Design Series

Operating Instructions

Global®
Hydraulic Vibrators

Model #	Part #
C3-1.5-2HC	532015
C3-2.0-2HC	532020
C3-2.5-2HC	532025
C3-3.0-2HC	532030
C3-4.0-2HC	532040
C3-5.0-2HC	532050
C3-6.0-2HC	532060
C3-1.5-5HC	535015
C3-2.0-5HC	535020
C3-2.5-5HC	535025
C3-3.0-5HC	535030
C3-4.0-5HC	535040
C3-5.0-5HC	535050
C3-6.0-5HC	535060

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

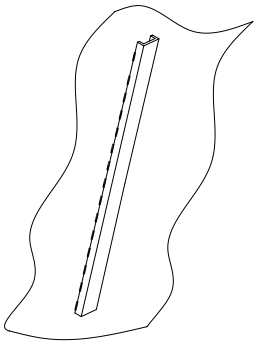
- Follow all mounting instructions.
- Always use a safety cable or chain for support.
- Do not operate vibrators when structure is empty.
- Do not operate vibrators when gate is closed or conveyor is stopped unless consolidation of material is desired.
- Wear ear protection for 90+ decibel levels.
-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

Channel Iron - Size & Mounting

Important!

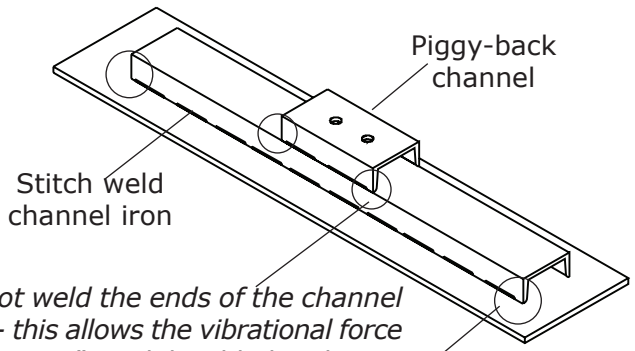
The channel iron should be at least two-thirds of the height of the sloped portion of the hopper but no greater than 10 feet (3 m).

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:

Model	Channel Iron Size	Minimum length
C3-1.5-2HC/5HC C3-2.0-2HC/5HC	C5" x 6.7 lb/ft	72"
C3-2.5-2HC/5HC C3-3.0-2HC/5HC	C130 x 10 kg/m	1829 mm
C3-4.0-2HC/5HC C3-5.0-2HC/5HC	C6" x 13 lb/ft	72"
C3-6.0-2HC/5HC	C150 x 19 kg/m	1829 mm

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.

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.

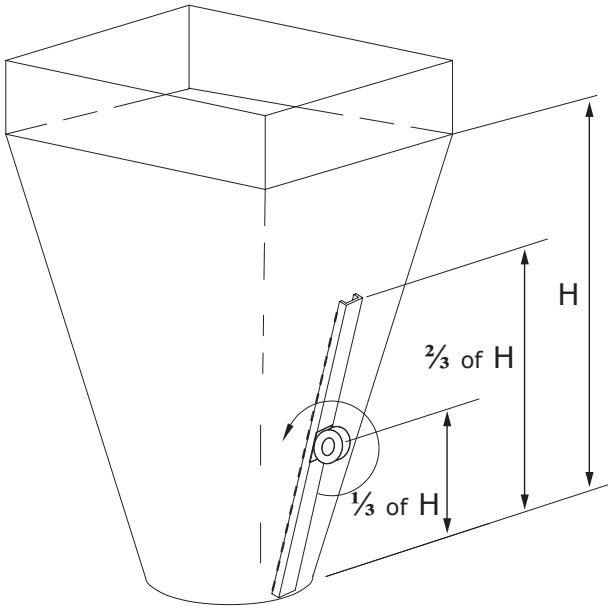
Secure the vibrator to the channel iron with SAE coarse thread grade 8 plated bolts with lock washers or an adhesive such as Loctite® 262. Tighten bolts in a sequential process. At least two passes are required in most situations. Give all bolts the same torque value. Grade 8 bolts can handle more torque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

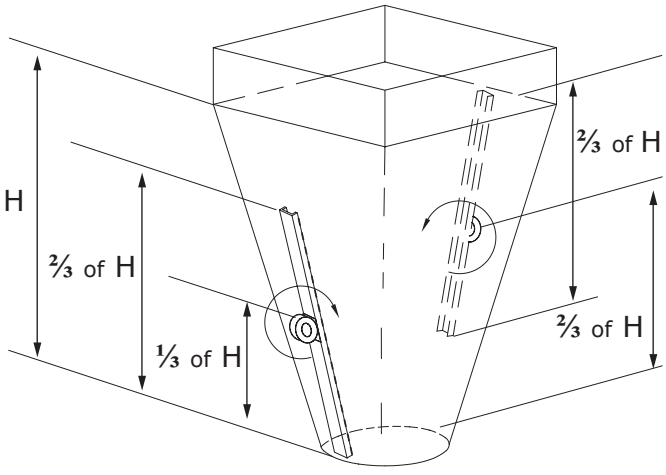


Multiple Vibrators

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.

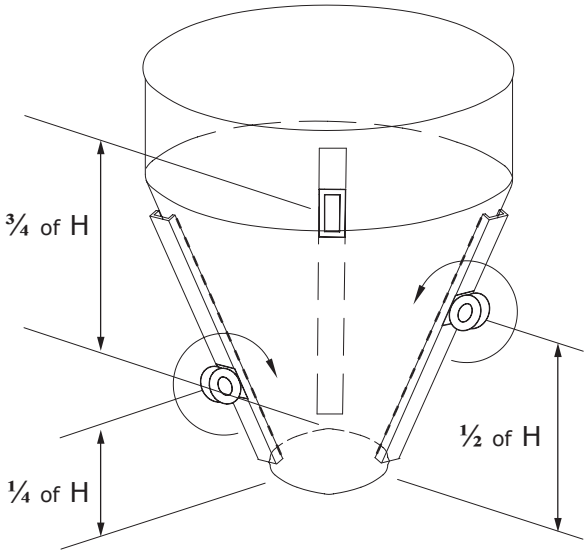
Two Vibrators on Round or Square Hoppers

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.



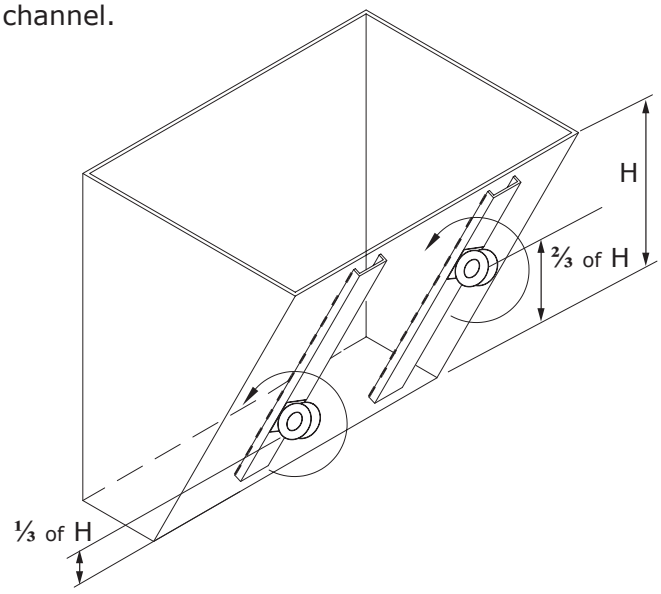
Three Vibrators

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.



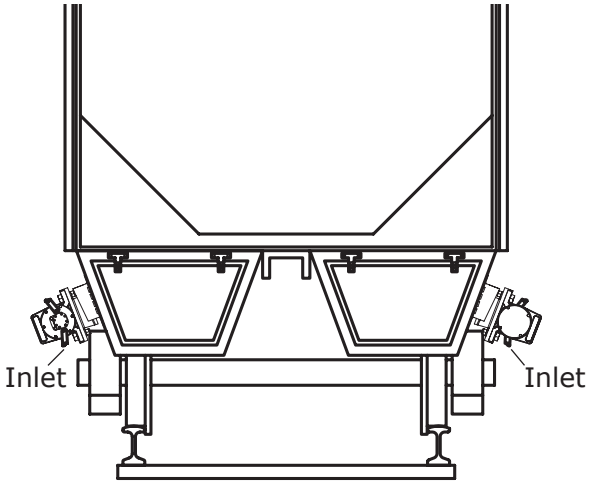
Two Vibrators on Rectangular Hoppers

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.



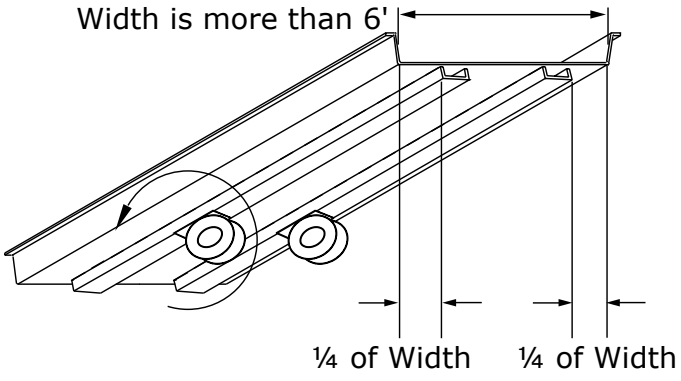
Installation on Rail Cars

Install the C3 model vibrator onto a C3/GBM wedge bracket and slip it into the pocket on the railcar. Eccentric weights should rotate clockwise to wedge bracket into railcar hopper pocket



Installation on Chutes and Flow Pipes

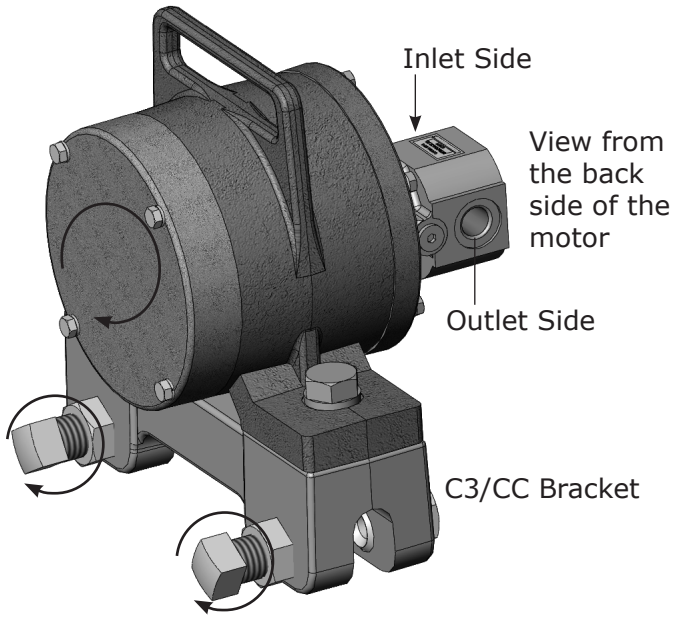
Mount channel iron stiffeners vertically or in the direction of material flow. Center the channel if the chute is less than 6 feet (1.83 m) in width. If the chute is greater than 6 feet in width, use two vibrators on separate channel irons. To maximize each vibrator's radius of influence; center each 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 ⅛", additional reinforcement may be required.



IV. Operation

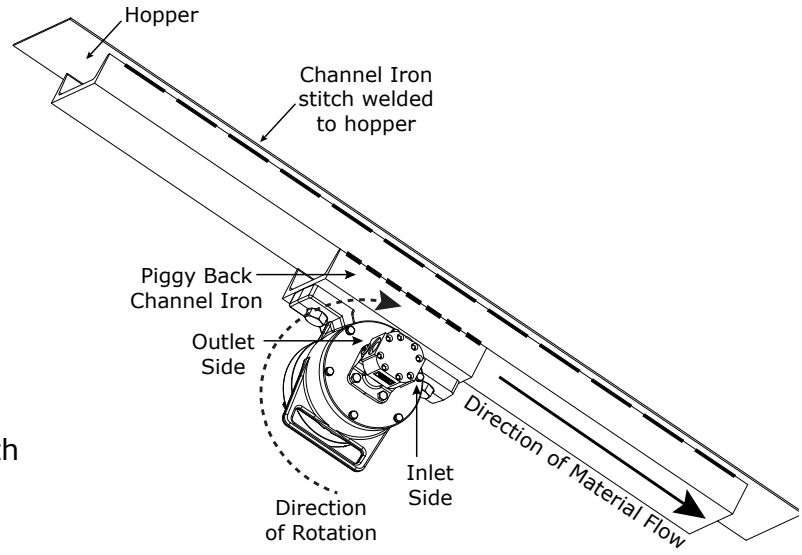
Direction of Rotation

C3/CC Clamp-On Bracket: The eccentric weights of the vibrator should rotate in the same direction as the tightening of the clamp bolts if the C3 vibrator is mounted to a C3/CC clamp-on bracket. This will prevent the clamp bolts from loosening. The clamp bolts turn (tighten) in a clockwise direction. Look at the vibrator from the motor side. The inlet port is on the right side of the motor for clockwise rotation



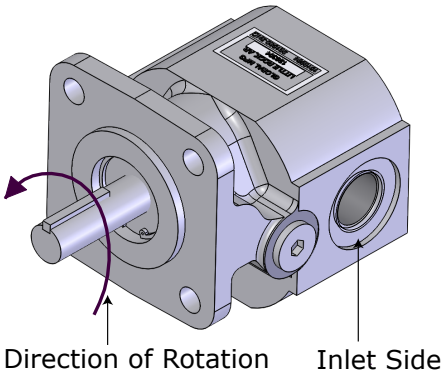
Placement on Channel Iron

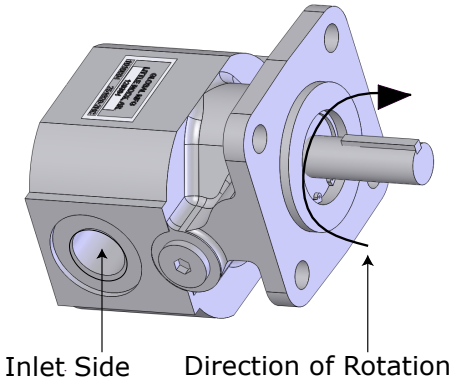
The axis of rotation of the eccentric weights for all rotary vibrators should be oriented in the direction of material flow. The shaft of the vibrator should ideally be in a horizontal position to prolong bearing life.



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

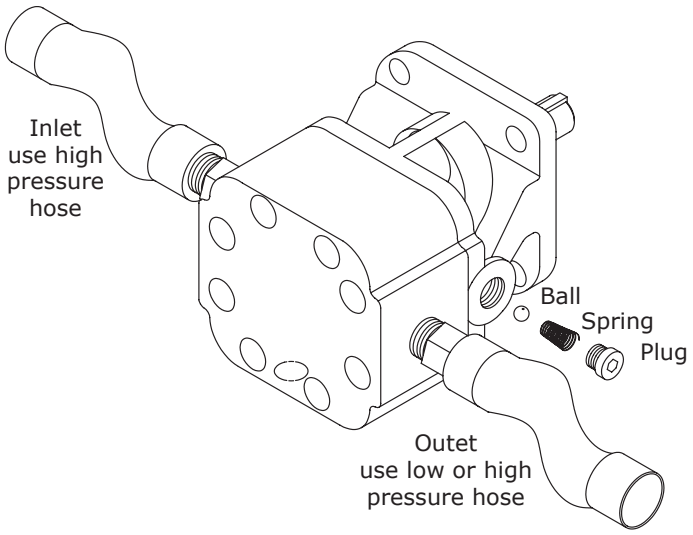
Use an inlet hose that is the same size or larger in diameter as the inlet port of the vibrator. Use a short, flexible hose between the vibrator and the main hydraulic line if the main line is metal to avoid strain on the vibrator motor ports. Allow a loose bend of 9" to 16" (23 cm to 41 cm) to be formed 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

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.

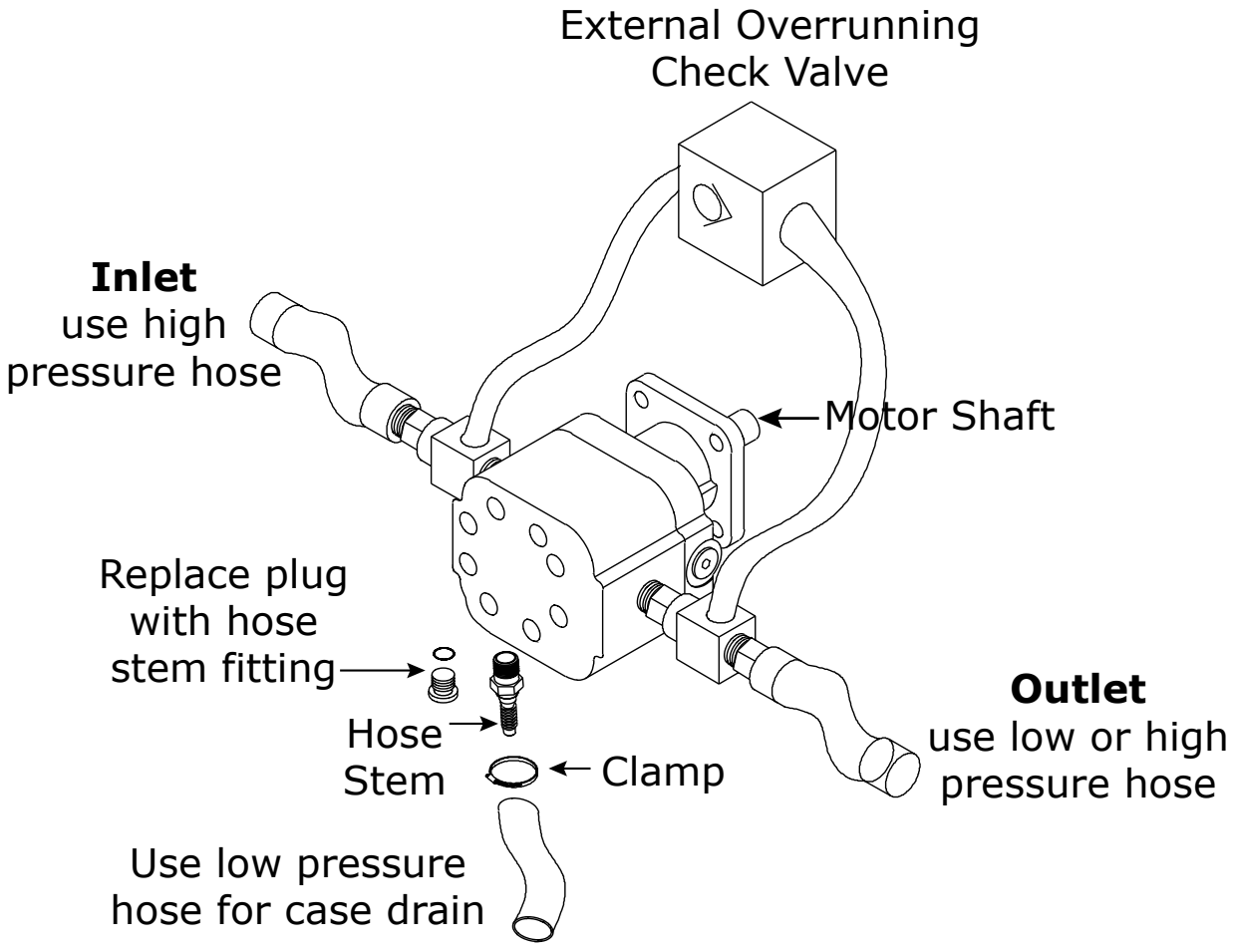


Case Drain

In most applications a case drain is not required, because the case 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 back 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. You may not need a case drain if the motor has the right amount of gpm.

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.

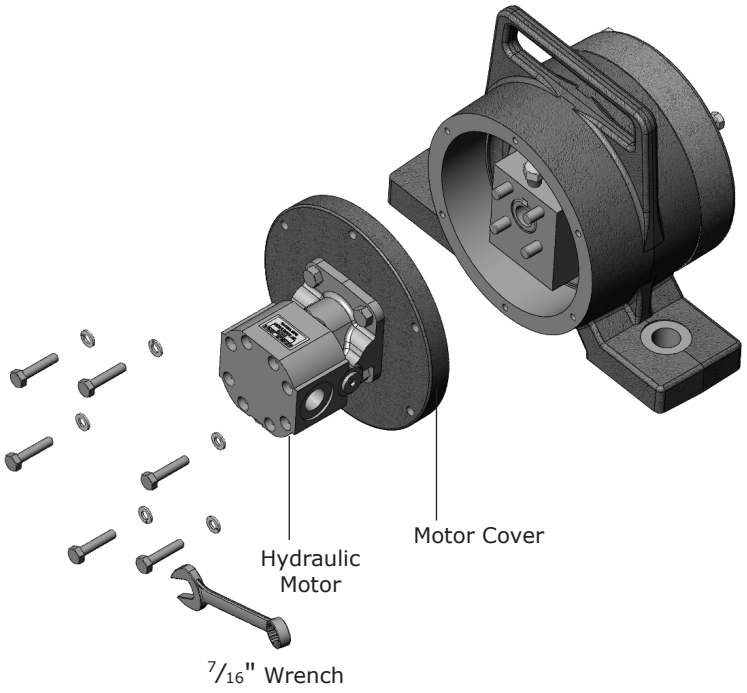


V. Repairing the C3 Vibrator

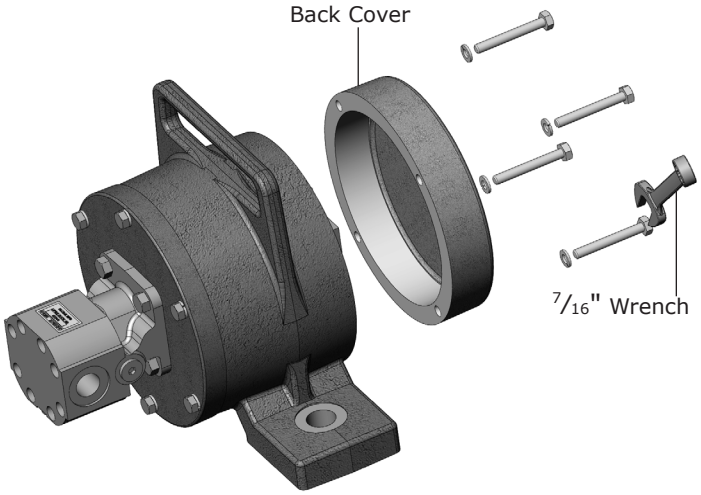
Tools Required:

Torque wrench - ⅜" drive minimum 33 ft-lb capacity

7/16" combination wrench
½" combination wrench
9/16" combination wrench
2 ea 12" pry bars
⅛" hex key
3/16" hex key
1 ea press rod ¾" dia. x 6" long
1 ea press tube 2¾" o.d. x 2 ¼" i.d. x 6" long
Retaining ring pliers to fit medium retaining rings, inside and outside.
Thread locking adhesive

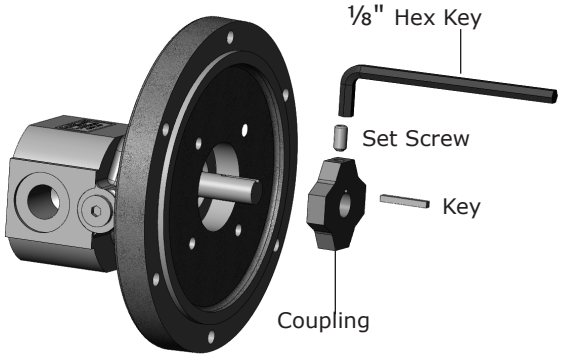


Procedure:

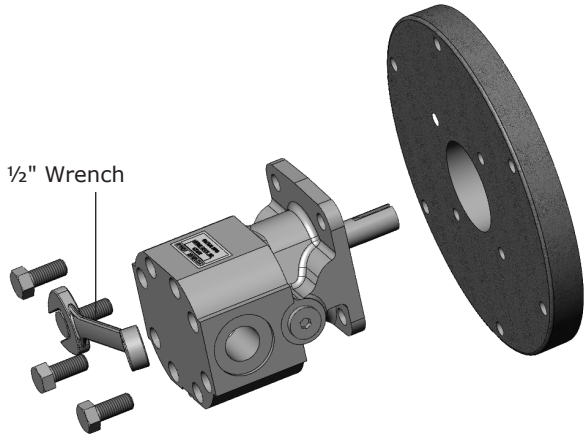


1. Remove the four screws from the back cover with a 7/16" wrench. Remove the back cover.

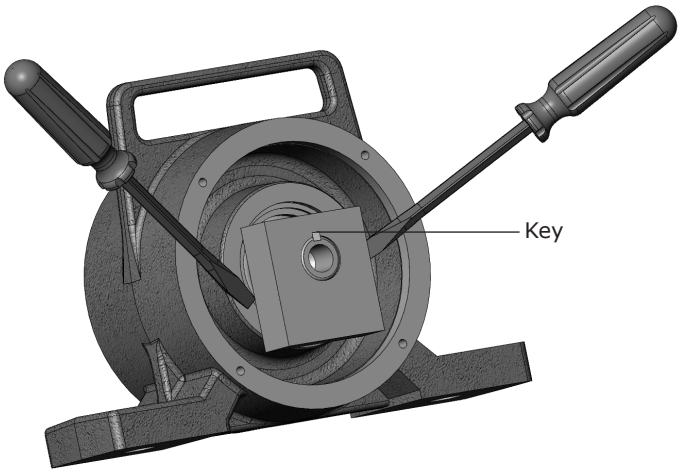
2. Remove the six ¼" - 20 screws from the motor cover with the 7/16" wrench. Remove motor cover.



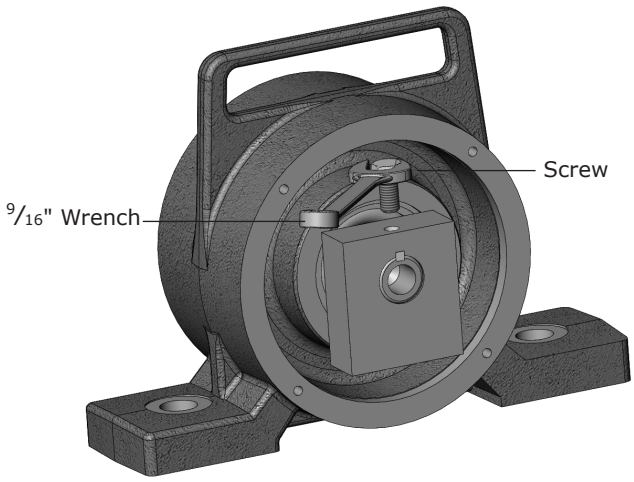
3. Remove the set screw from the coupling with a ⅛" hex key. Slide the coupling and key from the motor shaft.



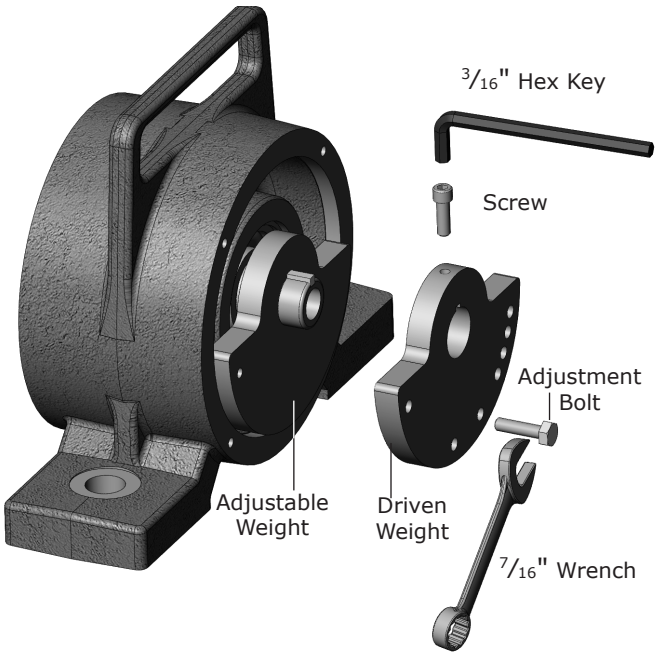
4. If motor repair is necessary remove the four motor screws that mount the motor to the motor cover with a ½" wrench. This is best done by "breaking" the bolts loose while the cover is still mounted on the housing. The motor then may be removed for repair.



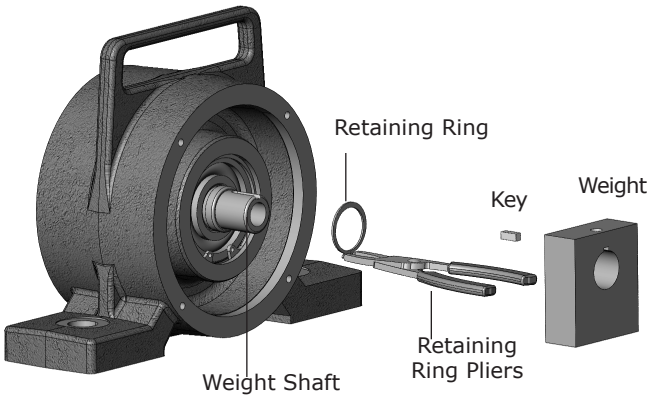
6. Pry the weight from the shaft as shown in the drawing. Repeat the procedure for the weight on the opposite side. Remove the keys from each end of the shaft.



5. For models with fixed weights remove the screw from the driven weight (the weight without the drive pins) with a 9/16" wrench.

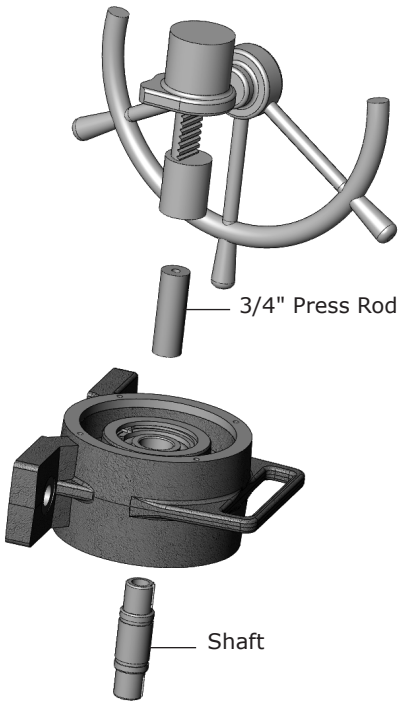


7. For models with adjustable weights remove the adjustment bolt locking the weights together with a 7/16" wrench. Note the screw location in the weight for proper replacement. Remove the screw from the top of the driven weight (no drive pins) with a 3/16" hex key. Pry the weights off the shaft.



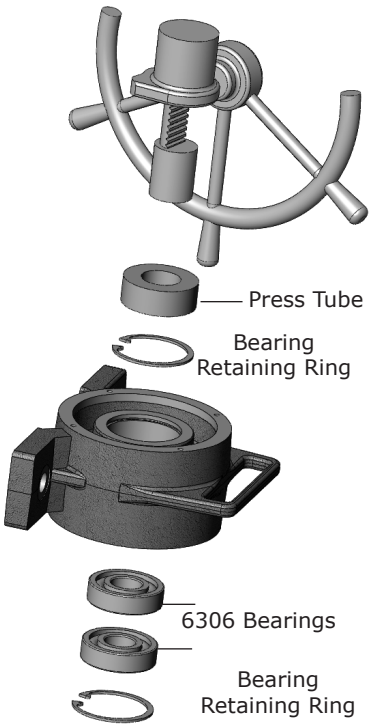
8. Use external retaining ring pliers to remove the retaining ring from the weight shaft.

9. Repeat steps 5 - 7 to remove the drive weights from the motor side (opposite side) of the vibrator.

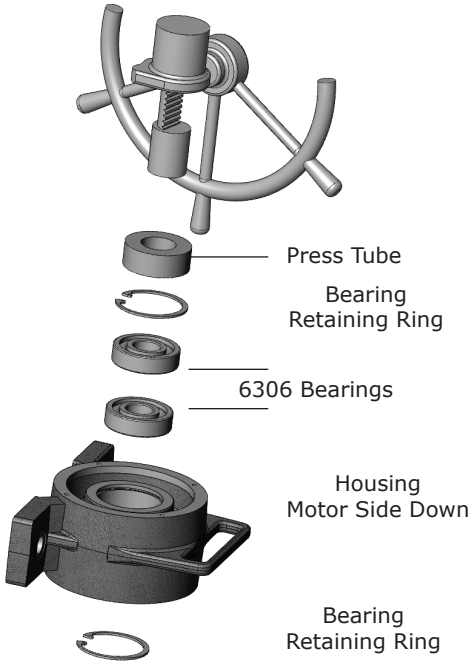


10. Use a press and a ¾" press rod to press the shaft through the bearings. Do not use a hammer as it will damage the shaft end and bearings (especially if they are going to be reused).

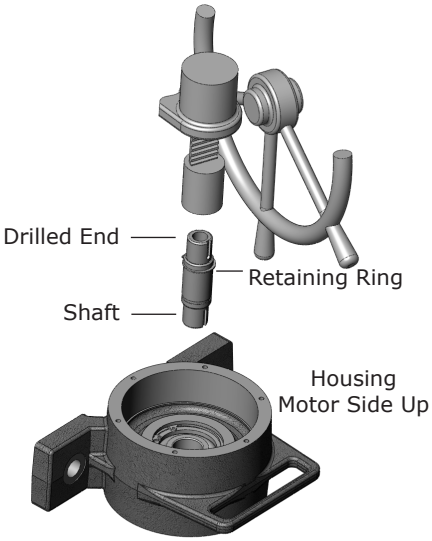
11. Remove the bearing retaining rings (internal) from the housing with the inside retaining ring pliers. Use the 2¾" press tube to force the bearings out of the housing bore. Do not press on any bearing surface except the outer race.



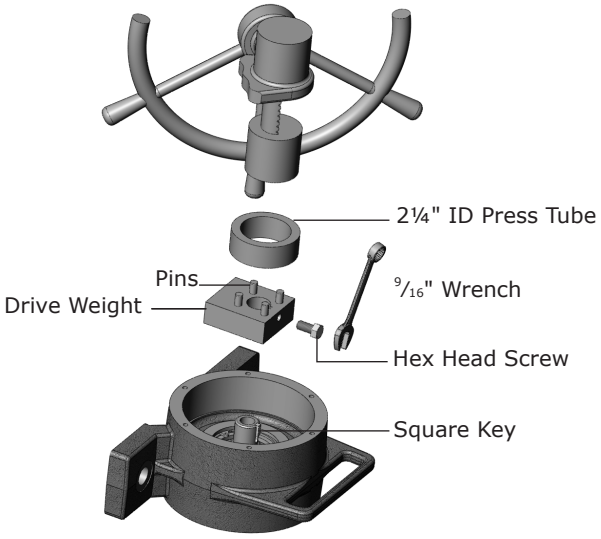
Reassembly



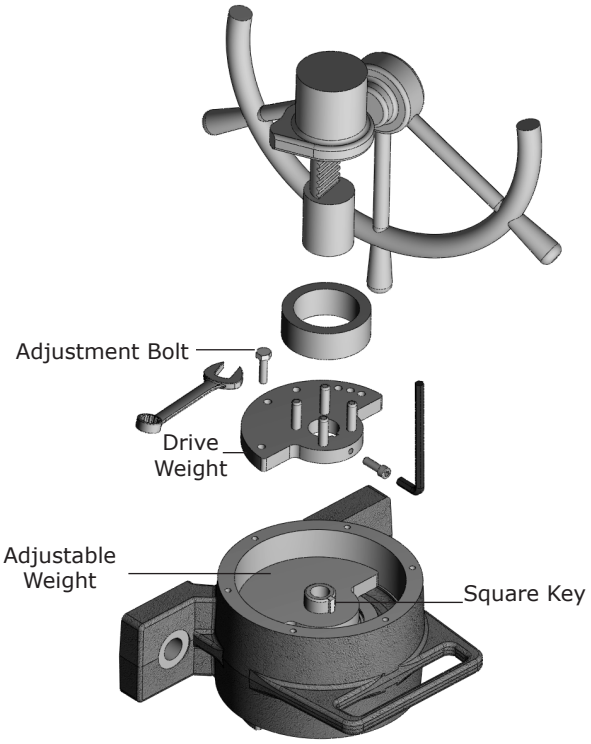
12. Install one of the *bearing* retaining rings into the housing bearing bore. Apply a light coat of oil on the outer race of the bearings. Use a 2¾" x 6" press tube to press the bearing into the bore until it contacts the inner face of the retaining ring. Press the remaining bearing into the bore until it contacts the first bearing. Install the remaining ring into the bearing bore.



13. Turn the housing so that the motor side is facing up. Install a retaining ring closest to the drilled end on 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 light press. Do not hammer on the shaft to avoid damage to it and the bearings. When the shaft is in place, replace the retaining ring into the opposite side shaft groove.



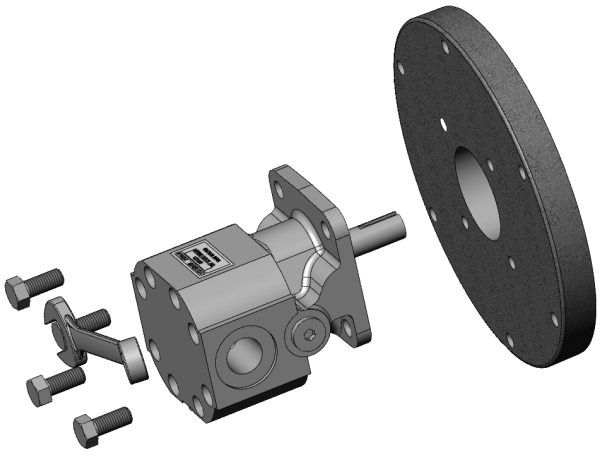
14. For models with fixed weights, install the 3/16" square key in shaft keyway. Align the keyway in the weights with the key in the shaft. Slide the drive weight (with pins up) onto the shaft until it seats against the shoulder stop. Support the shaft on the opposite side to prevent damage to bearings. This procedure may require a light press. Do not use a hammer as it will damage the bearings. Place a drop of thread adhesive on the ⅜" - 16 x 1¼" hex head screw. Install the set screw into the weight and torque to 33 ft-lb (45 N-m). Repeat procedure for the driven weight on opposite side of housing.



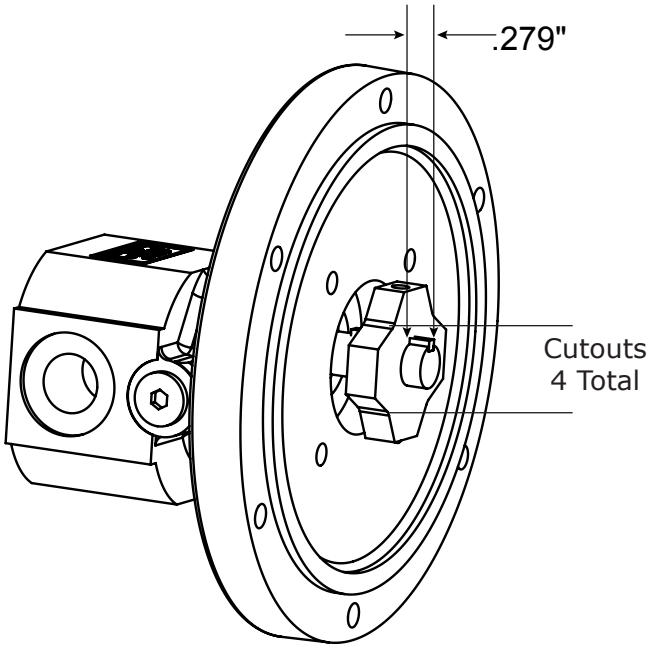
15. **For models with adjustable weights**, slide the adjustable weight (no pins) onto the shaft until it seats against the shoulder. Support the shaft on the opposite side to prevent damage to the bearings. Do not use a hammer as it will damage the bearings. Replace the square key into the shaft. Slide the drive weight over the shaft aligning the weight keyway with the key in the shaft. The weight will rest against the adjustable weight. Rotate the adjustable weight until the adjustment bolt hole is aligned with the correct hole in the adjustable weight.

NOTE: The adjustable weight is milled on both sides. The adjustment hole should be on the right on the motor side and on the left (when facing shaft) on the non-motor side. Also, milled faces on the weights should face each other on both sets of weights.

Place a drop of thread adhesive on the ⅜" - 16 hex bolt and install through the drive weight into the adjustable weight. Tighten securely. Place a drop of thread adhesive onto the thread of the ¼" - 20 socket cap screw and install in screw hole at drive weight. Repeat procedure to install the driven weights on opposite side.



16. If removed, place the hydraulic motor on the motor cover. Place a drop of thread adhesive on the threads of the four 5/16" - 18 x ¾" hex bolts. Slide the bolts through the motor mount flange and into the motor cover. Tighten in stages in a crisscross pattern until tight. Aim for a bolt torque of approximately 18 ft-lb (24 N-m).



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 ⅛" square key into the key slot formed by the coupling and shaft keyways. Continue sliding the coupling down the shaft until .279" of the motor shaft is protruding through the coupling.

NOTE: Do not place the key in the shaft keyway prior to installing coupling as the coupling will force the key into the motor seal upon installation causing the seal to leak.

Aligning the cutouts on the coupling with the drive pins on the weight, slide the motor cover onto the housing. Install 3 bolts 120° apart through motor cover and into housing. Turn the weight on the opposite side of the housing to make sure weights and motor turn freely and are not binding at any point. As weight is swung back and forth, a slight "clicking" can be heard. This indicates proper slack or backlash between the coupling and the drive pins on the weight. If there is binding, remove motor cover and move the coupling back an additional .020" on the shaft and repeat trial fit. When adequate backlash is attained, remove cover bolts and apply a drop of thread adhesive to the ¼" - 20 coupling set screw and tighten securely against the key and motor shaft.

Reinstall the motor cover on the housing. Use a drop of thread adhesive on all six ¼" -20 hex bolts and torque evenly in a crisscross pattern to 12 ft-lb each.

Reinstall back cover.

Note: If coupling wears out, often the pins in the drive weight will also be worn. The best remedy for this is to order a replacement drive weight (see page 19). This drive weight comes with the pins installed. Installing new pins in the weight is difficult and requires a hydraulic press capable of at least 10,000 pounds of force.

VI. Adjusting the Eccentric Weights

All "C3" model vibrators have adjustable weights. 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.

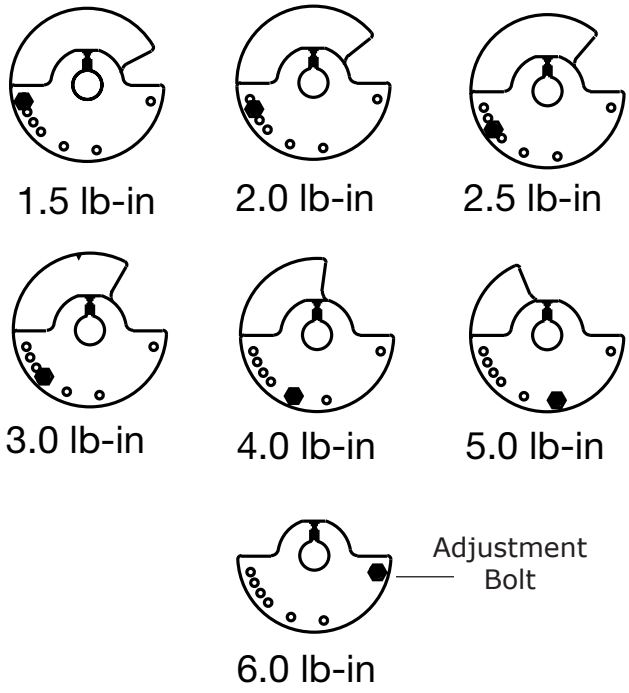
4. Repeat process to the weights on the opposite side of the vibrator.

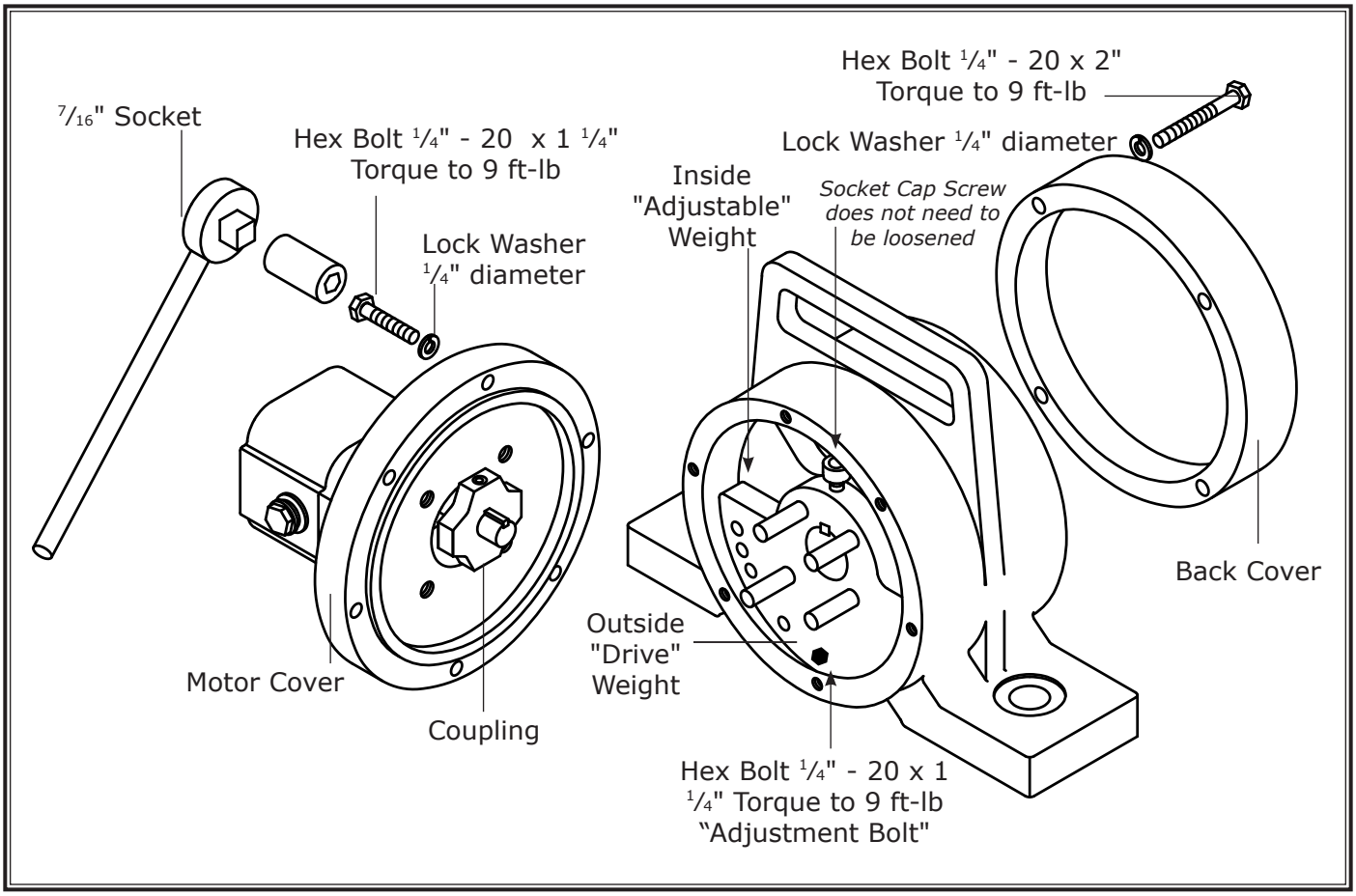
5. **It is very important that the weights on both sides are set the same.**

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.

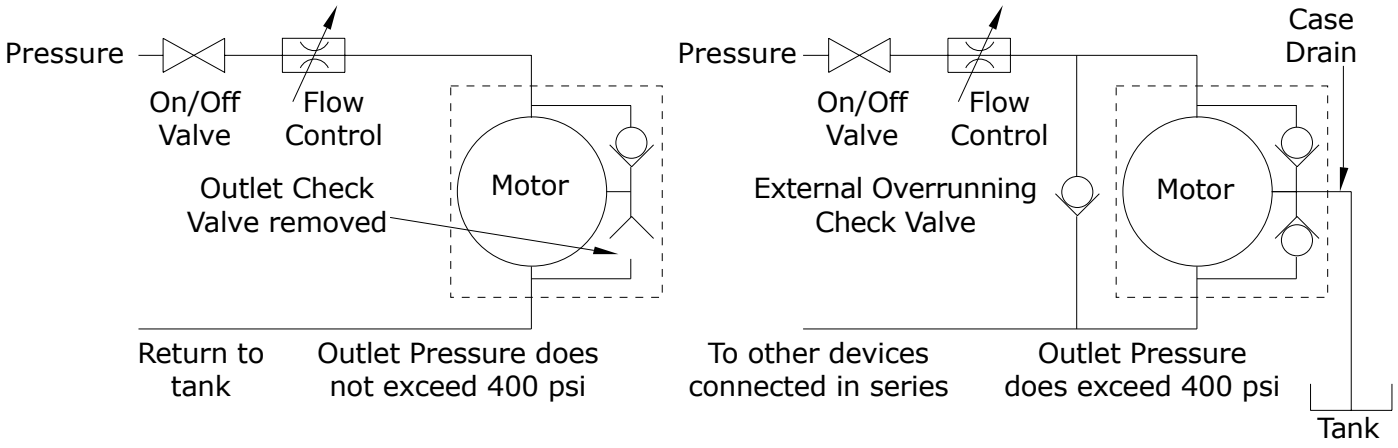




VII. Hydraulic Motor Data

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**
			US	**rpm**	**gpm**	**psi**	**psi**	**psi**
			Metric		**Lpm**	**bar**	**bar**	**bar**
2HC	¾"-16	½"	.129 cu in	5000	2.8	3000	4000	400
			2.11 cc		12.7	207	276	27
5HC	¾"-16	⅝"	.388 cu in	5000	8.4	1600	2500	400
			6.36 cc		38	110	172	27

VIII. Plumbing Diagram



IX. Vibrator Performance Data

C3 Hydraulic Design Series Vibrator Performance Data											
VIBRATOR MODEL	**UNB.**	**START-UP**	**SPEED**	**FLOW**	**FORCE**	**SPEED**	**FLOW**	**FORCE**	**SPEED**	**FLOW**	**FORCE**
	lb-in	**psi**	**rpm**	**gpm**	**lb**	**rpm**	**gpm**	**lb**	**rpm**	**gpm**	**lb**
	kg-mm	**bar**		**Lpm**	**kN**		**lpm**	**kN**		**lpm**	**kN**
C3-1.5-2HC	1.5	80	3,000	1.7	380	4,000	2.2	680	5,000	2.8	1,070
	173	5.5		6	1.7		8	3.0		11	4.8
C3-2.0-2HC	2.0	105	3,000	1.7	510	4,000	2.2	910	5,000	2.8	1,420
	230	7.2		6	2.3		8	4.1		11	6.3
C3-2.5-2HC	2.5	130	3,000	1.7	640	4,000	2.2	1,140	5,000	2.8	1,780
	288	9.0		6	2.8		8	5.1		11	7.9
C3-3.0-2HC	3.0	155	3,000	1.7	770	4,000	2.2	1,360	5,000	2.8	2,130
	346	10.7		6	3.4		8	6.1		11	9.5
C3-4.0-2HC	4.0	200	3,000	1.7	1,020	4,000	2.2	1,820	5,000	2.8	2,840
	461	13.8		6	4.5		8	8.1		11	12.6
C3-5.0-2HC	5.0	250	3,000	1.7	1,280	4,000	2.2	2,270	5,000	2.8	3,550
	576	17.2		6	5.7		8	10.1		11	15.8
C3-6.0-2HC	6.0	300	3,000	1.7	1,530	4,000	2.2	2,730	5,000	2.8	4,260
	691	20.7		6	6.8		8	12.1		11	18.9
C3-1.5-5HC	1.5	55	3,000	5.0	380	4,000	6.7	680	5,000	8.4	1,070
	173	3.8		19	1.7		25	3.0		32	4.8
C3-2.0-5HC	2.0	60	3,000	5.0	510	4,000	6.8	910	5,000	8.4	1,420
	230	4.1		19	2.3		26	4.1		32	6.3
C3-2.5-5HC	2.5	66	3,000	5.0	640	4,000	6.7	1,140	5,000	8.4	1,780
	288	4.6		19	2.8		25	5.1		32	7.9
C3-3.0-5HC	3.0	72	3,000	5.0	770	4,000	6.7	1,360	5,000	8.4	2,130
	346	5.0		19	3.4		25	6.1		32	9.5
C3-4.0-5HC	4.0	84	3,000	5.0	1,020	4,000	6.7	1,820	5,000	8.4	2,840
	461	5.8		19	4.5		25	8.1		32	12.6
C3-5.0-5HC	5.0	97	3,000	5.0	1,280	4,000	6.7	2,270	5,000	8.4	3,550
	576	6.7		19	5.7		25	10.1		32	15.8
C3-6.0-5HC	6.0	160	3,000	5.0	1,530	4,000	6.7	2,730	5,000	8.4	4,260
	691	7.6		19	6.8		25	12.1		32	18.9

X. Hydraulic Motor Performance Factors

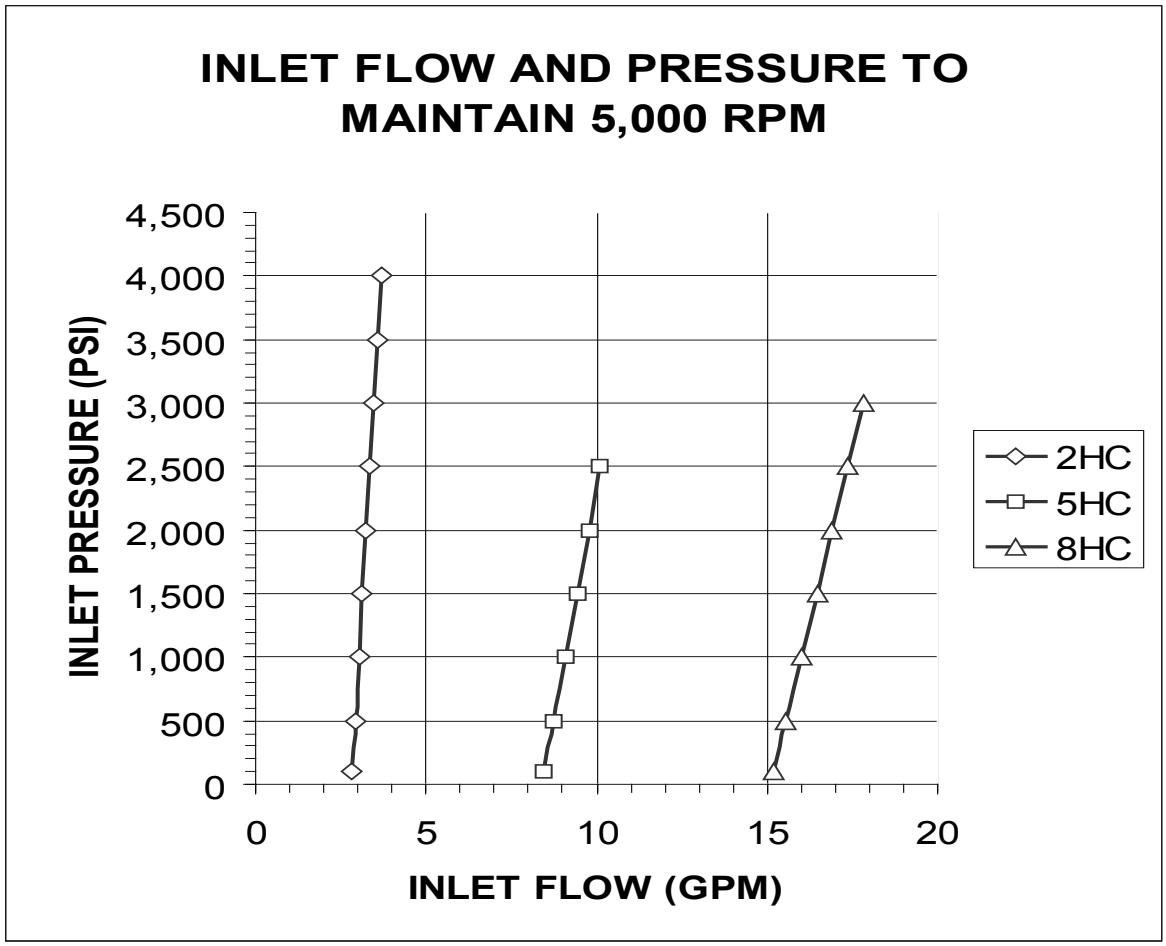
There are no "black & white" answers to the question of what the 'exact' gpm and psi is for different speeds of the hydraulic motors. Besides gpm & psi, there are several variables that affect the vibrator speed, such as the motor shaft seal, internal leakage always inherent in gear motors, and back pressure. The following chart is a snapshot of the hydraulic motor.

Motor Property	Units	2HC	5HC	8HC
Port Size	side ports	¾" - 16 SAE	¾" - 16 SAE	¾" - 14 NPT
Minimum Hose Size	i.d.	½"	⅝"	¾"
Displacement (Dr)	cubic inches/ rev	0.1	0.4	0.7
Slippage Rate (fs)	gpm/100 psi	0.0	0.1	0.1
Shaft Diameter (D)	inches	0.5	0.5	0.6
Maximum Speed (Vrpm)	rpm	5000	5000	5000
Maximum Speed (VI)	feet/minute	654.5	654.5	818.1
Maximum Continous Inlet Pressure (Pi)	psi	3000	1600	2000
Maximum Intermittent Inlet Pressure (Pi)	psi	4000	2500	3000
Maximum Back Pressure by Mfg (P)	psi	400	400	400
Maximum Back Pressure @ 5,000 rpm	psi	305.6	305.6	244.5
Inlet Flow in gpm (Fi) to maintain 5,000 rpm at specified Inlet Pressures in psi	100	2.8	8.5	15.2
	500	2.9	8.7	15.6
	1000	3.0	9.1	16.0
	1500	3.1	9.4	16.5
	2000	3.3	9.8	16.9
	2500	3.4	10.1	17.4
	3000	3.5	N/A	17.8
	3500	3.6	N/A	N/A
	4000	3.7	N/A	N/A

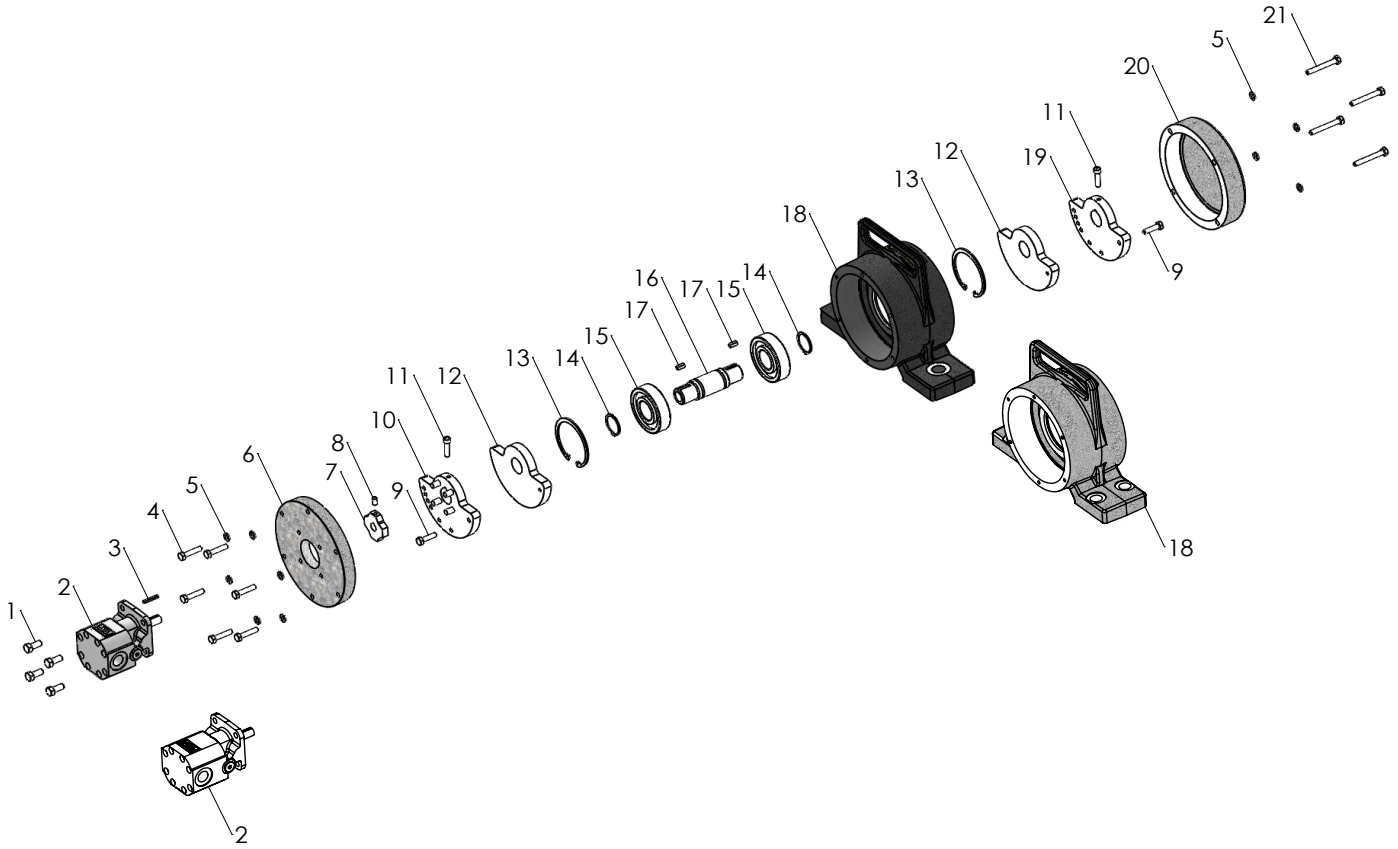
Note: These are motor performance statistics only. Vibrator performance may vary due to the size of the unbalanced weights used. All calculations based on oil viscosity of 200 ssu.

See page 14 for hydraulic motor performance.

Hydraulic vibrator speed can fluctuate significantly with inlet pressure (psi) and inlet flow (gpm). For instance, a vibrator with a 2HC motor is given exactly 2.00 gpm at 750 psi runs about 3,272 rpm. If the inlet flow drops to even 1.80 gpm (10%), the speed will drop to 2,914 rpm (11%). Therefore, when assessing vibrator speed on a particular application it is critical to have accurate inlet flow and pressure measurements. Also, be aware that vibrator speed will vary with the size of the unbalanced weights used. One other important factor is oil viscosity, which can vary considerably with oil temperature. All published data assumes an oil viscosity of 200 ssu.



XI. C3 Hydraulic Vibrator Parts List and Parts Explosion



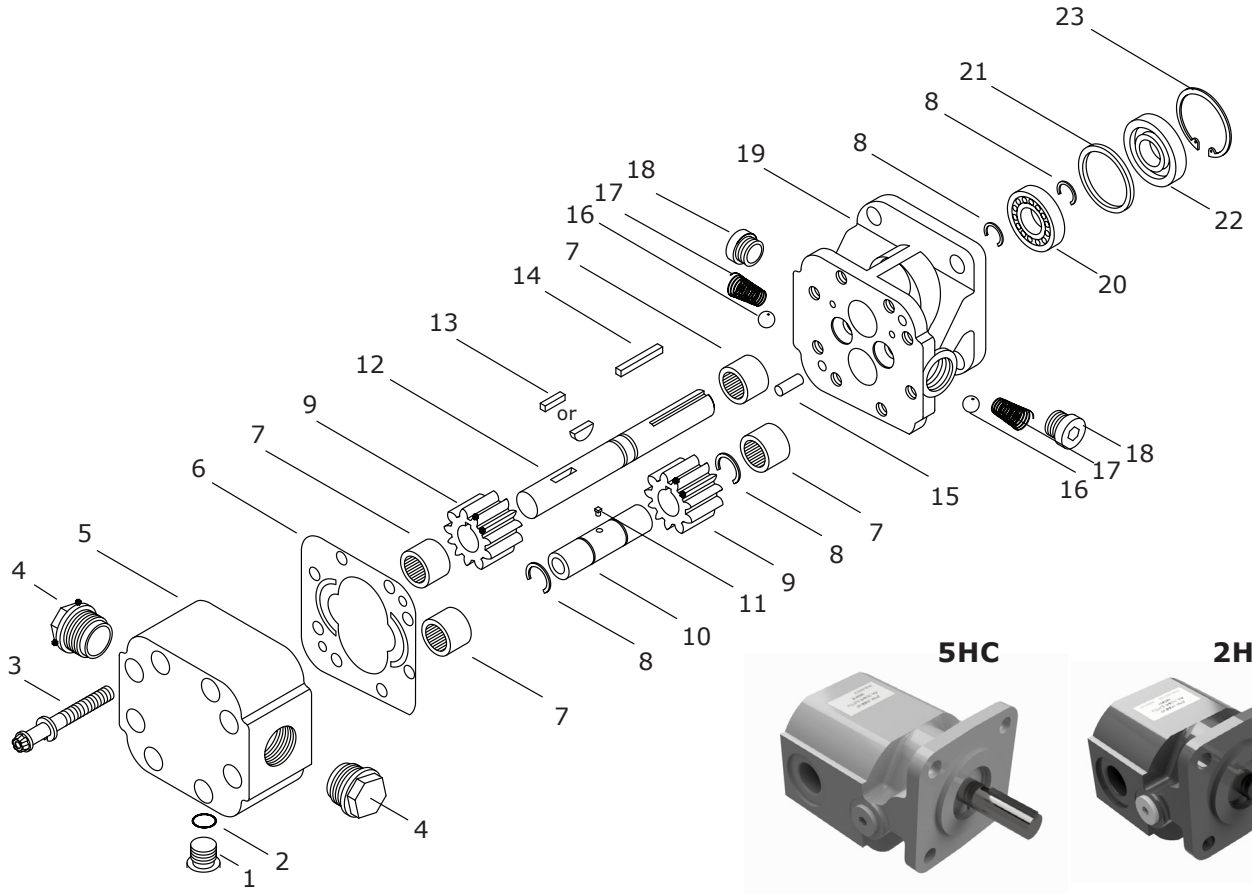
Parts List for C3 Hydraulic Vibrators

C3-1.5-2HC (pn 532015) C3-2.0-2HC (pn 532020)
C3-2.5-2HC (pn 532025) C3-3.0-2HC (pn 532030)
C3-4.0-2HC (pn 532040) C3-5.0-2HC (pn 532050)
C3-6.0-2HC (pn 532060)

C3-1.5-5HC (pn 535015) C3-2.0-5HC (pn 535020)
C3-2.5-5HC (pn 535025) C3-3.0-5HC (pn 535030)
C3-4.0-5HC (pn 535040) C3-5.0-5HC (pn 535050)
C3-6.0-5HC (pn 535060)

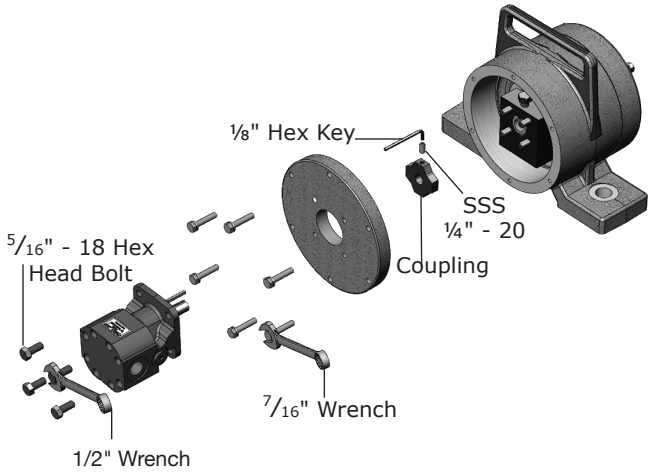
#	Description	Part #	Qty	#	Description	Part #	Qty
1	Hex Bolt 5/16" - 18 UNC x ¾" Gr.8	330107	4	12	Adj Weight Inner Weight	194806	2
2	Motor 2HC *or*	251020	1	13	Retaining Ring #5000-287	347287	2
2	Motor 5HC	251050	1	14	Retaining Ring #5000-118	349118	2
3	Key ⅛" x ⅛" x 1"	Included w/ mtr	1	15	Bearing 6306	380306	2
4	Hex Bolt ¼"-20 x 1.25"	330012	6	16	Shaft	200303	1
5	Lock Washer ¼"	338104	10	17	Key 3/16" square x ½"	345803	2
6	Motor Cover	110430	1	18	Housing 2 Holes *or*	142030	1
7	Coupling	203045	1	18	Housing 3 Holes	142430	1
8	SSS ¼"-20 x ½"	336105	1	19	Driven Outer Weight	194706	1
9	Hex Bolt ¼" - 20 x 1"	330010	2	20	Cover	110230	1
10	Drive Weight with pins	194606	1	21	Hex Bolt ¼" - 20 x 2"	330020	4
11	SCS Screw ¼" - 20 x 1"	336910	2				

XII. 2HC & 5HC Hydraulic Motor Parts List & Parts Explosion

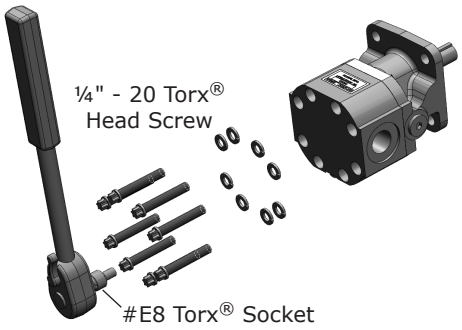


Parts List for 2HC (pn 251020) & 5HC (pn 251050) Hydraulic Motors							
#	**Description**	**Part #**	**Qty**	**#**	**Description**	**Part #**	**Qty**
1	Plug, Steel .43 SAE Soc. Hd.	257413	1	14	Key, Square ⅛" sq x 1" long	**K2**	1
2	O-Ring	N/A	1	15	Shear Pin	N/A	2
3	Screw 1/4"- 20 x 1 ½" (2HC)	257230 or K2	8	16	Nylon Ball .375 Diameter	**K2**	2
3	Screw 1/4"- 20 x 2" (5HC)	257250 or K2	8	17	Spring	**K2**	2
4	Plug, Plastic 3/4" - 16 SAE	N/A	2	18	Steel Plug .50 SAE Soc. Hd.	**K2**	2
5	Gear Housing	N/A	1	19	Stator	N/A	1
6	Gasket	K1	1	20	Ball Bearing	**K1**	1
7	Needle Bearing	K1	4	21	Spacer	**K2**	1
8	Crescent Ring, External	K2	4	22	Oil Seal	254025 or **K1**	1
9	Gear (2HC)	257120	2	23	Retaining Ring, Internal	347112	1
9	Gear (5HC)	257150	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 (2HC)	257020	1	**K2**	HMRK#2 - 5HC	252050	
12	Drive Shaft (5HC)	257050	1	•	Gasket Kit 2/5HC	251025	
13	Woodruff Key (2HC)	K2	1		Gasket Kit includes 5 different colors of gaskets. Gasket color is unknown until the motor is disassembled.		
13	Key, Sq ⅛" sq x ½" long (5HC)	K2	1				

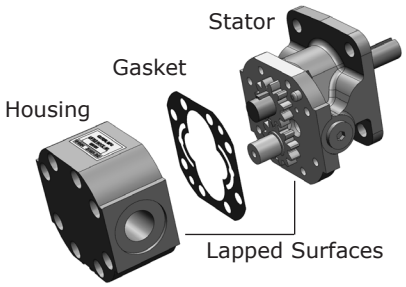
XIII. Rebuilding Hydraulic Motor



1. Remove motor from the vibrator according to the disassembly instructions on pages 8 - 9.

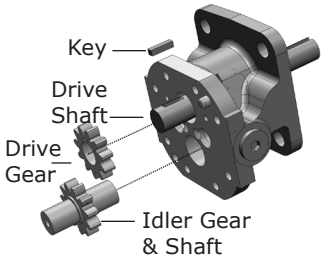


2. Remove eight Torx® head screws from the motor housing using a #E8 Torx® socket.

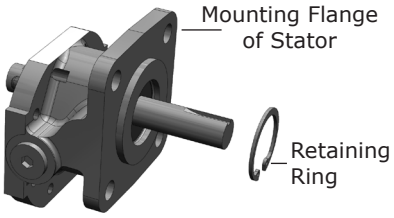


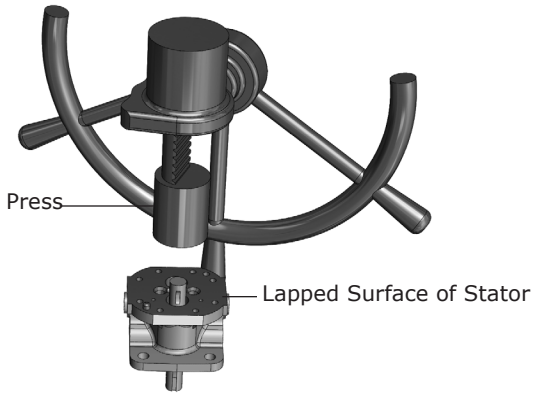
3. Separate the housing from the stator. **Note: Do not damage the lapped surfaces of the housing and stator.** Do not damage gasket if not replacing. Discard used gasket if one is available. Important - replace gasket with the same color gasket. Gasket colors are different due to tolerance gaps and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



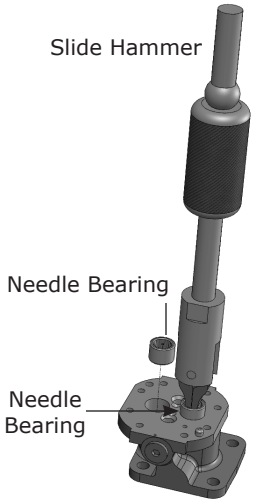
5. Turn the stator around and remove the retaining ring from the shaft seal bore using the retaining ring pliers.

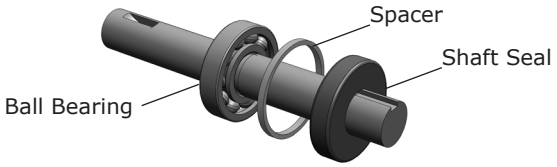




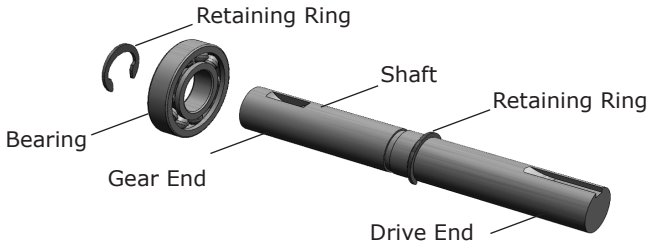
6. Support the stator on its flange and press the shaft out of the stator with an arbor press. Note: Do not allow press to contact the lapped surface of the stator. When the seal has been pressed out of the bore, the shaft and bearing should fall out of the stator. Discard damaged shaft seal.

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 ⅝" rod until they stop in the motor housing. **Be careful not to damage the lapped surface.**

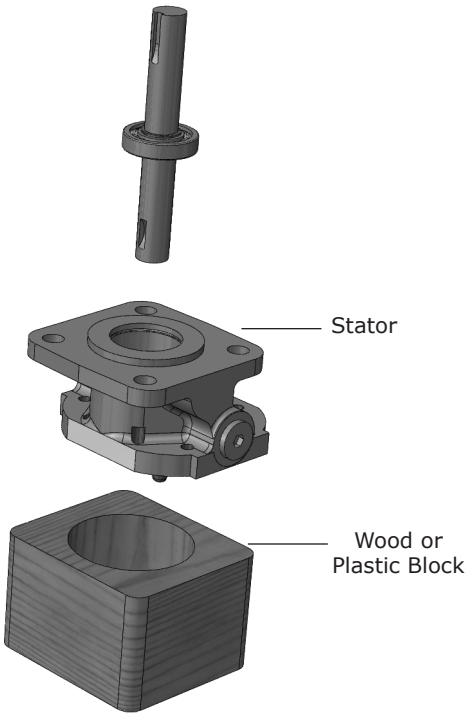




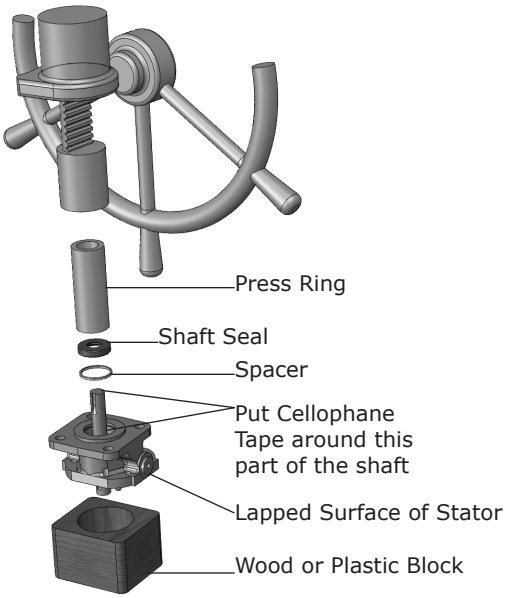
8. Slide the seal off the drive end of the shaft. To replace ball bearing, remove retaining ring. The ball bearing **must** be pressed off the **gear end** of the shaft to avoid scratching the shaft. Replace shaft if it is scratched.



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 ½" ID X 3" long pipe.

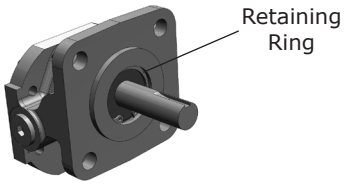


10. Support the lapped surface of the stator with a block of soft material. Slide the shaft and ball bearing into the stator. This is a close fit and may require a very light press.

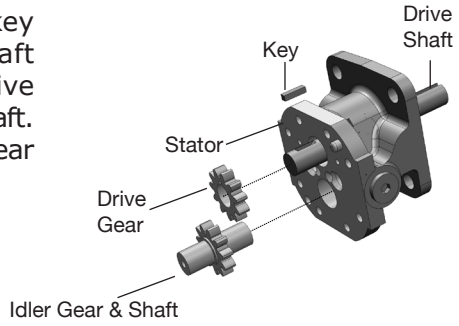


11. The shaft seal is **very delicate** and if damaged the motor will leak. Thoroughly clean the shaft and bore in the stator. **Wrap thin cellophane tape around the end of the shaft completely covering the keyway (this is very important because the keyway can nick the shaft seal if not covered).** Spread 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.

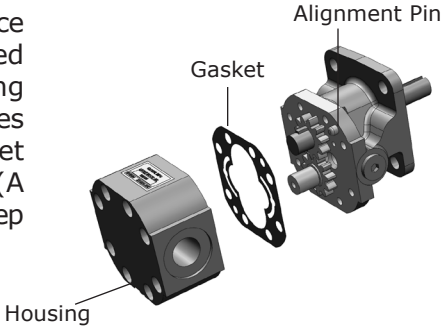
12. Install a retaining ring in the bore of the shaft seal.



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

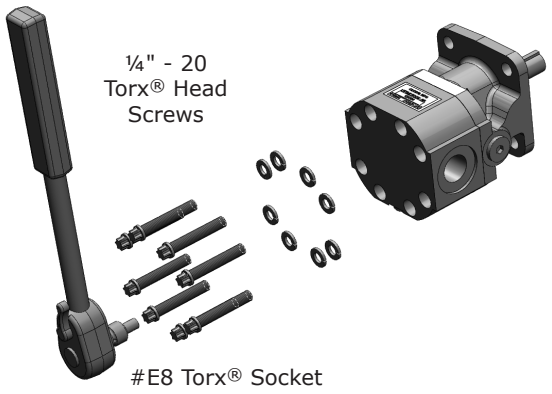


14. Carefully place gasket onto lapped surface of housing or stator. Align holes and smooth gasket completely flat. (A little oil helps to keep gasket in place.)



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 Nm) in a crisscross pattern. If the screws are too tight the gears will bind, and if the screws are too loose oil will leak around the gears.

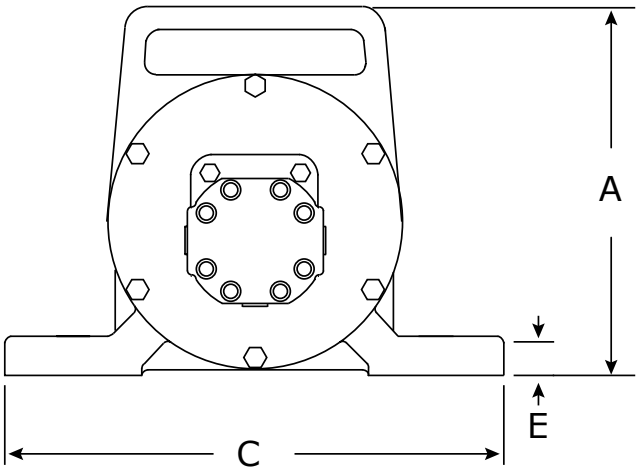
16. Attach the motor to the cover and reassemble the vibrator according to the assembly instructions starting on page 10.

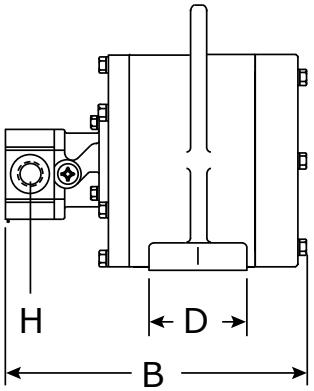


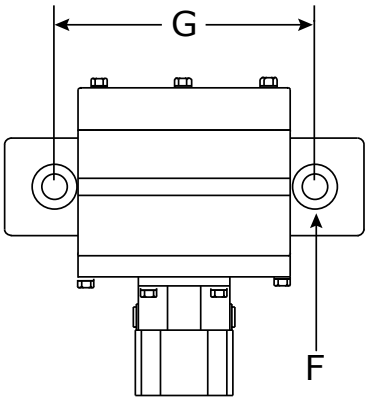
XIV. Troubleshooting Guide

Problem	Probable Cause	Solution
Vibrator will not run	Not enough starting pressure	Increase pressure
	The check valve is 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 flow control valve
	Oil temperature over 400°F	Reduce oil temperature
Excessive noise	Bearing failure (squealing sound)	Replace the bearings
	Insufficient mount	Replace with stronger - more rigid mounting apparatus - a channel iron is highly recommended
	Damaged housing or covers	Replace damaged parts
Premature bearing failure	Operating the vibrator too fast	Reduce speed by reducing psi and gpm The hydraulic motors can take a high psi load. It is often too much flow that causes the vibrator to run too fast

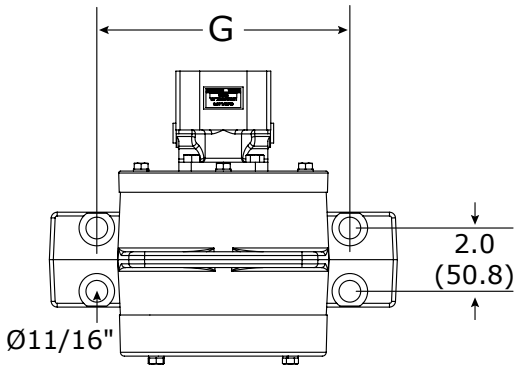
XV. C3 Hydraulic Vibrator all models Dimensions





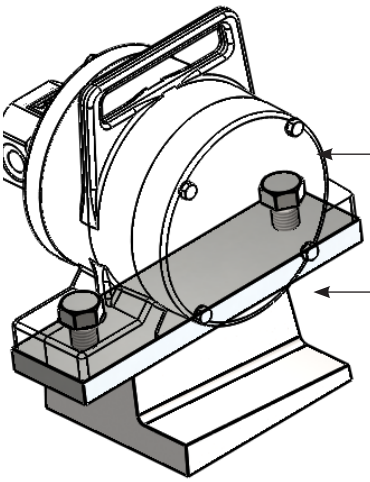


4-Bolt Model



C3 Hydraulic Vibrator Dimensions											
Vibrator Model	Weight	A	B		C	D	E	F		G	H
		Height	Length C3-2HC motor	Length C3-5HC motor	Width	Foot Width	Foot Thickness	Bolt Hole 2-bolt model	Bolt Hole 4-bolt model	Bolt Centers	Hyd Motor Port Size
	lb	in	in	in	in	in	in	in	in	in	¾"-16 SAE
	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	
C3 all models	40.00	8.12	9.25	9.75	11.00	3.00	0.88	25/32"	11/16"	8.00	
	18.14	206	235	247	279	76	22	20	17.5	203	

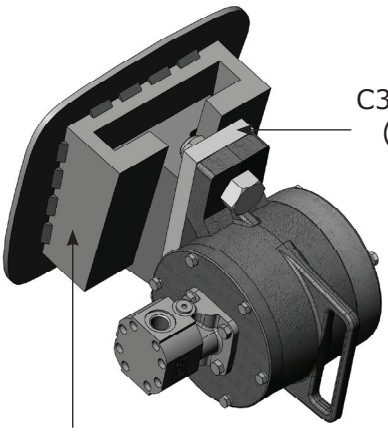
XVI. Brackets



This bracket fits in a standard railcar hopper pocket.

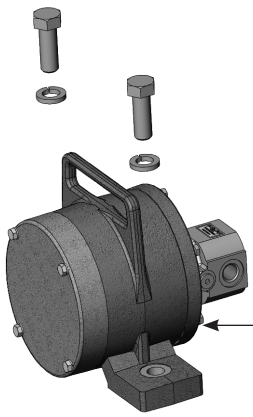
C3 Vibrator

C3/GBM Bracket (pn 167000)

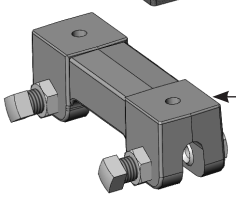


C3/GBM Bracket (pn 167000)

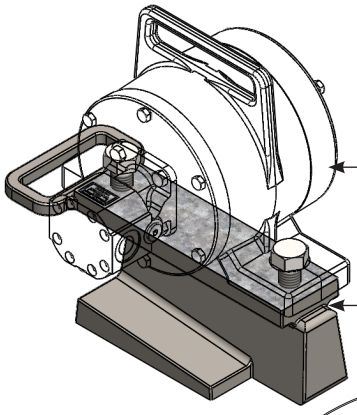
GBF Bracket (pn 167071)
The GBF bracket is usually standard on the railcar hopper discharge chute.



C3 Vibrator



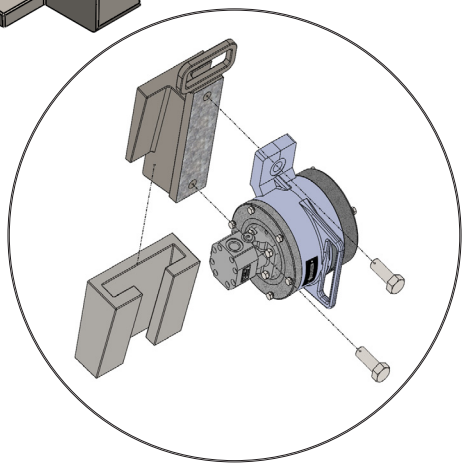
C3/CC Bracket pn 167503



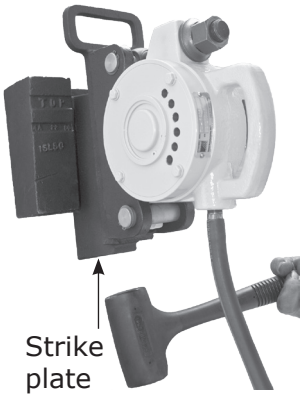
This bracket fits in a standard railcar hopper pocket.

C3 Vibrator

C3/GBMX Bracket (pn 167100)



GBM-X Bracket



Strike plate

- Excellent Bracket for Railcar Unloading
- Fits Universal Railcar Pocket Bracket
- Unitized Construction
- One Piece Ductile Iron Casting
- Heavy Duty - Handles Rough Treatment
- Design has a Hammer Strike Plate
- Features Unique Handle for Ease of Use
- One Bracket for 5 different vibrators

Hammer Strike Plate
After unloading, the vibrator may become wedged in the railcar pocket. The best way to dislodge the vibrator is to use our unique Hammer Strike Plate. Operators often use a large hammer and hit the vibrator, causing damage. The GBM-X Bracket features a heavy-duty strike plate, which extends below the railcar bracket. The hammer blow is directed to the *strike plate* and not to the vibrator.