



LINEAR MOTION SHAKER

GENERAL OPERATIONS, MAINTENANCE AND SPARE PARTS MANUAL FOR KEMTRON LINEAR MOTION SHAKERS

Revision D



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1. Introduction

KEMTRON Technologies, Inc. manufactures a wide variety of shakers. Whether it is a standalone unit or combined with our packaged recycling systems, KEMTRON's shakers are built to be reliable and durable. Although the shakers differ in geometric configuration, such as physical size, number of decks, number of screens, etc., the basic operations and maintenance principles remains the same.

Several shaker models incorporated in our mud recycling systems are shown below. As a standard, all use pre-tensioned screens with a wedge/bar fastening system for ease of installation. Consequently, KEMTRON can configure each shaker to accommodate hook-strip screens and wedge-wire screens, upon customer request.



KTL-448 AG Four Panel Shaker



KTL-48 STD Three Panel Shaker

2. Operation

The Linear Motion Shaker is the backbone of a primary solid/liquid separation system. It is designed to remove coarse solids from a liquid to be recovered or recycled. This can take the form of dewatering coal tailings in a mining operation, separation of cuttings from drilling mud, and/or the cleaning of wastewater in a waste treatment facility. It accomplishes this by using Linear Motion Vibrator Motors and a tight screening surface.

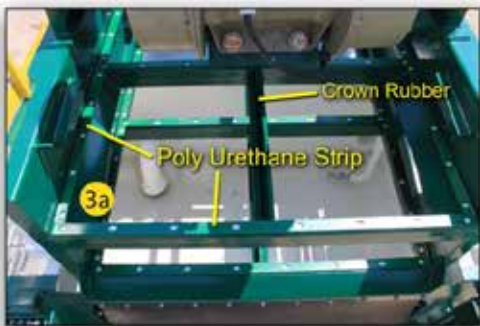
The Vibrator Motors are designed in such a way as to produce a vertical and horizontal linear motion causing the liquid to vibrate up and down on the screens causing the heavier solids to discharge off the unit and the fluid to be recycled.

CAUTION

The shaker base must always be level. This is imperative to allow even distribution of the liquid flow across the screening surface.

Key Shaker Components

1. Vibrator Motors
2. Screen Wedge & Bar
3. Screens
- 3a. Polyurethane Strips & Crown Rubber
4. Deck Springs
5. Leveling Jack
6. Mud Skirt
7. Gumbo Tray
8. Possum Belly
9. Control Panel



a. Shaker Base Assembly

The Shaker Base Assembly (“basket”) is the support structure for the shaker bed. The screens, vibrator motors are attached to the shaker bed. KEMTRON’s shaker basket is constructed of ASTM A36 plate steel that has been seal welded. This ensures maximum durability in any industrial setting. As an alternative, KEMTRON can also manufacture its baskets using 304 Stainless Steel. All carbon steel baskets are coated with a high-quality industrial coating that requires annual upkeep to ensure that corrosion does not attack the weldments or base metal. It is imperative that the base metal and coating be inspected on an annual basis.

- The **Shipping Brackets** are provided to secure the Shaker bed during transport. (See Figure 1). Shipping brackets are typically highlighted with red paint and a yellow warning label. This may not always be the case, so close inspection of the shaker upon receipt is recommended.



• **WARNING** •

- Shipping brackets **MUST** be attached prior to transporting.
- Do **NOT** operate the Shaker with the Shipping Brackets bolted. This will cause damage to the shaker bed and host equipment.

- There are four (4) **Deck Springs** located around the shaker. These are specially designed to isolate the bed vibration from the host equipment and shaker carriage. A molded polyurethane washer (a.k.a. “fabric washer”) is used on each end of each spring for isolation and to prevent metal to metal contact of the spring with the shaker basket and carriage. As Deck Springs are powder-coated carbon steel, it is important that the spring condition be reviewed every month for visible signs of surface cracks, corrosion, and/or plastic deformation.



- The **Jack Assembly** is designed to increase or decrease the shaker bed deck angle. This is done with the use of the furnished Jack Wrench. The Deck Angle plays an important role in shaker operation. The higher the deck angle the more residence time the cuttings have on the screens, thus the drier the solids effluent.
 - A 0° to -1° angle is recommended for conveyance of sticky solids generated while drilling reactive clays.
 - A $+2^{\circ}$ to $+3^{\circ}$ angle is recommended when fine mesh screens (i.e. KPT-110 to KPT-140) are used while drilling hard shale formations. A maximum $+5^{\circ}$ is provided. The grinding of solids and excessive screen wear to the first panel in the pool area at the back of the Shaker can result from extended use at higher angles.



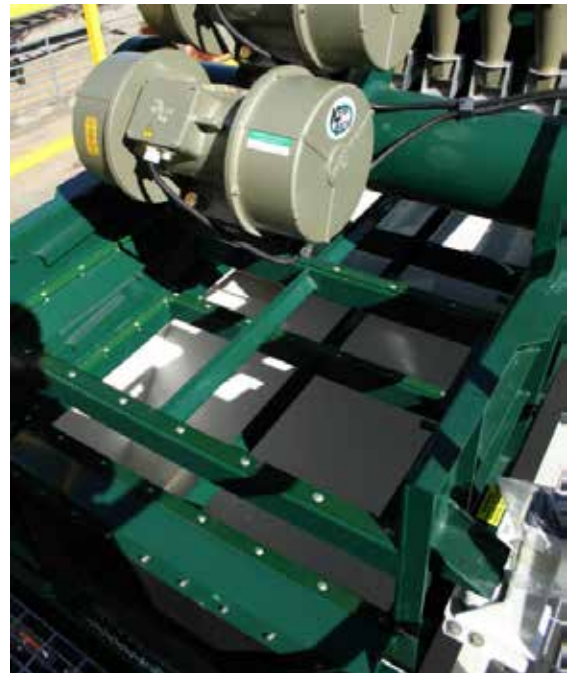
Care should be taken to use the appropriate Jack Wrenches. Inappropriate actuation of the jack assemblies can cause the Jack Bolts to become stripped. It is also important that the jack sleeves be greased on a monthly basis to ensure fluid movement of the Jack Assembly.

- The **Vibrator Motor Mount** is designed to support and efficiently transmit vibrating forces to the bed. They are sized relative to the shaker bed and the size of motors installed. KEMTRON Shakers can be fitted with up to four different motors therefore providing a range of G-force output.



Shaker motors should be inspected on a daily basis for excessive heat generation, loose head cover screens, and loose mounting bolts.

- The **Screen Support Framework** is designed to hold the screens in such a manner to facilitate easy installation and removal while fitting snugly enough to prevent leakage on the periphery. The Screen Support Framework incorporates a series of polyurethane seals fastened in place using expansion fasteners. These polyurethane seals (a.k.a. “polystrips”) prevent metal to metal contact of the screens with the shaker and mitigate the potential for solids by-pass around the screens. It is important to note, that the use of KEMTRON two-piece wedge blocks, provides a secondary sealing method along the edges of each screen. This type of fastening system provides a redundancy in sealing the screens to the shaker basket.



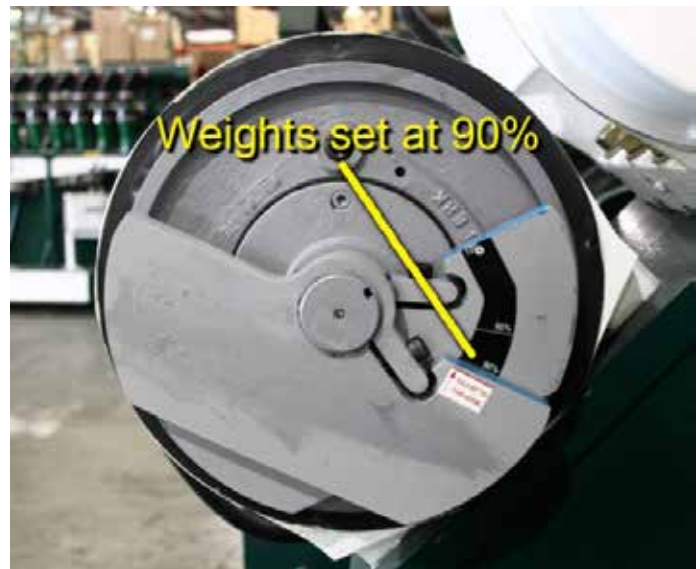
The Screen Support Framework should be inspected on a monthly basis to check for visible signs of surface cracking, plastic deformation, and corrosion. Corrosion can cause the fastening system to weaken.

All polystrips should be inspected on a monthly basis. Loose or damaged polystrips can lower screen life and cause cuttings bypass around the screen.

In a few applications, some KEMTRON shakers will not take advantage of polystrips, but will use screens with a integral seal.

b. Vibrator Motors

The Vibrator Motors are designed with a set of counter weights on each side. A variety of vibrator motors are available depending on the operating conditions and the required G-force.



- The **Counter Weights** are factory set for optimum performance. Each Vibrator Motor has a left and right side set of counter weights. They must mirror one another to ensure proper operation of the shaker.
- All four Counter Weights **MUST BE SET IDENTICALLY**. If the Counter Weights are not set identically overheating and premature bearing failure will occur.

• **WARNING** •

The Counter Weights are factory set to give optimum performance.
Any changes made to the weights by a non-certified technician may void the warranty.

- Electrically the Vibrator Motors are connected for high voltage (i.e. 575 / 460 / 415 / 380 Volts). These connections are made to U1, V1, & W1 respectively. All electrical connections are completed by KEMTRON using training and certified electricians. Any modification to the electrical must be performed by an electrician.

It is also important to note that the electrical cables may include explosion-proof cable glands and potting. As such, any change to the electrical wiring, will require new glands and potting.

- **The Bolt Fastening System** used to secure the Vibrating Motors to the Motor Mounting Weldment is very important. Various bolts are used corresponding to the size of Vibrator Motor installed. The various bolt sizes are shown in the Parts Breakdown at the end of this manual, as well as the torque



Three Bolt Hole Mounting Points Top & Bottom of Each Motor

values that must be adhered to. It is imperative that all bolts are secured using the specified torque values. Replacement of bolts with non-OEM bolts and/or the inappropriate application of torque to the bolts will void the warranty.

All motor mounting bolts are specified by KEMTRON to ensure proper torque. Each bolt is torque to engineered tolerances by KEMTRON prior to shipping. Non-OEM replacement bolts are strictly prohibited.

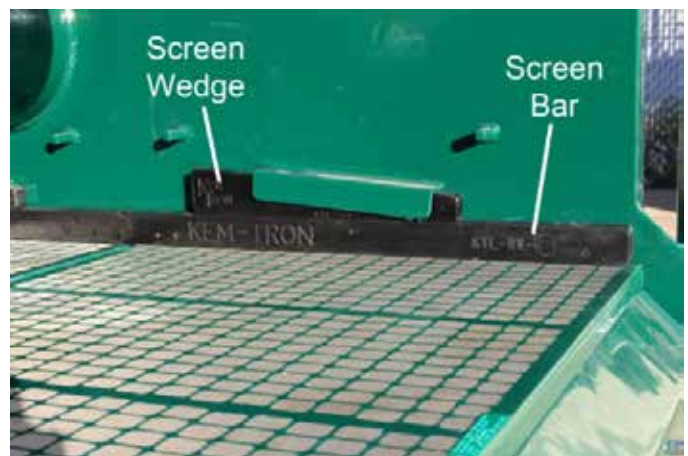
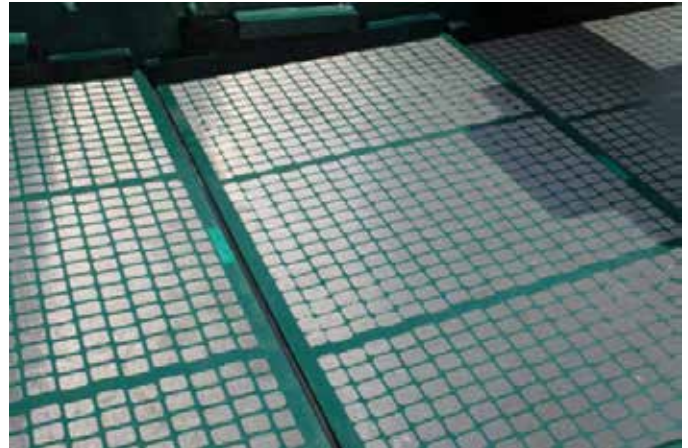
CAUTION

If a Vibrator Motor Mounting Bolt becomes loose – **NEVER RETIGHTEN** – Always replace with a complete bolt assembly.

Mounting Bolts that have loosened, once fully torque, are no longer fit for purpose and must be replaced.

c. Screens

Pretension Screens come in varying sizes to fit individual systems. A detailed list of screens and associated parts can be found under the Screen Parts Breakdown section in this manual. As a standard, a Wedge-Block System is employed for retaining the screens on the shaker bed. Alternative methods of screen fastening may be employed, based on customer preference. Alternative screen fastening methods are not specifically covered in this manual.



- The selection of screens is critical and should reflect the operating conditions. Screens mesh count and screen ratings significantly impact shaker performance. It is important to understand how each screen directly influences the ability of the shaker to achieve solid/liquid separation and consistent conveyance.
- Generally, the coarser screens go to rear and lower deck (if there is one) while using progressively finer screens toward the output. When using a dual deck shaker, it is important to understand if the shaker is being used in cascade flow or in parallel flow. Cascade flow typically uses finer screens on the bottom deck and more course screens on the top deck. Dual flow or parallel flow shakers use finer screens on the top deck and more course screens on the bottom deck. Contact KEMTRON Technical Services Team for additional support, if needed.
- This is only a guide. Individual experience should guide screen selection for flow rate and solids type to maximize solids removal and discharge dryness. Remember that finer screens wear out faster, especially when subjected to high volumes of solids, such as when drilling very fast.

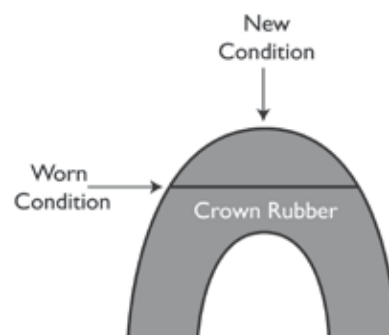
Generally, a screen one mesh coarser is run on the end of each Shaker to allow discharge to be as dry as possible.

- Another important item to understand is that how dry the discharge cuttings do not unilaterally define shaker performance are. A linear motion shaker is designed to provide a clean recoverable fluid. Typically the dryer the solids discharge, the less clean the recovered fluid. A shakers performance is defined by balancing the dryness of the solids discharge with the cleanliness of the recovered fluid.
- KEMTRON manufactures a pretensioned polyester powder-coated triple layer screen for use in its shakers. Triple layer wire cloth bonded to a stainless steel punch plate attached to a rigid steel frame provides the greatest support for a durable long-lasting shaker screen.
- The table below illustrates the difference in conductance and micron cut for a few select screen sizes.

KEMTRON Pretensioned Polyester Powder-Coated Screens			
Part No.	D100 (MICRONS)	API Designation	Conductance (kd/mm)
KPT-28-API20NG-PS	870	20	17.00
KPT-28-API25NG-PS	757	25	12.99
KPT-28-API35NG-PS	491	35	9.24
KPT-28-API50NG-PS	315	50	4.50
KPT-28-API60NG-PS	275	60	3.74
KPT-28-API80NG-PS	189	80	2.37
KPT-28-API120NG-PS	121	120	1.44
KPT-28-API140NG-PS	103	140	1.25
KPT-28-API170NG-PS	96	170	1.00
KPT-28-API200NG-PS	81	200	0.82
KPT-28-API230NG-PS	62	230	0.71

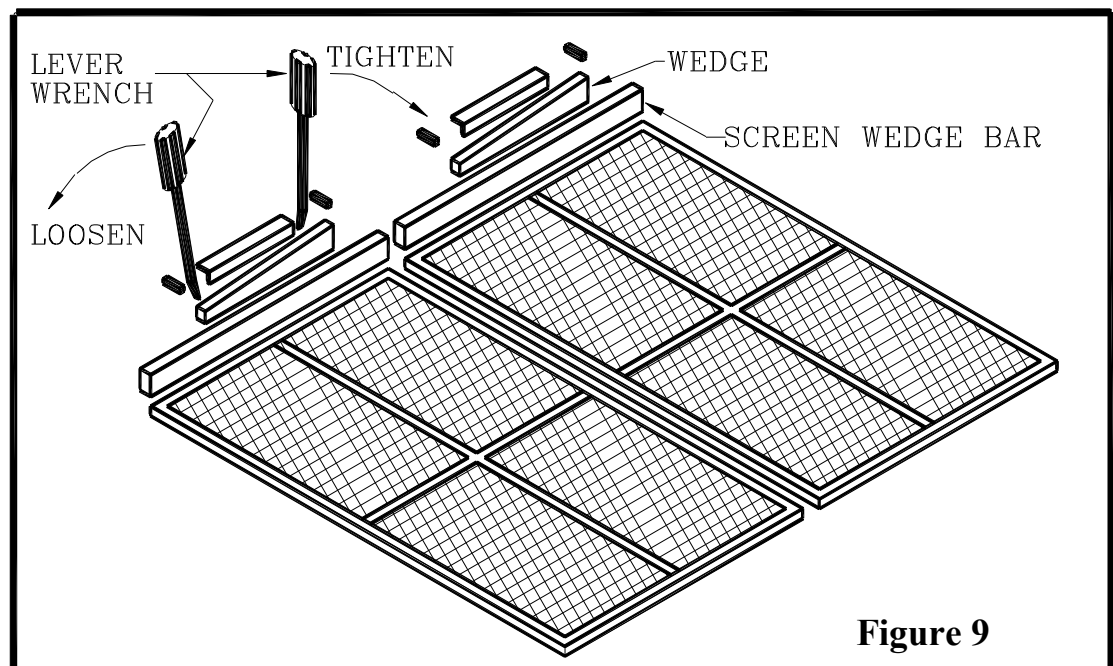
KEMTRON offers a complete line of screens for Derrick (flat screen), American Auger (flat screen), NOV-Brandt ATL/King Cobra and MiSwaco Mongoose shakers.
Call Today for details.
1-800-536-8766

- Prior to installing the screens always check that the **Crown Rubbers** are in place and inspect each for wear. There should be at least one **Crown Rubber** per screen and it fits a metal support running lengthwise down the middle sections of the shaker screen frame. As the Crown Rubber ages, the top will flatten and no longer make the necessary



compressive contact with the installed screens. This will cause excessive vibration and will cause premature screen failure.

- Screens should be washed and inspected for damage. Any minor damage can be repaired using KEMTRON Screen Saver Plugs or silicon sealant. **Do not** attempt to use sealant to prolong the use of the screen. Screen Saver Plugs are available and will seal off any broken cell within the screen.
- The rearmost and bottom screens should be installed first. Care must be taken not to damage the polystrips or integral screen seals upon installation.
- Once the bottom screen(s) are in place, position the wedge bars and wedges. The wedge bar runs along the entire side length of the screen and provides additional sealing protection. The wedges can be tightened using the supplied Lever Wrench or a small heavy mallet being careful not to damage the screens or the shaker basket.



IMPORTANT

Extra care should be taken to ensure the wedges are very tight and secure. If one of the wedges becomes loose it can severely damage a screen. Not to mention loosing the integrity of the recycled mud and the time it takes to reinstall it.

- The remaining screens can be installed as above.
- Wash screens if the drilling mudflow is interrupted for an extended period or at the end of the day. This will prevent the screen from becoming plugged and reducing the screen work area. Some solids can accumulate within the layers of the screen mesh, when the screens are not regularly cleaned. This accumulation can cause excessive weight to be added to a section of the screen, therefore affecting solids conveyance and will result in premature screen failure.
- Place screens in their original box for storage and stack them on flat selves. It is also important never to drop screens as the manufacturing process takes advantage of powder coating techniques. The adhesive effects of the powder coat can be detrimentally impacted by dropping the screen.

d. Moving and Start-Up

Prior to transporting or moving the shaker, it is important to follows these steps:

- Remove **screens**, **wedge bars**, **wedges**, and **crown rubbers** and store it an appropriate place. Lower the shaker deck angle using the **jacks** on either side of the bed. Secure the shaker bed using the **shipping brackets**.

Prior to starting-up the shaker, it is important to follows these steps:

- Reverse the steps above. Ensure that the shaker is in a **level** plane. Check all **bolts** are present and secure. Inspect the **wiring** for worn or damaged insulation. Inspect the **crown rubbers** for wear. Inspect the **screens** for damage and the presence of the sealing **gasket strips**. Inspect for broken **springs** and worn **fabric washers**.

3. Maintenance

The Linear Motion Shaker requires limited preventative maintenance. However there are a few steps to follow to ensure years of trouble free service.

a. General

- Complete a common sense inspection of the structure, vibration motors, etc. on a daily basis.
- Daily inspect the Screens for wear or holes. Repair or replace as necessary.

b. Lubrication

- Grease **Jack Assembly** weekly with a good grade of synthetic lithium base grease using approximately 1-2 shots per fitting.
- The **Vibrator Motors** should be greased with **MOBIL XHP 222 (for Invicta Motors)** or **Kluber ISOFLEX TOPAS NB 52 (For Martin Motors)** based on the chart below. Do not mix grease types without first checking with supplier to ensure they are compatible. If mixing grease is unavoidable, use only lithium complex alternatives. Ensure that grease nipples are clean to prevent introducing contamination into bearings.



CAUTION

Over greasing causes overheating of the bearings and

MUST BE AVOIDED.

RELUBRICATION INTERVAL BASED ON AMBIENT TEMPERATURE FOR INVICTA VIBRATOR MOTORS

ULBK 21 are fitted with shielded ball bearings and are greased for life.

ULBK 26 TO 30, remove end covers, circlips and out of balance weights (noting position of weights to keep the same force output on re-assembly). Remove bearing housing with bearing outer race. The inner race remains on the rotor shaft. Provided the bearing and grease are in good condition add new grease by lightly smearing it onto the rollers and re-assemble.

ULBK 40 TO 75 have grease nipples fitted as standard. Ensure that they are clean to prevent contamination.

Recommended grease is Esso Unirex N3. If mixing of grease is unavoidable use only Lithium complex alternatives. Over greasing causes overheating of the bearings and must be avoided. Grease cavities should never be filled above one third of their capacity and bearing caps should be removed occasionally to clean out excess grease. Old grease should periodically be removed and the bearings cleaned and repacked with new grease. Relubrication intervals are based on continuous operation in ambient temperature up to 20°C and should be reduced as follows for increases in ambient temperature 25°C x 0.8, 30°C x 0.65, 35°C x 0.5, 40°C x 0.4. Above 40°C consult our Technical Department.

Data is provided as a guide only and intervals should be shortened/lengthened based on service experience with the particular application.

Relube Interval (Hours)	Relube Amount		Initial Fill		Relube Interval (Hours)	Relube Amount		Initial Fill	
Type	50 Hz	60 Hz	Gms	Gms	Type	50 Hz	60 Hz	Gms	Gms
ULBK 26-13/2	1700	1400	7	17	ULBK 26-11/6	5800	4800	7	17
ULBK 30-16/2, -20/2	800	700	11	25	ULBK 30-14/6	6000	5000	15	30
ULBK 40-30/2	750	650	15	35	ULBK 30-18/6	6000	5000	15	30
ULBK 40-40/2	700	600	20	55	ULBK 40-27/6	5000	4300	20	40
ULBK 50-50/2	250	200	18	80	ULBK 45-42/6	4800	4100	26	60
ULBK 50-60/6		4200		3800		30		90	
ULBK 26-14/4	3900	3300	7	17	ULBK 50-75/6	3800	3400	38	110
ULBK 30-18/4, 25/4	3500	3100	13	30	ULBK 60-105/6	3000	2600	54	160
ULBK 40-35/4	3000	2700	18	40	ULBK 75-150/6	2000	1800	66	200
ULBK 45-45/4		2500		2200		22		60	
ULBK 50-55/4	2200	1800	30	90	ULBK 30-7.5/8, -10/8	8000	7000	15	30
ULBK 50-75/4	2000	1600	38	110	ULBK 40-15/8	7000	6500	20	40
ULBK 60-95/4	900	800	47	160	ULBK 45-24/8	6500	6000	26	60
ULBK 50-35/8, -45/8		6000		5500		30		90	
ULBK 50-55/8		5500		5000		38		110	
ULBK 60-65/8, -90/8		5000		4500		60		160	
ULBK 75-150/8		3500		3000		66		200	

RELUBRICATION INTERVAL BASED ON AMBIENT TEMPERATURE FOR MARTIN VIBRATOR MOTORS

CAUTION

Use only prescribed grease in vibrator motor. If a different grease is used, vibrator can be damaged and warranty will be voided.

Use only prescribed amount of grease to lubricate vibrator. Too much grease will cause bearings to overheat and result in premature bearing failure.

Lubricate the vibrator with Klüber ISOFLEX TOPAS NB 52 grease from Klüber Lubrication according to Table.

Frame Size	Quantity g	Frequency hrs.
40	12	2000
50	16	2000
60	25	3000
70	40	2000

CAUTION

For 3,600 rpm machines operating continuously or for long periods of time, reduce lubrication time and amount as described in step 2. Failure to do so could result in premature bearing failure.

If vibrator housing temperatures exceed 194°F (90°C), cut lubrication time and amount in half for every 18°F (10°C) increment that meets or exceeds 194°F (90°C).

Lubricate with Klüber ISOFLEX TOPAS NB 52 grease only. Clean vibrator at each pipe plug in housing to remove dirt and debris. Remove pipe plug. Insert 1/8 in. NPT grease fitting. Add grease. Remove grease fittings; tightly replace pipe plugs. (Use anti-seize compound on threads.)

4. Troubleshooting

Below is a table of some possible problems, causes and solutions:

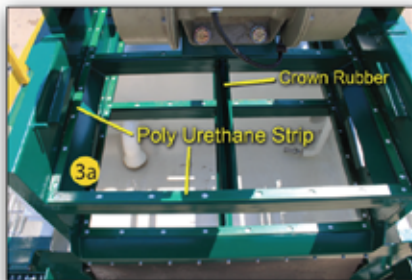
Problem	Possible Cause	Possible Solution
Unable to turn on vibrator motors (No response to the Start Push Buttons)	<ul style="list-style-type: none"> Generator not running 	<ul style="list-style-type: none"> Start Generator
	<ul style="list-style-type: none"> Main CB not ON or tripped 	<ul style="list-style-type: none"> Reset Main CB. Turn OFF to reset then ON
	<ul style="list-style-type: none"> Emergency Stop Push Button depressed 	<ul style="list-style-type: none"> Twist the Emergency Stop Button and pull outward
	<ul style="list-style-type: none"> Control CB inside the electrical enclosure tripped 	<ul style="list-style-type: none"> Turn off main CB. Open the door and reset the Control CB by turning off and then on
	<ul style="list-style-type: none"> 480 Volts from generator not present 	<ul style="list-style-type: none"> Check for 480 volts at the top of the Main CB. If not there check for broken or loose wires and connections Check for voltage at the generator-See generator service Manual
	<ul style="list-style-type: none"> MCC tripped 	<ul style="list-style-type: none"> Reset MCC. Turn knob CCW to off (reset) then CW to on
Vibrator Motors starts but trips	<ul style="list-style-type: none"> An open circuit in the wiring (Wires not connected) 	<ul style="list-style-type: none"> Check that the wiring at the bottom of the respective MCC is in the captive screw terminal and secure. Also check wiring at the motor terminal box to be sure the wire-nuts are secure
	<ul style="list-style-type: none"> A damaged motor 	<ul style="list-style-type: none"> Check motor windings for continuity
Vibrator Motors starts but trips	<ul style="list-style-type: none"> The MCC current adjustment is set to low 	<ul style="list-style-type: none"> Readjust the current setting on the affected MCC (Should be set at 8 amps for the shaker motors-16 amps for the trash pump motor and 19 to 20 amps for the remaining three pump motors)
	<ul style="list-style-type: none"> A damaged motor 	<ul style="list-style-type: none"> Check motor windings for continuity
Shaker running but no linear motion	<ul style="list-style-type: none"> Vibrator Motors not counter rotating 	<ul style="list-style-type: none"> Switch any two leads of a single motor to get opposite rotation

Problem	Possible Cause	Possible Solution
Shaker discharge material is too wet	• Flow too high for screen area	• Decrease the effluent flow to the shaker
	• Screens plugged	• Wash screens the a high pressure washer
	• Incorrect Screens	• Try coarser Screens especially at the end
Excessive noise	• Shaker Shipping Brackets still attached	• Undo Shipping Brackets.
	• Wedges loose	• Reinstall Wedges
	• Worn Crown Rubber	• Replace Crown Rubber
	• Missing Fabric Washer under one of the springs	• Replace missing Fabric Washer
	• Jack Assembly unevenly adjusted	• Adjust Jack Assemblies to the same height
	• Deck angle too low	• Increase Deck angle

5. Shaker Parts Breakdown

Shaker Parts List for KEMTRON Technologies Packaged Mud Recycling Systems								
Reference #	Description	KEMTRON Part No.	Mud Bug Mini	Mud Bug 130	Pit Bull	Tango 500	Tango 1000	
1	VIBRATOR MOTOR EXPLOSION & NON-EXPLOSION PROOF There are various sized motors. Call to confirm HP and voltage.	Call For Part #	2	2	2	2	8	
	Bolts, Lock Nuts and Washers for Vibrator Motors vary. Refer to chart on next page for details.							
	Bolts (Qty for two motors per shaker)	Refer to chart for #	8	8	12	12	48	
	Lock Nuts (Qty for two motors per shaker)	Refer to chart for #	8	8	12	12	48	
	Washers (Qty for two motors per shaker)	Refer to chart for #	16	16	24	24	96	
2	SCREEN WEDGE - LEFT	KTL-WG-12L	2	4	4	6	24	
	SCREEN WEDGE - RIGHT	KTL-WG-12R	2	4	4	6	24	
	SCREEN BAR 26"	KTL-BR-28	4	8	8	12	48	
	PRY BAR - Tool	KPT-PBR-001	N/A	N/A	N/A	N/A	N/A	
3	Pretensioned Screens come in various mesh counts depending on your drilling needs. Call inside sales to order replacement screens.	Call For Part #	2 KPT-33 Size	2 KPT-33 Size	4 KPT-28 Size	6 KPT-28 Size	18 KPT-28 Size	
3a	POLY URETHANE STRIP - 50D, GREEN 3/4" X 1 1/2" X 49" WITH METAL INSERT	KTL-SCR-MGA-1549	N/A	N/A	8	8	32	
	POLY URETHANE STRIP - 50D, GREEN 3/4" X 1" X 26-1/2"FOR KPT-28 SCREENS WITH METAL INSERT	KTL-SCR-MGA-126	N/A	N/A	8	12	48	
	GASKET, RETAINING FASTENER W/ STEEL DRIVE PIN	KTL-AST-100	N/A	N/A	90	130	372	
	CROWN RUBBER, 26" LONG KPT-28 SCREEN	KTL-CR-28	N/A	N/A	4	6	18	
	CROWN RUBBER, 48" LONG KPT-33 SCREEN	KTL-CR-33	2	2	N/A	N/A	N/A	
4	DECK SPRING, PAINTED	KTL-J-9	4	4	4	4	16	
	FABRIC WASHER	KTL-J-8	8	8	8	8	36	
5	JACK ASSEMBLY RIGHT, PAINTED	KTL-J-00R	2	2	2	2	8	
	JACK ASSEMBLY LEFT, PAINTED	KTL-J-00L	2	2	2	2	8	
6	RUBBER MUD SKIRT 3/4"x15"x49 1/2"	KTL-S-15	1	1	1	1	4	
	MUD SKIRT MOUNTING BRACKET	B-14-IN	1	1	1	1	4	

1. Vibrator Motors
2. Screen Wedge & Bar
3. Screens
- 3a. Polyurethane Strips
& Crown Rubber
4. Deck Springs
5. Leveling Jack
6. Mud Skirt



Shaker Vibrator Motor Fastner Chart

This chart shows the bolts, lock nuts and washers used to mount the vibrator motors to the shaker mounting plate for all shakers.						
Please note that the Martin 2.5 HP motor shipped prior to March 1, 2013 use two different size washers. If your unit was purchased after March 1, 2013 the 2.5 HP motors will only use the 1" washer.						
Brand	Bolt		Lock Nut		Washer	
	Part Number	Description	Part Number	Description	Part Number	Description
Martin 2.5 Motor	KTL-VMA-1-412	L-9 Bolt, 1" - 8 x 4 1/2"	KTL-VMA-1-B	L-9 Lock Nut, 1" - 8	KTL-VMA-1-C KTL-VMA-1-C2	L-9 Washer 1" SAE L-9 Washer 1.63" Hardened
Martin 2.0 Motor	KTL-VMA-3/4-A	L-9 Bolt, 3/4" - 10 x 4 1/2"	KTL-VMA-3/4-B	L-9 Lock Nut, 3/4" - 10	KTL-VMA-3/4-C	L-9 Washer 3/4" SAE
Invicta 2.4 Motor	KTL-VMA-1-A	L-9 Bolt 1" - 8 x 6"	KTL-VMA-1-B	L-9 Lock Nut, 1" - 8	KTL-VMA-1-C	L-9 Washer 1" SAE
Invicta 1.5 Motor	KTL-VMA-5/8-A	L-9 Bolt, 5/8" 11 x 4 1/2"	KTL-VMA-5/8-B	L-9 Lock Nut, 5/8" - 11	KTL-VMA-5/8-C	L-9 Washer 5/8" SAE
Invicta .67 Motor	KTL-VMA-5/8-A	L-9 Bolt, 5/8" 11 x 4 1/2"	KTL-VMA-5/8-B	L-9 Lock Nut, 5/8" - 11	KTL-VMA-5/8-C	L-9 Washer 5/8" SAE

The following part numbers are for complete bolt assemblies which include the bolt, lock nut and two washers in a kit.	
Part Number	Description
KTL-VMA-1	Motor Mount Bolt Assembly 1" for Invicta 2.4 HP Vibrator Motor
KTL-VMA-5/8	Motor Mount Bolt Assembly 5/8" for Invicta 1.5 & .67 HP Vibrator Motor
KTL-VMA-1-M2.5	Motor Mount Bolt Assembly 1" for Martin 2.5 HP Vibrator Motor <i>(two different washers)</i>
KTL-VMA-1-M2.5A	Motor Mount Bolt assembly 1" for Martin 2.5 HP Vibrator Motor <i>(one size washer)</i>
KTL-VMA-3/4-M2.0	Motor Mount Bolt Assembly 3/4" for Martin 2.0 HP Vibrator Motor

Vibrator Motor Fastening System – Martin Motors

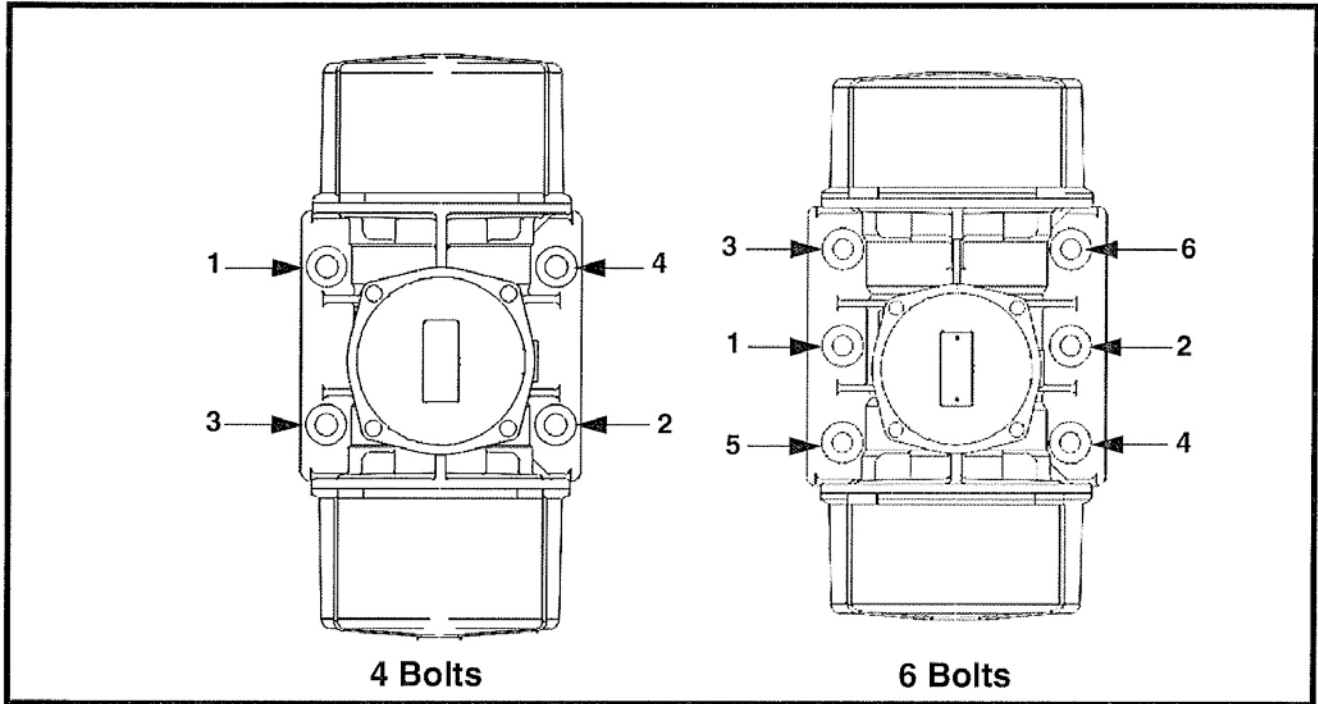


Figure 3. Mounting Bolt Tightening Sequence

7. After the vibrator has been operated for 10 to 20 minutes, check bolt torque. Tighten if necessary.

Table I. Mounting Bolts and Torque Requirements*

Vibrator Type	Frame Size*	English		Metric	
		Bolt Size (gr 5)	Dry Torque (ft-lb)	Bolt Size	Dry Torque (kgm)
MMX	60	3/4 in. -10NC	288	M20	38
	70	7/8 in. -9NC	430	M22	56
MIX	60	5/8 in. -11NC	137	M16	19
	70	1 in. -8NC	644	M25	89
MVX	60, 70	3/4 in. -10NC	288	M20	38

*Torque specifications are for reference only. Contact fastener manufacturer for specific information regarding bolt torque.

Vibrator Motor Fastening System – Invicta Motors

ULBK 21 - 40: Use Grade 8.8 bolts with Grade 8 "Polystop" nuts, torqued to values below. Figures apply with lightly oiled threads.

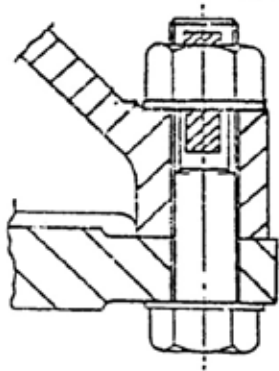
Size	Torque (N.m)		Size	Torque (N.m)	
	Cap-Screws	Setscrews /Bolts		Cap-Screws	Setscrews /Bolts
M 5	8	-	M 12	127	96
M 6	15	11	M 16	310	242
M 8	34	27	M 20	-	473
M 10	68	56	M 24	-	818

Use the above figures for all screws except out of balance weights

Size	Torque (N.m)	Size	Torque (N.m)
	Capscrews/ Setscrews		Capscrews/ Setscrews
M 5	6.5	M 12	96
M 8	27	M 16	176
M 10	56	M 24	490

Use the above figures for out of balance weight Screws only

ULBK 45 - 75: Bolting procedure is half turn method.



PSN 661 – High Strength nut

PSN 612 – Hardened washer under bolt head and nut

PSN 780 - High strength bolt with nylon patch

FIG.2

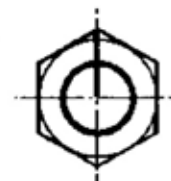


FIG.3



Remove any paint, dirt or scale from all mating surfaces.

Fit hardened washer (PSN 612) under bolt head and nut. Pre-tighten until all mating surfaces are in contact. Mark nuts and bolts as shown in fig. 2 and slog nut one half turn until marks are as shown in fig. 3. Slogging spanners Part No. PSN 777 are available for purchase.