

DC Electric Vibrators

Operating Instructions

Global[®] External
12-Volt DC Electric Vibrators

Intermittent Use Only

Models:

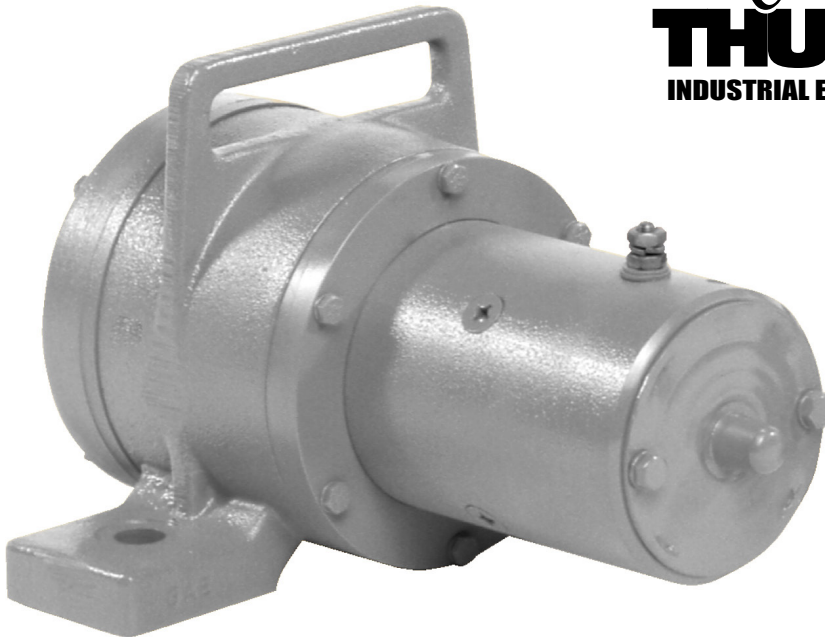
CEG-1800-12

CEG-2200-12

CEG-2800-12

CEG-3600-12

CEG-4200-12



GlobalManufacturing.com

Global Manufacturing Inc.[®]

1801 East 22nd St
Little Rock, Arkansas 72206

501.374.7416 TEL

800.551.3569 TOLL FREE USA & CANADA

501.376.7147 FAX

Table of Contents	Page
I. Introduction	2
II. Operation	3
III. Special Applications - Performance Variations	4 - 5
IV. Wiring Instructions	6
V. Wiring Diagram	7
Mount Kits & Accessory Kits	
VI. Installation Procedures	8
VII. Mounting	9 - 10
VIII. Adjusting the Weight Settings	11
IX. Dimensions	12
X. Performance Data	13
XI. CEG 12V DC Vibrator Parts Explosion	14
XII. Troubleshooting	15

I. Introduction

For optimum performance, cycle the vibrator on and off. The vibrator acts as a friction reducer and once the bulk solid is set into motion, gravity should do the rest. Do not operate the vibrator on an empty hopper or truck bed as this may cause structural damage to the hopper.

Vibrators should be operated only when discharge gates are open or truck bed is in an unloading position. Operating the vibrator with the discharge gate closed will cause the material inside the structure to compact.

Vibration has two important elements – Frequency and Amplitude. Frequency is the speed (rpm) or the number of vibrations per minute. The speed is controlled by a rheostat. 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

Read this entire manual and follow all installation and operating instructions.

This vibrator is rated for **intermittent** use

Always make sure of a proper ground.

Always use a safety cable to attach the vibrator to an independent stronghold.

Do not operate the vibrator on an empty structure. This can damage the structure or the vibrator.

If a truck battery is used to power the vibrator, the vehicle engine should remain running while the vibrator is in use. Keep all ancillary equipment such as air conditioners turned off while operating the vibrator.

Do not operate the vibrator with the cover removed or if any fasteners are missing. Disconnect or lock out the electrical supply before performing maintenance on the vibrator.

Persons near the vibrator should wear ear protection if the decibel levels exceed 90 dB.

II. Operation

Electrical Requirements:

The CEG-1800, CEG-2200, CEG-2800, CEG-3600, and CEG-4200 truck vibrators are 12 Volt DC models. They require a 12 Volt - DC power source that can provide a 250 amp peak and 100 amps continuous. The maximum allowable motor temperature is 200°F (93.3°C).

Important!

These models are rated for intermittent use only.

Running the Vibrator:

These CEG models are rated for **intermittent** use only (smaller sized continuous operation models are available). The vibrator **cannot run continuously**. The vibrator should be started by pressing a momentary contact switch. Allow the vibrator to cool for at least three minutes for each minute of operation. Operate the vibrator for only one minute, for each operating cycle. Switch vibrator off, cool for three minutes, and then it can be run again for one minute, and so on. Excessive vibrator operation can discharge the vehicle battery. Keep the engine running during vibrator operation and allow sufficient time for the battery to recharge between operating cycles.

Accessory Kits:

Accessory kits are available from Global Manufacturing. See page 7 for more details.

Material Flow Applications:

Once properly installed, the vibrator is operated by activating the momentary switch provided in the accessory kit. Cycle the vibrator on and off to maintain material flow. Once the material is set in motion, gravity will keep it moving. Be sure to stop the vibrator whenever all material has been removed from the hopper or truck bed. Allowing the vibrator to run on an empty hopper or truck bed can damage the structure or vibrator.

Truck Dump Body Applications:

Excessive vibrator operation can discharge the vehicle battery. Operate the vibrator only enough to keep the material in the dump bed flowing. Keep the engine running during vibrator operation and allow sufficient time for the battery to recharge between operating cycles. Operate the vibrator through a momentary contact switch to preclude accidental excessive operation. A momentary contact switch comes in the Accessory Kit.

Concrete Consolidation Applications:

These CEG DC vibrators are rated at 5,000 rpm. This rate of vibration (same as rpm of vibrator) is only about half of what is ideal for concrete consolidation - 10,000-14,000 vibrations per minute is recommended. Therefore, another Global vibrator should be selected for concrete consolidation applications.

Controlling Vibrator Speed:

A rheostat can be used to control the speed of DC electric vibrators. Operating the vibrator at lower voltages will slow the speed of the vibrator, reduce the force of the vibrator, and enhance the bearing life (a 10% decrease in speed increases the bearing life by 50%). If using a rheostat to control the vibrator speed, reduce the speed using the rheostat until material flow stops. Gradually increase the voltage until the speed of the vibrator is adequate to maintain the material flow.

Maintenance:

The CEG DC vibrators require very little maintenance. These vibrators are equipped with sealed bearings that are permanently lubricated at the factory. No lubrication is required. Periodically check for loosening of the mount.

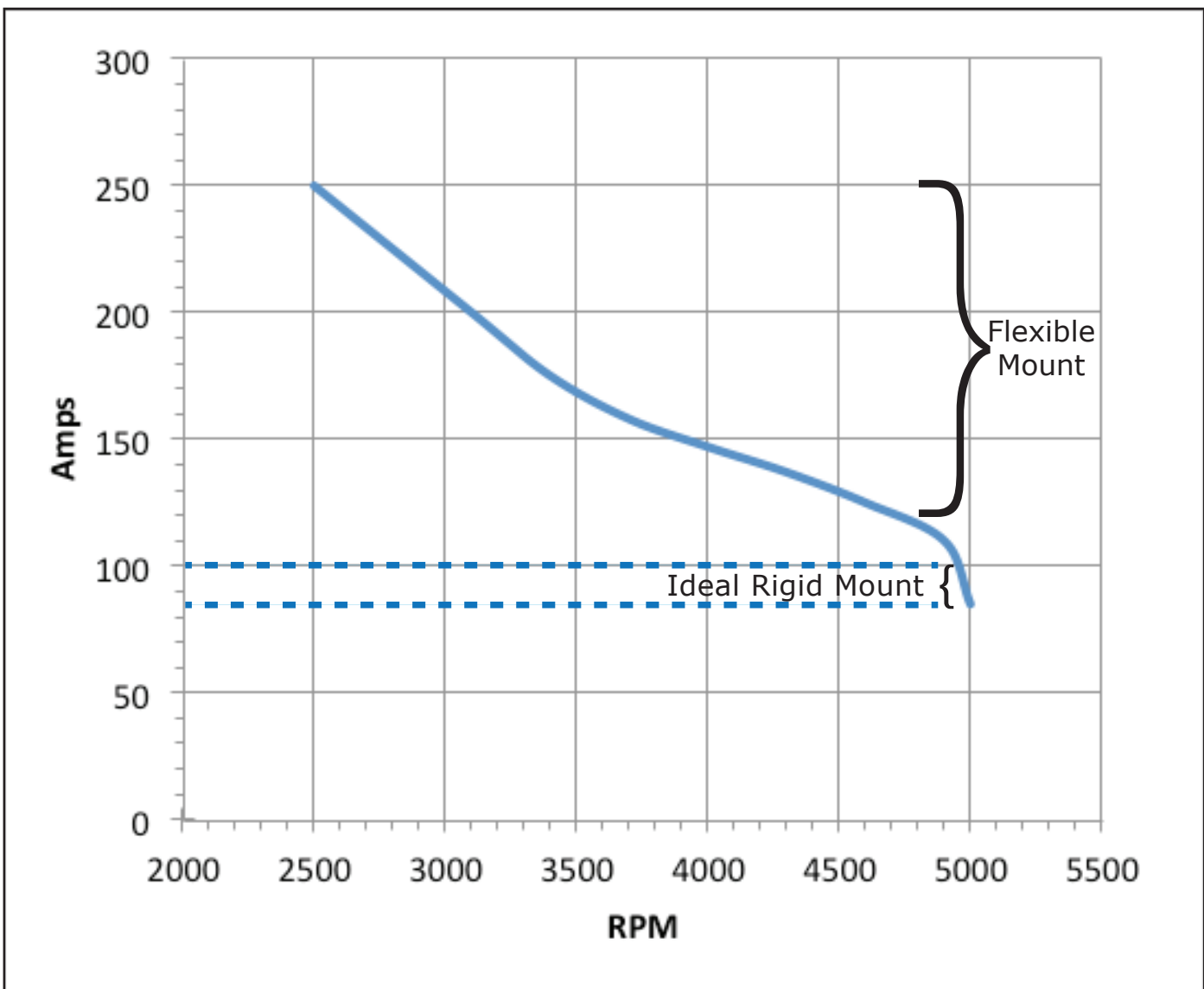
III. Special Applications Causing Performance Variations

Examples - High Amps and Reduced Speed Reducing Force Output

When using Global Manufacturing DC Vibrators on certain applications, performance can vary unexpectedly. The speed or force output might be less than expected from our standard performance data. Also, the amp draw might be higher than anticipated. First it should be understood that the **published performance data is based on an ideal rigid mount**. With electric vibrators of all types, the performance can vary quite a bit depending on the rigidity of the mount. **The more flexible the mount, the higher the amp draw will be, and the slower the vibrator will run (the force output will decrease as the vibrator speed decreases)**. With AC Vibrators using squirrel cage induction motors, this lack of

rigidity in the mount can be disastrous because if the vibrator does not get up to speed, the windings will overheat and fail.

DC Motors are more forgiving. As with universal AC brush motors, the speed can vary with the load and input voltage. The motor for this series of Global vibrators is very powerful. **Although we expect it will run at 5,000 rpm and pull 80-90 amps at 12V DC on a good rigid mount, it can tolerate a less rigid mount. The motor will slow down and pull more amps, but this will not hurt the motor because it can tolerate over 200 amps.** In fact, the motor is most efficient at 225 amps. See graph below.



The important fact to keep in mind is the motor temperature. These motors are capable of high torque and can handle high amps, but they are designed for intermittent use and have no fan or vents for cooling. To be safe we **recommend operation for one minute followed by three minutes of rest for cooling.** For special applications where the vibrator is only run once in a 30 minute period, they probably can be run for 4 or 5 minutes at a time. To be sure you are not damaging the motor, it is best to test your operating protocol by monitoring the motor temperature. Checking the temperature at a spot near the center of the motor housing, make sure you **don't exceed 200°F.** This way you can customize the use of your DC vibrator without jeopardizing the life of the motor. You can also fine tune your operating protocol for optimum performance in different ambient temperature environments.

We hope these guidelines help you better understand and use your Global DC vibrator. If you have additional questions, please contact Global Customer Service at 800-551-3569.

Since the heat production of the motor is directly related to the amp draw, it is best to do what you can to keep the amp draw as low as possible. As implied above, having a rigid mount will help to do that. We recommend you follow as closely as possible the mounting instructions in the operations manual provided with your vibrator. Another way to keep the amp draw down is to make sure you keep your voltage as close to 12 volts as possible. On truck applications, we recommend keeping the truck engine running while operating the vibrator. This will help to keep the battery fully charged. It is also **important to use the proper cable for your application to minimize the voltage drop between your power source and the vibrator.** A good voltage drop calculator can be found at:

<http://www.nooutage.com/vdrop.htm>

- Select 12V for voltage.
- Select the cable size you are attempting to use (we recommend at least 4 awg).
- For the load enter the amp draw you measure for your application.
- Select copper conductor for conductor type.
- Select DC for sytem type.
- Select conductor temperature.
- Select "no conduit" for conduit type.
- Select "single set of conductors".
- Put in the length of your cable in feet.
- Then press "Calculate Voltage Drop." If the voltage drop is greater than 5%, we recommend using a heavier cable or a shorter cable.

IV. Wiring Instructions

Wiring to Power Source and Switching

Wire these CEG Model DC vibrators for **intermittent duty only** (see page 3, "Running the Vibrator"). All wires and cables must be of the **multi-strand type** - this wire type helps resist vibration and flexing.

To assist in installation Global Manufacturing offers **DC Electric Accessory Kits**:

CEG/C3 Accessory Kit Intermittent 25

- intermittent switch
- 12V solenoid
- 25' of #4 cable
- 4-#4 connectors
- 6-#16 connectors

CEG/C3 Accessory Kit Intermittent 50

- intermittent switch
- 12V solenoid
- 50' of #4 cable
- 4-#4 connectors
- 6-#16 connectors

See the drawing on page 7, which illustrates necessary connections.

1. Be sure all the equipment is all rated for the 12 voltage:

12 volt Battery
12 volt Vibrator
12 volt Solenoid

2. Be sure the negative battery terminal is properly grounded to the truck chassis.

3. Connect the positive battery terminal to the large input terminal on the solenoid using AWG #4 cable or heavier.

4. Ground the small input terminal on the solenoid to the truck chassis or the negative battery terminal using AWG #16 wire or heavier.

5. Connect the large output terminal of the solenoid to the power terminal on the vibrator using AWG #4 cable or heavier. The DC Electric Vibrator Accessory kits include the solenoid and 25 or 50 feet of cable with the necessary terminal and connectors to do this.

6. Connect the momentary switch to the small output terminal on the solenoid using AWG #16 wire or heavier. The switch is included in the DC Electric Vibrator Accessory kits. If it is desired to control more than one vibrator, with a single switch, each vibrator must be connected to its own solenoid. The switch can be connected to the multiple solenoids to operate the vibrators.

7. Connect the other side of the switch to the positive battery terminal using AWG #16 wire or heavier.

8. Connect the ground cable to mounting bolt of vibrator or alternatively remove paint or other insulating coatings from the bottom of the vibrator mounting feet and mount surface. This will allow you to use the vibrator as the ground.

9. Connect the ground terminal found on the end cover of the vibrator motor to the mount channel or truck bed using AWG #4 cable or heavier.

Important!

There should be one solenoid per vibrator. The switch can be wired to control two solenoids simultaneously.

Caution

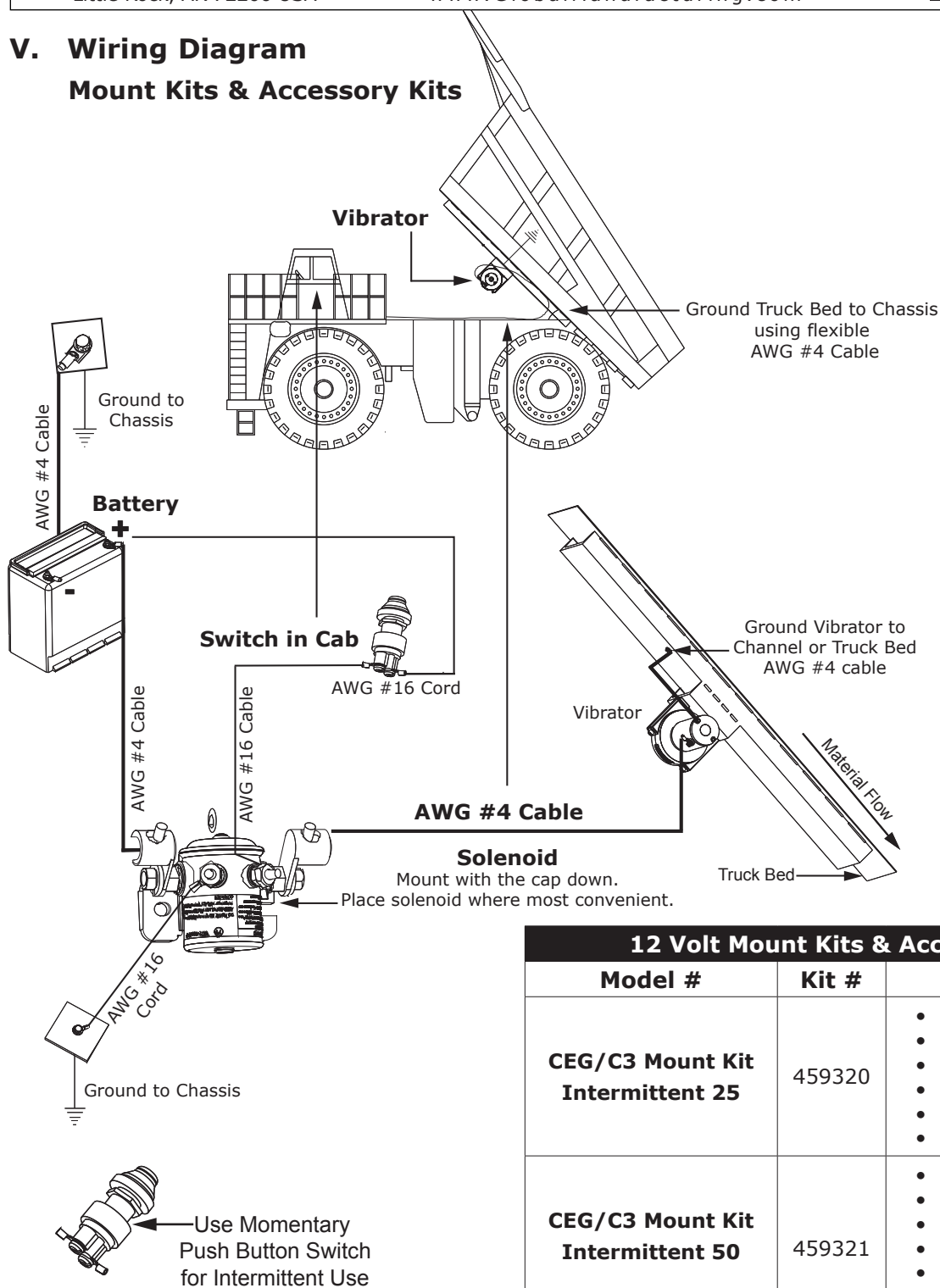
All wires and cables connecting to the vibrator should have some slack. All wires and cables must be of the multi-strand type. A solid conductor wire will not tolerate flexing and vibration.

The vibrator must be properly grounded. Use a heavy duty ground cable or strap to complete the electrical circuit between the truck bed and the truck frame to insure proper grounding and operation.

For non-truck applications, mount the solenoid & switch where most convenient.

V. Wiring Diagram

Mount Kits & Accessory Kits



Note: There should be one solenoid per vibrator. The switch can be wired to control two solenoids simultaneously.

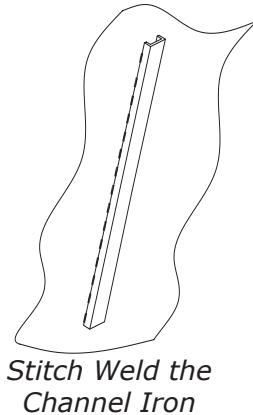
12 Volt Mount Kits & Accessory Kits		
Model #	Kit #	Description
CEG/C3 Mount Kit Intermittent 25	459320	<ul style="list-style-type: none"> • mount plate & bolts • intermittent switch • 12V solenoid • 25' of #4 cable • 4-#4 connectors • 6-#16 connectors
CEG/C3 Mount Kit Intermittent 50	459321	<ul style="list-style-type: none"> • mount plate & bolts • intermittent switch • 12V solenoid • 50' of #4 cable • 4-#4 connectors • 6-#16 connectors
CEG/C3 Accessory Kit Intermittent 25	459325	<ul style="list-style-type: none"> • intermittent switch • 12V solenoid • 25' of #4 cable • 4-#4 connectors • 6-#16 connectors
CEG/C3 Accessory Kit Intermittent 50	459326	<ul style="list-style-type: none"> • intermittent switch • 12V solenoid • 50' of #4 cable • 4-#4 connectors • 6-#16 connectors

VI. 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. The vibrator should appear motionless. There should not be a large amount of motion or noise.



Channel Irons - Size & Mounting

Important!

The channel iron should be at least two-thirds of the height of the sloped portion of the hopper but no greater than 10 feet (3 m).

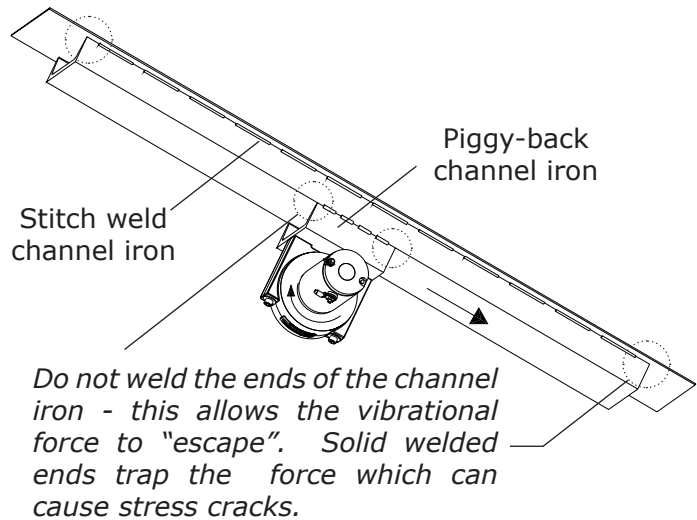
The channel iron should be at least two-thirds the height of the sloped portion of the hopper, but not less than 6 feet (1.83 m) in length. The channel iron width should not be less than the base width of the vibrator. See chart below for recommended channel sizes. **Do not** install more than one vibrator 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 Size:

For all CEG-1800,CEG-2200,CEG-2800, CEG-3600, and CEG-4200 DC 12V models use the following channel iron size:

C6 x 13 lb/ft (C150 x 19 kg/m)

Attach the vibrator to the channel iron. Stitch weld nuts to the back of the channel iron. 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.



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.

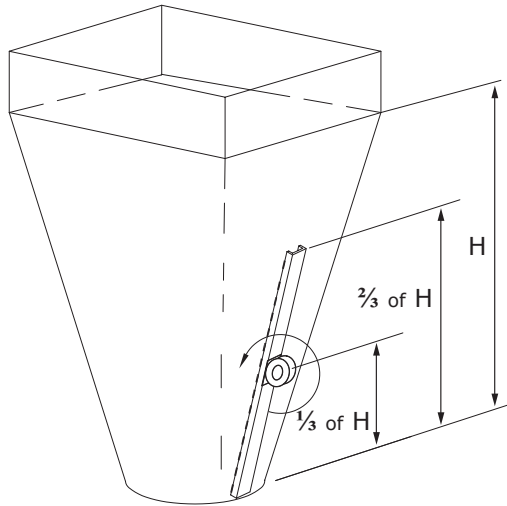
Secure the vibrator to the channel iron with SAE coarse thread grade 8 plated bolts with lock washers or an adhesive such as Loctite[®] 262. Tighten bolts in a sequential process. At least two passes are required in most situations. Give all bolts the same torque value - 282 ft-lb (382 N-m). Grade 8 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. Attach the vibrator end of the safety cable to the cast-in handle on the vibrator housing and secure with cable clamps.

VII. Mounting

Single Vibrator

Install a channel iron stiffener on the outside of the sloping wall $\frac{1}{3}$ the distance above the discharge opening.

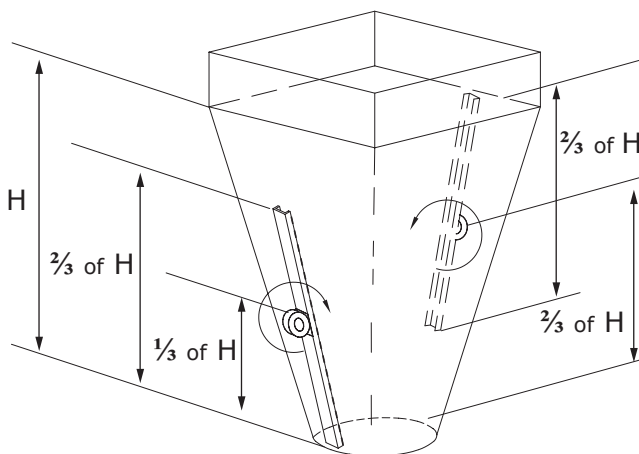


Multiple Vibrators

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.

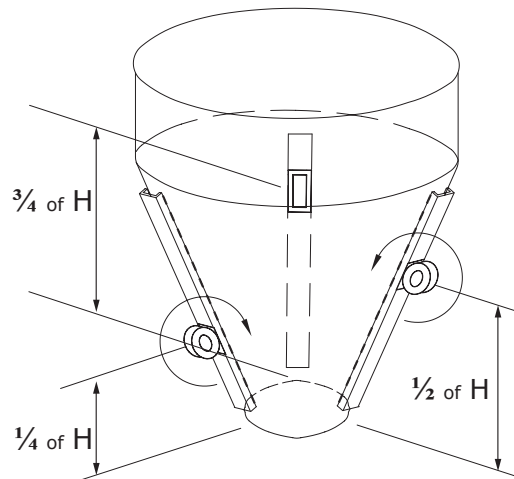
Two Vibrators on Round or Square Hoppers

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



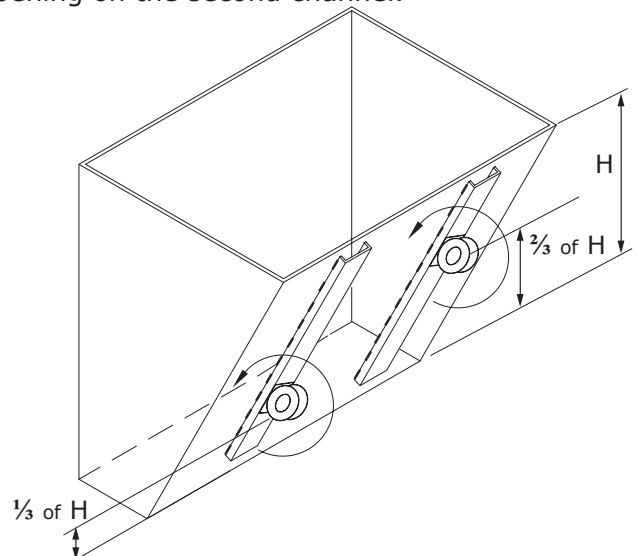
Three Vibrators

Install channel iron stiffeners mounted 120° apart. Install the first vibrator on the outside of the sloping wall $\frac{1}{4}$ the distance above the discharge opening. Install the second vibrator on a separate channel iron at $\frac{1}{2}$ the distance above the discharge opening. Install the third vibrator on the remaining channel iron at $\frac{3}{4}$ the distance above the discharge opening.



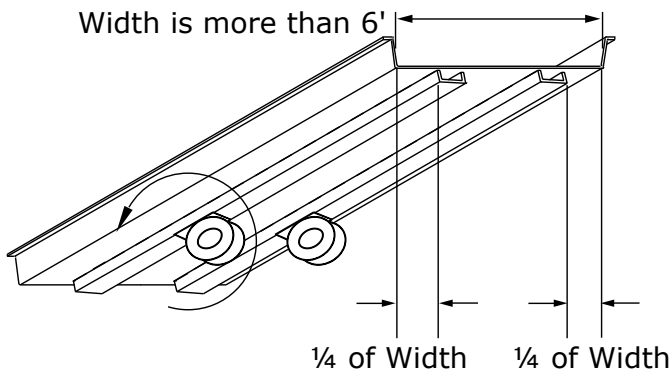
Two Vibrators on Rectangular Hoppers

Install channel iron stiffeners on opposite sides of the long walls. Install one vibrator on the outside of the sloping wall $\frac{1}{3}$ the distance from the discharge opening. Install the second vibrator on the outside of the opposite sloping wall $\frac{2}{3}$ 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 $\frac{1}{3}$ above the discharge opening on one channel iron and the other vibrator $\frac{2}{3}$ above the bin's discharge opening on the second channel.



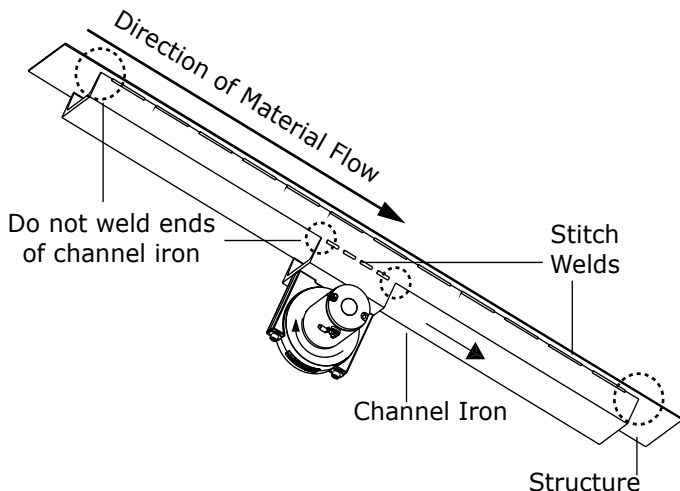
Installation on Chutes and Flow Pipes

Mount channel iron stiffeners vertically or in the direction of material flow. Center the channel if the chute is less than 6 feet (1.83 m) in width. If the chute is greater than 6 feet 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 $\frac{1}{4}$ of the chute width from the edge and $\frac{1}{2}$ of the chute width apart. (e.g. – for a chute 8' wide, the channel iron locations would be 2' from each edge and 4' apart.) When wall thickness is less than $\frac{1}{8}$ ", additional reinforcement may be required.



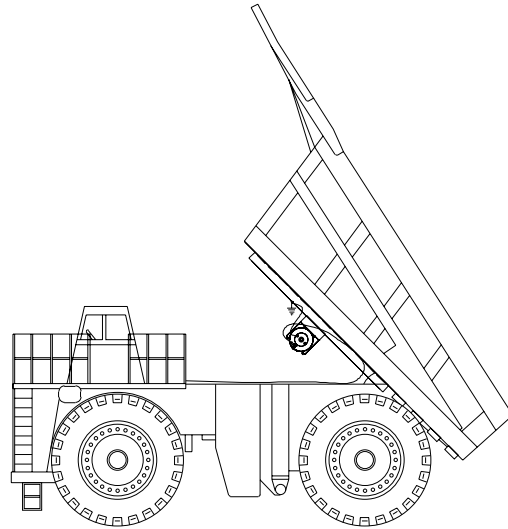
Orientation of Vibrator

The vibrator should be mounted with the shaft horizontal and the DC motor on the right when looking at the application from outside the structure with the direction of material flow from top to bottom. This will provide the proper direction of rotation to assist material flow.



Mounting on Truck Bed

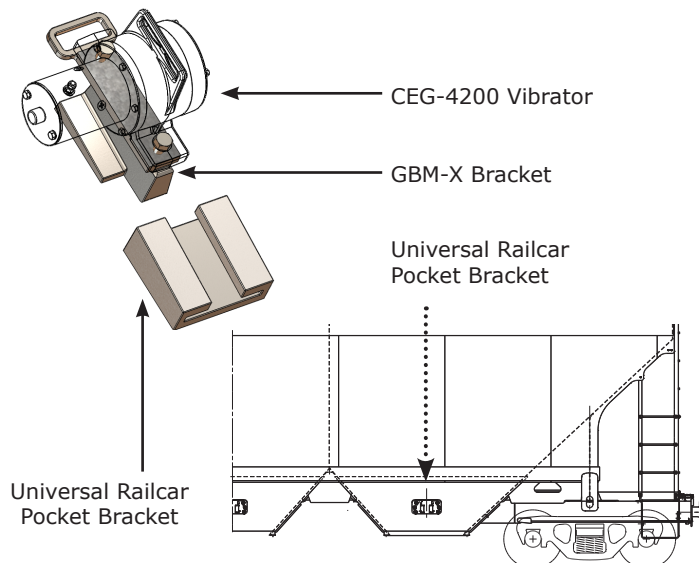
Mount each vibrator on an independent channel iron. Locate the channel iron as close as possible to the material flow problem area. The most common problem areas are in the corners of the dump body.



Railcar Application

The CEG 12-Volt models may be mounted onto a wedge bracket (model GBM-X). The GBM-X Bracket fits into the railcar hopper pocket. Securely bolt the vibrator to the bracket using grade 8 bolts, nuts and lock washers. Torque to 282 ft-lb (382 N-m). Retorque after initial operation.

The direction of eccentric weight rotation should be toward the hopper pocket and down. Do not operate vibrator for more than one minute. Allow vibrator to cool down for at least 3 minutes.



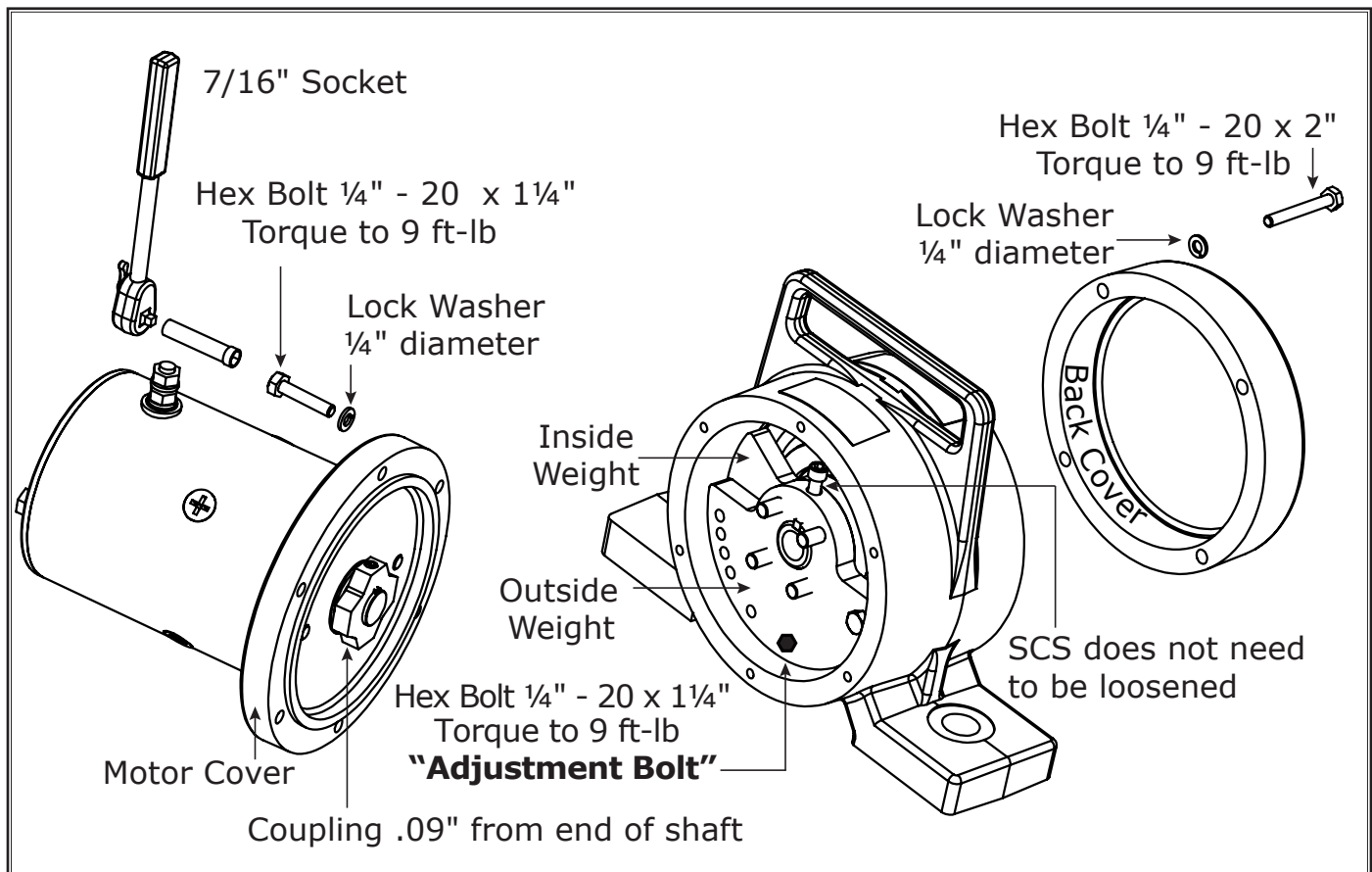
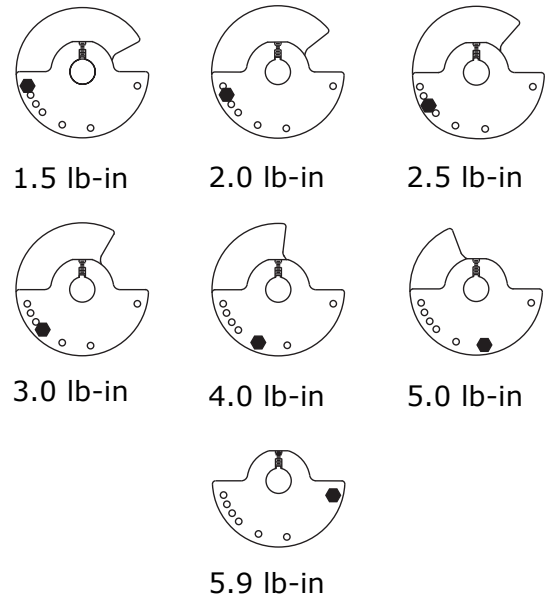
VIII. Adjusting Weight Settings

To change the amount of vibration, reposition the weights (also referred to as the "unbalance" or the "eccentric weights") on the shaft, by removing and reinstalling an adjustment bolt.

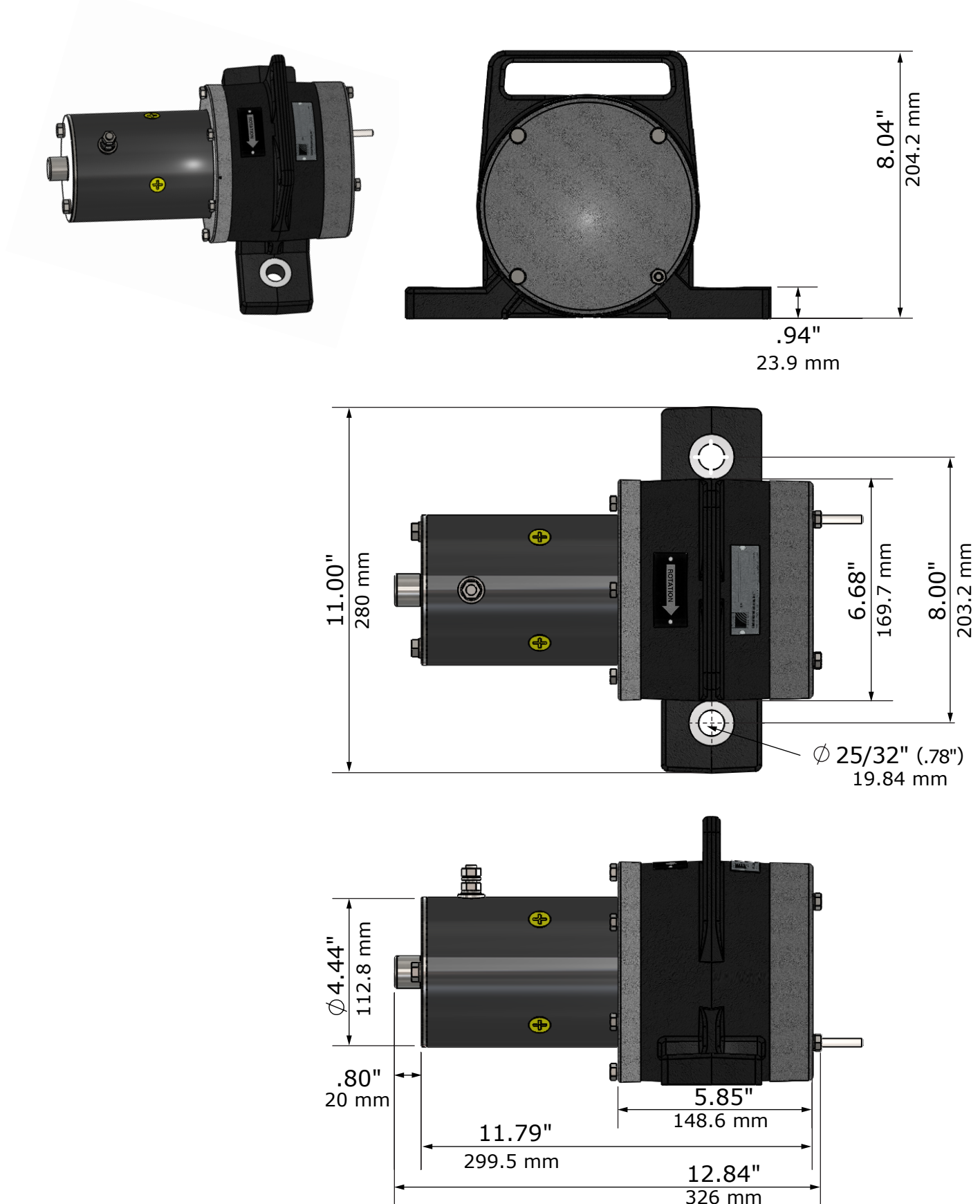
1. Remove both covers.
2. Remove the adjustment bolt to allow inside weight to rotate on shaft. There are two weights on each side of the vibrator - an inside and outside. The inside weight (adjustable weight) is attached to the outside weight with the "adjustment bolt". The outside weight is fixed to the shaft with a set screw and a key (Do not loosen the set screw on the outside weight.).
3. Rotate the inside weight until the tapped hole lines up under the desired bolt hole of the outside weight and reinstall the adjustment bolt.
4. Repeat process to the weights on the opposite side of the vibrator.
5. **It is very important that the weights on both sides are set the same.**
6. Replace covers using 9 ft-lb of torque. Make sure the motor coupling aligns with the pins on the weight.

Weight Position Guide

Notice the position of the **adjustment bolt** (black in color) at each weight setting.



IX. Dimensions for CEG Vibrators - 12 Volt Models



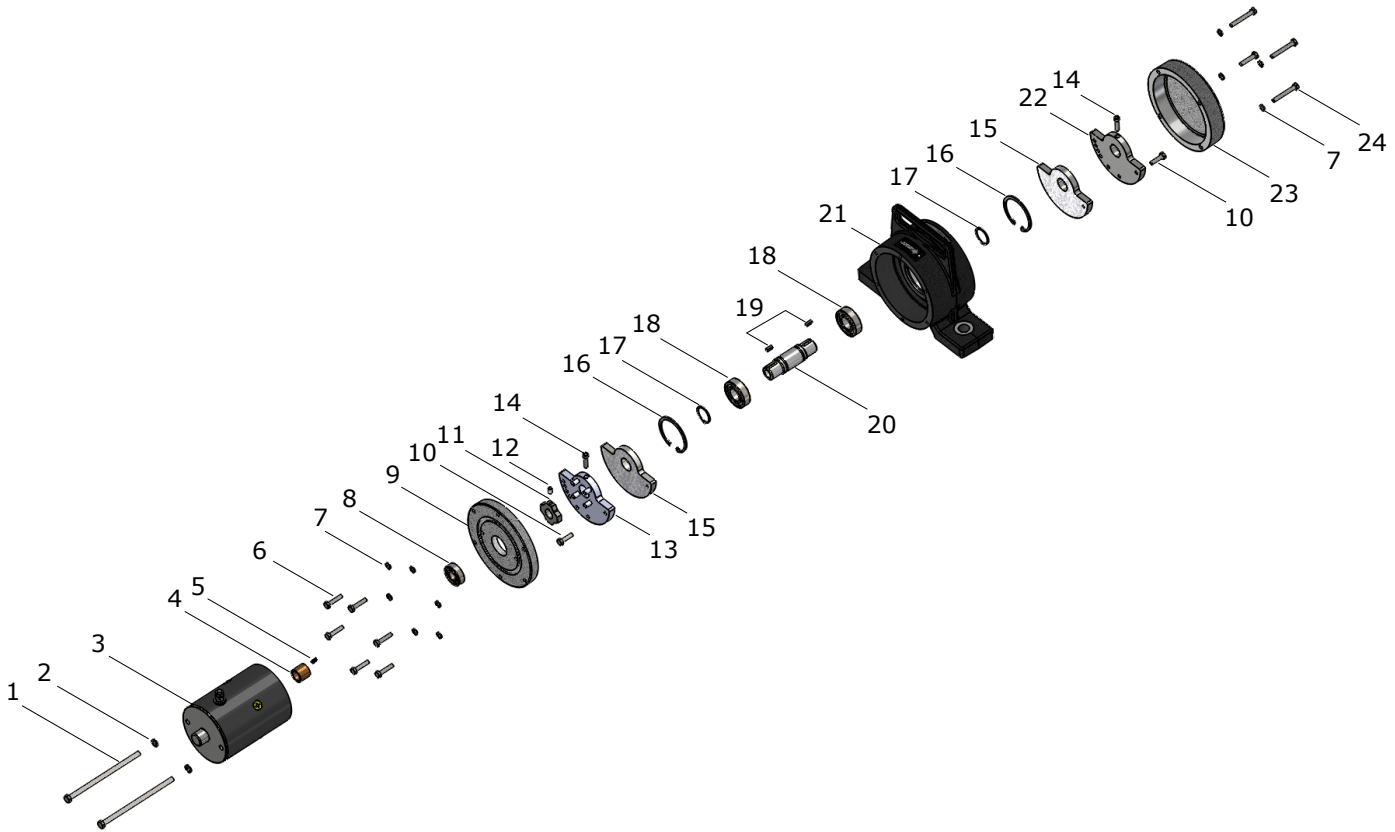
X. Performance Data

12 Volt DC Vibrators Performance Data

VIBRATOR MODEL	Speed	Unbalance	Force	Unbalance	Force	Unbalance	Force	Voltage	Amp Draw
		min		med		max			
		lbf-in	lb	lbf-in	lb	lbf-in	lb		
		kgf-mm	kN	kgf-mm	kN	kgf-mm	kN	Volts	Amps
CEG-1800-12	5,000	1.50	1,065	2.00	1,420	2.50	1,775	12V DC	85
		17	4.74	23	6.32	29	7.90		
CEG-2200-12	5,000	2.00	1,420	2.50	1,775	3.00	2,130	12V DC	85
		23	6.32	29	7.90	35	9.47		
CEG-2800-12	5,000	2.50	1,775	3.00	2,130	4.00	2,840	12V DC	85
		29	7.90	35	9.47	46	12.63		
CEG-3600-12	5,000	3.00	2,130	4.00	2,840	5.00	3,550	12V DC	85
		35	9.47	46	12.63	58	15.79		
CEG-4200-12	5,000	4.00	2,840	5.00	3,550	5.89	4,182	12V DC	85
		46	12.63	58	15.79	68	18.60		

Force output is determined by the speed the motor rotates. Motor speed can be affected by the type and quality of the mount and the load on the motor. Follow manufacturer's guidelines for optimum performance. The standard performance data is based on the vibrator having a proper rigid mount.

XI. CEG 12V DC Models Vibrator Parts Explosion



Parts List for CEG Models - 12V Intermittent DC Vibrators

CEG-1800-12 (pn 539018)
CEG-2800-12 (pn 539028)
CEG-4200-12 (pn 539042)

CEG-2200-12 (pn 539022)
CEG-3600-12 (pn 539036)

#	Description	Part #	Qty	#	Description	Part #	Qty
1	Draw bolt 5/16 - 18 x 6 - 1/2"	331165	2	16	Retaining ring 5000-287	347287	2
2	Lock washer	338105	2	17	Retaining ring 5100-118	349118	2
3	Electric 12V motor	460012	1	18	Bearing 6306	380306	2
4	Spacer	387030	1	19	Key 3/16 x 3/16 x 1/2"	345803	2
5	Woodruff key #404	345603	1	20	Shaft	200303	1
6	Hex bolt 1/4 -20 x 1 1/4 "	330012	6	21	Housing	142030	1
7	Lock washer 1/4" plated	338104	10	22	Fixed driven weight	194706	1
8	Bearing 6203.750 2RS	380203	1	23	Back Cover	110230	1
9	Motor cover	112312	1	24	Hex bolt 1/4 - 20 x 2"	330020	4
10	Hex bolt 1/4 - 20 x 1"	330010	2	Mount Kits & Accessory Kits available See page 5 for details			
11	Coupling	203000	1				
12	SSScrew 1/4 - 20 x 1/2"	336105	1	CEG/C3 Mount Kit Intermittent 25		459320	1
13	Fixed drive weight with pins	194606	1	CEG/C3 Mount Kit Intermittent 50		459321	1
14	SCS 1/4 - 20 x 1"	336910	2	CEG/C3 Accessory Kit Intermittent 25		459325	1
15	Adjustable weight	194806	2	CEG/C3 Accessory Kit Intermittent 50		459326	1

XII. Troubleshooting

PROBLEM	PROBABLE CAUSE	SOLUTION
Vibrator will not operate.	Poor electrical connections.	Check to make sure all electrical connections, including ground connections, are secure and free of corrosion. Check switch to ensure it is making contact.
	Field/Armature is locked up.	Disconnect and check to make sure shaft turns freely.
Vibrator starts but fails to continue to operate.	Battery is low.	Recharge battery. Keep engine running while operating vibrator. Turn off other accessories using battery.
	Brushes are worn.	Replace brushes in motor.
	Short circuit in motor windings.	Replace motor.
Vibrator makes too much noise.	Inadequate mount.	Be sure all mounting bolts are tight and that mount is rigid and secure. Be sure all mounting instructions are followed.
	Bearing failure (squealing noise).	Replace bearings.
	Loose cover or motor.	Be sure all bolts securing the cover and the motor to the vibrator housing are secure.
Vibrator overheats.	Inadequate mount.	Be sure all mounting bolts are tight and that mount is rigid and secure. Be sure all mounting instructions are followed.
	Ambient temperature is too hot for vibrator.	Protect vibrator from ambient temperatures above 180°F (82°C).
	Vibrator has been operated continuously for too long.	These models may only operate intermittently. See page 3. Motor will overheat if operated continuously or for more than a minute without allowing time to cool in between operating intervals.
High Amp Draw and/or Low Force Output	Inadequate mount or portable equipment.	See pages 4 - 5 - Special Applications causing performance variations.
	Power cable of insufficient size.	