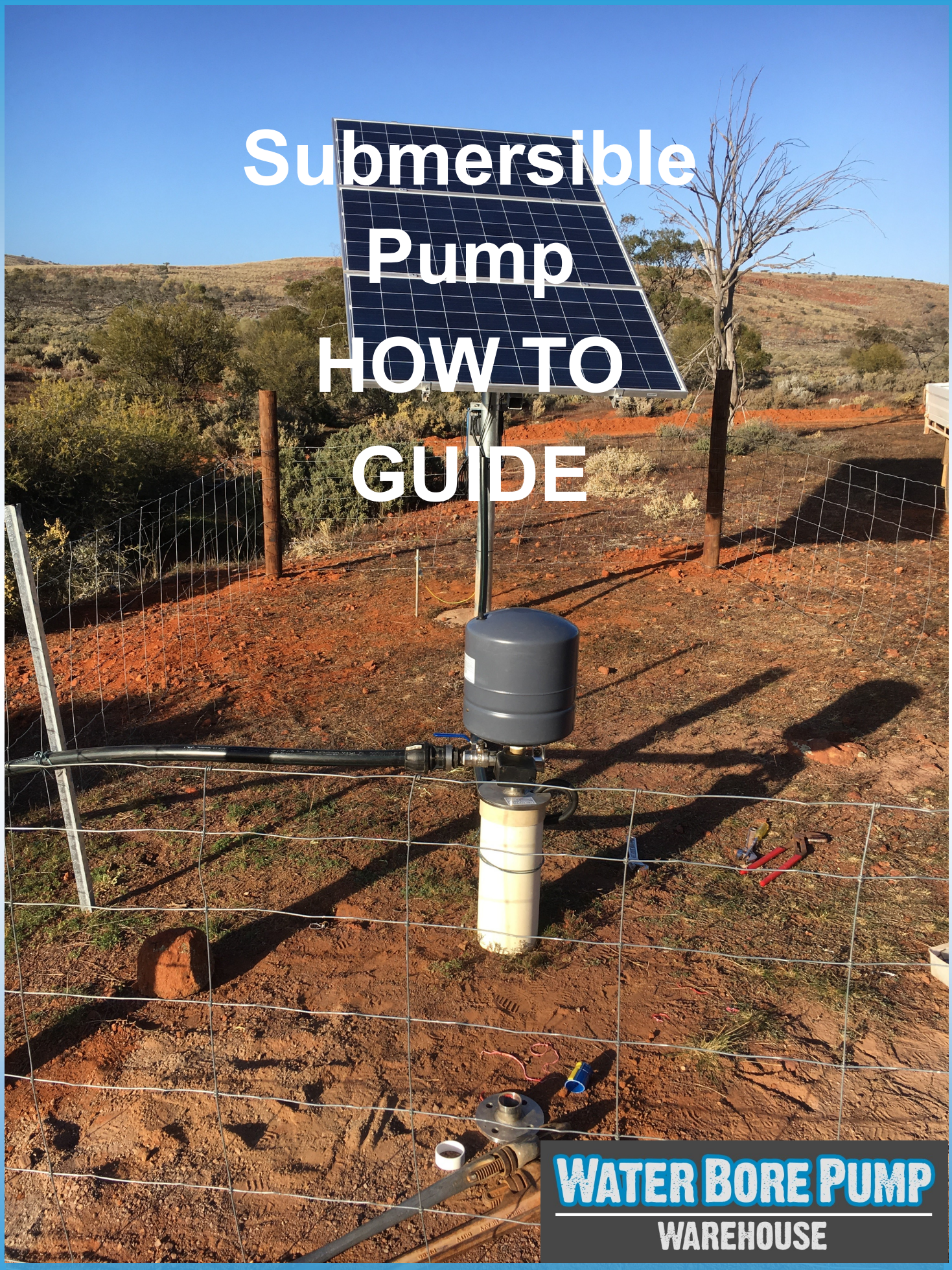
Submersible Pump HOW TO GUIDE



WATER BORE PUMP
WAREHOUSE

How to Guides

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This guide contains information on how to choose the correct submersible pump, how to prepare the pump and components for installation, and how to adjust the controls and switches once the pump is installed. The fault finding guide is also included to assist with finding the problem and it's possible cause.

I have put this guide together based on experience gained as a mechanical / electrical tradesman over the last 35 years working in residential back yards, industrial sites and mine sites, Drilling Water bores, installing pumps and associated equipment and fault finding.

If you need assistance call 1300 727 042 or mobile 0414 711 131

Email: info@waterborepump.com.au or info@solarborepumps.com.au

1. Submersible Pump Selection

Pump selection is the term used for choosing the correctly sized pump that suits the characteristics of the water bore and the intended use of the pumped water.

Submersible pumps range in output from a few litres per minute up to 280m3 per hour and head pressure from 10 metres to 500 metres. It is very important to select the right one.

Information on the bore is required. This information will include the depth of the bore, diameter of the bore casing, the standing water level, the pumping water level (or an estimate), the bore yield or flow rate and the water quality. This information is usually recorded by the driller and passed on to the land owner and also available online.

Next consideration is what the is the pumped water going to be used for? How high above the pumping water level of the bore is the storage or use of the water? Will the pump system require automatic control of pressure or level?

Is mains power supply available? Is it single phase or three phase?

Is the water too salty or sandy for a standard pump?

Once all the information is available a pump selection chart or performance curve chart can be used to select the correctly sized pump, submersible pump cable, pump rising main, power requirement and equipment required to install it.

We can select the correct pump based on your information.

Send us an email to info@waterborepump.com.au or info@solarborepumps.com.au

Or use the following link-

http://www.waterborepump.com.au/send-bore-information.html

http://www.solarborepumps.com.au/send-details-of-you-bore.html

2. Submersible Pump Shroud

A submersible pump shroud is required to allow the flow of water into the pump inlet to pass across the drive motor to keep it cool. Water may enter the water bore above the pump while the pump is drawing water. This may allow the drive motor to sit in stagnate water while the inflow passes the pump end and is drawn into the pump inlet. This action will not provide adequate cooling for the drive motor. A pump shroud will be required when using a submersible pump in an open body of water like a dam, creek or tank. If the pump to bore casing clearance is not sufficient to fit a shroud, the shroud will not be necessary.

Cut a length of PVC pipe to match the nominal diameter of the pump assembly and long enough to cover the motor. Cut slots in the PVC approximately 75mm long around one end of the PVC.
Fit a hose clamp and gently tighten.

Gently heat the PVC with hot air gun and increase tension on hose clamp. Continue to tighten the clamp and heat until the PVC neatly fits the pump

Re-tension the hose clamp as the assembly cools. Wrap with duct tape to seal the water entry.

We can fit a pump shroud and make the cable splice connection when you purchase a pump from us.

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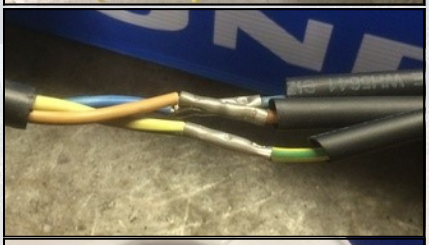
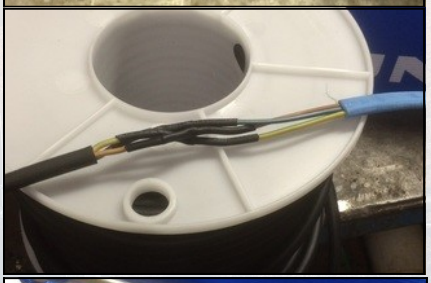
3. Submersible Cable Splice

Contents of submersible pump cable splice kit.

Tools required to cut, crimp, heat and test completed cable splice.



1. Strip back about 25mm of the black insulation from the submersible drop cable and strip back 10mm of insulation off of each conductor. Strip back about 80mm of the blue insulation off the motor cable and strip 10mm of insulation off the conductor. Slide large heat shrink on to cable. Crimp one end of crimp connector to each conductor. Slide small heat shrink on to each conductor. Crimp connector to matching conductor of other ca-



2. Heat with heat gun starting from one end of heat shrink. All of the heat shrinks normally shrink at the same time. Key the about 50mm of the outer black and blue insulator with the sand paper from the kit. This process takes the shine off the rubber and allows the sealing tapes and heat shrink to bond. Do not key the rubber along the length of cables.

3. Wrap the sticky red flat putty around each end of the cable ends. Squeeze putty to fill the gaps.

4. Wrap the black sealing tape around the joint from one end to the other. Squeeze gently to fill all the gaps. Slide the large heat shrink over the wrapped joint. Ensure the keyed area extends beyond the heat shrink each end. If not slide the heat shrink back and extend the keyed area.

5. Hold the cable vertical and heat the heat shrink from the centre upwards to the top, then invert it and heat the heat shrink to the top again. This process will expel the air bubbles and extrude a some of the resin beyond the end. Allow to cool straight if possible.

4. Solar Powered Submersible Pump Installation

Select required pump system

Use our selection guides or contact us to get the best information and advice.

Unpack the pump system

Lay the pump and components out identify and familiarise yourself with the items.

Give us a call if you need more information.

Install post

Dig a hole around 1m deep and about 300mm in diameter for the installation of the pole mount for the solar array.

Align the axis of the frame mounting hole to allow the panels to face north. Concrete the pole in and allow to set overnight.

Install pump

Lay submersible pump along side the water bore or source of water. Connect the Crusader Flexibore or Metric poly pipe to the pump and bore cap.

Layout electrical cable then cable tie the electrical cable to the lugs on the Flexibore or tape electrical cable to the Metric Poly pipe every couple of metres. Lower the pump into the bore or water source. Install Flow and or pressure switches in discharge pipe from bore cap to your intended destination of pumped water.

Mount Solar Panels

Make up frame on the post following the instructions included with the Pole Mount System. Set the angle according to the data sheet supplied by Solarborepumps. Mount controls and drive unit to post. Make connection of pump power cable to AC isolator and drive unit. Follow instruction supplied with drive unit for correct wiring for particular unit. Ensure the DC isolator is in the off position, Plug the solar panel output cables together in series and then connect to isolator. Stand back and check that each step is complete. Open valves if fitted, turn on pump AC isolator, turn on DC isolator on the drive unit and pump should now power up and pump should start pumping. Sometimes it takes a couple of starts to inflate the Crusader Flexibore hose and allow flow switch to activate.

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5. Submersible Pump Installation

At the Water Bore Pump Warehouse we have been Drilling Water Bores, selecting, supplying and installing Submersible Water Bore Pumps for over 15 years.

Our preferred rising main or pump column is Crusader Hose Flexibore, HDPE metric poly pipe or steel, depending on the required depth, pressure and water quality.
A correctly selected and correctly installed submersible water well pump in a properly constructed water well can be expected to provide trouble free service for many years. We supply submersible pump kits with the cables connected, tested and tagged ready to plug in, if you require.

1. Check the bore - looking for damage to the bore casing, check the depth and the standing water level.
2. Check the kit of supplied components. Check the details of the drive motor - looking for power supply rating, identify weather it is a 2-wire single phase, a 3 wire single phase and needs a pump stater box or 3 phase configuration. Check the submersible pump drop cable suits the motor cable and motor and is correctly rated for submersion in water. Check the fittings match the outlet on the pump, the rising main and the bore cap.
3. Gently clamp the drive motor in vice. Put a small dob of grease on the motor shaft and attach the pump end to the motor. Screw the poly pipe or Flexibore fitting into the pump using Teflon thread tape to seal.
4. Connect the drive motor cable to the submersible drop cable with the kit supplied.
5. Lay the pump and cable assembly adjacent to the bore. Connect the poly pipe or Flexibore to pump. Roll out pipe and connect to bore cap.
6. Lay out the electrical cable and stainless steel safety cable (if required).

Warning don't be tempted to use a safety cable with Flexibore.

5. Submersible Pump Installation Continued.

7. Tape the cable splice to the poly pipe then the electrical cable to the poly pipe every 6 metres, allowing 50mm slack each time. If using Crusader Flexibore - cable tie the cable splice to the yellow strap on the hose. If the electrical cable could rub when installed fit some protection as pictured, then proceed to cable tie the electrical cable every metre, allow 100mm of slack between ties. The Crusader Flexibore may stretch up to 10% in length when installed.
8. Double back some electrical cable below the bore cap for use at a later date if the pump requires servicing.

9. If using metric poly attach the stainless steel safety cable to bore cap. Allow for stretch of the pipe or

hose. The cable should never be tight.
10. Check pipe and hose connection are tight. Check electrical cable slack to allow for stretch.
11. If the pump and assembled components can be safely lifted by hand lower pump down bore, ensuring electrical cable doesn't get damaged. Rest bore cap on top of bore casing.

12. If the pump and assembly is too heavy to manage by hand a suitable roller and tow vehicle may be used to lower the pump down the bore. Flexibore installations may be installed by utilizing a crane and clamps.
13. Fit elbow or discharge pipe to bore cap.
14. Connect electrical cable from pump motor to pump starter or controller and protection device. Energize pump and allow a few moments or minutes for water to be pumped to the surface.
15. Set and test control devices and switches if installed.

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6. Solar Panel Installation

- Dig hole about 1 metre deep for pole. Ensure it is located in a position that will be in full sunlight all day.
- Align pole to face north.
- Concrete pole into position.
- Allow concrete to set.
- Loosely clamp angle adjustment plates to pole

- fit large main beam.
- Set to specified angle.
- Tighten angle adjustment plates.
- Loosely install steel cross beams.

- Loosely fit aluminium rails to cross beams, ensure rails are flush with the top of the angle plates and measure stick out from bottom of cross beams. Set all rails to the same stick out.
- Measure spacing between parallel cross breams, adjust and tighten all Allen screws and bolts.

- When the frame is square, parallel and stick out measurements are equal start to fit first two panels.
- Centre panels onto frame assembly.

- Fit remaining panels.
- Install DC isolator.
- Ensure DC isolator is in off position.
- Connect DC leads from panels and connect to isolator.

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7. Telemechanique XMP Pressure Switch Adjustment

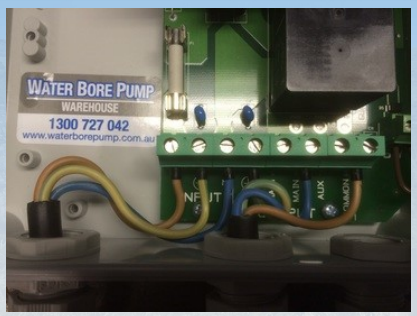
The pressure switch is used to switch the pump drive motor off when the pump system is up to its required pressure, when all of the valves are closed and their is no further demand for water. The pressure tank stores a volume of water so the pump will not start if the system settles or leaks slightly. In this example the pressure switch is the black box under the pressure tank. Always disconnect the power supply from the pressure switch and test with a multi-meter to ensure the switch is not live before removing the cover.

A correctly charged pressure tank and correctly set pressure switch will allow the pump to shut off when there is no demand for water and restart when the pressure drops due to a demand or requirement for more water. The pressure switch contacts should remain closed and the pump running while the demand for water is present. That means the pump will run constantly while filling the tank or watering the garden. If the pressure switch is out of adjustment the pump will stop and start and cycle between on and off while in use. This condition of cycling or rapid cycling will damage the pump and motor and consume a large amount of power.

Adjustment of the pressure switch is made while the power is isolated from the pump. To increase the cut out pressure of the Telemechanique XMP pressure switch turn the large thumb dial clockwise. Reconnect the power and allow the pump to run in its normal operating condition. If the pressure switch allows the pump to cycle on and off unnecessarily. Isolate the power and increase the pressure further. Always check that the pump can reach the set cut out pressure and stop when the valves are closed.

8. Grundfos PRO-Tect AUTO ME set-up

The Grundfos PRO-tect ASYNCHRONOS MOTOR PROTECTION device is designed to protect the pump from dry running by stopping the motor when a low current draw situation is present. The unit restarts the pump after time delay allowing the water level to recover and the pump to run normally until a fault reoccurs. The unit also protects the motor from overload and under or over voltage faults. The display will indicate the status of the power supply to the motor and a code will indicate the fault.



Electrical connection.

Incoming single phase 230 volt power is connected to the input side of the terminal bar as marked. The motor cable is connected as pictured, taking note that the terminal marked main is the neutral and the common is active. Fit the cover install the pump and prepare to calibrate the unit.

Set-up and calibration.

1. Plug the unit in to the power supply and turn on. Ensure the rocker switch is in the on position. The unit will power up and flash mains frequency in Hz.

2. To run the pump select the auto calibration mode by pressing the up arrow once to display At.

3. Press the square button to confirm the selection.

The current draw of the motor will be displayed in Amps.

4. Allow the pump to run, build up pressure and run in it at normal flow and pressure conditions for a minute or two.

5.When the pump system has settled down and the amp draw is constant press the up arrow again to start the self calibration process. The display will flash CL indicating calibration learn.

6. Press the square button to confirm auto calibration.

The unit is now calibrated ready to protect you pump system.

Test the unit by shutting the discharge valve, stopping the water flow.

The current draw will decrease as the pressure rises.

The unit will trip the power supply to the pump.

Re-set using the on/off rocker switch.

Other mode and further instructions are included in the Installation and Operating Instructions included with the packaged unit.

9. Submersible Pump Fault Finding Guide

Electricity will kill you if you contact live wires or components. Ensure the power supply is isolated from the pump, controls and switches before carrying out repairs.
A pump that is not working may still be live. Fault finding and repairs must be carried out by a trained and skilled operator.

Is pump working? If yes - leave it alone.

No -Is power available?
If the circuit breaker has tripped try resetting it. Sometimes a power supply fluctuation might cause a nuisance trip. If it trips again a short or overload condition is present. Isolate power supply and check with the multimeter to ensure it is safe. Disconnect the pump drop cable from junction box, pressure switch or pump controller and reset circuit breaker. If the circuit breaker trips again the fault is above ground in a cable, switch or controller.

If circuit breaker didn't trip again with pump disconnected. The fault is below ground . The next test may be to Megga the drop cable and motor with Megg Ohm meter. A measurement of a low resistance of the motor windings to earth will indicate the fault in the drop cable, pump or motor. The pump will need to be removed and tests carried out on the motor and cable separately.

Yes - Power available Has the pump controller or protection device tripped out? Follow the instructions for that type of device. It may have saved the pump and motor from damage, the fault may not be present now and pumping may return to normal.
If a protection device is not used external switches like a pressure switch, flow switch of level switch may have not allowed the pump to start. Check the power into and out of the switches. These switches may be temporarily by-passed to test the pump.

If power is available to the pump via the drop cable—is the water pressure increasing or can water flow be heard? A blocked filter or damaged valve may be stopping water flow from the pump. If power is available and water flow or pressure can not be found the next step is to pull the pump and motor from the bore. The motor may be open circuit, the pump may have failed, the drop cable may be open circuit or the pump and motor may be operating and all the pumped water may be leaking from a hole in the pump column.

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