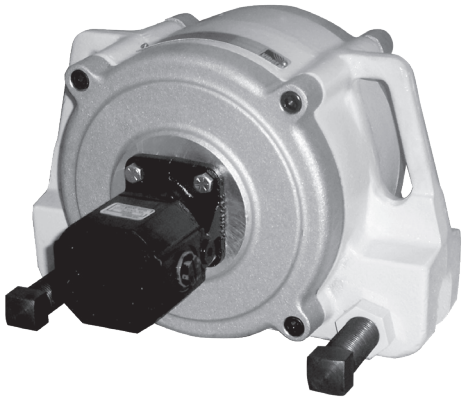
Design Series

Operating Instructions

Global Hydraulic Vibrators

MODELS

CC4.5-6-2HC	CC4.5-6-5HC
CC4.5-8-2HC	CC4.5-8-5HC
CC4.5-10-2HC	CC4.5-10-5HC
CC4.5-10A-2HC	CC4.5-10A-5HC
D4.5-6-2HC	D4.5-6-5HC
D4.5-8-2HC	D4.5-8-5HC
D4.5-10-2HC	D4.5-10-5HC
D4.5-10A-2HC	D4.5-10A-5HC



CC4.5 Series

Portable
Mount
Clamp-On

D4.5 Series

Permanent
Mount

Global® VIBRATORS Viber® VIBRATORS Global® AIR BLASTERS

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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 as this may cause structural damage to the hopper.

Vibrators should be operated only when discharge gates are open. 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. It is controlled by the oil flow to a hydraulic vibrator or 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 the frequency.

SAFETY PRECAUTIONS

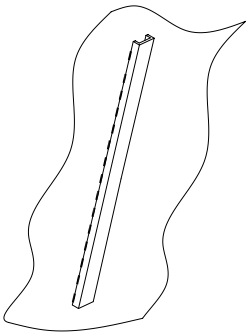
- Follow all mounting instructions.
- Always use a safety cable or chain for support.
- Do not operate vibrators when structure is empty.
- Do not operate vibrators when gate is closed or conveyor is stopped unless consolidation of material is desired.
- Wear ear protection for 90+ decibel levels.
- Do not operate vibrators without side covers.
- Do not operate the hydraulic vibrators above the maximum pressure (psi) or flow (gpm).
- Never use your hands to check for hydraulic leaks. Hydraulic fluid can be extremely hot.
- Always disconnect hydraulic line before maintenance.

II. Installation Procedures

⚠ Caution!

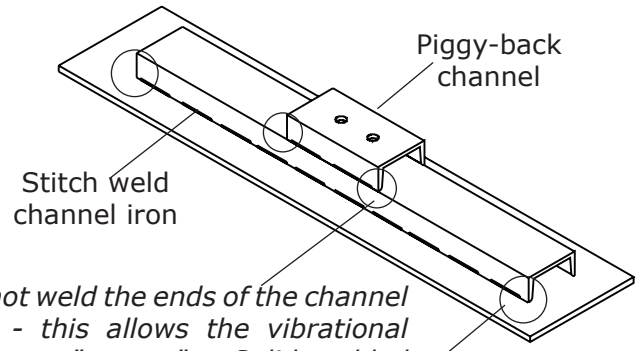
Do not mount the vibrator directly to the structure wall. Use a channel iron stiffener for proper mount rigidity and as the transducer of the vibrational energy.

The key to successful vibration is a proper mount because rotary vibration resonates the material inside the structure, when the vibrator is mounted correctly. The vibrator should appear motion-less. There should not be a large amount of motion or noise.



Stitch Weld the Channel Iron

Attach 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.



Do not weld the ends of the channel iron - this allows the vibrational force to "escape". Solid welded ends trap the force which can cause stress cracks.

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 (1829 mm) 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:

Model	Channel Iron Size	Minimum length
All D4.5 Models	C8" x 18.7 lb/ft	72"
	200 x 27.9 kg/m	1829 mm

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.

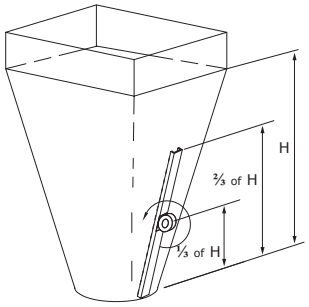
Secure the vibrator to the channel iron with SAE coarse thread grade 8 plated bolts with lock washers or an adhesive such as Loctite® 262. Tighten bolts in a sequential process. At least two passes are required in most situations. Give all bolts the same torque value. Grade 8 bolts can handle more torque 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.

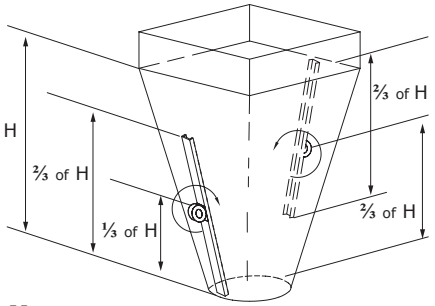


Multiple Vibrators

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.

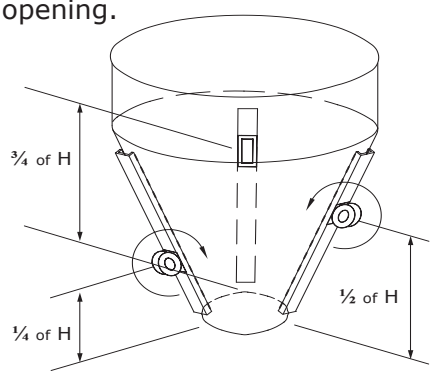
Two Vibrators on Round or Square Hoppers

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.



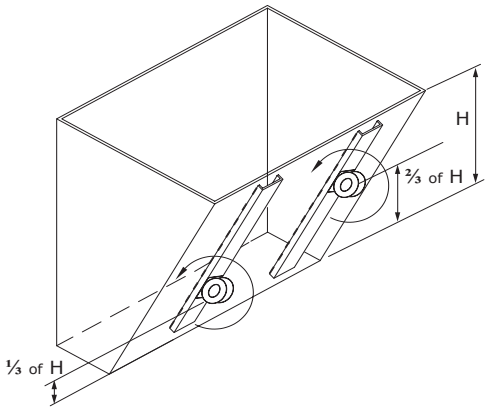
Three Vibrators

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



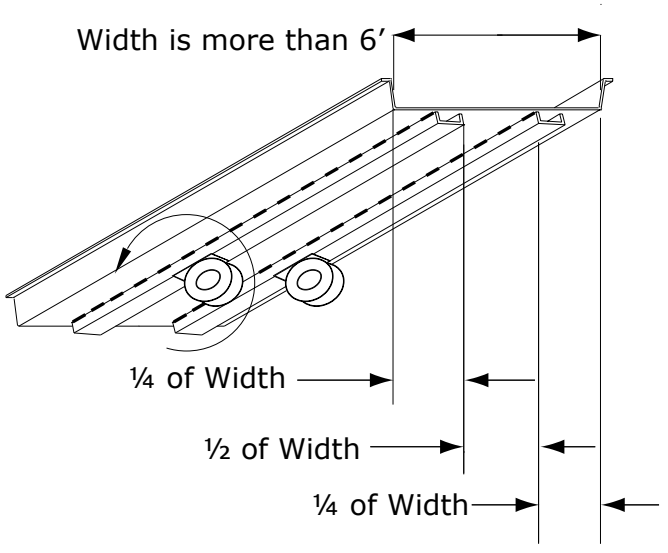
Two Vibrators on Rectangular Hoppers

Install channel iron stiffeners on opposite sides of the long walls. Install one vibrator on the outside of the sloping wall 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.



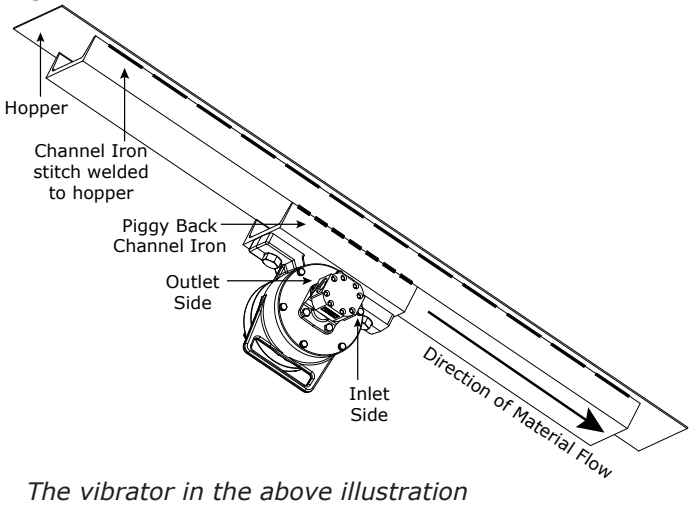
Installation on Chutes and Flow Pipes

Mount channel iron stiffeners vertically or in the direction of material flow. Center the channel if the chute is less than 6 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 ¼ of the chute width from the edge and ½ 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 1/8", additional reinforcement may be required.



Placement on Channel Iron

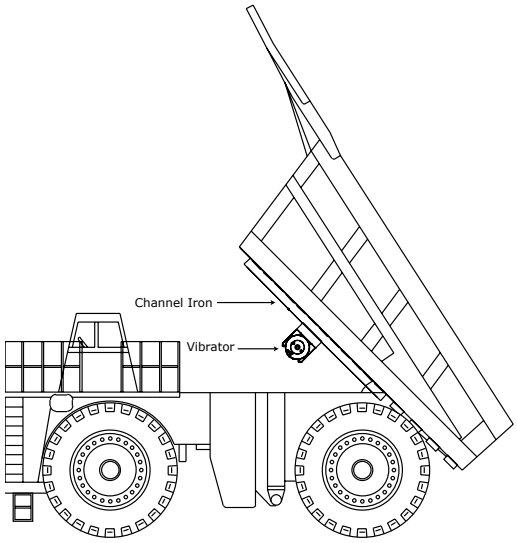
The axis of rotation of the eccentric weights for all rotary vibrators should be oriented in the direction of material flow. The shaft of the vibrator should ideally be in a horizontal position to prolong bearing life.



The vibrator in the above illustration is a C3 Hydraulic vibrator. Follow the same mounting configuration for your D4.5 Hydraulic vibrator.

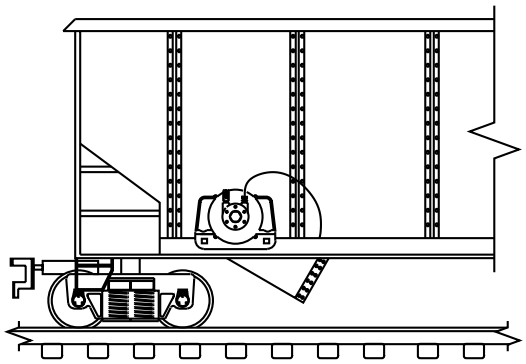
Mounting on Truck Bed

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.



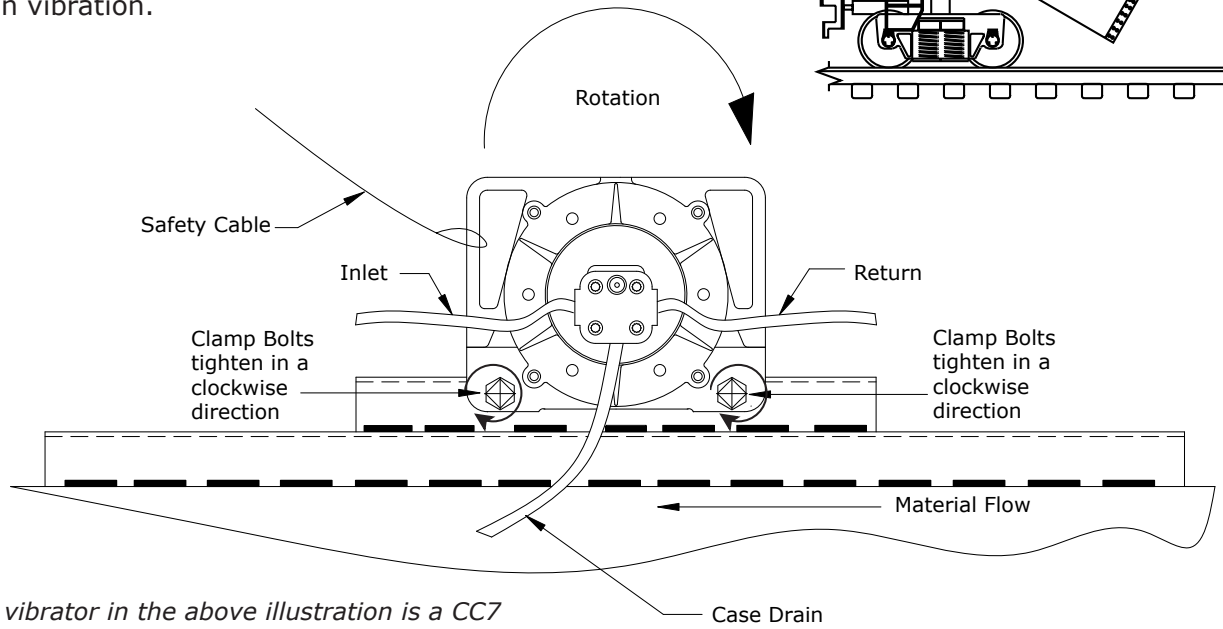
Installation on Railcars

Install clamp-on CC4.5 model vibrators on the center beam of car or on a corner of the car near the hopper body as shown.



Direction of Rotation - CC4.5 Series

The eccentric weights of the vibrator must rotate in the same direction as the tightening of the clamp bolts. See illustration below. The clamp bolts turn (tighten) in a clockwise direction. Facing the motor side of the vibrator, install the inlet on the left side of hydraulic motor. If the inlet and outlet are reversed it will cause the clamp bolts to loosen upon vibration.

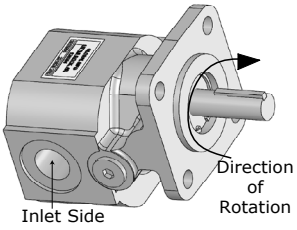


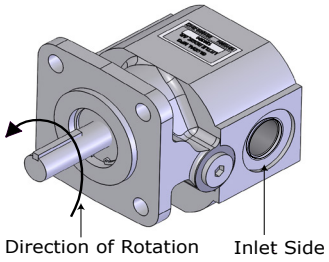
The vibrator in the above illustration is a CC7 Hydraulic vibrator. Follow the same mounting configuration for your CC4.5 Hydraulic vibrator.

IV. Operation

Bidirectional Motors

The motors of the Design Series vibrators are bidirectional; therefore the eccentric weight rotation can be reversed by changing the hose connections. (Change the inlet to the outlet and the outlet to the inlet.)





Pipes & Hose Sizes

Use an inlet hose that is the same size or larger in diameter as the inlet port of the vibrator. Use a short, flexible hose between the vibrator and the main hydraulic line if the main line is metal to avoid strain on the vibrator motor ports. Allow a loose bend of 9" to 16" (23 cm to 41 cm) to be formed by the hose to prevent cracking from vibration. Use a return hose at least one size larger than the inlet hose. Using a larger hose will minimize back pressure which can blow the shaft seal. In applications where the vibrator hoses are frequently disconnected, use in-line filters to keep contaminants out of the vibrators.

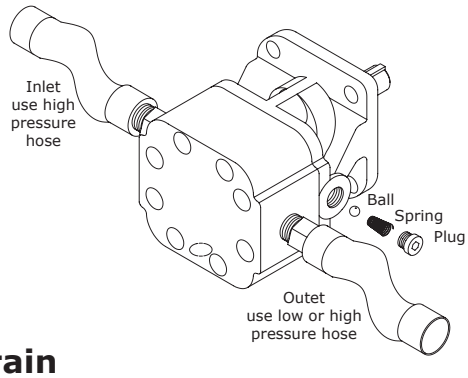
Important!

Overrunning Condition

If the return pressure is 200-300 psi, the chances of gear cavitation are reduced and removal of the check valve may not be necessary. However, every application is different so, the following procedure is recommended as a safety precaution.

The heavy eccentric weights act like a fly wheel that continue rotating the motor shaft when the hydraulic flow is shut off. It is important to allow the vibrator to wind down slowly to prevent damage to the motor and to prolong the life of the vibrator. This can be done by removing the ball and spring (check valve) on the return side (outlet) of the motor. For clockwise rotation remove the plug from the return side of the motor as shown in the diagram below using a 3/16" allen wrench. Remove the ball and spring and replace the plug. For counter clockwise rotation remove the ball and spring from the opposite side and switch the inlet and return hoses. **A check valve must always be installed on the inlet side of the motor.**

When the outlet check valve is removed, the motor is not bi-rotational. If the vibrator must be run in the opposite direction, the inlet check valve (ball & spring) must be moved to the opposite side, so that, there is always a check valve on the inlet side.

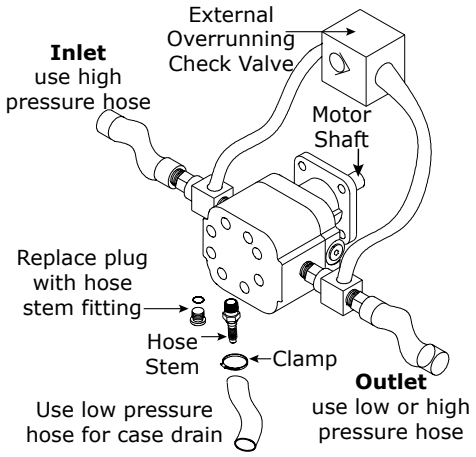


Case Drain

In most applications a case drain is not required, because the seal pressure is relieved through the check valve connected to the outlet port. However, the VITON shaft seal in the motor will fail if the case pressure exceeds 400 psi. If the case pressure exceeds 400 psi, the pressure on the seal will exceed 400 psi and the seal will blow. The seal is rated for a maximum back pressure of 400 psi. Therefore, if the back pressure or pressure spikes at the outlet port exceed 400 psi a case drain must be run back to the tank.

We often find the motor has been given too much flow (gpm), which causes the motor seal to blow. Check the inlet flow and adjust accordingly.

To install the case drain, remove the case drain plug and install a hose stem that has 7/16-20 threads and an o-ring. Clamp a low pressure hose to the stem and run it directly back to the tank. **Do not remove either of the check valves when a case drain is installed.** Instead install an external overrunning check valve to allow the vibrator to wind down slowly.



V. Repairing 4.5 Series Vibrator

Tools Required:

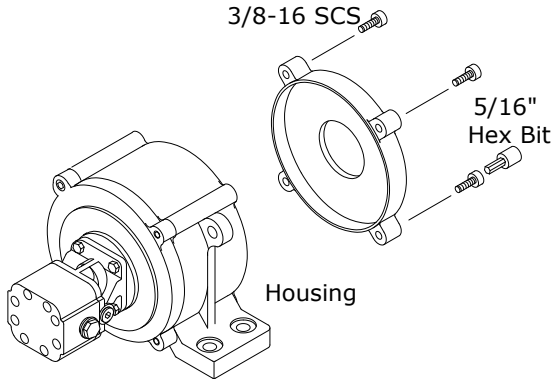
1. Arbor press
2. Press Ring - 3" O.D. x 6" long pipe
3. Press Rod - 3/4" O.D. x 6" long rod
4. Torque wrench - 3/8" drive 50 ft-lb capacity
5. 9/16" socket - 3/8" drive
6. 1/2" socket - 3/8" drive
7. hex bit - 5/16" for 3/8" drive
8. 5/16" hex key
9. 1/8" hex key
10. 3/16" hex key (adjustable weight model)
11. 1/2" wrench
12. 9/16" wrench
13. Retaining ring pliers - internal and external to fit medium retaining rings
14. Thread locking adhesive

1. Disconnect power source from vibrator.

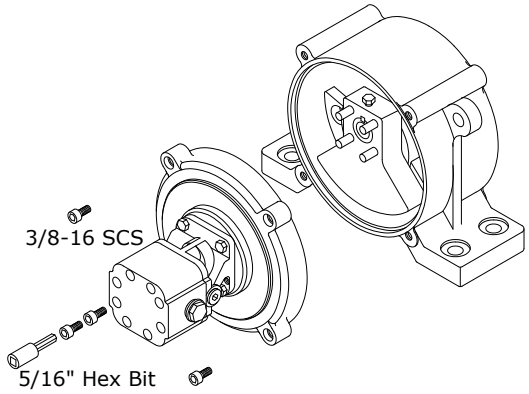
2. Disconnect hydraulic lines from vibrator. Note and mark the high pressure line and return to the same port on motor to maintain directional integrity.

3. Dismount vibrator.

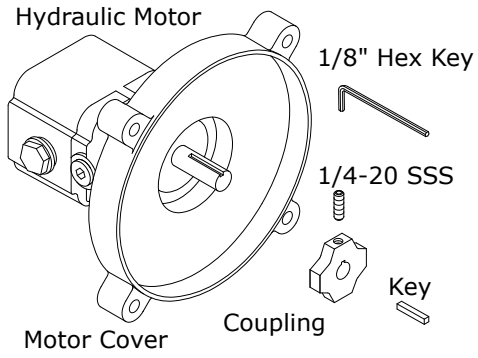
4. Remove the four screws from the back cover with a 5/16" hex bit. Remove back cover. This may require gently prying the cover off with a light pry bar.



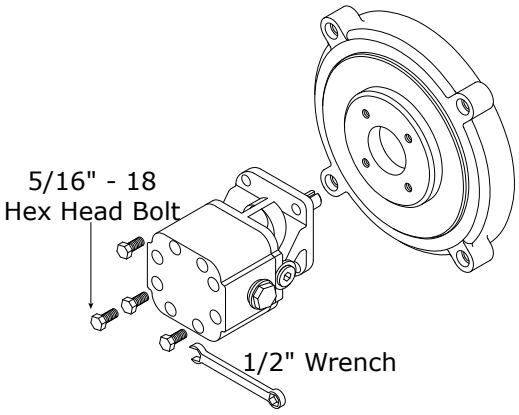
5. Remove the four screws from the motor cover. Follow instructions in step 4 to remove motor cover.



6. Remove the set screw from the coupling with a 1/8" hex key. Slide the coupling from the motor shaft.

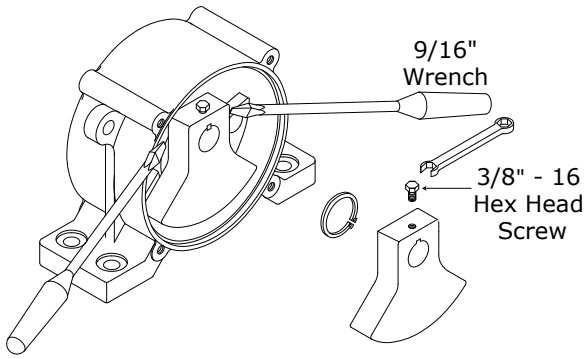


7. If motor repair is necessary remove the four motor screws that mount the motor to the motor cover with a 1/2" open end wrench. Remove motor for repair.



8. **For models with fixed weights** remove the screw from the driven weight (the weight without drive pins) with a 9/16" wrench. Pry the weight off the shaft with two pry bars as shown in the drawing. Remove the shaft retaining ring now exposed.

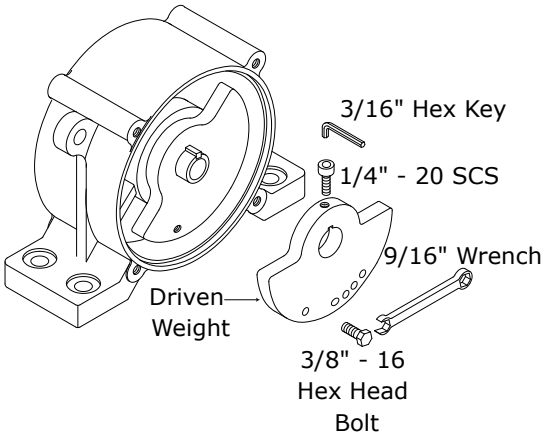
Repeat the procedure for the drive weight on the motor side. Remove the exposed keys from the shaft.



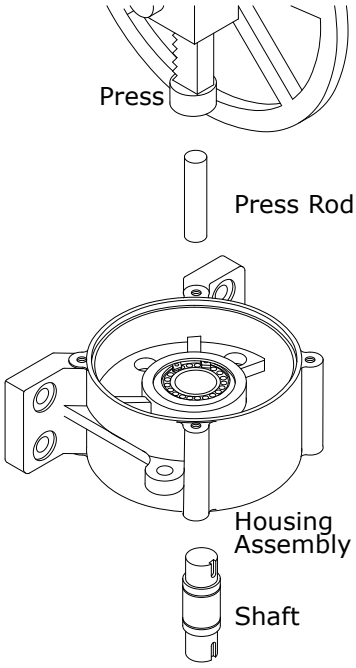
9. **For models with adjustable weights** remove the adjustment screws locking the weights together. Note screw location in adjusting hole for replacement.

Remove the screw from the top of the driven weight (no drive pins) with a 3/16" hex key. Pry the weights off the shaft. Remove the exposed retaining ring from the shaft.

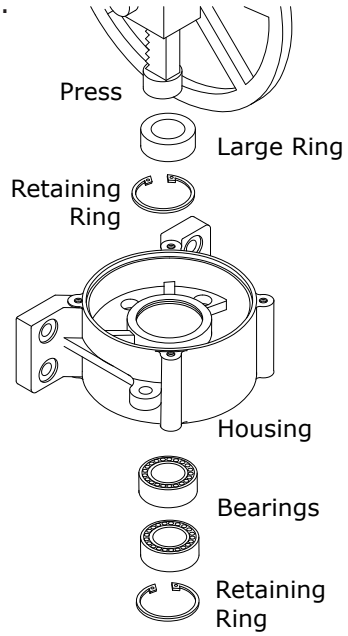
Repeat the steps to remove the drive weight from the motor side. The square keys can now be removed from the shaft.



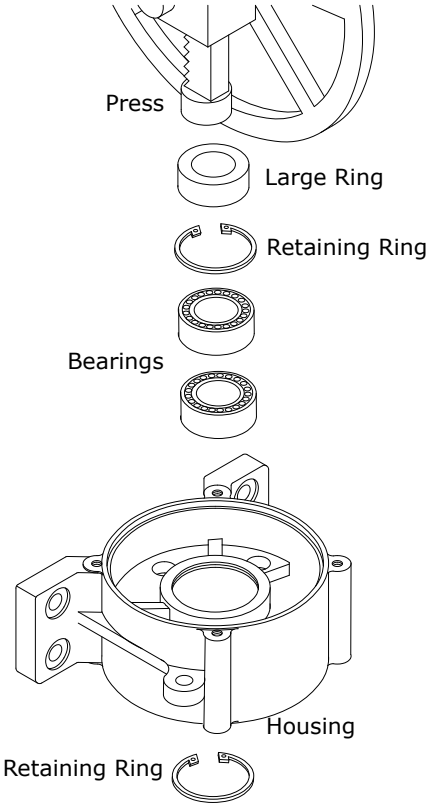
10. Slide the shaft out of the bearings. This may require a light press and press rod. Do NOT use a hammer as it will damage the end of the shaft and also the bearings if they are to be reused.



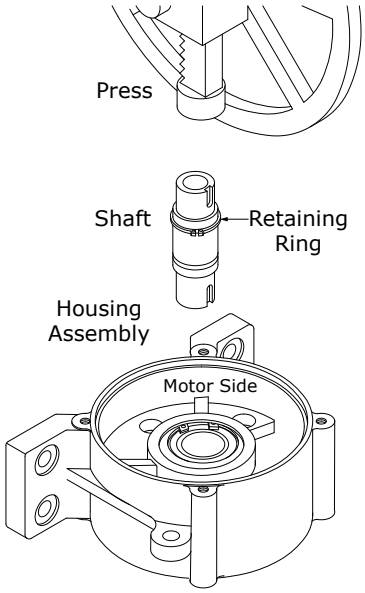
11. Remove the housing retaining rings. Using the press ring press the bearings from the housing. Do NOT press on any surface of the bearing but the outer race.



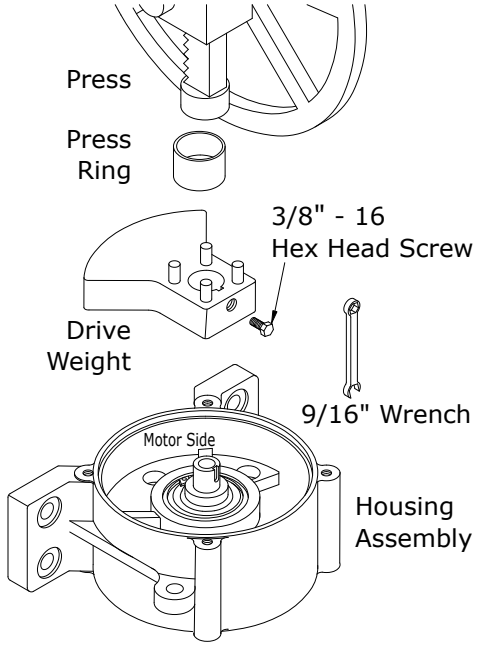
12. Install one of the large retaining rings into the bearing bore. Spread a small quantity of oil on the outer race of the bearing. Using the press ring, press the bearing into the bearing bore until it contacts the inner face of the retaining ring. Press the remaining bearing into the bore until it rests against the first bearing. Install the remaining retaining ring into the bearing bore.



13. Turn the housing so the "motor side" is facing up. Install a retaining ring in the shaft. Place the ring in the shaft retaining ring groove closest to the drilled end of the shaft. Slide the shaft into the bearings (from motor side) until the retaining ring contacts the inner race of the bearing; this may require a slight press. Do NOT use a hammer to install the shaft as this will damage the bearings. Once the shaft is in place the retaining ring may be installed on the opposite side shaft groove.



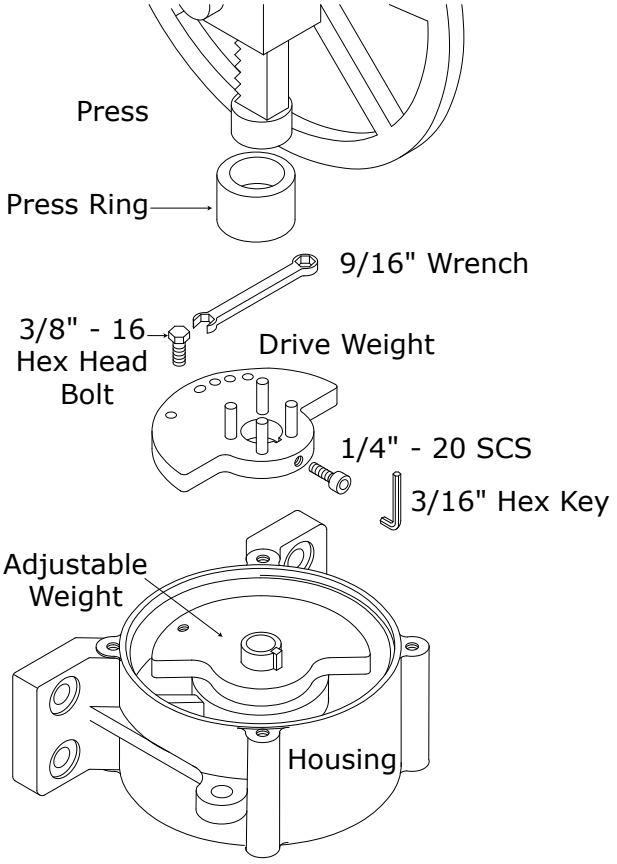
14. **For models with fixed weights** slide the drive weight (the weight with four pins) onto the shaft until it seats against the shoulder stop. **Do support the shaft on the opposite end to prevent damage to the bearings.** This procedure may require a light press. Do NOT use a hammer - it may damage the bearing. Place a drop of liquid thread locking adhesive on the threads of the 3/8" - 16 x 1 1/4" hex head set screw. Install the set screw into the weight and torque to 33 ft-lb (45 N-m). Repeat procedure to install the driven weight on the opposite side of the housing.



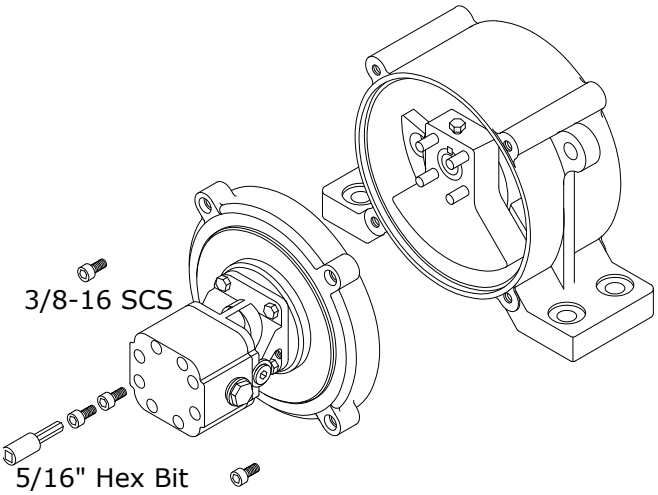
15. **For models with adjustable weights** slide the adjustable weight (no pins) onto the shaft until it seats against the shoulder stop. This may require a light press. **Do support the shaft on the opposite end to prevent damage to the bearings.** Do NOT use a hammer - it may damage the bearings. Replace the square key in the shaft. Slide the drive weight over the shaft aligning the weight keyway with the key in the shaft. Rotate the adjustable weight until the bolt hole is in the correct position in relation to the drive weight. Place a drop of thread locking adhesive on the threads of the 3/8" - 16 hex bolt and install through the drive weight and adjustable weight. Tighten securely.

Place a drop of thread locking adhesive on the threads of the 1/4" - 20 socket cap screw and install in set screw hole in drive weight. Tighten the set screw securely.

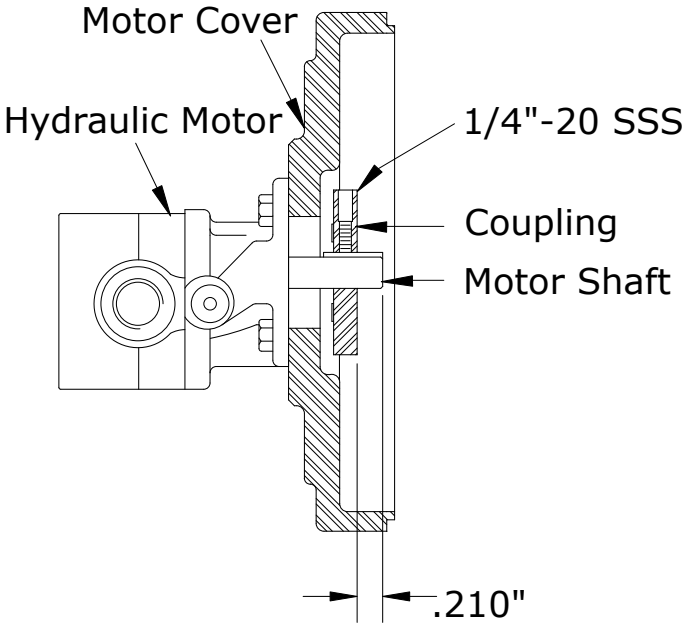
Repeat this procedure to install driven weights on opposite end of the shaft.



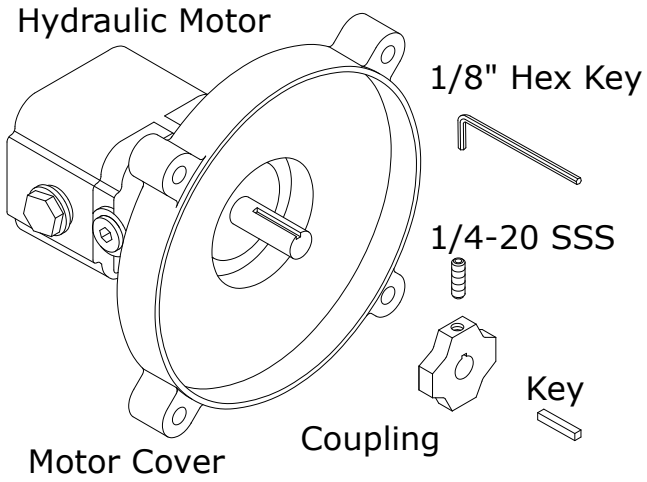
16. If removed, place the hydraulic motor on the motor cover. Place a drop of thread locking adhesive on the threads of the four 5/16 - 18 x 3/4" hex bolts. Slide the bolts through the motor mount flange and into the motor cover. Tighten in stages in a crisscross pattern until tight. Torque bolts to 18 ft-lb (25 N-m).



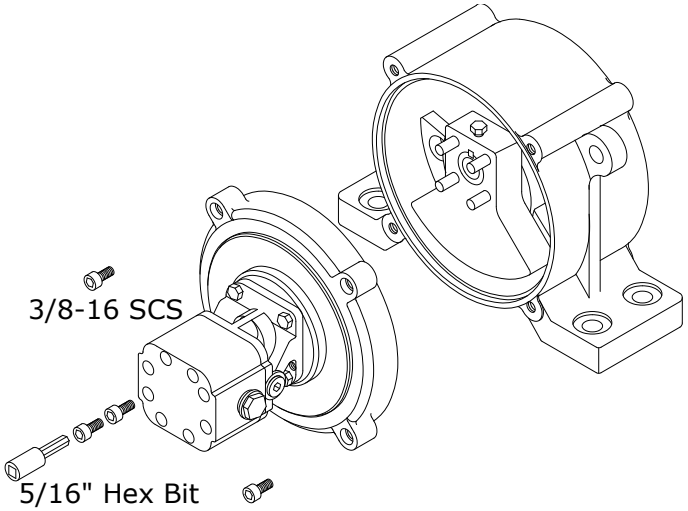
Place a drop of thread locking adhesive on the threads of the 1/4" - 20 set screw. Tighten the set screw in the coupler until it seats very securely against the key in the motor shaft.



17. Slide the coupling onto the motor shaft until the outer face of the coupling is flush with the end of the motor shaft. Push the 1/8" square key into the key slot between the coupling and motor shaft. Continue sliding the coupler/key combination down the motor shaft until the shaft end extends .210" past the coupler. **Do not place the key in the shaft first as the coupler may carry the end of the key into the motor seal, causing a leak.**



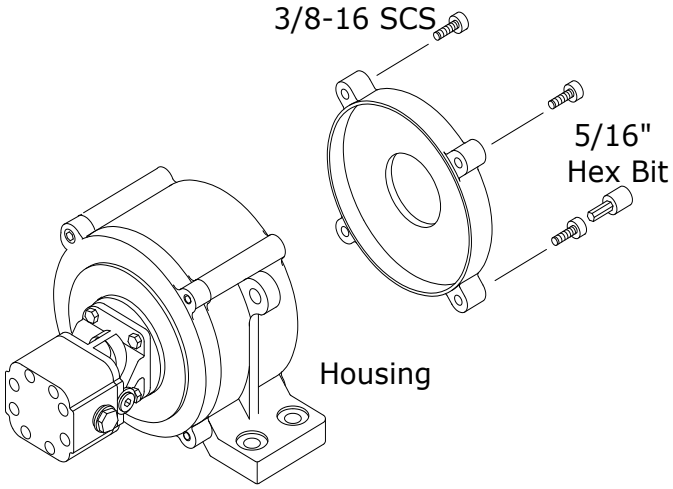
18. Place the cover and motor assembly near the motor side of the housing. Rotate the coupling until the valleys in the coupling align with the pins on the weight, then place the motor assembly on the housing. Place a drop of thread locking adhesive on the threads of four 3/8" - 16 x 1 1/4" socket head cap screws. Initially, turn screws through the cover and into the housing just far enough to seat heads against the cover, then tighten in a crisscross pattern. Torque screw to 44 ft-lb (60 N-m).

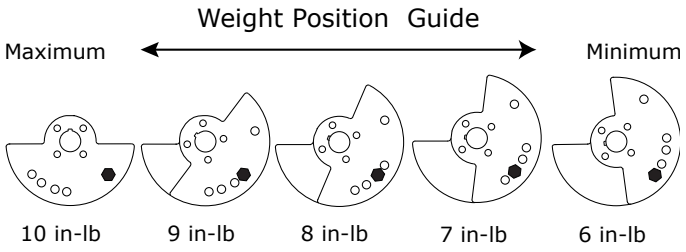


19. Spin the weight assembly on the exposed side to assure the weights rotate without binding. If there is evidence of binding, remove the motor cover and move the coupler in an additional 1/16" (1.6 mm) and reinstall cover. The weights should spin freely with only bearing seal and motor drag. Place the back cover on the housing. Place a drop of thread locking adhesive on the threads of the remaining socket head screws and install. Torque bolts evenly to 44 ft-lb (60 N-m).

Important!

Weights must be set exactly the same on each side of the vibrator shaft.

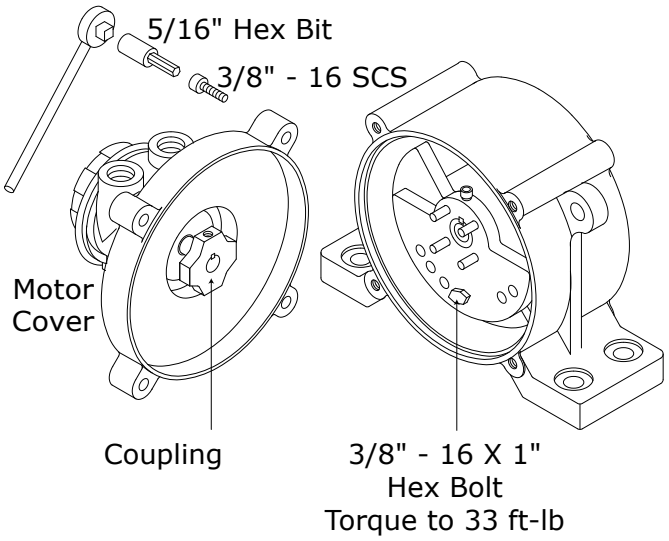




Adjusting the Adjustable Weights

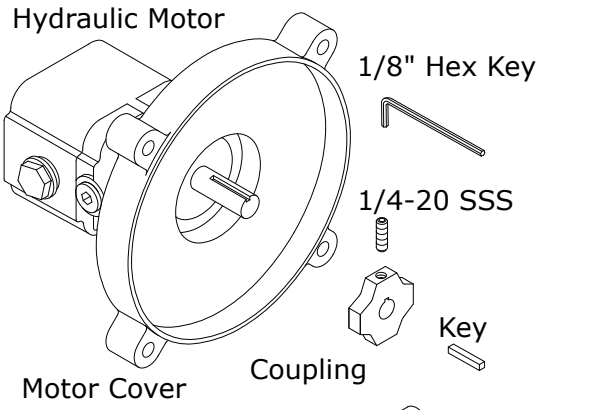
Vibrators with a "10A" in the model number, such as, D4.5-**10A**-4AC, have adjustable weights. ***All 10A models will leave our facility with weights in the 8 in-lb position unless requested otherwise.*** To change the amount of vibration (the force output), the weights are repositioned on the shaft.

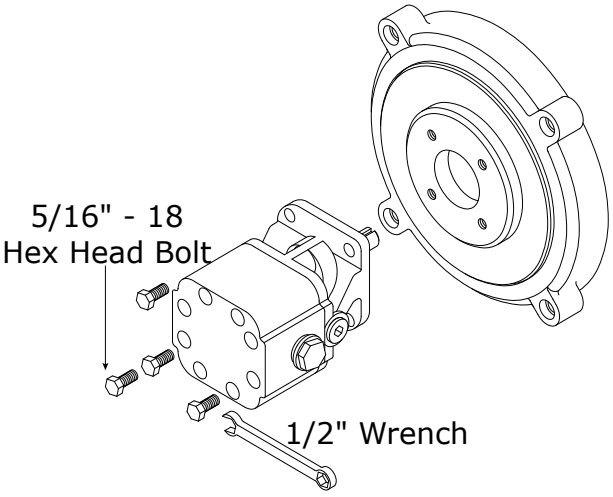
To adjust the weights, the front and back covers must be removed. There are two weights on *each* end of the vibrator shaft. Each set of weights has an inside and an outside weight. The outside weight is fixed to the shaft with a socket cap screw and a key. The inside weight, the adjustable weight, is attached to the outside weight with a single hex head bolt. By removing this bolt, the inside weight is free to rotate on the shaft. Rotate the inside weight until the tapped hole lines up under the desired bolt hole of the outside weight and reinstall the bolt. **It is important the weights on both sides are set the same.** There is no need to ever loosen the socket cap screw on the outside weight. After securing the inside weight to the outside weight, align the pins on the weight to rest between the flat V-shape cutout of the coupling. Bolt the covers onto the vibrator using 44 ft-lb of torque. The vibrator is now ready for operation.



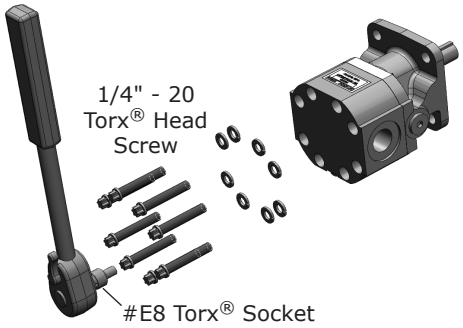
VI. Rebuilding Hydraulic Motor

1. Remove motor from the vibrator according to the disassembly instructions on page 7.

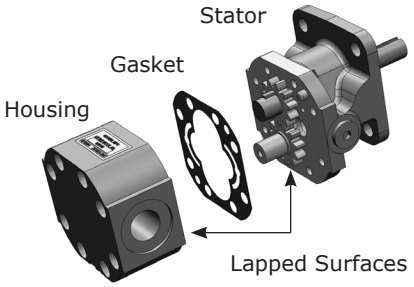




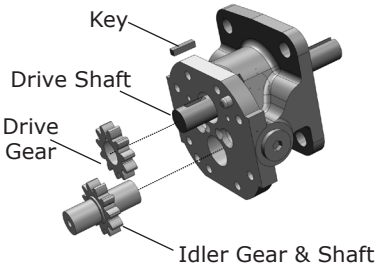
2. Remove eight Torx® head screws from the motor housing using a #E8 Torx® socket.



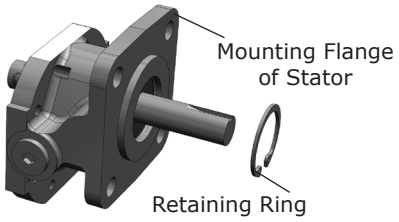
3. Separate the housing from the stator. **Note: Do not damage the lapped surfaces of the housing and stator.** Do not damage gasket if not replacing. Discard used gasket if one is available. Important - replace gasket with the same color gasket. Gasket colors are different due to tolerance gaps and must be matched to get a proper seal.



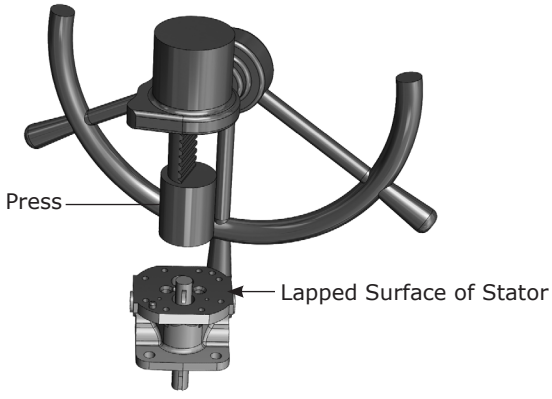
4. Remove the idler gear and shaft. Slide the drive gear off the shaft and remove the key.



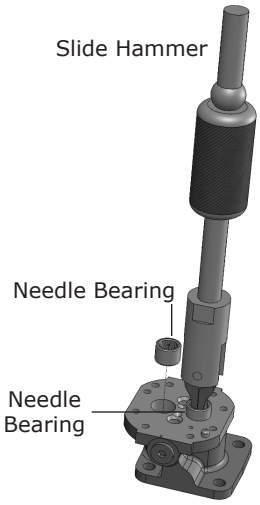
5. Turn the stator around and remove the retaining ring from the shaft seal bore using the retaining ring pliers.



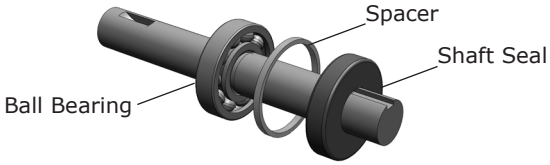
6. Support the stator on its flange and press the shaft out of the stator with an arbor press. Note: Do not allow press to contact the lapped surface of the stator. When the seal has been pressed out of the bore, the shaft and bearing should fall out of the stator. Discard damaged shaft seal.



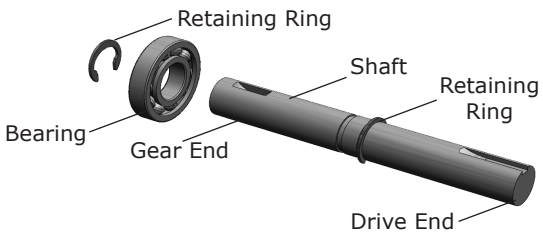
7. To replace the needle bearings, use a slide hammer and collet to pull them out of housing and stator. Gently press new needle bearings into the bearing bores using a 5/8" rod until they stop in the motor housing. **Be careful not to damage the lapped surface.**



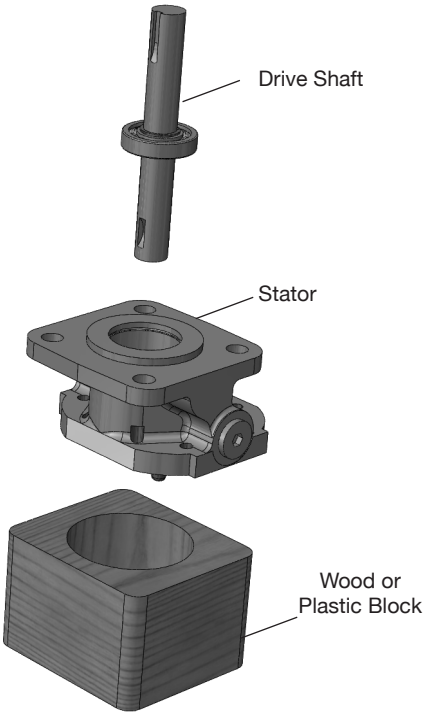
8. Slide the seal off the drive end of the shaft. To replace ball bearing, remove retaining ring. The ball bearing **must** be pressed off the **gear end** of the shaft to avoid scratching the shaft. Replace shaft if it is scratched.



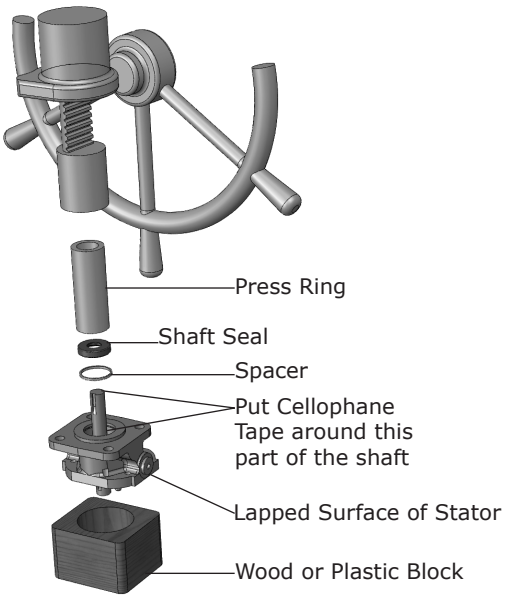
9. Install a retaining ring in the groove nearest the drive end. The ball bearing **must** be pressed onto the shaft from the **gear end**. Be careful not to scratch shaft especially seal area. (Even the smallest scratch can cause a leak under high pressure.) Press only against the inner race of the bearing, using a 1/2" ID X 3" long pipe.



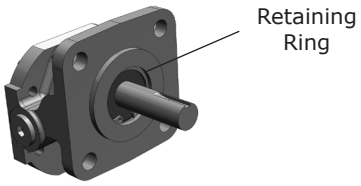
10. Support the lapped surface of the stator with a block of soft material. Slide the shaft and ball bearing into the stator. This is a close fit and may require a very light press.



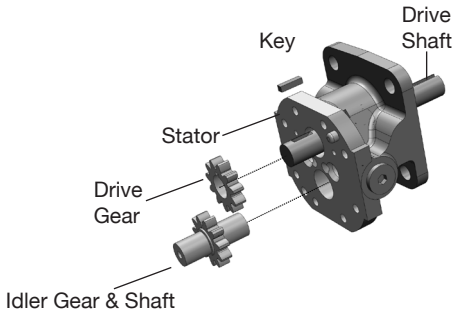
11. The shaft seal is **very delicate** and if damaged the motor will leak. Thoroughly clean the shaft and bore in the stator. **Wrap thin cellophane tape around the end of the shaft completely covering the keyway (this is very important because the keyway can nick the shaft seal if not covered).** Spread a little oil around the lip of the seal and slide the seal down the shaft. Use a 1" OD X 2" long pipe to press the seal into the bore deep enough so that the retaining ring can be installed.



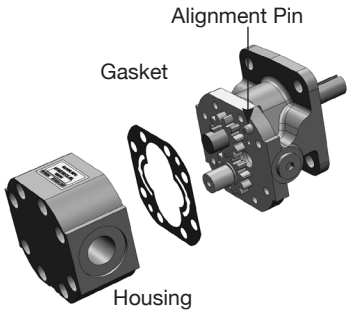
12. Install a retaining ring in the bore of the shaft seal.

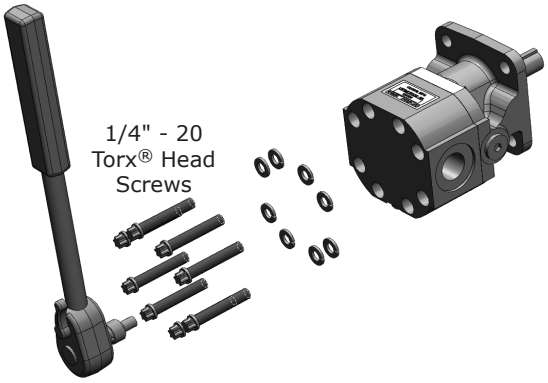


13. Place the key in the drive shaft and slide the drive gear on to the shaft. Install the idler gear and shaft.



14. Carefully place gasket onto lapped surface of housing or stator. Align holes and smooth gasket completely flat. (A little oil helps to keep gasket in place.)





#E8 Torx® Socket

15. Place the housing on the stator using the shear pins for alignment. Insert eight Torx® head screws into the housing and tighten to 9.5 - 10.5 ft. lb. (12.0 - 14.2 N-m) in a criss-cross pattern. If the screws are too tight the gears will bind, and if the screws are too loose oil will leak around the gears.

16. Attach the motor to the cover and reassemble the vibrator according to the assembly instructions starting on page 10.

VII. Troubleshooting

Problem	Probable Cause	Solution
Vibrator will not operate	Not enough starting pressure.	Increase pressure.
	Check valve missing from inlet side of motor.	Install a check valve on the inlet side of the motor.
Hydraulic shaft seal blows	Excessive back pressure or pressure spikes.	Reduce back pressure below 400 psi. Use a transducer to detect pressure spikes. If they are present, eliminate them. If back pressure cannot be reduced or pressure spikes eliminated, install a case drain to prevent damage to the shaft seal.
	Too much oil flow.	Reduce oil flow. Check performance data on page 16.
	Oil temperature over 400°F.	Reduce oil temperature.
Excessive noise	Bearing failure (squealing sound).	Replace the bearings.
	Insufficient mount.	Replace with stronger mounting apparatus.
	Damaged housing or covers.	Replace the housing or covers.
Premature bearing failure	Operating the vibrator too fast.	Reduce speed by reducing psi and gpm (These vibrators can take a high psi load. It is usually too much flow that causes the vibrator to run too fast.)
	Excessive oil temperature.	Reduce temperature to 130°F to 160°F (54°C to 71°C).

VIII. Performance Charts - Vibrator and Hydraulic Motor

CC4.5 & D4.5 Hydraulic Design Series Vibrator Performance Data

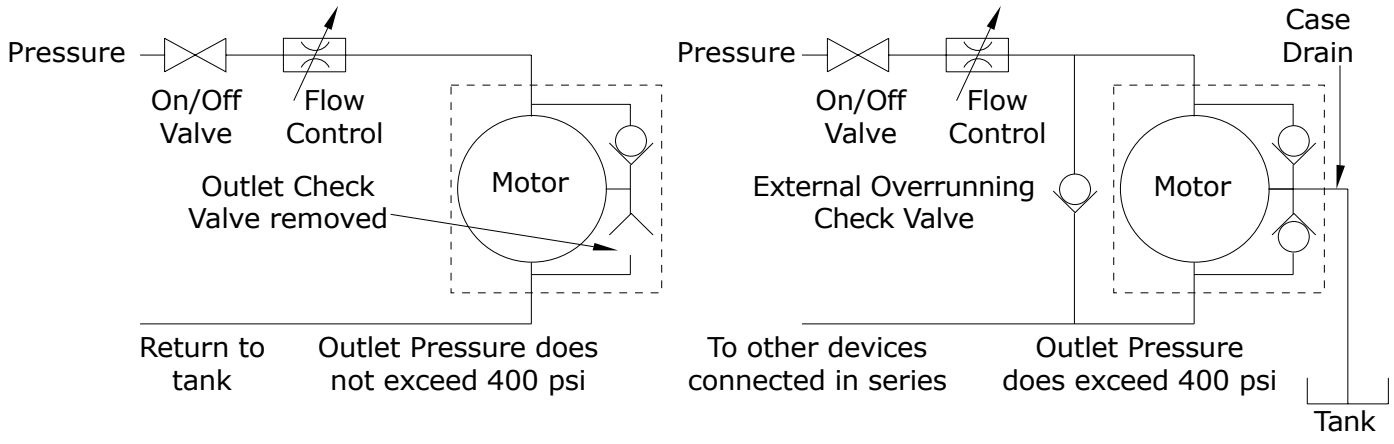
Model	Unbalance lb-in / Unbalance kG-MM	Start PSI / Start BAR	Speed RPM	Flow GPM / LPM	Force Pounds / kN	Speed	Flow GPM / LPM	Force Pounds / kN	Speed	Flow GPM / LPM	Force Pounds / kN
D4.5-6-5HC CC4.5-6-5HC	6.0 / 691	110 / 7.6	3,000	5.0 / 19	1,530 / 6.8	4,000	6.7 / 25	2,730 / 12.1	5,000	8.4 / 32	4,260 / 18.9
D4.5-8-5HC CC4.5-8-5HC	8.0 / 922	140 / 9.7	3,000	5.0 / 19	2,040 / 9.1	4,000	6.7 / 25	3,640 / 16.2	5,000	8.4 / 32	5,680 / 25.3
D4.5-10-5HC CC4.5-10-5HC	10.0 / 1152	180 / 12.4	3,000	5.0 / 19	2,560 / 11.4	4,000	6.7 / 25	4,540 / 20.2	5,000	8.4 / 32	7,100 / 31.6

The table above represents the vibrator's performance at various speeds. It is important to note that with any rotary vibrator the load on the bearings increases as the speed increases therefore, the life of the bearings is very sensitive to the speed. Increasing the speed by just 10% will cut the bearing life in half. Likewise, reducing the speed 10% will double the bearing life. Please remember that the speed is controlled by the flow or volume of oil (GPM) in relation to the pressure (PSI). The pressure across the motor will vary according to the rigidity of the vibrator mount and the type of material being resonated.

Standard Hydraulic Motor Performance Data - 2HC and 5HC Motors

Motor	Port Size SAE	Minimum Hose Size I.D.	Displacement per Revolution	Max Speed RPM	Flow Rate at Maximum Speed	Maximum Continuous Pressure	Maximum Intermittent Pressure	Maximum Back Pressure
2HC	3/4" -16	1/2"	.129 cu in / 2.11 cc	5000	2.8 GPM / 12.7 LPM	3000 psi / 207 bar	4000 psi / 276 bar	400 psi / 27 bar
5HC	3/4" -16	5/8"	.388 cu in / 6.36 cc	5000	8.4 GPM / 38 LPM	1600 psi / 110 bar	2500 psi / 172 bar	400 psi / 27 bar

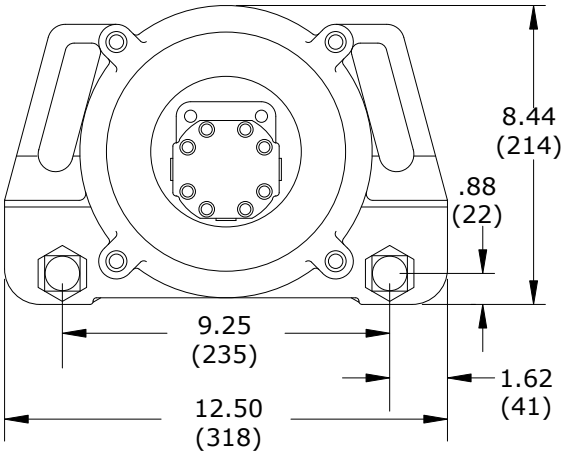
IX. Plumbing Diagram

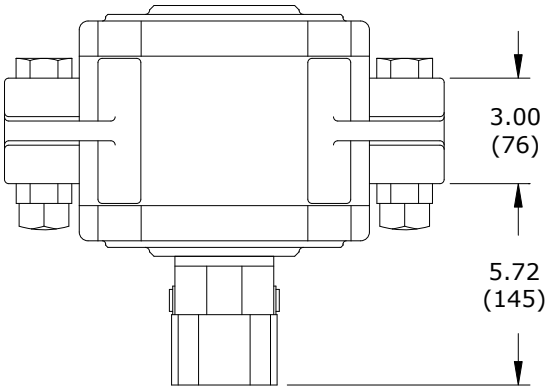


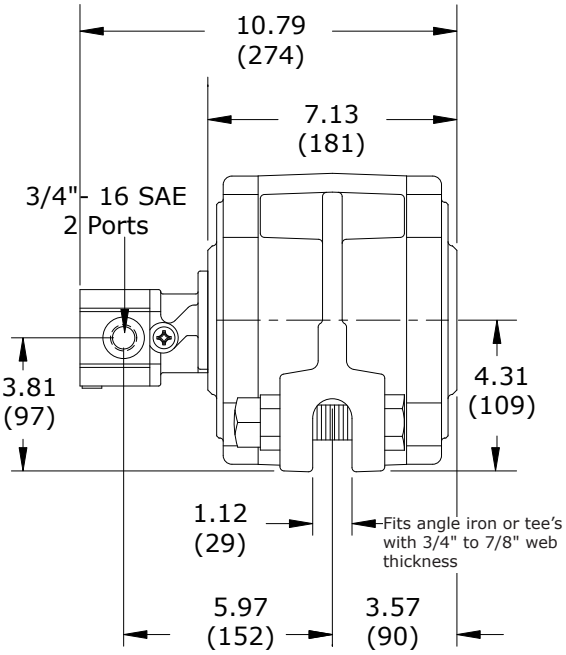
X. Vibrator Dimensions - Inches (millimeters)

CC4.5 Series

Mount with Clamp Bolts supplied with unit.
Torque to 893 ft-lbs (1210 N-m).
Vibrator weighs approximately 58 lb (25 kg).

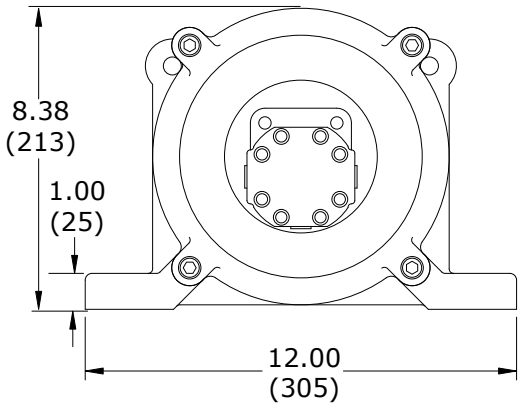


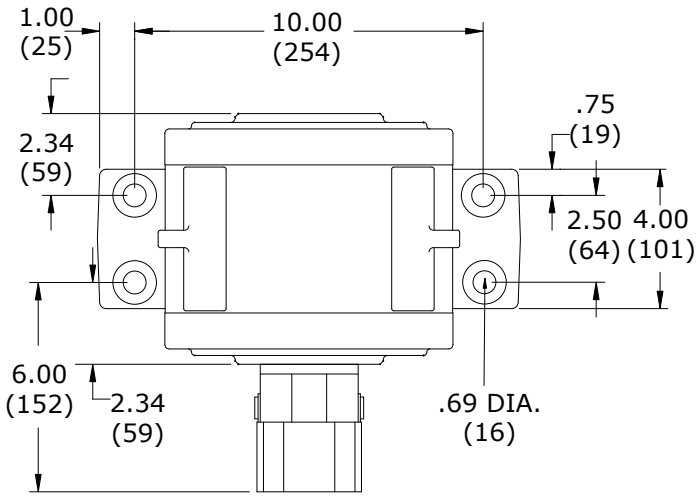


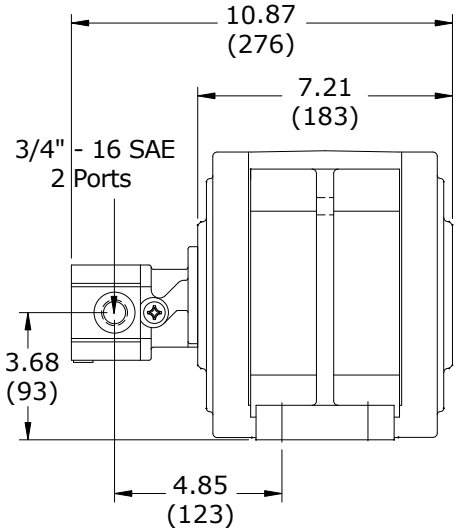


D4.5 Series

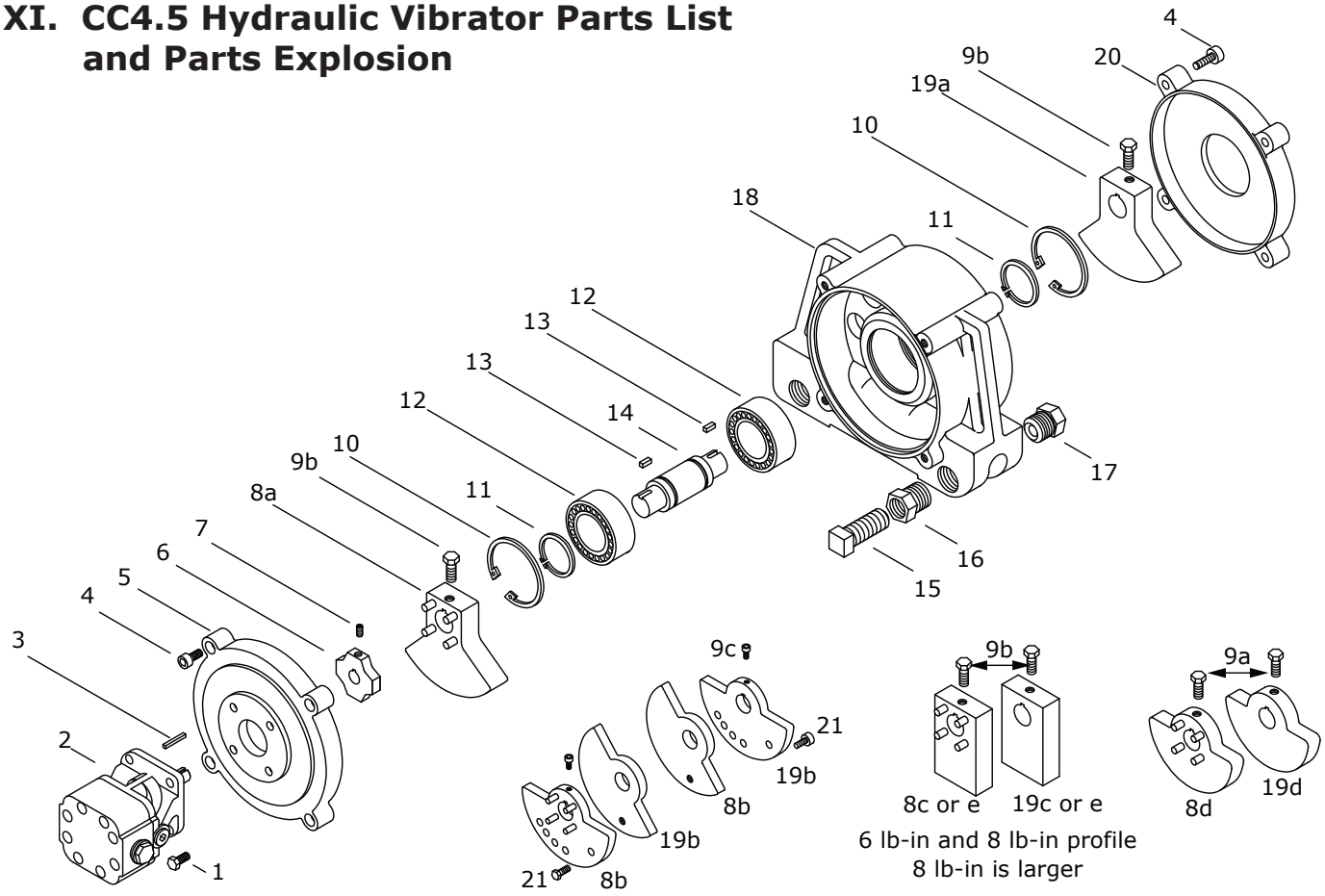
Mount with 5/8" - 11unc Grade 8 plated bolts.
Torque to 159 ft-lbs (216 N-m).
Vibrator weighs approximately 47 lb (21 kg).







XI. CC4.5 Hydraulic Vibrator Parts List and Parts Explosion



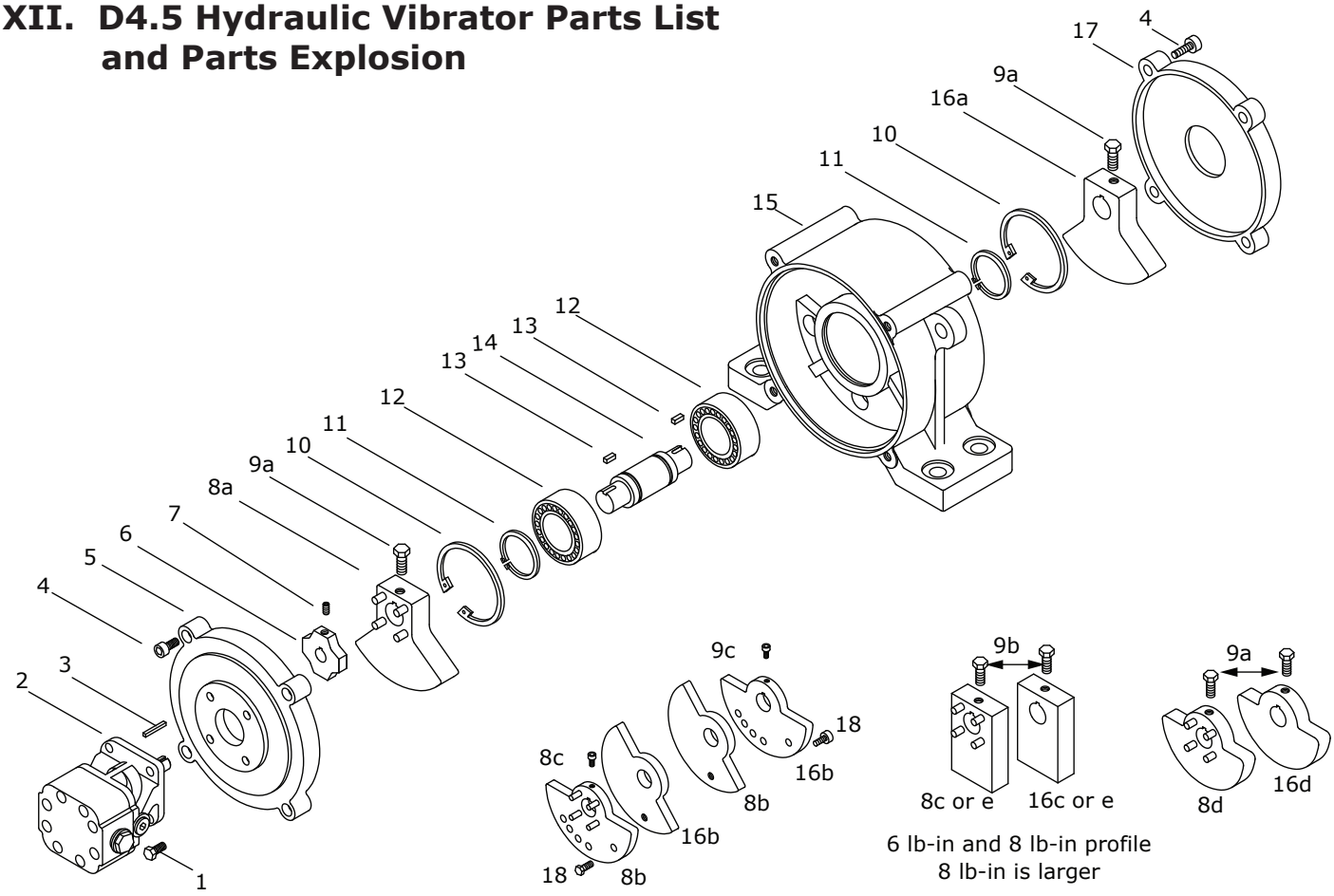
Parts List for CC4.5 Hydraulic Vibrator

CC4.5-6-2HC (pn 552006)
CC4.5-8-2HC (pn 552008)
CC4.5-10-2HC (pn 552010)
CC4.5-10a-2HC (pn 552011)

CC4.5-6-5HC (pn 555006)
CC4.5-8-5HC (pn 555008)
CC4.5-10-5HC (pn 555010)
CC4.5-10a-5HC (pn 555011)

#	Description	Part	Qty	#	Description	Part	Qty
1	Bolt Hex 5/16 - 18 x 3/4"	330107	4	11	Retaining Ring 5160-137	349237	2
2	Motor 2HC Hydraulic	251020	1	12	Bearing 6307 2RS	380307	2
2	Motor 5HC Hydraulic	251050	1	13	Key - 3/16" Sq. X 1/2" Long	345803	2
3	Key - 1/8" Sq. X 1" Long	(1)	1	14	Shaft	200445	1
4	SCS 3/8-16 X 1 1/4"	337112	8	15	Bolt, Clamp	333516	2
5	Motor Cover	113445	1	16	Bolt, Bushing	333501	2
6	Coupling	203045	1	17	Bolt, Static	333503	2
7	SSS 1/4-20 X 1/2"	336105	1	18	Housing	143045	1
8a	Drive Weight - 10 lb-in	194210	1	19a	Driven Weight - 10 lb-in	194310	1
8b	Drive Weight - 10A lb-in	194610	1	19b	Driven Weight - 10A lb-in	194710	1
8c	Drive Weight - 8 lb-in	193280	1	19c	Driven Weight - 8 lb-in	193380	1
8d	Drive Weight - 6 lb-in	194206	1	19d	Driven Weight - 6 lb-in	194306	1
8e	Drive Weight - 6 lb-in	193260	1	19e	Driven Weight - 6 lb-in	193360	1
9a	Bolt Hex 3/8 - 16 X 1"	330210	2	20	Cover	112445	1
9b	Bolt Hex 3/8 - 16 X 3/4"	330207	2	21	Hex Bolt 3/8 - 16 x 1"	330210	1
9c	SCS 1/4 - 20 x 3/4"	336907	2	Note: (1) Key included with replacement motor.			
10	Retaining Ring N5000-315	347315	2				

XII. D4.5 Hydraulic Vibrator Parts List and Parts Explosion



6 lb-in and 8 lb-in profile
8 lb-in is larger

Parts List for D4.5 Hydraulic Vibrator

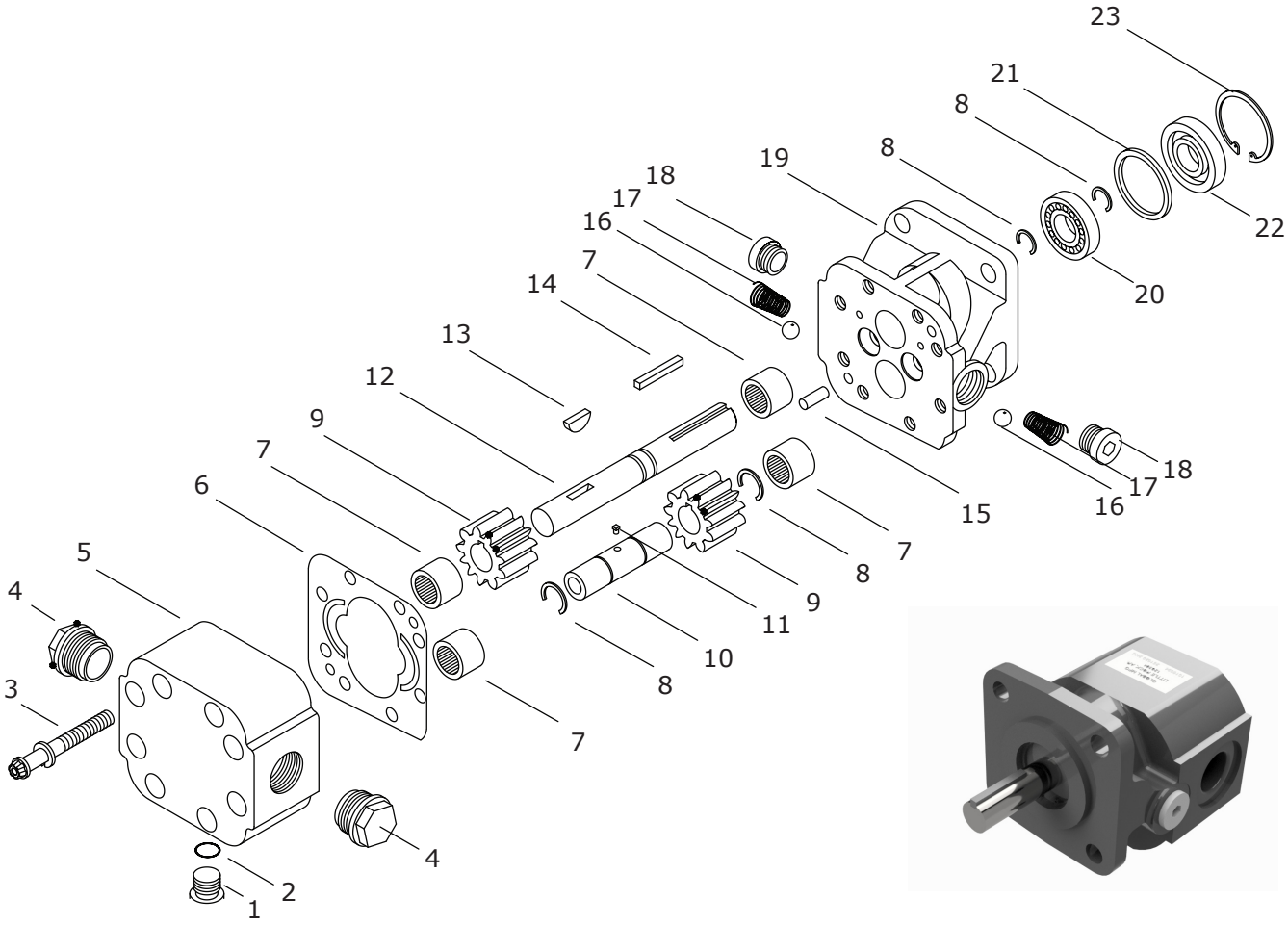
D4.5-6-2HC (pn 542006)
D4.5-8-2HC (pn 542008)
D4.5-10-2HC (pn 542010)
D4.5-10A-2HC (pn 542011)

D4.5-6-5HC (pn 545006)
D4.5-8-5HC (pn 545008)
D4.5-10-5HC (pn 545010)
D4.5-10A-5HC (pn 545011)

#	Description	Part	Qty	#	Description	Part	Qty
1	Bolt Hex 5/16-18 X 3/4" Long	330107	4	9b	Bolt Hex 3/8-16 X 3/4"	330207	2
2	Motor 2HC Hydraulic	251020	1	9c	SCS 1/4 - 20 x 3/4"	336907	2
2	Motor 5HC Hydraulic	251050	1	10	Retaining Ring N5000-315	347315	2
3	Key - 1/8" Sq. X 1" Long	(1)	1	11	Retaining Ring 5160-137	349237	2
4	SCS 3/8-16 X 1 1/4"	337112	8	12	Bearing 6307 2RS	380307	2
5	Motor Cover	113445	1	13	Key - 3/16" Sq. X 1/2" Long	345803	2
6	Coupling	203045	1	14	Shaft	200445	1
7	SSS 1/4-20 X 1/2"	336105	1	15	Housing	144045	1
8a	Drive Weight - 10 lb-in	194210	1	16a	Driven Weight - 10 lb-in	194310	1
8b	Drive Weight - 10A lb-in	194610	1	16b	Driven Weight - 10A lb-in	194710	1
8c	Drive Weight - 8 lb-in	193280	1	16c	Driven Weight - 8 lb-in	193380	1
8d	Drive Weight - 6 lb-in	194206	1	16d	Driven Weight - 6 lb-in	194306	1
8e	Drive Weight - 6 lb-in	193260	1	16e	Driven Weight - 6 lb-in	193360	1
9a	Bolt Hex 3/8-16 X 1"	330210	2	17	Cover	112445	1
Note: (1) Key included with replacement motor.				18	Hex Bolt 3/8 - 16 x 1"	330210	2

XIII. 2HC Hydraulic Motor Parts List & Parts Explosion

Parts List for 2HC Hydraulic Motor - Part Number 251020							
#	**Description**	**Part #**	**Qty**	**#**	**Description**	**Part #**	**Qty**
1	Plug, Steel .43 SAE Soc. Hd.	257413	1	16	Nylon Ball .375 Diameter	**K2**	2
2	O-Ring	N/A	1	17	Spring	**K2**	2
3	Screw ¼"- 20 x 1 ½"	257230 or **K2**	8	18	Steel Plug .50 SAE Soc. Hd.	**K2**	2
4	Plug, Plastic ¾" - 16 SAE	N/A	2	19	Stator	N/A	1
5	Gear Housing	N/A	1	20	Ball Bearing	**K1**	1
6	Gasket	**K1**	1	21	Spacer	**K2**	1
7	Needle Bearing	**K1**	4	22	Oil Seal	254025 or **K1**	1
8	Crescent Ring, External	**K2**	4	23	Retaining Ring, Internal	347112	1
9	Gear	257120	2		**Repair Kits**	**Part #**	
10	Idler Shaft	**K2**	1	**K1**	HMRK#1 - 2/5HC	251125	
11	Drive Pin	**K2**	1	**K2**	HMRK#2 - 2HC	252020	
12	Drive Shaft	257020	1	•	Gasket Kit 2/5HC	251025	
13	Woodruff Key	**K2**	1	**Gasket Kit** includes 5 different colors of gaskets. Gasket color is unknown until the motor is disassembled.			
14	Key, Square ⅛" sq x 1" long	**K2**	1				
15	Shear Pin	N/A	2				



XIV. 5HC Hydraulic Motor Parts List & Parts Explosion

Parts List for 5HC Hydraulic Motor - Part Number 251050							
#	**Description**	**Part #**	**Qty**	**#**	**Description**	**Part #**	**Qty**
1	Plug, Steel .43 SAE Soc. Hd.	257413	1	16	Nylon Ball .375 Diameter	**K2**	2
2	O-Ring	N/A	1	17	Spring	**K2**	2
3	Screw ¼" - 20 x 2"	257250 or **K2**	8	18	Steel Plug .50 SAE Soc. Hd.	**K2**	2
4	Plug, Plastic ¾" - 16 SAE	N/A	2	19	Stator	N/A	1
5	Gear Housing	N/A	1	20	Ball Bearing	**K1**	1
6	Gasket	**K1**	1	21	Spacer	**K2**	1
7	Needle Bearing	**K1**	4	22	Oil Seal	254025 or **K1**	1
8	Crescent Ring, External	**K2**	4	23	Retaining Ring, Internal	347112	1
9	Gear	257150	2		**Repair Kits**	**Part #**	
10	Idler Shaft	**K2**	1	**K1**	HMRK#1 - 2/5HC	251125	
11	Drive Pin	**K2**	1	**K2**	HMRK#2 - 5HC	252050	
12	Drive Shaft	257050	1	•	Gasket Kit 2/5HC	251025	
13	Key, Square ⅛" sq x ½" long	**K2**	1	**Gasket Kit** includes 5 different colors of gaskets. Gasket color is unknown until the motor is disassembled.			
14	Key, Square ⅛" sq x 1" long	**K2**	1				
15	Shear Pin	N/A	2