitted and sifting and tapping will be interrupted
- "TEST STACK SECURE" – When the test stack is properly in place, testing is ready to proceed
- "TEST IN PROGRESS" – Indicates the test is currently running
- "TEST COMPLETE" – The machine will emit 4 beeps when testing is complete
- "RUN ABORTED" – If the STOP button has been held for two seconds, a series of 4 beeps will sound and the timer will reset
- "HMI BATTERY LOW" – When this message is displayed, please contact your W.S. Tyler representative for instructions for maintenance.



TIMER

The maximum test run-time is 59 minutes and 59 seconds. To program the test run time, touch the green button below the “**TEST TIME**” box.

Program the minutes and seconds for your test, then touch the enter key.



The test time length will display in green under the “**TEST TIME**” button. The time remaining is displayed below that in yellow.

LIGHT

The interior light may be turned on or off by tapping the “**LIGHT**” button.



VERTICAL AND HORIZONTAL TAPPERS

The tapping mechanisms on the VariSifter™ assist in reorienting particles on the sieve surface and breaking up agglomerates. Each may be independently turned on or off, per user preference. The respective buttons will be green if the function is on and grey if the function has been turned off.

NOTE: When sifting powders 45µm and finer, addition of the horizontal tappers may be beneficial. Use of the vertical and/or horizontal tappers may not necessarily help with static electric charge issues.



REMOVING THE STACK ASSEMBLY

The stack assembly can be removed from the test chamber by first removing the Column Stop in front of the test stack. Grasp the locking arms on the column lock assembly and pull straight down while squeezing the arms together. This will lock the assembly together so the stack can be slid straight out of the test chamber. **WARNING:** *Do not leave the column lock arms clamped while the test stack is out of the test chamber. To avoid possible stack upset, unclamp the arms immediately upon removal from the machine.*

DISASSEMBLING THE STACK ASSEMBLY

While steadying the stack with one hand, spread the column locking arms with the other hand by sliding a thumb and forefinger into the openings between the lowest sieve and the column locking. The spring-loaded column lock will release. It can then be carefully removed and access gained to the rest of the stack components.

SELECTING THE SIEVES FOR ANALYSIS

Select the sieves required for analysis. The height of the testing stack used within the VariSifter™ is a fixed height.

U.S. Standard Sieve Series – 5/8" overall height

A maximum of six U.S. standard series sieves (sieve sizes #3.5 through #635) may be used at one time. Any combination of sieves, accessories, or spacers making up the standard stack height of six standard sieve units may be used.

Precision Electroformed Sieve Series – 1-1/4" overall height

A maximum of three precision electroformed sieves may be used at one time. Any combination of sieves, accessories, or spacers making up the standard stack height equivalent to three precision electroformed sieves may be used. When performing separations 30µm or finer, use only **one** precision sieve at a time.

PREPARATION FOR THE ANALYSIS

To prepare for the analysis of a sample for the first time, it will be necessary to perform a few simple tasks:

Gather the Ancillary Equipment Needed:

- Weighing device (balance or scale with resolution in grams suitable for your application; generally, 0.1g or 1.01g are sufficient) 100g capacity is suitable.
- Small, natural hair brush for brushing fine particles from the standard sieves wire cloth or precision mesh **frames**. (NOTE: Brush sieves from the underside ONLY! Never force material through a sieve opening. **Never brush precision mesh.**)
- Means of recording and calculating tare weights, sample weights, percentages, etc.

Note: In addition, prior to performing the first test, all sieve, standard spacers, and the top cone should be washed according to the care section that follows. This step will reduce the chance of sample contamination from any residues left over from the manufacturing process.

PERFORMING THE ANALYSIS

The following steps constitute a typical analysis with the VariSifter™ Sonic Separator:

WEIGHING THE PARTS

Weigh and record the tare weights of the diaphragm, top cone, spacers, sieves, and fines collector.

INSTALLING THE FINES COLLECTOR

Install the fines collector in the fines collector holder. Fasten the round metal plate at the bottom of the fines collector to the fines collector holder by sliding the keyhole slot in the fines collector over the fastener mounted in the fines collector holder base.

ASSEMBLING THE SIEVE STACK

Assemble the sieve stack with the coarsest sieve on the top of the stack and finest sieve at the bottom. If fewer than six (6) standard series or three (3) precision electroformed sieves are used, add spacers to the **top** of the stack to fill out the proper stack height as described in the *Selecting the Sieves for Analysis* section above.

INTRODUCING THE POWDER

Discussion of the proper methods of extracting gross samples and preparing test samples for analysis is far too complex to be dealt with here. For more information on sample extraction and preparation, please refer to the publication, *Test Sieving: Principles and Procedures*, toward the back of this manual.

A good rule of thumb is to use the smallest sample size possible that is still representative of the lot from which it was extracted. Sample sizes of 1 gram are a good starting point for VariSifter™ determinations. The sample size can be increased until the optimal combination of sample size, time, sift amplitude and frequency are determined.

Select a proper mass of powder to be tested. When sieving materials larger than 38 µm; do not exceed 20g. When sieving materials smaller than 38µm, do not exceed 10g. Weigh and record the mass of the powder sample. Place the powder sample on the top sieve in the stack.

INSTALLING THE DIAPHRAGM

Place the diaphragm on top cone with the metal ring protruding downward. When properly orientated, the word "**TOP**" will show on the latex material.

REPLACING THE COLUMN LOCK

WARNING: *Do not lock column lock arms until you are ready to place the test stack into the test chamber! Uncontrolled release of the arms could cause stack upset and sample loss.* Place the column lock onto the sieve stack and press straight down until the locking arms snap onto the fines collector holder.

CHECK THE CONTROL PANEL

As a safeguard, make sure the amplitude control is set at “0” before placing the stack assembly into the test chamber. This is necessary to prevent damage to the sieves and the test sample in the chamber. If the amplitude had been inadvertently set to the maximum setting or the timer interrupted mid-cycle, for example, the sudden impact of the signal from the speaker driver could damage the sieves or compromise your test sample.

INSERTING THE STACK ASSEMBLY

Slide the stack assembly into the test chamber with the column arms locked. The stack assembly is stopped at the top by two tabs on the driver support plate above. On the test chamber table, you will notice two rivets that limit how far the stack can be placed inside the chamber. The table switch on the left side of the test platform is a safety interlock device that prevents the unit from operating if the stack moves out of position. This switch will be properly deployed and the circuit activated if the stack is inserted correctly.

Once the stack assembly is in position, the column lock can be released by sliding a thumb and forefinger into the openings between the lowest sieve or spacer and the column locking arms. Spread the column locking arms. The spring-loaded column lock will release and expand to lock the column into the test chamber, forming a tight seal.

Place the L3-N9 Column Stop in front of the test stack. This column stop ensures the stack will remain in place during testing.

Close the sliding door to the test chamber.

BEGINNING THE TEST

Program the predetermined testing time and frequency per the instructions in the Control Panel section above. Choose whether to activate your bottom and side tappers. While virtually all test procedures benefit from the use of the vertical tap, some may not. Use the setting appropriate to your samples. Refer to the “Vertical and Horizontal Tappers” section in the Control Panel section for more information.

Setting the Amplitude

Note: The amplitude is the “lift” action on the particles as the oscillating sonic column is set in motion. The higher the amplitude setting, the more “lift” on particles. Moving the particles more vigorously than necessary **DOES NOT** increase the speed or precision of the separation. In fact, excessive amplitude settings may increase electrostatic problems, sample loss, and equipment wear.

WARNING: *Due to the extremely fragile nature of the Precision Electroformed Series sieves, excessive amplitude, especially over extended periods of time can cause immediate or premature sieve failure.*

After starting the timer, increase the amplitude **SLOWLY** until the largest particles begin rolling on the top sieve. The entire operation can be viewed through the sidewalls of the sieves. The finer material should begin flowing through the sieves within seconds. Note that no particles should be arcing higher than half the height of the sieve.

Completing the Test

For an initial test run: When no more material can be seen falling through the sieves, note time elapsed. For detailed instructions on determination of optimal test time, please see Chapter Six “Performing the Sieve Analysis” of *Test Sieving: Principles and Procedures*. The section titled “Recommended Time Intervals” will be helpful.

For a routine test run: When the timer counts down to “0”, open the door and follow the procedures listed for ‘Removing the Stack Assembly’. Caution should be exercised when dismantling the stack assembly to avoid loss of sample retained on the sieves or in the fines collector.

The parts can be weighed directly on the weighing device, removing the need to transfer the material to a weighing dish (thus reducing potential sample loss). Don’t forget to weigh the fines collector as well. Record the weights on the worksheet used to record the tare weights. Subtracting the tare weight from the post-test weight yields the mass of the sample retained on the part. The percentage retained at each sieve size can be calculated simply by comparing the weight on each part with the starting sample weight.

CARE OF VARISIFTER™ SONIC SEPARATOR AND ACCESSORIES

The Model VS1000 VariSifter™ and Accessories will perform satisfactorily for many years if the following basic care instructions are observed:

Cleaning the Sieves and Stack Assembly Parts

For best results, stack assembly components and sieves should be cleaned in an ultrasonic cleaner of 150 watts or less. General cleaning is best accomplished in a mild solution of dishwashing detergent and water maintained at 75-80°F (24-27° Celsius). Ultrasonic cleaning has proven to be the most effective method of removing particles plugging woven wire cloth sieve openings. Regular ultrasonic cleaning will help prevent particle buildup in the sieve openings, thus reducing the amount of time each sieve must be exposed to ultrasonic vibrations. Care must be taken in how long the sieves are exposed to the ultrasonic vibrations, as damage can result from overexposure. Do NOT ultrasonically clean precision sieves.

After washing, rinse the parts with tap water, and allow to air dry. DO NOT expose the sieves, spacers, or top cone to heat sources of any kind. Heat sources will cause warping and/or cracking of the parts which will compromise the airtight seal between the stack assembly parts during use. If an ultrasonic cleaner is not available, immerse items to be cleaned in the same mild detergent solution, rinse and allow to air dry as directed. **Precision (electroformed) test sieves have very specific warnings and care procedures. Please refer to the Handling and Use Instructions on the jewel case.**

CAUTIONS

U.S. Standard Sieve Series: Improper handling can cause serious damage to the sieve openings and accelerate sieve failure.

- **DO NOT** remove particles clogging sieve openings with a needle or other sharp object.
- **DO NOT** use compressed air to clean the sieves or dislodge trapped particles.

Precision Electroformed Sieve Series: Store the precision electroformed sieves in the protective jewel case provided and follow the Handling and Use Instructions on the box.

- **DO NOT** remove particles clogging sieve openings with a needle or other sharp object.
- **DO NOT** brush the electroformed media.
- **DO NOT** touch the electroformed media with your fingers. Natural acids and oils in the skin will attack and discolor the fragile electroformed mesh and cause permanent failure.
- **DO NOT** ultrasonically clean precision electroformed sieves.

Cleaning the Fines Collector and Diaphragm

The fines collector and diaphragm are made of durable latex material. With regular care, these parts can withstand a considerable number of duty cycles. Both parts can be cleaned in a mild detergent and water solution and rinsed with water. The parts should be allowed to air dry, avoiding heat and sunlight.

After drying, both parts should be dusted lightly with talcum powder (NYTAL 200 or any commercial unscented talcum powder). The excess talcum powder can be blown off with low-pressure compressed air. Return the parts to their protective envelopes for storage, as light and some chemicals in the air can be harmful to the latex, causing holes and cracks to appear prematurely.

Users' Tip: For longer life of the fines collectors, rotate the use of several collectors over time. For example, use fines collector #1 on Monday, wash and store the collector at the end of the day and use collector #2 on Tuesday, etc. Set up a regimen to rotate 3-5 collectors over the course of a week, or whatever your usage requires. Allowing the latex to 'rest' before it is put back into regular service can significantly extend the life of the individual collector.

Cleaning and Care of the VariSifter™ Sonic Separator Unit

The VariSifter™ cabinet, test chamber and aluminum stack assembly parts should be wiped off periodically with a soft, damp cloth.

Servicing the VariSifter™ Sonic Separator Unit

Only personnel qualified by Advantech/W.S. Tyler should service the VariSifter. If any performance or operational problems arise, please contact Advantech/W.S. Tyler directly.

VARISIFTER™

FREQUENTLY ASKED QUESTIONS

For specific sieving procedures, please refer to [Test Sieving: Principles and Procedures](#) located in the User's Manual.

1. **Can I use one sieve and fill the rest of the stack with spacers?**

Yes, a single sieve can be used at a time. Be sure to add spacers at the top of the stack and place the sieve at the bottom. Please note when using precision mesh sieves, only one sieve may be used at a time while performing separations of 30 microns and finer.

2. **When would I need to activate the Horizontal Tappers?**

While sifting media 45 microns and finer, it may be beneficial to incorporate the Horizontal Tappers. These tappers fire opposite the Vertical Tapper and may aid in elimination of particle agglomeration.

3. **How do I determine the best amplitude setting for my test?**

Always start the test at zero amplitude. Slowly increase the amplitude until the heaviest particles are rolling on the sieve surface. Media particles should arc no higher than half the height of a standard sieve therefore never touching the sieve above it. When using precision mesh sieves, media particles should arc a maximum of ¼" above the wire mesh surface. Final test results may be adversely affected by not complying with this rule.

4. **How long should I run my test?**

Generally, there are industry or "in-house" standards for sieving durations. For instructions on determining the optimum test time, please refer to the *Recommended Time Intervals* section in *Chapter 6: Performing the Sieve Analysis* in the [Test Sieving: Principles and Procedures](#) manual. Generally, the VariSifter test is complete when media is no longer filtering into the next sieve below. It is recommended to perform three tests for repeatability, noting the frequency, amplitude and test time for the running of future tests.

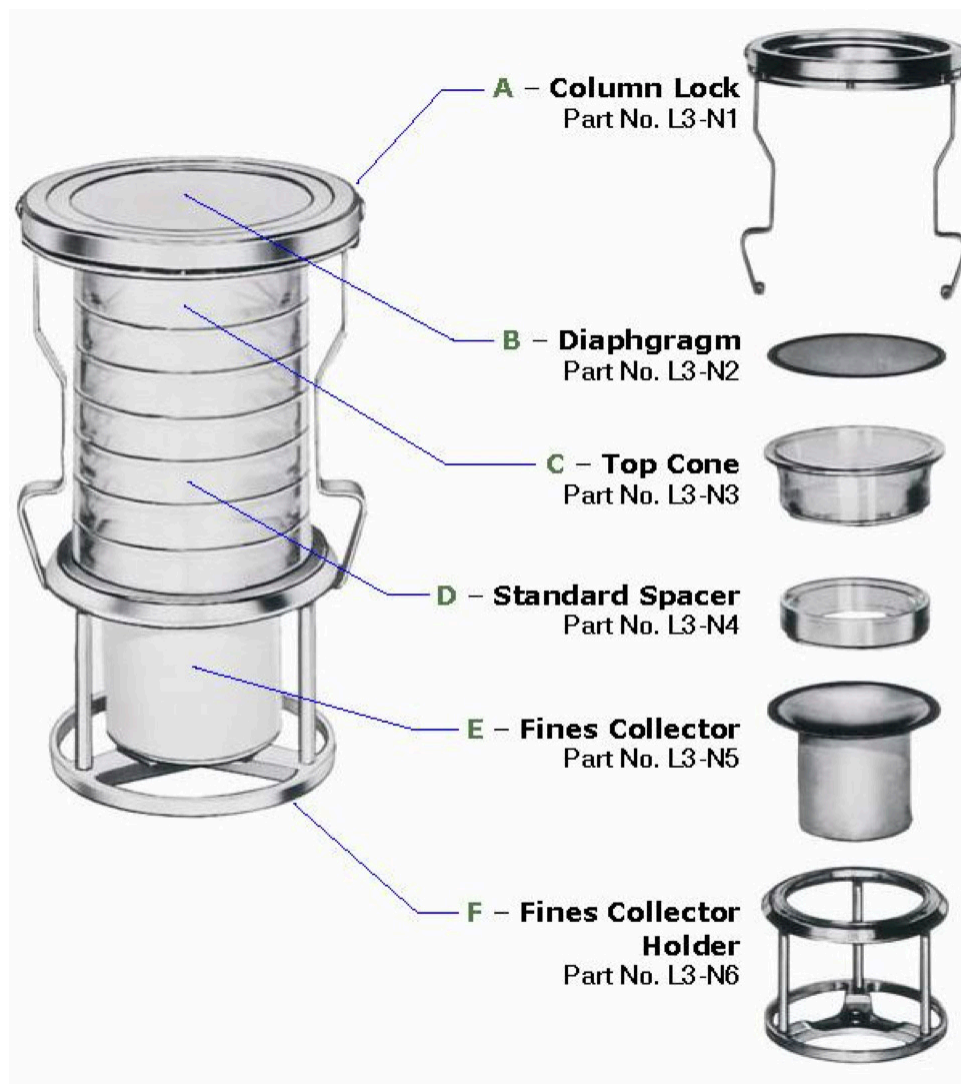
5. **The media samples are not staying within the stack assembly. What is happening?**

There are a few possible reasons for the sample escaping the stack assembly:

1. The stack may have been improperly assembled and inserted.
2. There may be holes or tears in the fines collector or diaphragm or cracks in the sieve frames.
3. The amplitude may be improperly set.

Start by examining the sieve stack assembly. Be sure the following steps have been executed:

- Hook Fines Collector to bottom of Fines Collector Holder.
- Assemble your sieve stack with up to six standard sieves or up to three precision mesh sieves. If fewer sieves are used, replace with Spacers.
- Add the Top Cone.
- Add the sample.
- Add the Diaphragm.
- Add the Column Lock and snap the arms down under the rim of the Fines Collector Holder.
- Insert the stack assembly into the test chamber until it hits the stop at the rear and the table switch is fully engaged.
- Release both arms on the column lock. A firm snapping sound will be heard.
- Your sieve stack should fit **very** securely in the test chamber.
- Place the Column Stop in front of the entire assembly



If this has not solved the problem, visually inspect the Diaphragm and Fines Collector for holes or tears and each sieve frame for cracks. Examine the Column Lock springs. There should be six springs, all oriented vertically.

Lastly, setting the amplitude too high may also contribute to loss of the sample. Refer to **question three** for instructions on setting the amplitude.

6. **My VariSifter™ does not turn on or will run for a short time, then stop? What is happening?**
The stack assembly must be fully inserted into the test chamber and locked in place by releasing the Column Lock arms. Please refer to **question five** for instructions on properly assembling and inserting the sieve stack assembly. If the column lock is not released, the stack is able to vibrate out of position, releasing the table switch and turning the unit off. The table switch must remain fully engaged in order for the unit to function.
7. **Can the VariSifter™ be operated with the door open?**
Yes. However, it is not recommended the door be wide open as it may alter your test results.
8. **Why does the VariSifter™ have a light inside?**
The light allows the user to set the proper amplitude. The sieves were designed with clear acrylic frames so sample media can be viewed while the test is running. The appropriate amplitude has been achieved when the largest particles of the sample are observed rolling on the sieve surface and none arc higher than half the height of the sieve frame. Particles that are arcing too high will be forced back into the sieve above, thereby altering the test results.
9. **Does the VariSifter™ have to be calibrated?**
No. The VariSifter does not come calibrated. The Frequency setting is a function of internal power converter. Amplitude is an expression of percentage of power.

Test sieves, however, **can** be certified using W.S. Tyler's sieve certification service.
10. **What regular maintenance does the VariSifter™ require?**
There is no routine maintenance required for the VariSifter™. It is recommended the unit be kept clean by regularly wiping it down with a soft, damp cloth.
11. **What is the warranty on the VariSifter™?**
The VariSifter™ carries a one-year limited warranty against defective material and workmanship.
12. **Can I use 3" brass sieves in my VariSifter™?**
No. The VariSifter™ is designed only for use with 3" acrylic sieves and the diaphragm and fines collector. Metal 3" sieves are not compatible.

TERMS

Driver (X465030): The driver looks like a speaker and produces the sonic vibrations that agitate the particles.

Cam Assembly (X465035): The cam assembly is the spring-loaded pivot block.

Column Lock (L3-N1): Locks the test stack together for easy insertion and removal from the test chamber. Upon release of the arms, helps form a seal between the driver plate and the diaphragm.

Diaphragm (L3N2): Blocks the particles from entering the driver and sits on the top cone. It is made out of latex.

Top Cone (L3-N3): The top cone acts as a funnel and holds the diaphragm on. This is where the sample is introduced into the stack assembly.

Spacers (L3-N4): Spacers are used in place of sieves to maintain the stack assembly height.

Fines Collector (L3-N5): Made of latex, the fines collector collects the minus material that has passed through the stack assembly.

Fines Collector Holder (L3-N6): The fines collector holder is used to hold the fines collector and is the base of the stack assembly.

Stack Assembly (L3-N7): Consists of column lock, diaphragm, fines collector, fines collector holder, top cone and selected sieves or spacers. This device is where the sample is placed for the particle separation.

Column Stop (L3-N9): Placed at the bottom of the test chamber in front of the test stack, this piece ensures the test stack stays in position during testing.

Tapper Coil Assembly (X351404B): Located on the lower portion of the unit, the purpose of the tapper coil assembly is to convert pulsating electrical energy to mechanical energy. It does this at a rate of one vertical tap every four seconds.

Note: The VariSifter™ operates on a sonically agitated air column. The amplitude increases the intensity of sound in the sieve column.

TROUBLESHOOTING

Problem

Possible Cause

Unit won't work and is plugged in.

Check plug input to unit, then check fuse.

Unit will sift, but not pulse.

Pulse timer inoperative.
Call for technical support.

Unit comes on, but will not sift or pulse.

Make sure stack assembly is inserted correctly. If the stack assembly is not the problem, the cam assembly may be out of alignment or the trigger spring may be broken.

Unit works, but shuts off before timer hits zero.

Stack assembly has not been unlatched.

Unit runs but lacks power.

Possible defective driver.

The Column Lock tends to spring open unexpectedly.

The arms on the Column Lock may have fallen out of adjustment. **Gently** bend the arms toward one another so they get a tighter grip on the Fines Collector Holder.