VENTURES
EQUIPMENT

King Scorpion User Manual

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Dear Customer,

Please make a note of.

Machine Date of purchase…….

Machine serial number……

Please familiarize yourself with and understand the operation of this equipment by reading the information contained in this manual.

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Section 1 - General Safety information

Danger

Follow these instructions very carefully to avoid injury to yourself or others.

The King Scorpion pump creates enormous amounts of torque and pressure during operation. Take appropriate safety precautions to avoid injury to self, the operator and to people nearby.

Wear safety clothing and eye protection when operating, maintaining, or working near this equipment.

Electrically powered machine. High voltages exist going to and within this machine. Ensure all powered sources are disconnected and discharged prior to working on this machine.

Always ensure that the machine is not running and that all parts are stationary before ANY maintenance / repair work is conducted on the machine.

Ensure that all guards or grates are correctly fitted before starting or attempting to operate the machine.

Ensure that all fasteners are present and correctly fitted before attempting to start or operate the machine.

Ensure that all components of the machine are present, properly attached and free of damage before attempting to start or operate the machine.

Check all electrical connections to and from the machine prior to and during operation. If any breaks, possible breaks or damage is found cease operation and seek assistance before commencing operation.

Check all hoses, connections, and fittings prior to use and during use. Stop operation immediately if breaks or leaks are found and seek assistance before commencing operation.

Authorized persons ONLY can use this machine.

Section 2 - Machine Description

Operation / Function

The King Scorpion pump is a 2 Cu FT “Wheeled” based unit and designed to be moved via a forklift or other suitable lifting device. Using single phase 240VAC electrical power from either the grid or generator to power the King Scorpion Pump, which via a variable frequency drive turns an electric motor and gearbox to turn a driveshaft within the pumping hopper. The driveshaft turns a rotor stator pump, attached to the front of the hopper, which moves the material through a hose to the location of utilization.

The electric motor gearbox drives a R8-1.5 Rotor Stator pump unit.

The Start / Stop push buttons provide machine start and stop functions to the unit.
The directional control switch and speed control knob provide clockwise rotation, counterclockwise rotation and rotational speed control of the electric motor. The degree of rotation of the speed knob directly affects the rotational speed of the pump unit. Holding the “FWD/REV” switch to the right, in the reverse position changes the rotational direction of the pump to “reverse”. Allowing the directional control switch to return to the “Forward” or “normally maintained position” allows the pump to rotate in the forward or pumping direction of rotation.

Forward, FWD or clockwise is the pumping rotational direction. Reverse, REV, counterclockwise or anti clockwise is the reverse pumping rotation direction.

The electric motor transmits its rotary action through a Drive Auger to the drive shaft that is equipped with directional flighting, helping to convey and mix the material as it travels towards the rotor stator pumping unit.

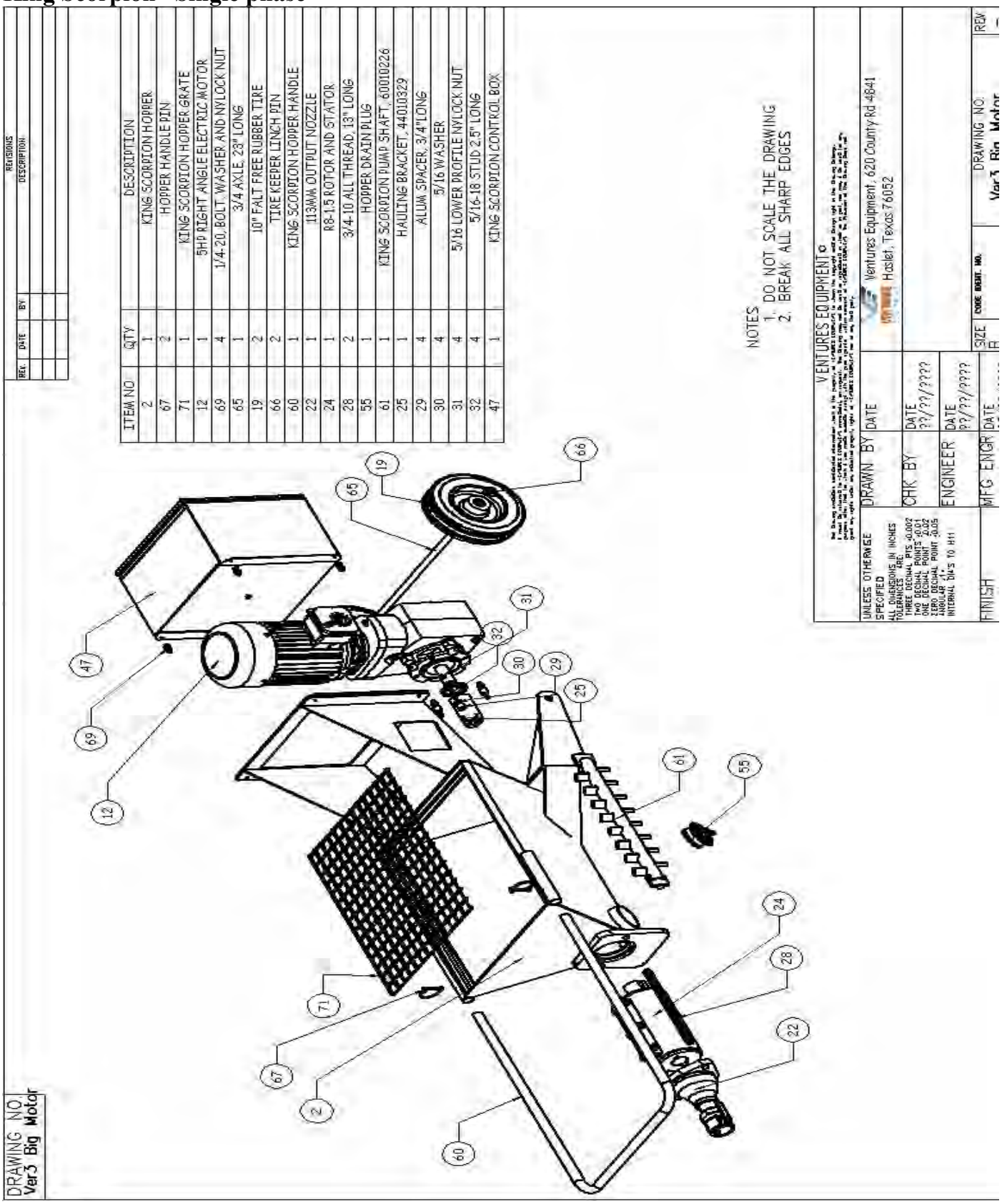
The pumping unit is a progressive cavity “rotor / stator” pump unit comprised of a helical rotating “rotor” within the rubber lined “stator”. As material is drawn/fed into the pumping unit it is moved through a series of cavities that progress from one end to the other, causing the material to be moved towards the outlet.

Once the material has reached the outlet it is guided through a reducer via a 1.5” male pipe nipple connection with camlock, or 1.5” flange connection into the dispensing hose through to the hose outlet where the material is applied.

A number of different devices can be fitted to the outlet of the tube for different means of application. For details of these different devices please contact Ventures Equipment directly.

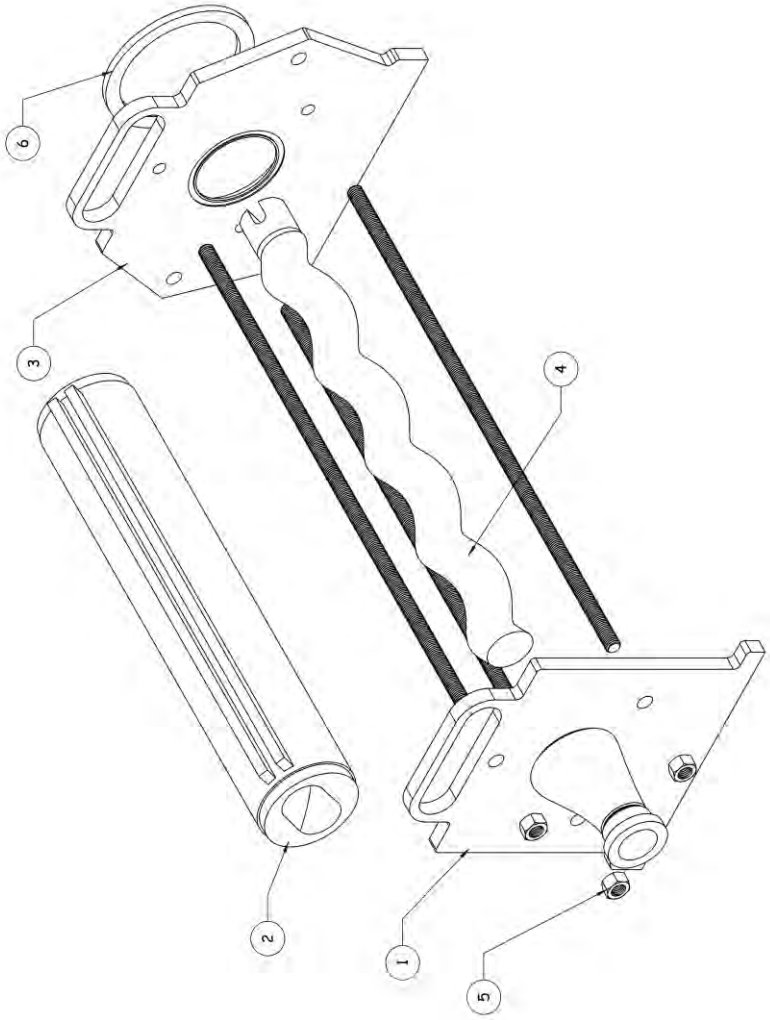
Machine illustrations

King Scorpion– Single phase



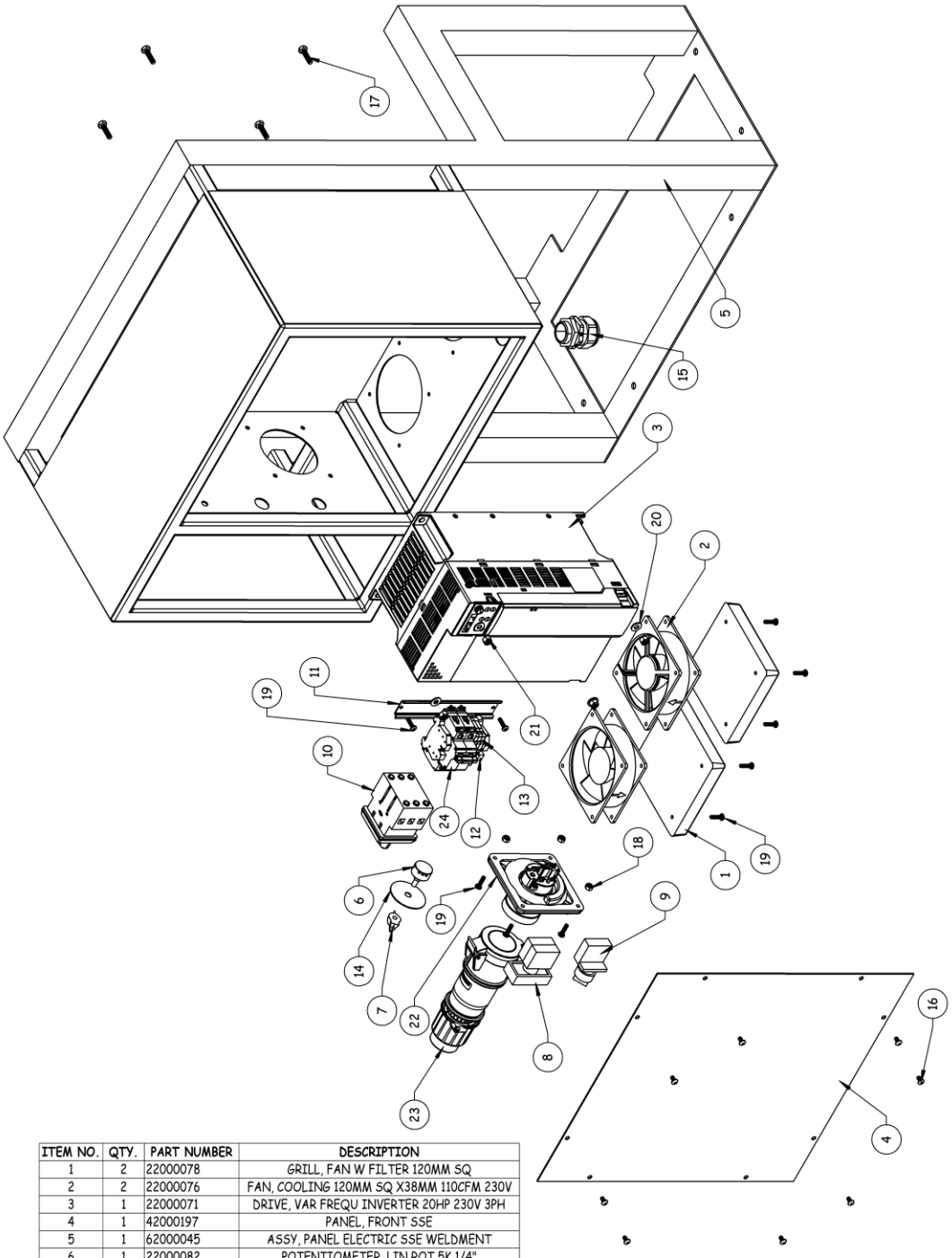
R8-1.5 Pump Assembly -

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	62000020	ASSY, OUTPUT NOZZLE 60-12
2	1	52000004	STATOR 60-12
3	1	42000054	PLATE, PUMP SEAL OUTPUT 60-12
4	1	52000005	ROTOR 60-12
5	3	12000004	NUT, HEX 3/4-10 GD2 ZNPLT
6	1	42000023	GASKET, SEAL 2L8
7	3	12000044	3/4-10 ALL THREAD - 30"



Note: output can be 2" male NPT thread or flange.

Control Assembly – 62000080 Single phase.



ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	22000078	GRILL, FAN W FILTER 120MM SQ
2	2	22000076	FAN, COOLING 120MM SQ X38MM 110CFM 230V
3	1	22000071	DRIVE, VAR FREQU INVERTER 20HP 230V 3PH
4	1	42000197	PANEL, FRONT SSE
5	1	62000045	ASSY, PANEL ELECTRIC SSE WELDMENT
6	1	22000082	POTENTIOMETER, LIN ROT 5K 1/4"
7	1	22000029	KNOB, CONTROL 1/4" SHAFT BLK
8	1	22000075	START/STOP SWITCH SSE
9	1	22000074	FWD/REV SWITCH SSE
10	1	22000081	DISCONNECT, POWER 63A DOOR MNT COMPLETE
11	1	22000012	DIN RAIL 35MM 6.8""
12	2	22000013	DIN GROUNDING SECTION 35MM 14-8AWG
13	4	22000059	FUSE HOLDER MIXER DIN RAIL MNT
14	1	52000043	RHEOSTAT DIAL SCALE 0-100
15	1	22000009	GLAND, CABLE 1"NPT
16	8	12000095	SCREW, PH PHIL 10-32x3/8" ZNPLT
17	4	12000096	BOLT, HEX 1/4-20x1" ZNPLT
18	6	12000037	NUT, NYLOC 10-24 SS
19	14	12000038	SCREW, PH PHIL 10-24 x3/4" 18-8SS
20	8	12000077	WASHER, FLAT 1/4" 18.8SS
21	4	12000085	NUT, NYLOK 1/4-20 18-8SS
22	1	22000101	INLET, POWER 250V-1PH 30A 6h
23	1	22000104	SOCKET, CONN CABLE 1PH 30A 250VAC 6h
24	1	22000105	BREAKER 2 POLE 63A 240V D CURVE DIN

Control panel layout.

Typical single phase

Main power plug, receptacle and power isolator switch

single phase 30A receptacle

Main PWR isolator – OFF/ON

Start / Stop switch and Forward / Reverse switch.

Start/Stop

FWD/REV – Rev Pos

FWD/REV – FWD Pos

Moving and holding the spring return FWD/REV switch in the reverse position will reverse the direction of the running pump by slowing to a brief stop and reversing back to speed. Releasing the reverse switch to the forward position reverses the direction of rotation back to the forward running rotation direction through a short stop period, if the pump was previously running. Holding the direction control switch in the reverse direction whilst pressing the start switch will start the stationary machine in the reverse direction, releasing the reverse switch to forward will slow the rotation to stationary then back to the selected speed in the opposite direction.

Speed control knob.

Dial at stationary position

Dial at 50% speed position

Electric motor gearbox drive

Gear motor

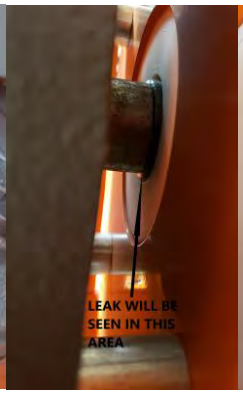
un mounted gear motor

hollow gearbox shaft

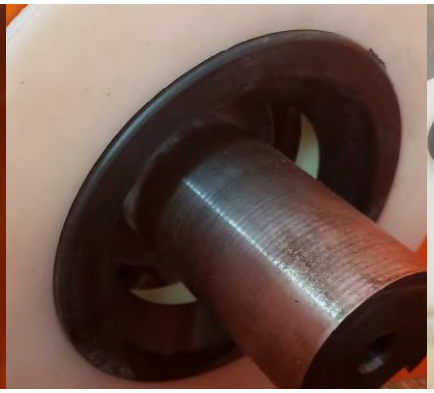
Motor mount spacers

The 5 HP motor gearbox is a Right-angled drive unit with a hollow through shaft output. It is supplied with 30A single-phase 200-240VAC electricity via the power cord from the drive control enclosure.
The motor is attached to the hopper via spacers and threaded studs.

Motor mounted to hopper



Seal leak area


Seal in locating disc (coupler removed)

Loose seal “sealing lip” in disc.

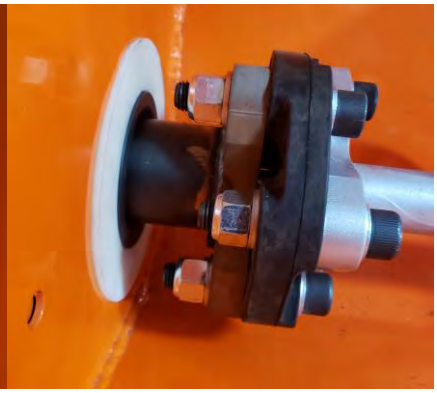
It is possible that if the hopper is filled with just water the seal will weep slightly, however once the hopper becomes full of grout or cement the leak will cease.

The through shaft of the motor locates the motor drive shaft and key stock prevents rotation. The motor drive shaft passes through the gearbox and is capped using a retainer disc and bolt. The other end of the shaft protrudes into the rear of the hopper through the seal and plastic seal locating housing.

Motor drive shaft

Shaft end cap

Motor/Seal gap


drive coupling, seal & housing

Section 3 –Transportation and pre-operational checks

Overview

Prior to any transportation, ensure that ALL parts of the pump, ALL grates secured, ALL tools, and such are either stowed or secured.

The unit is a Wheeled unit with 2 wheels to allow simple transportation and storage.

Attempts should be made to locate the unit on a stable surface that is level, if not level then the pump should be positioned so that the motor is higher than the pump discharge to aid draining and material flow.

Drive system

Electrical connections

Ensure that the unit's power source be it a generator or grid power be correctly wired by a licensed electrician prior to operation. The direction of rotation is clockwise when viewed from the motor towards the rotor stator.
The King Scorpion needs a 200-240Vac single electrical supply single phase power rating is rated at 30A as the machine is fitted with a 30A rated electrical breaker. The machine needs to be grounded to Earth in case of an electrical fault.

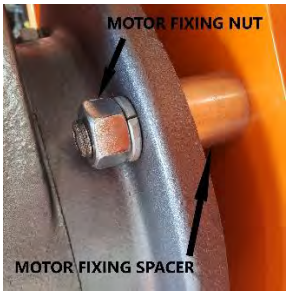
Pumping unit

Ensure that the pumping unit is correctly secured to the front of the material hopper and all nuts tight and secure. Pay attention to the clamp nuts installed either side of the stator unit. Make sure they are fully tightened.

Drive Auger shaft and Coupler.

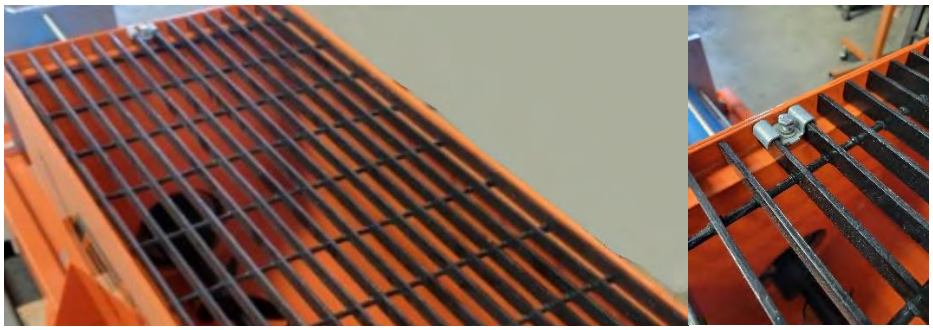
Check that the drive shaft is correctly bolted to the flexible coupling and that the fasteners are secure. Ensure that the drive shaft socket is engaged over the head of the rotor and ensure that the drive tang inside the drive shaft socket is engaged in the slot of the rotor head.

Check that the 4 nuts that hold the electric motor to the 4 hopper spacers and in turn the hopper mounting plate are secure.



Grate fixed

Check that the grate is fixed in position at either end, using the clamps provided.



Ensure that ALL fasteners are present, in good condition and tightened securely prior to any operation.

Hopper drain bung

Hopper drain bung inserted into the drain hole and tighten the wing nut to expand the rubber section to secure.

Section 4 – Machine operation

Ensure that the unit is clear of bystanders and other possible hazards before starting.

Startup

Connect the hoses of the required length to the King Scorpion pump section.

Turn on the control box via the main isolator on the control box.

Do Not start the pump at this time.

Pre-wet the pumping hopper with water and a small amount of dish soap. Approx. 2 Fl/oz of dish soap / gallon of water is adequate and provides a level of lubrication for the dry rotor and stator making it easier to break free without damage. Fill the hopper until the full opening of the stator is covered with water, then add sufficient water and dish soap to be able to wet out the center of all the fitted pump hoses.
Note – A 1 ½" hose of 66' long will hold approx. 6 gallons or almost 1 cubic foot of fluid.

- Run the pump in the pumping direction by setting the speed control knob to approx. 50% and press the start button.

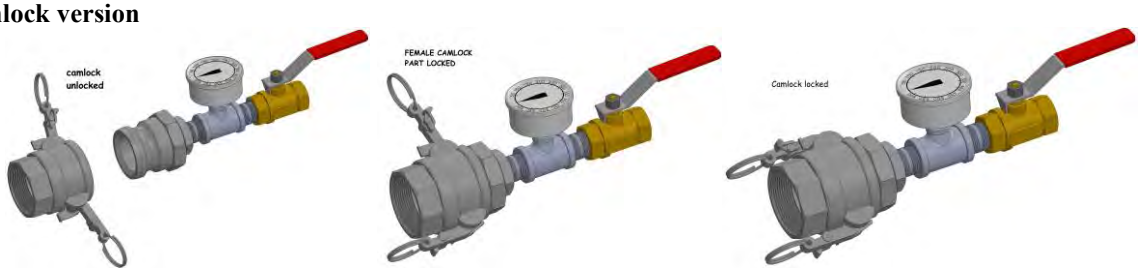
- Observe the drive shaft to rotate the Rotor/Stator pump in the forward direction, indicated by the water from the hopper being pumped out of the unit and the drive shaft turning.
- If the drive shaft does not start turning immediately press "stop", hold the FWD/REV knob in "reverse" and press the "start" button then observe the pump to turn in reverse.
- Immediately push the stop button, release the FWD/REV knob back to the "forward" position the press the start button again and check that the pump now runs in the forward direction.
- If the driveshaft does not turn, then repeat both the forward and rev operations to rock the rotor back and forth to progressively draw the soapy water into the rotor stator allowing lubrication, which in turn allows the driveshaft to turn the rotor.

Once the driveshaft will repeatedly rotate without trouble then either continue to run the unit until the hopper no longer empties the water (If recently pressure tested) and then drain the hopper and hoses, ready for operation OR . Stop the pump by pressing the stop button and continue to pressure testing.

Pressure testing the Rotor and Stator using the supplied pressure tester before each use helps to not only check the amount of wear to the Rotor and Stator but also to ensure your setup will be able to achieve the desired pumping distance/height.

Attached the supplied pressure tester to the output of the King Scorpion pump, by either inserting the male camlock fitting into the pumps female camlock fitting then closing the "ears" of the clamp to ensure safe and complete retention…OR...by placing the Concrete flange (CF) tester assembly face against the CF face of the pump unit then place the opened clamp around the two flanges and close using the nut or lever then ensuring that it is fully secure.

Camlock version



Attach the pressure tester to the pump unit and secure. Move the ball valve to the open position (illustrated above). Fill the hopper with water and dish soap mix (approx. 2floz / Gallon) until the drive shaft and pump opening are covered.

- Start the rotor turning in the forward pumping direction until water can be seen flowing from the ball valve on the pressure tester and stop the pump.
- Close the ball valve by twisting the lever to 90 degrees.
- Start the pump running in the forward pumping direction gradually increasing the RPM using the speed control knob until a maximum pressure is displayed on the gauge (Note the reading will "pulse" up and drop down as the rotor turns. The pressure is the average of the upper and lower two readings). The test pressure at which a R8-1.5 unit is deemed in good condition is 300PSI. If the pressure cannot be achieved the stator requires adjustment – (see Section 6, Stator adjustment)
- Stop the pump.
- Carefully open the ball valve to discharge the excess pressure within the pump assembly, take care not to discharge in the direction of other people or objects.
- Remove the pressure tester from the pump unit.

Remove the plug from the base of the hopper to drain any remaining water and soap solution, then remove and drain the hoses. - **Replace the hopper drain plug**.

The King Scorpion pump is now ready for operation by trained and qualified operators.

NOTE – Do not operate the driveshaft in reverse for periods longer than a few seconds. Reverse is used to break free and to depressurize the pumping hoses in the event of a blockage.
NOTE – Do not operate the unit without either soapy water or material in the pumping hopper, or premature wear and / or damage to the stator can result.

General notes for operation

- Do not let the hopper run dry while the pump is running.
- To stop the machine, press the "Stop" button.
- If a hose becomes plugged while pumping, stop the machine, then reverse the driveshaft direction on pump to relieve line pressure using pressing the "stop" button, then hold the FWD/REV button in reverse and press the "Start" button followed by the "stop" button.
- Never point a hose towards personnel when pump is working.
- When cleaning the pump, do not remove the safety grate while pump is running. Wash out the hopper with water and let it run out of the hose. When the hopper is clean, run foam balls through hose with clean water then wipe down all machine surfaces with a damp rag.
- Hopper draining is achieved by the removal of the drain plug from the lower section by unscrewing the wing nut on the plug to release the plug.

- If access is required into the hopper, then turn off the machine by pressing stop, followed by twisting the main isolator from “on” to “off” then unscrew the fixing bolts for the two clamps at each end of the hopper and lift the grate out. Once cleaning or required access is complete, the grate must be reassembled and secured prior to further operation.
- The pumping unit can be disassembled by removing the clamping nuts and removing the pump unit from the hopper facilitating easier clean up.
- King Scorpion is supplied with an adjustable stator. The sleeve can be tightened to bring working pressure back to normal range as the stator wears. This should be done evenly along the length and in small increments. Overtightening the stator will cause premature wear and heat up material. See Section 6 for details.
- Always check hoses, shafts and power cords for wear.
- The unit runs at high pressures.
- Use caution when moving the unit.
- Check the condition of the flexible coupling at each use. Look for signs of wearing tears or cuts on the rubber.
- Check that the fasteners are all secure.

Section 5 – Simple maintenance and cleaning

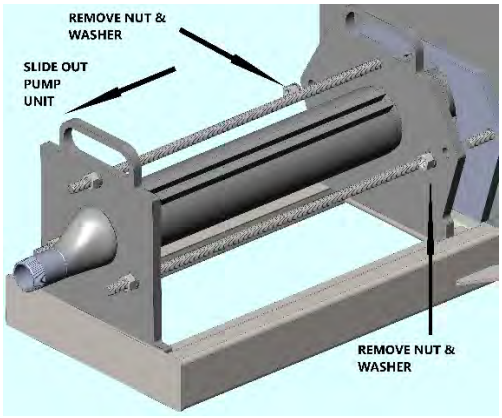
The King Scorpion pumping unit is amazingly simple to maintain.

The biggest part of maintenance on the unit is cleaning after the job is complete. Failure to clean properly after use will damage seals, paint, and moving parts due to material build up. This causes wear and hinder operation and startup next time.

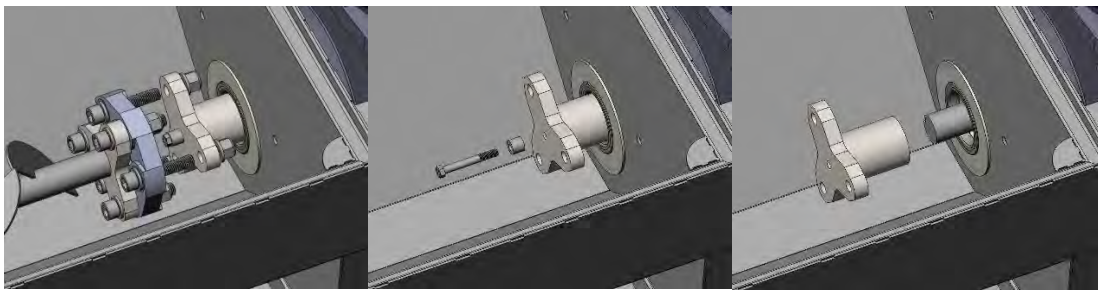
Pay particular attention to the seal between the rotor stator flange and the flange on the front of the hopper. When cleaning, you should also pay attention to the seal around the drive shaft and the flexible drive coupling at the rear of the machine.

Pump seal replacement and flexible coupling removal.

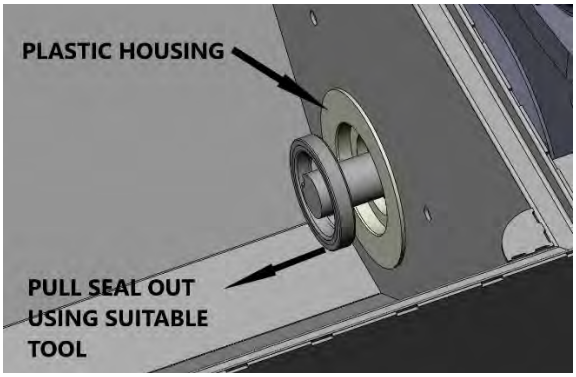
- Remove the rotor stator pump unit from the front of the hopper by removing the holding nuts, sliding forward to decouple the drive shaft and lifting clear – Note the pumping unit is heavy and requires a lifting device or multiple persons.



- Remove the drive shaft and the flexible coupling by removing the three nuts and socket head bolts attaching the items to the drive coupling, then the bolt and spacer holding the coupling to the shaft and then the coupling itself.



- Using a seal removal tool, paint can opener or suitable tool remove the seal from the plastic housing.



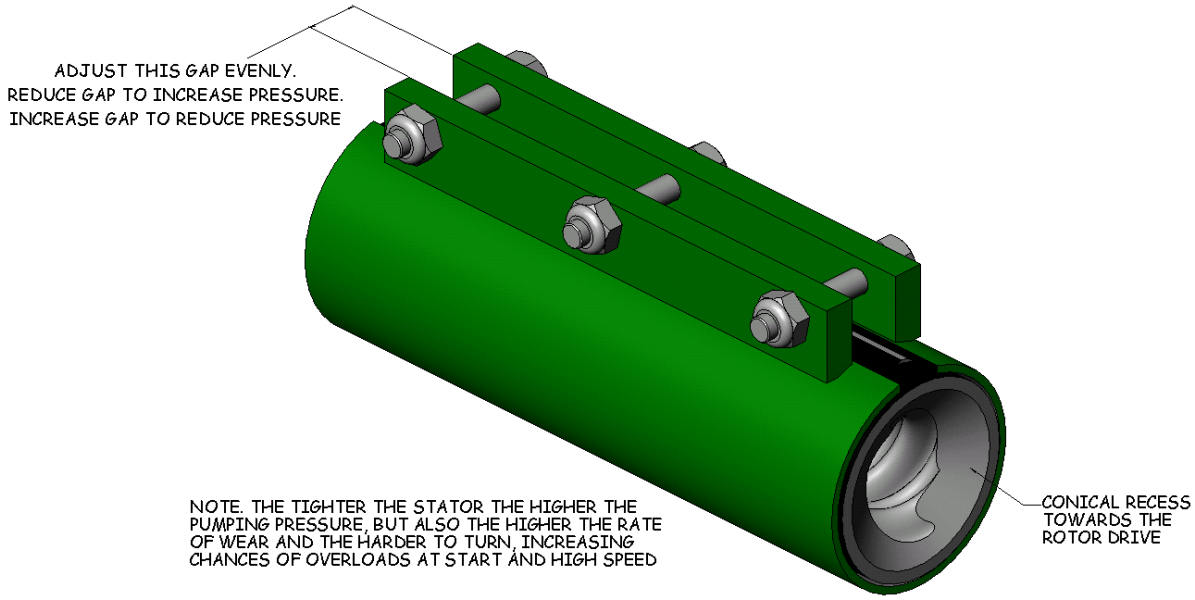
- Obtain a replacement seal place within the plastic housing seal location bore, then tap into place using a suitable support ring and hammer until flush with the housing.
- Apply a small amount of lubricant, such as dish soap to the seal lip and the outside diameter of the coupling, then re-assemble onto the shaft – NOTE – remember to include the key stock in the groove on the shaft.
- Re-assemble the bolt and spacer through the coupling into the shaft and secure.
- Reassemble the flexible coupling along with drive shaft to the coupler and secure.
- Reassemble the pump unit into the hopper cradle then align with the drive shaft and fully engage.
- Re-assemble the nuts and washer to the bolts passing through the hopper and pump unit then secure.
- Check your work!
- Apply power to the King Scorpion and with care check that the drive shaft turns the pump forwards and in reverse correctly.

Section 6 – Notes on wear of rotor / stator pump unit

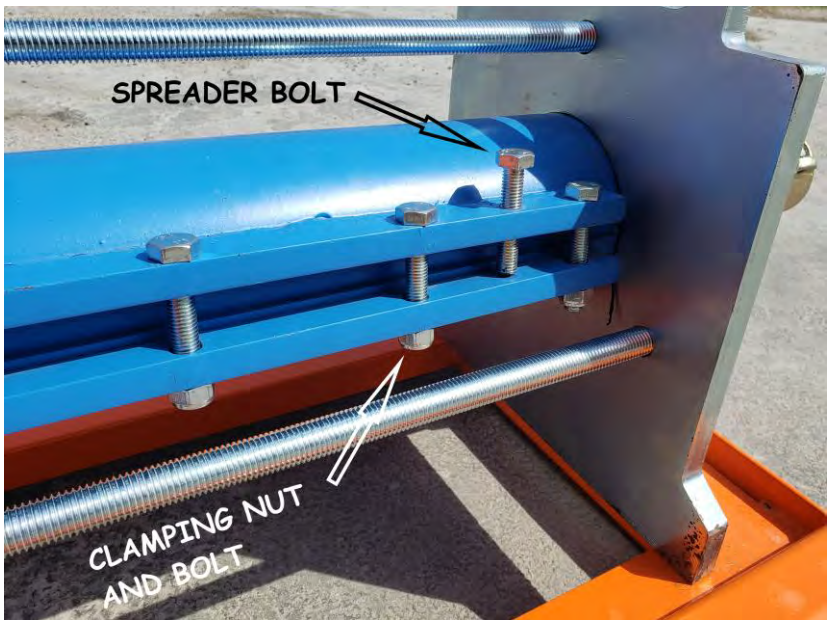
A **rot**or is the metal corkscrew looking item that **Rot**ates inside the stator.
A **stat**or is the **Stat**ionary part that the rotor rotates inside.

Stator adjustment

Certain stators have the capability to be adjusted. A few are not.
The adjustable units allow the tightening of some bolts to squeeze together two flanges, which in turn reduce the diameter of the inside of the stator allowing a tighter fit around the rotor to give renewed ability to produce higher pressures, like when the unit was new.



D8-1.5 ILLUSTRATED



R8-1.5 Rotor Stator shown.

To loosen the Stator, slacken off the clamping nuts and bolts then tighten the spreader bolts to open up the stator.
To tighten the Stator, first back off the spreader bolts then tighten the clamping nuts and bolts.
Pressure test between all adjustments and do not overtighten.

Wear issues

Dry running of a rotor-stator pump.
A screw pump can only work reliably if there is adequate and appropriate lubrication. The lubricant reduces the friction between the rotor and the stator. If this lubricating film is damaged, high temperatures are reached, and the elastomer wears it within a noticeably short time. Even if dry running lasts only a few seconds with new parts, the effect resembles that of a wheel spin on a car tire, dramatically affecting its length of service.

The use of simple dish soap or specific water-based lubricants mixed with water whilst hose cleaning or pump priming can dramatically reduce the negative effects of dry running and help prolong the natural life of the rotor and stator.

Please note - Rotor Stator wear is related to the amount of work that the unit must perform. A low-pressure job with a smooth mix will cause less wear than a high-pressure job with smooth mix. A low-pressure job with a course mix will wear more than a low-pressure job with a smooth mix.

The life of a rotor and stator combination will need to be determined on a job-by-job basis, being dependent upon the coarseness of the mix and the amount of pressure required.

LIMITED WARRANTY POLICY

Ventures EQ. warrants each of its new machines to be free of defects in material and workmanship under normal use and services for a period of one (1) year from the date of delivery.

The warranty is issued ONLY to the INITIAL USER. The warranty period begins when the product is delivered to the initial user or when first put into service, whichever occurs first. Said warranty is void if the machine is subject to misuse, neglect, accident, or abuse.

The Ventures EQ. obligation under this warranty is limited to correcting without charge, at its warehouse, any parts, or parts thereof which shall be returned to its warehouse, transportation/shipping prepaid and upon Ventures EQ. examination proves to have been originally defective. Correction of such defects by repair or replacement shall constitute fulfillment of all obligations to the initial user. This warranty does not include labor or transportation charges unless specifically identified and authorized in writing by Ventures EQ., nor does the warranty apply to any unit upon which repairs, or unauthorized alterations have been made.

The warranty does not apply to normal maintenance service or to normal replacement of certain machine parts which are subject to normal wear (including but not limited to pins, bushings, seals, rotors, stators, hoses, shaft couplings and connectors, pump shafts, filter elements, batteries and tires).

THIS IS A LIMITED WARRANTY AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE. In no event shall Ventures EQ. be made liable for incidental, general or consequential damage, loss or any expense directly or indirectly related to and resulting from use or lack of use caused by delay in delivery, parts failure, or any other causes associated with the product use. No person, firm or corporation is authorized to assume for Ventures EQ. any other liability in connection with the sale of Ventures EQ. products.