

J. & P. RICHARDSON INDUSTRIES PTY. LTD A.B.N. 23 001 952 325

THE DOMAIN ESTATE STAGE 6

SEWERAGE RETICULATION PUMPING STATION No.1

OPERATION AND MAINTENANCE MANUAL

BY
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5.0	"AS CONSTRUCTED" DRAWINGS

1.0

PUMPS

1.0 PUMPS

SUPPLIER: KSB AJAX

CARBERRY STREET EBBW VALE QLD 4304

Ph: (07) 3282 1766 Fax: (07) 3816 0172

MODEL: E100-280 4 POLE TYPE TLC

MOTOR KW RATING: 12kW

MOTOR SPEED: 1440RPM

FULL LOAD CURRENT: 23A

VOLTAGE: 415V

<u>SERIAL NUMBERS:</u> 19555-1A & 1B

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SERVICE MANUAL

KSB Ajax Pumps Pty. Ltd.



KSB AJAX PUMPS PTY LTD IPSWICH WORKS

All members of the KSB Ajax Pumps Works staff are pleased to have been part of the team who produced your unit. Every effort is made by us to ensure the product you have purchased is finished to the highest standard.

Our Ref: Submersible-D203Version 1.0

Manual Part Number: 5399D20

PROJECT DETAILS

Pump Model: E100-280 TLC
 Motor: 12 KW 4 Pole
 Project Drawings: N/A
Pump Serial Number: 19555-1A/1B

PERFORMANCE DETAIL

SPECIAL CONSTRUCTION DETAILS

Cable Length: 10 MTRS Thermistors Fitted: YES Water Sensor Fitted: YES Cable Connection: DELTA

CLIENT

Customer: J & P RICHARDSON INDUSTRIES
Project: B.C.C. THE DOMAIN
Pump Station: STG 6
Contract Number: UF001231

FOR AFTER SALES AND SERVICE CONTACT YOUR LOCAL KSB AJAX PUMPS BRANCH:

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1.1	PUMP TECHNICAL DATA	
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	Mechanical Seal:	REFER APPENDICES 12.1
	Wiring Diagram:	REFER APPENDICES 12.8

1.0

TECHNICAL DATA

1.2 **PUMP IDENTIFICATION**

To ensure the correct procedure is followed when working on equipment and ordering spares it is essential you identify equipment correctly.

Pump units are fitted with an identification similar to:

KSB AJAX PUMPS PTY LTD					
SUBMERSIBLE INDUCTION MOTOR (AS1359) AND PUMP					
CONTRACT NO. SEAL NO.					
PUMP TYPE MOTOR					
VOLTS 3 PHASE HERTZ . AMPS					
RATING S1 INSUL F DESIGN CONN					
KW RPM L/SEC HEAD M					
MADE IN AUSTRALIA 199 IPSWICH PUMP WORKS					

DETAILS ARE:

Contract Number - filled in with clients contract number if known.

Serial Number - special serial number for this unit. This number must be quoted to ensure correct spares are supplied.

Pump Type - details specific pump model.

Motor - this nominates the motor frame size. This allows the client to follow correct procedure in the following manual eg. FR203 refers to a motor with a stator diameter nominally 203mm.

Volts - indicates correct operating volts.

Hertz - indicates correct operating frequency.

2

Amps - indicates motor full load current.

Design - indicates motor design capability.
 eg. N - normal starting.

NY - able to be star delta started.

CONN - indicates cable connection.

Y - star connected.

"DEL" OR Δ - delta connected.

- open delta connected (2 sets power leads)

KW - rated kilowatts of motor.

RPM - speed of motor.

L/Sec - flow in litres per second where a specific duty is nominated.

Head - head in metres where a specific duty head in nominated.

Year of manufacture is also noted.

As well as the above the pump has a direction of rotation tag on the pump volute which has specific pump serial number stamped on it.

If the unit is a stock standard pump unit it will also be fitted with a single plate stamped with a part number for that unit. Quoting this number will also ensure correct spares are supplied.

2.0 PRINCIPLES OF OPERATION

2.1 **PUMP DESCRIPTION**

This pump unit is a submersible, wet well, sewage pump close coupled to a submersible motor. The non clog impeller is double shrouded non-clog design with open passages to minimise the possibility of blockages while pumping sewage. The impeller and pump case are fitted with replaceable wear rings on the suction side of the impeller to maximise the life of the major components. The impeller is mounted directly onto the motor shaft via a key and positively locked by means of a lock nut. The impeller is balanced at the factory before dispatch. Motor and pump are fitted with a one piece stainless steel shaft.

Also available is a cutter pump where an open vane impeller operates against serrated suction cover. This creates a shearing action which is particularly effective for breaking down plastics and rags.

The pump and motor are normally vertically. In the most common configuration a discharge stand is permanently fixed to the wet well floor. The discharge of the pump is fitted with a locking plate, which forms an automatic seal with the discharge stand when the pump is lowered onto the stand. Guide rails run from the stand to the top well opening to guide the pump onto the stand. Should maintenance on the pump or motor be required the whole unit may be lifted from the well even if the well is full.

The pump is also available in a free standing configuration, different guide arrangement or a dry well application in which the motor is fitted with a cooling jacket.

Once installed the pump will operate continuously provided there is fluid present to be pumped.

Automatic control of the pump can be achieved with a variety of electrical or mechanical controls. The pump may be stopped by isolating the motor from the power supply. For the safety of maintenance staff it is recommended that a remote lockout type stop button or isolator is provided near the well in case of emergency.

This is particularly important if the switchboard controlling the pump is remote from the pump station.

The pump end is normally constructed of a heavy duty high quality cast iron. All fixings are stainless steel (special materials of construction are used when specified).

2.2 MOTOR DESCRIPTION

This motor is a KSB Ajax Pumps, Ipswich Works submersible motor. The motor is cooled by the pumping medium around the outside of the motor frame in the well. It is recommended that the motor operates submerged during its normal pumping cycle. With jacketed motors product fluid is circulated through jacket to provide It is recommended (although essential) where possible to circulate clean water through this jacket. The motor frame is designed for heavy duty application and constructed from cast iron. The stator assembly consists of laminations of low loss electrical grade steel clamped together with cleats in dovetail slots.

The windings are copper wire coated with polyester imide to a thickness complying with AS1194 Grade 2 insulations. The insulation material is Class F to BS2757. The winding overhangs are laced together securely then impregnated with a Class F varnish and baked at high temperature to cure the varnish to a solid homogeneous mass. Insulation is carried out using a vacuum impregnation process.

The winding tails consist of tinned, flexible copper wire of sufficient diameter to ensure that the current density at the rated load does not exceed 3.5 Amperes per square millimetre. The tails are insulated with Class F material. The winding tails are run to a terminal box. Motors below 3kw use a 3 wire star connection. 3kw and above have 6 wires to the terminal block.

The stator windings contain one positive temperature coefficient (P.T.C.) thermistor per phase in the overhang. The three thermistors are connected in series and the wires taken to a terminal block in the terminal box.

The rotor core is made of laminations of low loss electrical grade steel. These are stacked and fixed by pressure case aluminium or copper bars. The rotor is shrunk onto a stainless steel shaft and dynamically balanced.

The motor is sealed from the pump by a double mechanical seal. Seals consist of tandem seal configuration. In standard arrangement the upper seal is silicon carbide against carbon with the lower seal being silicon carbide against silicon carbide. Upper and lower seal faces are separated by an oil filled chamber.

NOTE: Motors manufactured at KSB Ajax - Ipswich Works use a white mineral oil (Whiterex 307) or equivalent which is low-toxic and environmentally friendly.

3.0 OPERATING PROCEDURE

3.1 CAUTION

NOTE: ANY INTERFERENCE WITH THE ENCLOSURE OF THE ELECTRIC MOTOR VOIDS ANY WARRANTY ON THE ELECTRIC WINDINGS AND TERMINALS. ENSURE CORRECT SUPPLY VOLTAGE AND PHASE ROTATION IS SUPPLIED TO MOTOR AS INCORRECT ROTATION CAN CAUSE PERMANENT DAMAGE TO EQUIPMENT.

3.2 **STARTING**

- 3.2.1 Check that the complete rotating element is free to turn prior to connecting electrical power.
- 3.2.2 Ensure pump and motor are fully submersed prior to operating. In the case of a dry well application ensure volute is full of fluid and a positive head exists on the inlet of the pump.

NOTE: WHERE STARTING CONDITIONS HAVE BEEN CHECKED THE PUMP MAY BE STARTED WITH AN OPEN DELIVERY VALVE. AS WITH ANY CENTRIFUGAL PUMP PROLONGED OPERATION AGAINST A CLOSED DISCHARGE VALVE IS NOT RECOMMENDED.

- 3.2.3 Where the discharge line has not been charged with fluid it is permissible to operate the pump against a partially closed discharge valve.
- 3.2.4 Ensure there is sufficient fluid in the well and then start the motor. Ensure equal and correct voltage is supplied to each phase.
- 3.2.5 Open the pump delivery valve slowly until the required pressure or flow is obtained.

CAUTION: 1. PROLONGED RUNNING WITH A CLOSED DELIVERY VALVE CAN DAMAGE PUMP INTERNAL COMPONENTS AND MUST BE AVOIDED.

3.3 CONTINUOUS OPERATION

Most pump installations run under automatic control so providing the pump unit has been commissioned correctly and maintenance schedules are maintained the pump unit requires little additional supervision unless there is a duty change required.

3.4 **STOPPING**

Isolate the motor from the mains and mechanically lock the isolator out. If work is to be carried out on the pump unit ensure that the isolator is mechanically locked open and power supply is isolated from motor. Do not restart the motor before it has fully stopped. Restarting the motor results in very high current fluctuations in the motor windings and pressure surges in the rising main and may cause serious damage to the unit or the system.

3.5 **EMERGENCY STOPPING**

Follow the procedure outlined in Section 3.4 above. It is recommended that lock out isolators be installed at all points where work is to be carried out on the pump or its associated equipment.

3.6 ENSURING MAXIMUM LIFE FOR YOUR UNIT

In the interest of ensuring maximum benefit and life from equipment the following basic recommendations should be followed:

- a) Operate with correct power supply,
- b) Provide adequate protection for equipment in the form of thermistor protection, and overload protection set to suit motor rating,
- c) Do not run dry or without an adequate supply of fluid (run with motor submersed),
- d) Run units in correct rotation (clockwise when viewed from drive end),

- e) Operate pump in its correct range of design flow and discharge pressure.
- f) Use pump in pumping medium for which unit was designed.
- g) Ensure regular maintenance of station pumping units and ancillary equipment is carried out.

4.0 GOODS INSPECTION AND STORAGE

4.1 **INSPECTION**

- 4.1.1 Immediately on receipt of the equipment, inspect it thoroughly. Examine the crate and the wrapping before discarding them, since parts or accessories are sometimes wrapped individually or fastened to the crate.
- 4.1.2 Report any damage or shortage to KSB Ajax Pumps and the carrier immediately. All claims must be made (or confirmed) in writing within seven days.
- 4.1.3 If the equipment is not being installed immediately, it must be stored under suitable conditions.

4.2 **STORAGE**

4.2.1 SHORT TERM

- 4.2.1.1 When it is necessary to store a pump for a short time before it is installed, place it in a dry location. Ensure cable ends are kept dry and cable is protected against mechanical damage.
- 4.2.1.2 To prevent rusting-in or seizing, lubricate the unit before storing paying particular attention to components which run in close tolerance, eg. wear rings, etc. Turn the pumpset by hand at least once a week. Extreme care should be exercised with regard to the motor cables: ensure, that the pump dose not stand on the motor cables and that the cable seal on the end of the cable is not damaged as it prevents water entering the cable.

4.2.2 LONG TERM

4.2.2.1 More thorough precautions are required if the pump is to be stored for an extended period of time. Refer to IPSWICH PUMPS WORKS for full information on long term storage.

Do not store any equipment in any area which is subject to either direct or indirect vibration as this can have a detrimental effect on bearings.

5.0 PIPEWORK INSTALLATION

5.1 **DELIVERY PIPEWORK**

- 5.1.1 It is essential to ensure that the delivery pipework is adequately supported and anchored to resist hydraulic thrust.
- 5.1.2 If the delivery pipe does not rise continuously air pockets can form in the pipe at high spots. It is good pumping practice to remove these air pockets in the pipe by venting the air through an air release.

6.0 PUMPSET INSTALLATION

6.1 PROCEDURES PRIOR TO INSTALLATION

6.1.1 CLEANING PRIOR TO INSTALLATIONS

- 6.1.1.1 All packing and crating should be removed and discarded prior to starting the installation procedure. Check all the packing before discarding it to ensure that no parts or accessories are attached to it in individual wrappings.
- 6.1.1.2 All parts of the assembly must be thoroughly cleaned before installation begins. All traces of rust preventative must be removed from the discharge and suction faces, exposed shafting, and all coupling surfaces.

6.1.2 LAY-OUT OF PUMP PARTS FOR INSTALLATION

- 6.1.2.1 Care must be taken to avoid damage to components whenever handling or installing them.
- 6.1.2.2 If suitable lifting tackle is not available, skids must be employed to transfer heavy weights at ground level. Loaded crates, individual components or subassemblies must never be dropped to the ground from a transport vehicle.
- 6.1.2.3 Individual components should be layed out on clean dry timbers or on a suitably cleaned surface in the order which they will be installed.
- 6.1.2.4 Any packing or other protective material must be removed before starting the installation procedure.

6.2 **PUMPSET FOUNDATION**

- 6.2.1 An adequate pump foundation is essential. It should consist of a solid block of concrete brickwork or masonry sufficiently massive and rigid to provide continuous support for the pump pedestal throughout the pumps life.
- 6.2.2 The top of the foundation plinth should be 25mm to 38mm below the required finished height of the stand's lower flange. This is to allow the discharge stand to be adjusted and levelled during installation. The remaining gap is filled with grout after levelling to provide support to the discharge stand.
- 6.2.3 Foundation bolt holes should be prepared in the foundation plinth to match the discharge stand holes. Each hole should be drilled the correct diameter to accept the masonry anchor.

6.3 PEDESTAL STAND LEVELLING

- 6.3.1 Position the masonry anchors or fixings using stand or dimension drawing as a guide.
- 6.3.2 Place solid packers approximately 30mm high on either side of each masonry anchor.
- 6.3.3 Sling the stand and lift it onto the anchors so that it sits on the packers. Level the discharge stand by placing shims between the packers and the stand.
- 6.3.4 Once the stand is level place a washer on each masonry anchor and screw on the nuts. Tension the nuts, until the masonry anchor has gripped firmly and the stand is clamped tight. Check stands for level after tensioning.

6.4 **GROUTING**

- 6.4.1 The use of good grout is important when installing a pump as it prevents lateral movement of the pedestal stand and damps vibration. The use of a non-shrink grout or other available propietry product is recommended. (Hilti provide a range of suitable fixings, adhesives & grouts).
- After levelling and alignment is completed and all foundation bolts pulled down tightly, preparation for grouting the stand can commence.

 Boxing should be placed around the stand's lower flange to contain the grout when it is poured.
- 6.4.3 Manufacturer recommendations for application of grouting material should be followed.

NOTE: IT IS IMPORTANT THAT THE GROUT FILLS THE CAVITY BETWEEN THE LOWER FLANGES AND THE FOUNDATION SO THAT FULL SUPPORT IS GIVEN TO THE STAND. IF NECESSARY USE A VIBRATING TOOL TO SETTLE. IT SHOULD BE CHECKED THAT THE GROUT DOES NOT SHRINK FROM THEN STAND'S FLANGE AFTER CURING.

- 6.4.4 The exposed surfaces should be covered and allow to cure before loading as per Manufacturer recommendation.
- 6.4.5 When the grout is set, the boxing should be removed and a smooth finish given to the grout and foundation surfaces. Manufacturer recommendations should be followed.
- 6.4.6 After curing, where applicable guide rails and top bracket can be fitted.

6.5 **CONNECTING THE PUMP**

6.5.1 **SUBMERSIBLE**

Before lowering the pumpset onto the discharge stand the motor and pump should be checked as per Section 3 of this manual.

6.5.2 After carrying out the above checks the pumpset is ready to be installed on the discharge stand. Attach a sling to the lifting points on the motor and position the pumpset across to the well opening and lower it onto the guide rail. Lower the unit down the guide rail until it locks onto the discharge stand. It may be necessary to manipulate the unit by hand while supported to ensure that it has seated home correctly and that the seal between the pump and discharge stand is complete. Keep the pump completely vertical when lowering into position.

6.5.3 FREE STANDING

In the case of free standing pump, discharge pipework is securely attached to the pump discharge prior to lowering into position. It is advantageous to fit pipework with a quick connect type coupling. Ensure the pump is mounted on level foundations and slung to prevent turning.

6.5.4 DRYWELL

Pipework is connected to inlet and outlet.

NOTE: UNDER ALL CIRCUMSTANCES WHEN CONNECTING PIPEWORK, DO NOT FORCE OR LOAD JOINTS. NO LOAD SHOULD BE TRANSFERRED TO PUMPS OR PEDESTALS. WHERE NECESSARY USE RUBBER STYLE JOINTS TO PREVENT TRANSFER OF VIBRATION OR LOAD TO PUMPS.

6.6 COMMISSIONING THE PUMPSET

6.6.1 Start the pump unit as per Section 3 of this manual.

- Allow it to run for approximately ten minutes to fill the pipeline with fluid and stabilise in its operation. Test readings of head, flow, voltage, current and power should then be taken to check that the unit is operating correctly. If flow measurement equipment is not available then the flow may be calculated by measuring the rate at which the fluid level drops in the wet well. The flow may be adjusted by altering the setting of the discharge pipe valve. Where pumps start against an empty rising main, operate against a partially closed valve.
- 6.6.3 Once the commissioning procedure outlined above has been finished the pump unit should be shut down as per Section 3 of this manual.

7.0 MAINTENANCE SCHEDULES

7.1 ROUTINE MAINTENANCE

ALWAYS COMPLY WITH CORRECT PROCEDURES WHEN MAINTAINING PUMPING EQUIPMENT. UNDER ALL CIRCUMSTANCES SAFETY FIRST.

When a pump station is initially commissioned it should be visited daily for the first two weeks to check that all the systems are working correctly. Particular care should be taken with a new installation that foreign matter such as concrete, tins, timber or tools do not foul the pump. The wet well should be hosed down and pumped to its minimum level each day to check for such foreign matter. All such material should be removed.

Each time the pump station is visited readings of the hours run, voltage and current should be taken and recorded in a station log book for each pump. Abnormalities in these readings are often the first sign that maintenance is required on the pump unit. Ideally the station should be visited on a daily basis to check the pumps operation, record the above data and clean any build ups of fats or foreign material in the wet well. The required frequency of visits to the well can often be established by the attention required during the daily visits for the two weeks following commissioning.

7.2 **PERIODIC MAINTENANCE**

7.2.1 The tables in Appendix 12.2 give the recommended times for periodic maintenance checks. The major check required is a six monthly or 1500 hour inspection of the motor. The procedure to be followed in this check is detailed in the following section.

- 7.2.2 The pump unit requires a complete overhaul once either the delivery head drops below an unacceptable level or the power consumption rises significantly. The establishing of acceptable variation to the installed performance is normally left to the maintenance engineer's discretion, however a variation of 15% in power, flow or head usually warrants investigation. The unit should then be returned to KSB Ajax Pumps or the instructions in Sections 8 to 11 followed to repair the unit.
- 7.2.3 Where a pump station involves sub-contractors associated equipment it is important that their instructions are read so that a fully comprehensive maintenance schedule can be drawn up for the station.

7.2.4 SIX MONTHLY OR 1500 HOUR INSPECTION

- 7.2.4.1 The pump and motor should be checked every six months or 1500 hours of operation, whichever comes first. The checks cover the condition of the electrical insulation in the motor windings, condition of the mechanical seal and the wear of the pump components.
- 7.2.4.2 Refer to Section 8 to electrically disconnect the motor and lift the motor-pump from the pump well. Where possible, the incoming power isolator should be padlocked in the 'OFF' position. Any electrical work on the enclosure of the electrical motor, should be carried out by suitably qualified personnel. Any work should be conducted following good safety procedures.
- 7.2.4.3 Inspect the pump end for wear or damage. Ensure all the fasteners are tight. Inspect the discharge sealing ring (120) for damage or excessive wear.
- 7.2.4.4 Refer to section 8 for instructions on disassembly of pump.

- 7.2.4.5 Check the diametrical clearance between the impeller wear rings and the case wear rings. If the diametrical clearance is greater than 1.5mm the wear rings will require replacement. Refer to section 8 for wear ring removal.
- 7.2.4.6 After the inspection refer to Section 11 for instructions on the procedure for replacement of pump components.
- 7.2.4.7 The mechanical seal should be checked to ensure it is sealing correctly. Leaving pump/motor upright remove the upper plug (15B) sealing the oil reservoir in the lower end of the motor. Draw off a small sample of oil (approx. 100mls) and put into a clean glass container. Allow the oil to settle. Inspect the oil to see that it is not milky or that water has not settled at the bottom of the container. Caution should be taken when removing the taper plugs as the oil may spray out if the pressure remains in the oil chamber.
- 7.2.4.8 If the oil contains water and it has been ascertained that it has not leaked through the plugs the mechanical seal may require reconditioning. Refer to Section 9 for the procedure to remove the mechanical seal.

It is quite acceptable under normal operating conditions for a small amount of water to infiltrate into the seal chamber. Above 5 percent contamination normally indicates a problem with the seal.

7.2.4.9 Refer section 1 for motor frame identification.

If the oil tested is only milky (less than 5%) it is acceptable practice to drain the oil chamber and refill with Mobil Whiterex Type 307 white mineral oil or equivalent.

For motor frame 203, drain oil with motor standing vertically. Remove plugs 15(c) then drain oil into a suitable container.

After applying thread sealant replace plugs 15(c). Remove plugs 15B and 15A. Fill chamber with oil until oil comes out of filler plug hole 15A. Apply thread sealant and replace plugs 15A and 15B.

- 7.2.4.10 If the motor was previously stripped refer to Section 10 for motor assembly and mechanical seal assembly. Ensure that the impeller is free and revolving truly and reinstall pump-motor unit back into the pump station.
- 7.2.4.11 Refer to Section 3 for the procedure for reconnecting the motor to the switchboard and starting the pump.

8.0 TO DISASSEMBLE THE PUMP

- 8.1 PREPARATION PRIOR TO DISASSEMBLY
- 8.1.1 Isolate the electric motor from the mains by opening the main isolator supplying power to the switchboard or lock the power isolator and control circuit isolator for the unit (remember safety first) in the 'OFF' position.
- 8.1.2 Disconnect power and control cables.
- 8.1.3 Close the discharge isolating valve.
- Remove the pump from the well and thoroughly clean down the outside of the pumpset. In the case of dry well pumps it is often easier to leave volute in line and remove motor with impeller fitted.
- 8.1.5 The highest possible standard of cleanliness must be maintained throughout any maintenance operation.
- 8.2 DISASSEMBLY PROCEDURE (REFER SECTION 12 FOR SECTIONAL ARRANGEMENT DRAWING)
 For Non Clog Pumps
- 8.2.1 To remove the impeller
- 8.2.1.1 Stand the pump-motor unit upright on clean, dry timbers, ensuring that it is stable. Chock it securely.
- 8.2.1.2 Remove the nuts, which secure the motor to the volute.

- 8.2.1.3 Attach a sling to the lifting points on the motor and using suitable safe lifting equipment lift the motor off the pump end. If the gasket will not release the motor from the pump end raise the pump-motor unit approximately 5mm off the timber and strike the volute with a soft hammer onto a piece of timber. The motor complete with impeller can be withdrawn from volute.
- 8.2.1.4 Remove gasket /O Ring between volute and motor (113) if damaged in any way.
- 8.2.1.5 Position the motor unit on a bench at a suitable working height and chock it securely.
- 8.2.1.6 Secure the impeller (102) to prevent rotation.
- 8.2.1.7 Remove the locknut (103) and washer (104). Using a puller remove the impeller (102) from the shaft. The impeller is driven by the shaft using a tapered drive and key. The impeller may require a gentle impact to remove. In the case of an impeller being difficult to remove the application of heat to the impeller will assist Rapid heating of impeller its removal. minimising heat transfer to the shaft provides best results. When impeller has parallel bore an impeller puller is required to jack impeller off shaft.
- 8.2.2 Complete disassembly.
- 8.2.2.1 Check the diametral clearance between the volute wear rings (108) and the impeller wear rings (107).if the diametral clearance is greater 1.5mm the wear rings will Replacement if also recommended if replacement. significant scoring of wear rings has occurred. Excessive wear of wear rings result in less efficient operation of pumps, flow loss and head loss, therefore resulting in higher operating costs.

- 8.2.2.2 To remove the impeller wear rings (107) set the impeller in a lathe and machine if off. If a lathe is not available grind a flat through one side of the wear ring and knock the wear ring off. Ensure the original machine surface of impeller under wear ring is not damaged.
- 8.2.2.3 To remove the case wear ring (108) press the wear ring out of the volute.
- 8.2.2.4 Remove the key (33) from the shaft (4).
- 8.2.2.5 Discard any gasket if damaged.
- 8.2.2.6 Remove the discharge sealing ring (120) if it is worn, perished or damaged.
- 8.2.2.7 Clean all the components thoroughly and lay them out ready for reassembly.
- 8.3 DISASSEMBLY OF CUTTER PUMPS.
- 8.3.1 Remove Suction Cover.
- 8.3.2 Remove impeller lock nut then remove impeller (a puller will be required). Procedure is similar to non-clog pumps for other disassembly work.

- 9.0 TO DISASSEMBLE THE MOTOR (REFER SECTION 12 FOR SECTIONAL ARRANGEMENT DRAWINGS)
- 9.1 TO REMOVE THE MECHANICAL SEAL
- 9.1.1 Introduction
- 9.1.1.1 Once the mechanical seal has been removed from the motor it should not be reinstalled. The seal should be reconditioned or replaced.

 REMEMBER: THE MECHANICAL SEAL IS THE HEART OF THE SUBMERSIBLE MOTOR. LAY MOTOR ON ITS SIDE AFTER DRAINING OIL AS PER SECTION 7.
- 9.1.1.2 The area in which the motor is worked on MUST be very clean and extreme care should be taken not to damage or scratch the sealing area on the shaft or any of the seal components. The faces of the mechanical seal are lapped to obtain a flatness not achievable in the field and rapid deterioration of the seal faces may occur unless the instructions are followed implicitly. External seal faces are silicon carbide. This material is very hard but brittle and should be handled with extreme care.
- 9.1.1.3 Clean shaft under seal. Remove retaining circlip 21B and back up washer 21A. Remove external seal 21 by sliding off shaft. After being installed the rubber bellows will adhere to the shaft. The bellows may require slight compression to break the adhesion to shaft. The seal will require reasonable force to slide off the shaft.
- 9.1.1.4 Remove set screws (13) and spring washers (9) securing seal plate (12) to motor housing (1). Slide the seal plate (12) over the shaft (4) taking care not to let the seal seat of the external seal (21) come in contact with the shaft.

- 9.1.1.5 Place seal plate on a flat surface with rag placed beneath the seal seat area. Push the seal seat out from the top of the plate so that the seat is caught on the rag.
- 9.1.1.6 Remove retaining circlip, back up washer and seal head of the internal seal (97) with bellows as per external seal.

9.2 TO REMOVE THE CABLE ASSEMBLY

- 9.2.1 Attach support to the cables and take the weight of the cables.
- 9.2.2 Remove fixings (27) (31) and spring washers (27) holding the terminal box to the motor housing (1).
- 9.2.3 Move the terminal box (201) away from the side of the motor a sufficient amount to be able to access the terminal blocks. Be careful not to strain the cable leads or the motor tails which connect to the terminal blocks.
- 9.2.4 Disconnect cable after recording their position.
- 9.2.5 Lift the entire cable assembly clear of the motor and place it in an area which is clean and dry.
- 9.2.6 Remove the O-ring (11d).

9.2.7 To check the cables

- 9.2.7.1 Inspect the inside of the terminal box for any signs of water leaking into the motor. If water is present check the O-ring (11d). Also thoroughly inspect the cable for any nicks and cuts on the outer sheath.
- 9.2.7.2 Check the continuity of each lead in the cable with a multimeter. The resistance of the leads should be equal.

9.2.7.3 Check the insulation between each cable and all the rest of the cables with a 500 volt Meggar. The insulation between each lead and the terminal box should also be checked. All readings should be infinity.

If readings are irregular disconnect stator winding tails from terminal blocks then carry out above continuity & insulation checks.

9.3 DISASSEMBLY PROCEDURE

- 9.3.1 Remove the set screws (35) and spring washers (36) from the top bearing cap (34). Remove the top bearing cap (34) from the motor housing (1).
- 9.3.2 Discard the O-ring (11C) from the top bearing cap (34) if O-ring (11C) is not in perfect condition.
- 9.3.3 See note below. Remove the set screws (9) and spring washers (13) holding the motor housing (1) to the bottom bearing bracket (7).
- 9.3.4 Using the jacking screw holes provided jack the motor housing (1) off the bottom bearing bracket (7).
- 9.3.5 Lift the entire motor frame vertically until it clears the top of end of the shaft (4). Lift with extreme care to ensure windings are not damaged. The slightest bump can result in permanent damage. The inner ring of the top bearing (5) remains on the shaft, sliding through the rollers of the bearing and through the oil seal (96). Place the motor frame on clean dry timbers.

NOTE: The motor housing should only be initially lifted 100mm. The lead to the water sensor probe (32) should be disconnected before lifting the motor completely off the bottom bearing bracket.

9.3.6 Discard the O-ring (11A) if not in perfect condition.

- 9.3.7 Remove the oil seal (96) by tapping it down, out of the bore, allowing it to drop through the motor housing.
- 9.3.8 Remove the outer race of the top bearing (5) from the motor housing (1). Do this by using a bearing puller or by inverting the housing and tapping the race out of the bore.
- 9.3.9 Clean the recess where the top bearing (5) seats.
- 9.3.10 If the stator (2) needs to be pressed out of the motor housing (1) the position of the stator in the housing should be measured and recorded so that it may be replaced in the same position when it is re-installed. Stator is an interference fit in the housing and requires a press to remove.
- 9.3.11 Remove circlip (38) from bottom bearing bracket (7).
- 9.3.12 Lift the shaft (4) complete with top bearing inner ring (5), rotor (3) and bottom bearing (6) out of the bottom bearing bracket (7). If the outer race of the bottom bearing bracket (6) will not slide out of the bottom bearing bracket it may be necessary to apply heat quickly and uniformly around the boss of the bottom bearing bracket which houses the bottom bearing.
- 9.3.13 Lay the shaft on a clean bench at a suitable working height.
- 9.3.14 Remove circlip (39) then remove the bottom bearing (6) with a bearing puller taking care not to damage the shaft particularly in the area where the mechanical seal sits.

- 9.3.15 Remove the inner ring of the top bearing (5) from the shaft with a bearing puller. It is permissible to grind a flat through one side of the ring and knock the ring off the shaft however, extreme care must be taken not to damage the shaft.
- 9.3.16 Thoroughly clean all the components and lay them out on a clean, dry surface for re-assembly.

9.4 COOLING JACKET

- 9.4.1 For special applications and dry well units, motors are fitted with a cooling jacket. The jacket consists of a cast iron chamber which allows fluid to circulate around motor housing.
- 9.4.2 When product is used to provide cooling, it is recommended that hoses be removed at 6 month intervals to allow jacket to be flushed out. Flushing interval can be adjusted depending on the conditions on site.
- 9.4.3 Jacket is a sliding fit. Remove retaining screws (53) at top of jacket and slide jacket over housing. If necessary use tapped holes provided for retaining screws to attach brackets that can be used as jacket point if jacket is tight. Under normal circumstances it should not be necessary to remove the jacket for repairs on the motor.

10.0 TO ASSEMBLE THE MOTOR (REFER SECTION 12 FOR SECTIONAL ARRANGEMENT DRAWINGS)

10.1 ASSEMBLY PROCEDURE

- 10.1.1 All parts including stator should be thoroughly cleaned before reassembly. If stator has been contaminated then clean and revarnish. Before the motor is re-assembled the motor housing (1) with the stator (2), shaft (4) with the rotor (3), desiccating bag (57), bottom bearing bracket (7) and seal plate (12) should all be placed in a drying oven at 80 90 degrees celsius overnight. The motor must be assembled on the same day that the components are removed from the drying oven, preferably while still warm. This ensures maximum displacement of any moisture from stator.
- 10.1.2 After the stator has been taken from the drying oven it should have the electrical checks detailed in section 3 carried out on it. It is important to carry these checks out at this stage so that it is confirmed that the stator is sound before assembly commences.
- 10.1.3 Before commencing to re-assemble the motor check that all the replacement parts are to hand. It is recommended that no O-rings, bearings or seals are reused when the motor is rebuilt.
- 10.1.4 Place the shaft (4) on a clean bench at a suitable working height.
- 10.1.5 Thoroughly clean the area on the shaft (4) where the bottom bearing (6) will sit with acetone to remove all traces of grease or oil.

- 10.1.6 Remove bearing shield and clean out bottom bearing Heat the bottom bearing (6) (6). slightly so that it just slides onto the shaft. Do not over heat bearing. If it is necessary to apply pressure to seat the bearing against the shaft shoulder a dolly should be used to apply the force to the inner ring of the bearings. Pack bearing with grease SKFLGHT 3/1 (do not over grease). Spin bearing by hand and remove excess grease. Replace bearing shield.
- 10.1.7 Lift the shaft and position it above the bottom bearing bracket (7) after fitting circlip (39).
- 10.1.8 Lower the shaft (4) and allow the bearing to slide into the bottom bearing bracket (7). If the outer race of the bearing will not slide into the bottom bearing bracket apply heat quickly and uniformly around the boss which houses the bottom bearing. Care should be taken not to raise the temperature to a point where the grease begins to break down.
- 10.1.9 Lock bearing (6) into place with circlip (38).
- 10.1.10 Fit the inner race of the top bearing (5) to the shaft (4) using the same procedure outlined in section 10.1.5 to 10.1.7.
- 10.1.11 Fit the oil seal (96) to the motor housing (1) by tapping it down into its bore so that the top edge is level with the bearing bore. Ensure its correct orientation when fitting. (To retain grease).
- 10.1.12 Fit the outer race and rollers of the top bearing (5) to the motor housing (1). Apply heat quickly and uniformly around the boss which houses the bearing until the outer race just slides to the bottom of the bore.

Care should be taken not to raise the temperature to the point where the bearing or grease seal is affected. Use a press and suitably sized pipe jig to press outer race into place.

- 10.1.13 Lightly grease both the bearing race and oil seal (96) with SKF LGHT 3/1 high temperature grease.
- 10.1.14 Cover the top bearing (5) with a clean, dry, dust free cloth to keep dust and dirt out of the bearing.
- 10.1.15 If the stator (2) was pressed out of the motor housing (1) in section 9.3.5 it should be pressed back into the housing paying particular attention that it is in its original position and that the winding overhangs are not damaged in any way. Feed stator tails through side of housing and reconnect to terminal block.

The correct position of the stator (2) is centralised around the rotor.

- 10.1.16 Replace the O-ring (11a) on the bottom bearing bracket (7).
- 10.1.17 Lift the motor housing (1) across to the bottom bearing bracket. Position the housing above the shaft (4) and rotor (3) and slowly lower the housing over the rotor ensuring that the stator does not scrape down the side of the rotor.

The motor housing (1) should be held approximately 100mm above the bottom bearing bracket (7) while the control wire is connected to the water sensor (32).

10.1.18 The motor housing may require rotation to line it up with the holes in the bottom bearing bracket (7).

Care should be taken that the O-ring (11a) is not pinched as the housing seats home.

The insulation between the water sensor probe (32) and the motor housing should be checked with a 500 volt MEGGER. Test from the water sensor lead to the motor housing. The reading should show infinity.

- 10.1.20 Replace the fixings (9 & 13) and tighten. Through out the assembly procedure turn shaft by hand ensuring it is free to rotate at all times.
- 10.1.21 Replace the O-ring (11C) to the top bearing cap (34). Fit the top bearing cap (34) to the motor housing (1). Replace the set screws (35) and spring washers (36) to the top bearing cap (34) and tighten.
- 10.1.22 Lift the motor at its lifting points and lay it on a bench at a suitable working height.
- 10.2 CABLE ASSEMBLY
- 10.2.1 Lift the cable assembly across to the motor.
- 10.2.2 Renew the O-ring (11d).
- 10.2.3 Reconnect wires as per original connection.
- 10.2.4 Wire the earth leads to the motor housing (1) using the earth screw and spring washer.
- 10.2.5 Ensure the motor tails are placed out of the way.

- 10.2.6 Fix cover (201) into place with fixing (31) and (23) with the spring washers (27) then tighten. Carry out insulation & continuity checks through cable to ensure no damage has occurred during assembly.
- 10.3 TO ASSEMBLE THE MECHANICAL SEAL
- 10.3.1 NOTE: Seal seats and heads are silicon carbide or carbon. They must be treated with extreme care as any impact can cause chipping or breaking.

Thoroughly inspect the shaft (4), bottom bearing bracket (7) and seal chamber (12) in the areas which the mechanical seal (21) will seat. They should be free from scratches and burrs and be spotlessly clean.

- 10.3.2 Lubricate the shaft and elastomer components with detergent and water to assist in the assembly. Under no circumstances should grease or oil be used to assist assembly.
- 10.3.3 Check that the o-ring is properly seated in both of the seal seat assemblies.
- 10.3.4 Fit the seal seat assembly into the bottom bearing bracket (7). If the seal seat is difficult to push into the recess it is permissible to cover the seal seat with a clean piece of cardboard fashioned to slide over the shaft and exert pressure on the cardboard with a jig. Both seal seats are silicon carbide. The upper rotating seal head can be carbon or silicon carbide (carbon is standard). Do not fit carbon seal head to external seal.
- 10.3.5 Wipe the faces of the seal with a clean, dry, dust free piece of cloth so that it is thoroughly clean.

- 10.3.6 Slide upper seal head along shaft until faces contact. The seal head incorporate bellows which make it quite tight to press onto the shaft. Lubricate bellows with liquid detergent to aid fitting. DO NOT USE OIL OR GREASE TO LUBRICATE BELLOWS.
- 10.3.7 Compress bellow, slide on backing ring (21A) and retaining circlip (21B) into place. It is recommended to carry out final compression of seal with circlip and washer to prevent over compression of seal. Wipe off excess detergent.
- 10.3.8 Replace the O-ring (11b) on bottom bearing bracket (7), then fix seal plate (12) to bottom bearing bracket (7) with fixings (13), nuts (31) and spring washers (85). Fit seal seat in seal plate (12).
- 10.3.9 Slide product end seal head onto the shaft and fit using the same procedure noted above for internal seal. (Care should be taken not to damage the lapped face). Note the bottom product faces are silicon carbide to silicon carbide).

NOTE: Seal must not be allowed to rest on the shaft too long before the backing washer and circlip is placed in position, as the bellows has a tendency to adhere to the shaft.

Oil chamber must be filled (as per maintenance instruction) before the pump is run. Bellow seals are often tight on the shaft requiring extra pressure and lubrication (with detergent) to fit.

NEVER RUN THE SEAL DRY !!

10.3.10 Fill the oil chamber with Mobil Whiterex 307 or an equivalent. Unit is filled through (15B) with level plugs (15A). Fill chamber through 15B until oil just starts to flow out of 15A. Motor is vertical when unit is filled. Replace plugs 15A and 15B after cleaning and applying a thread sealant.

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10.3.11 Hold motor vertically. Run the motor for a maximum of three minutes. Let it stand for a further thirty minutes. Check the shaft for any oil due to the seals leaking. If the amount of oil showing is only very slight clean the shaft carefully and repeat run.

If oil still leaks from the seal they have not been fitted correctly and their installation should be checked, especially the O-rings.

- 10.3.12 Replace the key (33).
- 10.3.13 Turn the motor shaft by hand to ensure that no binding has occurred. Shaft runout should be checked to ensure it is running true (within 0.05 mm).
- 10.3.14 Remove the plug (15A) in the motor housing (1). Screw in a T-piece fitted with stop valves. Attach a vacuum pump to one branch and a bottle of dry nitrogen to the other. Evacuate the motor to a pressure of -50 to -60 Kpa (gauge pressure) and isolate the vacuum pump with the valve. Check that the motor will hold this vacuum for ten minutes. If the vacuum diminishes it is possible that an O-ring has been damaged during assembly and the O-ring will require replacement. If vacumn holds open the valve to the nitrogen tank and charge the motor with nitrogen to a pressure of 30 Kpa (gauge pressure). Repeat this procedure to ensure all air is purged from the motor.

10.4 COOLING JACKET

Clean surfaces of housing and inside jacket. Fit o'rings (11G) and (11F) and lightly grease with rubber grease. Lower jacket onto housing. Using lifting bolt fixing holes put a plate across the top of motor and jack the jacket into place with threaded rod. Replace jacket securing screws (53). Reconnect cooling lines.

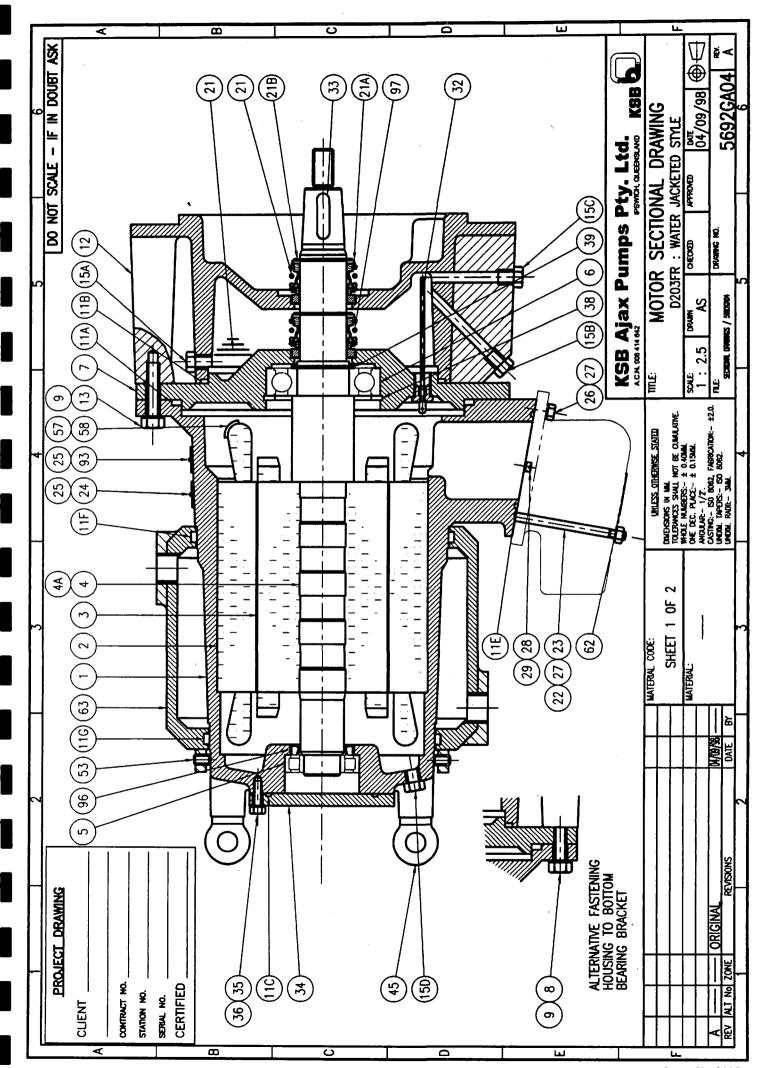
11.0 TO ASSEMBLE THE PUMP

- 11.1 ASSEMBLY PROCEDURE (NON CLOG PUMP)
- 11.1.1 Using new gaskets/O Rings recommended during the assembly procedure below. Use anti-seize on all threads.
- 11.1.2 Renew the discharge sealing ring (120) if required.
- 11.1.3 Lay the motor unit on bench at a suitable working height.
- 11.1.4 If the impeller wear ring (107) was removed refit a new wear ring by heating the new ring and pressing in onto the impeller (102). "Scotch key" impeller wear ring to impeller.
- 11.1.5 Fit the key (33) into the shaft. Ensure key is a tight fit and all burrs in keyway and key have been removed.
- 11.1.6 Fit the impeller (102) onto the shaft and ensure the shaft and impeller are correctly engaged. Take care that there are no burrs, defects or dirt on the shaft or impeller bore as this will affect the fit. Prior to fitting impeller balance should be checked to ensure normal wear has not caused imbalance.
- 11.1.7 Fit the locknut washer (104) and screw the locknut (103) onto the thread. Locknut is the nyloc type and particular care should be taken not to damage thread on the pump shaft (4).
- 11.1.8 Tighten the locknut (3).
- 11.1.9 Check runout of impeller using a dial gauge. Runout should be within 0.25mm.
- 11.1.10 If the case wear ring (108) requires replacing in section 8 replace the new wear ring by pressing it into the volute (101).

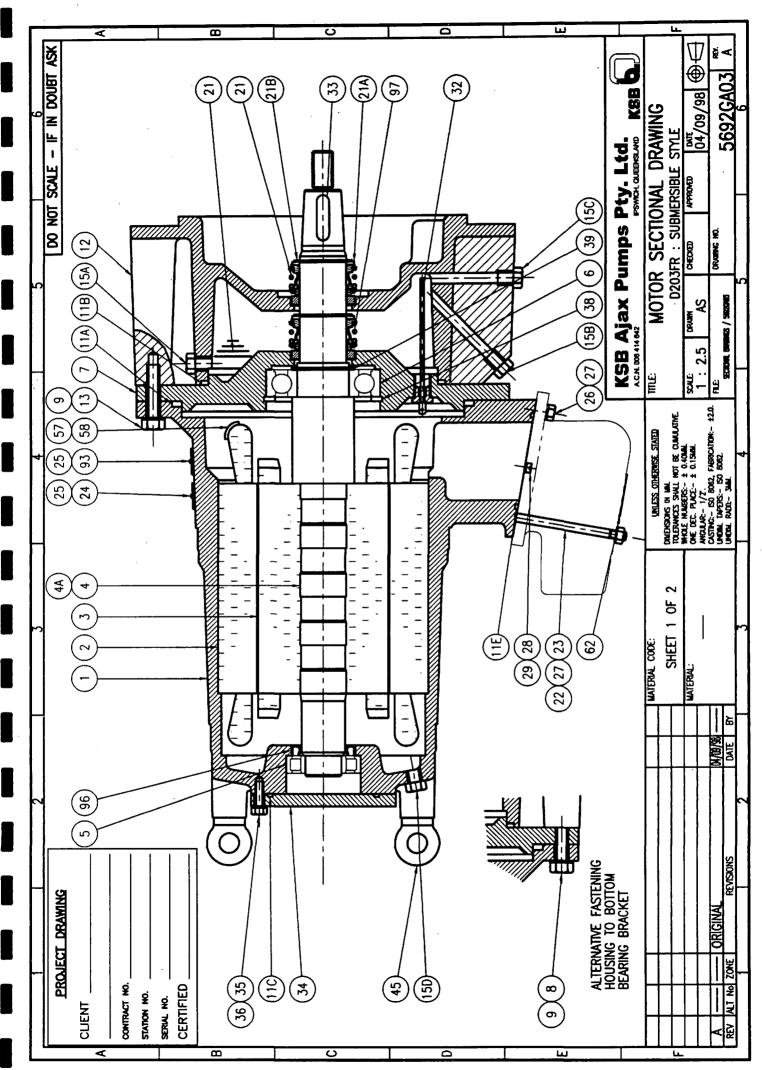
- 11.1.11 Where fitted, fit motor adaptor (114) and replace gasket. Attach a sling to the motor complete with impeller and lift the motor over to where the pump volute is supported on clean, dry timbers.
- 11.1.12 Renew the gasket (113) which will be between the motor and the volute (101).
- 11.1.13 Lower the motor onto the double ended studs (117) making sure that the lifting points on the motor are on the same centre line as the discharge of the pump.
- 11.1.14 Screw the nuts (112) onto the double ended studs (117). Tighten the nuts (112) to tension.
- 11.1.15 Turn impeller by hand to ensure it is free. Before running the pumpset the installation procedure in section 6 should be followed through thoroughly.

12.0 APPENDICES

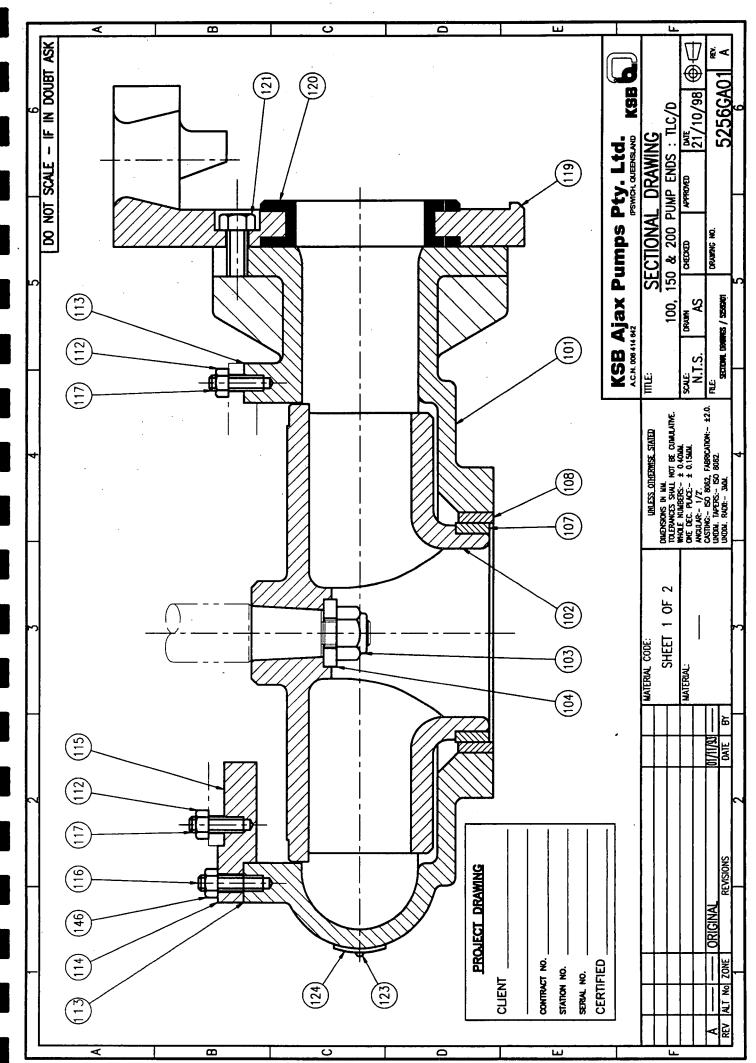
12.1 SECTIONAL AND DIMENSIONAL DRAWINGS

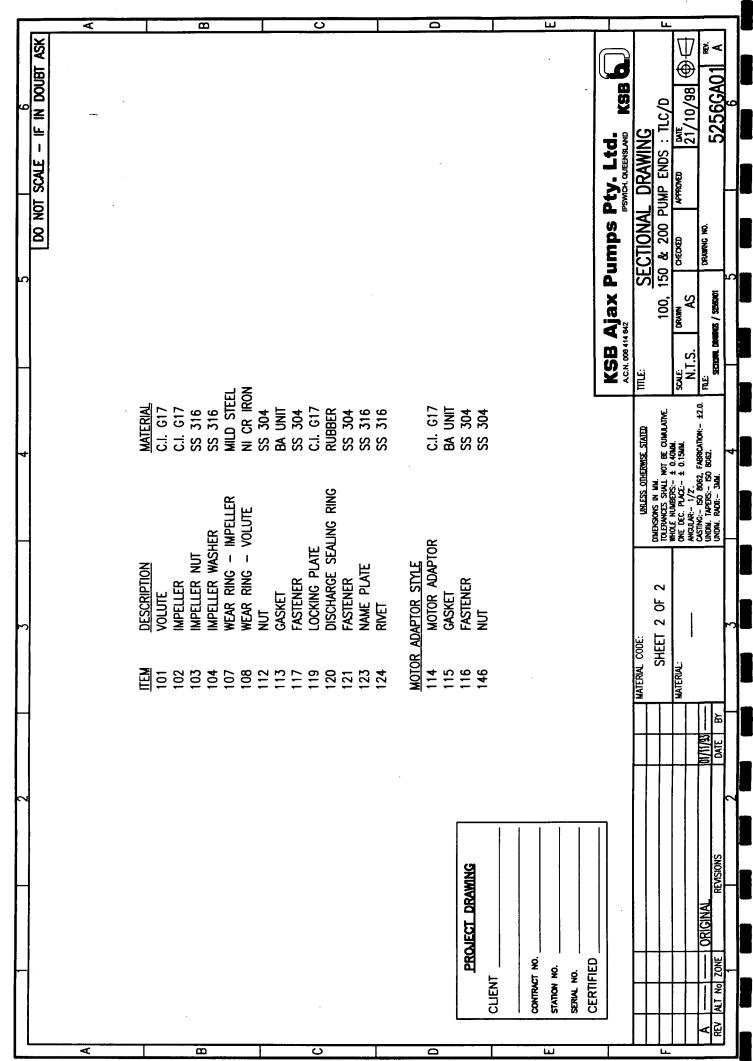


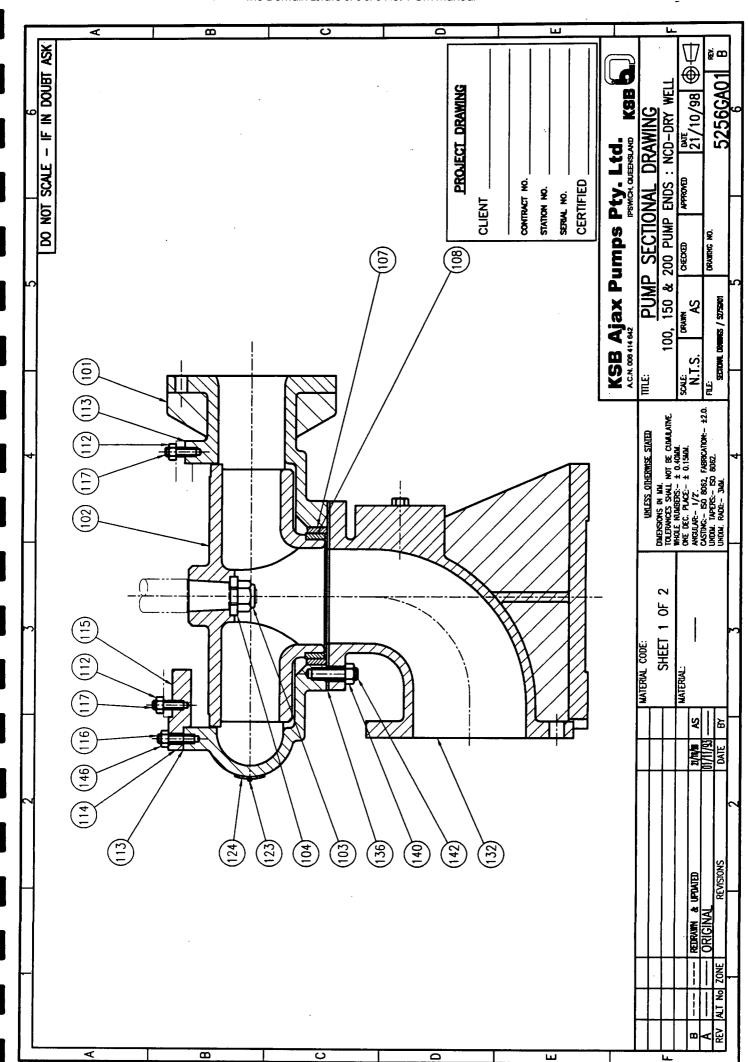
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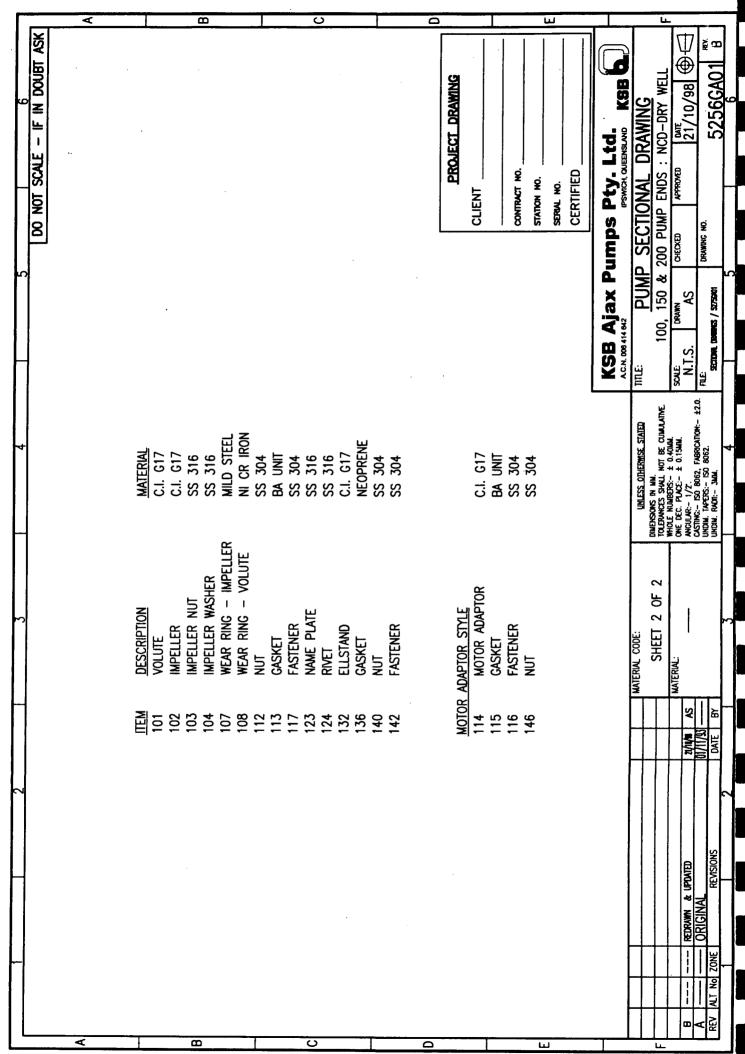


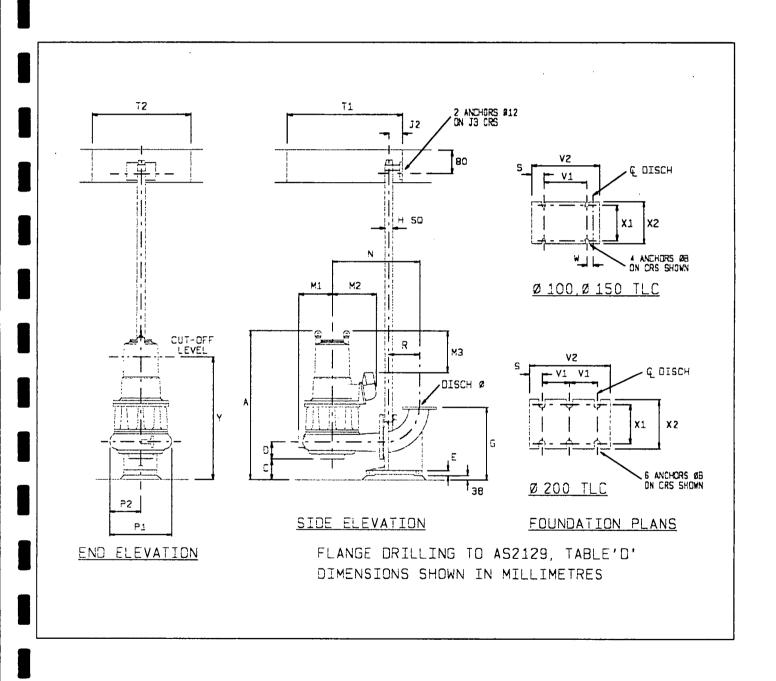
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E100-340	203	100	924	12	138	103	28	459	50	86	121	244	294	265	566	489	256	199	31	900	700	300	362	12	179	220	759	
	250	100	1071	12	138	103	28	459	50	86	121	244	294	387	566	489	256	199	31	900	700	300	362	12	179	220	B59	
E100-350	260	100	1071	16	127	114	26	459	50	86	121	319	294	387	598	548	274	199	31	900	800	300	362	12	179	220	859	
£100-380	260		1108																	900								
	300	100	1162	16	146	95	28	459	50	86	121	280	274	435	613	560	280	199	31	900	800	300	362	12	179	220	922	
****					4.05							240				- 40		4.00				300	350	4.0	470		004	
E100-405	260		1075																									
	300		1137																									
	350	100	1267	16	127	114	28	459	50	85	121	319	442	415	598	549	2/4	199	31	900	800	300	352	12	1/9	220	987	
		. = =																					455			075		
K150-330	203		1000																									
	260		1147																									
	300		1165																									
	350	150	1334	15	186	122	28	453	75	121	171	247	442	415	554	484	242	234	32	900	B00	375	438	N/A	225	2 /5	1054	
#150 OF 0	353			••		457	20	400	75	121	171	202	224	207	coo	F 7 9	24.5	224	าา	1000	000	מדנ	420	A1 / A	105	275	044	
£150-350	250		1136																									
	300 350		1210 1334																									
	370																											
	376	150	1334	10	131	137	20	403	13	141	1/1	203	•••	470	663	300	313	234	32	1000	auu	3/3	430	13/A	223	213	1034	
(150-405	260	150	1142	16	218	90	28	463	75	121	171	283	294	387	781	569	305	234	32	900	800	375	438	N/A	225	275	947	
	300	150	1204	16	218	90	28	463	7 5	121	171	283	274	435	781	569	305	234	32	900	800	375	438	N/A	225	275	964	
	350	150	1334	16	219	90	29	463	75	121	171	293	442	415	791	569	305	234	32	900	B00	375	438	N/A	225	275	1054	
	370	150	1334	16	218	90																						
		,					_		•											•								
K200-360	260	200	1369	20	370	132	3 5	695	75	145	241	330	294	387	936	635	350	302	51	1000	800	254	610	N/A	305	406	1174	
	300	200	1401	20	370	132	35	595	75	145	241	330	274	435	935	635	350	302	51	1000	800	254	610	N/A	305	406	1151	
	350	200	1527	20	370	132	35	695	75	146	241	330	442	416	936	635	350	302	51	1000	B00	254	610	N/A	305	406	1247	
	370	200	1527	20	370	132	35	695	75	146	241	330	442	416	936	635	350	302	51	1000	800	254	610	N/A	305	406	1247	

12.2 TABLES FOR ROUTINE MAINTENANCE

MAINTENANCE CHART

	DAILY	WEEKLY	MONTHLY	3 MONTHLY	6 MONTHLY	YEARLY	REMARKS
Check for leaks.							Extend to monthly if proved satisfactory during running-in.
Check electrical continuity & insulation resistance.							Extend to 6 monthly if proved satisfactory during running-in.
Check oil in seal chamber, drain & refill.							Extend to 12 monthly if proved satisfactory during running in and 1500 hrs. Running not exceeded.
Check for vibration.							Extend to weekly if proved satisfactory during running-in.
Check cable for damage.							Depending on environmental condition.
Inspect wear rings.		. "					Frequency can be changed depending on findings and pumping conditions.
Check for undue wear or corrosion of volute or impeller.							Check at end of first 3 months. Extend to yearly dependant on environmental and pumping conditions.
Check holding down bolts for tightness							Check at end of running in period, then at 12 monthly intervals.
Remove Water jacket and clean out all feeder lines. (if applicable)							Depending on environmental condition.

PUMP OVERHAUL

The pump should be completely overhauled if the discharge pressure drops below an acceptable level the overhaul procedure is detailed in the maintenance instructions.

MOTOR OVERHAUL

The motor requires overhauling if an excessive amount of water is present in the seal chamber. The motor bearings should be replaced at each major overhaul.

PROBLEM SOLVING FOR KSB AJAX PUMPS PTY LTD SUBMERSIBLE PUMP & MOTOR

PROBLEM SOLVING AND REMEDIAL ACTION REQUIRED

_	PROBLEM SOLVING AND	REMEDIAL ACTION REQUIRED
(A)	Power failure.	- Restore power.
(B)	Damaged cable.	- Repair or replace cable.
(c)	Blown fuses.	- Check to ensure the correct rating is being used. Check that the pump is not jammed. Check voltage supply. Carry out insulation and continuity checks. Remove cause of overload, rectify electrical problems. Replace fuse.
(D)	Thermistor failure.	- Check thermistors using a low voltage multimeter resistance. Should be 60 OHMS to 500 OHMS. Check for open circuit in thermistor wiring. Check backup relay. Check if more than 2.5 volts has been applied across thermistors. Repair Thermistor Circuit or replace damaged components.
(E)	Overload tripped.	- Reset. Follow procedure as for Item C.
(F)	Circuit breaker tripped.	- Reset. Follow procedure as for Item C.
(G)	Jammed/choked impeller.	- Remove cause of blockage. Check wet well for foreign material.
(H)	Restriction/discharge line.	- Remove restriction. Check gate valve.
(I)	Worn wear ring.	- Replace wear rings.
(J)	Excess air in liquid.	- Check inlet lines into station and baffle or relocate if necessary. Check level in well.
(K)	Head higher than design head.	- Check systems. Check for blockages in system.
(L)	Loose or damaged wiring.	- Repair or replace as required.
(M)	Open circuit/burnt-out stator.	 Replace, repair or rewind stator as required.

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Loose plug/seal compartment. - Tighten.

- (P) "O" ring/gasket failure. Replace.
- (Q) Casting fracture/failure. Repair or replace as required.

TROUBLE SHOOTING FOR KSB AJAX PUMPS PTY LTD SUBMERSIBLE PUMP AND MOTOR

PUMP WILL NOT START

- (A) Power failure.
- (B) Damaged cable.
- (C) Blown fuse.
- (D) Thermistor failure.
 - E) Jammed impeller.

- (F) Overload tripped.
- (G) Circuit breaker tripped.
- (H) Electrical switch board fault.
- (I) Motor incorrectly connected.
- (J) Faulty motor winding.

PUMP STARTS BUT MOTOR HAS EXCESS CURRENT and/or LOW SPEED

- (A) Wrong direction of rotation.
- (B) Over or under voltage.
- (C) Clogged impeller.
- (D) Failed bearing.
- (E) Fault in the motor.
- (F) Incorrect motor connection.
- (G) Pump installed in wrong system or system change to pipework change or failure.

PUMP RUNS BUT CAPACITY LOW

(A) Wrong direction of rotation.

- (F) Head higher than design head.
- (B) Impeller choked or inlet restricted. (G)
- (G) Leakage from discharge.(H) Supply voltage incorrect.

Wire clamped.

(F)

- (C) Restriction of discharge line. (H)
- (D) Wear rings worn excessively.
- (E) Excessive air in liquid.

LOW RESISTANCE READING or SHORT

- (A) Water in cone housing.
- (B) Cable damaged.
- (C) Water in stator housing.
- (D) Stator burnt out.
- (E) Loose wire.

HIGH CONTINUITY READING

- (A) Open circuit in stator / stator burnt out.
- (B) Broken wire or loose connection.
- (C) Damaged cable.

12.3 RECOMMENDED SPARES & LUBRICANTS

RECOMMENDED SPARE PARTS LIST

	DESCRIPTION	ITEM NO:
· .	Bearing Upper	5
]	Bearing Lower	6
1	Mechanical Seal - Inner	97
1	Mechanical Seal - Outer	21
]	Locknut	103
V	Wear Ring Impeller	107
V	Wear Ring Volute	108
S	Sealing Ring	120
1	'O' Ring & Gasket Set	

When ordering spare parts quote the serial number of the pump.

RECOMMENDED LUBRICANTS

Oil for Seal Chamber - Mobil Whiterex 307 (FR203 - 2 Litres)

Bearing Grease - SKF LGHT 3/1 High Temperature Grease

12.4 RECOMMENDED TOOL LIST

This equipment can be serviced using standard equipment normally available to Electrical and Mechanical Tradespersons.

Meggar Multimeter Screwdrivers Open ended spanners Socket spanners & extension bars

Major overhauls should be carried out in a workshop containing the following:-

Presses

Heating Apparatus - Induction Heater

- Gas Flame Heater

- Oven

Bearing Pullers Impeller Puller 12.5 PUMP PERFORMANCE CURVES AND SHEETS

KSB Ajax Pumps Pty. Ltd. Submersible Electric Pump Test Data

	Meter	0-100 PRESSURE GAUGE					an.	/ 3 ph / 50 Hz			kW			12-1980	As Tested	0.2889 KWH/KL	32 00 %
ıments:	Magna Flow Meter		kWH Meters		Forrer	WD 203	_	415	ພ	19555-17	12.0 k	23.0 A		Works Test AS 2417 Part 2 - 1980	With Toler.	0.000	000
Measuring Instruments:	Flow:	Discharge Head:	Power:	MOTOR	Make:	Frame:	Speed:	Supply:	I vpe:	Serial No.:	Power:	Amps:		Works	9	XX	XX
				\	5.0 1/s	1440		2 ×			~						
J&P RICHARDSON	BCC. THE DOMAIN STG 6	K1-60		YIOO	Fign: Head:	Speed	Power	Efficiency Pumn:	Motor Efficiency:	77 / 17 / 17 / 17 / 17 / 17 / 17 / 17 /		mber	Ç	900	5	n	
જ <i>ે</i>	202			EORRERS	Submersible	E100-280 TLC	273 mm	100000 mm	100		=	XX	XX	:		Motore. M	11 12
Customer:	Unit Serial No.		PINE	Make	Type:	Model:	Impeller Dia.:	Suction Pipe Dia.:	Discharge Pine Dia.:	Gange Hight Cor.		Barometric Pressure:	Water Temperature:	Meter Constant in Revs/KWH:	No. of Revs:	Current Transformer Meters:	

							Energy	per Vol		0.000.0	0.4401	0.2889	0.2166	0.1136	0.0864	0.0712	0.0586
							O/All	EH.		0.00	16.02	23.47	30.22	49.85	55.65	54.62	47.72
1	_			_	,		Pump			:	8.4	26.98	34.73	57.30	63.97	62.79	54.85
200		CS	MHD	IA.	7.6		Power in	(Pump) KW			5.24	5.43	5.77	6.94	8.29	9.20	9.65
80 96	200	0.00	24.93	1.70	4.40		Total :	Head E	0	28.90	25.91	24.93	24.06	20.81	17.67	14.30	10.28
2	1	0, 0,	ōγ	31			Flow	1/8	0	0.00	3.80	9.00	8.50	19.50	30.60	41.20	52.50
C		$[H_{G^{\times}A}^{H}H]^{T}$	///	0.3			Speed	Ę	9771	1440	1440	1440	1440	1440	1440	1440	1440
XX	5 60	2000	23.30				=	£	000	00.0	10:0	0.03	0.00	0.31	0.77	1.40	2.28
					_	7	FOR	Ì	0.70	0.70	0.70	0.70	0.70	0.78	87.0	0.78	0./8
						Pomer for	(Motor)	ΚW		603	6.05	6,63	2 00	06.7	9.55	10.38	11.09
						y Was		٧		134/134/129	136/136/131	139/139/134	15/15/15/15	1.6176.6176.61	0.01 / 7.1 / 7.71	10.47.10.47.17.9	19.17.16.97.18.5
							W3			23.47	22.40	21.19	17.26	14.63	13.13	13.50	6.71
						KWII Meter	11.2			22.22	21.50	20.25	16.75	14.16	17.75	12.13	61.7
							1.44		,	21.50	20.93	19.60	16.73	13.72	12.41	18 1	5
						Correction	Head	E	XX	××	X	×	XX	×	×	×	{
2						Delivery	Head	E	28.90	25.90	24.90	24.00	20.50	16.90	12.90	008	; ;
						Suction	Head	E	×	××	×	××	××	××	×	XX	
mean mer merel 3.						Flow		Vs	0.00	3.80	6.00	8.50	19.50	30.60	41.20	52.50	

Reliability Test (Yes/No) -: XX (If Yes) Hours: XX

Office: W.P. O' DOHERTY | Signed: L. P. O'

Test Officer: Witnessed by:

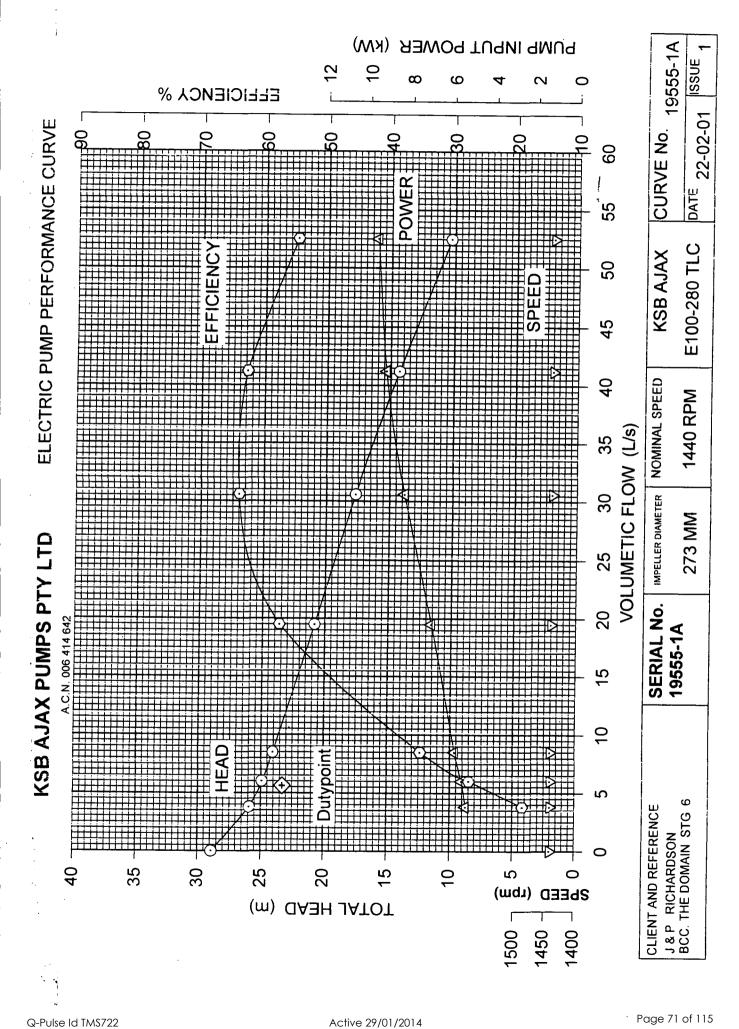
1 Signed:

Comments:

Date: 22/02/01

CACAL COMON

Point



KSB Ajax Pumps Ptv. Ltd. Submersible Electric Pump Test Data

Customer: Project:	J&P RICHARDSON BCC THE DOMAIN STC 4	Measuring Instruments:	ij
Unit Serial No.	10666 10	Flow: M	Mag
	(11-000)	Discharge Head: 0-100	0-10
		Power: FV	F.W.I

Magna Flow Meter 0-100 PRESSURE GALICE

kWH Meters

MOTOR Make: Frame:

PUMP				DUTY			
JIRKe:	FORRERS			Flow:	5.6	s/	
i y pe:	Submersible	<u>ء</u>		Hend:	23.3	Σ	
Jeneděl:	F.100-280 TLC	=		Speed:	1440	mdı	
Impelier Dia:	8/7	נונו		Power:	12	ΚW	
Suction Pipe Dia.:	000001	E		Efficiency Pump:	××		
Discharge Pine Dia.:	901	11111		Motor Efficiency:	87		
Gauge Hight Cor.:	=	£		kWh / kl:	××		
Barometric Pressure:		XX	mbar				
Water Temperature:		XX	Ö				
Meter Constant in Revs/KWH:	vs/KWH:		400				
No. of Revs:			. 2				
Current Transformer Meters;	Meters:	z					

1440 rpm 415 / Submersible 19555-1B 12.0 kW 23.0 A

Speed: Supply: Type: Serial No.:

		KWH/KL	RFF.	r.s	MHD	N.	36
art 2 - 1980	As Tested	1	27.52	00'9	24.73	1.50	4.00
WOLKS 1681 AS 241 / Part 2 - 1980	With Toler.	0.0000	0.00	("3" X" 2" (QG XO)"	Δν μγ	0.40	
-	Quoted	×	×	5.60	23.30		

Energy	per Vol kwhei	0,0000 0,4187 0,2810 0,2097 0,1101 0,0842 0,0697
O/AII	E.M.y	0.00 17.16 23.94 30.69 50.68 55.74 55.60 48.40
Pump	EM.	19.72 27.52 35.28 58.26 64.07 63.91
Power in	(pamp) kW	4.99 5.29 5.59 6.80 7.97 8.86
Total	Head E	28.00 26.41 24.73 23.66 20.52 17.25 14.26
Flow	1/8	0.00 3.80 6.00 8.50 19.70 30.20 40.50
Speed	шd	1440 1440 1440 1440 1440 1440 1440
ВУН	E	0.00 0.01 0.03 0.06 0.32 0.75 1.36
Motor	<u>.</u>	87.0 87.0 87.0 87.0 87.0 87.0
Power In	kW	5.73 6.08 6.42 7.82 9.16 10.18
Аппря	<	13.5 / 13.5 / 13.2 13.6 / 13.6 / 13.4 13.8 / 13.8 / 13.6 15.2 / 15.1 / 15.0 16.6 / 16.5 / 16.5 18.0 / 18.0 / 17.6 18.5 / 18.6 / 18.4
W3		24.50 22.97 21.59 17.69 15.07 13.56
KWH Meter W2		23.32 22.06 20.78 17.22 14.62 13.22
130	·.	22.81 21.62 20.68 16.88 14.50 13.00
Correction Head	E	******
Delivery Head	E	28,00 26,40 24,70 20,20 16,50 7,90
Suction Head	E	******
. Flow	Vs.	5.00 6.00 7.50 7.50 7.50 7.50 7.50 7.50

Reliability Test (Yes/No) -: XX

(Vest/No) -: XX (If Yes) Hours: XX
W.P. O' DOTHERTY + Signed: W.P. O' Aler And Signed:

Test Officer: Witnessed by:

Date: 22/02/01

Comments:

DATE: 12/09/97

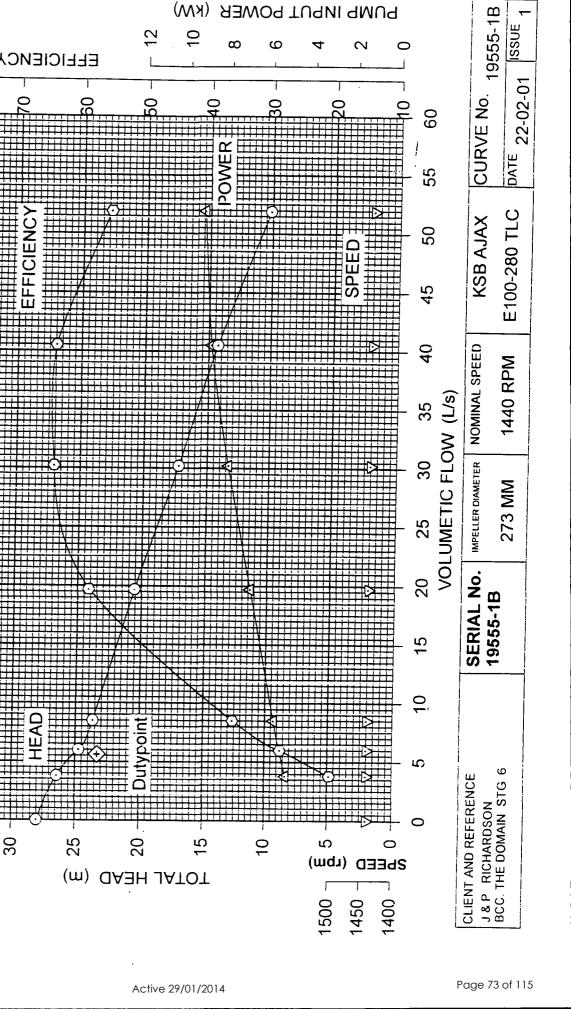
PAGE: 1 OF 1

Point

35

KSB AJAX PUMPS PTY

ELECTRIC PUMP PERFORMANCE CURVE



PUMP INPUT POWER (KW)

ELLICIENCY %

12.6 PUMP TECHNICAL DATA & DIMENSION SHEETS

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FORRERS PUMP DETAILS

Model (Old Model No)	SP280	SGV100- 150	SGV280	4S250/3	4s330/3
Model (New Model No)				E100-280	E100-340
Discharge Diameter	75	75	75	100	100
Inlet Diameter	75	75	75	125	170
Impeller Type	Shredde r	Shredder	Shredder	Non Clog	Non Clog
Impeller Fixing	Locknut	Locknut	Locknut	Taper/Lockn ut	Taper/Locknut
Rang to fit pump	180 - 100	150 - 100	180 - 100	277 - 185	340 - 275
W/ring Diametrical Clearance	N/A	N/A	N/A	0.82-0.61	340 - 275
W/ring Fixing	N/A	N/A	N/A	Pressed	Pressed
Min Submergence - TLC	440	440	440	440	440
Weight - Pump Only	40	38	40	96	114

FORRERS PUMP DETAILS

Model (Old Model No.)	4S350/3	4S380/4	4S405/3	6D330/3.5	6D350/4
Model (New Model No.)	E100-350	E100-380	E100-405	K150-330	K150-350
Discharge Diameter	100	100	100	150	150
Inlet Diameter	168	100	185	125	150
Impeller Type	Non Clog	Non Clog	Non Clog	Non Clog	Non Clog
Impeller Fixing	Taper/Lockn ut	Taper/Lockn ut	Taper/Lockn ut	Taper/Lockn ut	Taper/Locknut
Range to fit pump	355 - 340	370 - 270	406 - 346	330 - 250	344 - 265
W/ring Diametrical Clearance	0.81-0.71	0.81-0.71	0.81 -0.71	0.81-0.71	0.81-0.71
W/ring Fixing	Pressed	Pressed	Pressed	Pressed	Pressed
Min Submergence - TLC	440	450	440	550	550
Weight - Pump Only	135	131	155	170	198

12.7 MOTOR TECHNICAL DATA SHEETS

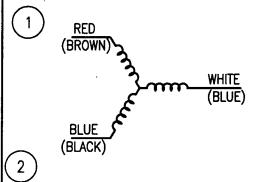
MOTOR TECHNICAL DATA (COMMON CONSTRUCTION DETAIL)

Frame Size .	D203
Enclosure	IP68
Insulation Class	F
Mechanical Seal Size	45
Seal Face Material	EXTERNAL SIC/SIC INTERNAL SIC/C
Seal Style	TANDEM
NDE Bearing	NU207EC-C3
Size	Dia. 35
D.E. Bearing	6310VV-C3
Size ·	DIA 50
Bearing Lubrication	Sealed/ Grease
Weight	155KG

Note: Bearing Types - Examples 6310 VV-C3 indicates ball bearing
NU209EC-C3 indicates roller bearing
7315BECB-C3 indicates to matched angular contact ball bearings

12.8 WIRING DIAGRAM

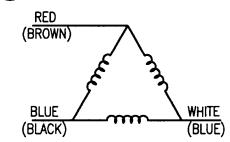
MOTOR CONNECTION FOR SUBMERSIBLE MOTORS (FORRERS) POWER CABLE - OLEX



BLUE 2 (BROWN 1)

BLUE 1 (BROWN 2)

WHITE 2 (BLUE 2) (BLUE 1)



RED 2 (BROWN 2) (BROWN 1)

WHITE 1 (BLUE 1)

WHITE 2 (BLUE 2)

WHITE 2 (BLUE 2)

RED 1 (BROWN 1)

BLUE 2 (BLACK 2)

CONTROL CABLES

- TWO BLACKS IN MAIN CABLE WINDING THERMISTORS
- TWO BLACKS IN MAIN CABLE WATER SENSOR
- 7 TWO BLACKS IN MAIN CABLE 1 WINDING THERMISTORS
- TWO BLACKS IN MAIN CABLE 2 WATER SENSOR
- SEPARATE CABLE
 RED & BLUE WINDING THERMISTORS
 (BROWN & BLUE)
 GREEN & WHITE WATER SENSOR
 (GREEN & BLACK)
- SEPARATE CABLE
 RED & BLACK WATER SENSOR
 (BROWN & BLUE)
- SEPARATE CABLE
 RED & BLACK WINDING THERMISTORS
 (BROWN & BLUE)

FOR CORRECT ROTATION, DE, LOOKING INTO EYE OF IMPELLER CONNECT R.W.B. TO R.W.B. OF A SUPPLY WITH A TIME SEQUENCE R.W.B.

	STANDAR	ND MOTOR CON	INECTION	STAR/DELTA MOTOR CONNECTION			
RATING	STANDARD THERMS	STANDARD THERMS & SENSOR	STANDARD SENSOR	STAR/DELTA THERMS	STAR/DELTA THERMS & SENSOR	STAR/DELTA THERMS	
3kW TO 75kW	2, 11	2, 9	2, 10	3, 11	3, 9	3, 10	
ABOVE 90kW	4, 11	4, 9	4, 10	3, 11	3, 9	3, 10	

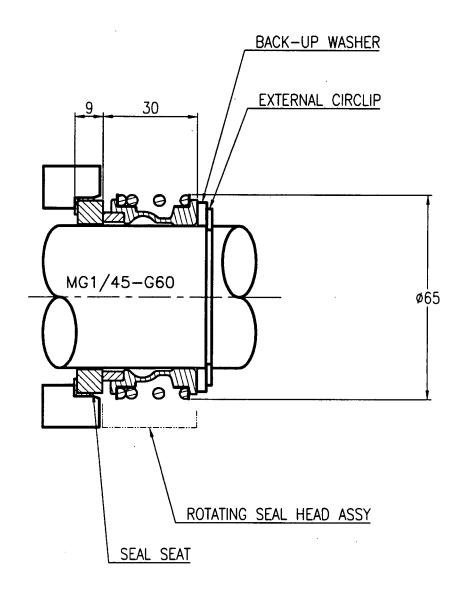
Master_Cable_Diagram_Olex

12.9 MECHANICAL SEAL DATA



MECHANICAL SEAL

BURGMANN - MG1



NOTES:

- 1. USE NORMAL OR SOAPY WATER TO MOUNT ELASTOMER BELLOW SEALS ONTO SHAFT.
- 2. NEVER USE OIL OR GREASE.
- 3. CHECK THAT THE RINGS, SPRINGS AND SEAL FACE SIT CORRECTLY.

MG1_63_G6_Manual

2.0 VALVES

SUPPLIER: TYCO WATER

63 CURRUMBIN CREEK ROAD

CURRUMBIN Qld 4223

Ph: (07) 5589 4400

Fax: (07) 5534 7079

MODEL:

100mm DIA. SWING CHECK VALVE FREE ACTING FBE COATED

100mm DIA. SLUICE VALVE RS ACC c/w C.I. CAP

SUPPLIER: TYCO FLOW CONTROL

1189A KINGSFORD SMITH DRIVE

EAGLE FARM QLD 4009

Ph: (07) 3260 2444

Fax: (07) 3260 2140

MODEL:

CLA-VAL RP6L 25mm RPZ VALVE c/w ISOLATING VALVES & STRAINER

Page 83 of 115

OPERATION AND MAINTENANCE MANUAL

CONTENTS

1.00.00	Description of DN100 Table C Resilient Seated Sluice Valve
1.01.00	Operating Instructions
1.02.00	Maintenance Instructions
2.00.00	Spare Parts List
3.00.00	Address for Queries

Ref: 170-94.MKT

Sheet 1 of 3

OPERATION AND MAINTENANCE MANUAL

1.00.00 DESCRIPTION

- 1.00.01 This section covers a manually operated DN100 Flg/Flg Class 16 Resilient Seated Sluice Valve, Table C.
- 1.00.02 Reference drawing number 04-16-02-1081.

1.01.00 OPERATING INSTRUCTIONS

- 1.01.01 The valve is operated in an anti-clockwise closing direction.
- 1.01.02 The number of turns from open to close is approximately 23.
- 1.01.03 Valves of this type are not designed for throttling purposes.

1.02.00 MAINTENANCE INSTRUCTIONS

- 1.02.01 This valve does NOT require any lubrication.
- 1.02.02 In the unlikely event of any of the long life Stem Sealing Rings (items 14 & 15) requiring replacement, ensure valve is fully OPEN and remove Cap and Stem Housing (items 6 & 3) by removing concealed Capscrews (item 12). This will permit the Stem Housing (item 3) to be removed from the stem (item 5) for replacement of the appropriate rings.
- 1.02.05 Re-assemble in the reverse sequence using any commercially available water pump grease applied to the upper end of the Stem to aid assembly. Reseal Setscrews with silicon sealant.

2.00.00 SPARE PARTS LIST

- 2.00.01 Spare parts are NOT normally required for this type of valve.
- 2.00.02 In the unlikely event of a sealing ring failure the appropriate ring may be selected from items 14 & 15 in the attached general assembly drawing No. 04-16-02-1081.

Ref: 170-94.MKT

Sheet 2 of 3

3.00.00 ADDRESS FOR QUERIES

3.00.01 Should there by any queries or additional information required, please contact:

Tubemakers Foundry Products
Coastline Foundry (Qld) Pty Ltd
63 Currumbin Creek Road
CURRUMBIN QLD 4223
Ph: (075) 34 2522

Ph: (075) 34 2522 Fax: (075) 34 7079

Ref: 170-94.MKT

Sheet 3 of 3

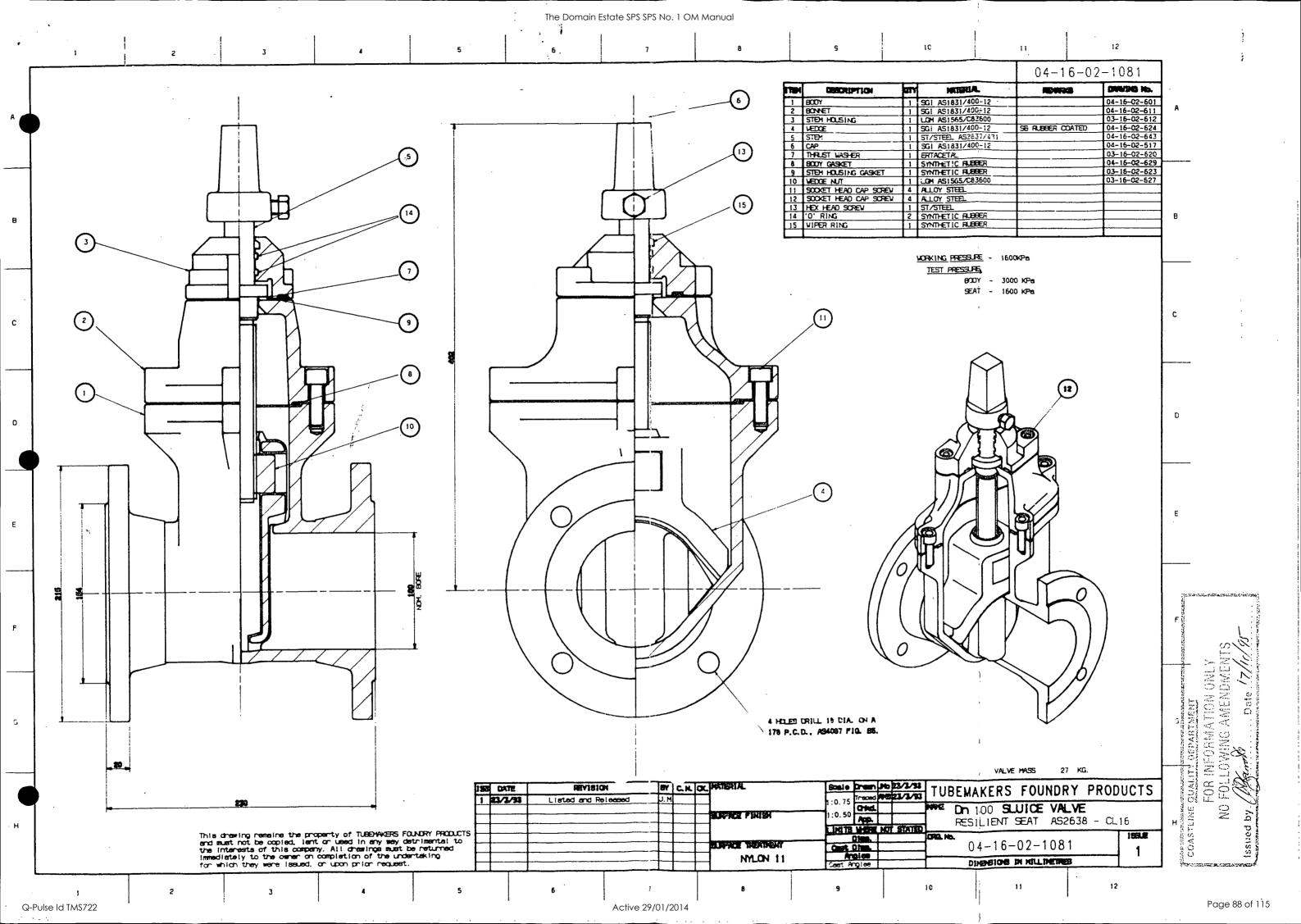
BILL OF MATERIAL

DN100 RESILIENT SEATED SLUICE VALVE - CLASS 16 TABLE 'C'

PARENT ITEM NO. : VRDCC10500A

CHILD ITEM NO.	DESCRIPTION	MATERIAL	QTY
VZ041602601C	BODY, FL/FL 'C'	DUCTILE IRON	1
VZ041602611	BONNET	DUCTILE IRON	1
VZ031602612	STEM HOUSING	GUNMETAL	1
VZ041602624	WEDGE (SBR COATED)	DUCTILE IRON	1
VZ041602644	STEM	STAINLESS STEEL	1
VZ041602518	CAP	DUCTILE IRON	1
VZ031602620	THRUST WASHER	ERTACETAL	1
VZ041602629	BODY GASKET	SYNTHETIC RUBBER	1
VZ031602623	STEM HOUSING GASKET	SYNTHETIC RUBBER	1
VZ031602628	WEDGE NUT	GUNMETAL	1
ZDBMT12035	SOC. HEAD CAPSCREW	ALLOY STEEL	4
ZDBMT10030	SOC. HEAD CAPSCREW	ALLOY STEEL	4
ZDSTH12020	HEX. HEAD SETSCREW	STAINLESS STEEL	1
ZSRR0214	'O' RING	SYNTHETIC RUBBER	2
ZSRRW20	WIPER RING	SYNTHETIC RUBBER	1

Ref: 174-94.MKT



OPERATION AND MAINTENANCE MANUAL

CONTENTS

1.00.00	Description of DN100 & DN150 Flanged Class 14 Swing Check Valves
1.01.00	Operating Instructions
1.02.00	Maintenance Instructions
2.00.00	Spare Parts List
3.00.00	Troubleshooting Guide
4.00.00	Address for Queries

Ref: 3-96.MKT

OPERATION AND MAINTENANCE MANUAL

1.00.00	DESCRIP	TION
	1.00.01	Operation and maintenance instructions for DN100 & DN150 flanged class 14 swing check valves. Free acting and lever and weight versions.
	1.00.02	Reference drawing number 04-16-03-002 typical.
1.01.00	OPERATI	ING INSTRUCTIONS
	1.01.01	The operation of the swing check valve is automatic. The valve opens in response to flow velocity and closes in response to cessation or reversal of flow in the forward direction.
	1.01.02	Valves are supplied either free acting or with extended hinge pin for fitting of lever and weight.
	1.01.03	Lever and weighs are often applied to swing check valves to assist the closing action and to make the valve more responsive to flow reversal and thus reducing disc slam with resulting water hammer effects.
	1.01.04	When lever and weight is applied it should be positioned on the hinge pin to maximise its effect on closure ie. with valve positioned horizontally, the lever should move through an arc 45° below the centre line.
	1.01.05	Through trials the weight should be positioned along the lever at a point where the smallest valve action is obtained under cessation of flow.
	1.01.06	Where a valve is fitted with extended hinge pin it should also be fitted with lever and weight. When a valve is fitted with extended hinge pin it necessarily has to have seals fitted. The seals increase friction which in turn retards the action of the disc, increasing the tendency toward valve slam and thus more severe water hammer effect.
	1.01.07	To minimise wear and increase the valve performance life, ensure the valve is correctly sized and the disc is fully open under normal flowing conditions.

1.02.00 MAINTENANCE INSTRUCTIONS

- No external maintenance either preventative or otherwise can be applied external to the valve under operating conditions other than adjustments to lever and weight assemblies etc.
- 1.02.02 Major maintenance involving complete de-watering of the valve may be necessary once or twice throughout the product's life, depending on severity of service conditions. The usual reasons for such a service are:
 - Worn hinge components needing replacement.

Ref: 3-96.MKT

Degradation of seat seal requiring refacing.

- Severely retarded valve action requiring cleaning and freeing of all hinge bearing areas.

1.02.03

To obtain access to internal components, first remove both hinge seal plugs, RH screwed. In free-acting valve hinge pin, can be drifted from bearings from either side releasing disc sub-assembly for removal through the cover opening.

For the extended hinge pin version, drift hinge pin from the non-extended side, the bronze hinge pin bush interference fitted, will be removed with the hinge pin thus releasing the disc assembly.

2.00.00 SPARE PARTS LIST

2.00.01 It is not usual to carry spare parts for this product as they are major components used very infrequently.

Refurbishment is usually carried out in conjunction with major planned outages. The reason for the work has usually been identified well prior to the shutdown allowing for specific components to be obtained from the manufacturer if necessary.

3.00.00 TROUBLE SHOOTING GUIDE

There are a number of malfunctions which can occur within the generic type.

- Seat leakage replace body and disc seats
- Increasing tendency for valve slam (increasing water hammer) hinge components binding, clean and free.
- Disc hanging up (not closing) worn hinge components replace.

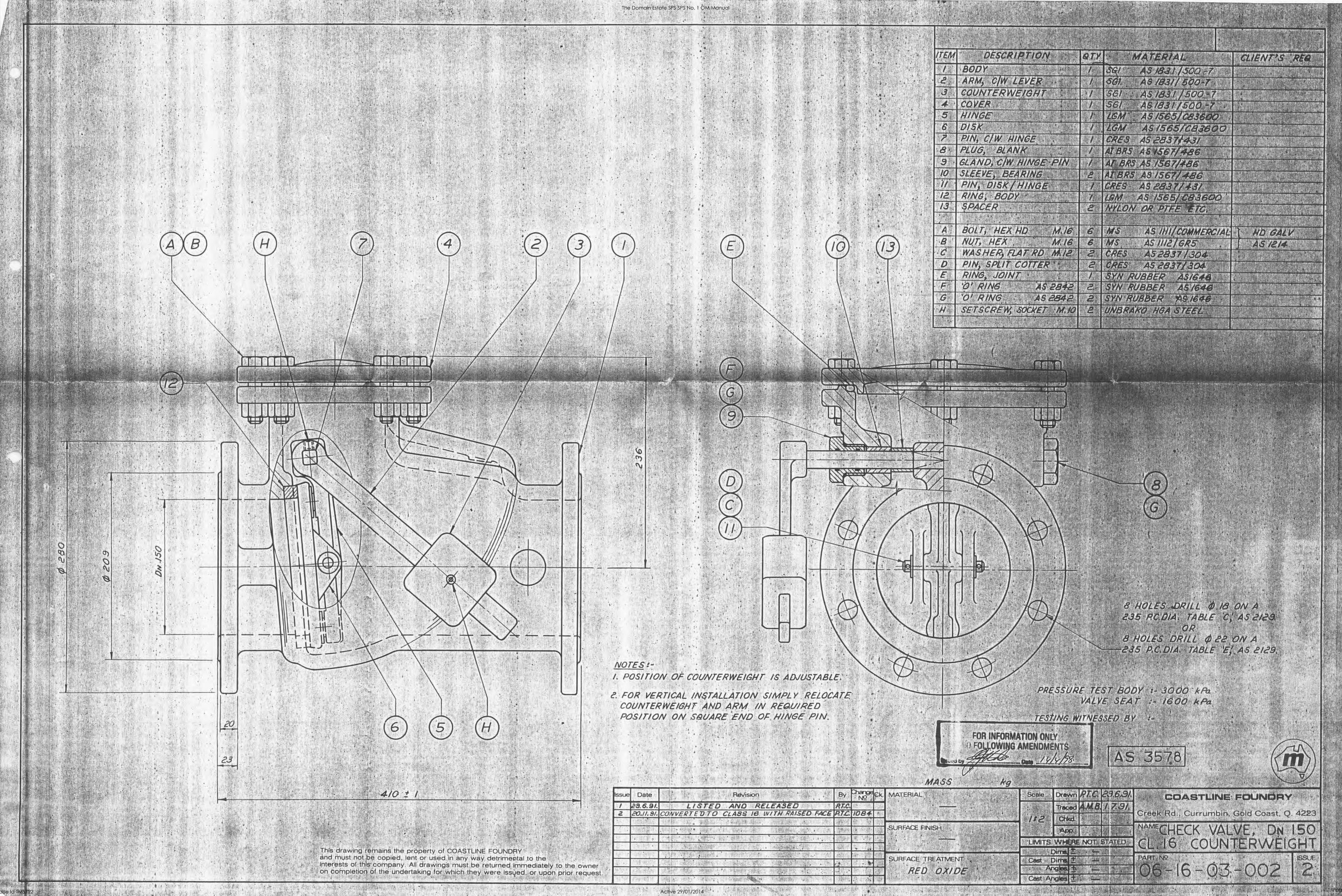
4.00.00 ADDRESS FOR QUERIES

4.00.01 Should there by any queries or additional information required, please contact:

Tubemakers Water 63 Currumbin Creek Road CURRUMBIN QLD 4223

Ph: (07) 5534 2522 Fax: (07) 5534 7079

Ref: 3-96.MKT



/ IREVOR

JAP RICHARDSON



MODEL—RP6L

Reduced Pressure Principle Backflow Preventer



Sizes 3/4" - 1" - 1 1/2" - 2"

Operation

In a flow condition the check valves are open with the pressure between the checks, called the zone, being maintained at least 5.0 psi lower than the inlet pressure and the relief valve is maintained closed.

Should abnormal conditions arise under no flow or reversal of flow, the differential relief valve will open and discharge to maintain the zone at least 2 psi lower than the supply.

In resumption of normal flow, the zones differential pressure will resume and the relief valve will close.

- Low Head Loss
- Meets Specifications of AWWA, ASSE, and Is Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California
- Documented Flow Curves
- All Internal Parts are Serviceable Inline
- Replaceable Relief Valve Seat Ring on 3/4", 1, 1/2" and 2"

The CLA-VAL Model RP6L Backflow Preventer combines maximum protection against backflow with low head loss characteristics. It operates on the reduced pressure principle, which is an accepted method of safeguarding potable water supplies for high hazard service.

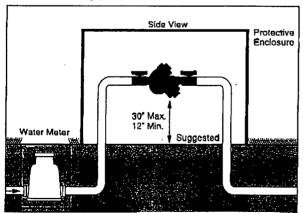
The Model RP6L assembly is carefully constructed of corrosionresisting materials. It consists of two independently acting y-type check valves, an automatic pressure differential relief valve located between two check valves, two shut off valves and four test cocks. Field testing is easily performed by means of the test

The RP6L must be installed in a horizontal position with the Relief Valve discharging vertically down.

Installation

Reduced Pressure Backflow preventers should be installed with minimum clearance of 12" between port and floor or grade. They must be installed where discharge will not be objectionable and can be positively drained away. They should be installed where easily accessible for testing and maintenance and must be protected from freezing. Thermal water expansion and/or water hammer downstream of the backflow preventer can cause excessive pressure. Excessive pressure situations should be eliminated to avoid possible damage to the system and assembly.

Refer to local codes for specific installation requirements. Some codes may prohibit vertical installation.



Typical Applications

Reduced Pressure assemblies are used to protect against high hazard (toxic) fluids in water services to industrial plants, hospitals, morgues, mortuaries, and chemical plants. They are also used in irrigation systems, boller feed, water lines and other installations requiring maximum protection.

Material Specifications

Maximum working pressure 175 psi Hydrostatic test pressure 350 psi Temperature range

Fluid

Fiastomers

End detail Main valve body Relief valve body 32°F to 140°F Water

Threaded ANSI B2, 1 Bronze ASTM B584-78 Bronze ASTM B584-78

Nitrile ASTM D-2000 Seat Discs*

Diaphragms: Nitrile, fabric

reinforced

Springs

Stainless Steel, 300 series

* On water systems that experience an excess of a constant 140°F, device must be ordered with HW (RP6L 1" HW).

1 Can be supplied with optional silicone seat disc

INWARD OUTWARD CLA-VAL LOGGED BY.

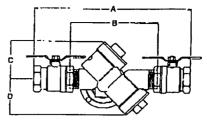
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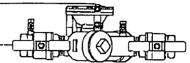
Dimensions (In inches) and Weights (In lbs.)

Size	,	۸۰		_		_	Net Wt.
512.6	øv.	GV.	B	C -	D	E	
3/4	12 1/4	11 1/4	7 3/4	4 1/8	3 1/4	4 1/8	11 1/2
1	13 5/8	11 5/8	7 3/4	4 1/8	3 1/4	4 1/8	12 1/2
1 1/2	18 1/4	15 1/4	10 5/8	5 1/4	4 1/2	5	26 1/2
. 2	19	15 1/2	10 5/8	5 1/4	4 1/2	5	29

(METRIC - mm.)

Size		4.	-	_	_	_	Net WL
3120	BV.	GV.	•	B C D	E	(Kgs.)	
20	311.2	285.8	196.9	104.B	82.6	104.6	5.2
25	346.1	295.3	196.9	104.6	82.6	104.8	5.7
40	463.6	387.4	269.9	133.4	114.3	127.0	12.0
50	482.6	393.7	269,9	133.4	114.3	127.0	13.0

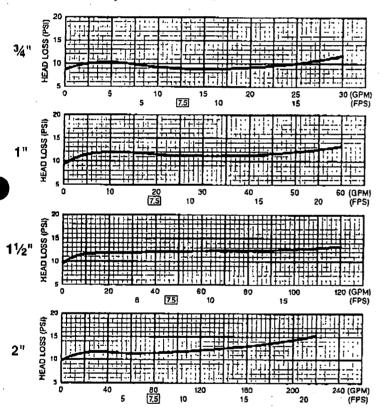




A*av is approximate length with Ball Valve shut-offs. A*gv is approximate length with Gate Valve shut-offs. All dimensions are approximate.

Flow Curves

Flow curves generated by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California,



FLOW RATE (in GPM and FPS)

NOTES: 1. Velocities are calculated for flows in Schedule 40 steel pipe.

2. Typical water system flow velocities of 0 to 7.5 (ps should be used for head loss efficiency compansons.

Agency Compliance

- ASSE Listed 1013
- AWWA C506 Conformance
- ASSE Listed 1013
- · CSA B-64.4 Certified
- IAPMO* Listed
- Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California.
- Valves must be supplied with resillent seated shut-off valves and test cocks

Typical Specifications

The reduced pressure backflow preventer shall consist of two independently operating, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve. The assembly shall automatically reduce the pressure in the "zone" between the check valves to at least 5 psi lower than intel pressure. Should the differential between the upstream and the zone of the unit drop, to 2 psi, the differential relief valve shall open and maintain the proper differential.

Mainline valve body and caps including relief valve body and cover shall by bronze. Check valve moving member shall be center stem gulded. All hydraulic sensing passages shall by internally located within the mainline and relief valve bodies and relief valve cover. Diaphragm to seat area ratio shall be 10:1 minimum. Relief valve shall have removable seat ring. Check valve and relief valve components shall be constructed so they may be serviced without removing the valve body from the line. All seat discs shall by reversible. Shut-off valves and test cocks shall be full ported ball valves.

The assembly shall be rated to 175 psi MWWP and water temperature range from 32°F to 140°F.

The assembly shall meet the requirements of ASSE Standard 1013; AWWA Standard Code C506-78; and USC Foundation of Cross Connection Control and Hydraulic Hydraulic Research, latest Edition.

Reduced Pressure Principle Assembly shall be a CLA-VAL RP6L or approved equal.



CLA-VAL CO.

PO Box 1325 Newport Beach CA 92659-0325 Phone: 714-722-4800 • Fax: 714-548-5441

CLA-VAL CANADA, LTD.

4687 Christle Drive Beamsville, Ontario Canada LOR 1B4 Phone; 905-563-4963 Fax: 905-563-4040 COPTRIGHT CLAVA, 1291 F CLA-VAL SA Chemin das Mosangos 1 CH-1032 Homanel/ Lausanne, Switzerland Phone: 41-21-843-15-50 Fax: 41-21-843-15-50 WWW.cla-val.com -Daprecented-By:

PART # 943833 025 RPGL CO \$220+GST. RECIARDS MICK

3.0 AUTO WELL WASHER

<u>SUPPLIER:</u> AUTO WELL WASHERS Pty. Ltd.

LOT 8/69 RUNNING CREEK ROAD

YANDINA Qld 4561

Ph/Fax: (07) 5446 7167

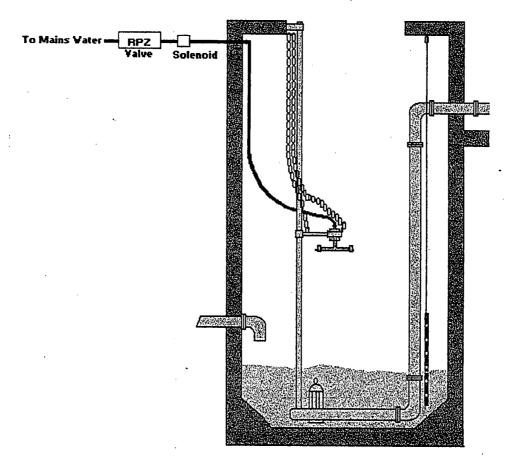
Page 95 of 115

McBerns AutoWellWasherTM

(Australian Patent No. 655111) INSTALLATION INSTRUCTIONS For

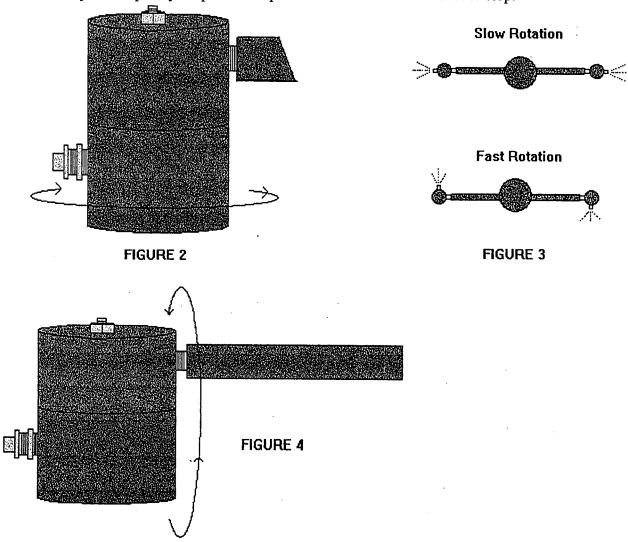
GUIDE RAIL MOUNTING BRACKET

The guide rail bracket is adjustable to fit most guide rail configurations, shapes and dimensions. These include single rails of 3" and 2" diameter and twin rails from 1" to 3". Positioning of the device in the well can be critical to the effectiveness of the wash system. Configuration of wells can differ but, in general the Washer should be positioned in the clearest available space to ensure the rotating arms do not come in contact with guide rails, chains, probes, etc. For wells of diameter up to 2.5metres, we recommend the washer be positioned approximately 2 metres above the duty level. In larger diameter wells it would need to be lower, but no lower than 50cms above duty level.



- 1). Your first task is to assemble the bracket according to whether you are mounting to a single or double guide rail. The two methods are shown in the diagrams on page 4. There are 4 alternative positions for the rear angle pieces. Choose the position which has the bracket secure on the rail, but still allows the bracket to slide up and down.
- 2). Two lengths of chain must now be attached to the points provided. One is at the front of the washer's head clamp, and the other on top of the bracket at the rear. The chains must be of sufficient length to lower the Washer to your chosen operating point down the guide rail. NB. An accessory chain kit is available from you distributor. It comprises two 5 metre lengths of 316 SS chain and four 316SS "D" shackles.

- 3) .Now secure the Washer head in the clamp of the bracket and attach 3/4"flexible hose to the 3/4" SS nipple on the Washer head. Use a good quality hose that can resist sulphides, not ordinary garden hose. We have found "Gates Adaptaflex" hose to be suitable.
- 4). The next step is to set the rotation speed by adjusting the spray buckets. This is best achieved by connecting water to the Washer and testing your adjustments before installing on the guide rail. By loosening the bolt which passes through each bucket, the nozzle housing can rotate through 360 degrees (see Figure 2). The nozzles need to be pointing in opposite directions to cause the spray arms to rotate. Speed of rotation is affected by the angle at which the nozzles are set (Figure 3). Best results are obtained with slow rotation, but care must be taken to allow for drops in water pressure at times of peak water usage in the locality. A temporary drop in water pressure can cause the Washer to stop.



5). Now by twisting the nozzle buckets on the nipples, which join them to the spray arms, the nozzles can be directed to wash the desired areas (Figure 4). Each nozzle gives a wide fan of spray. Usually, one would be directed to cover the well wall from high to low water line. The other can be directed at a sharper angle to hit the top of the pumps, probe/float switches, guide rails etc.

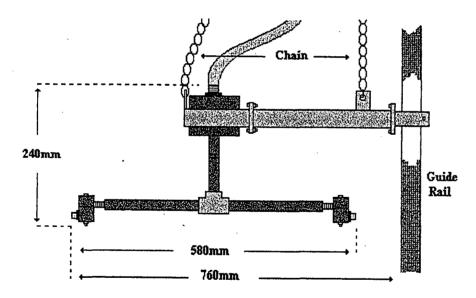
Above ground you should have already installed an approved back-flow prevention device to the water supply line. Australian Standard specifies a Reduced Pressure Zone (RPZ) valve, and we recommend a 25mm model. Between this and the Washer a solenoid valve should be fitted in the water line. This solenoid is wired to the sewage pump control board so as to open when the pump turns on, and close when the pump stops. Thus the Washer operates as the well is being emptied

THE WELL WASHER KIT CONTAINS:

Rotating Washer Assembly Guide Rail Mounting Bracket Installation Instructions

TO INSTALL YOU NEED TO PROCURE:

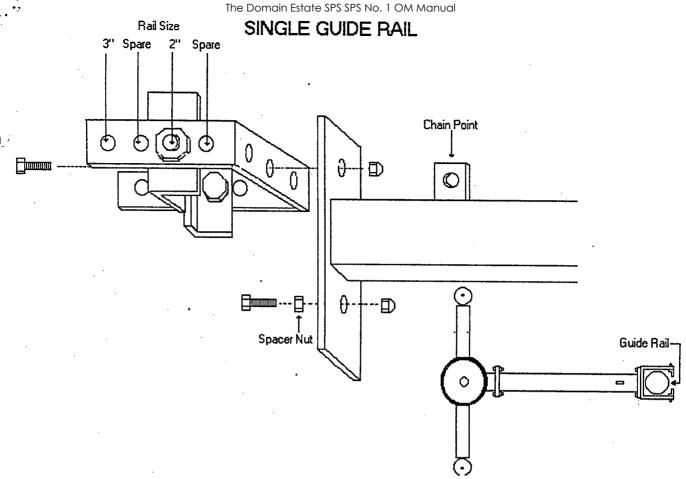
Back flow prevention device. (Brand is your choice but we recommend 25mm size.) 24volt AC Solenoid. (Brand and type is best chosen by your Electrician). Two lengths of chain and four "D" shackles (kit available from your Well Washer distributor.) Good quality flexible hose.

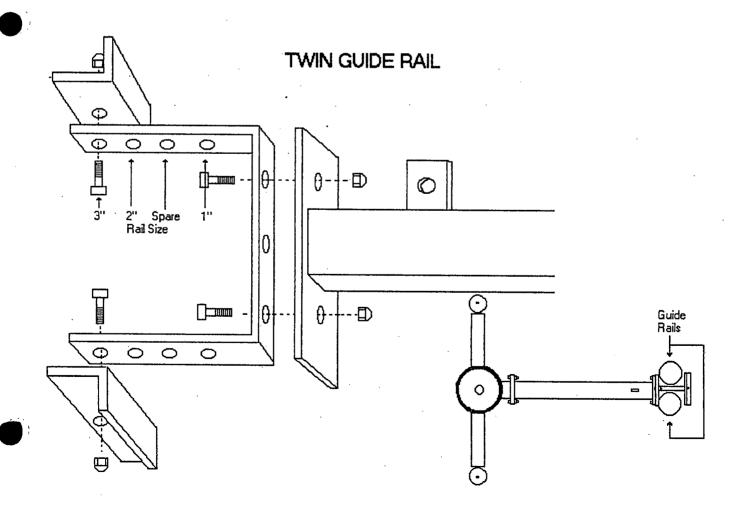


Please note the dimensions above are a guide only. Slight variations may occur.

Auto Well Washers Installation Hotline 07 54467167 69 Running Creek Road Yandina Qld 4561 Australia

© McBerns Pty Ltd June, 2000





4.0 TEST SHEETS

File://Jpr_Server/docs/!sched/PUMPManual.mas.doc
27, 2001

Revision 0 April

kwrki per Vol

0.000.0

0.2889 0.2166 0.1136 0.0864 0.0712 0.0586

PAGE: 1 OF 1 ·

Ajax Pumps Pty. Ltd. Submersible Electric Pump Test Data

Unit Serial No.: Customer: **Project:**

BCC. THE DOMAIN STG 6 J & P RICHARDSON

19555-1A

DUTY Flow: Head: Speed: Power: FORRERS Submersible E100-280 TLC 273 100000 100 Suction Pipe Dia.:

5.6 23.3 1440 12 XX 87 XX Efficiency Pump: Motor Efficiency: cWh/kl:

mbar C

× ×

Water Temperature: Meter Constant in Revs/KWH:

Barometric Pressure:

Discharge Pipe Dia .: Gauge Hight Cor.:

Impeller Dia.:

Mnke: Model: Current Transformer Meters:

No. of Revs:

Z Z ES

3 ph / 50 Hz 0-100 PRESSURE GAUGE Magna Flow Meter Submersible 19555-1A 12.0 kW 23.0 A kWH Meters Forrer WD 203 1440 415 Measuring Instruments: Discharge Head: MOTOR Make: Frame: Type: Serial No.: Power: Amps: Speed: Supply: Power:

	Works Test AS 2417 Part 2 - 1980	art 2 - 1980	
Quoted	With Toler.	As Tested	
XX	00000	0.2889	KWII/KL
xx	00.0	26.98	EFF.
5.60	[OX . Oc] = (HX . OH)	00'9	LSS
23.30	[2n] [- ns]	24.93	MHID
	0.31	1.70	H_{r}^{r}
		4.40	ð۲

O/AB		000	20.91	23.47	30.22	10.85	55.65	54.62	47.72
Pump Effy			18.71	26.98	1173	57.30	63.97	62.79	54.85
Power in	KW.		5 24	5.43	5.77	76.5	8 29	9.20	9.65
Total Head	E	28 90	25.91	24.93	24 ()6	20.81	17.67	14.30	10.28
How	1/8	000	3.80	00.9	8.50	19.50	30.60	41.20	52.50
Speed	rbu	1440	1440	1440	1440	1440	1440	1440	1440
DVII	E	0.00	10.0	0.03	90.0	0.31	0.77	1.40	2.28
Motor	•	87.0	87.0	87.0	87.0	87.0	87.0	87.0	.87.0
Power in (Motor)	kW		6.03	6.25	6.63	7.98	9.53	10.58	11.09
Amps	<		13.4/13.4/12.9	13.6/13.6/13.1	13.9/13.9/13.4	15.5/15.5/15.1	17.2 / 17.2 / 16.6	18.4 / 18.4 / 17.9	19.1 / 18.9 / 18.5
C.N			23.47	22.40	21.19	17.26	14.63	13.13	12.59
KWJI Meter W2			22.22	21.50	20.25	16.75	14.16	12.75	12.13
I,W			21.50	20.93	19.60	16.73	13.72	12.41	11.81
Correction Head	E	×	×	×	×	XX	×	×	×
Delivery Head	E	28.90	25.90	24.90	24.00	20.50	16.90	12.90	8:00
Surtion Hend	E	×	××	XX	×	××	×	ž	×
Flow	Ľs	0.00	3.80	00'9	8.50	19.50	30.60	41.20	52.50
oint ,	°.	_	7	۳,	7	171	9	7	ø

Reliability Test (Yes/No) -: XX

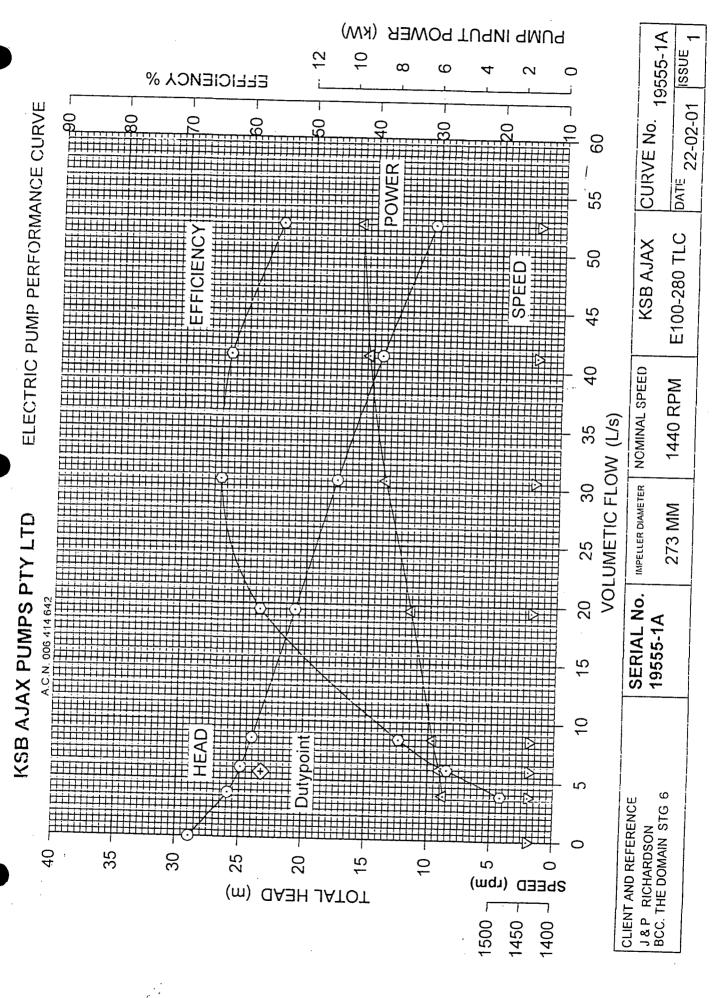
W.P. O' DOI IERTY

Witnessed by: Test Officer:

1 Signed: Le P. O'DOL (If Yes) Hours: XX

Date: 22/02/01

DATE: 12/09/97



AB Ajax Pumps Pty. Ltd. Submersible Electric Pump Test Data

BCC. THE DOMAIN STG 6 J & P RICHARDSON 19555-113 Unit Serial No.: Customer: Project:

5.6 23.3 12 12 XX XX XX XX Motor Efficiency: kWh / kl: Efficiency Pump: Speed: Power: lead: Flow: mbar C P100-280 H.C Submersible FORRI'RS Water Temperature: Meter Constant in Reys/KWII; 27.3 100000 Barometric Pressure: Discharge Pipe Dia.: Gauge Hight Cor.: Suction Pipe Dia .: Impeller Dia.: No. of Reve PUMP Make: Type: Model

Current Transformer Meters:

			1105/				
	5	1440 rpm	, 3 ph	ible	ខ	ķ₩	<
Forrer	WD 20	1440	415	Submers	19555-1	120	23.0
Make:	Frame:	Speed:	Supply:	Type:	Serial No.:	Power:	Атря:

0-100 PRESSURE GALICIE

Discharge Head:

MOTOR Power:

N M M M

kWH Meters

Magna Flow Meter

Measuring Instruments:

117 Part 2 - 1980	As Tested	0.2810 KWIUKL	27.52	ol ² 6.00 L/S	24.73 N	1.50 .4/	4.00 3.0
Works Test AS 2417 Part 2 - 1980	With Toler.	0.0000	00.0	113.14 [65.50]	Δx . . .	0.40	
	Quoted	X	×	5.60	23.30		

Facrgy per Vol RWB RJ	0.0000 0.4187 0.2810 0.1101 0.0812 0.0607
O.An Effy	0,00 17,16 23,94 30,69 50,68 55,74 55,60 48,40
Pump Eff.y	19.72 27.52 35.28 58.26 64.07 63.91
Power in (pump) kW	4.29 5.29 5.59 6.80 7.97 8.86
Total Hend M	28.00 26.41 24.73 23.66 20.52 17.25 14.26 10.13
Поч 1/18	0.00 3.80 6.00 8.50 19.70 30.20 40.50 51.90
Speed	1440 1440 1440 1440 1440 1440
DVII E	0.00 0.01 0.03 0.06 0.32 0.75 1.36
Motor Effy	87.0 87.0 87.0 87.0 87.0 87.0
Power in (Mator) kW	5.73 6.08 6.42 7.82 9.16 10.18
Аmps	13.5/13.5/13.2 13.6/13.6/13.4 13.8/13.6/13.4 15.2/15.1/15.0 16.6/16.5/16.5 18.0/18.0/17.6
W)	24.50 22.97 21.59 17.69 15.07 13.56
KWII Meter W2	23.32 22.06 20.78 17.22 14.62 13.22
W .	22.81 21.62 20.68 16.88 14.50 13.00
Correction Head m	****
Delkery Hrad m	26.40 24.70 21.60 20.20 16.50 7.90
Suction Head m	\$\$\$\$\$\$\$\$
Flow Es	3.80 6.00 8.50 19.70 30.20 40.50 51.90

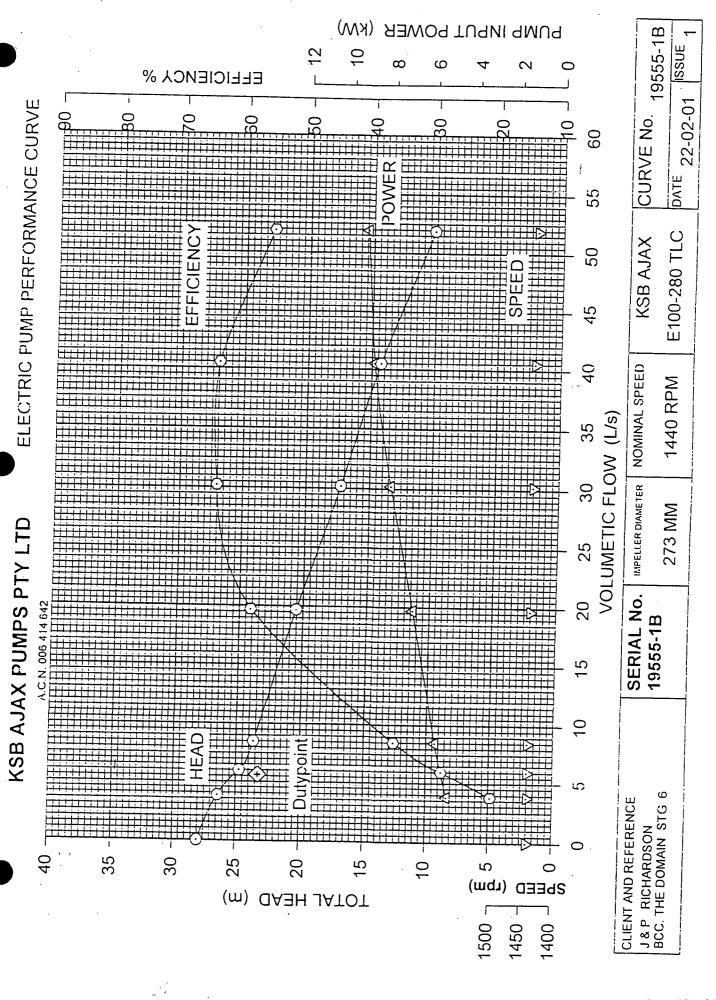
Reliability Test (Yes/No) -: XX

W.P. O' DOHERLY

Witnessed by: Test Officer:

1 Signed: W. P. O. Los K. Signed: (If Yes) Hours: XX

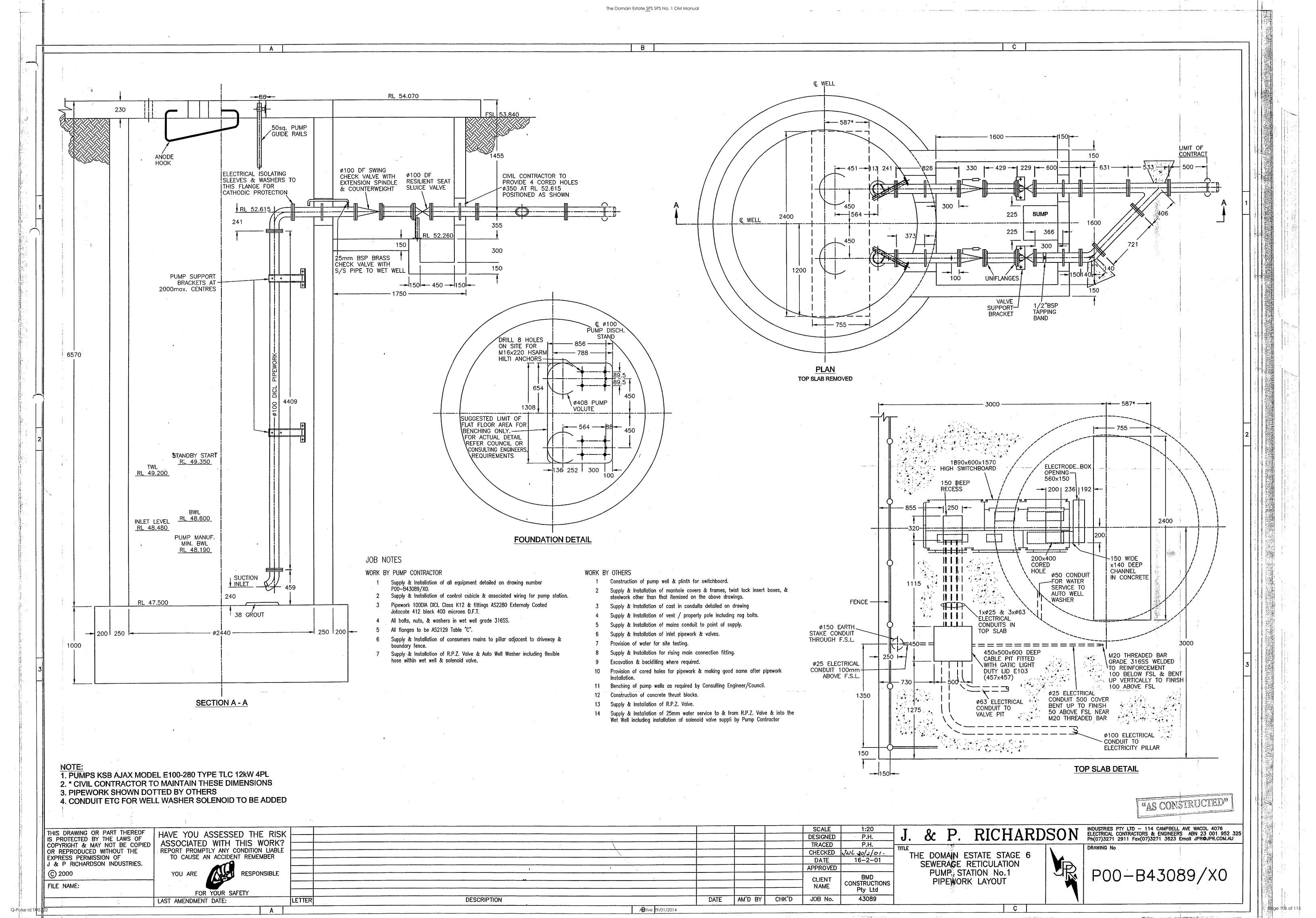
Date: 22/02/01

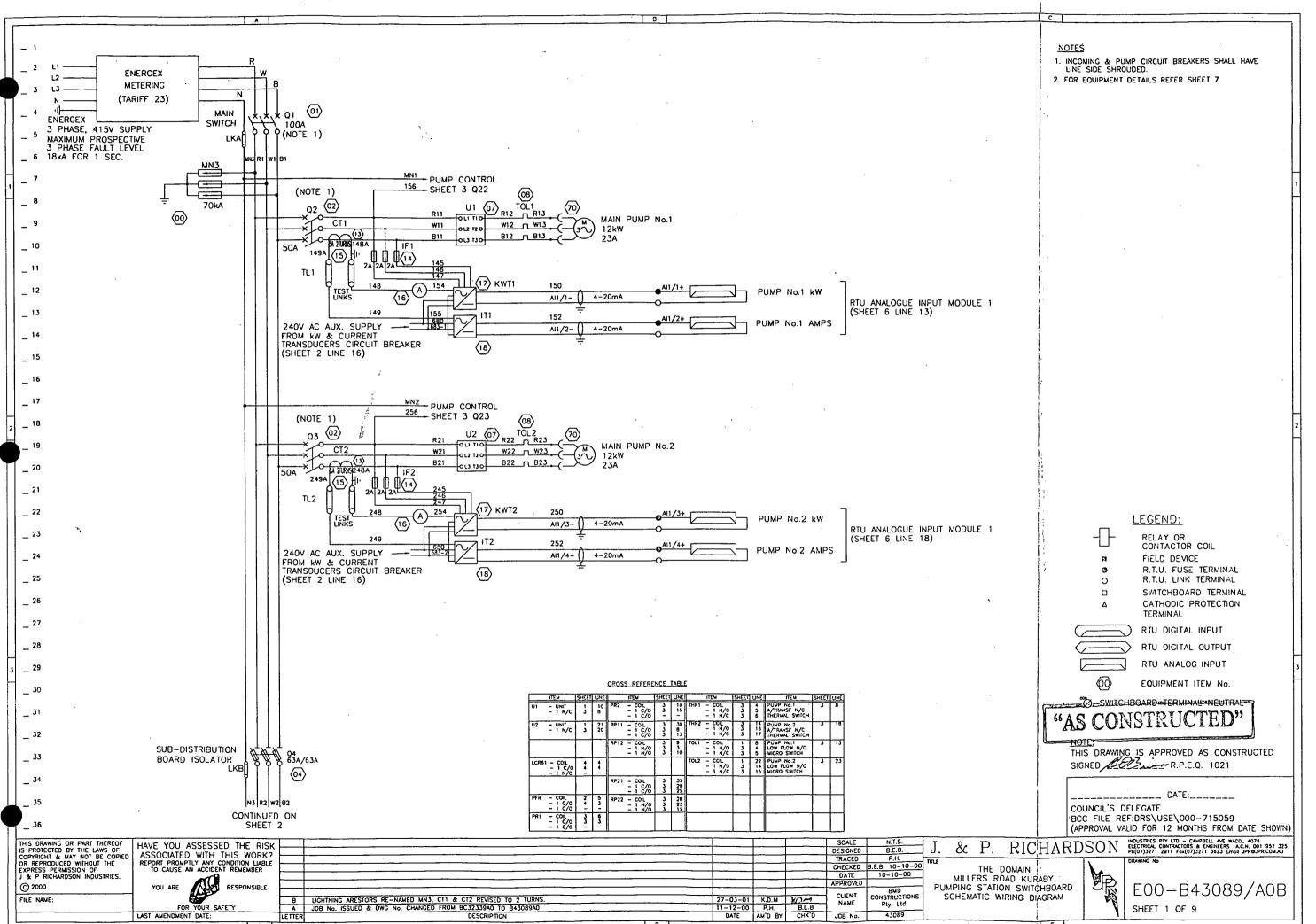


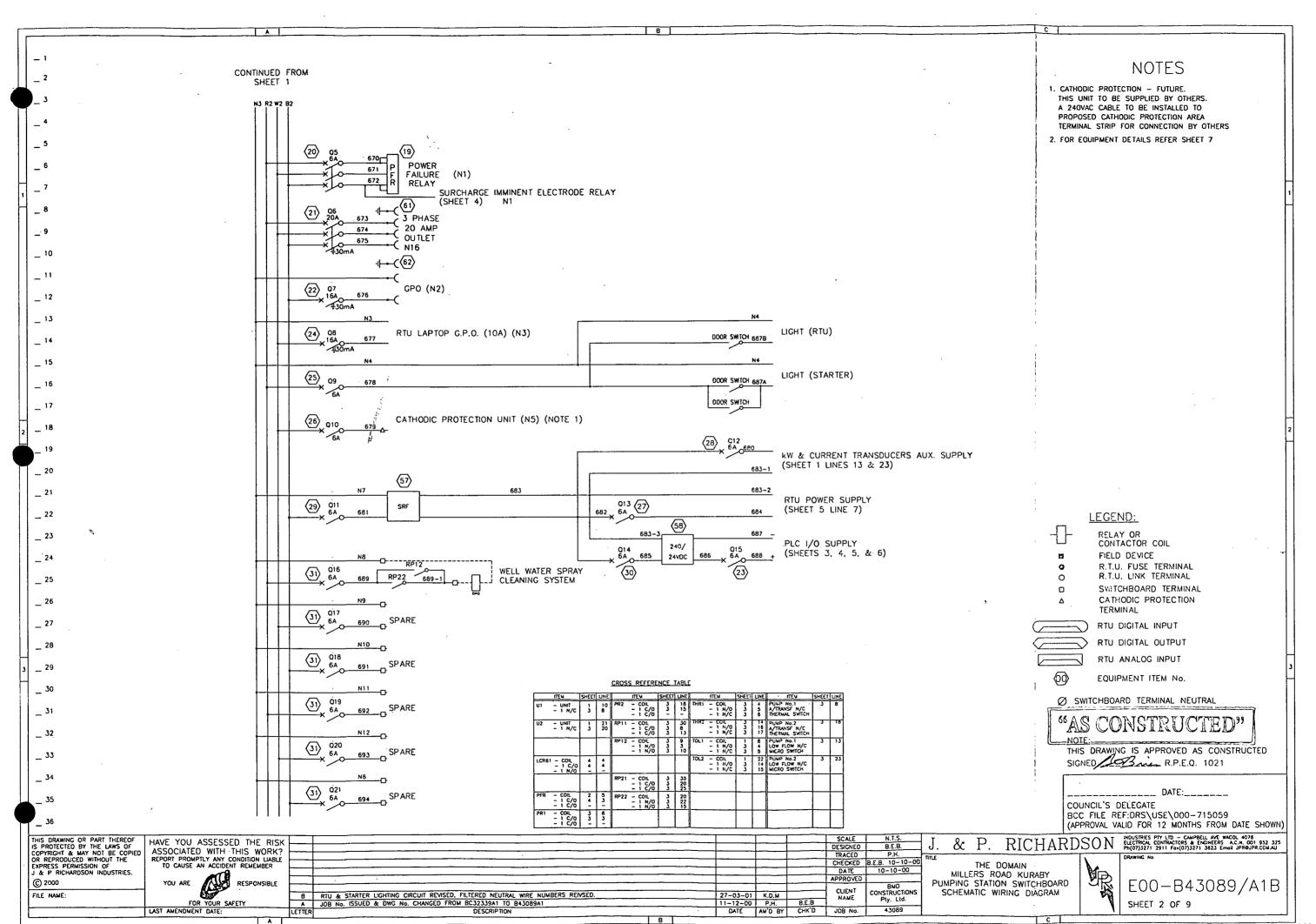
5.0 "AS CONSTRUCTED" DRAWINGS

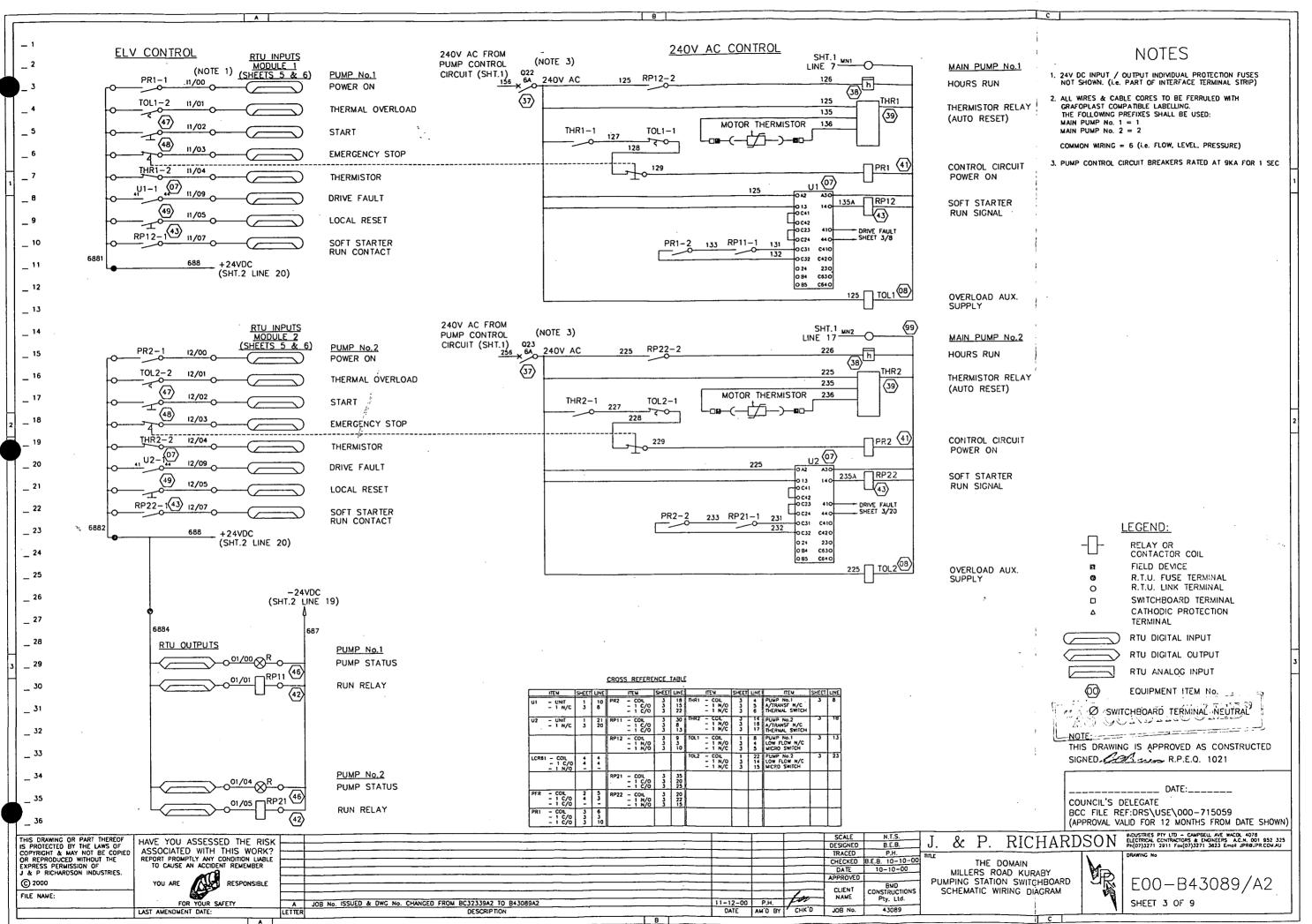
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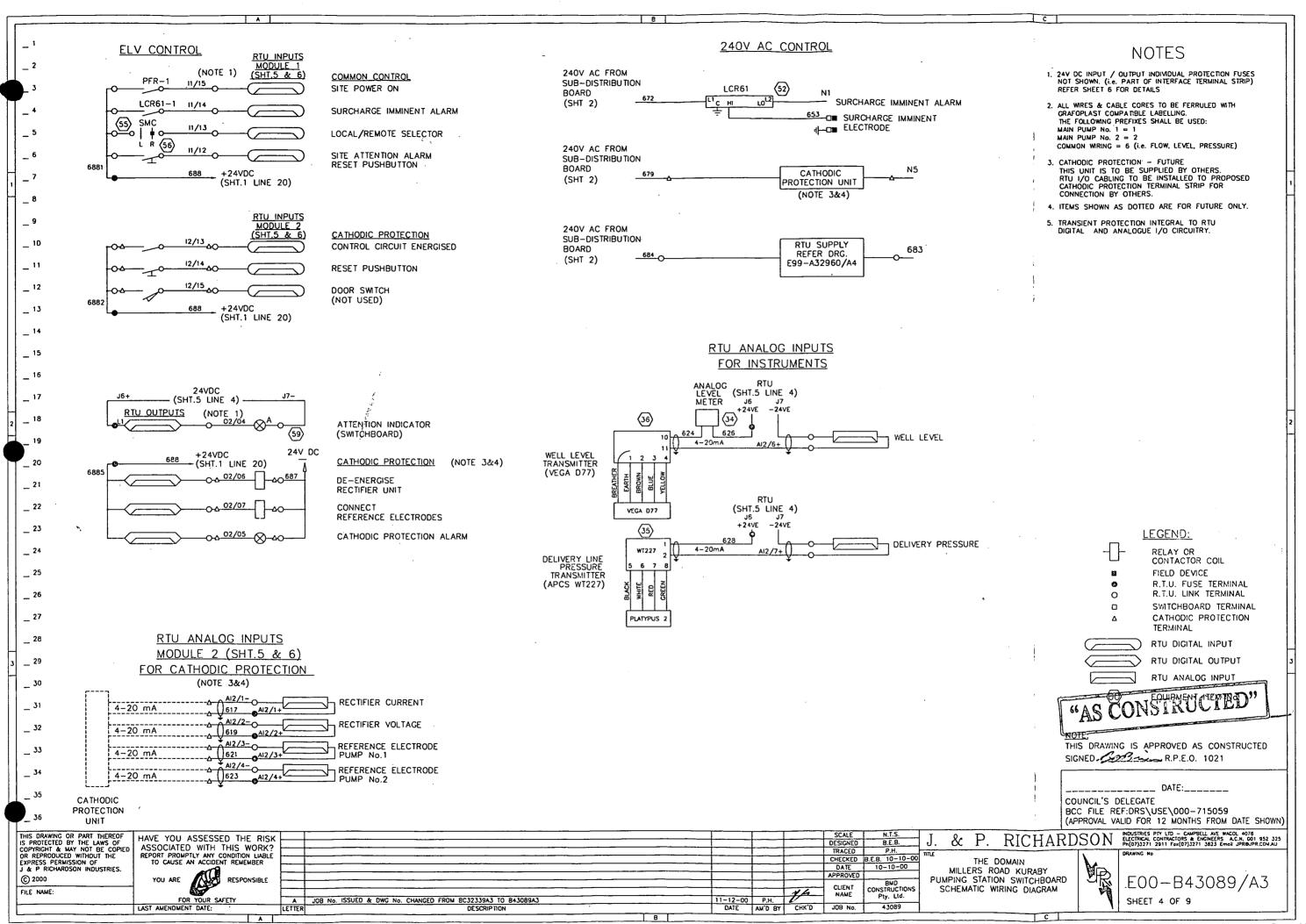
Revision 0 April

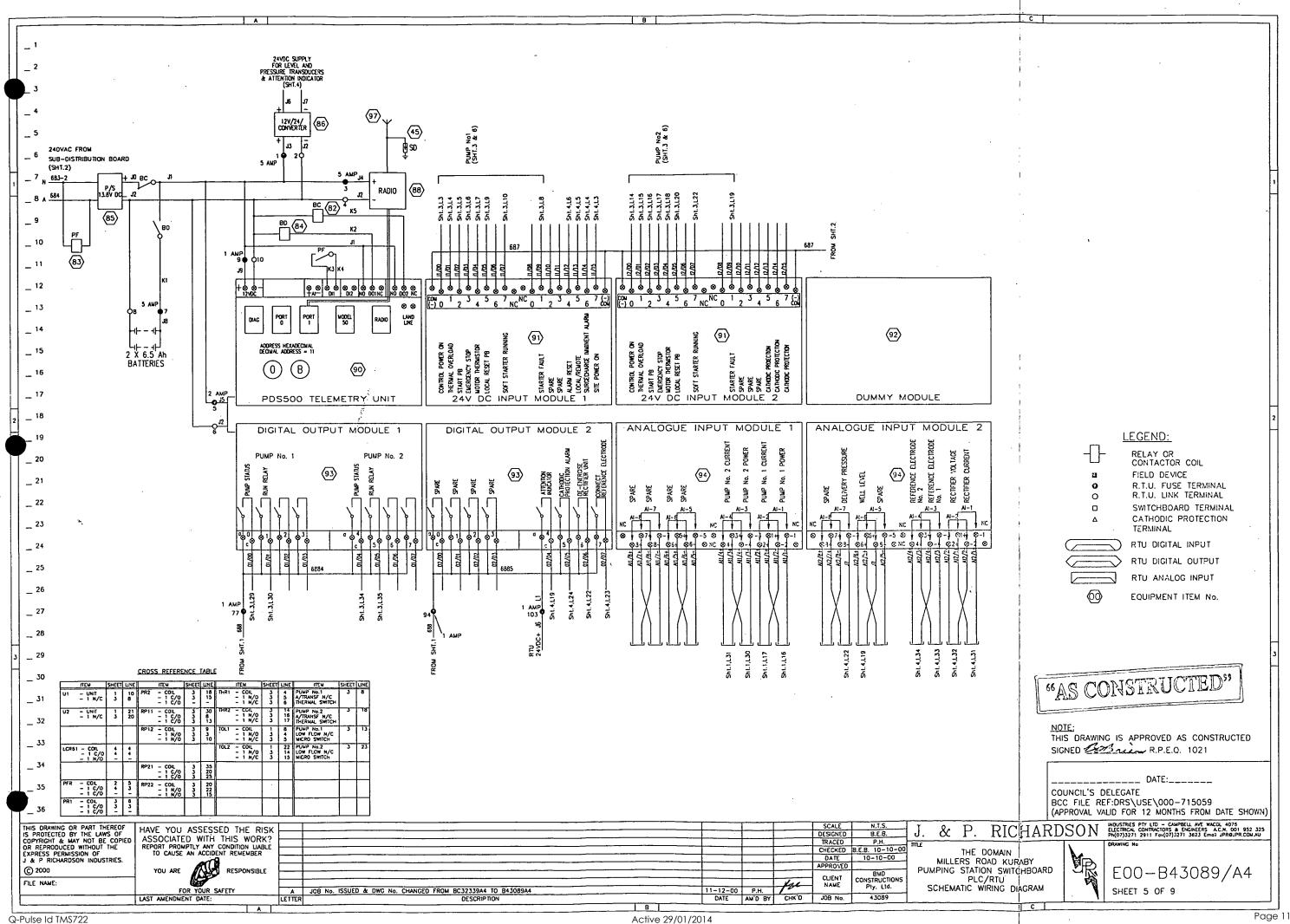


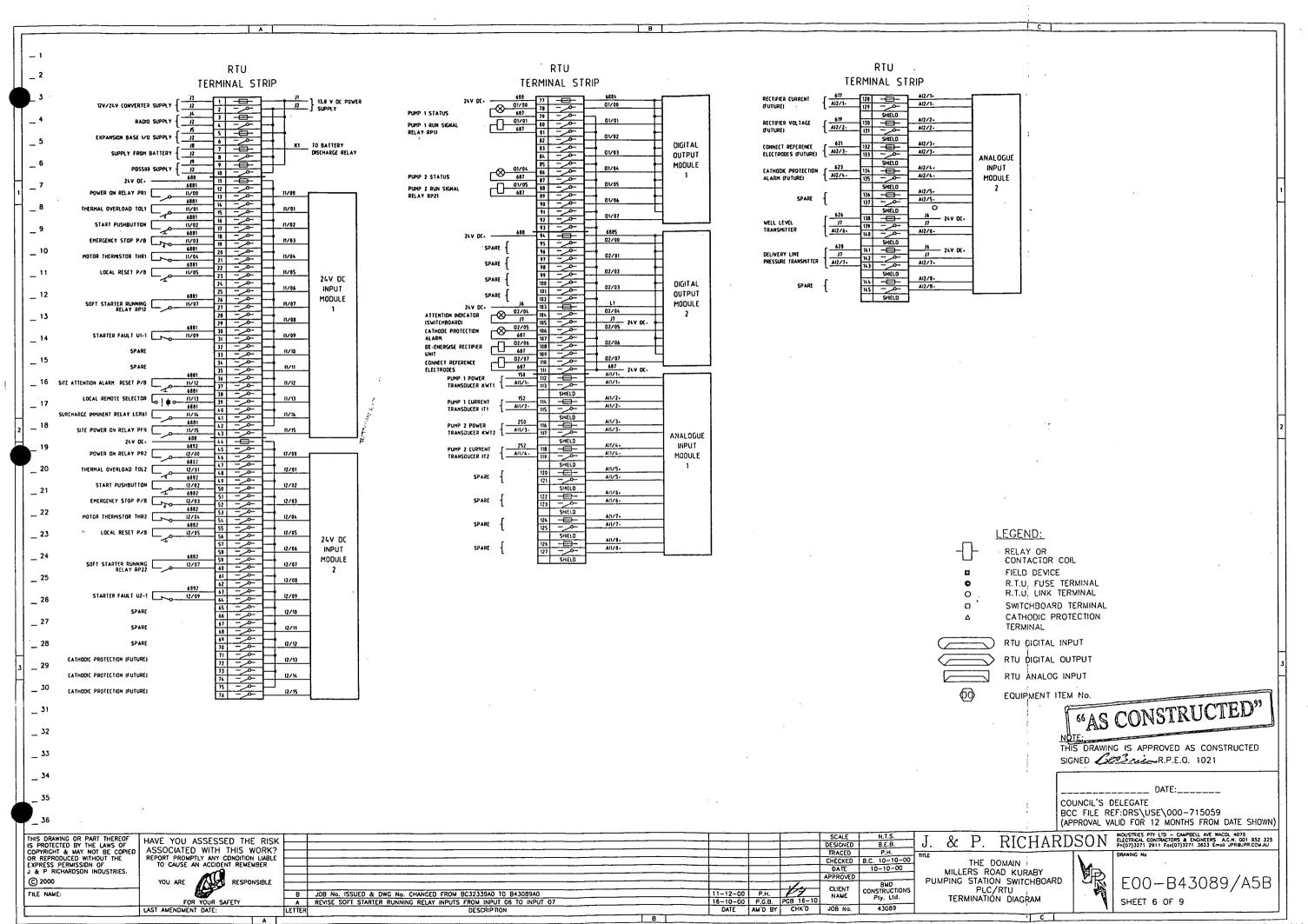












							8			C
										
_ 1									į	
- •				SWI	TCHBOARD EC	QUIPMENT AND L	ABEL SCHEDULE		ì	•
_ 2	ITEM	01~	NAME & MINDED	DESCRIPTION			MAKE & NUMBER	DESCRIPTION	LABEL	
_	11 LIVI	QII	MAKE & NUMBER	DESCRIPTION	LABEL	11CM 911			CAUCE	
_ 3	00	3	SIEMENS 510V-B60H275	LIGHTNING ARRESTORS	LIGHTNING ARRESTORS	45 1	POLYPHASER CORP. IS-50NX-C2 (HUNTER WATERIECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RADIO COAX. SURGE PROTECTION	•	
4	01	1	TERASAKI XS-125NJ1003 WITH XFHA22 HANDLE	MAIN CIRCUIT BREAKER	MAIN SWITCH	46 2	SPRECHER & SCHUH D5P-P43DLO WITH	MAIN PUMP No.1 & No.2	PUMP STATUS	
_ •	02	2	TERASAKI XH-125NJ503 WITH XFHA22 HANDLE	MAIN PUMP No.1 & No.2	PUMP No.1 / No.2	47 2	80 95-13-24V-2W SPRECHER & SCHUH D5P-F33LX10	STATUS INDICATION LAMP MAIN PUMP No.1 & No.2	START	•
_ 5	UZ	-	TEROSANI AR-123NUSUS WITH AFRAZZ PANULE	CIRCUIT BREAKERS :	POMP NO.1 / NO.2	77 2		START PUSHBUTTON	'	
			·	•		48 2	SPRECHER & SCHUH D5P-MTS343LX02	MAIN PUMP No.1 & No.2 STOP PUSHBUTTON	EMERGENCY STOP	·
_ 6	04	1	NHP DESA63G1 WITH 3 X GEC TIS63L CARTRIDGES	SUB DISTRIBUTION BOARD	SUB-DIST BOARD ISOLA	TOR 49 2	SPRECHER & SCHUH DSP-F63LX10	MAIN PUMP No.1 & No.2	LOCAL RESET	
	05		TERACAMI ICI 121 DIIEDAR MITU 2 V ICI EC EMPARE	ISOLATOR		£2 1	MULTITRODE MTR-2 WITH D.2/1-10M PROBE	RESET PUSHBUTTON SURCHARGE ALARM RELAY	10061	
_ 7	05	1	TERASAKI ICL121 BUSBAR WITH 2 X ICLEC ENOCAPS	SUB DISTRIBUTION BOARD BUSBAR		52 1	MULITIRUDE MIR-2 WITH 0.2/1-10M FROSE	SUNCTIANCE ADARM RELAT	LCR61	
						55 1	KRAUS & NAIMER CG8-A220-FT2-604 HEADING STATION CONTROL, LABEL LOCAL-REMOTE	STATION CONTROL MODE SELECTOR		
_ 8						56 1	SPRECHER & SCHUH D5P-F63LX10	SITE ATTENTION ALARM	ALARM RESET	
	07	2	AUCOM MSX2-0034	SOFT STARTER	U1/2		ODITE OF 11 175V	RESET PUSHBUTTON SURGE REDUCTION FILTER		
_ 9		_				57 1	CRITEC OSF-6A-275V	SONGE REDUCTION FILTER	SRF	
	08	2	SPRECHER & SCHUH CEF1-11-240V	MAIN PUMP No.1 & No.2 THERMAL OVERLOADS	TOL1/TOL2	58 1	COLOURVIEW S-100 240/24VDC	24VDC POWER SUPPLY	24VDC SUPPLY	•
_ 10	13	2	IME TAI 200 60/5	MAIN PUMP INSTRUMENT	PUMP No.1 / No.2	59 1	SPRECHER & SCHUH D5P-P53DLO WITH	SWITCHBOARD ATTENTION	ATTENTION ALARM	
	14	6	GEC SC20H WITH 6 X NS2 CARTRIDGES	CURRENT TRANSFORMERS MAIN PUMP INSTRUMENT FUSES	PUMP No.1 / No.2		Bo 9s-13-24V-2W	ALARM		
_ 11	• •	•		montometri i oded		61 1	CLIPSAL 56C420	THREE PHASE OUTLET	415VAC	
12	15	4	SPRECHER & SCHUH VUTW4-10	CURRENT TRANSFORMER		62 2	CLIPSAL 15	SINGLE PHASE OUTLET & RTU SINGLE PHASE OUTLET	240VAC / RTU LAPTOF SUPPLY	Р .
				TEST LINKS		63 2	CLIPSAL 2000SMK SURFACE MOUNTING BLOCK CLIPSAL BP165012 WITH 2 X BP165F FEET	NEUTRAL LINKS	NEUTRAL	
_ 13										
	16	2	IME RO72E-ACT 5A5X 0-30A	MAIN PUMP No.1 & No.2 AMMETERS	PUMP No.1 / No.2	64 2	CLIPSAL BP165D12	EARTH LINKS	EARTH	
14	17	2	APCS ACT141-104410 0-5A	MAIN PUMP No.1 & No.2	KWT1/2	65 50		SWITCHBOARD TERMINALS		
-	10	•	50Hz 21.56kW 4-20mA ABCS AWT190-1244010 24MV 3nh	KILOWATT TRANSDUCERS MAIN PUMP No.1 & No.2	•	10 66 26		R.T.U. FUSE TERMINAL		•
_ 15	18	2	APCS AWT190-1244010 240V 3ph	CURRENT TRANSDUCER	IT1/2	66 26 26	SPRECHER & SCHUH VU4-2.5/4	MAIO. FOSC TERMINAL		
	19	1	NHP DWR2-440V	PHASE FAILURE RELAY	PFR	26 67 120		R.T.U. LINK TERMINALS		·
_ 16	20	1	TERASAKI DIN-T10306C	PHASE FAILURE RELAY	REFER LEGEND CARD	6/ 120	SPRECHER & SCHUH VOIM 4-4 SPRECHER & SCHUH VAST 4-4	MALON EINE TERMINALS	1	
				CIRCUIT BREAKER		60 .		EARTH BARS	EARTH	
_ 17	21	'	TERASAKI DIN-T10320C	THREE PHASE 20A OUTLET CIRCUIT BREAKER	REFER LEGEND CARD	69 3	CLIPSAL L5P		EARIG	
	22	1	TERASAKI DSMCB1630	SINGLE PHASE GPO CIRCUIT BREAKER	REFER LEGEND CARD	70 2	CUTLER HAMMER 31-34013 DECONNECTOR CUTLER HAMMER 31-300CO-027 ADAPTOR	MAIN PUMP No.1 & No.2 DECONNECTORS		
_ 18	23	1	TERASAKI DIN-T10106C	24V0C #	24V0C	2 2	CUTLER HAMMER 31-30000-027 ADAPTOR CUTLER HAMMER 31-31013 PLUG	2200.11.20.000		
10			•	CIRCUIT BREAKER		82 1	TELEMECANIQUE RXN-41G12-12VDC WITH RXZ-1G BASE	RTU BATTERY CHARGE RELAY	BC	
19	24	1	TERASAKI DSMCB1630	RTU LAPTOP GPO CIRCUIT BREAKER	REFER LEGEND CARD	83 1	TELEMECANIQUE RXN-41G12P7 WITH RXZ-1G BASE	RTU POWER FAIL RELAY	PF :	
20	25	1	TERASAKI DIN-T10106C	SWITCHBOARD FLUORESENT LIGHT CIRCUIT BREAKER	REFER LEGEND CARD				·	
	26	1	TERASAKI OIN-T10106C	CATHODIC PROTECTION UNIT	REFER LEGEND CARD	84 1	TELEMECANIQUE RXN-41G12-12VDC WITH RXZ-1G BASE	RTU BATTERY DISCHARGE RELAY	eo ce	
_ 21				CIRCUIT BREAKER		85 1	POWERBOX P50E-15 (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RTU POWER SUPPLY 13.8VDC		
-	27	1	TERASAKI DIN-T10106C	RTU POWER SUPPLY CIRCUIT BREAKER	RTU POWER SUPPLY	86 1	POWERBOX VTA254SC12	RTU 12V/24VDC CONVERTER		
_ 22	28	1	TERASAKI DIN-T10106C	KW & CURRENT TRANSOUCER AUX	REFER LEGEND CARD		(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	•		
	29	1	TERASAKI DIN-T10106C	CIRCUIT BREAKER FILTERED SUPPLY	REFER LEGEND CARD	88 1	TRIO TR9000R/L (HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	RADIO		
_ 23	3.			CIRCUIT BREAKER		89 4	HUNTER WATERTECH SYNAX BOOSEBUS	EXPANSION BASE		
	30	1	TERASAKI DIN-T10106C	240/24VDC SUPPLY CIRCUIT BREAKER	240/24VDC SUPPLY	90 1	(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.) HUNTER WATERTECH POSSOO	TELEMETRY UNIT		· · ·
_ 24	31	6	TERASAKI DIN-T10106C	SPARE 240VAC	REFER LEGENO CARO	30 ,	(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)			
	32	,	BURGESS DS3	CIRCUIT BREAKER SWITCHBOARD DOOR SWITCHES		91 2	SYMAX 8005DN116 (HUNTER WATERTECH ~ SUPPLIED BY BRISBANE WATER A.M.P.S.)	DIGITAL INPUT MODULE		
25	J2	,		SHITCHBOARD DOOR SHITCHES		92 1	SYMAX 8005DMU1	DUMMY MODULE	•	•
	33	2	LANSON LBB113	13W SWITCHBOARD FLUORESENT LIGHT		21 2	(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.) SYNAX '800SRT108	DIGITAL OUTPUT MODULE		
26	34	1	CROMPTON 243-01AG WITH SUPPLIMENTRY	WELL LEVEL INDICATOR	WELL LEVEL	93 2	(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)		•	
27	••		REO POINTER 4-20mA INPUT SCALE 0-100%			94 2	HUNTER WATERTECH POSBA1 (HUNTER WATERTECH - SUPPLIED BY BRISBANE-WATER A.M.P.S.)	ANALOGUE INPUT MODULE		
27	35	1	PLATYPUS 2 WITH 10m CABLE RANGE 0-60m HEAD WITH APCS-WT227	DELIVERY PRESSURE TRANSMITTER	DELIVERY PRESSURE TRANSMITTER	97 1	HUNTER WATERTECH ANTENNA COMPLETE WITH ACCESSORIES	ANTENNA		•
28	36	1	VEGA D77XKA4X21DC3EBL WITH 10m CABLE RANGE D-1.0 BAR	WELL LEVEL TRANSMITTER	WELL LEVEL	_	(HUNTER WATERTECH - SUPPLIED BY BRISBANE WATER A.M.P.S.)	_	:	
20	37	2	TERASAKI DIN-T10106C	MAIN PUMP No.1 & No.2	TRANSMITTER PUMP No.1 & No.2	99 4	100mm MUFFIN FANS	LEGEND:		
29		• . -		CONTROL CIRCUIT BREAKER	CONTROL					
	38	2	IME RQ48.0 240VAC	MAIN PUMP No.1 & No.2 HOUR RUN METER	PUMP No.1 / No.2			RELAY OR CONTACTO		1009
30	39	2	SPRECHER & SCHUH RT3-A-240VAC	MAIN PUMP No.1 & No.2	THR1/2	CROSS	REFERENCE TABLE	■ FIELD DE\		TAR CONGTRUCTED"
	41	,	TELEMECANIQUE RXN-41G12P7 WITH RXZ-1G BASE	THERMISTOR RELAY CONTROL CIRCUIT POWER	PR1/2		TEM SHEET LINE TEM SHEET LINE TEM SHEET LINE	_	SE TERMINAL	COVS COLADITURE A TELE
31		•		ON RELAY	·	U1 - UNIT 1 10 PR2 - 1 N/C 3 8	- COIL 3 18 THR1 - COIL 3 4 PUMP No.1 3 8 - 1 C/O 3 15 - 1 N/O 3 5 A/TRANSF N/C - 1 C/O 1 N/C 3 6 THERMAL SWITCH	-	K TERMINAL	The state of the s
	42	2	TELEMECANIQUE RXN-41G12BD WITH RXZ-1G BASE	PUMP RUN RELAY RP11/21	RP11/21	1 1 1 1		•	ARD TERMINAL	
32	43	2	TELEMECANIQUE RXN-41G12BO WITH RXZ-1G BASE	SOFT STARTER RUNNING RELAY	RP12/22		- 1 C/O 3 8 - 1 N/O 3 18 A/TRANSF N/C - 1 C/O 3 13 - 1 N/C 3 17 THERWAL SWITCH	_	PROTECTION	
						1 1 1	- COIL 3 9 TOL1 - COIL 1 8 PUMP No.1 3 13 - 1 N/O 3 4 LOW FLOW N/C	TERMINAL		NOTE:
33							- 1 N/O 3 10 - 1 N/C 3 5 MICRO SWITCH	RTU DIGIT.	AL INDIT	THIS DRAWING IS APPROVED AS CONSTRUCTED
						LCR61 - COIL 4 4 - 1 C/O 4 4 - 1 N/O	TOL2 - COIL 1 22 PUMP No.2 3 23 - 1 N/O 3 14 LOW FLOW N/C - 1 N/C 3 15 MICAO SWITCH	KIU DIGITA	ne ini UT	SIGNED LABOUR.P.E.Q. 1021
34							- COUL 3 35 - 1 C/O 3 20 - 1 C/O 3 225	RTU DIGIT.	AL OUTPUT	
7.5						PFR - COIL 2 5 RP22	- COn. 3 20	RTU ANAL	OG INPUT	DATE:
35						= 1 6/8 4 3	- COR. 3 20 - 1 N/O 3 22 - 1 N/O 3 15	<u> </u>	.55 51	COUNCIL'S DELEGATE
36			,			PR1 - COLL 3 6 - 1 C/O 3 3 - 1 C/O		(O) EQUIPMEN	T ITEM No.	BCC FILE REF:DRS\USE\000-715059
36						- i č/ŏ - -)		(APPROVAL VALID FOR 12 MONTHS FROM DATE SHO
DRAW	NC OR F	PART THE	REOF HAVE YOU ASSESSED THE RISK				SCAL	LE N.T.S. T O	D DIGII	I A DIDCONI INDUSTRIES PTY LID - CAMPBELL AVE WACOL 4076
PROTEC1	TED BY T	THE LAWS	COPIED ASSOCIATED WITH THIS WORK?				DESIG	NED B.E.B. J. &	<u>r. kich</u>	IARDSON HOUSTRIES PTV LTD - CAMPBELL AVE WACOL 4076 ELECTRICAL CONTRACTORS & ENGLÉGES ACEN, 001 9520 Ph(07)3271 2911 Fox(07)3271 3823 Emoil JPROJPR.COM
REPRO	DUCED W	THOUT 1					TRAC		THE DOMAIN	DRAWING No
P RIC	HARDSON	INOUST	RIES.				DAT	E 10-10-00 MILI	LERS ROAD KURAB	ar Me
2000			YOU ARE RESPONSIBLE				APPRO	PUMPING	S STATION SWITCHE	BOARD 4K FOO-B43089/A6
NAME							CLIE!	CONSTRUCTIONS EQUIPME	INT & LABEL SCHE	EDULE MA LOO DIOCOS/ AO
	_		FOR YOUR SAFETY A JO LAST AMENDMENT DATE: LETTER	No. ISSUED & DWG No. CHANGED FR	OM BC32339A6 TO B4308 DESCRIPTION	39A6	11-12-00 P.H. DATE AM'D BY CHK'D JOB I	Fty. Etc.	'	SHEET 7 OF 9
			DAT AMENDMENT DATE:		DESCRIPTION		DAIE AMO BY CHY D 308 I	75005		c l

