PumpEng

Tough Submersible Pumps

INSTALLATION, CARE &

Maintenance Manual

of the **Raptor 8kw**

HIGH HEAD SUBMERSIBLE PUMP

www.pumpeng.com.au

Manual Contents

PumpEng is an Australian company founded in 2001 that specialises in submersible pumps for use in mining, construction and industrial dewatering. Founder Paul Meneghel has experience in submersible pumps and mining stretching back to the 1980s.

PumpEng uses innovative design to manufacture pumps that perform well in the toughest of circumstances. PumpEng has been successful in the Australian market with its innovative line of Raptor® pumps. Now PumpEng have launched a new pump - JetGuard®- that uses patented design innovations to better handle underground mining conditions including the presence of Shotcrete fibre and other tramp material.

Introducing JetGuard®

What Does a Broken Pump Really Cost a Mining Operation?

Many dewatering pumps were designed before Shotcrete was widely used in underground mining. Shotcrete fibres are now a major cause of underground pump failure and production delay. In a multi million dollar operation, even small delays can be expensive.

Benefits of JetGuard® for Mining Operations

- Performance: increase mine performance, productivity and profit by reducing breakdowns and delays.
- Safety: reduce workplace hazards by reducing the number of breakdown maintenance events.
- Cost: reduce equipment life cycle cost by increasing total pump life.

Why is JetGuard® Better?

PROTECTED - Less Fibre Gets In

A hydraulic curtain repels surface fibre, and the suction strainer intake is on the bottom of the pump, not the side. So less Shotcrete fibre gets inside. If any fibres do get in, a cutter plate chops up fibres into tiny pieces.

TOUGHENED - Less Damage Gets Done

Internal components in the wet end are tough metal, not elastomer. Fibre and tramp can more quickly destroy elastomer components, while toughened steel components power on. The mechanical seal is in a non pressurised zone, away from the high pressure intake area and removed from the fluid/Shotcrete path.

PRODUCTIVE - Less Downtime More Production

JetGuard® has been designed for tough environments, to keep on pumping when traditional dewatering pumps might fail.

PumpEng manufacture and sell tough submersible pumps suitable for underground mining and other heavy duty applications. We innovate to increase operational reliability and productivity.

JetGuard®	Heavy duty underground dewatering pump. Shotcrete handling capability, all metal wet end, electro submersible pump with high chrome impeller. 10Kw (20Kw and 37Kw planned)
Raptor®	Underground dewatering submersible. Compatible with Xylem/Flygt Bibo range. 5Kw to 20Kw Disclaimer: PumpEng Pty Ltd is not an authorized distributor of parts or services for the products of Xylem. PumpEng Pty Ltd products are not associated with, endorsed by or sponsored by Xylem. Any use of Xylem names, trademarks, model no, item no or part no is for reference purpose only. Flygt is a registered trademark of Xylem.
ScatPump®	Heavy duty submersible sludge/slurry pump with high chrome impeller & agitator. Flows available up to 83 l/s and heads up to 35 m. 1.5Kw to 22Kw
CorroTuff®	A 415v range of pumps with smart technology. Stainless Steel with a HRC impeller. 1.5Kw to 22Kw
Vortex	A pump designed to handle solids without damaging the product. 4Kw to 18.5Kw
MetalVest	MetalVest™ submersible pumps use a full metal build, so there is no urethane or rubber lined parts for a longer life available in 1000v & 415v. The cylindrical MetalVest™ HHS Slimline is designed for those places where physical size is an issue. It fits inside caissons for offshore requirements. 4Kw to 18.5Kw The Heavy Duty MetalVest HH for those tough conditions 37kw.
Grinder	Small 240v grinder pump for dirty water applications. 0.75Kw to 1.1Kw

Parts, Hire & Service - A Full Service Provider

PumpEng stock an extensive range of spare parts. The entire range of PumpEng submersible pumps is available for hire Australia wide on short and long term contracts.

A range of service programs are available, and can be tailored to your requirements.

To ensure you never pay too much for our services, we offer a price guarantee on our product range. This effectively caps your maximum repair price. Simply send us your old pump if it goes over our limit and we will supply you with a PumpEng manufactured replacement.

Vision & History

Our vision is to be the specialist in tough submersible dewatering pumps based on:

- Innovative thinking: To offer solutions to customer needs.
- Product availability: Products available on time every time.
- Technically sound product & system advice: Supplying the correct product every time.
- After sales support: Providing support to our customers after the initial sale.

Our goals are:

- Develop & manufacture our own product range to give us product security and introduce these products into the market place with respect to our core values.
- Develop brand name & product recognition of our products to ensure future growth, security & profit.

PumpEng is an Australian company founded in 2001 that specialises in submersible pumps for use in mining, construction and industrial dewatering. Founder Paul Meneghel has experience in submersible pumps and mining stretching back to the 1980s. We are now a well established specialist submersible pump supplier to a wide range of customers across Australia, and are addressing global opportunities.

We have developed a team of experienced staff enabling us to satisfy our customers needs which vary from the design, manufacture and supply of our pumps to the expedient repair/ rebuild & full aftermarket support of our product range. The skills of our staff are further enhanced through the alignment of PumpEng with major foundries and engineering facilities located within Australia as well as abroad.

PumpEng's philosophy is to provide exceptional product and follow on with first-rate sales service and support. We aim to provide a Total Dewatering Solution.

Plant & Equipment

Our Perth, Kalgoorlie & Mount Isa branches comprise of stock holding as well as assembly, testing, fabrication and repair facilities. We have all the equipment needed to fully support our pump range including a custom built test facility which is able to test to AS 2417 Standards.

Our workshop is one of the few pump facilities in Western Australia incorporating a 1000v test bay and is equipped with a 200kva, 1000v transformer. Our manufacturing facilities in Western Australia and internationally have strict adherence to quality procedures throughout all stages of manufacture.

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 submereged.

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 wear resistant de-watering pump, incorporating unique features to minimize both the effects of wear and the costs associated with the 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.

8kw Raptor Technical Specifications

Motor Details	415v	1000v
Full Load Amps	15 amps	6 amps
Full Load Torque	26 Nm	26 Nm
Locked Torque/Full Torque	2.6	2.9
Speed	2890 RPM	2890 RPM
Phase	3	3
Hz	50	50
Winding Insulation	Class F/H	Class F/H
Pump Details		
Maximum discharge head	70 meters	
Maximum flow	15 liters/second	
Discharge	80mm BSP Female	
Gross Packed Weight	115 kg	
Oil Type	Hydraulic 68 ISO68 or equiv	
Oil Quantity	2.0 Litres	
Maximum Water Temperature	40 C	
Maximum Pump Submergence	22 m	
Maximum SG of Pumped Water	1.1	

Transportation, Storage & Installation

- Always lift the pump via the lifting handle. Never lift or drag the pump via 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 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 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 designated 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 in 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 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 possible 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 2.0 Liters) 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 o-ring failure and as such it is recommended that the pump be repaired by 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, 0-rings and seal sleeve as necessary. When re-fitting the seal sleeve ensure that the cable entry clamps are tightened securely on the electric power cable.
- Inspect all wet end components & replace as necessary.

8kw Torque List

8kw Raptor Torque List

Item #	Part #	Item	Description	Recmd Torque Nm
1	0812001	Impeller Nut	Special nut G1/2	70 Nm
72	08130072	Oil/Stator Inspection Screws	Special bolt 5/8 unc	20 Nm
87	08120087	Bearing Cover Bolt	1/4 unc x 13mm	8 Nm
89	08120089	Handle Bolt	1/2 unc x 3/4	30 Nm
90	08120090	Diffuser Disk Bolts	3/8 unc x 13mm	8 Nm
91	08120091	Bearing Housing Upper Bolt	3/8 unc x 3/4	25 Nm
95	08120095	Cable Entry Nut	3/8 unc	Tighten until it bottoms out to metal
96	08120096	Suction Cover Nut	1/2 unc	60 Nm
	08120096	Diffuser Nut	1/2 unc	60 Nm
	08120096	Strainer Nut	1/2 unc	60 Nm
	08120096	Oil Housing Nut	1/2 unc	60 Nm
	08120096	Stator Housing Nut	1/2 unc	60 Nm
	08120096	Outer Casing Nut	1/2 unc	60 Nm
	08120096	Lid Nut	1/2 unc	60 Nm
141	08120141	Top Cover Bolt	3/8 unc x 3/4	10 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 Mohms 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

Checklist 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 Flourine content in the water is less than 0.8 PPM.
6. Maximum San 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 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, Auto transformers, (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.

Checklist Prior to Installation

A .Correctly selected Overloads or Circuit Breakers are 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 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

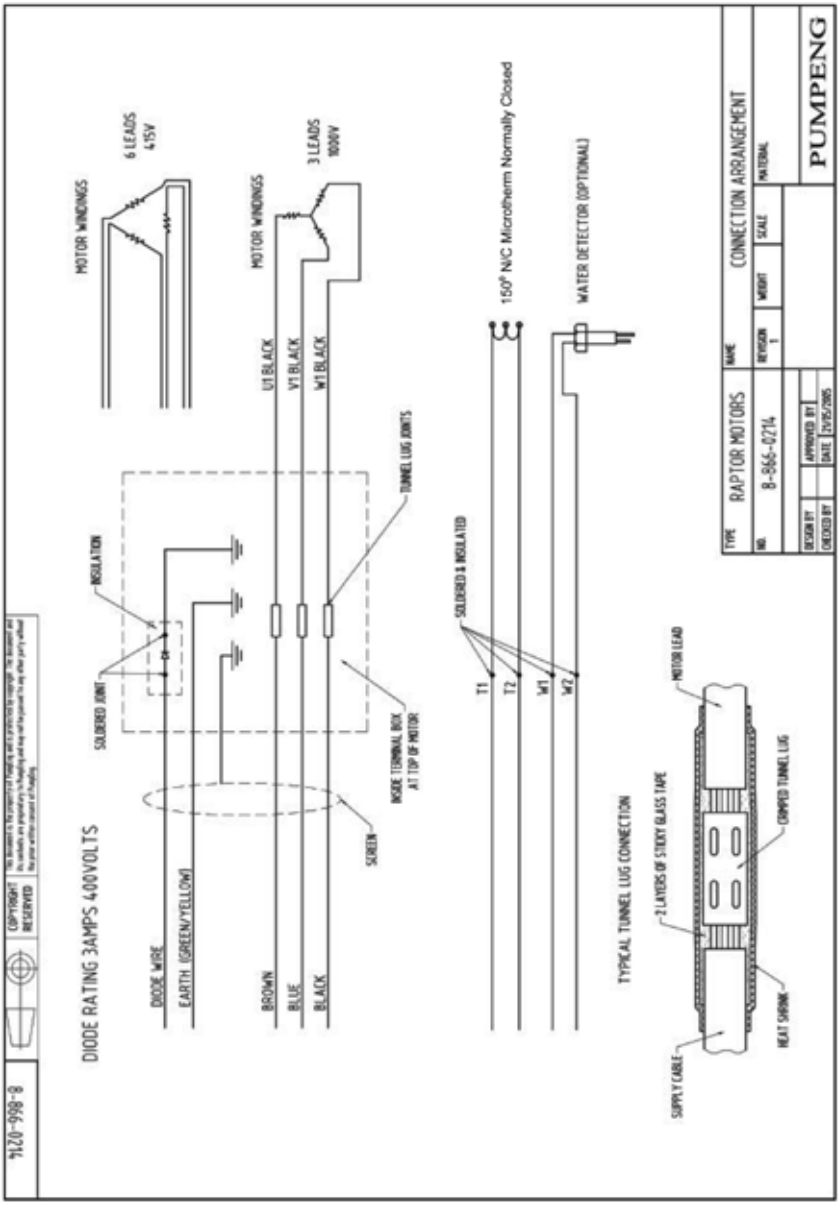
1. After energising the motor for the first time, ensure that the starting current drops to below the nameplate current within 5 seconds, which means that the motor has run up to full speed.
2. Check the starting reaction, flow rate and pressure from the pump is running in the correct direction of rotation. 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.

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 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



PumpEng

Tough Submersible Pumps

Perth

1/18 Renewable Chase
Bibra Lake WA 6163

(08) 9434 9922

Kalgoorlie

8 Keogh Way
Kalgoorlie WA 6430

(08) 9021 5965

Mount Isa

Mount Isa
QLD 45825

0457 006 407

Email us:
sales@pumpeng.com.au

www.pumpeng.com.au