High Frequency

Operating Instructions

Global® Pneumatic Roller Vibrators

Models

GCL-4400	GCD-4400
GCL-5000	GCD-5000
GCL-5500	GCD-5500
GCL-6500	GCD-6500

GCD

GCL

Global® VIBRATORS Viber® VIBRATORS Global® AIR BLASTERS

GlobalManufacturing.com

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I. Introduction

You have purchased a GCL-4400/GCD-4400, GCL-5000/GCD-5000, GCL-5500/GCD-5500, or GCL-6500/GCD-6500 High Frequency vibrator manufactured by Global Manufacturing, Inc.® They are excellent roller style high frequency pneumatic vibrators used on forms for concrete consolidation. The GCL model fits the standard cradle lug brackets commonly used on concrete forms. The GCD models are bolt-on for a more permanent mount, although they can also be attached to portable brackets.

For optimum performance, cycle the vibrator on and off. Vibrators act as friction reducers and once the bulk solid is set into motion, gravity does the rest. Do not operate the vibrator on an empty hopper as this may cause structural damage to the hopper. Operate vibrators only when discharge gates are open. Vibration will compact the material inside the structure if the discharge gate is closed.

Vibration has two important elements – Frequency and Amplitude. Frequency is the speed (RPM) or the number of vibrations per minute. It is controlled by the air flow to a pneumatic vibrator. Amplitude is the unbalance or amount of force produced by the eccentric weight. The faster the eccentric weights turn the more force output generated. Force and frequency work together. It is not necessary to use a lot of force when you have adequate frequency.

⚠ SAFETY PRECAUTIONS

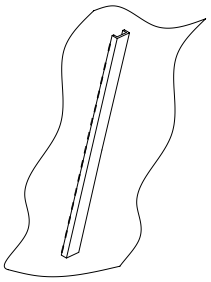
- Follow all mounting instructions.
- Always use a safety cable or chain for support.
- Do not operate vibrators when structure is empty.
- Do not operate vibrators when gate is closed or conveyor is stopped unless consolidation of material is desired.
- Wear ear protection for 90+ decibel levels.
- Do not operate the pneumatic vibrators above 100 p.s.i.
- To prevent explosive hazards, do not use combustible gases to drive the pneumatic motor.
- Do not use hydrocarbons (fuel or kerosene) as a lubricant or de-icer.
- Always operate pneumatic vibrator with a regulator, filter, and lubricator.
- Always disconnect air line before maintenance.

II. Installation Procedures

⚠ Caution!

Do not mount the vibrator directly to the structure wall. Use a channel iron stiffener for proper mount rigidity and as the transducer of the vibrational energy.

The key to successful vibration is a proper mount because rotary vibration resonates the material inside the structure, when the vibrator is mounted correctly. Rotary vibrators should appear motionless and make minimal noise.



Channel Irons - Size & Mounting

Important!

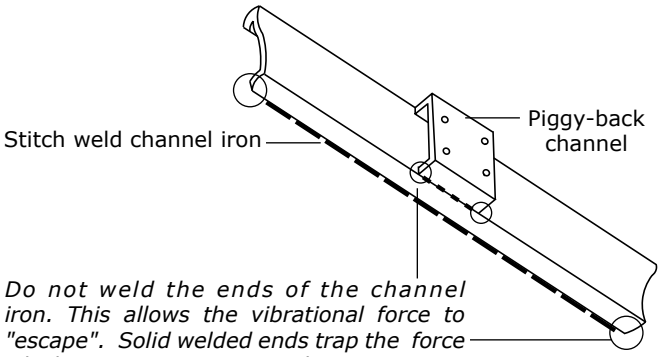
Install a channel iron that is at least two-thirds of the height of the sloped portion of the hopper but no greater than 10 feet (3 m).

Install channel iron at least two-thirds the height of the sloped portion of the hopper, but not less than 6 feet (1.83 m) in length and the width not less than the base width of the vibrator. See chart below for recommended channel sizes. Do **not** install more than one vibrator on the same channel iron or use a channel iron shorter than the recommended length. A short channel may flex the bin wall.

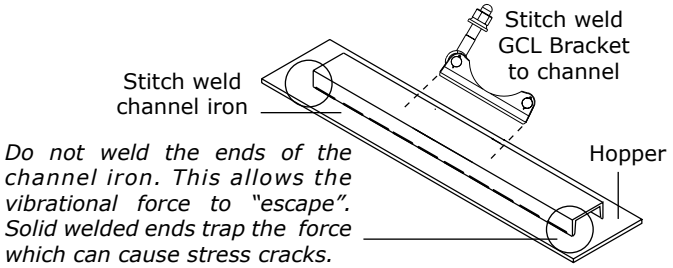
Channel Iron Designation

Model	Channel Iron	Minimum Length
GCL-4400 GCD-4400	C4" x 5.4 lb/ft	60"
	C100 x 8 kg/m	1524 mm
GCL-5000 GCD-5000	C4" x 5.4 lb/ft	72"
	C100 x 8 kg/m	1829 mm
GCL-5500 GCL-6500 GCD-5500 GCD-6500	C4" x 7.25 lb/ft	72"
	C100 x 11 kg/m	1829 mm

Attaching the vibrator to the channel iron. Stitch weld nuts to the back of the channel iron or the channel iron may be drilled and tapped to accept the mounting bolts. An alternate method is to cut a second channel iron slightly longer than the footprint of the vibrator. Stitch weld the second channel iron to the first. Do not weld the ends. Mount the vibrator to the second channel iron.



Mounting GCL cradle lug model - Stitch weld a GCL Bracket to the back of the channel iron. Do not weld the ends. Mount the vibrator in the bracket by sliding the foot into the GCL Bracket, lowering the latch bolt into the fingers on the vibrator housing, and securely tightening the nut.



Stitch weld the channel iron vertically to the sloped portion of the bin wall. Weld 3 inches (7.5 cm), skip 1 inch (2.5 cm), weld 3 inches (7.5 cm), etc... Leave 1 inch (2.5 cm) un-welded on the ends and corners. This allows the vibration to dissipate out the ends of channel without causing stress cracks to the hopper or bin. By doing so, should the weld fail, the entire mount will not fall off. Do not mount the channel iron horizontally.

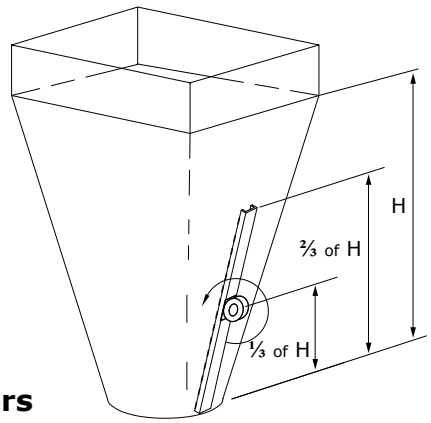
Secure the vibrator to the channel iron with SAE coarse thread grade 8 plated bolts with lock washers or an adhesive such as Loctite® 262. Tighten bolts in a sequential process. At least two passes are required in most situations. Give all bolts the same torque value. Grade 8 bolts can handle more torque than standard bolts. If Loctite® is not used, retorque the bolt after the vibrator has operated for a few minutes and check tightness often. If Loctite® is used do not retorque the bolts as this will break the Loctite® bond.

Attach a safety cable to a stronghold (not the channel iron mount), which is higher than the mounted vibrator and capable of holding the vibrator's weight.

III. Mounting Locations

Single Vibrator

Install a channel iron stiffener on the outside of the sloping wall 1/3 the distance above the discharge opening.

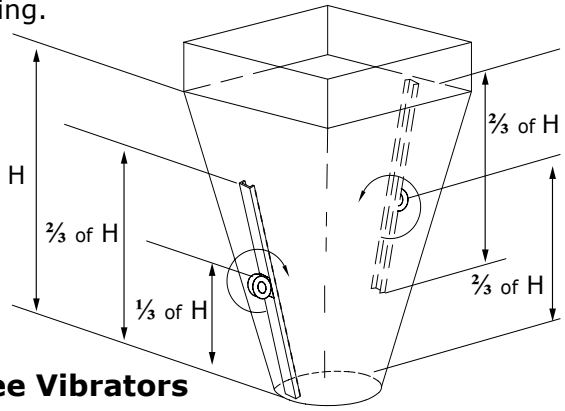


Multiple Vibrators

Use more than one vibrator when the diameter or width of any wall is greater than 12 feet (3.66 m). Always mount the vibrators on different planes.

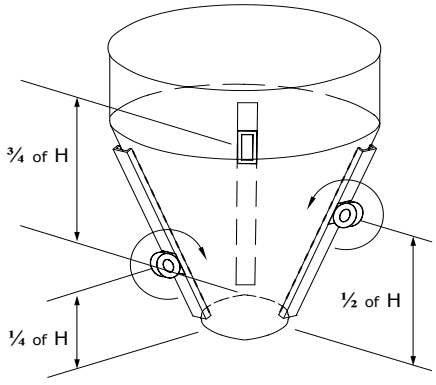
Two Vibrators on Round or Square Hoppers

Install channel iron stiffeners 180° apart. Install one vibrator on the outside of the sloping wall 1/3 the distance above the discharge opening. Install the second vibrator on the outside of the opposite sloping wall 2/3 the distance above the discharge opening.



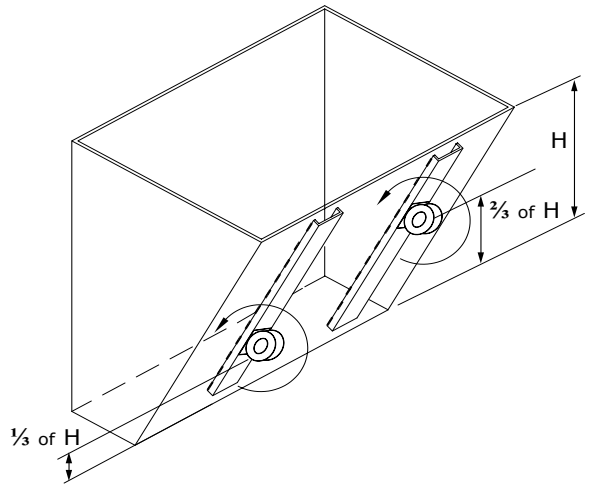
Three Vibrators

Install channel iron stiffeners mounted 120° apart. Install the first vibrator on the outside of the sloping wall ¼ the distance above the discharge opening. Install the second vibrator on a separate channel iron at ½ the distance above the discharge opening. Install the third vibrator on the remaining channel iron at ¾ the distance above the discharge opening.



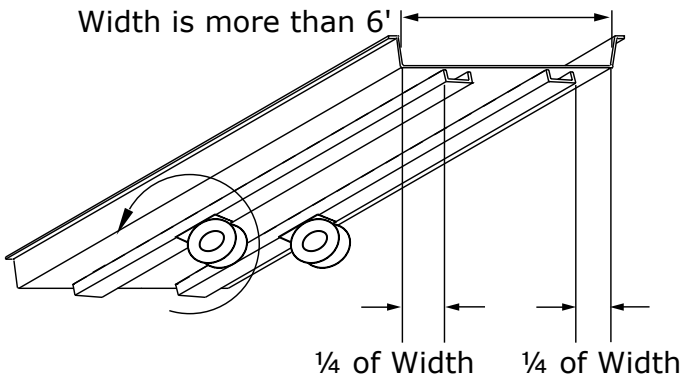
Two Vibrators on Rectangular Hoppers

Install channel iron stiffeners on opposite sides of the long walls. Install one vibrator on the outside of the sloping wall 1/3 the distance from the discharge opening. Install the second vibrator on the outside of the opposite sloping wall 2/3 the distance above the discharge opening. When only one wall slopes, mount both stiffeners on it. Equally space the stiffeners on the wall. Place one vibrator 1/3 above the discharge opening on one channel iron and the other vibrator 2/3 above the bin's discharge opening on the second channel.



Installation on Chutes and Flow Pipes

Mount channel iron stiffeners vertically or in the direction of material flow. Center the channel if the chute is less than 6 ft (1.83 m) in width. If the chute is greater than 6' in width, use two vibrators on separate channel irons. To maximize each vibrator's radius of influence; center each channel iron in each half of the chute. Each channel iron should be located ¼ of the chute width from the edge and ½ of the chute width apart. (e.g. – a chute 8' wide, the channel iron locations would be 2' from each edge and 4' apart.) When wall thickness is less than ⅛", additional reinforcement may be required.



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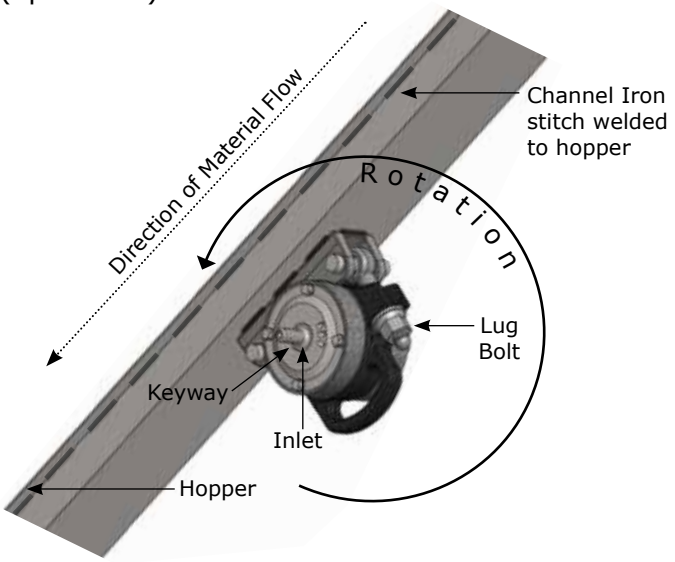
Placement on Channel Iron

Orient the direction-of-rotation of the unbalance (roller weight) so that it turns in the direction of material flow. Position lug bolt on the high side (uphill side) of the channel iron.



Installation on Railcars

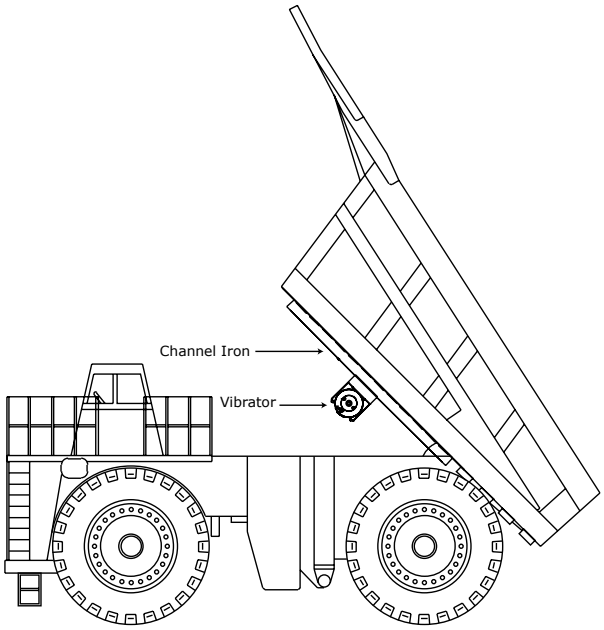
Place GCL vibrator in a GCL Bracket or a GCL-GBM Bracket. The vibrator on the bracket slides into the standard railcar bracket on the hopper car. If two vibrators are used on one railcar, use an air regulator to run them at different speeds. For correct vibrator rotation, the hose barb is on the left side of the handle.

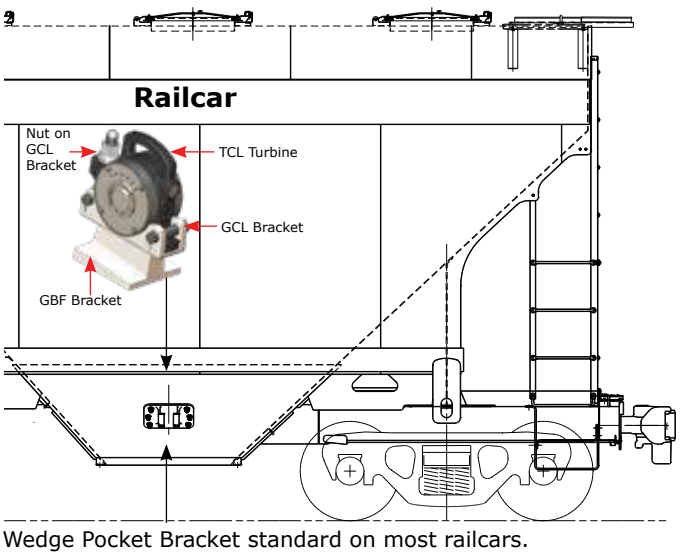
Securing Vibrator to GCL Bracket

Attach the vibrator to the cradle lug bracket by placing the tab at the base of the vibrator under the bar on the end of bracket. Rotate the vibrator towards the bracket until it is fully seated. Rotate the bracket bolt until it fits between the two fingers on the vibrator housing and secure it using the cradle lug nut. Use a standard open-end or box wrench to tightened. Repeated tightening with an air wrench will eventually cause excessive wear to the fingers on the vibrator housing.

Mounting on Truck Bed

Weld GCL bracket to an independent channel iron. The GCL vibrator inserts quickly into bracket. Locate the channel iron as close as possible to the material flow problem area.





Wedge Pocket Bracket standard on most railcars.

IV. Operation

Global High Frequency External Vibrators are pneumatic with dual rollers. Their ease of operation and low maintenance is due in part to the fact that these vibrators contain no bearings or motors.

The vibrator may run continuously at speeds up to the rated running conditions shown in our performance data. Use a ball valve or solenoid valve to turn the vibrator on and off. A regulator provides constant speed control even as the plant air pressure varies.

Install a filter, regulator, gauge, and lubricator in the air line within 10 to 12 feet (3 - 3.7 m).

Filtration

Do not connect the vibrator directly to plant air. Use a 64 micron filter. Drain the airline filter regularly and examine the element for signs of clogging.

Regulation

Operate the vibrator on filtered, regulated, lubricated air between 40 - 80 psi (2.8 - 5.5 bar) at 45 - 60 cfm (21 - 28 Lps).

Lubrication

Use a lightweight lubricant. Replenish the airline lubricator as required and set to give the following drop rate minimum. Will operate in temperatures of 32° F (0° C) to 250° F (120° C).

Filter & Lubrication Requirements	
Filtration Required	**Lubrication Required**
64 Micron	10 -12 Drops per Minute 10 Weight Oil

Recommended Lubricants

Shell: Tellus 37
B.P.: Energol HL65
Castrol: Hyspin 70
Mobil: Alma oil No 1

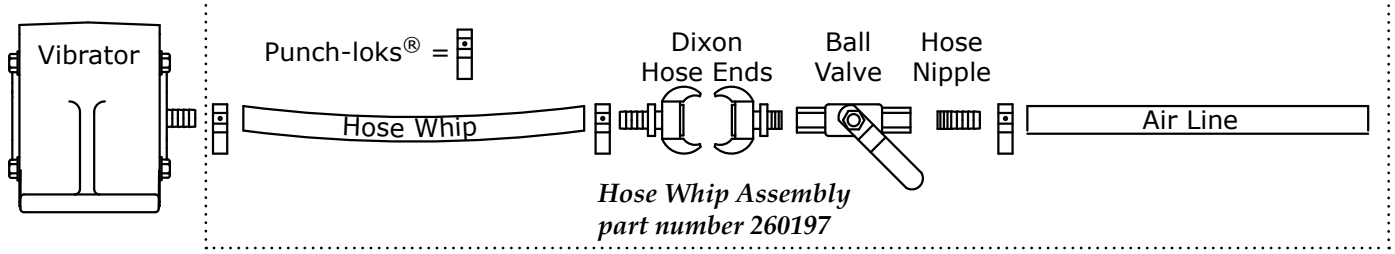
Pipe and Hose Connections

The vibrator has a barb fitting to accept a ¾" I.D. hose. Clamp the hose securely to the fitting with a Band-It, Punch-Lok®, or a similar clamp. A worm driven clamp is not recommended since the vibration may cause the clamp to loosen and allow the hose to blow off the fitting.

The table below shows the recommended hose size according to the amount of air required.

SCFM Flow (Lps)	Hose Length and I.D.		
	Hose Length		
	0 - 25' (7.6 m)	26' - 50' (7.6 - 15 m)	50' - 200' (15 - 61 m)
	Hose I.D.		
20 (9)	5/16"	⅜"	½"
30 (14)	⅜"	½"	½"
60 (28)	½"	¾"	¾"
80 (38)	¾"	1"	1"

If the vibrator will be moved or disconnected frequently, a hose whip is recommended (see illustration below). The whip is a short piece of hose (12" - 18") atttached to the shaft with a clamp. Attach a quick coupling, such as a Dixon® hose coupling, to the free end of the whip. Add a ball valve to the plant air line to shut off the air before disconnecting the quick coupling.



Hose Whip Assembly part number 260197

V. Assembly & Disassembly

For proper vibration operation, it may be necessary to change the direction of rotation or the position of the vane. Both the GCD and GCL models are disassembled and assembled in the same manner.

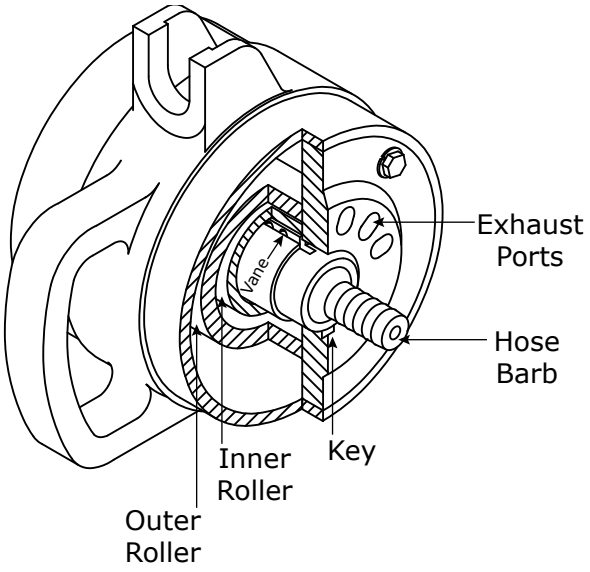
Tools Required:

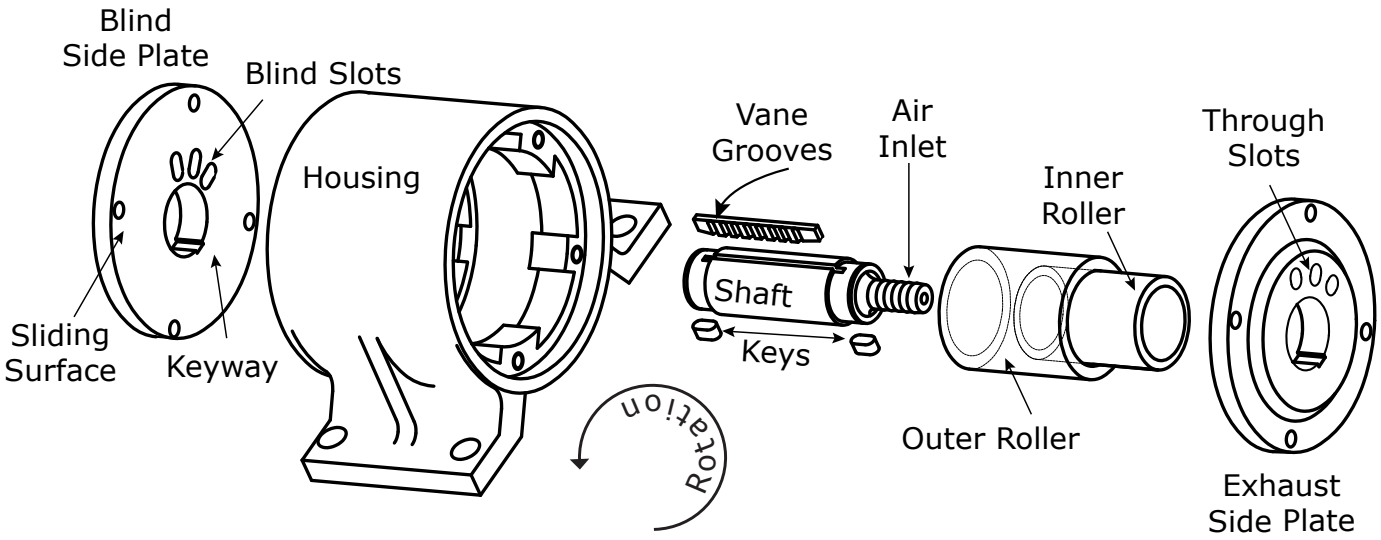
- Press
- Torque Wrench
- ⅜" Wrench

Disassembly:

Note 1: The vibrator shaft is pressed into the side plates. The side plates have a slip fit in the housing.

1. Remove the four ⅜" hex bolts and lock washers from each side plate.
2. Opposite the air inlet, using a press, carefully press against the backside of the shaft. This will push out the (exhaust) side plate and the shaft (as one assembly). Protect the air inlet connection. The inner and outer rollers will come out with the shaft. Remove blind side plate if necessary.
3. Lift air vane from shaft. Inspect side plates, shaft, and vane for wear. Any grooving on the side plates or noticeable wear on the inner roller, shaft, or vane requires component replacement.



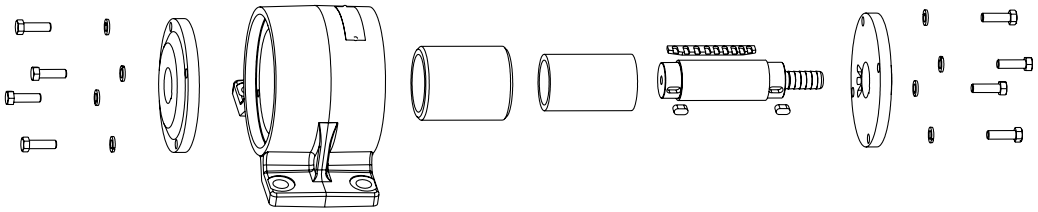


Assembly

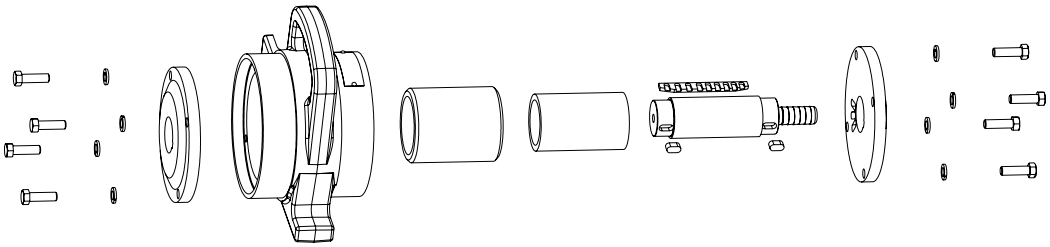
Introduction: The GCD and GCL high frequency vibrators can be assembled, using all the same parts, in two different configurations. The configuration to be used on a particular assembly job will depend on how the customer will be using the vibrator. If the vibrator will be used for a **Concrete Consolidation** application, the vibrator will be assembled so the direction of rotation of the weights is in a particular direction. If the vibrator will be used on a hopper to restore or facilitate **Material Flow** it will be assembled so the direction of rotation of the weights is in the opposite direction.

The illustrations below show how the parts should be assembled to obtain the appropriate direction of rotation for either the **Concrete Consolidation** configuration or the **Material Flow** configuration. Use these to verify that the vibrators have been properly assembled for the desired configuration.

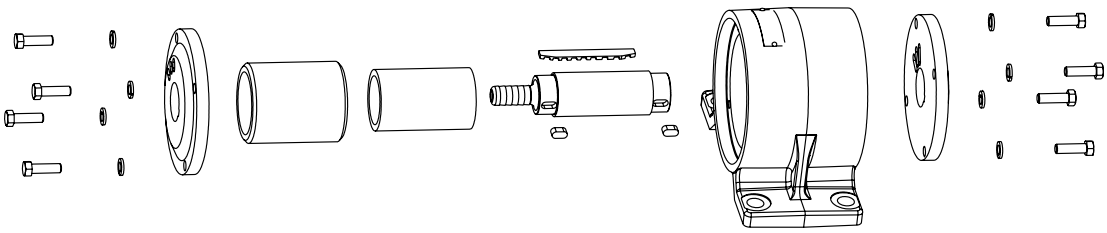
GCD for Concrete Consolidation



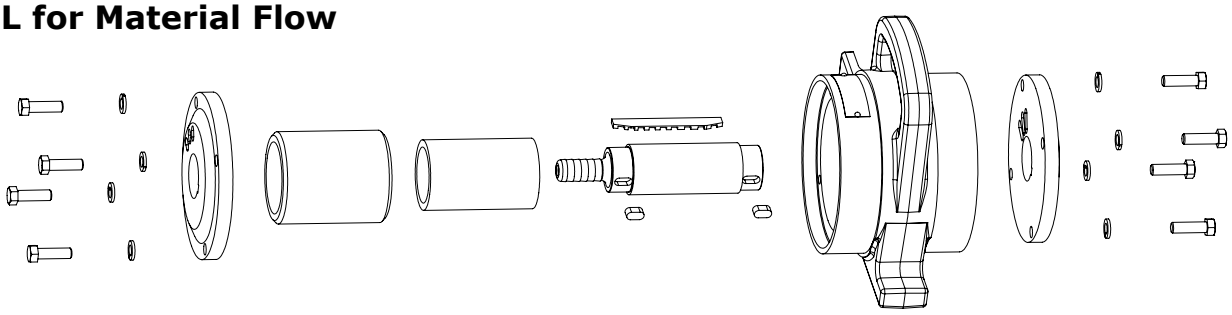
GCL for Concrete Consolidation



GCD for Material Flow



GCL for Material Flow



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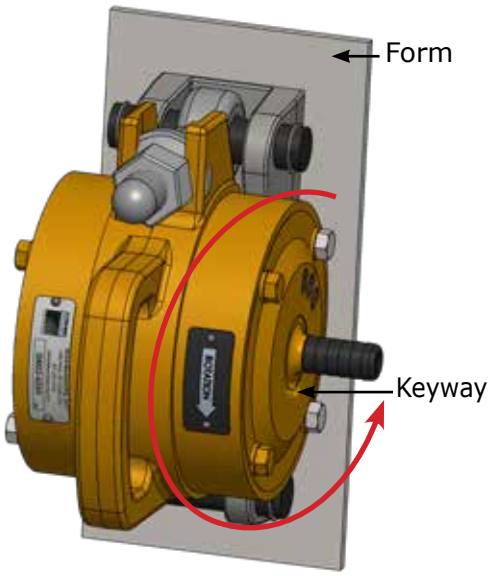
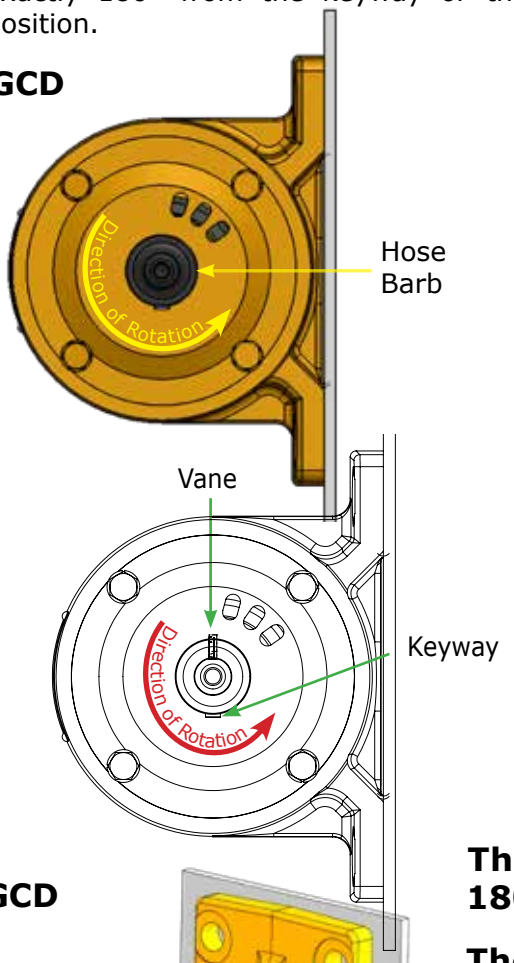
Concrete Consolidation:

- The hose barb end of the shaft will point to the **RIGHT**.
- The exhaust ports will be on the RIGHT side plate, on the SAME side as the hose barb.
- The exhaust ports will be in the 1 o'clock position, when the vibrator is mounted on the form, in relation to the hose barb.
- The keyway will be down in the 6 o'clock position in relation to the hose barb. The vane (not visible once the vibrator is assembled) will be positioned exactly 180° from the keyway or the 12 o'clock position.

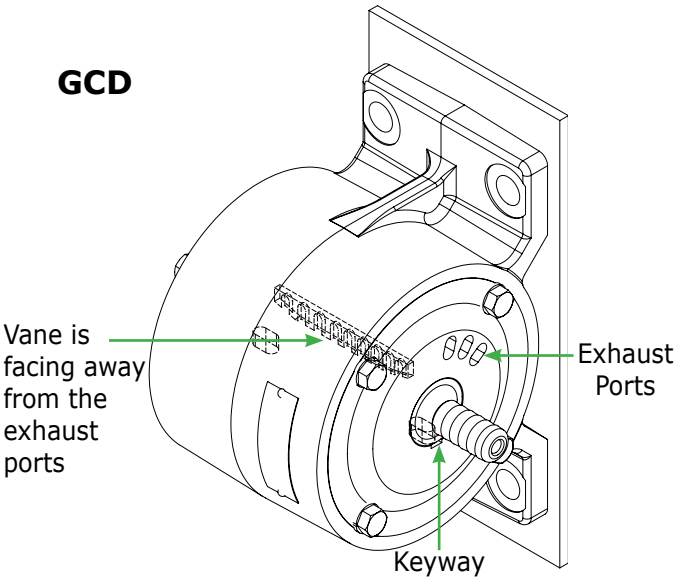
GCL



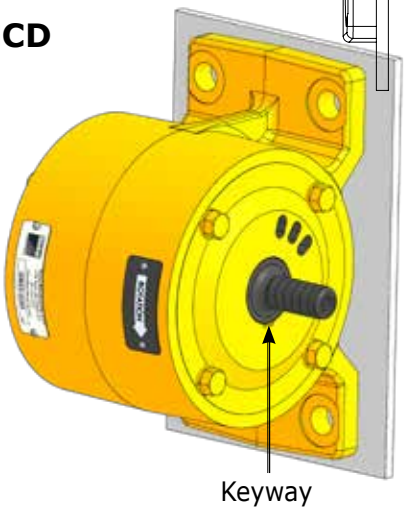
GCD



GCD



GCD



NOTE:

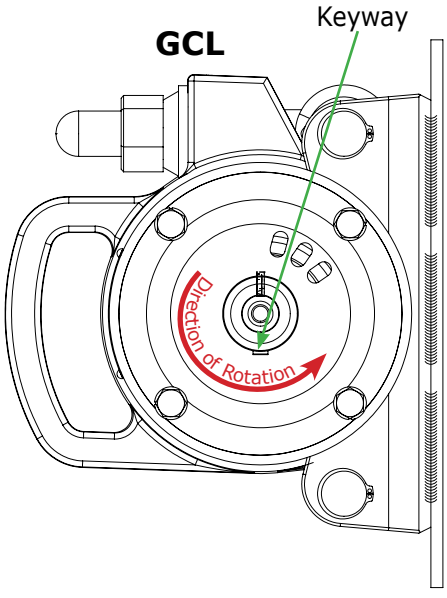
The keyway is always 180° from the vane.

The Exhaust is always on the hose barb side.

Face vanes away from the exhaust ports

In mounted position for the CONCRETE CONSOLIDATION rotation, the hose barb has to be on the right side.

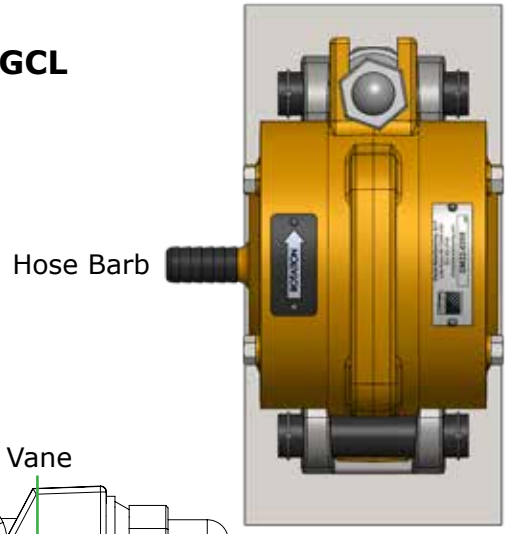
GCL

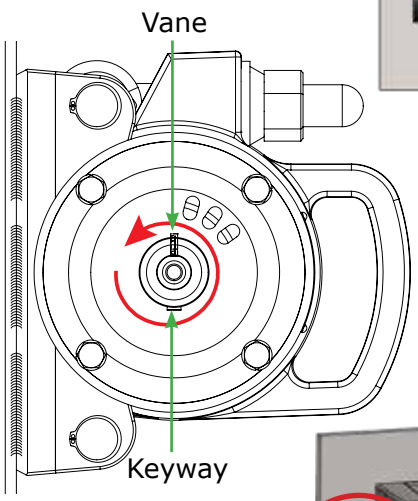


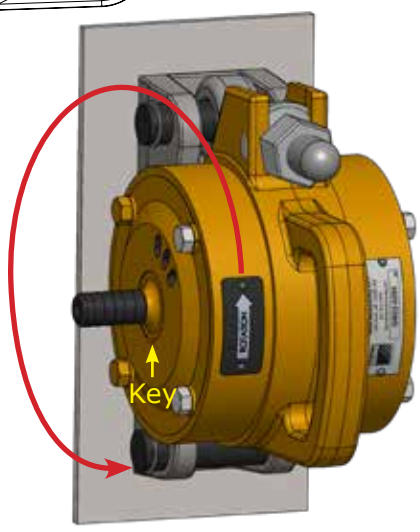
MATERIAL FLOW:

- The hose barb end of the shaft will point to the **LEFT**.
- The exhaust ports will be on the LEFT side plate,on the SAME side as the hose barb.
- The exhaust ports will be in the 1 o'clock position when the vibrator is mounted on the hopper, in relation to the hose barb.
- The keyway will be down in the 6 o'clock position in relation to the hose barb. The vane(not visible once the vibrator is assembled) will be positioned exactly 180° from the keyway or the 12 o'clock position.

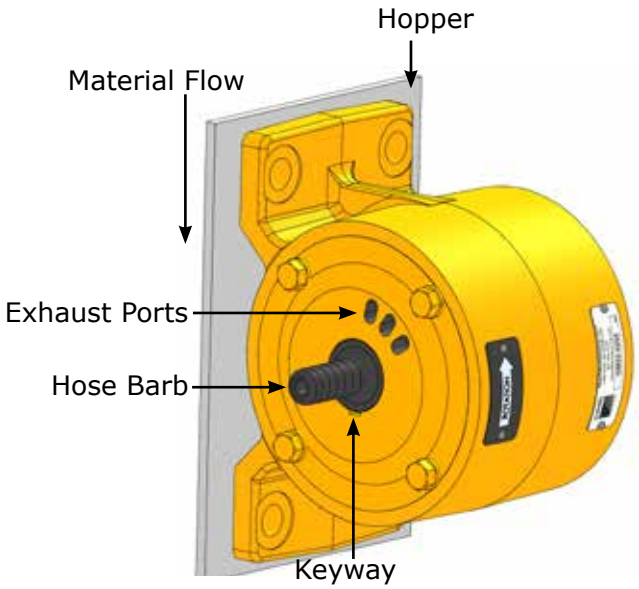
GCL

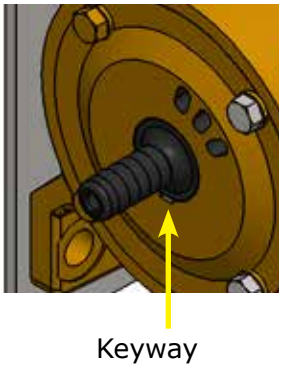


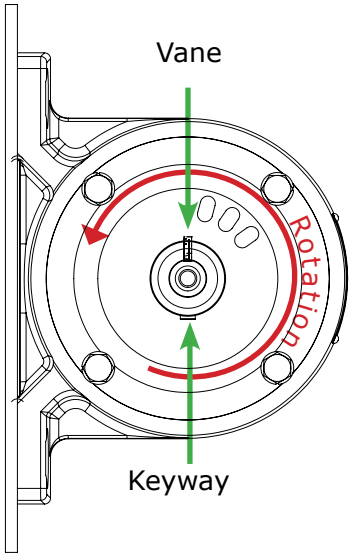




GCD







NOTE:

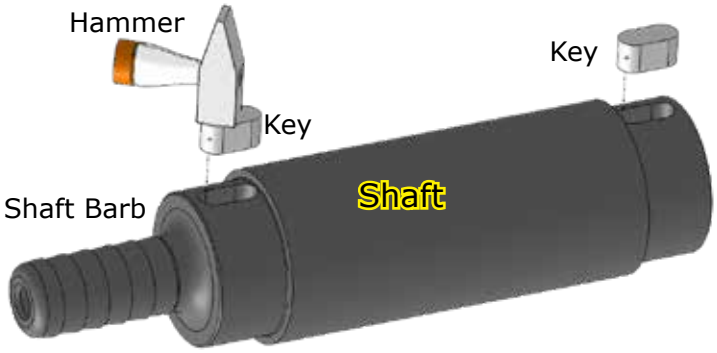
The keyway is always 180° from the vane.

The Exhaust is always on the hose barb side.

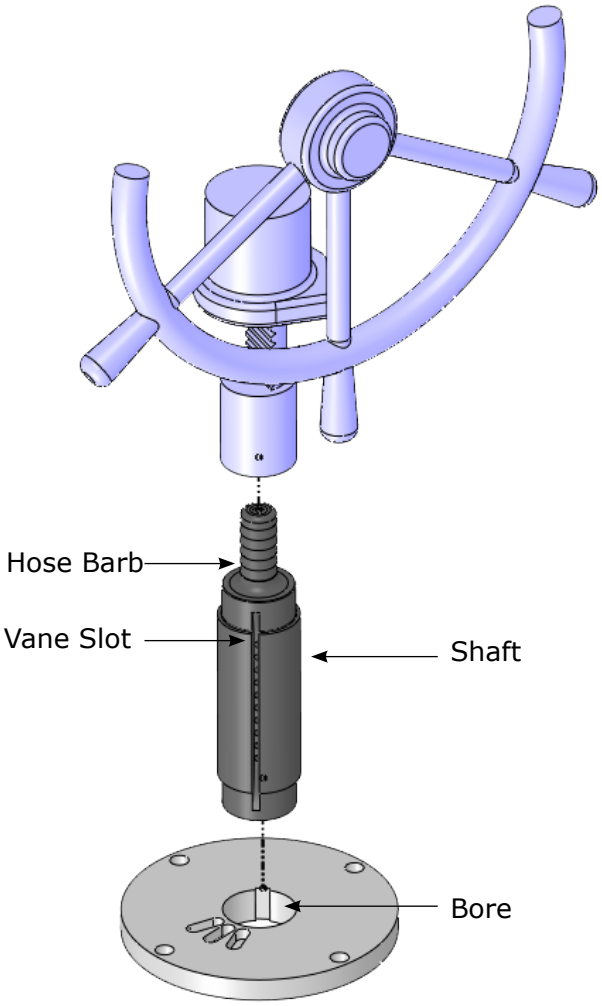
Face vanes away from the exhaust ports

In mounted position for the MATERIAL FLOW rotation, the hose barb has to be on the left side.

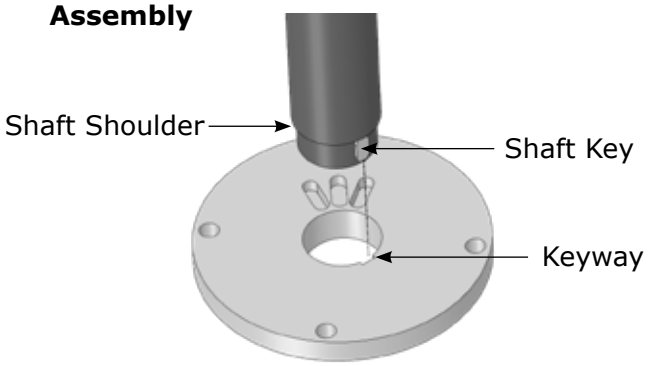
Install the two shaft keys into the machined grooves in the shaft. Gently tap the keys into the grooves with a hammer until fully seated. **Do NOT deform the keys.**



Install shaft into Blind Side Plate: Place a **Blind Side Plate** (side plate with no exhaust openings) with the flat side up on the press. Coat the bore in the center of the side plate with oil. Align the **Shaft** so the key at the end opposite the hose barb aligns with the keyway in the side plate. Press the shaft into the side plate bore until it seats on the shaft shoulder.

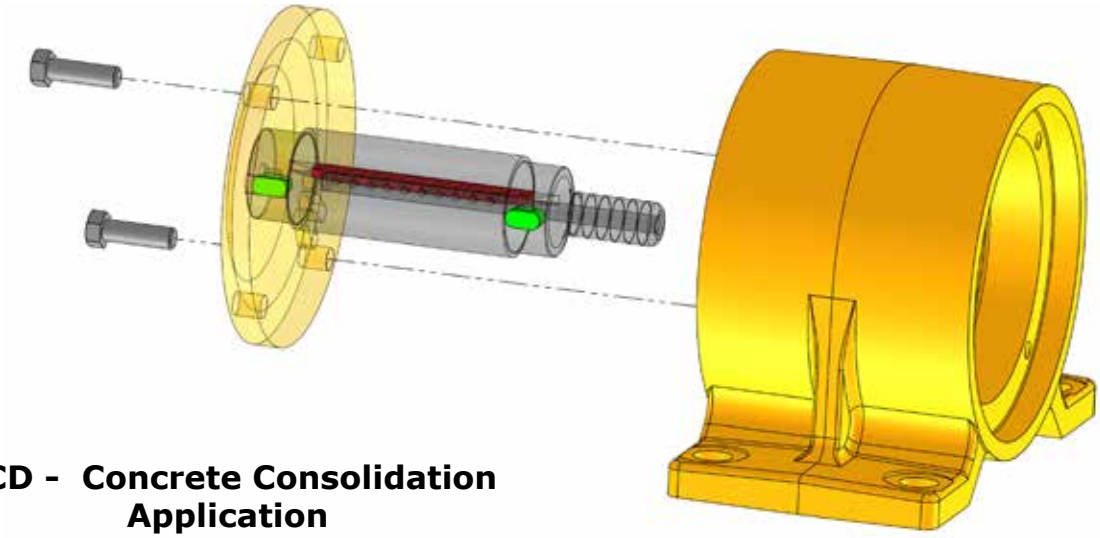


Blind Shaft Assembly

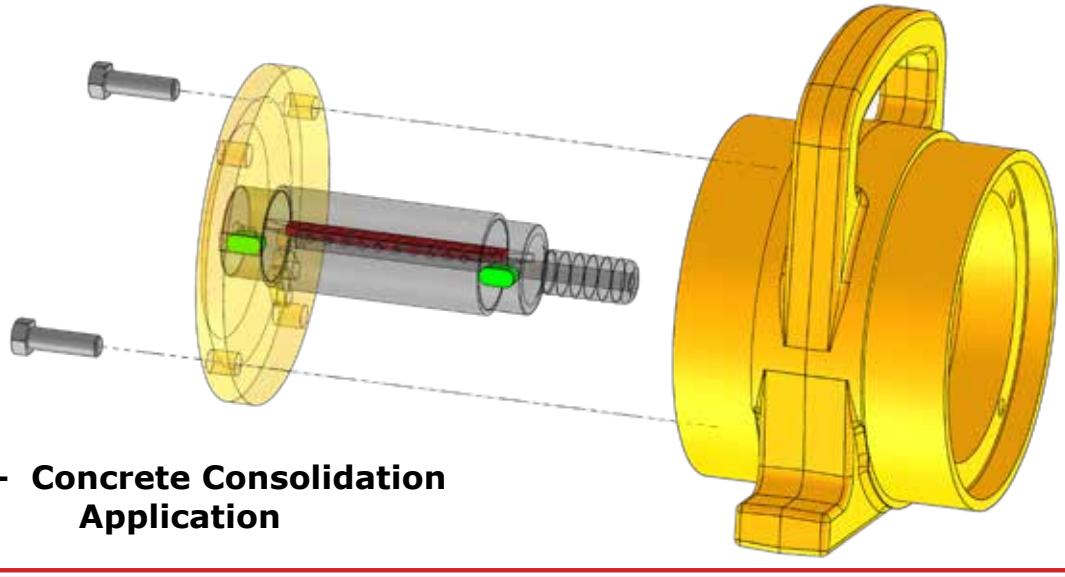


Install the Shaft/Blind Side Plate Assembly into Housing: Place the **Housing** on the table with the bore in the center of the housing running right to left. For **GCD** units place the feet flat on the table with one foot pointing away and the other foot point towards you. For the **GCL** units place the housing upright with the handle up and the forked arm pointing away.

- **For Concrete Consolidation:** Place the shaft/plate assembly into the **left** side of the housing so the hose barb protrudes from the **right** side of the housing. Be sure to rotate the assembly so the slot in the shaft for the vane points away from you and the keyway points towards you. Seat the side plate into the housing and use TWO ⅜" "grade 8 bolts to properly align the shaft plate assembly and to temporarily secure the side plate to the housing. These two bolts should be only "finger tight."



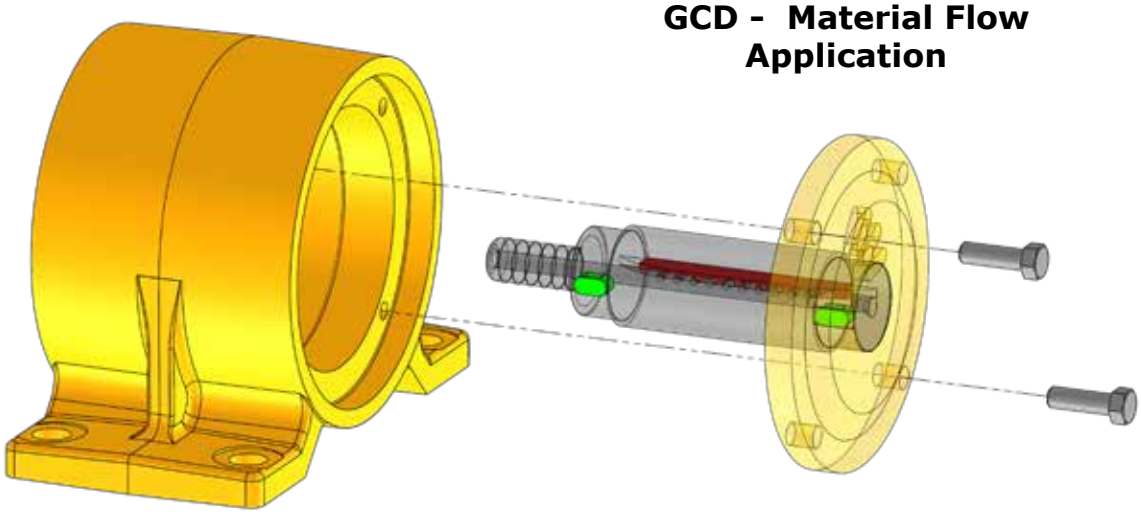
GCD - Concrete Consolidation Application



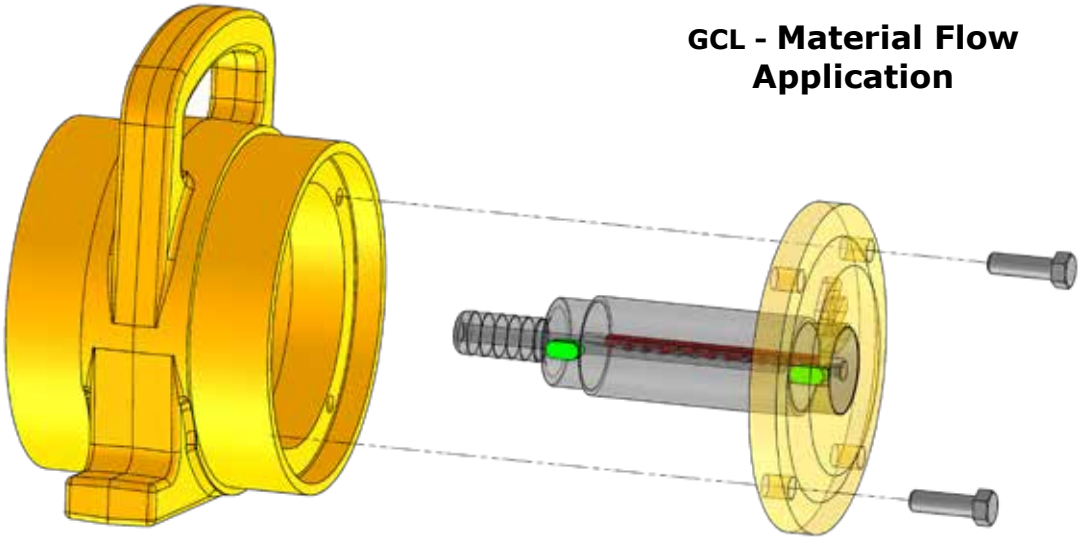
GCL - Concrete Consolidation Application

- **For Material Flow:** Place the shaft/plate assembly into the **right** side of the housing so the hose barb protrudes from the **left** side of the housing. Be sure to rotate the assembly so the slot in the shaft for the vane points away from you and the keyway points towards you. Seat the side plate into the housing and use **two** ⅜"-16 x 1-¼" bolts to properly align the shaft plate assembly and to temporarily secure the side plate to the housing. These two bolts should be only "finger tight."

GCD - Material Flow Application

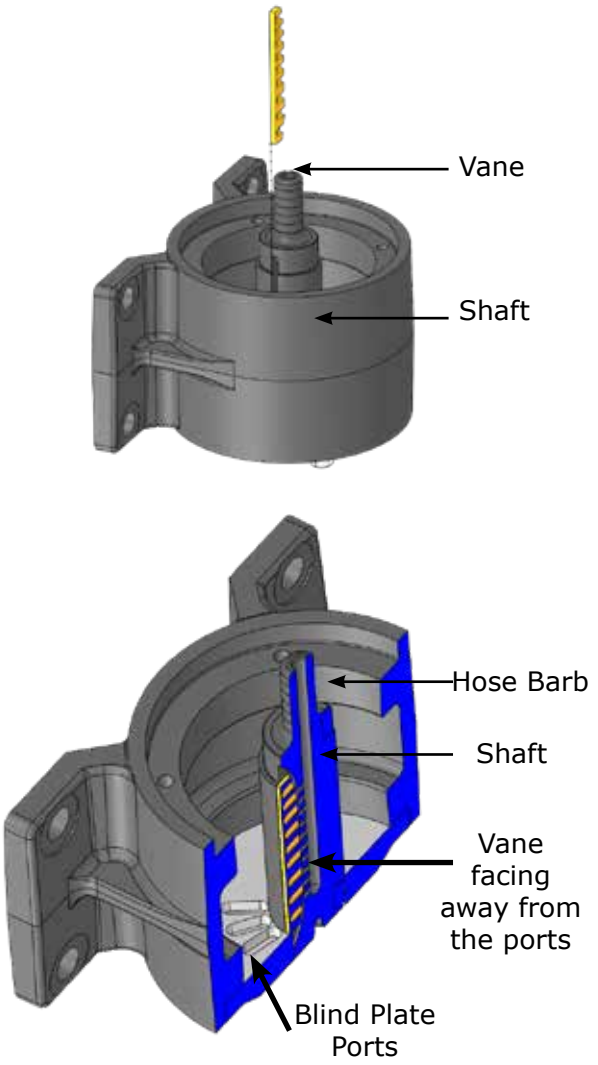


GCL - Material Flow Application



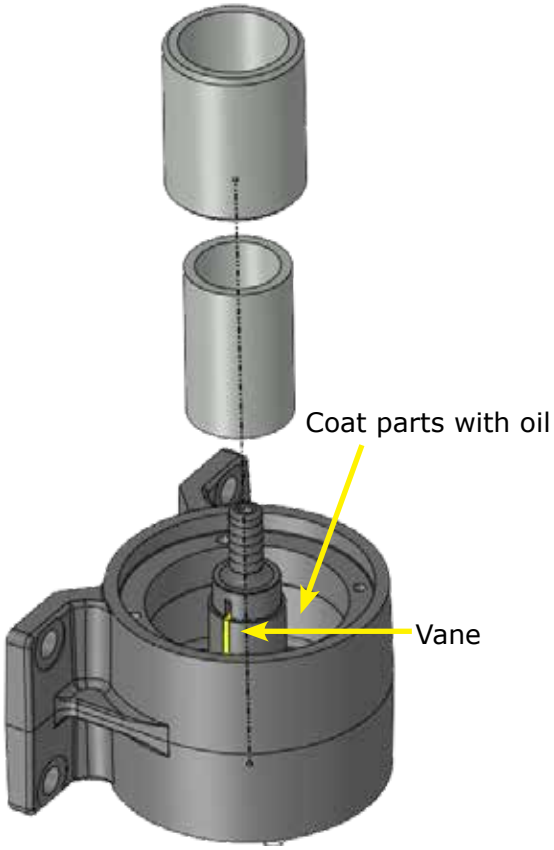
Install Vane, Rollers, And Exhaust Side Plate: Place the housing assembly from #8 on the press with the blind cover down.

1. Install the vane into the groove in the shaft. The grooves in the vane need to be facing away from the ports machined in the side plate. Also, the grooved edge of the vane goes into the shaft and the solid edge faces outward from the shaft.

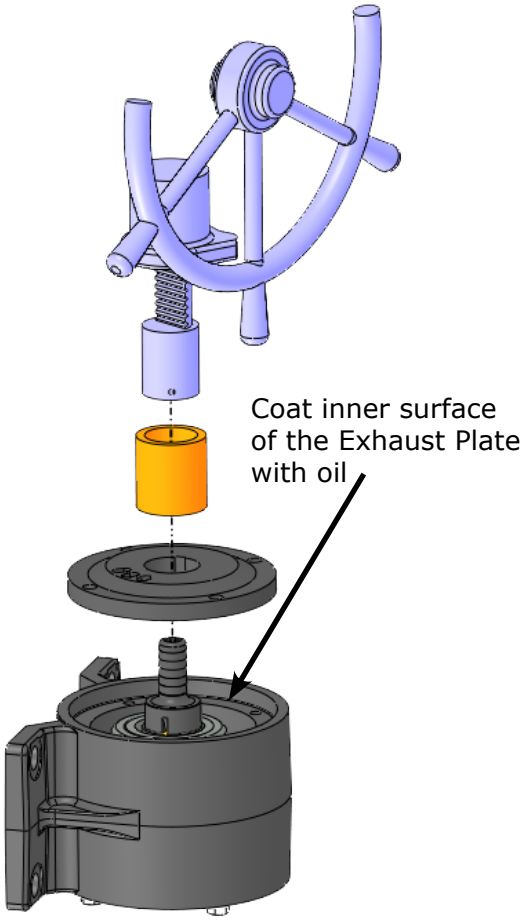


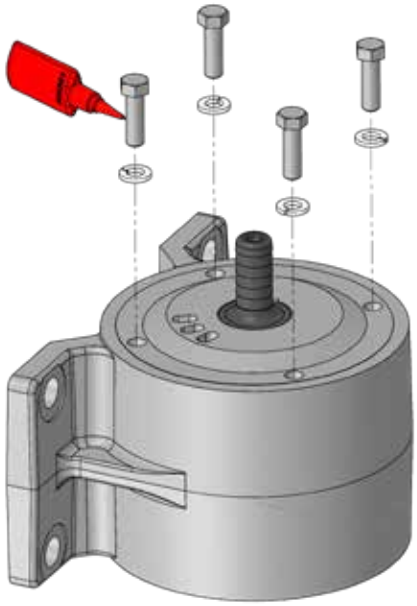
2. Coat the inner surface of the blind side plate, the OD of the shaft, and all surfaces of the two rollers with oil.

3. Install the inner roller onto the shaft. Install the outer roller (weight) onto the inner roller.



4. Coat the inner surface (flat surface) of the **Exhaust Side** Plate with oil. Place the exhaust side plate over the hose barb end of the shaft with the flat (oiled surface) down. Rotate the side plate so the keyway aligns with the key on the shaft. Press the side plate onto the shaft until it seats in the housing. Place lock washers on **four** ⅜"-16 x 1-¼" bolts, apply Loctite®, and secure the exhaust side plate to the housing. Torque all four bolts to 44 ft-lb.





Complete the Installation of the Blind Side Plate: Set the vibrator upright on its housing. Place lock washers on TWO "-16 x 1-¼" bolts, apply Loctite®, and install the bolts in the two open holes in the blind side plate. Remove the **two** ⅜"-16 x 1-¼" bolts left "finger tight" in step #8. Add lock washers and Loctite® to these bolts and re-install them to secure the blind side plate to the housing. Torque all four bolts to 44 ft-lb.

Test the Vibrator: Shake the vibrator to ensure the rollers are free to rotate. You should hear them moving inside. Test the vibrator with compressed air. It should run easily. If it doesn't start, rotate the housing so the roller is sitting on top of the vane – the keyway will be facing downward.

VI. Vibrating Wet Concrete

Concrete Consolidation by vibration is achieved by adding a mechanically-induced combination of force and frequency allowing those forces to act on the freshly-poured concrete within the vibrator's area of influence. The proper combination of force and frequency will ensure that the concrete will retain its homogeneity while allowing the entrapped air to escape through the surface. A frequency of 9,000 – 12,000 vibrations per minute initiates resonance in (or "excites") the cement, causing the ultra-fine cement particles to release the extremely small air pockets that have adhered to the cement, so that the mortar fills in all of the spaces around the aggregate. Vibration evenly distributes the cement and aggregates resulting in a more dense and a smoother concrete finish.

When enough of the entrapped air has risen to the surface to achieve concrete consistent with the intended strength of the mixture, the vibration is complete. In practical terms, it is neither possible nor necessary to remove all of the entrapped air in the consolidation process.

How to Select an External Vibrator

There is not an exact method or science when using external vibrators for concrete consolidation. Mixes vary, and therefore, consolidation procedures and preferred vibrator styles vary. "Experts" become experts through trial and error. What makes every application different is that the mixes will vary due to the slump, any chemical additives, aggregate sizes/shape, cement content, consistency of the mixture, weather conditions, and even the type of form work used. Following these general rules may be helpful in selecting the number and placement of external vibrators for effective concrete consolidation.

In selecting External Vibrators, the contractor should initially consider the workability of the concrete and the rigidity of the forms. Plastic concrete (slump > 3") responds better to high frequency vibration, while stiffer mixtures (slump < 3") require higher amplitude vibration to initiate fluidization. While properly-sized external vibrators can be successfully used on virtually any concrete formwork, using a too-powerful vibrator on lightweight forms can cause damage to the formwork. This has caused some contractors to mistakenly believe that external vibrators cannot be used on lightweight concrete formwork.

Vibrator Selection

Depending on specific conditions, external vibrators with speeds between 3,000 and 12,000 rpm may be suitable for form vibration. However, because the natural resonant frequency of Portland Cement is between 9,000 – 12,000 rpm, pneumatic vibrators are often the only equipment capable of delivering this necessary frequency.

After determining the approximate combined weight of the formwork and concrete to be vibrated, the contractor should select a vibrator producing the amount of force specified by the table below. It will often be necessary to use more than one vibrator to produce the total amount of force required.

Note: If specific density of the concrete is unavailable, use a standardized weight of 150 pounds per cubic foot (2,400 kg / m^3) for approximation.

Vibrator Selection for Concrete Consolidation

Consistency	Slump	Vibrator Selection
Very stiff concrete	<0.5"	Vibrator force output should be equal to 200-300% of the total weight of the concrete and form.
Stiff or stiff plastic concrete	0.5" - 2.0"	Vibrator force output should be equal to 130-150% of the total weight of the concrete and form.
Plastic or flowing concrete	>2.0"	Vibrator force output should be equal to the total weight of the concrete and form.

Tips for using External Vibrators for concrete consolidation:

Proper placement of the external vibrators is critical to ensure that the vibration is distributed over the desired area of the concrete. Depending on the concrete consistency, density of embedments and the quality of the mounting, External Vibrators produce an Area-of-Influence determined by the force and frequency of the vibrator and the duration of the vibrating time.

The following guidelines for spacing External Vibrators have been developed, but contractors should determine specific spacing requirements for each project to ensure complete coverage of vibration and successful consolidation.

Vibrator Spacing for Concrete Consolidation

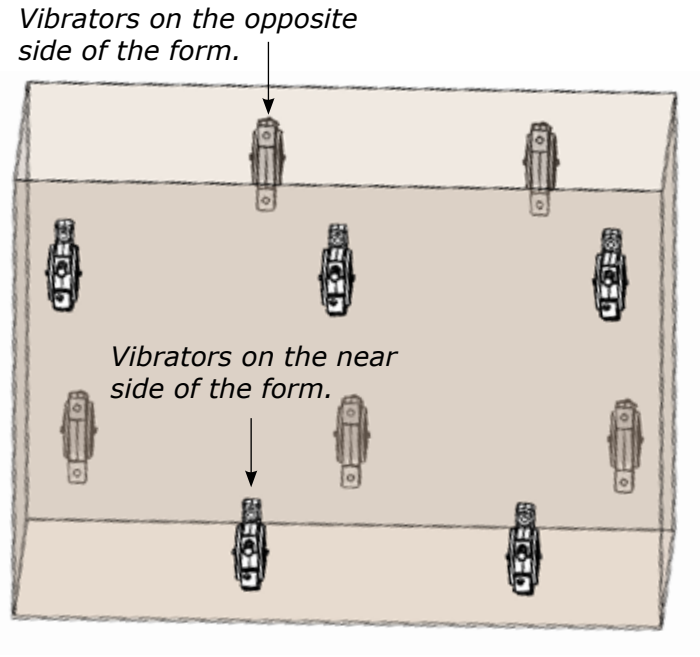
Consistency	Slump	Distance between Vibrators
Very stiff or stiff concrete	< 1.0" < 25 mm	5' Apart 1524 mm
Stiff plastic concrete	1.0 – 2.0" 25 – 50 mm	6' Apart 1828 mm
Plastic concrete	2.0 – 5.0" 50 – 127 mm	7' Apart 2134 mm
Flowing concrete	> 5.0" > 127 mm	8' Apart 2438 mm

Vibrating times for external vibrators may be longer than for immersed internal vibrators. Most operators will initially vibrate for approximately two minutes per lift, and increase or decrease vibrating times as needed. Note that the same criteria should be used to determine when the consolidation is complete (no air bubbles at the top surface, a thin film of mortar on the top surface and a stabilization of the speed of the vibrator).

Pour concrete into the forms in evenly dispersed layers (lifts). Do not exceed a 20" lift height otherwise the weight of the concrete can prevent the entrapped air from escaping. Operate vibrators in conjunction with each lift until the concrete is fully consolidated. As each subsequent lift is placed, locate additional vibrators for operation (or move them from the previous level). Some operators prefer to operate the previous lift's vibrators for a short period of time to promote "knitting" of the two layers together.

If the thickness of the concrete to be consolidated is greater than the area of influence of the vibrator, or if a higher-quality finished surface is required on both sides, the contractor should locate alternate vibrators on opposite form walls. For instance, the first vibrator is placed on the front wall and the next is 5' (1.5 m) away but on the back wall. See illustration below.

Alternating the vibrators on a concrete form



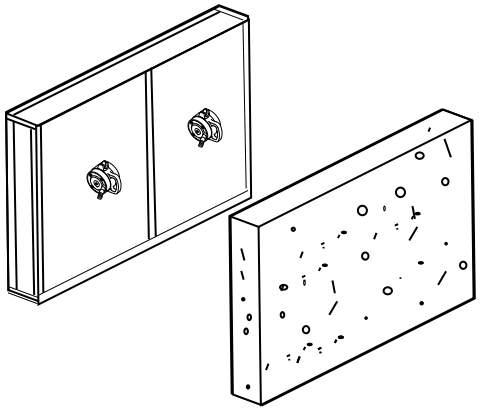
In some cases, when the thickness of the concrete to be consolidated is extraordinarily large, contractors may choose to use Internal Vibrators in the center section, with External Vibrators used simultaneously along the outer edges.

Important!

Forms should be well made to withstand the strains of vibration.

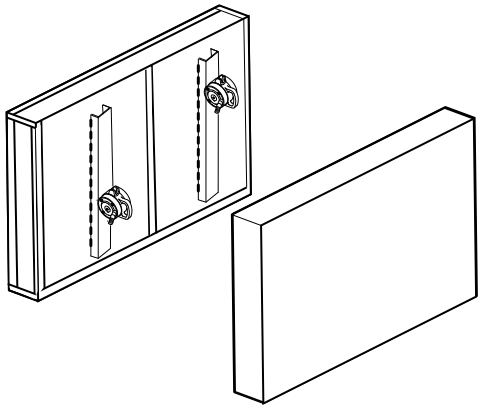
1. If using wooden forms, use screws instead of nails (which may back out with vibration).
2. Forms need to be well braced to prevent bulging.
3. Joints need to be closely fit to prevent leaking.
4. Monitor forms during placement of concrete. Tighten as needed.

Examples of Mounting External Vibrators



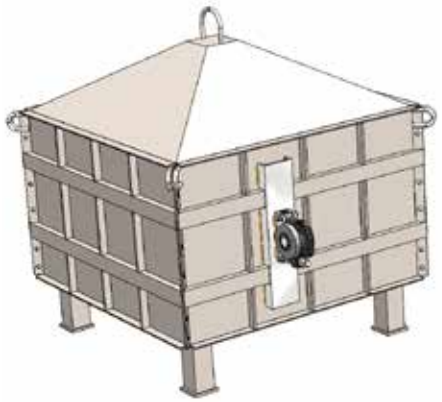
Poor Mount = Poorly Finished Concrete

The vibrator is mounted directly to the form wall. Without a channel iron, the force output is concentrated where the vibrator is attached, causing the wall to flex and may cause stress cracks. The vibration is not evenly distributed resulting in a poor concrete finish.

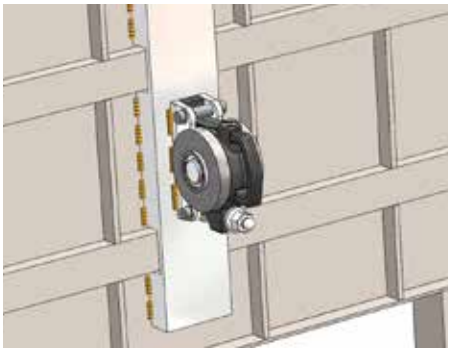


Excellent Mount = Superior Finished Concrete

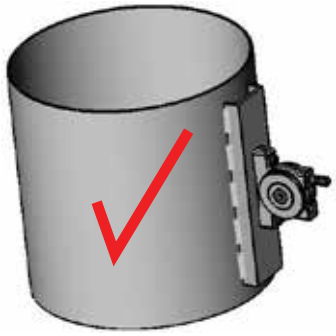
The vibrator is mounted on a channel iron, which acts as the transducer of the energy. The vibration is evenly distributed along the length of the channel iron, which results in an excellent concrete finish.



Excellent Mount



Do not weld the channel iron to horizontal stiffeners. Cut out the channel to fit over stiffeners.



Excellent Mount

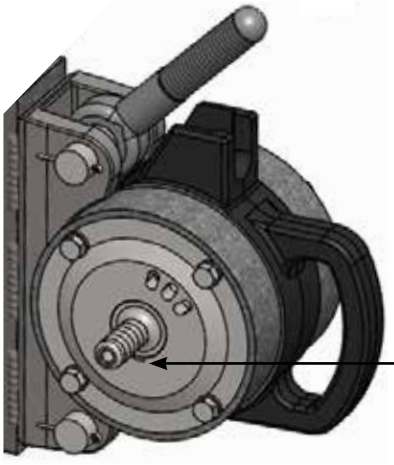
VII. Vibrator Orientation

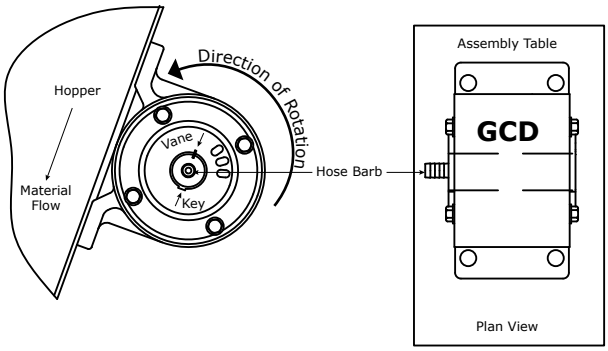
Whenever possible, mount the vibrator with the shaft in the horizontal position.

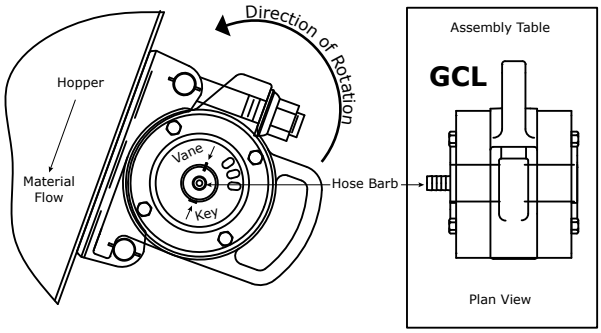
To ensure proper direction-of-rotation, the GCL vibrators are assembled for either a hopper or a concrete form application. This only applies to the GCL due to the way it sits in its bracket. To reverse direction of rotation, the shaft and side plates must be removed and swapped, so that, the shaft air inlet is on the opposite side of the housing. Always observe vane and exhaust port orientation. See page 7, Note 2).

The direction of rotation is determined by looking at the side plate with the hose barb and exhaust slots. The air enters the vibrator through the shaft and pushes up the vane. (The vane is opposite the keyway in the shaft.) The slots in the vane force the air to one side only. The air carries the inner roller with it as it travels around the shaft to get to the exhaust slots. If the vane is facing the wrong direction the air will have a direct path to the exhaust without having to circle the shaft. If the vane is not on the top of the shaft, but instead on the side or bottom, the weight of the roller will not press the vane back into the shaft and the vibrator may not start.

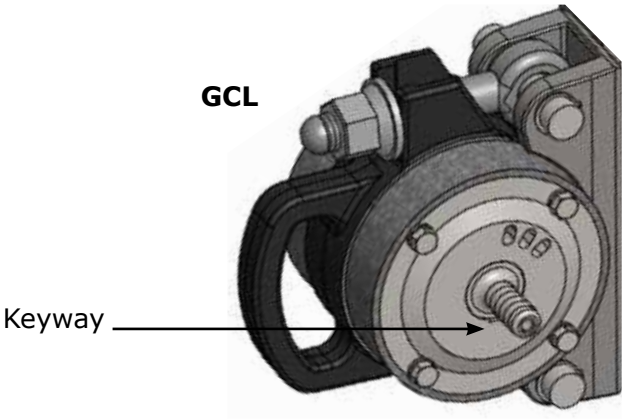
On a Hopper Wall: The direction of rotation is in the direction of material flow - the roller weight rotates toward the hopper and down. Facing the hopper, the shaft/hose barb will be on the left.

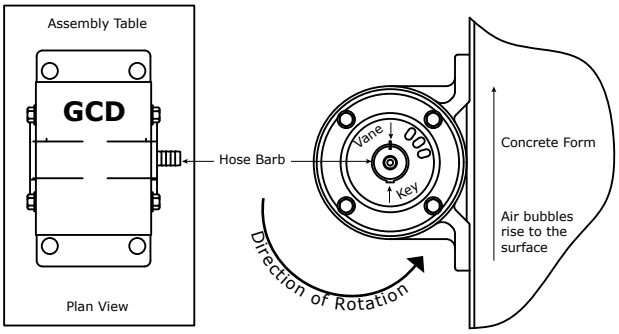


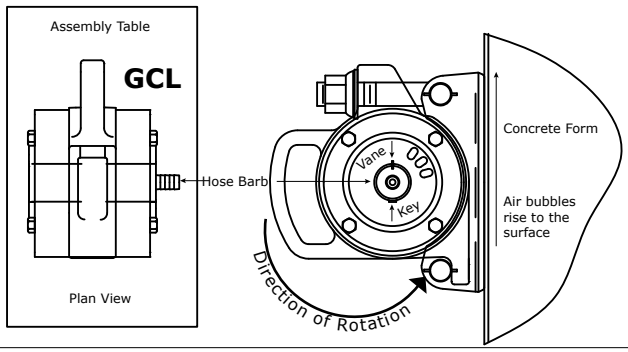




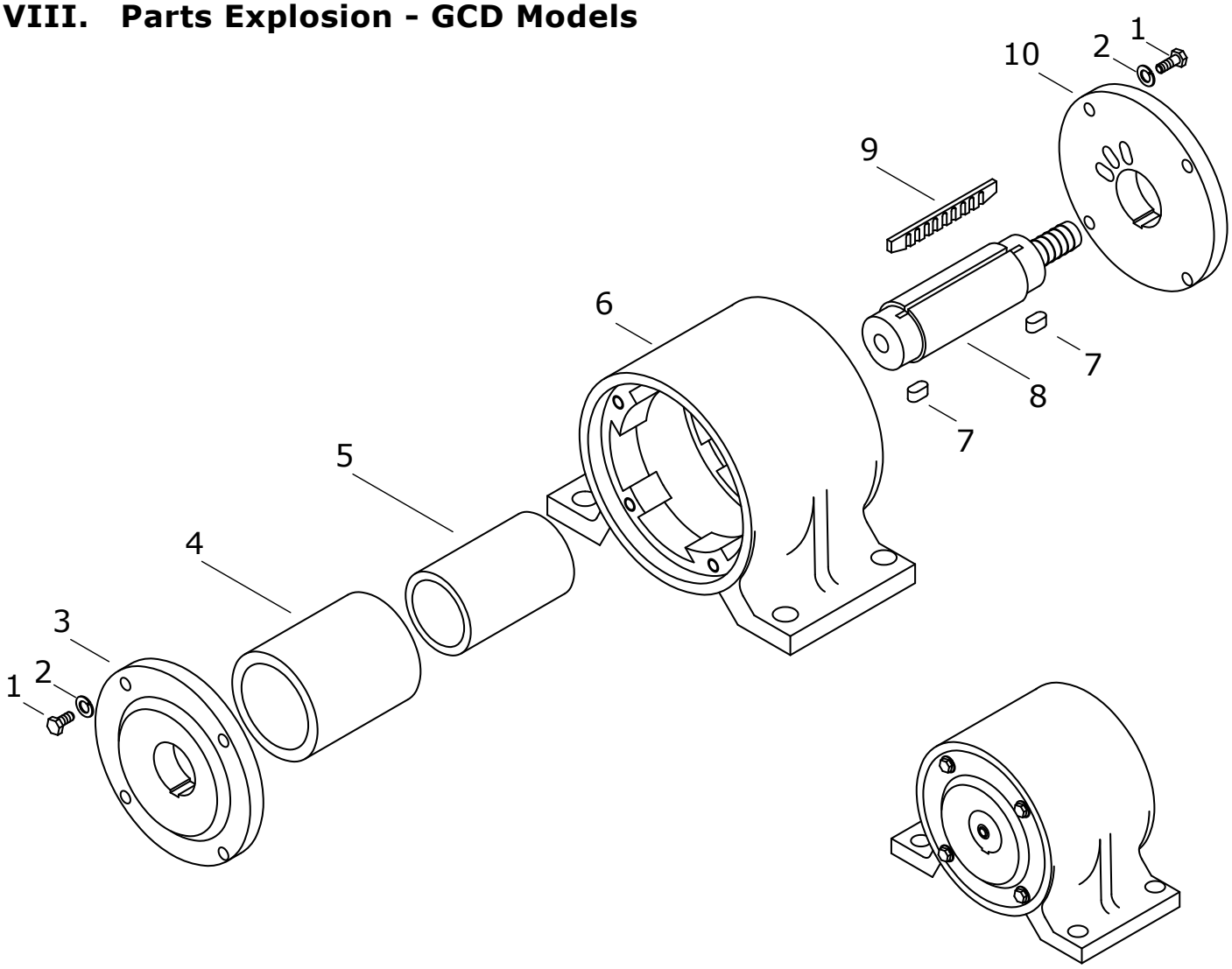
On a Concrete Form: *The rotation of vibrator roller (weight) is counterclockwise. This helps force the air bubbles to the surface. Facing the concrete form the shaft/hose barb will be on the right.*





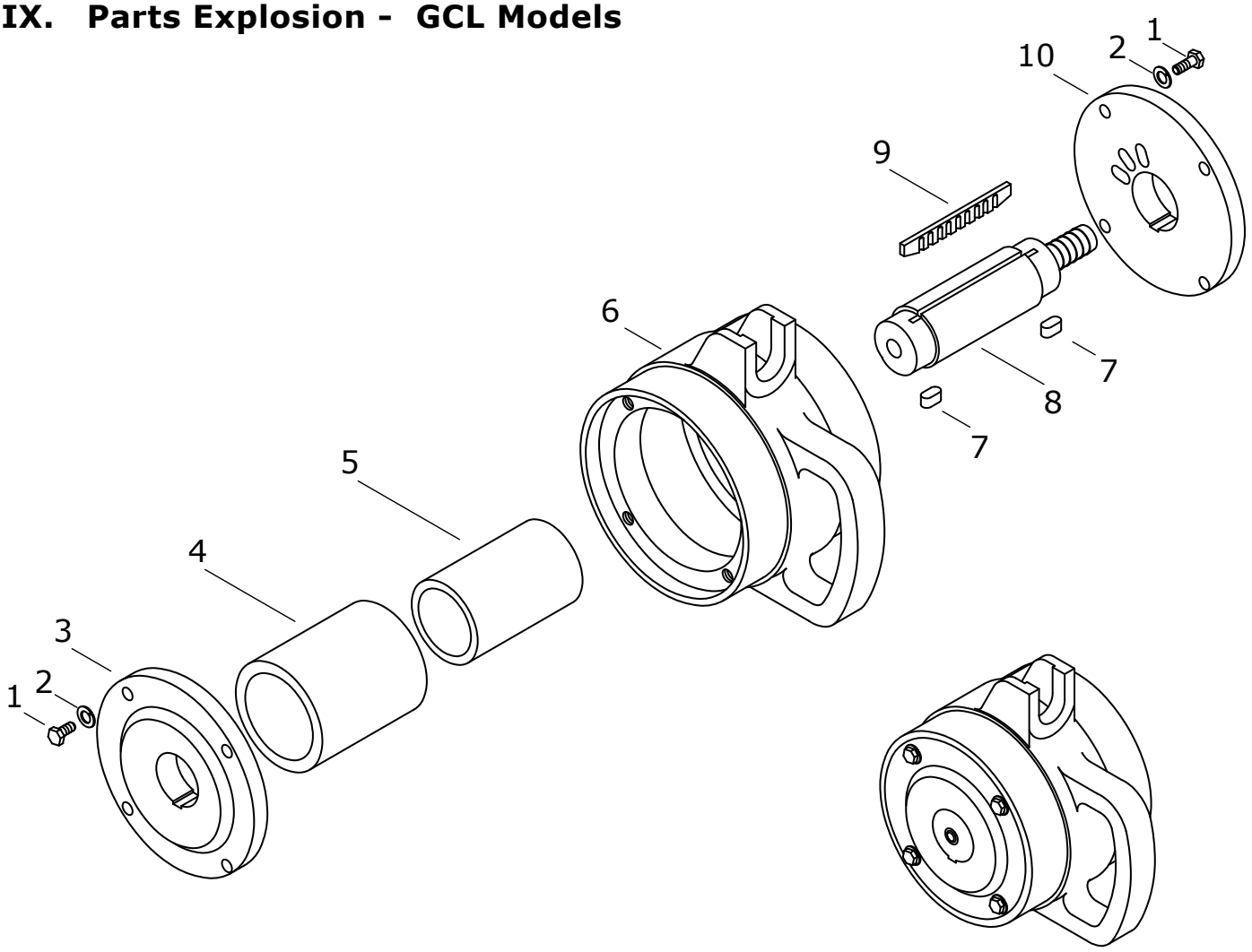


VIII. Parts Explosion - GCD Models



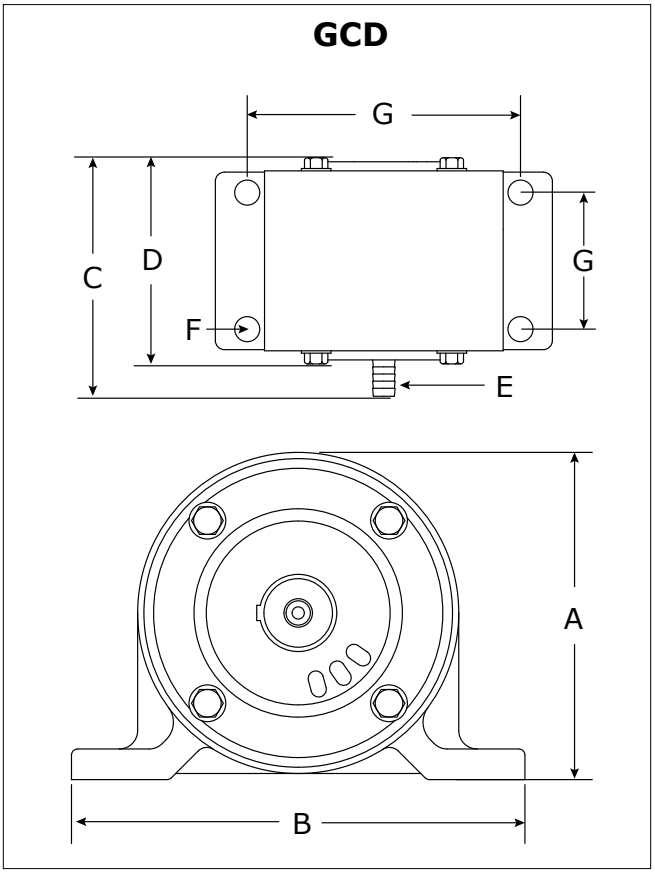
Parts List for GCD High Frequency Vibrators							
GCD-4400 (pn 522044) GCD-5000 (pn 522050)				GCD-5500 (pn 522055) GCD-6500 (pn 522065)			
#	Description	PART #	Qty	#	Description	Part #	Qty
1	Bolt Hex ⅜ - 16 x 1¼"	330212	8	5	Roller	192100	1
2	Lock Washer ⅜"	338106	8	6	Housing	141102	1
3	Side Plate - Blind	117000	1	7	Key	346205	2
4a	Roller Weight - 4400*	192144	1	8	Shaft	205000	1
4b	Roller Weight - 5000*	192150	1	9	Vane	270001	1
4c	Roller Weight - 5500*	192155	1	10	Side Plate - Exhaust	117031	1
4d	Roller Weight - 6500*	192165	1	*	1 weight per vibrator - determines force output		

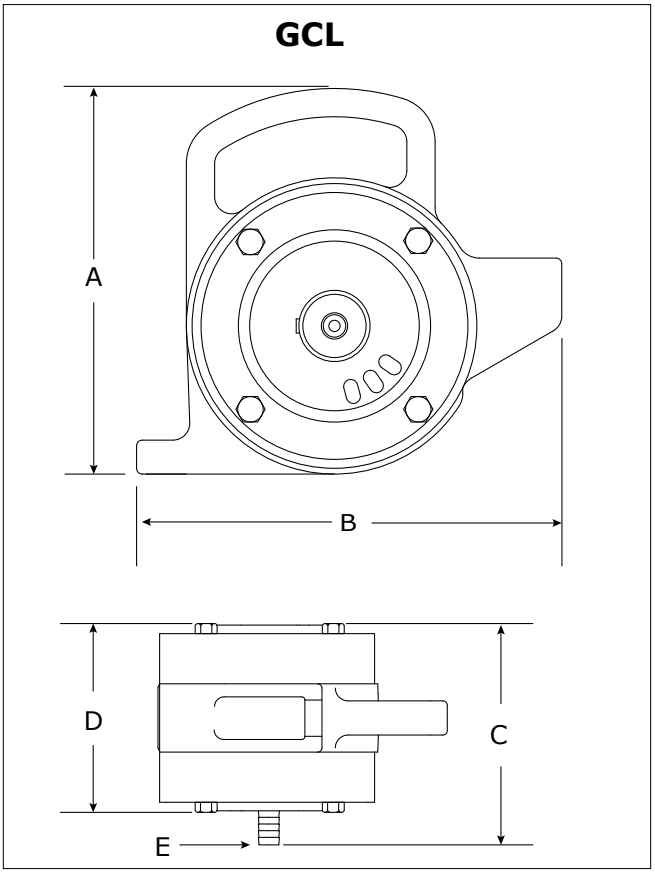
IX. Parts Explosion - GCL Models



Parts List for GCL High Frequency Vibrators							
GCL-4400 (pn 524044) GCL-5000 (pn 524050)				GCL-5500 (pn 524055) GCL-6500 (pn 524065)			
#	Description	PART #	Qty	#	Description	Part #	Qty
1	Bolt Hex ⅜ - 16 x 1¼"	330212	8	5	Roller	192100	1
2	Lock Washer ⅜"	338106	8	6	Housing	141104	1
3	Side Plate - Blind	117000	1	7	Key	346205	2
4a	Roller Weight - 4400*	192144	1	8	Shaft	205000	1
4b	Roller Weight - 5000*	192150	1	9	Vane	270001	1
4c	Roller Weight - 5500*	192155	1	10	Side Plate - Exhaust	117031	1
4d	Roller Weight - 6500*	192165	1	*	1 weight per vibrator - determines force output		

X. Dimensions of GCD and GCL Vibrators



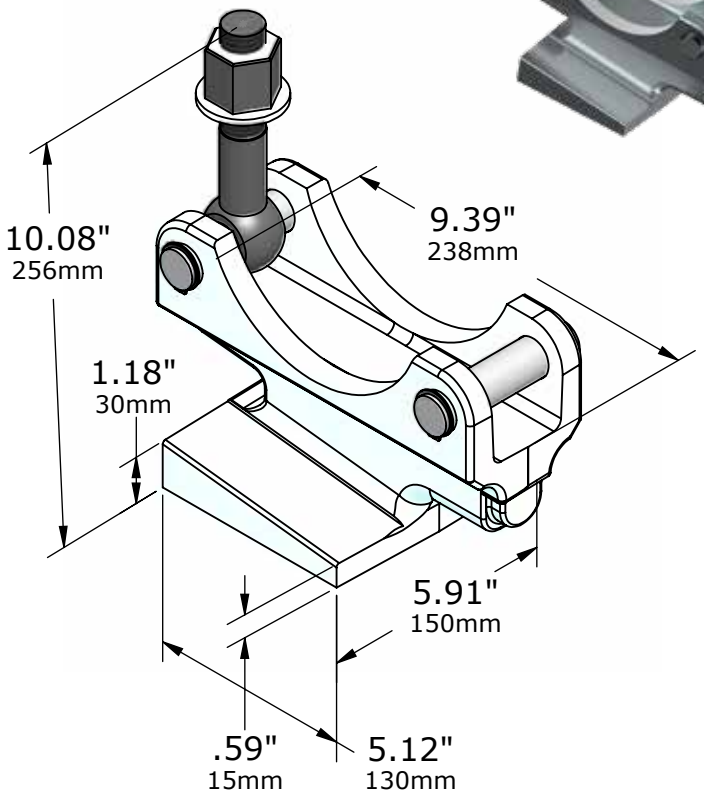


High Frequency Dual Roller Vibrator Dimensions								
Vibrator Model	Weight	A	B	C	D	E	F	G
		Height	Length	Width	Hsg Width	Inlet ID	Bolt Hole	Bolt Centers
	lb	in	in	in	in	in	in	in
	kg	mm	mm	mm	mm	mm	mm	mm
GCD-4400	34.8	6.7	9.2	7.4	5.7	3/4	0.7	7.5 X 3.8
	15.8	170	234	188	145	19	18	190 X 95
GCD-5000	35.2	6.7	9.2	7.4	5.7	3/4	0.7	7.5 X 3.8
	16.0	170	234	188	145	19	18	190 X 95
GCD-5500	35.4	6.7	9.2	7.4	5.7	3/4	0.7	7.5 X 3.8
	16.1	170	234	188	145	19	18	190 X 95
GCD-6500	38.7	6.7	9.2	7.4	5.7	3/4	0.7	7.5 X 3.8
	17.6	170	234	188	145	19	18	190 X 95
GCL-4400	32.8	8.5	9.4	7.3	5.5	3/4	N/A	Fits GCL Bracket
	14.9	216	239	185	140	19		
GCL-5000	33.2	8.5	9.4	7.3	5.5	3/4	N/A	Fits GCL Bracket
	15.1	216	239	185	140	19		
GCL-5500	33.4	8.5	9.4	7.3	5.5	3/4	N/A	Fits GCL Bracket
	15.1	216	239	185	140	19		
GCL-6500	36.8	8.5	9.4	7.3	5.5	3/4	N/A	Fits GCL Bracket
	16.7	216	239	185	140	19		

XI. Brackets Dimensions

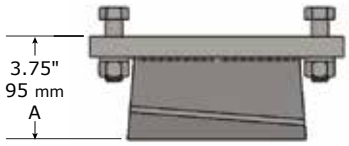
GCL-GBM Bracket (pn 167021)

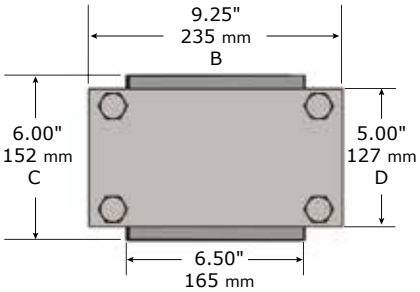
Bracket fits into the GBF Bracket found on railcars.



GCD-GBM Bracket (pn 167030)

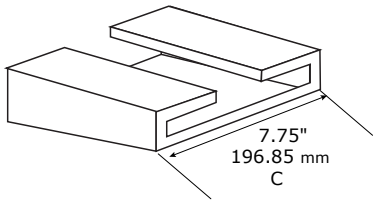
Bracket fits into the GBF Bracket found on railcars.

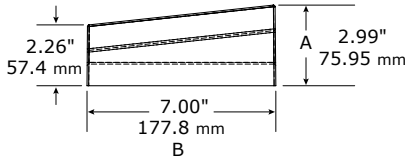


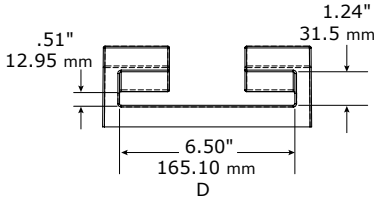


GBF Bracket (pn 167071)

This bracket is the female wedge pocket for the male brackets. The bracket is often found on railcars.

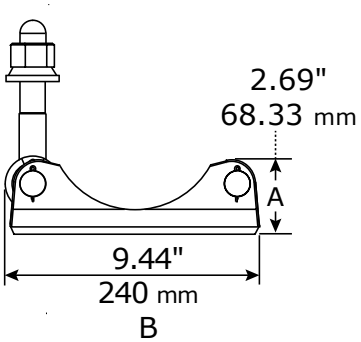


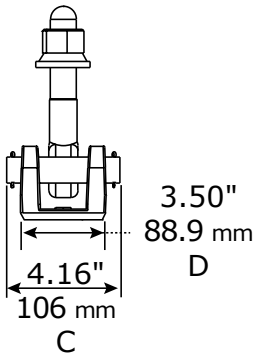




GCL Bracket (pn 168001)

Universal cradle-lug bracket. Competitive vibrator brands with cradle-lug housing profile fit into this bracket.





XII. Performance and Lubrication Charts

High Frequency Vibrators Performance Data

Model	Unbalance	Start-Up Pressure	40 psi / 2.8 bar			60 psi / 4.1 bar			80 psi / 5.5 bar		
	lb-in	psi	Speed	Flow	Force	Speed	Flow	Force	Speed	Flow	Force
	kg-mm	bar	rpm	cfm	lbf	rpm	cfm	lbf	rpm	cfm	lbf
				Lpm	kN		Lpm	kN		Lpm	kN
GCD-4400 GCL-4400	0.60	12	9,500	46.0	1,538	12,000	54.0	2,454	15,400	61.0	4,041
	7	0.8		1,303	6.8		1,529	10.9		1,727	18.0
GCD-5000 GCL-5000	0.80	14	9,350	47.0	1,986	11,800	57.0	3,164	14,500	63.0	4,777
	9	1.0		1,331	8.8		1,614	14.1		1,784	21.2
GCD-5500 GCL-5500	1.40	15	8,800	48.0	3,079	9,000	59.0	3,221	11,500	64.0	5,258
	16	1.0		1,359	13.7		1,671	14.3		1,812	23.4
GCD-6500 GCL-6500	2.80	20	7,600	49.0	4,593	8,200	60.0	5,347	10,000	67.0	7,952
	32	1.4		1,388	20.4		1,699	23.8		1,897	35.4

Pneumatic Motor Filter & Lubrication Requirements

Filtration Required	Lubrication Required
64 Micron	10 -12 Drops per Minute 10 Weight Oil*

Recommended Lubricants: Shell - Tellus 37, B.P. - Energol HL65, Castrol - Hyspin 70, Mobil - Alma oil No 1

XIII. Troubleshooting

Problem	Probable Cause	Solution
Vibrator will not operate	Airline blocked	Locate obstruction and remove. Check for kinked airline. Check filter.
	Inadequate air supply	Increase regulator setting or reduce number of units in use at same time. Check capacity of compressor.
	Airline too small for distance used	Use larger airline.
	Contamination in vibrator	Disassemble and clean.
	Clogged filter	Clean or replace filter.
	Foreign matter in vibrator jamming vane	Disassemble and clean.
	Vane is in wrong position	Disassemble and position shaft and vane according to this manual. Rollers must set on top of vane.
Excessive noise	Insufficient mount	Replace with stronger mounting apparatus.
	Damaged housing or covers	Replace the housing or covers.
Vibrator operates slowly	Airline leaking or constricted	Replace airline, valve, or filter.
	Airline too small for distance used	Replace airline with larger size air line.
	Filter clogged	Clean, repair, or replace.
	Contamination in vibrator	Disassemble and clean.
	Lack of lubrication or oil has thickened due to cold weather which may cause vane to stick	Increase amount of lubrication. Thin oil with alcohol or antifreeze. Switch to a lighter weight oil.
	Side plates are worn	Replace or resurface side plates.
Change in vibrator sound	Insufficient mount	Check for loose bolts, broken welds, and damaged brackets.
	Worn vane or side plates	Replace parts.
	Insufficient lubrication	Increase amount of lubrication.