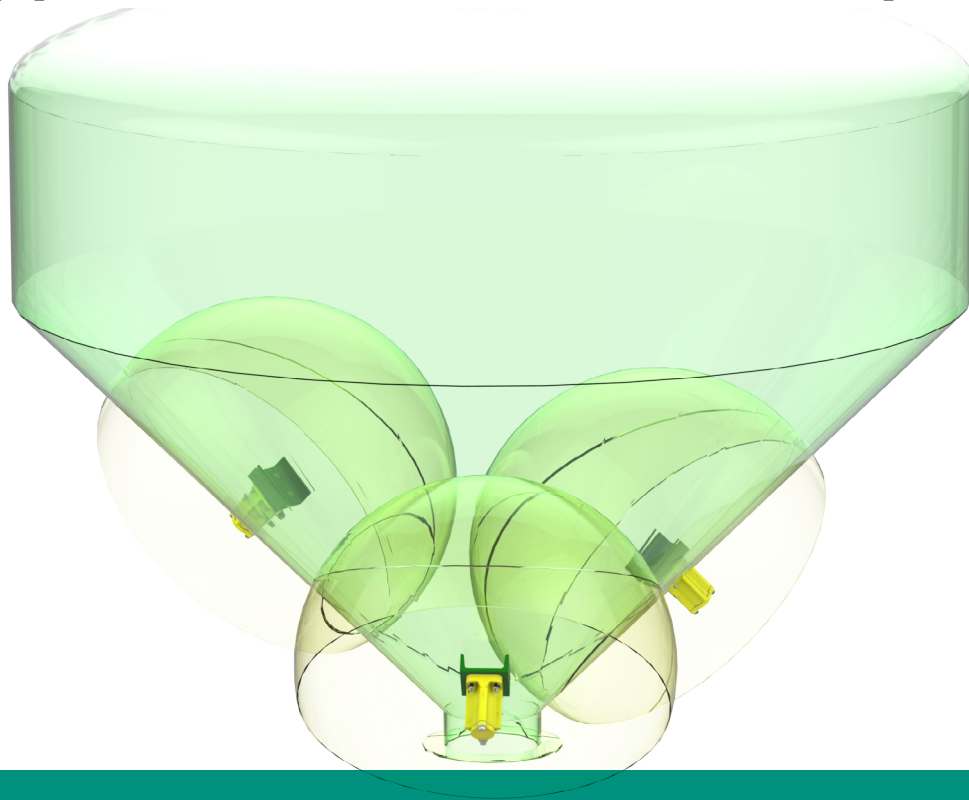


# Selection Guide for Air & Electric Vibrators for Hoppers, Bins, Chutes and Pipes



## Industrial Vibrator Selection Made Easy in 3 Simple Steps

The Cleveland Vibrator Company's line of industrial vibrators and material flow aids feature a wide range of force ranges, construction types in air-powered (pneumatic) piston vibrators, hammers, knockers and rappers, turbine and ball vibrators; or electric styles of rotary electric vibrator motors and electromagnetic linear vibrators for handling material flow challenges from a few pounds to over 100 tons in bins, hoppers, railcars, trucks, chutes, feeders, filters, screeners, packers, parts tracks and more.

### WHAT'S INSIDE

- Optimal vibrator mounting methods for performance and equipment safety
- Choosing best location(s) for vibrator installation on your bin, hopper or chute type
- Selecting the best vibrator type for your material and application
- Sizing the right force for your wall thickness and material load
- Installation guidance so you can plan ahead

# The 1, 2, 3 of Vibrator Selection for Bins, Hoppers, Chutes & Pipes



Inside these pages are guidelines that put the power of 90+ years of industrial vibrator application experience into an easy 3 step selection process for anyone looking to apply vibration to a bin, hopper, chute or pipe. Whether its use is to promote material flow or to clean out or clean off vessel walls, corners and sticking points, we believe that this guide can provide vibratory solutions for 90% of common applications we have seen throughout our long history. **However, this is only a guide.** If you need additional help in making the best vibrator selection for your application, we are happy to assist you. We have a friendly group of experienced experts that are eager to help, please do not hesitate to give us a phone call or email us for personalized, custom service.

The considerations that go into making the best choice are numerous but a few of the important factors include: the type of material within the bin, hopper, pipe or chute, the vibrator force and frequency needed for the application, the geometry of the bin, and environmental challenges, to name a few. With our 90+ years of experience, we have created a simple process of selecting the best vibrator(s) for bin, hopper, chute and pipe applications. By following these three easy steps, you can find the industrial vibrator that best suits your unique application. Be sure to follow these steps in the order given to achieve the most effective result.

## 1. FIND THE NUMBER OF VIBRATORS NEEDED FOR YOUR APPLICATION

Determining the amount of vibrators needed for your application is dictated by the size and shape of your bin, hopper, chute or pipe as well as the type of material flow solution your application requires. Remember, industrial vibrators have a “radius of influence” that controls how much of the vessel and material they will affect. The larger the vessel, the more vibrators needed to effectively move the bulk material.

Your application type determines if you need to shake the entire vessel to promote material flow, clean out or clean off walls, or vibrate a single problem area to get something “unstuck.”

The information provided on Page 2 of this Selection Guide will show you the number of vibrators needed for your application.

## 2. FIND THE STRENGTH OF VIBRATOR NEEDED FOR YOUR APPLICATION

If you are trying to clean out, clean off or unstick bulk materials, the wall thickness of the vessel is the only factor you need to consider, as finding the force of the industrial vibrator is not needed to determine the best vibrator model for this application.

If you are in search of a vibratory solution to promote material flow, you will need to calculate the total weight of the material in the transition area, also known as the sloped wall, of the hopper or chute. In finding this weight, you will be able to calculate the total force required to meet your application's vibratory aid needs.

Pages 3 and 4 will give you the tools needed for determining the material load in the sloped section and total force per vibrator required for various vessel shapes as well as selecting the correct strength needed for your load and/or wall thickness.

## IN THESE PAGES YOU WILL FIND:

- A Brief 1, 2, 3 How-To Overview
- Finding Quantity and Location(s) of Vibrator(s)
- Finding Strength of Vibrator(s) Needed
- Finding Best Type of Vibrator(s) Needed
- Optimal Vibrator Mounting Methods
- Proper Welding Techniques
- Plumbing & Electric
- Products Overview

## 3. FIND THE BEST TYPE OF VIBRATOR FOR YOUR APPLICATION

Now that you have found the number of vibrators and the strength needed for your application, you will discover there are multiple vibrator style options that best fit your application needs.

In this last step, you will choose the best selection based on power source requirements, noise and environmental concerns, material properties and application.

Pages 5 and 6 describe each vibrator model in great detail, ranking strengths of the many different models and types of vibrators Cleveland Vibrator offers to help you make the best decision that will get the job done.

### Need More Help Sizing Your Vibrator? Contact Us Today!

Phone: 1(800) 221-3298

Fax: 1(216) 241-3480

Email: [sales@clevelandvibrator.com](mailto:sales@clevelandvibrator.com)

Buy Online: [www.clevelandvibrator.com](http://www.clevelandvibrator.com)

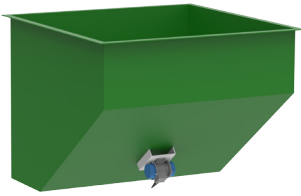
# Step 1: Find the Number of Vibrators Needed and Install Location(s)

## KEY CONCEPTS

- **Radius of influence:** Rule of thumb is that a correctly sized vibrator will have a ~5 ft. radius of influence on material and structure
- **Vibration Transfer:** Vibration transfers better through curves than through corners
- When in doubt where to place a vibrator, **think about where your problem point is** and make sure vibration gets to it
- **Be Aware of Rigid Structural Elements:** Locating the vibrator close to a rigid structural element, like a welded cross beam supporting a hopper wall, will prevent the vibrator from flexing the wall evenly and can cause damage to the wall, structure, mounting elements and vibrator.

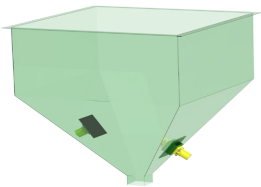
## BIN OR HOPPER WITH VERTICAL SIDE(S)

Mount the vibrator(s) on the wall(s) with the least slope in similar manner as mounting a vibrator on rectangular bins with hopper bottoms shown below.



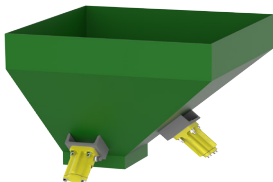
## RECTANGULAR & SQUARE HOPPERS

Mount is similar to conical hoppers on the centerline of one side. A second vibrator may be required if complete cleaning of all corners and sides is desired. Should a second vibrator be necessary, it should be mounted opposite and approximately 1/4 way up the wall. **Two (2) units work best for full corner clean out in bins and hoppers.**



## ASYMMETRICAL HOPPER

Similar to rectangular or square hoppers, mount the vibrator 1/3 the way up the sloped wall. Should a second vibrator be required, mount it on the adjacent sloped wall and 1/4 of the distance of the sloped wall.



## PARABOLIC BINS OR HOPPERS

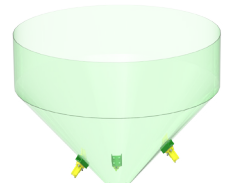
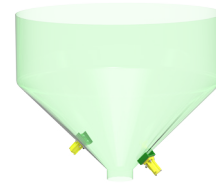
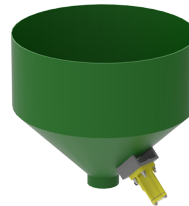
Mount the vibrator within 1-foot of each discharge opening and in line with center of opening.



## CONICAL HOPPERS

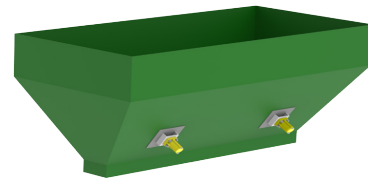
Mount the vibrator to the hopper wall 1/3 the distance from the discharge to the top of the sloped wall. Should a second vibrator be necessary, it should be mounted opposite and approximately 1/4 way up the sloped wall. For large hopper applications requiring three vibrators, mount the third vibrator 1/2 way up the sloped wall.

Small Hopper	Medium Hopper	Large Hopper
Hopper Diameter <8 ft.	Hopper Diameter 8-15 ft.	Hopper Diameter >15 ft.
1 Unit	2 Units	3 Units
	180° Apart	120° Apart



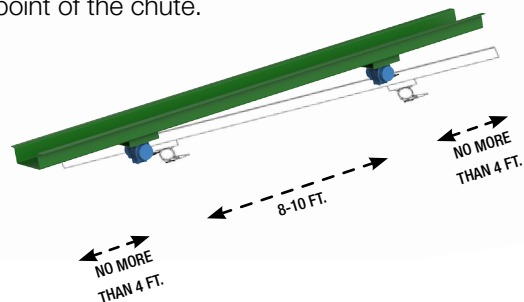
## TROUGH HOPPER

Arrange distance between the vibrators on the **same** wall with 8 to 10 feet between each unit. Be sure to stagger the unit heights of installation with the first vibrator installed 1/3 up the sloped wall. See rectangular & square hoppers for best multiple vibratory unit installation practices.



## CHUTE DISCHARGE

The vibrator is mounted every 8 to 10 feet along the chute. Do not install vibrators more than 4 ft. from the end point of the chute.

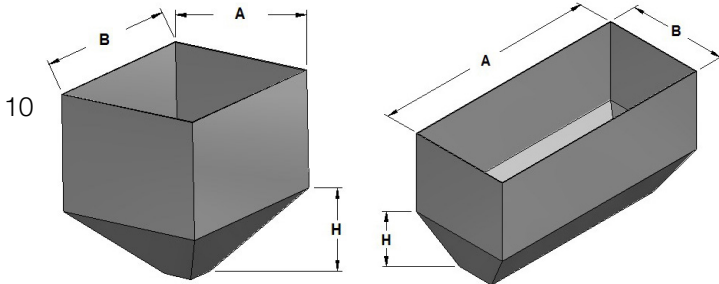


# Step 2: Find the Strength of Vibrator Needed

## BINS & HOPPERS

To move the material in a bin or hopper, the friction between the material and the bin wall must be broken. Once this is done, the material cannot cling to the bin sides and it will flow out through the discharge. The vibrator force needed to accomplish this, is for 80% of all applications, very simply calculated by following these three very easy steps.

**\*All dimensions must be calculated in FT.**



## Rectangular or Squared Shaped Hoppers

A: \_\_\_\_\_ FT.

B: \_\_\_\_\_ FT.

H: \_\_\_\_\_ FT.

MATERIAL DENSITY: \_\_\_\_\_ LBS./FT.<sup>3</sup>

NUMBER OF VIBRATORS NEEDED: \_\_\_\_\_

**STEP ONE:** Calculate the weight of your material in the transition or sloping part of the rectangular hopper. Normally this is the only place where the friction between the material and the hopper sides has to be broken. \*Be sure to only calculate the weight of the material in the transition part of your bin or hopper, not the total weight. Calculate using the following formula:

$$WT. = \text{LENGTH (B)} \times \text{WIDTH (A)} \times \text{HEIGHT (H)} \times 1/3 \times \text{MATERIAL DENSITY IN LBS./FT}^3$$

Weight of Bulk Material = \_\_\_\_\_

**STEP TWO:** When the weight has been calculated, divide that number by what we refer to as the Vibrator Force Factor of 10. This will give you the figure indicating the amount of force or impact needed for your vibrator to successfully move your materials out of your bin or hopper.

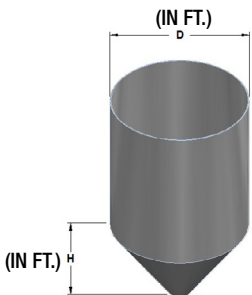
$$F = \frac{\text{BULK MATERIAL WEIGHT}}{10}$$

Total Force Needed = \_\_\_\_\_

**STEP THREE:** Finally, take the amount of total force required for your application and divide it by the number of vibrators needed determined in Step 1 of this Selection Guide on page 3.

$$\text{FORCE PER VIBRATOR} = \frac{\text{TOTAL FORCE REQUIRED}}{\text{TOTAL VIBRATORS REQUIRED}}$$

Total Force Per Vibrator Needed = \_\_\_\_\_



## Conical Shaped Hoppers

$$WT. = \frac{.261 \times \text{DIA.}^2 \text{ (D)} \times \text{HEIGHT (H)} \times \text{MATERIAL DENSITY IN LBS./FT.}^3}{\text{VIBRATOR FORCE FACTOR (10)}}$$

\*If more than one vibrator is recommended for your application, divide the solution to the equation above by the amount of vibrators necessary to find the force per vibrator required.

## LET'S WORK THROUGH AN EXAMPLE:

**STEP ONE:** You know that the length of your rectangular hopper wall is 10 ft., the width is 5 ft. wide and the height of the sloping wall is 2 ft. tall. You also know that your material has a bulk density of 125 lbs/ft.<sup>3</sup>. First, calculate the weight of the bulk material within the sloping section of your hopper.

$$WT. = 10 \text{ (A)} \times 5 \text{ (B)} \times 2 \text{ (H)} \times 1/3 \times 125 \text{ (Material Density)}$$

Weight of Bulk Material = 4,167 lbs.

**STEP TWO :** You determined that the weight of the bulk material in the sloped section of the hopper is 4,167 lbs. You can now find the total force needed to sufficiently move your materials out of your hopper by dividing it by the Vibrator Force Factor of 10.

$$F = \frac{4,167}{10}$$

Total Force Needed = 416.7 lbf.

**STEP THREE :** You found on page 2 that your application requires 2 vibrators. You must now find the force needed per vibrator to move onto Step 3 of this Selection Guide.

$$\text{FORCE PER VIBRATOR} = \frac{416.7}{2}$$

Total Force Per Vibrator Needed = 208.35 lbf.

# Step 3: Find the Best Type of Vibrator for Your Application



VIBRATOR FORCE	ROTARY VIBRATOR WALL THICKNESS	ELECTRIC MODELS				PNEUMATIC MODEL						LINEAR VIBRATOR WALL THICKNESS							
		RE-2 POLE 3600 RPM	RE-4 POLE 1800 RPM	DC	CM 3600 VPM	TURBINE	BALL	AIR CUSHION PISTONS	IMPACT PISTONS										
10	<1/8"					CVT-P-1											Less than 1/8"		
25		RES-0-1-2																	
50																			
75																			
100																			
150	1/8"	RE-1-2															1/8"		
200																			
250																			
300	3/16"	RES-2-2																	
400	1/4"																3/16"		
500		RE-3-4																	
600	1/4"	RE-3-5-2															1/4"		
700																			
800	3/8"																3/8"		
900		RES-6-4																	
1,000	1/2"																1/2"		
1,500		RE-10-2																	
2,000	3/4"																3/4"		
2,500		RE-12-4																	
3,000	>1"																>1"		
3,500		RE-17-4																	
4,000	1"																1"		
4,500		RE-24-4																	
5,000	>1"																>1"		
5,500		RE-30-2																	
6,000	>1"																>1"		
6,500		RE-34-4																	
7,000	>1"																>1"		
7,500		RE-40-2																	
8,000	>1"																>1"		
8,500																			
9,000	>1"																>1"		
9,500																			
10,000	>1"																>1"		

Using the provided table on this page, draw a line starting with the required force calculated in Step 2, from left to right. You will find a choice of several vibrators, both electric and pneumatic models. If your need only a clean out aid, size your vibrator according to wall thickness chart.

List them below and continue:

---



---



---



---

To continue with the example - 208 lbs. of vibrator force is needed. Draw a line from left to right, beginning at 208 lbf. The line will cross through a number of suitable vibrators.

## KEY CONCEPTS

- Wall Thickness:** Wall thickness is a priority consideration. If your need only a clean out aid, size your vibrator according to wall thickness chart. If the vibrator matching your force does not match the wall thickness of your hopper, size down to a smaller vibrator and consider adding units, or add a stiffener plate to increase wall thickness.
- Total Force Needed:** For material flow, you will find a total force needed. This value should be divided by the number of vibrators being used to find the force required per vibrator.
- Material Factors:** If your material is exceedingly sticky or moist, you may require sizing up one model or consult our sales team for single impact vibrator recommendations.

# Step 3: Find the Best Type of Vibrator for Your Application



**KEY CONCEPTS Frequency/Amplitude:** Higher frequency is most effective for breaking cohesive bonds between material and walls to assist materials that usually flow well with gravity. Lower frequency produces higher stroke or amplitude and is more effective for coarse and low density material. Material that might pack under vibration is best effected by timed impacts.

STYLE OF VIBRATOR SPECIFIC MODEL & DESCRIPTION	OPERATIONAL SPECS					BULK MATERIAL				APPLICATION			
	LINEAR OR ROTARY VIBRATION	NOISE LEVELS	ENVIRONMENTAL TOLERANCE	DUTY CYCLE	FREQUENCY	HIGH MOISTURE CONTENT	FINE MATERIALS	COARSE MATERIALS	STICKY MATERIALS	HOPPER MATERIAL FLOW AID	HOPPER CLEANOUT	PIPE/CHUTE DEEP SLOPE	PIPE/CHUTE SHALLOW SLOPE
<b>ELECTRIC MODELS</b>													
<b>3600 RPM -2 POLE ROTARY ELECTRIC VIBRATORS (RES-X-2 / RE-X-2)</b>													
Higher frequency Rotary Electric vibrators are good tools for promoting flow of fairly uniform sized material that will typically have some ability to flow with gravity, or helping clean outs. They do not operate well with high frequency of on/off cycles and do require more up front investment for starters or controls. They are very low maintenance for long life in harsh conditions and have adjustable weights for changing force outputs.													
<b>1800 RPM -4 POLE ROTARY ELECTRIC VIBRATORS (RES-X-4 / RE-X-4)</b>													
Lower frequency Rotary Electric vibrators are good tools for promoting flow of stickier and coarse or chunky sized material as they provide a larger stroke to flex hopper walls. They are not best suited for frequent on/off cycling and do require more up front investment for starters or controls. They are very low maintenance for long life in harsh conditions and have adjustable weights for changing force.													
<b>ELECTROMAGNETIC VIBRATORS (CM)</b>													
Electromagnetic vibrators are 3600 VPM with linear force, good for agitation of hoppers and chutes with material that has some ability to flow with gravity. They are also good for clean out and unsticking small amounts of material. They can be economical to install with simple on/off, but are not for continuous duty and do require maintenance on leaf springs from time to time.													
<b>DC TRUCK/TRAILER VIBRATORS (DC-Z / MG)</b>													
DC powered vibrators are rotary force, with one force setting, good for flow and clean out aids on trucks or trailers where battery power is preferred over using on-board compressors for pneumatic power.													

KEY TO ELECTRIC & PNEUMATIC SELECTION CHARTS			
<b>TYPE OF VIBRATION</b> (Linear or Rotary)		Linear Vibration	
<b>MEASURABLE ATTRIBUTES</b> (Noise Levels, Air Consumption, Frequency)		Low	
<b>RELATIVE APPROPRIATENESS (STRENGTH)</b> (Environmental Tolerance, Duty Cycle, All Bulk Materials & Applications)		Least Well Suited	

# Step 3: Find the Best Type of Vibrator for Your Application



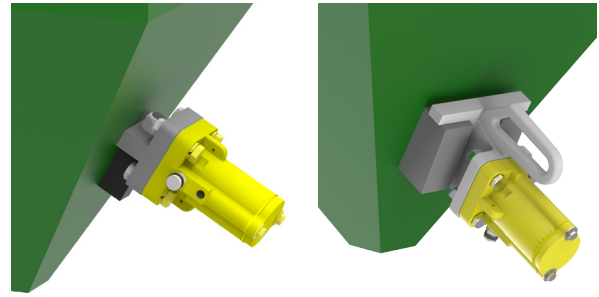
**KEY CONCEPTS Force Direction:** Linear force can be directed into the hopper wall and/or material. Rotary motion applies a centrifugal force that can help with directing flow in direction of rotation.

STYLE OF VIBRATOR SPECIFIC MODEL & DESCRIPTION	OPERATIONAL SPECS						BULK MATERIAL				APPLICATION			
	LINEAR OR ROTARY VIBRATION	AIR CONSUMPTION	NOISE LEVELS	ENVIRONMENTAL TOLERANCE	DUTY CYCLE	FREQUENCY	HIGH MOISTURE CONTENT	FINE MATERIALS	COARSE MATERIALS	STICKY MATERIALS	HOPPER MATERIAL FLOW AID	HOPPER CLEANOUT	PIPE/CHUTE DEEP SLOPE	PIPE/CHUTE SHALLOW SLOPE
<b>PNEUMATIC MODELS</b>														
<b>TURBINE VIBRATORS (CVT-Cast Body / CVT-A-Aluminum Body / CVT-P-Plastic Body / CVT-S-Stainless Steel Body)</b>														
Turbine vibrators have high frequency vibration and rotary force. They are relatively quiet, efficient on air consumption, and have consistent performance through their life without lubrication. They are effective for clean outs or chute and pipe flow aids for materials that typically flow well with gravity. They are not as effective for hopper flow.														
<b>BALL VIBRATORS (VBB / VBC / VBD)</b>														
Ball Vibrators are economical to purchase and install. They are more tolerant to misuse such as dirty air than other pneumatics. They produce rotary force at higher frequency, making them more effective on clean outs and gravity assisted chute/pipe flow, like turbines. They are not as efficient with air, produce more noise than a turbine vibrator and have degrading performance over their life.														
<b>IMPACT PISTON VIBRATORS (VM / SA-EP / VMS / VMR)</b>														
Impact piston vibrators produce linear force at lower frequencies than rotary options, making them best for hopper flow or lower angle chutes and pipes as you can "aim" the force into the wall and material. Impacts create a sharp kinetic energy transfer into their mounts, giving extra force to break material bonds, as well as higher noise levels. They are low maintenance and feature protected exhaust ports. The bore and piston do eventually wear over time and reduce performance.														
<b>AIR CUSHIONED PISTON VIBRATORS (ACM / SAM / VMSAC / VMRAC)</b>														
Air Cushioned piston vibrators produce linear force at lower frequencies than rotary options, making them best for hopper flow or lower angle chutes and pipes as you can "aim" the force into the wall and material. There are no impacts of the piston, reducing noise considerably, but eliminating the extra force of impacts. They are low maintenance and feature protected exhaust ports. The bore and piston do eventually wear and reduce performance.														
<b>SINGLE IMPACT KNOCKERS (SI)</b>														
Single Impact Knockers are controlled by a 5-port spool valve with solenoid designed to deliver low frequency knocks, similar to a dead blow hammer, but without damage to people or equipment. They are most effective on sticky and/or very fine material that might pack under continuous vibration.														

# Optimal Vibrator Mounting Methods

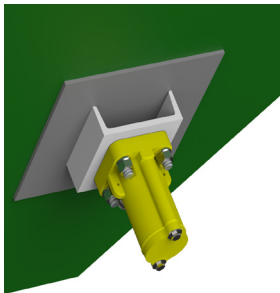
## KEY CONCEPTS

- Spread vibration and maintain rigidity appropriate to vibrator force. In other words, choose the appropriate mounting option which will not be bent or deformed from the vibrational force of the vibrator. Rigidity is especially important for electric vibrators
- Maintain access to vibrator mounting fasteners
- Always use safety cables
- Avoid proximity to the rigid supports on the hopper



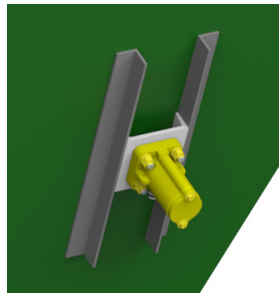
## FEMALE BRACKETS FOR PORTABLE APPLICATIONS

UH style pin and sheath or RR (Railcar style) dovetail welding options available for female bracket installations.



## SHORT MOUNTING CHANNEL ON STIFFENER PLATE

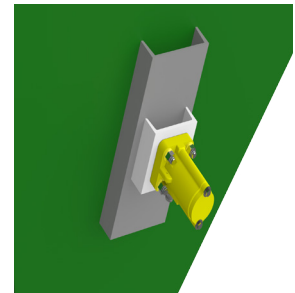
Stiffener plates should be approximately 3-4 times the surface area of the mounting bracket. When stitch welded, thickness should be equal to the recommended wall thickness for vibrator. When plug welded, the thickness can be the difference between the recommended thickness and the existing wall thickness.



## SHORT MOUNTING CHANNEL WITH ANGLE RUNNERS

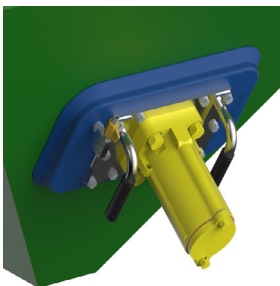
The Angle Runner serves to spread vibration through more of the hopper wall as well as help with rigidity. The runner length should be approximately 30-40% of the length of the wall.

**Example:** If the sloped section of the hopper is 6 ft. long, Cleveland Vibrator suggests to install the vibrator with 2-2½ ft. long angle runner.



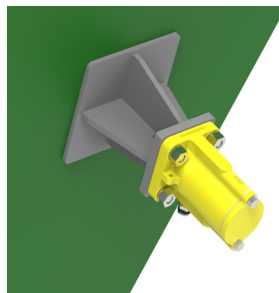
## SHORT MOUNTING CHANNEL ON CHANNEL RUNNER LENGTH

Similar to the Short Mounting Channel with Angle Runners, the channel runner length should be approximately 30-40% of the length of the wall.



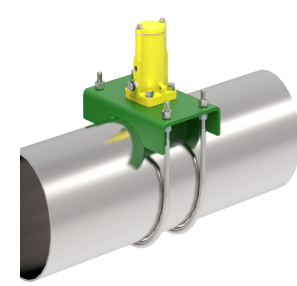
## VACUUM MOUNT FOR PORTABLE APPLICATIONS

Unit runs only on air, including the suction, eliminating bolts or welding making it a completely portable option for problematic areas on bins or hoppers. Perfect for applications where permanent attachment is an issue.



## CHANNEL STACK OR EXTENDED MOUNT FOR HIGH TEMPERATURE APPLICATIONS

This assists in heat diffusion. Hi-temp gaskets and seals are also available.



## PIPE BRACKET ASSEMBLY

Unit comes fitted with mounting channel and U-bolts and is a moveable option for pipe applications.



# Proper Welding Techniques

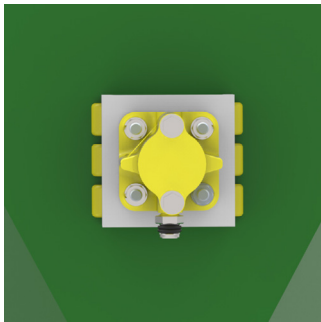
## KEY CONCEPTS

- Never continuously weld
- Leave the corners free of weld
- The thickness of the weld should be at least as thick as the minimum thickness of either the bin wall or the mounting channel  
**For example:** if welding our SMP-2 on a 1/4" thick bin wall, use a weld that is at least 1/4" thick

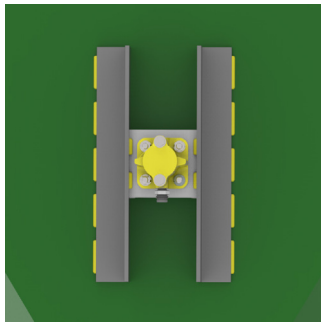
**MIG, or also known as GMAW, welding is the preferred method.** It is recommended to use flux core wire for the MIG weld, as it is ideal for welding to surfaces such as mild steel and stainless steel

- It is the responsibility of the welder to know the thickness of the bead and the penetration of the weld into both the channel and the bin wall. Penetration is critical. Too deep, the weld will go through the bin wall. Too shallow, the mounting channel hopper joint will fail
- It is suggested to have an equal 1:1 ratio of weld bead to gap between welds.  
**For example:** if an SMP-2 is being installed, we suggest 2" beads then 2" gap then 2" bead then 2" gap, etc.

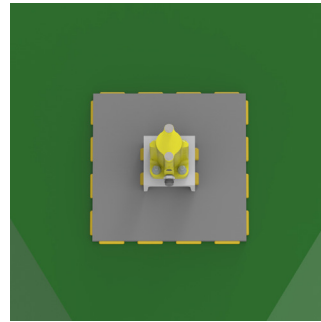
When stitch welding a cast iron bracket to a mild steel vessel, preheat casting (500°F to 1200°F) before beginning the welding job. A rod similar to Ni55 is suggested to be used when MIG welding the bracket to the vessel.



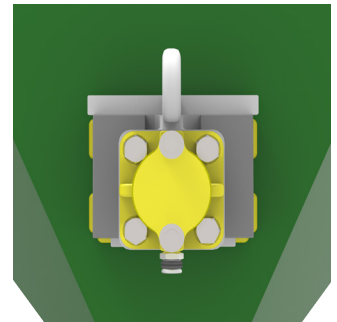
Proper Welding of a Short Mounting Channel



Proper Welding of a Short Mounting Channel with Angle Runners



Proper Welding of a Short Mounting Channel with Stiffener Plates



Proper Welding of a Railcar Style Female Bracket

1. **READ THE MANUAL** - Read and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.
2. **GEAR UP** - Protect your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and leather boots with 6-8 inch ankle coverage. Safety glasses/goggles should always be worn.
3. **BREATHE FREELY** - Use enough ventilation or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits.
4. **ELECTRIC SHOCK CAN KILL** - Do not touch live electrical parts. Welding machines should be properly grounded and be sure you are insulated from live electrical parts.
5. **PROTECT YOUR EYES** - 2,000+ people are admitted to burn centers annually with severe arc flash burns. A good welding helmet protects the eyes & skin from sparks and potential vision-damaging ultraviolet & infrared rays emitted by the arc.
6. **COOPERATING FOR SAFETY** - Cooperation between management and employees is vital to the success of every company. By working together toward the common goal – SAFETY IN WELDING – everyone wins! Welders and their supervisors should have adequate safety training

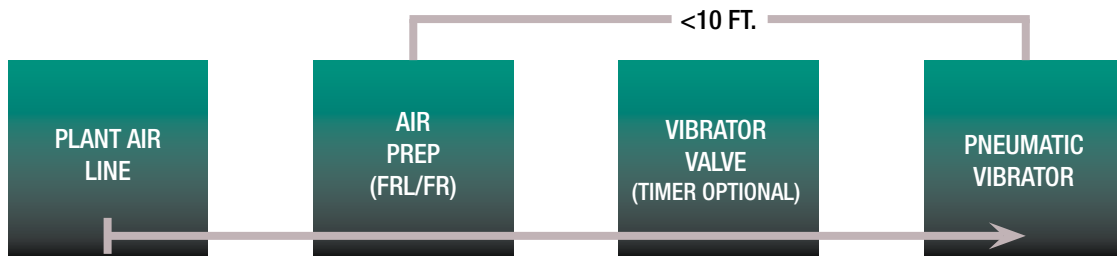
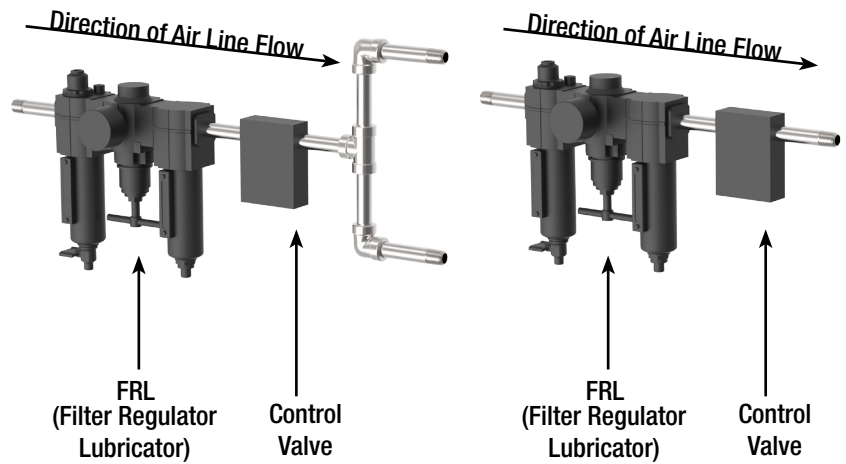
**\*Information provided by The Lincoln Electric Company - To learn more about proper welding safety, go to [www.lincolnelectric.com](http://www.lincolnelectric.com)**

# Plumbing Overview

## IMPORTANT INSTALLATION NOTES

- The air prep (FRL/FR) should be within 10 ft. of the vibrator & installation height should be equal to or above the vibrator location to allow for best lubricant flow
- The vibrator valve (ball or solenoid) must be installed within 10 ft. of the vibrator and have quick on/off capabilities to provide quick burst of air to the vibrator for the necessary air burst to start the piston or ball or impeller
- The timer (which is optional) can be tied into the solenoid valve, however their voltages MUST be the same

## SEQUENCE OF PNEUMATIC VIBRATOR INSTALLATION



## FEED THE PNEUMATIC VIBRATOR

If your operations require multiple vibrators to operate on one valve, appropriate adjustments must be made to size of the NPT inlet. Let us walk you through finding the correct size NPT inlet needed with this simple equation:

$$\text{INLET SIZE} \times \sqrt{\text{NUMBER OF VIBRATORS OPERATING ON 1 VALVE}}$$

**For example:** Let's say we are trying to operate (3) 1350 VMSAC on one valve. The 1350 VMSAC has a 1/2" NPT inlet. So, you'd take  $1/2 \times \sqrt{3}$  to determine the size of the ports required on the valve. The answer here .866 which means a 1" NPT valve would be required to handle all (3) 1350 VMSAC from the same valve. The standard valve to operate (1) 1350 VMSAC is 1/2" NPT.

## CONTROL THE PNEUMATIC VIBRATOR

For pneumatic vibrators, short bursts, 5 to 30 seconds, of operation are often times more effective than continuous use. While many of Cleveland Vibrator's air vibrators are continuous duty units, they do not necessarily need to be operated this way. The most efficient ratios of air consumption to force output of the vibrators are found when the vibrator is operated between 20-80 PSI. **Do not operate vibrators against closed hopper gates or valves.**



## PROTECT THE AIR PISTON VIBRATOR

FRL is a critical component required in the air line. Filtering the air removes dust and other contaminants from the supply line. Regulating the air pressure to proper levels (20-80 PSI) prevents damage to the vibrator and leads to the most efficient use of air consumption. Lubricating the air line limits the chance of the piston seizing inside the body of the vibrator. It is suggested to use Cleveland Vibrator's Vibra-Lube or a similar 10W/ NR lubricant. One (1) drop of oil per minute for every 10 CFM is recommended.

## PROTECT THE PNEUMATIC TURBINE VIBRATOR

These units have permanently greased and sealed bearings and do not require lubricant. All that is needed is a FR component to filter and regulate the air similar to what is done for the air piston vibrators.

## PROTECT THE PNEUMATIC BALL VIBRATOR

These units can be operated with or without lubricant. However, the same concepts mentioned for filtering and regulating the air supply to the piston and turbine vibrators should be applied to the ball vibrators as well.

# Electric Overview

## SEQUENCE OF ELECTRIC VIBRATOR INSTALLATION



### PROTECT THE ROTARY ELECTRIC VIBRATOR

A capacitor is required for all single phase Rotary Electric Vibrators. Thermal overloads are needed for each 3 phase motor to independently protect the vibrator. Dual thermal overloads are required when operating 2 motors from 1 control box. Lastly, overloads are sized based on the full load amp draw of the vibrator operating at the specified voltage.

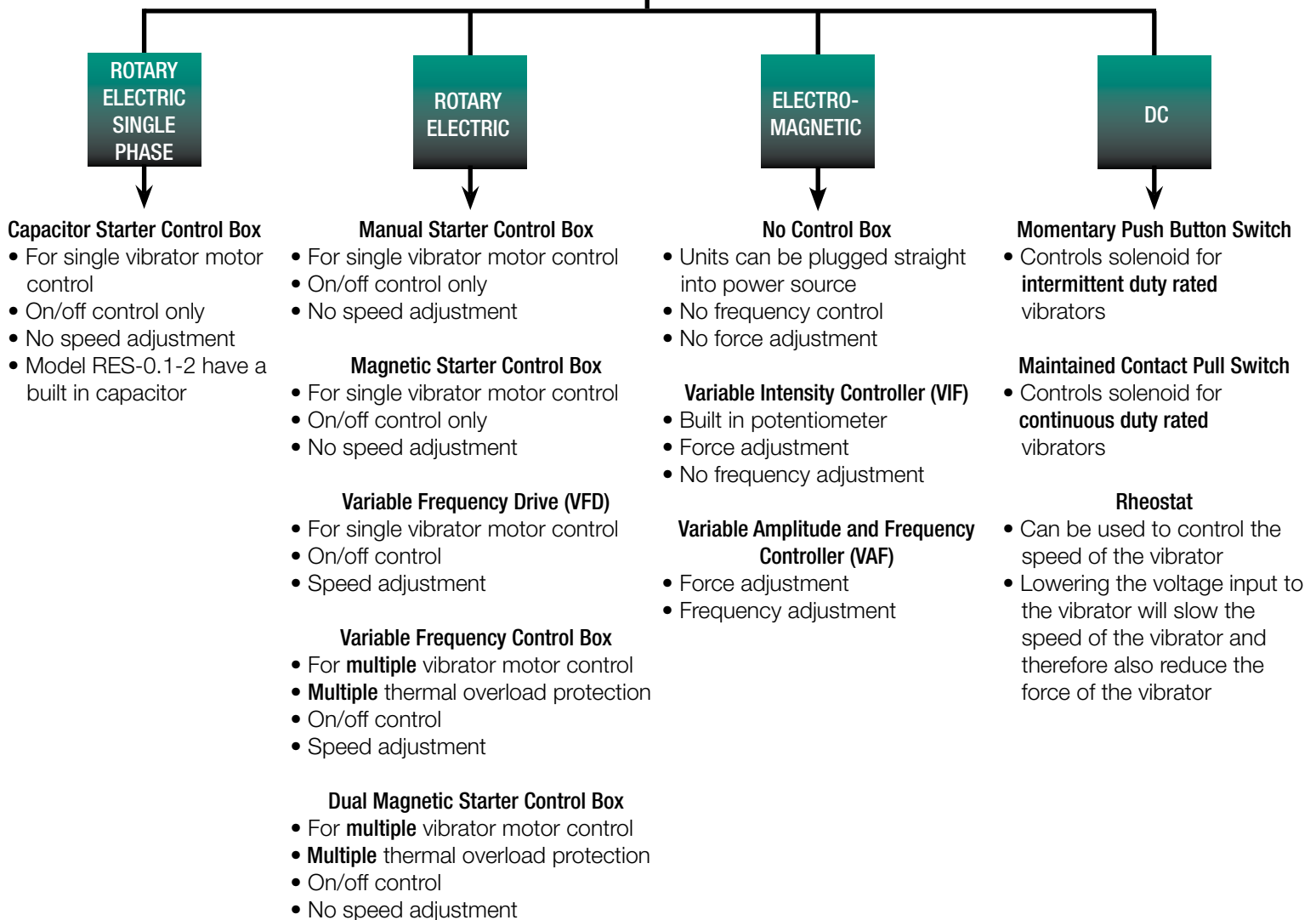
### PROTECT THE ELECTROMAGNETIC VIBRATOR

Fuses are required within the control box and are sized based on the full load amp draw of the vibrator operating at the specified voltage.

### PROTECT THE DC VIBRATOR

Same as our Electromagnetic Vibrators, fuses are required within the control box and are sized based on the full load amp draw of the vibrator operating at the specified voltage.

## CONTROL THE ELECTRIC VIBRATOR



# Cleveland Vibrator Products Overview

We manufacture products. We design Equipment. We solve problems. We're the Cleveland Vibrator Company, and we've been driving innovation in materials handling since 1923.

## OUR PRODUCTS ARE PERFECT FOR:

- Bin agitation and unloading
- Settling and packing
- Feeding and conveying
- Screening
- Precipitator and filter cleaning

### PISTON MODELS - VMS, VMSAC, SI, VM, ACM, SAM, SA-EP



### TURBINE MODELS - CVT (Cast Body) CVT-A (Aluminum Body), CVT-P (Plastic Body) CVT-S (Stainless Steel Body)



### BALL MODELS - VBB, VBC, VBD



### ROTARY ELECTRIC MODELS - RE, RES



### DC TRUCK/TRAILER MODELS - DC-Z, MG



### ELECTROMAGNETIC MODELS - CM



Exclusive U.S. Distributor of  
Uras Techno® Rotary  
Electric Vibrators

## VIBRATORY COMPACTION TABLES

Vibratory tables from Cleveland Vibrator handle tough material challenges of condensing, settling, densifying, de-airing and packing. Designed to improve your current operations, our multiple models provide options to fit your needs in production, filling and packing or weighing.

### COMMON APPLICATIONS INCLUDE:

- Consolidation of concrete and other refractories
- Foundry shake-out
- Compact bulk material in containers
- Product quality and fatigue testing
- Remove voids and air pockets in molds
- Flatten bulk bags prior to palletizing

## VIBRATORY FEEDERS

The Cleveland Vibrator Company's vibratory feeder machines are used to feed raw materials or finished products into mixers, furnaces, production processes or final containers. Available in a wide variety of styles and finishes, lower production cost and improved quality and throughput by ensuring controlled and consistent material flow. Flexibility in design options ensures a seamless fit into your existing production processes for your specific application

### COMMON APPLICATIONS INCLUDE:

- Controlled flow of ingredients into mixing tanks
- Feeding bulk materials at a controlled rate to a precise production process
- Feed metal parts to heat treating furnace
- Meter flow of product into processing equipment
- Transfer material from supply hopper to mixing station
- Continuous duty feeding for filling stations or packaging lines
- Loss-in-weight and gain-in-weight systems

## VIBRATORY SCREENERS

Cleveland Vibrator Company offers multiple vibratory screener, scalper and sieve styles to handle separation and sizing of materials, or removal of unwanted materials from a batch, such as liquids, fines or over-sized product. Models that use pneumatic vibrators can be used in hazardous or explosive environments.

### COMMON APPLICATIONS INCLUDE:

- Separating materials for recovery and recycling
- Sizing and classifying aggregate materials or chemicals
- Dewatering mined materials
- Sizing or screening to remove fines from pellets

## FINE MESH VIBRATORY SCREENING

Cleveland Vibrator Company's affiliate, HK Technologies, provides production and laboratory sized vibratory sieves and ultrasonic vibratory sieves, sifters and screeners for fine particle sizes, typically from 5 micron to #10 mesh. Handling both wet and dry applications, HK's vibratory sieves can be used for sizing, fines removal or liquid/solid separation. HK's unique design for optional application of ultrasonic vibration outperforms sieve throughput of competitive units. Ultrasonic vibration can be applied as a retrofit conversion on most standard sized competitive vibratory screeners, sieves and sifters

### COMMON APPLICATIONS INCLUDE:

- Effective screening tools for lab or pilot plant evaluating small powder batches
- Full screen replacement service with conversion capabilities for common brands such as Russell Finex, Kason, Sweco, Midwestern and Vorti-siv
- Conversion could include the addition of ultrasonics for debinding your screen surface and improve material throughput