

Remote pumping buyer's guide

Moving water is a requirement on nearly every remote and rural property. We take a look at the different types of pumping systems, and what pumps are on the market

Pumping water is a task that is often necessary on many remote and rural properties. Whether it be for watering stock, plant irrigation, or for providing potable water for the occupants, the pumping systems must be reliable, easy to maintain, and will usually have to be other than mains electricity powered, simply because many rural properties have to supply their own power.

Sometimes, water may need to be pumped from a creek or river, sometimes from a dam, and often, water needs to be drawn up from a well or bore. These tasks all require different pumps, and the amount of water, and the head it needs to be pumped to, all vary from one site to another.

Because of these variations in pumping requirements, there are now many different types of pumps on the market. These include the well-known windmill-powered bore pumps, solar bore pumps, reticulation pumps and pressure pumps. There are also numerous types of each of these categories, making selecting a pump for a particular job a less than simple task.

One type of pump we will not look at in this guide is the 240-volt powered pump. There are so many of these on the market, in so many shapes and sizes, that it would simply be impossible to cover them all, and in most cases, they are unsuitable for remote pumping, as they require AC power to operate, necessitating the use of batteries and inverters, thus increasing system cost and complexity.

Pumps work in a number of different ways. Windmill bore pumps, for

instance, use pistons, buckets or cups to lift the water up inside a plastic or metal tube that runs down inside the bore to below water level.

Then you have electric pumps, which can be either centrifugal, similar to a pump used on a swimming pool, diaphragm, helical rotor or piston. The latter type can be either single or double acting, and are often just a standard windmill-style bore pumping arrangement with an electric motor and gearbox replacing the windmill.

In putting together this guide we found many different pumps, being sold in all sorts of configurations. Some companies will sell a specific pump on its own, while others will sell a package with that pump, some solar panels, a maximiser and wiring harness. This has made it difficult to give accurate prices for some of the pumps, as the costs of the packages vary from supplier to supplier.

What to look for

Things to look for in a pump include the use of non-corrosive fittings and components, particularly stainless steel, as this is very strong and long-lasting.

Many of the bore pumps now use PVC pipe in place of the older galvanised steel pipe, and are not prone to early failure due to corrosion from salty water.

In general, the pumps known as positive displacement pumps will have higher efficiencies than centrifugal types, especially when pumping to high heads, so if getting the most out of your solar panel pumping system is impor-



A Southern Cross windmill pumping system, very common in rural areas in Australia.

tant to you, a positive displacement pump would be best. If you are not sure that the pump you are looking at is this type, ask your supplier.

There are also a few terms that you should understand, including head, lift and flow rate.

Head is how high the pump can push water above it. It is not the total dis-

tance up a hill, only the vertical height component. In a bore pump, it also includes the depth from the pumping head, inside the bore, to the surface.

Lift is sort of the opposite of head. It is generally how far a pump can raise water from below it. A pump's lift rating is usually a lot lower than its head rating, and some pumps cannot lift water at all.

The flow rate is the amount of water that the pump will move over a given time period. For electric pumps, the flow rate depends on several factors, including the amount of electrical input power, the head and lift the pump must deal with and the diameter of the pipes connected to the pump.

Wind-powered pumps are dependent on wind speed, head, lift and pipe diameter.

DC pumps

There are a large variety of pumps made to run on extra-low-voltage DC power supplies. Some are meant to be run from battery systems, while others are run directly from solar panels via a maximiser-style device, which matches the load of the pump motor to the panels.

The pumps usually consist of a DC motor, either electronically commutated (brushless) or brushed, connected to a pump head of some kind.

Some pumps have all of the components in a compact package, such as the Shurflo submersible bore pumps, while others have them mounted separately and coupled via a shaft or belt drive. The Sunergy Mono is an example of this type of pump, using a standard Mono helical rotor pump coupled to a $\frac{1}{3}$ horsepower DC motor.

Circulation pumps

These are used to circulate water through a closed system, such as through a remote coupled solar hot wa-

ter system where the tank is lower than the panels.

They can also be used for many other purposes that do not require high differential pressure across the pump, though many can withstand high system pressures, making them suitable for use in mains pressure systems. They are generally not suited to pumping to high heads.

General purpose pumps

These include all sorts of small and large pumps. They are often used for moving water or other liquids from one place to another, over relatively short distances, and at low pressures and heads. An example of these are bilge pumps, which are often used to move water from one tank to another, or in water fountains and low-pressure irrigation. Bilge pumps are available from marine supply shops, and are not included in this guide, as they are not designed to run continuously.

Pressure pumps

These are used to provide the equivalent of mains pressure water to a house from a water tank, dam or other reservoir.

Pressure pumps usually come complete with a pressure switch that allows them to run only when the system pressure drops below a certain level. They are normally used in conjunction with a small pressure vessel or tank that helps maintain an even system pressure, and acts as a pressure reservoir (the pressure vessel contains a 'bubble' of compressed air).

Bore pumps

Submersible bore pumps are generally cylindrical in shape, with a wire mesh screen intake at one end. They are mounted inside the bore itself, and can pump water at relatively high flows and

to high heads. They usually pump up to a water tank or dam for storage.

Most bore pumps can pump silty water without damage, though, as with many pumping systems, regular maintenance will need to be carried out.

Another type of bore pump is the remotely coupled piston pump, where a pump at the bottom of the bore is connected to the driving motor at the surface by rods and couplings.

Wind-powered pumps

You can pump water with the wind in a number of different ways. The most well-known is the use of a low-speed, high torque wind turbine to drive a mechanical pump directly at the base of the turbine tower. The Oasis windmill is an example of this type of pumping system. This is a tried and proven pumping method, and pumps of this type have been providing water to farms and remote buildings around the world for over a century.

Another way of pumping with the wind is to use an electricity-producing wind turbine to drive an electric pump.

A third method is to use a wind turbine to compress air, which can then be used to drive a pump of some sort. Two examples of home-built pumps of this type appeared in issue 66 of *ReNew*.



This floating pump consists of a Mono Sunray pump mounted on a floating pontoon.

Water-driven pumping

It may sound strange, but running water can indeed be used to pump water, and to quite high heads.

The Glockemann ram pump is an example of such a system. A relatively large flow at low pressure, such as the diverted flow from a river or stream, is used to pump a much lower volume of water to much higher pressure, so that it may be pumped to a high head.

Maximisers

A maximiser, or maximum power point tracker, is a small electronic device used with solar panels that enable a pump or motor to keep operating in conditions of cloud and low light levels.

Many pumps will simply stop when a cloud causes the solar panel output to reduce. This happens because the pump motor places too-high a load on the panels, and their voltage drops dramatically, thus reducing their output power. The maximiser works by preventing this, and will allow the pump to keep operating, thus pumping more water than it otherwise would.

If you are installing a solar-powered pumping system, then you really should consider a maximiser in the system. Most pumping suppliers have them, and they range in price from less than \$100 to over

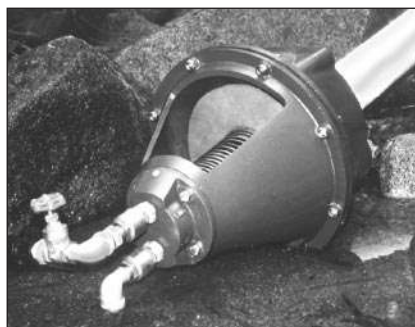
\$1000, depending on their power handling capabilities and features.

What's available

The pumps are listed in three separate tables—solar and DC pumps, wind-powered pumping systems, and water-powered pumps.

Many of the pumps listed in table two actually come as pumping packages, including solar panels, and sometimes a maximiser-style controller. If panels are included, this is detailed in the comments column in the table.

The wind-powered pump table also includes those systems that just consist of a pump pipe, rods and buckets etc, without a wind turbine or tower. These can usually be attached to any standard water pumping windmill, but can also be used in conjunction an electric motor and solar panel system. ✘



Using water to pump water! The Glockemann Peck pump does just that.

Contact details

Below is a list of manufacturers and distributors. Due to space constraints, it is not possible to list all of their dealers. We suggest that you contact those companies listed below, or your local solar dealer and see what they can supply.

Choice Electric Co, 3 Prospect St Bowen Hills Qld 4006, ph: 1800 074 007, email: choice@powerup.com.au, www: www.choiceelectric.com.au

Davy Industries, RMB 1036, Barnawartha Nth VIC 3688, ph:(02)6026 7711.

Grundfos Pumps P/L, unit 3/2 Sarton Rd Clayton VIC 3168, ph:(03)9561 0111, fax:(03)9561 0211.

Laing: Solar Charge Pty Ltd, 115 Martin St Brighton VIC 3186, ph:(03)9596 1974, fax:(03)9596 1389.

LVM: Quirk's Victory Light Co PO Box 440, Rose Bay NSW 2029, ph:(02)9371 6600, fax:(02)9371 6623

March: Solar Charge Pty Ltd, 115 Martin St Brighton VIC 3186, ph:(03)9596 1974, fax:(03)9596 1389.

Mondesh Pumps: New Mill Solar P/L, 2/6 Duffy St, Burwood VIC 3125, ph:(03)9888 9953, fax:(03)9888 9954.

Mono pumps: Mono Pumps Pty Ltd, 338-348 Lower Dandenong Rd, Mordialloc VIC 3195, ph:(03)9580 5211, fax:(03)9580 6659.

OASE: Quirk's Victory Light Co PO Box 440, Rose Bay NSW 2029, ph:(02)9371 6600, fax:(02)9371 6623

Shurflo Pumps, 27 Treforest Drive, Clayton VIC 3168, ph:(03)9562 6162, www.sureflo.com

Solarjack: WD Moore and Co, ph:1800 654 766

Solar Energy Systems Pty Ltd, 3/81 Guthrie St, Osborne Park WA 6017, ph:(08)9204 1521.

Southern Cross: Southern Cross machinery Australia, ph: 131 786.

Sunergy Mono Mini: Solar Charge Pty Ltd, 115 Martin St Brighton VIC 3186, ph:(03)9596 1974, fax:(03)9596 1389.

Thumpa Pumpa: Southwest Pumps N Solar, 46 Wyndham St, Roma QLD 4455, ph:(07)4622 4528.

Table 1. Wind-powered pumps and pump heads

Make	Model	Pump type	Blade diameter	Tower	Maximum head (m)	Used for	Comments	Warranty	Price
New Mill Solar	Mondesh	multi-cup PVC bore pump	NA	NA	60	Bore pumping	Multi-cup system. Designed to be self-cleaning. Available in 2, 2.5 and 3 inch versions.	1 year	POA
Oasis		¾" to 1½" double acting bore pump	1350mm	3, 4.5m lattice	80m	Bore pumping	Four different pump sizes and gear ratios available.	1 year	\$1,450 (3m tower) \$1,800 (4.5m tower)
Southern Cross	IZ series	Stainless steel piston pump	1.8m to 4.3m	6m to 18m	up to 135m	Bore pumping	Five different rotor sizes, six different tower heights and two different tower types available.	3 years	POA
Southwest Pumps N Solar	PolyRod	Windmill column and rod	NA	NA	60	Bore pumping	Used in conjunction with standard bore pump. Replaces galvanised steel pipes and rods.	1 year	POA
	Flexi-column	Windmill column and rod	NA	NA	52		Flexible, one-piece bore pipe. Used in conjunction with standard bore pump. Replaces galvanised steel pipes and rods. Standard or heavy duty units.		POA

Table 2. DC pumps and pumping packages

Make	Model	Pump type	Voltages	Max. current	Solar panels	Flow (L) at head (m)	Maximum head (m)	Used for	Comments	Warranty	Price
Choice	Floating solar pump	Shurflo positive displacement	24	—	2 x 53 or 2 x 80 watt	up to 50,000L/day	up to 22	Pumping from dams, streams and wells	General purpose pontoon pump, supplied in various packages with Solarex modules and pump controller.	1 year	POA
Davy Industries	Solar piston pump	Chang Seng piston pump	29	—	up to 200 watts	12,000L/day @ 12m	30m	Pumping from dams, streams and wells	8m suction lift capacity @ sea level. Available on own or as a kit.	1 year	POA
			58	—	up to 300 watts	10,300L/day @ 36m	36m				
Grundfos	400	Multistage centrifugal	45, 60, 75, 90	—	150 to 400 watt array	up to 40,000L/day	up to 40	General pumping and supply	All stainless steel construction. PV or battery power. Built-in fault monitoring. Eleven different pump/motor combinations.		POA
	SP series	See comments		—	350 to 2000 watt array	up to 24,000L/Hr	up to 120		All stainless steel construction. PV or battery power. Built-in fault monitoring. Six different pump combinations available.		
Laing		Magnetic drive impeller	12	0.25	—	up to 420L/Hr	—	Circulation pumping	Suitable to 100°C. Can be used for hot water systems.	1 year	\$336
LVM	Congo	Centrifugal submersible and inline pump	12, 24	6 @ 12V	—	2200L/Hr	14psi	Fresh and sea water transfer, diesel transfer	Small diameter inline pump suitable for general use	150 hours of pumping	\$125, \$135
	Amazon			4.5 @ 12V		1100L/Hr	14psi		Small diameter inline pump suitable for general use. Temperatures to 80°C.		\$100, \$110
	Nile		2.5	764L/Hr		11psi		\$79			
	Niagara		2.8	14psi		Fresh and sea water transfer	Small diameter inline pump suitable for general use. Temperatures to 80°C.	\$65			
	Zambezi	Centrifugal inline	12, 24	4.5 @ 12V		1100L/Hr	15psi	Fresh water transfer	Water temperature to 80°C		\$92, \$100
	Missouri	flexible impeller inline	12, 24	9 @ 12V		1100L/Hr	16psi	Diesel, fresh and sea water transfer	Temperatures from 4 to 60°C. Cannot run dry for more than 30 seconds		\$275, \$290
March	809BR	Magnetic drive impeller	12	1.1	—	up to 900L/Hr	—	Circulation pumping	Suitable to 120°C. Can be used for hot water systems.	1 year	\$420
New Mill Solar	Big Red	Bore pump head	24	—	—	up to 1200L/Hr	60	Bore pumping	Designed to be coupled with the Mondesh PVC bore pump or other bore pumps	1 year	from \$3,357
Mono	Sun Sub series	Submersible helical rotor	180	—	2 to 21 x 60 watt	up to 90,000L/day	120	Bore pumping	Comes with fixed or tracking solar array and controller. Has 240V AC input.	1 year	\$6,000 to \$20,000
	Sun Ray series	Helical rotor	24	—	2, 3 or 4 panels	up to 17,300L/day	30	Low-head surface water transfer	Available in 2, 3 and 4 solar module packages - available in surface mount or with floating pontoon.		POA
	Sun Rotor		160	—	2 to 24 panels	up to 140,000L/day	100	High flow, long distance pumping	Slow-speed pump for long life. 240V AC input option.		
	Sun Downer	160	—	Borehole pumping				Surface mount motor with inlineshaft drive bore pump. 240V AC input option.			
OASE	Aquasolar 700	Centrifugal	12 - 24	8 watts	—	720L/Hr @ 24V	2	Fountains and water features	Also available as a package with solar panel, fountain and nozzels	3 years	\$255
	Aquasolar 1500			17 watts	—	1500L/Hr @ 24V	3				\$338
Shurflo	2088 series	Diaphragm	12, 24	4	—	up to 640L/Hr	—	Mains pressure pumping	Comes complete with filter and pressure vessel. Designed for intermittent use.	1 year	\$204
	8000 series	Diaphragm	12	7.2	—	up to 390L/Hr	40	General delivery	Designed for intermittent use.	1 year	\$160
	9300 series	Submersible diaphragm	12, 24	4.1	1 or 2 x 53 or 2 x 80 watt	443L/hr @ 6m 310L/hr @ 70m	70	General bore pumping	Replacement of diaphragm every 12 months recommended. Available as a complete package.	1 year	\$1,250
Solar Energy Systems	Poly-Piston-Pump	Double-acting piston pump	30, 60	—	2 x 32 to 6 x 90	up to 36,000L/day	54	Bore and transfer pumping	Available in several pump sizes, with many different configurations of pump and solar panel combinations.	2 years	POA
Solarjack	SDS series	Submersible diaphragm	12 to 30	—	up to 2 x 83 watt	up to 840L/Hr	up to 40	General and bore pumping	Can be used in open vented or pressurised system. Available to suit 4 or 5 inch bores.	1 year	POA
Southwest Pumps N Solar	Thumpa Pumpa	Piston pump	58	—	2 x 60 watt to 8 x 60 watt	up to 28,000L/day	up to 48	General water pumping	A complete package available in 6 different versions to suit requirements. Uses AERL controller.	1 year	\$3950 to \$7850
Sunergy	Mono Mini	Helical rotor	12, 24	—	2 x 60 or 2 x 83 watt	6600L/day @ 5m	25	General moderate head pumping	Solar panels included. Good for silted and sandy water. Toothed belt drive.	1 year	\$2,500 to \$2,700 ex tax
WD Moore	Sola-Flo	Positive disp. bore pump	48	—	4 x 64 watt	up to 10,000L/day	up to 200	Bore pumping	Includes low water level sensing, stainless steel construction. Fits 4 inch bore casing.	1 year	POA
	SF series	Positive disp. surface pump	12, 24	—	2 x 64 to x 64 watt	up to 16,000L/day	up to 30	Pumping from dams and lakes	Capable of lifting water 4.5 metres. Low water level sensing built in. Also available as a floating pontoon system.		

Table 3. Water-powered pumps

Make	Model	Pump type	Pumping Flow rate	Supply fall	Supply flow rate	Maximum head (m)	Used for	Comments	Warranty	Price
Glockemann Peck	160 Water Dragon	Diaphragm piston pump	up to 5,000L/day	0.5 to 2m 1.5L/sec or more	1.5L/sec minimum	100	General water supply pumping	Available with 35, 48 and 60mm pump bores. Flow rate depends on supply head.	1 year	\$990
	320 Oasis		up to over 22,100L/day	0.4 to 2m		200		Available with 35, 48, 60, 73, 98 and 124mm pump bores. Flow rate depends on supply head.		\$1950