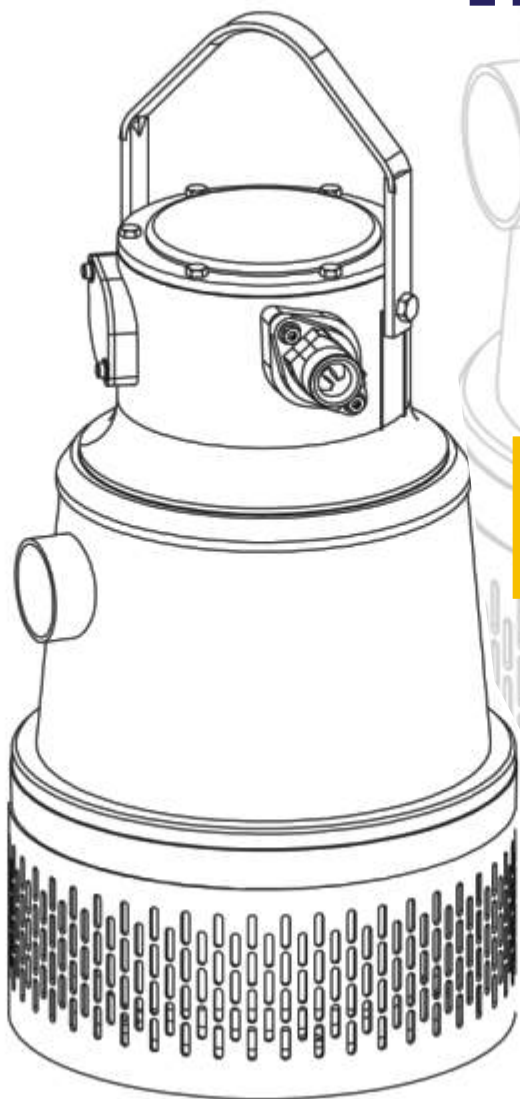




Installation, care & maintenance manual

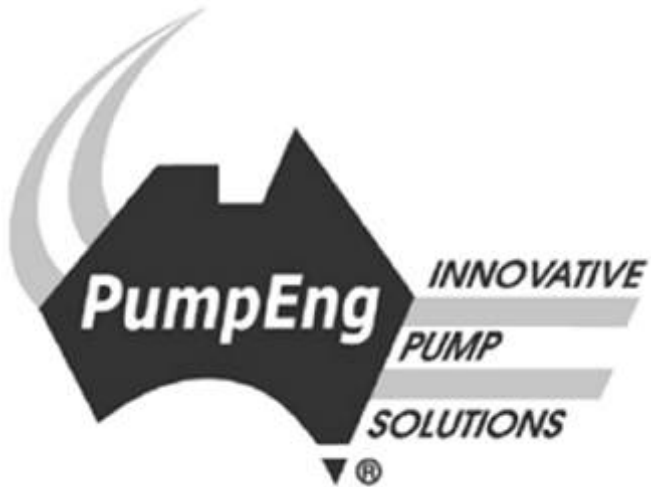
of the

Raptor 20kw



**high head
submersible pump**

Manual Contents



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Warranty



PumpEng will repair faults in the products we manufacture within the following constraints:

- The fault has been caused by defects in materials or workmanship.
- The fault has occurred when the product is used in circumstances to which the product was intended to be operated in and in accordance with installation and operating recommendations.
- All repairs and regular maintenance is performed by an authorized PumpEng repair dealership.
- All components used in servicing and repairs must be genuine PumpEng components
- The fault is not caused by inadequate maintenance.
- The fault occurs and is reported to PumpEng or an authorized PumpEng dealership within twelve (12) months of purchase.
- The product is returned to PumpEng or an authorized dealer at nil expense to the receiver.
- PumpEng accepts nil liability for consequential damage or losses
- PumpEng reserves the right to alter information and specifications without notice.

Pump Description

The PumpEng manufactured “Raptor” series of pumps are electro submersible de-watering pumps.

By incorporating a water cooled, jacketed motor these pumps can run both fully and partly submerged.

This feature allows de-watering to be achieved to a lower level than that which can be achieved with non jacketed submersible pump designs.

To further enhance this feature the “Raptor” pump series are supplied with class H (180 C) insulated motors thereby increasing the allowable temperature rise which would be applicable if a standard class F(150 C) motor was used.

This feature increases the life expectancy of the motor when dry run or snore operation is encountered.

Another design feature which helps to extend pump life during dry run or snore operation is the incorporation of dual mechanical seals running in an oil bath.

The standard motor configuration is 3 phase, 50 cycle. Motor speed is 2 pole and motors are available in both 415v and 1000v.

Variations on these standard motor specifications are available to suit specific requirements. **Note that the “Raptor” series of pump are not Ex-approved and as such cannot be used in explosive or flammable environments.**

The design speed of these pumps is set at 2 pole so as to allow high head pumping to be achieved. All pump Impellers are of a semi open design with full rear shrouds to help maintain constant discharge head over the wear life of the Impeller.

The pumps are designed as a wear resistant de-watering pump, incorporating unique features to minimize both the effects of wear and the costs associated with damage that occurs through wear. Due to the high speed and high head design of these pumps they are not intended for use as a slurry pump.

20 KW Raptor Technical Specifications

20 KW Raptor Technical Specifications		
Motor Details	415V	1000V
Full load Amps	33.9 amps	14.1 amps
Speed	2925 RPM	2930 RPM
Full Load Torque	65Nm	65Nm
Locked Torque	1.5	1.5
Phase	3	3
Hz	50	50
Winding Insulation	Class H	Class H
Maximum Water Temperature	40 C	40 C
Maximum Pump Submergance	22m	22m
Maximum SG of Pumped Water	1.1	1.1
Pump Details		
Maximum Discharge Head	70metres	
Maximum Flow	40 litres/second	
Gross Packed Weight (Nil accessories)	225kg	
Net Weight	185kg	
Bearing Housing Oil Type	Hydraulic 68 (ISO68) or equiv	
Bearing Housing Oil Quantity	4.0 Litres	
Outlet Discharge	100mm BSP Female	
Max Diameter solids	8.0mm	

Transportation, Storage and Installation

- Always lift the pump via the lifting handle. Never lift or drag the pump via the electrical power cable.
- Always ensure the pump is secured and packaged to prevent damage during transportation. When transporting along unsealed roads, pack the pump so as to prevent damage which can be caused to the bearings and seals by excessive vibration
- Do not drop the pump as not only can this cause physical damage to the exterior of the pump it can also cause damage to bearings and mechanical seals.
- Where pumps are stored for extended periods ensure that the cable, seal sleeve and mechanical seals, are intact before putting the pump into operation, also ensure that the impeller can rotate freely and that oil/grease levels are correct.
- Installation must be undertaken by suitably qualified persons. Ensure all relevant safety standards are adhered to and be aware of hazards which exist in the area in question.
- When positioning the pump in an operating environment take measures to reduce the amount of solids and fines which can enter the pump. Wear and associated repair costs are directly related to the amount of solids being pumped.
- Ensure that all electrical connections are correct and that suitable overload/motor protection devices are used and that the pump is operating within its designed current range.
- Ensure the direction of rotation is correct.
- Ensure discharge lines and fittings are properly secured and rated for the installation's design pressure. All discharge lines must be free of kinks and blockages.

Maintenance

The Raptor series of pumps are designed for long periods of trouble free operation.

The frequency of service inspections is determined by the operating conditions which the pump is operating in.

As a minimum the following inspections should be made every six (6) months, however site maintenance staff should set inspection intervals based on the operating conditions which the pumps are operating in.

Note that a drop in output capacity or changes in operating current are an indication that the pump is in need of inspection.

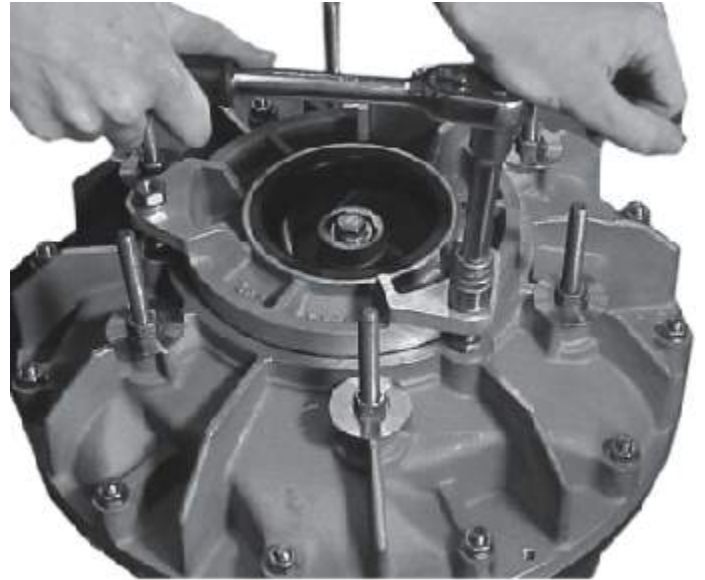
- Ensure all inspection work is performed by suitably qualified and trained persons.
- Inspect the electrical power cable for damage and replace as necessary.
- Measure the insulation resistance of the power cable and motor windings. If the winding resistance is not correct then remove the cable and measure the resistance of the windings only. If this reading returns to normal replace the cable. If the reading does not return to normal the pump should be sent to a PumpEng dealership for repairs.
- Visually inspect all external components of the pump and replace any damaged components.
- Ensure that the cooling jacket internal waterways are free of obstruction, flush/clear as required.
- Check that all nuts, bolts and screws are secure. Remove the oil inspection screws. **(Danger this area may be under pressure, take appropriate precautions)** Lay the pump on its side and pour the oil into a suitable container, check the condition of the lower bearing housing oil. If there is any indication of contaminates in the oil then it is probable that the mechanical seals or bearing housing o-rings have failed and as such the pump should be sent to a PumpEng dealership for repairs. If the oil is not contaminated replace with new oil (quantity required is 4.0Litres) ensuring that the inspection screw o-rings are replaced and the inspection screws are tightened to 20 Nm.
- Remove the stator inspection screw. **(Danger this area may be under pressure, take appropriate precautions)** lay the pump on its side and check if there is any water or oil in the stator casing. If evidence of oil or water are present it is indicative of a mechanical seal or o-ring failure and as such it is recommended that the pump be repaired by a PumpEng dealership. If nil water or oil is evident replace the stator inspection screw O-ring and ensure that the inspection screw is tightened to 20 Nm.
- Remove the junction box cover and inspect for signs of water. **(Danger this area may be under pressure, take appropriate precautions)** If evidence of water exists determine where the water has entered. If the water has entered from the stator casing the pump should be returned to a PumpEng dealership for repairs. If on the other hand the water has entered via the lid or power cable then replace the cable, o-rings and seal sleeve as necessary. When re-fitting the seal sleeve ensure that the seal sleeve seals on a new area of the electric power cable, also ensure that the cable entry clamps are tightened securely on the electric power cable.
- Inspect all wet end components & replace as necessary.

Wet end dismantling

Remove the suction strainer nuts and then take off the strainer.



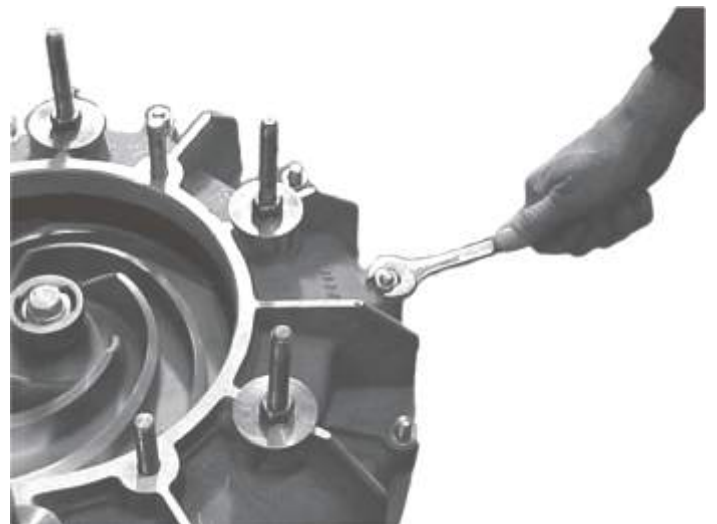
Remove the nuts and Suction Cover



Remove the springs, sleeves and pipe spacers



Remove nuts and the Diffuser



Remove the impeller retaining bolt and washer. Be careful of sharp edges when handling the impeller.



Refit the impeller washer with an M16 bolt



Once the impeller washer is in place tighten the M16 screw down onto the shaft, this will release the impeller. Do not force or pry the impeller from the shaft as damage can occur.



Wet end assembly

Check that the shaft and key way is clean and free of burrs.

Fit the impeller key and adjusting shim spacers. See note 1. Align the key ways then fit the impeller to the shaft tighten down to 70Nm with impeller washer. Part No. 20120054 and impeller screw Part No. 20120014



Note 1:

The minimum amount of adjusting shim spacers should be used so that the clearance between the underside of the impeller and the oil housing is minimal. Recommended clearance 0.2mm to 0.3mm.

Check that the impeller turns freely by hand be careful of sharp edges on the impeller. Fit the diffuser, tighten down with nuts and large washers.



Fit the three half size adjusting locking nuts part No.20120022 onto their studs threading them all the way down on the thread.

Fit the suction cover into position where it touches the impeller evenly, now raise the half size adjusting lock nuts so that they just make contact with under side of the suction cover plus half a turn.

Tighten down the suction cover evenly with nuts and washers, further adjustment may be required by adjusting the locking nuts so that the clearance between the impeller face and the suction cover is minimal and even recommended clearance between 0.2mm to 0.3mm.

A set of feeler gauges as below will help set the clearance, check that the impeller spins freely by hand once the suction cover spacing's are set and locked in position.



Fit the spring assemblies (spacer sleeve, rubber spacer sleeve and spring) to the six studs. Install the strainer and tighten down with nuts and washers.



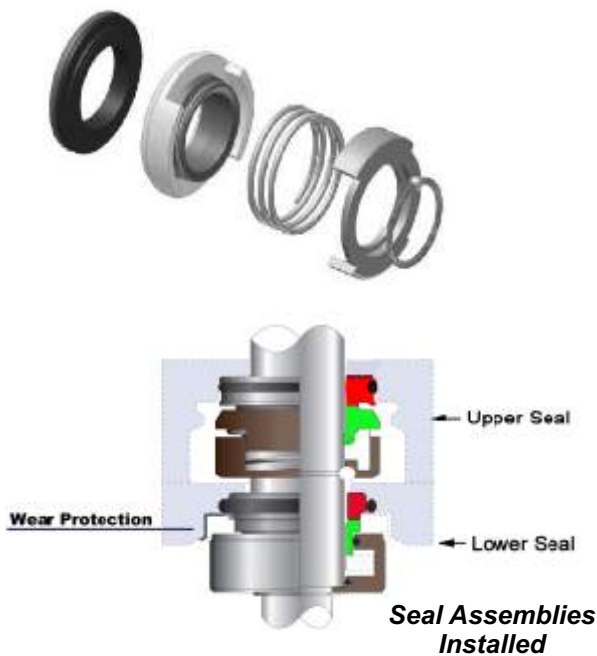
Installation instructions for the Raptor 20kw seals:

Installation Instructions for Raptor 20kw seals: General:

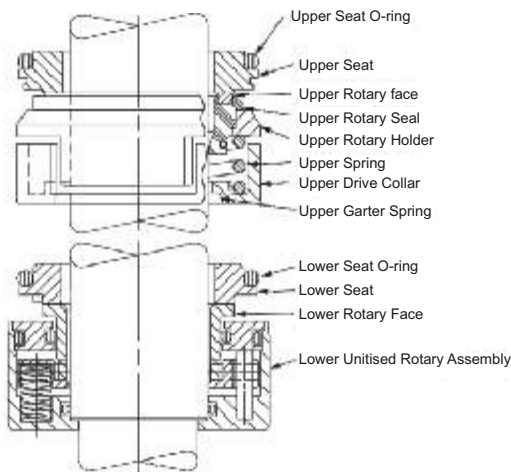
The seals fitted to this pump have tungsten carbide rotary and stationary faces. The upper seal has component parts as shown and the lower seal is of unitized design, made to fit directly into the pump assembly.

Caution: Mechanical Seals are precision components and should be stored in the protective packaging supplied, until they are required for use.

Handle the seal carefully, as some parts can be easily damaged through heavy handling or knocks. Do not use a hammer to install under any circumstances.



INNER SEAL (UPPER)
Ref No. 20128067



OUTER SEAL (LOWER)
Ref No. 20128077

Component Parts of Seal Assembly.

Old Seal Removal:

Drain oil from pump, dismantle pump housing, impeller and key as previously described.

Lower Seal: Remove retaining circlip and slide unitized seal assembly down off the shaft. Using a screwdriver, lever the stationary seat out of the oil housing.

Remove oil housing. Upper Seal:

Push drive collar forward to remove the garter spring, followed by the drive collar, compression spring, seal holder and seal. Using a screwdriver, lever the stationary seat.

Preparation: Ensure that all seal and pump parts are present, and that the pump shaft and housing are clean and free from any burrs or sharp corners. The pump shaft should have a chamfer to assist entering seal onto the shaft and the same chamfer is required in the housing for the seat. Assemble pump as previously outlined ready for the seal assembly. Clean hands before installing seal.

Installation: (Upper Seal) Check the O-ring is installed on the stationary seat. Lubricate the outside of the O-ring and the motor housing with lube oil or liquid soap. Carefully slide the stationary seat into the motor housing push the stationary firmly into place with finger pressure, until it is securely mounted in the cavity.

Wipe the face with a clean lint free cloth. Clean the face of the rotary seal, lubricate the rubber inside of the seal and shaft, then slide seal and seal holder along the shaft until the seal faces are in contact.

Install the compression spring and drive collar, making sure to engage the tangs between the seal holder and drive collar. Push the drive collar forward until it is possible to fit the garter spring into the groove on the shaft.

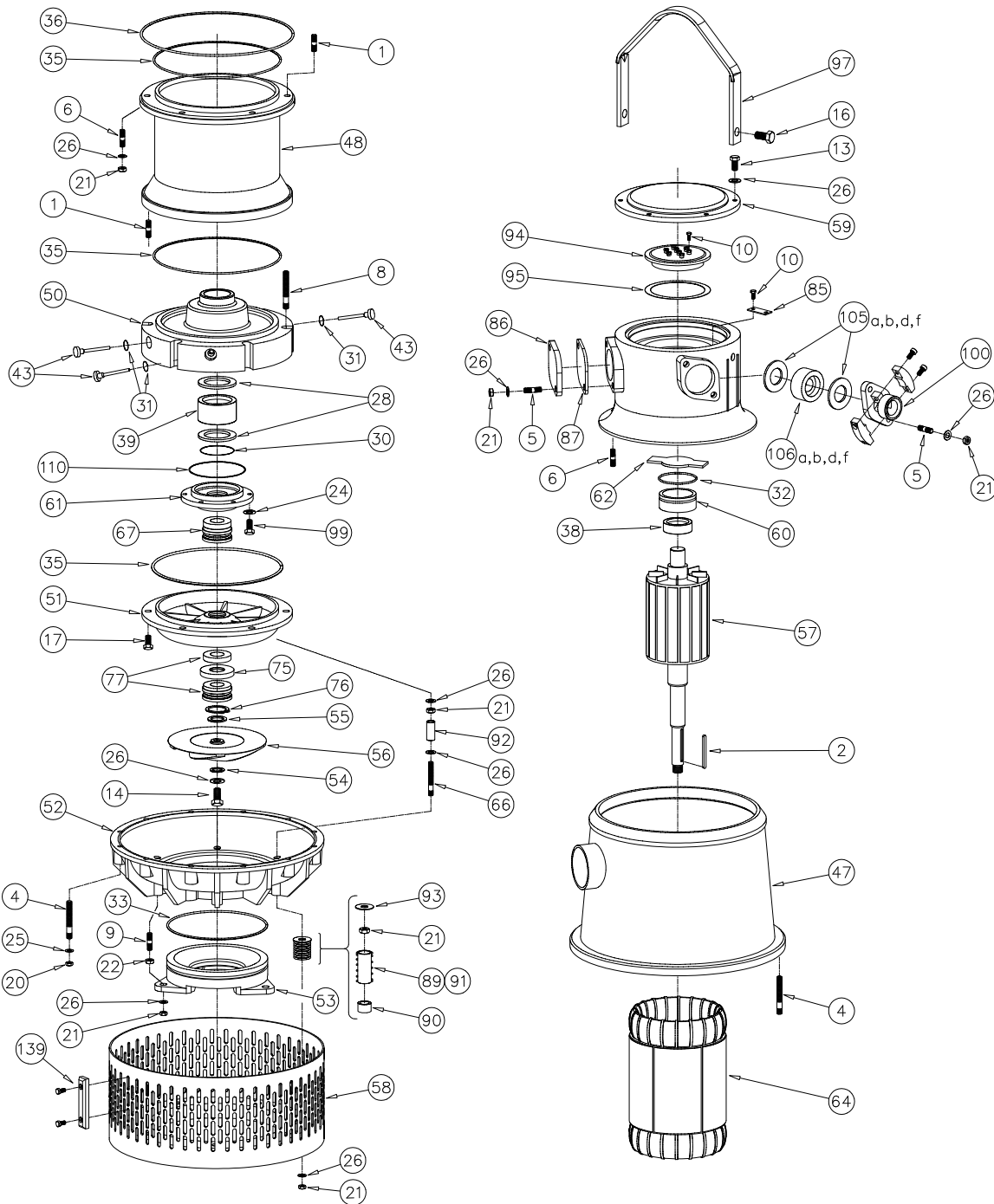
Ensure the ball is correctly engaged in hole provided. Release the pressure on the drive collar and make sure the ball also engages in slot provided.

Installation: (Lower Seal) Install the oil housing in place, check the O-ring is installed on the stationary seat. Lubricate the outside of the O-ring and the housing with lube oil or liquid soap. Carefully slide the stationary seat into the housing.

Push the stationary firmly into place with finger pressure until it is securely mounted in the cavity. Wipe the face with a clean lint free cloth. Clean the face of the rotary seal, and slide unitized seal onto shaft until faces are in contact. Install retaining circlip at the back of the seal. Re-install the key, impeller and pump housing as previously instructed.

20kw Assembly

“Enhanced performance part numbers”



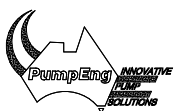
DO NOT SCALE

Title *PUMPENG 20kW 'Raptor'
HIGH HEAD SUBMERSIBLE
DEWATERING PUMP*

Rev. B Dec. '08

SUPPLIED BY:

INFORMATION ON THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE



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Assembly A

ACCESSORIES		
PART No.	DESCRIPTION	CONSISTS OF:
20RK	20kW Repair Kit	Item #30 - Bearing Circlip
		Item #38 - Bearing Upper
		Item #39 - Bearing Lower
		Item #67 - Upper Seal
		Item #75 - Wear Protection
		Item #76 - Circlip
		Item #77 - Lower Seal
		+
		1x O-Ring Kit #20 OK



ACCESSORIES		
PART No.	DESCRIPTION	CONSISTS OF:
20 OK	20kW O-Ring Kit	:-
		Item #31 - O-Ring
		Item #32 - O-Ring
		Item #33 - O-Ring
		Item #35 - O-Ring
		Item #36 - O-Ring
		Item #110 - O-Ring
		Item #95 - Terminal Board Gasket
		-

ENHANCED PERFORMANCE PARTS

ITEM No.	PART No.	DESCRIPTION	MATERIAL	QTY.	ITEM No.	PART No.	DESCRIPTION	MATERIAL	QTY.
1	20100001	Location Pin	HTS	3	57a	20120057A	Replaceable Rotor Shaft Only	S/Steel	1
2	20120002	Impeller Key	S/Steel	1	58	20100058	20kW Strainer	Galv/St	1
4	20120004	Stud Diffuser	S/Steel	12	59	20190059	Junction Box Cover	Aluminium	1
5	20120005	Stud Cable Entry	S/Steel	4	60	20100060	Bearing Seat	Cl	1
6	20120006	Stud Stator Casing/Lid	S/Steel	6	61	20100061	Bearing Cover	Aluminium	1
8	20120008	Stud Bearing Housing Cover	S/Steel	6	62	20100062	Cover	Fibre	1
9	20120009	Stud Suction Cover	S/Steel	3	64	20200064	20kW 415v Stator	-	1
10	20120010	Screw	S/Steel	8	64a	20200064a	20kW 1000v Stator	-	1
13	20120013	Junction Box Screw	S/Steel	6	66	20120066	Stud Wet End	S/Steel	6
14	20120014	Impeller Screw	S/Steel	1	67	20128067	Upper Seal	TC	1
16	20120016	Handle Screw	S/Steel	2	75	20101075	Wear Protection	SS/Poly	1
17	20120017	Oil Housing Screw	S/Steel	3	76	20120076	Circlip	S/Steel	1
20	20120020	Nut	S/Steel	12	77	20128077	Lower Seal	TC	1
21	20120021	Nut	S/Steel	27	85	20120085	Earth Plate	S/Steel	1
22	20120022	Lock Nut	S/Steel	3	86	20190086	Cable Entry Cover Plate	Aluminium	1
24	20120024	Washer	S/Steel	8	87	20100087	Cable Entry Cover Gasket	Rubber	1
25	20120025	Washer	S/Steel	12	89	20120089	Spacer Pipe	Galv/St	6
26	20120026	Washer	S/Steel	34	90	20100090	Spacer Pipe Sleeve	NBR	6
28	20120028	Bearing Washer	S/Steel	2	91	20100091	Spacer Pipe Spring	Galv/St	6
30	20100030	Bearing Circlip	HTS	1	92	20120092	Spacer Nut	S/Steel	6
31	20100031	O-Ring	NBR	3	93	20120093	Washer-Spring	S/Steel	6
32	20100032	O-Ring	NBR	1	94	20100094	Terminal Board	Composite	1
33	20100033	O-Ring	NBR	2	95	20100095	Terminal Board Gasket	Fibre	1
35	20100035	O-Ring	NBR	3	97	20100097	Handle	Galv/St	1
36	20100036	O-Ring	NBR	1	99	20120010	Screw	S/Steel	4
38	20100038	Bearing Upper	-	1	100	20190100	Cable Entry 14mm to 30mm	Aluminium	1
39	20100039	Bearing Lower	-	1	105a	20120105A	Seal Sleeve Washer 16-18mm	S/Steel	2
43	20120043	Screw Inspection	S/Steel	3	105b	20120105B	Seal Sleeve Washer 18-20mm	S/Steel	2
47	20630047	20kW Outer Casing	S/Steel	1	105d	20120105D	Seal Sleeve Washer 22-24mm	S/Steel	2
48	20190048	20kW Stator Casing	Aluminium	1	105f	20120105F	Seal Sleeve Washer 26-28mm	S/Steel	2
49	20190049	Bearing Housing Upper/Lid	Aluminium	1	106a	20101106A	Seal Sleeve 16-18mm	Rubber	1
50	20190050	Bearing Housing Lower	Aluminium	1	106b	20101106B	Seal Sleeve 18-20mm	Rubber	1
51	20191051	Oil Housing	Alum/Poly	1	106d	20101106D	Seal Sleeve 22-24mm	Rubber	1
52	20191052	Diffuser	Alum/Poly	1	106f	20101106F	Seal Sleeve 26-28mm	Rubber	1
53	20191053	Suction Cover	Alum/Poly	1	110	20100110	O-Ring	NBR	1
54	20120054	Impeller Lock Nut	S/Steel	1	-	-	-	-	-
55	20120055	Impeller Shim 0.3mm	S/Steel	3	139	GP2400139	Anode	Zinc	4
55a	20120055A	Impeller Washer 1.5mm	S/Steel	5	-	-	-	-	-
56	20710056	Impeller	Cr27	1	-	-	-	-	-
57	20100057	20kW Rotor Assembly - Complete	S/Steel	1	-	-	-	-	-

20 KW Raptor Torque List

20KW Raptor Torque List				
Item #	Part #	Item	Description	Recmd Torque Nm
10	20120010	Earth Plate/Terminal Board Screw	M8 x 20mm	8 Nm
13	20120013	Junction Box Bolt	M12 x 35mm	60 Nm
14	20120014	Impeller Bolt	M12 x 40mm	70 Nm
16	20120016	Handle Bolt	M16 x 35mm	60 Nm
17	20120017	Oil Housing Screw	M10 x 25mm	30Nm
20	20120020	Diffuser/ Outer Casing Nut	M10	50 Nm
21	20120021	Strainer Nut	M12	60 Nm
		Suction Cover Nut	M12	60 Nm
		Extension lock Nut	M12	60 Nm
		Bearing housing Upper/Lid Stud	M12	60 Nm
		Cable Entry Cover Plate Nut	M12	60 Nm
		Cable Entry Nut	M12	Tighten until it bottoms out metal to metal
22	20120022	Suction Cover 1/2 Nut	M12	60 Nm
43	20120043	Inspection Screw	Special bolt M16	20Nm
92	20120092	Spacer Nut	Extension Nut M12	60 Nm
99	20120010	Bearing Cover Bolt	M8 x 20mm	25 Nm

Raptor Motors

INSTALLATION INSTRUCTIONS FOR 3 PHASE SUBMERSIBLE MOTORS.

WARNING

CATASTROPHIC OR FATAL ELECTRIC SHOCK MAY RESULT FROM FAILURE TO CONNECT THE MOTOR CONTROL ENCLOSURE, METAL PLUMBING, AND ALL OTHER METAL NEAR THE MOTOR OR CABLE, TO THE POWER SUPPLY GROUND TERMINAL. TO REDUCE THE RISK OF ELECTRICAL SHOCK, DISCONNECT POWER BEFORE WORKING ON OR AROUND THE WATER SYSTEM.

THIS EQUIPMENT IS INTENDED FOR INSTALLATION BY TECHNICALLY QUALIFIED PERSONNEL. FAILURE TO INSTALL IN COMPLIANCE WITH NATIONAL AND LOCAL REGULATIONS, MAY RESULT IN ELECTRIC SHOCK OR FIRE HAZARD, UNSATISFACTORY PERFORMANCE, AND EQUIPMENT FAILURE. SUBMERSIBLE MOTOR INSTALLATION INFORMATION IS AVAILABLE FROM PUMP MANUFACTURERS AND DISTRIBUTORS.

HANDLING AND INITIAL CHECKS

1. Inspect the motor and cable for transport damage. Report any visible damage to the transport company and to your supplier immediately.
2. Do not lift the motor using the supply cable. Do not pull the supply cable. The supply cable needs to be protected at all times as a damaged cable may allow water into the individual conductors causing an Earth fault.
3. Check the motor nameplate data and ensure that it matches your purchase order and meets your requirements.
4. Motors are usually supplied with factory-installed oil in the Mechanical Seal chamber. Please check for any signs of oil leakage, and advise the supplier immediately if there appears to be any oil leakage.
5. On new installations and if the motor has not been used for a long period it must be "Meggered" at 1000V prior to operation. The Megger reading / Insulation Resistance should be at least 100 Mohms before operation and at least 50 Mohm when hot after running.
6. Verify that the motor Mechanical Seal chamber is full of oil to the fill plug level prior to installation. *(FAILURE TO ENSURE THAT THE SEAL CHAMBER IS FULL OF OIL PRIOR TO OPERATION WILL VOID ANY WARRANTY CLAIMS.)*

The oil chamber should only be filled to the level, as indicated in the specific pump model technical specs.) Ensure all filling plugs, drain plugs, cable connections, and mounting bolts are tight.

IF THERE IS A WARRANTY INSPECTION THE MOTOR MUST BE RETURNED TO THE ORIGINAL SUPPLIER, OR PUMPENG, WITH CABLES INTACT.

CHECK LIST PRIOR TO INSTALLATION

Please check the following:

1. Ambient Temperature of the water to be pumped and ensure that it is less than the temperature rating of the motor.
2. The PH of the water is between 6.5 and 8.
3. Maximum Chlorine content in water is less than 500 PPM.
4. Maximum Sulphuric Acid Iron content in the water is less than 15 PPM.
5. Maximum Fluorine content in the water is less than 0.8 PPM.
6. Maximum Sand content is less than 50 PPM.
7. The electrical control equipment includes suitable fast acting current overload protection, which is set to shut the motor down within 3 seconds under locked rotor current or starting current conditions.
8. The electrical control equipment includes suitable fuses or circuit breakers to disconnect the system if there is a fault.
9. Variation of the supply voltage and frequency combination is within 5% of the motor nameplate voltage and frequency.
10. Maximum voltage unbalance is less than 5%.
11. The cable sizes are calculated to ensure that the voltage at the motor is still within 2% of the motor nameplate voltage after allowing for volt drop at full load current.
12. Waterproof submersible type cables must be used with these motors.
13. The motor has been correctly selected to suit the pump, thrust load from the pump, electrical supply capacity, and water availability. The motor should be installed to be submerged at all times as this will ensure a long service life.
14. These motors may overheat if they are run continuously on full load while not submerged or whilst running on the snore.
15. Connection of the motor to an incorrect supply will void any warranty.
16. Protection against single phasing is strongly recommended. If the motor fails due to single phasing the warranty will be void.
17. Installation of Lighting Arrestors is also recommended to protect the control panel, motor cables, and the motor. Any failure due to lightening will not be covered by warranty.
18. Any cable joints must be done properly by technically competent technicians. They must be waterproof and give a good electrical connection with no significant volt drop.
19. Reduced voltage starting using Soft Starters, VVVF drives, Autotransformers, (or Star-Delta starters if the motor has been supplied with 6 leads out), can create additional problems for submersible motors. Please ensure compliance with the following points.
 - A. Correctly selected Overloads or Circuit Breakers are correctly installed and correctly set to protect the motor.
 - B. Suitable Short Circuit Protection is installed.

C. The starter will allow the motor to generate sufficient torque to start the pump and run it up to speed. (In general the torque is reduced by the square of the voltage a small reduction in voltage will lead to a large reduction in starting torque).

D. Timers are set to ensure that the motor has enough voltage for enough time to run the motor up to speed as quickly as possible, and also switch the motor over to full voltage as quickly as possible and prolonged running at reduced voltage will stress the motor windings.

COMMISSIONING and OPERATION

1. After energising the motor for the first time, ensure that the starting current drops to below the nameplate current within 5 seconds, which means that the motor has run up to full speed.
2. Check the starting reaction, flow rate and pressure from the pump to make sure the motor is running in the correct direction of rotation. Swapping any 2 of the 3 phase supply leads will change the direction of rotation.
3. While the motor is running for the first time check the water for sand. If sand appears continue to pump until the water clears. If the motor is switched off while the pump is still pumping sand this could accumulate in the pump and cause it to seize up.
4. During testing or checking rotation the number of starts and the time between starts needs to be

controlled. As a general rule the motor should be allowed 5 minutes to cool down between each start.

5. It is strongly recommended that the "Over Current" protection is set to trip at about 5% higher than the steady state current recorded when the motor/pump is commissioned. It is not recommended that the "Over Current" protection is set at just above Full Load Nameplate Current, as, in a lot of cases, this will not protect the motor if the current increases, especially if the motor is not fully loaded. We believe that the operator needs to know if the current starts to increase, so they can determine why.
6. All temperatures and all 3 phases of voltage and current and insulation levels should be recorded throughout the life of the installation and monitored and reviewed as a form of preventative maintenance.

MAINTENANCE

The ball bearings have been greased for life during assembly - there is no need for additional oil or greasing during the operating life of the motor and bearings. The motor cannot be accessed unless it is removed from the sump, so everything that can be monitored needs to be monitored on a regular basis, and any unexplained changes investigated.

1. The normal running current, and voltage on all 3 phases need to be recorded on a regular basis.
2. The motor winding and the cable insulation needs to be recorded on a

regular basis. If the cold insulation drops below 2 Megohms the installation needs to be carefully checked out so as to determine the cause of the low Megohm reading.

3. The output pressure and flow from the pump should also be monitored on a regular basis.

The overall performance of the pump and motor can be reviewed based on the information being recorded and this can be used to determine any need for maintenance or overhauling, which might be required

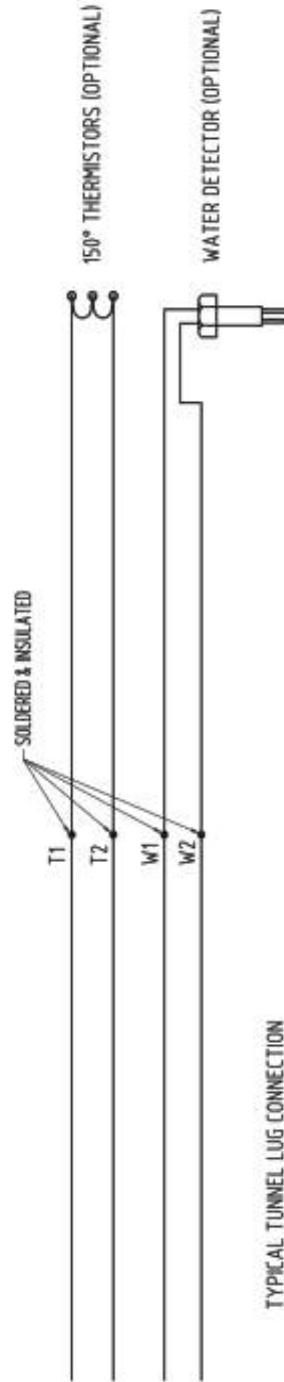
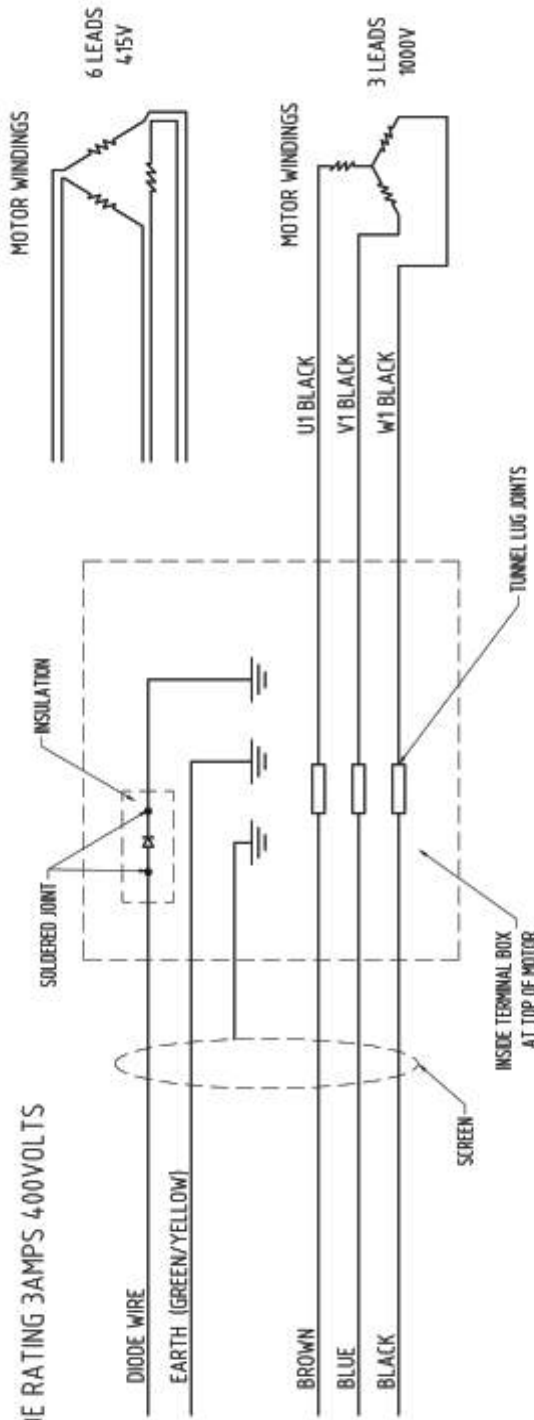
Raptor Motors - Connection arrangement

8-866-0214

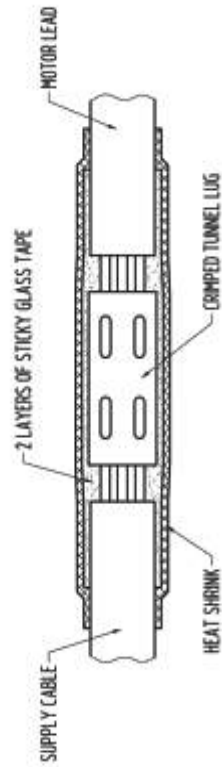
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DIODE RATING 3AMPS 400VOLTS



TYPICAL TUNNEL LUG CONNECTION



TYPE		NAME		CONNECTION ARRANGEMENT		MATERIAL	
RAPTOR MOTORS		8-866-0214					
NO.	8-866-0214	REVISION	1	WEIGHT		SCALE	
DESIGN BY		APPROVED BY		DATE	21/05/2005		
CHECKED BY							PUMPENG



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