

How to Evaluate if Your Rotary Electric Vibrators Are Working Properly on Vibratory Equipment



Counter Rotation & Synchronization Are Key

Vibratory Equipment such as mechanical feeders, industrial screeners and compaction tables are typically designed utilizing two (2) rotary electric vibrators. The use of rotary electric vibrators provides a quiet performance, even at higher vibratory frequencies and amplitudes, contributes toward a more comfortable work environment. They're an energy-efficient option that offers extreme durability, even when performing continuous duty out in the field. Their adjustable force output is a beneficial feature that performs well for light, medium and heavy-duty applications. For maximum performance and longevity of the equipment, it is critical that the two vibrators operate correctly. Proper set up requires that the two vibrators run together at the same speed and counter rotate or run in opposite directions.

Counter rotation – When wiring the two vibrators, the electrical connections must be such that the vibrators counter rotate. Typically the direction of rotation is not critical as long as one vibrator rotates clockwise and the other vibrator rotates counter clockwise. The counter rotation of the vibrators is what produces the linear motion in the equipment which is required for proper performance.

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One sure way to verify proper counter rotation of the vibrators is to remove one weight cover on the same end of each vibrator and observe rotation on start up. With the equipment OFF, remove the four bolts that hold the weight cover in place, and then remove the weight cover. Repeat on the second vibrator. With the weight covers removed, the direction of rotation of the vibrator's weights can be easily observed. Depending on the location of the unit controller, it may be best to have one person start the unit and a second person observes the direction of rotation during startup.

When performing this check ensure that all personnel are clear of the vibrators and the rotating weights before starting the unit. If the vibrators are running in the same direction, correct by “flipping” two of the power leads on one of the vibrators; this will change the rotational direction of that vibrator. Ensure all changes to the electrical connections are done with appropriate safety measures in place and that the work is performed by a qualified electrical technician.

Indicators of vibrators *not* counter rotating:

- On a vibratory feeder or screener, material will flow more slowly and will tend to move to one side of the tray as it travels the length of the unit.
- When observing a fixed point on the side of the unit, motion will be circular/elliptical instead of linear.
- On a vibratory table, material will tend to move to one side of the table. Sprinkling a small amount of sand or similar small particle material on the table top is helpful in observing this condition.
- When observing a vibratory feeder or screen from the end of the unit, side to side motion is present. When properly set up, all motion should be linear and in line with the length of the unit, resulting in no observable side to side motion.

Synchronization – When properly set up and running the vibrators will “sense” each other and will synchronize, running at the same speed. Synchronization is critical to the successful operation of this piece of equipment. Vibrators that are not properly synchronized can generate destructive forces which will be applied to the piece of equipment. This condition can reduce the effective working life of the equipment and the performance of the unit.

Steps to take to ensure proper vibrator synchronization:

1. Controls for the unit should be appropriately sized so that both vibrators can be started with one controller. Both vibrators need to be started simultaneously.
2. If using a Variable Frequency Drive (VFD) the acceleration ramp up should be as quick as possible. Slow ramp ups to the final desired speed for the unit is not advised and not beneficial to the proper operation of the piece of equipment.
3. “Soft start” types of controllers/motor starters should not be used with vibratory equipment which uses two vibrators.
4. For those vibrators with grease fittings, follow the lubrication schedule as outlined in the rotary electric vibrator manual. Proper bearing lubrication and maintenance provides the longest working life for the vibrator and equipment. Increased resistance within the vibrator due to poor bearing maintenance will reduce the ability of the vibrators to synchronize.

The best method to check for vibrator synchronization is to use a strobe tachometer. A variety of strobe tachometers can be found online through a number of sources.

Procedure to check for synchronization using a strobe tachometer:

1. Remove one weight cover on the same end of both vibrators. You need to be able to see the eccentric weights on the end of each vibrator.
2. Ensure that all loose objects and power cords are clear of the vibrators so that the rotating weights don't strike or catch on anything.
3. Ensure that all personnel are clear of the vibrators.
4. Start the unit and bring it up to full operating speed.

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5. Turn on the stroke tachometer and adjust the speed of the strobe light to match that of the rated speed of the vibrator.
6. As the speed of the strobe approaches the speed of the vibrators, the technician should be able to observe a “slowing” of the rotating weights. The goal is to have the strobe frequency match the frequency of the vibrators. At that point, it will appear as though the vibrators’ weights have stopped rotating.
7. With properly synchronized vibrators, the rotating weights will appear to stop at the same strobe speed. If one vibrator’s weights appear to “stop” and the other vibrator’s weights continue to rotate, the vibrators are not running at the same speed.
8. When the vibrators are properly synchronized, the rotating weights on the two units will appear to stop together. The position of the weights, vibrator to vibrator will appear to be a mirror image of each other.

What does it mean if the vibrators are not running together in synchronous operation? This could possibly indicate a problem with one of the vibrators, perhaps an early indication of a pending bearing failure or lack of grease on those vibrators with grease fittings. Always refer to the operation manual for the recommended maintenance schedule for grease application, both quantity and type of lubrication. Some of the smaller vibrators are permanently lubricated and don’t require maintenance of this type. Another option would be to double check the tightness of the vibrator mounting bolts. The vibrator mounting bolts should be checked periodically for tightness. Loose bolts can prevent proper operation and synchronization of the two vibrators. If problems persist, contact your industrial vibrator provider.

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